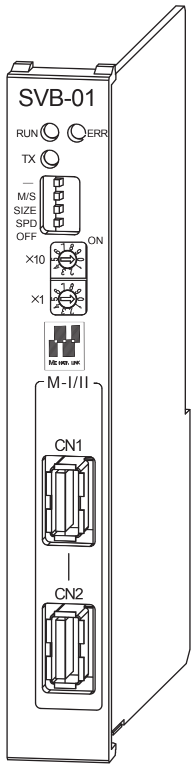
YASKAWA

Machine Controller MP2000 Series

Built-in SVB/SVB-01 Motion Module

USER'S MANUAL

Model: JAPMC-MC2100(-E), JEPMC-MP2400-E
JAPMC-MC2102-E, JAPMC-MC2140(-E),
JAPMC-MC2142-E, JEPMC-MP2300(-E),
JEPMC-MP2300S-E, JAPMC-MC2310(-E)
JEPMC-MP2310-E



MANUAL NO. SIEP C880700 33I

Using this Manual

Read this manual to ensure correct usage of the MP2000-series Machine Controller (hereinafter referred to as Machine Controller unless otherwise specified) and the SVB-01 Module. Keep this manual in a safe place so that it can be referred to whenever necessary.

■ Manual Configuration

Read the chapters of this manual as needed.

Chapter		Selecting Models and Peripheral Devices	System Design	Panel Configuration and Wiring	Trial Operation	Maintenance and Inspection
1	Overview	✓				
2	Settings and Installation	✓		✓		✓
3	Self-configuration and Created Definition Files		✓		✓	
4	Motion Parameters		✓		✓	
5	Motion Parameter Setting Examples		✓		✓	
6	Motion Commands		✓		✓	
7	Switching Commands during Execution		✓		✓	
8	Control Block Diagrams		✓		✓	
9	Absolute Position Detection		✓		✓	
10	Inverter Operation		✓		✓	
11	Utility Functions		✓		✓	✓
12	Troubleshooting		✓		✓	✓

■ Symbols Used in this Manual

The symbols used in this manual indicate the following type of information.

- This symbol is used to indicate important information that should be memorized or minor precautions, such as precautions that will result in alarms if not heeded.

■ MPE720 Engineering Tool Version Number

In this manual, the operation of MPE720 is described using screen captures of MPE720 version 7.
For this reason, the screen captures and some descriptions may differ for MPE720 version 5 or version 6.

■ Terms Used to Describe "Torque"

Although the term "torque" is commonly used when describing rotary servomotors and "force" or "thrust" are used when describing linear servomotors, this manual uses "torque" when describing both (excluding parameters).

■ Indication of Reverse Signals

In this manual, the names of reverse signals (ones that are valid when low) are written with a forward slash (/) before the signal name, as shown in the following example:

Notation Examples

- $\overline{\text{S-ON}}$ = /S-ON
- $\overline{\text{P-CON}}$ = /P-CON

■ Related Manuals

The following table lists the manuals relating to the MP2000-series Machine Controllers. Refer to these manuals as required.

Manual Name	Manual Number	Contents
Machine Controller MP210□/MP210□M User's Manual Design and Maintenance	SIEP C880700 01	Describes how to use the MP210□ and MP210□M Machine Controllers.
Machine Controller MP2101T/MP2101TM User's Manual	SIEP C880712 00	Describes how to use the MP2101T and MP2101TM Machine Controllers.
Machine Controller MP2200 User's Manual	SIEP C880700 14	Describes how to use the MP2200 Machine Controller and the modules that can be connected.
Machine Controller MP2300 Basic Module User's Manual	SIEP C880700 03	Describes how to use the MP2300 Basic Module and the modules that can be connected.
Machine Controller MP2310 Basic Module User's Manual	SIEP C880732 01	Describes how to use the MP2310 Basic Module and the modules that can be connected.
Machine Controller MP2300S Basic Module User's Manual	SIEP C880732 00	Describes how to use the MP2300S Basic Module and the modules that can be connected.
Machine Controller MP2000 Series Machine Controller System Troubleshooting Manual	SIEP C880700 40	Describes the troubleshooting of the MP2000-series Machine Controller.
Machine Controller MP900/MP2000 Series User's Manual Ladder Programming	SIEZ-C887-1.2	Describes the instructions used in MP900/MP2000 ladder programming.
Machine Controller MP2000 Series User's Manual for Motion Programming	SIEP C880700 38	Describes the instructions used in MP2000 motion programming.
Machine Controller MP2000/MP3000 Series Engineering Tool MPE720 Version 7 USER'S MANUAL	SIEP C880761 03	Describes how to install and operate the programming tool MPE720 version 7 for MP2000-series and MP3000-series Machine Controller.
Engineering Tool for MP2000 Series Machine Controller MPE720 Version 6 User's Manual	SIEP C880700 30	Describes how to install and operate the programming tool MPE720 version 6 for MP2000-series Machine Controllers.
Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual	SIEP C880700 05	Describes how to install and operate the MP900/ MP2000 series programming system (MPE720 Ver.5).
Machine Controller MP2000/MP3000 Series Distributed I/O Module User's Manual MECHATROLINK-II	SIEP C880732 13	Describes MECHATROLINK distributed I/O for MP2000/MP3000-series Machine Controllers.

■ Copyrights

- MECHATROLINK is a trademark of the MECHATROLINK Members Association.
- Other product names and company names are the trademarks or registered trademarks of the respective company. “TM” and the ® mark do not appear with product or company names in this manual.

Safety Information

The following conventions are used to indicate precautions in this manual. These precautions are provided to ensure the safe operation of the MP2000-series Machine Controller and connected devices. Information marked as shown below is important for the safety of the user. Always read this information and heed the precautions that are provided. The conventions are as follows:

⚠ WARNING	Indicates precautions that, if not heeded, could possibly result in loss of life, serious injury, or property damage.
⚠ CAUTION	Indicates precautions that, if not heeded, could result in relatively serious or minor injury, or property damage. If not heeded, even precautions classified under ⚠ CAUTION can lead to serious results depending on circumstances.
PROHIBITED	Indicates prohibited actions. Specific prohibitions are indicated inside . For example, indicates prohibition of open flame.
MANDATORY	Indicates mandatory actions. Specific actions are indicated inside . For example, indicates mandatory grounding.

Safety Precautions

The following precautions are for checking products on delivery, storage, transportation, installation, wiring, operation, inspection, and disposal. These precautions are important and must be observed.

■ General Precautions

⚠ WARNING
• Before connecting the machine and starting operation, ensure that an emergency stop procedure has been provided and is working correctly. There is a risk of injury. • Do not touch anything inside the Machine Controller. There is a risk of electrical shock. • Always keep the front cover attached when power is being supplied. There is a risk of electrical shock. • Observe all procedures and precautions given in this manual for trial operation. Operating mistakes while the servomotor and machine are connected may damage the machine or even cause accidents resulting in injury or death. • Do not remove the front cover, cables, connectors, or options while power is being supplied. There is a risk of electrical shock. • Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables. There is a risk of electrical shock, operational failure or burning of the Machine Controller. • Do not attempt to modify the Machine Controller in any way. There is a risk of injury or device damage. • Do not approach the machine when there is a momentary interruption to the power supply. When power is restored, the Machine Controller and the device connected to it may start operation suddenly. Provide safety measures in advance to ensure human safety in the event that operation restarts suddenly. There is a risk of injury. • Do not allow installation, disassembly, or repairs to be performed by anyone other than specified personnel. There is a risk of electrical shock or injury.

■ Storage and Transportation

⚠ CAUTION

• Do not store or install the Machine Controller in the following locations.
There is a risk of fire, electrical shock, or device damage.
  • Direct sunlight
  • Ambient temperature exceeds the storage or operating conditions
  • Ambient humidity exceeds the storage or operating conditions
  • Rapid changes in temperature or locations subject to condensation
  • Corrosive or flammable gas
  • Excessive dust, dirt, salt, or metallic powder
  • Water, oil, or chemicals
  • Vibration or shock
• Do not overload the Machine Controller during transportation.
There is a risk of injury or an accident.
• If disinfectants or insecticides must be used to treat packing materials such as wooden frames, pallets, or plywood, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.
Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.
If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.

Installation

⚠ CAUTION

- Never use the Machine Controller in locations subject to water, corrosive atmospheres, or flammable gas, or near burnable objects.
  There is a risk of electrical shock or fire.
- Do not step on the Machine Controller or place heavy objects on the Machine Controller.
  There is a risk of injury.
- Do not block the air exhaust port or allow foreign objects to enter the Machine Controller.
  There is a risk of element deterioration inside, an accident, or fire.
- Always mount the Machine Controller in the specified orientation.
  There is a risk of an accident.
- Do not subject the Machine Controller to strong shock.
  There is a risk of an accident.

Wiring

⚠ CAUTION

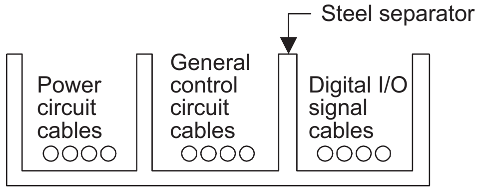
- Check the wiring to be sure it has been performed correctly.
  There is a risk of motor overrun, injury, or an accident.
- Always use a power supply of the specified voltage.
  There is a risk of burning.
- In places with poor power supply conditions, take all steps necessary to ensure that the input power supply is within the specified voltage range.
  There is a risk of device damage.
- Install breakers and other safety measure to provide protection against shorts in external wiring.
  There is a risk of fire.
- Provide sufficient shielding when using the Machine Controller in the following locations.
  There is a risk of device damage.
  - Noise, such as from static electricity
  - Strong electromagnetic or magnetic fields
  - Radiation
  - Near to power lines
- When connecting the battery, connect the polarity correctly.
  There is a risk of battery damage or explosion.
- Only qualified safety-trained personnel should replace the battery.
  If the battery is replaced incorrectly, machine malfunction or damage, electric shock, or injury may result.
- When replacing the battery, do not touch the electrodes.
  Static electricity may damage the electrodes.

■ Selecting, Separating, and Laying External Cables

⚠ CAUTION

- Consider the following items when selecting the I/O signal lines (external cables) to connect the Machine Controller to external devices.
  - Mechanical strength
  - Noise interference
  - Wiring distance
  - Signal voltage, etc.
- Separate the I/O signal lines from the power lines both inside and outside the control box to reduce the influence of noise from the power lines.
  If the I/O signal lines and power lines are not separated properly, malfunctioning may result.

Example of Separated External Cables



■ Maintenance and Inspection Precautions

⚠ CAUTION

- Do not attempt to disassemble the Machine Controller.
  There is a risk of electrical shock or injury.
- Do not change wiring while power is being supplied.
  There is a risk of electrical shock or injury.
- When replacing the Machine Controller, restart operation only after transferring the programs and parameters from the old Module to the new Module.
  If the data has not been transferred to the new module before the operation of the machine controller starts, damage to the device may result.

■ Disposal Precautions

⚠ CAUTION

- Dispose of the Machine Controller as general industrial waste.

■ General Precautions

Observe the following general precautions to ensure safe application.

- The products shown in illustrations in this manual are sometimes shown without covers or protective guards. Always replace the cover or protective guard as specified first, and then operate the products in accordance with the manual.
- The drawings presented in this manual are typical examples and may not match the product you received.
- If the manual must be ordered due to loss or damage, inform your nearest Yaskawa representative or one of the offices listed on the back of this manual.

Warranty

(1) Details of Warranty

■ Warranty Period

The warranty period for a product that was purchased (hereinafter called "delivered product") is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

■ Warranty Scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the warranty period above. This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.
This warranty does not cover failures that result from any of the following causes.

1. Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
2. Causes not attributable to the delivered product itself
3. Modifications or repairs not performed by Yaskawa
4. Abuse of the delivered product in a manner in which it was not originally intended
5. Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
6. Events for which Yaskawa is not responsible, such as natural or human-made disasters

(2) Limitations of Liability

1. Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
2. Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
3. The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
4. Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

(3) Suitability for Use

1. It is the customer's responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
2. The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
3. Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
   - Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals
   - Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
   - Systems, machines, and equipment that may present a risk to life or property
   - Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
   - Other systems that require a similar high degree of safety
4. Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
5. The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
6. Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

(4) Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

Contents

1

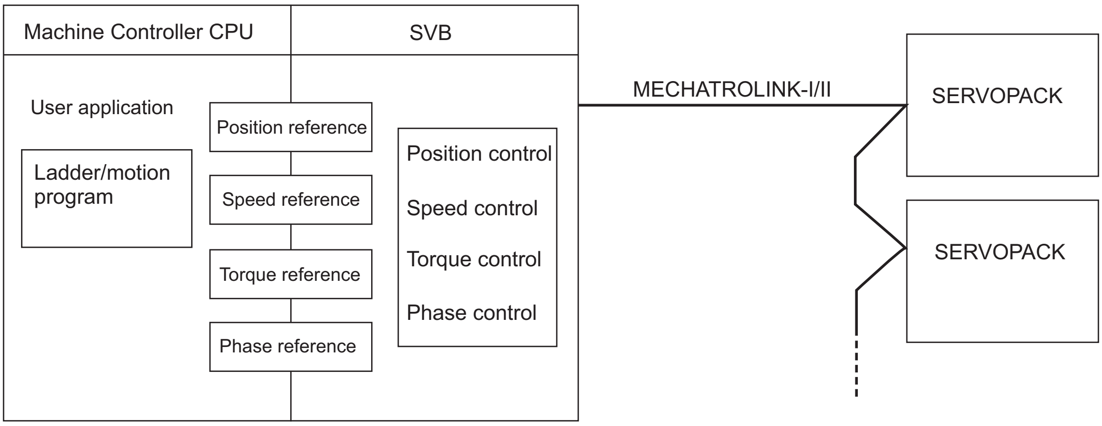
Overview

This chapter provides an overview and the features of the SVB Module.

1.1 SVB Module Overview and Features

1.1.1 SVB Modules

The SVB Module is a motion module used to control SERVOPACKs, stepping motor drivers, inverters, distributed I/O devices, etc. via MECHATROLINK interface MECHATROLINK-I or -II.
The MECHATROLINK-II enables position, speed, torque, and phase control for highly accurate synchronized control. In addition, sophisticated machine operations can be performed by switching the control mode while the axis is moving.



1.1.2 Built-in SVB and Slot-mounting Optional SVB

The SVB Modules are of two types: The built-in SVB (hereinafter referred to as Built-in SVB) and the slot-mounting optional SVB (hereinafter referred to as Optional SVB)
A built-in SVB Module is incorporated in the MP2000-series Machine Controller.*
The Optional SVB is one of the optional modules for the Machine Controller. The SVB-01 Module is an Optional SVB.

* The MP2100M and MP2101M have the SVB board equipped with the SVB function. This manual describes the SVB board as the built-in SVB.

1.1.3 Features

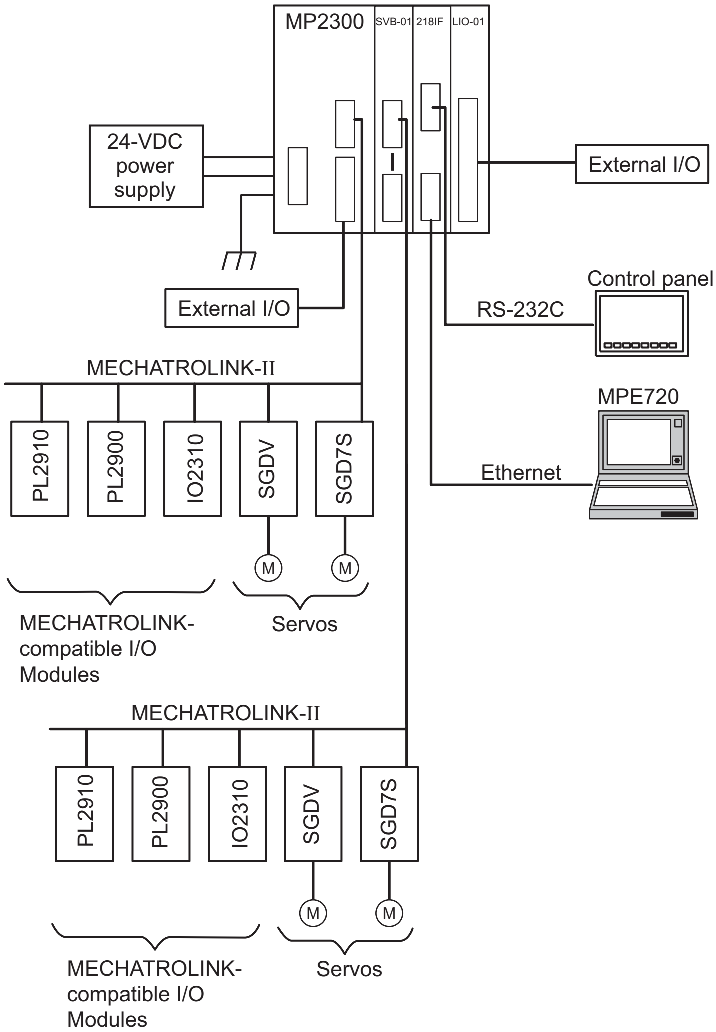
- Up to 21 slave stations can be connected to a single Module (the SERVOPACKs can be connected up to 16 axes).

Machine Controller	Number of SVB-01 Modules which can be Mounted
MP2100M MP2101M MP2101TM	If an extension rack is used, up to 14 SVB-01 Modules can be mounted in optional slots.
MP2200	If an extension rack is used, up to 16 SVB-01 Modules can be mounted in optional slots.
MP2300	Up to 2 SVB-01 Modules can be mounted in optional slots.
MP2310	Up to 3 SVB-01 Modules can be mounted in optional slots.
MP2300S	One SVB-01 Module can be mounted in optional slot.
MP3100 (16 axes) MP3300/CPU-301 (16 axes) MP3300/CPU-302 (16 axes)	If an extension rack is used, up to 15 SVB-01 Modules can be mounted in optional slots.
MP3100 (32 axes) MP3200 MP3300/CPU-301 (32 axes) MP3300/CPU-302 (32 axes)	If an extension rack is used, up to 14 SVB-01 Modules can be mounted in optional slots.

- Synchronization between Modules is also supported, making it suitable for both synchronous control and interpolation across Modules.
- An SVB-01 Module used as a slave can be connected to a host controller equipped with MECHATROLINK communication functions.
- Self-configuration enables automatic allocation of setting data for the slave device that is connected to MECHATROLINK.
- SERVOPACK parameters can be managed over networks.

1.1.4 System Configuration Example

The following diagram shows a system configuration example.



- Use the specified cables and connectors. Refer to *1.1.5 (4) Cables* to select appropriate cables and connectors to connect each device.
- The SERVOPACK models that can be connected through MECHATROLINK-I differ from those connected through MECHATROLINK-II. Refer to *1.1.5 Devices and Cables Connectable to MECHATROLINK* to select appropriate SERVOPACK models for the MECHATROLINK interface to be used.
- If both MECHATROLINK-I (4 Mbps) compatible devices and MECHATROLINK-II (10 Mbps) compatible devices are connected in a system, make the settings in accordance with MECHATROLINK-I specifications.
- When connecting a servo to an SVB Module via MECHATROLINK, connect signals such as overtravel, homing deceleration switch, and external latch to the servo. Refer to the relevant SERVOPACK manual for details on the connections.
- When connecting Σ-II series SERVOPACKs (SGDH+NS100 or SGDH+NS115), do not connect a hand-held type digital operator and SigmaWin+. If connected, alarms A.95 (command warning) and A.ED (execution not completed) will occur for the commands sent from the SVB Module, and normal operation will be interrupted. If a digital operator or SigmaWin+ must be connected to a Σ-II series SERVOPACK, disconnect the SERVOPACK from the SVB Module.

Overview

1

1.1.5 Devices and Cables Connectable to MECHATROLINK

The devices and standard cables that are compatible with MECHATROLINK and can be connected to the SVB Module are listed below.

(1) Compatible SERVOPACKs

Model Number	Details	MECHATROLINK-I	MECHATROLINK-II
SGD-□□□N SGDB-□□AN	MECHATROLINK-I-compatible AC SERVOPACK	Yes	No
SGDH-□□□E + JUSP-NS100	Σ-II Series SGDH SERVOPACK + NS100 MECHATROLINK-I Application Module	Yes	No
SGDH-□□□E + JUSP-NS115	Σ-II Series SGDH SERVOPACK + NS115 MECHATROLINK-II Application Module	Yes	Yes
SGDS-□□□1□□	Σ-III-series SGDS SERVOPACKs with MECHATROLINK-II Communications References	Yes	Yes
SJDE-□□AN□	JUNMA series SJDE SERVOPACKs with MECHATROLINK-II Communications References	No	Yes
SGDV-□□□□1□□	Σ-V-series SGDV SERVOPACKs with MECHATROLINK-II Communications References	Yes	Yes
SGD7S-□□□□10□	Σ-7-series SGD7S SERVOPACKs with MECHATROLINK-II Communications References	Yes	Yes

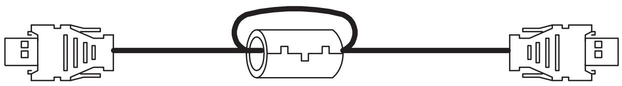
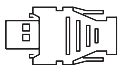
(2) Compatible Inverters

Model Number	Details	MECHATROLINK-I	MECHATROLINK-II
CIMR-G7A□ + SI-T	Varispeed G7 Inverter + MECHATROLINK-II Communication Option Card	Yes	Yes
CIMR-F7A□ + SI-T	Varispeed F7 Inverter + MECHATROLINK-II Communication Option Card	Yes	Yes
CIMR-V7AA□ + SI-T/V7	Varispeed V7 Inverter + MECHATROLINK-II Communication Option Card	Yes	Yes
CIMR-A□ + SI-T3	High Performance Vector Control Drive A1000 + MECHATROLINK-II Communication Option Card	Yes	Yes
CIMR-V□ + SI-T3/V	Compact Vector Control Drive V1000 + MECHATROLINK-II Communication Option Card	Yes	Yes

(3) Compatible Modules

Model Number	Details	MECHATROLINK-I	MECHATROLINK-II
JEPMC-IO350	64-point I/O Module 24 VDC, 64 inputs, 64 outputs (sink)	Yes	No
JAMSC-120DDI34330	DC Input Module 12/24 VDC, 16 inputs	Yes	No
JAMSC-120DDO34340	DC Output Module 12/24 VDC, 16 outputs	Yes	No
JAMSC-120DAI53330	AC Input Module 100 VAC, 8 inputs	Yes	No
JAMSC-120DAI73330	AC Input Module 200 VAC, 8 inputs	Yes	No
JAMSC-120DAO83330	AC Output Module 100/200 VAC, 8 outputs	Yes	No
JAMSC-120DRA83030	Relay Module Wide voltage range relay contacts, 8 contact outputs	Yes	No
JAMSC-120AVI02030	A/D Module Analog inputs, -10 to 10 V, 4 channels	Yes	No
JAMSC-120AVO01030	D/A Module Analog outputs, -10 to 10 V, 2 channels	Yes	No
JAMSC-120EHC21140	Counter Module Reversible counter, 2 channels	Yes	No
JAMSC-120MMB20230	Pulse Output Module, Pulse output, 2 channels	Yes	No
JEPMC-IO2310(-E)	64-point I/O Module 24 VDC, 64 inputs, 64 outputs (sink)	Yes	Yes
JEPMC-IO2330(-E)	64-point I/O Module 24 VDC, 64 inputs, 64 outputs (source)	Yes	Yes
JEPMC-PL2900(-E)	Counter Module Reversible counter, 2 channels	Yes	Yes
JEPMC-PL2910(-E)	Pulse Output Module Pulse output, 2 channels	Yes	Yes
JEPMC-AN2900(-E)	A/D Module Analog inputs, -10 to 10 V, 4 channels	Yes	Yes
JEPMC-AN2910(-E)	D/A Module Analog outputs, -10 to 10 V, 2 channels	Yes	Yes
JAPMC-IO2900-E	DC Input Module 24 VDC, 16 inputs	Yes	Yes
JAPMC-IO2910-E	DC Output Module 24 VDC, 16 outputs	Yes	Yes
JAMSC-IO2920-E	8-point I/O Module 24 VDC, 8 inputs, 8 outputs	Yes	Yes
JAPMC-IO2950-E	Relay Module Wide voltage range relay contacts, 8 contact outputs	Yes	Yes
AB023-M1	MECHATROLINK Bit decentralization I/O terminal (by Anywire Corporation)	Yes	Yes
JAPMC-MC2310(-E)	SVB-01 Motion Module	Yes	Yes
JEVSA-YV250(-E)	MYVIS YV250 Machine Vision System	Yes	Yes
JEVSA-YV260-E	MYVIS YV260 Machine Vision System	Yes	Yes
JEPMC-REP2000(-E)	MECHATROLINK-II repeater	Yes	Yes
JEPMC-MC400	MP940 Machine Controller	Yes	No

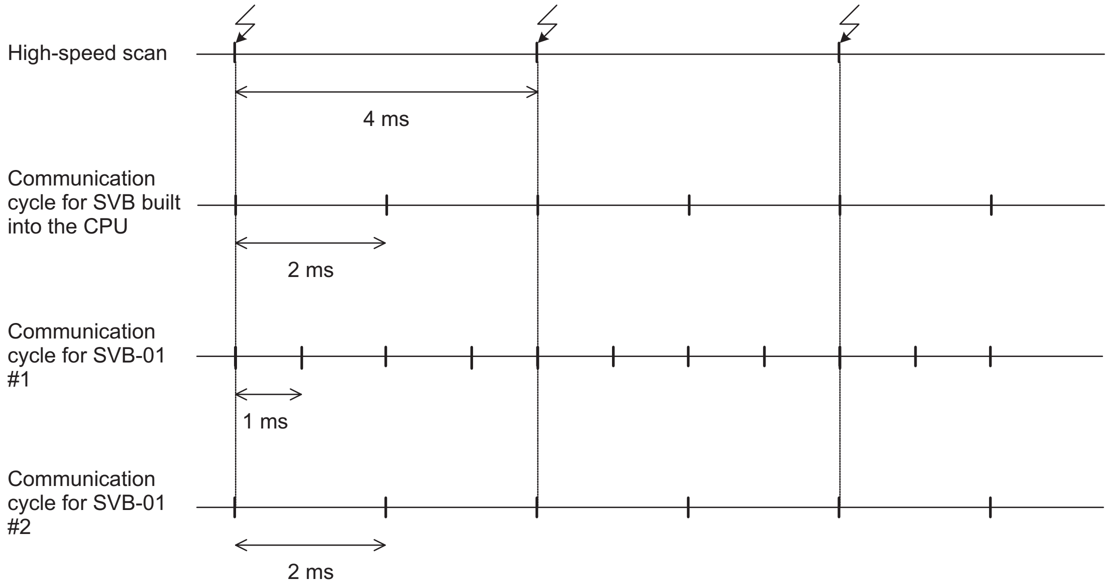
(4) Cables

Name and Specification	Model Number	Length
MECHATROLINK Cable MECHATROLINK Connector – MECHATROLINK Connector 	JEPMC-W6002-A5-E	0.5 m
	JEPMC-W6002-01-E	1 m
	JEPMC-W6002-03-E	3 m
	JEPMC-W6002-05-E	5 m
	JEPMC-W6002-10-E	10 m
	JEPMC-W6002-20-E	20 m
	JEPMC-W6002-30-E	30 m
	JEPMC-W6002-40-E	40 m
	JEPMC-W6002-50-E	50 m
MECHATROLINK Cable MECHATROLINK Connector – MECHATROLINK Connector (with Ferrite Core) 	JEPMC-W6003-A5-E	0.5 m
	JEPMC-W6003-01-E	1 m
	JEPMC-W6003-03-E	3 m
	JEPMC-W6003-05-E	5 m
	JEPMC-W6003-10-E	10 m
	JEPMC-W6003-20-E	20 m
	JEPMC-W6003-30-E	30 m
	JEPMC-W6003-40-E	40 m
	JEPMC-W6003-50-E	50 m
Terminator 	JEPMC-W6022-E	–

1.1.6 Synchronization between Modules

(1) Overview

The Machine Controllers have a function that can synchronize hardware between the CPU and an optional module. This function enables MECHATROLINK communications in synchronization with high-speed scans. As a result, synchronization between a built-in SVB Module and an SVB-01 Module, or among multiple SVB-01 Modules, can be enabled.



When synchronized mode is used, the start of the high-speed scan and the various communication cycles are synchronized. This means that commands from the high-speed scan will be sent at consistent points in communication cycle processing and simplifies distribution processing for interpolation commands.

(2) Conditions Under Which Synchronization Is Possible

The following table shows the combinations of high-speed scan times and MECHATROLINK communication cycles that allow synchronization between modules in the synchronization mode.

High-speed scan (RTC: 0.5 ms)	MECHATROLINK Communication Cycle			
	0.5 ms	1 ms	1.5 ms	2 ms
1.0 ms	Yes	Yes	–	Yes
1.5 ms	Yes	–	Yes	–
2.0 ms	Yes	Yes	–	Yes
2.5 ms	Yes	–	–	–
3.0 ms	Yes	Yes	Yes	–
3.5 ms	Yes	–	–	–
4.0 ms	Yes	Yes	–	Yes
4.5 ms	Yes	–	Yes	–
5.0 ms	Yes	Yes	–	–
5.5 ms	Yes	–	–	–
6.0 ms	Yes	Yes	Yes	Yes
:				

(3) Timing At Which Modules Are Synchronized

Modules are automatically synchronized when the power supply is turned OFF and ON again.

Overview

1

(4) Operation when High-speed Scan Cycle Is Changed

MECHATROLINK communication with SVB Modules will continue even if the high-speed scan cycle is changed. However, the speed waveform at execution of interpolation command will be disordered. When changing the high-speed scan cycle, do so either with the CPU stopped or when motion command are not being executed.
Change the high-speed scan setting and then save the settings to flash memory and turn the power supply OFF and ON when operation changes from synchronized to asynchronized or from asynchronized to synchronized.

(5) Operation When the MECHATROLINK Communication Cycle Is Changed

■ Changing the MECHATROLINK Communication Cycle of the SVB in the CPU

Synchronization may be lost when a change is made even if synchronization is possible for the high-speed scan and communication cycle combination. When a change is made, save the settings to flash memory and then turn the power supply OFF and ON.

■ Changing the MECHATROLINK Communication Cycle of the SVB-01 Module

Operation will be automatically synchronized when a change is made if synchronization is possible for the high-speed scan and communication cycle combination. It is not necessary to turn the power supply OFF and ON.

(6) Conditions when the Power Supply Must Be Turned OFF and ON

When any of the following operations is performed, save the settings to flash memory and then turn the power supply OFF and ON.

- After executing a self-configuration command from the MPE720 after turning ON the power supply
- After loading a Module definition after turning ON the power supply
- After changing the SVB communication cycle in the CPU after turning ON the power supply
- After operation changes from synchronized to asynchronized or from asynchronized to synchronized when the high-speed scan setting is changed

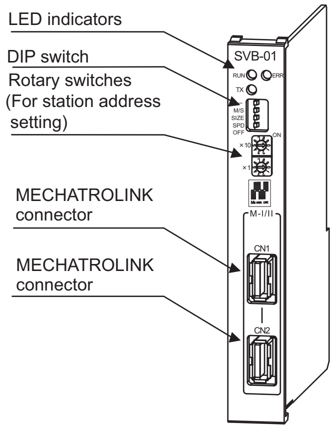
(7) Precaution

■ Observe the following precautions when the scan time over counter error occurs.

When an H Scan Time Over Counter error or L Scan Time Over Counter error occurs, the MECHATROLINK communication cycle is disturbed and a communication error may occur.
These scan time errors can be checked in the SW00044 and SW00046 registers.

1.2 Specifications

1.2.1 SVB-01 Module Hardware Specifications

Item		Specifications
Description		SVB-01
Model Number		JAPMC-MC2310(-E)
Module Appearance		
Max. No. of Modules to be mounted		Refer to *2.2 Applicable Machine Controllers for SVB-01 Modules* on page 2-6.
MECHATROLINK Motion Network		Motion network: 1 channel Communication ports: 2 ports SERVOPACK and I/O: Up to 21 stations connectable (SERVOPACK for up to 16 axes) Baud rate: 4 Mbps (MECHATROLINK-I) or 10 Mbps (MECHATROLINK-II)
Indicators		RUN (green) ERR (red) TX (green)
Switches	DIP Switch	– M/S (Master/Slave) SIZE (Number of transfer bytes) SPD (Baud rate)
	Rotary Switch	×1 (slave address) ×10 (slave address)
Environmental Conditions	Ambient Operating Temperature	0°C to 55°C
	Ambient Storage Temperature	-25°C to 85°C
	Ambient Operating Humidity	30% to 95% RH (with no condensation)
	Ambient Storage Humidity	5% to 95% RH (with no condensation)
	Pollution level	Pollution level 2 (conforming to JIS B 3502)
	Corrosive Gas	There must be no combustible or corrosive gas.
	Operating Altitude	2,000 m above sea level or lower
Mechanical Operating Conditions	Vibration Resistance	Conforms to JIS B 3502. Vibration amplitude/acceleration: $10 \leq f < 57$ Hz, Single-amplitude of 0.075 mm $57 \leq f \leq 150$ Hz, Fixed acceleration of 9.8 m/s^2 10 sweeps (1 sweep = 1 octave per minute) each in the X, Y, and Z directions
	Shock Resistance	Conforms to JIS B 3502. Peak acceleration of 147 m/s^2 twice for 11 ms each in the X, Y, and Z directions
Electrical Operating Conditions	Noise Resistance	Complying with EN 61000-6-2, EN 61000-6-4, EN 55011 (Group 1, Class A)
Installation Requirements	Ground	Ground to 100 Ω max.
	Cooling Method	Natural cooling

(cont'd)

Item	Specifications
Dimensions (mm)	125 × 95 (H × D)
Mass	80 g

- For more information on the hardware specifications for the built-in SVB Module, refer to the manual for your machine controller.

1.2.2 Specifications of SVB Module

This section describes the specifications of the built-in and the optional SVB modules are as follows.

(1) Motion Control Function

Item			Details	
MECHATROLINK Communication		Number of Communication Lines	• Two lines: MP2100M and MP2101M • One line: MP2100, MP2101, MP2300, MP2300S, MP2310, MP2400, and SVB-01	
		Number of Communication Ports (Connectors)	SVB-01, MP2100M, MP2101M, and MP2300S	2 ports
			MP2100, MP2101, MP2300, MP2310, and MP2400	1 port
		Terminating Resistance	JEPMC-W6022-E terminator must be purchased separately.	
		Transmission Distance	MECHATROLINK-II Min. distance between stations: 0.5 m Total network length: 50 m (can be extended to 100 m by connecting repeaters) MECHATROLINK-I Min. distance between stations: 0.3 m Total network length: 50 m (can be extended to 100 m by connecting repeaters)	
	Master Functions	Communication Interface	MECHATROLINK-II (2:N synchronous)	MECHATROLINK-I (1:N synchronous)
		Baud Rate	10 Mbps	4 Mbps
		Transmission Cycle	0.5 ms [*1], 1 ms, 1.5 ms, or 2 ms	2 ms
		Number of Link Communication Bytes	17 bytes or 32 bytes	17 bytes
		Number of Connectable Stations	Up to 21 stations (SERVOPACK for up to 16 axes)	Up to 14 stations
		C1 Messaging (Master Function)	Provided (selectable).	Not provided.
		C2 Messaging (Allocations)	Provided (selectable).	Not provided.
		Retry Function	Provided (selectable).	Not provided.
		Supported Slave Devices	For details, refer to *1.1.5 Devices Connectable to MECHATROLINK*.	
	Slave Functions[*1]	Communication Interface	MECHATROLINK-II	MECHATROLINK-I
		Baud Rate	10 Mbps	4 Mbps
		Transmission Cycle	The transmission cycle of the master station (0.5 ms min.)	2 ms
		Number of Link Communication Bytes	17 bytes or 32 bytes	17 bytes
		Messaging (Slave Function)	Supported.	Not supported.

* 1. Only for the SVB-01 Module.

(cont'd)

Item		Details
Servo Control	Communication Method	Single-send (communication cycle = transmission cycle) synchronous communication Transmission/communication error detection (hardware) provided. Synchronous communication error detection (software) provided. Automatic recovery function not provided (recovery when alarm is cleared).
	I/O Registers	Input/output using motion registers (synchronized on high-speed scan)
	Command Mode	Motion Command Mode/Servo Driver Transmission Reference Mode
	Supported Servomotors	Standard motors/linear motors/DD motors
	Control Type	Position control, speed control, torque control, and phase control
	Motion Commands	Positioning, External Positioning, Zero Point Return, Interpolation, Interpolation with Position Detection, JOG operation, STEP operation, Speed Reference*2, Torque Reference*2, Phase Control*2, etc.
	Acceleration/Deceleration Method	One-step asymmetric trapezoidal acceleration/deceleration, exponential acceleration/deceleration filter, moving average filter
	Position Unit	pulse, mm, inch, degree, µm
	Speed Unit	Reference units/s, 10^n reference units/min, percentage of rated speed
	Acceleration Unit	Reference units/s^2, ms (acceleration from 0 until rated speed reached)
	Torque Unit	Percentage of rated torque
	Electronic Gear	Provided.
	Position Control Method	Finite length position control, infinite length position control, absolute system infinite length position control, and simple absolute system infinite length position control
	Software Limit	Positive/negative direction for each point
	Zero Point Return Method	13 types
	SERVOPACK Parameter Management	Parameters can be managed in the MPE720's SERVOPACK Parameter Window.
Inverter Control	Communication Method	Single-send (communication cycle = transmission cycle) asynchronous communication Transmission/communication error detection (hardware) provided. Synchronous communication error detection (software) not provided. Automatic recovery function not provided (recovery when alarm cleared).
	I/O Registers	Input/output using motion registers (synchronized on high-speed scan)
	Command Mode	Motion Command Mode/Servo Driver Transmission Reference Mode
	Control Type	Speed control only (V/F, vector control and other control methods use inverter settings.)
	Motion Commands	Inverter I/O control, etc.
	Speed Unit	The speed unit depends on the inverter settings.
I/O Control	Communication Method	Single-send (communication cycle = transmission cycle) asynchronous communication Transmission/communication error detection (hardware) provided. Synchronous communication error detection not provided. Automatic recovery function provided.
	I/O Registers	Input/output using I/O registers and synchronized on the high-speed scan or low-speed scan (selectable).
Self-configuration Function		Module and slave devices can be automatically allocated.
Synchronization between Modules		Synchronization supported (enabled when power is cycled) when high-speed scan cycle = communication cycle times n.

* 2. Only with MECHATROLINK-II

(2) MECHATROLINK Communication Specifications

Item	MECHATROLINK-I	MECHATROLINK-II
Topology	Bus	Bus
Transmission Media	Twisted-pair cable	Twisted-pair cable
Transmission Distance	50 m max. (Can be extended to 100 m with repeaters)	50 m max. (Can be extended to 100 m with repeaters)
Minimum Distance between Stations	0.3 m	0.5 m
Baud Rate	4 Mbps	10 Mbps
Communication Cycle	2 ms	0.5 ms, 1 ms, 1.5 ms, or 2 ms
Number of Connectable Stations	Up to 14 stations	Up to 21 stations * (SERVOPACK for up to 16 axes)
Communication Control Method	Cyclic	Cyclic
Media Access Control Method	1:N	2:N
Communication Mode	Control communication	Control communication
Error Control	CRC check	CRC check

* Up to 16 stations can be connected if a JEPMC-REP2000(-E) MECHATROLINK-II Repeater is not used. Refer to *Machine Controller MP2000/3000 Series Distributed I/O Module User's Manual MECHATROLINK System* (Manual No. SIEP C880732 13) for details.

(3) Maximum Number of Slave Stations

The maximum numbers of slave stations that can be connected to the SVB Module are listed below.

■ MECHATROLINK Communication Setting and Maximum No. of Slave Stations

MECHATROLINK Communication Setting			Maximum Number of Slave Stations
Communication Method	Baud Rate	Communication Cycle	
MECHATROLINK-I	4 Mbps	2 ms	14
MECHATROLINK-II (17-byte Mode)	10 Mbps	0.5 ms	6
		1 ms	15
MECHATROLINK-II (32-byte Mode)	10 Mbps	0.5 ms	4
		1 ms	9
		1.5 ms	15
		2 ms	21 (SERVOPACK for up to 16 axes)

- Refer to *3.4.2 MECHATROLINK Transmission Definition Window* for information on how to set MECHATROLINK transmission settings.

■ Transmission Distance and Maximum No. of Slave Stations

Communication Method	Transmission Distance (Total Network Length)	Maximum Number of Slave Stations
MECHATROLINK-I	50 m	14
MECHATROLINK-II	30 m (Can be extended to 100 m with repeaters)	16 (21)*
	50 m (Can be extended to 100 m with repeaters)	15 (21)*

* The values in parentheses apply when a JEPMC-REP2000(-E) Repeater is used.
The Repeater must be used if 17 or more slave stations are connected when using MECHATROLINK-II communication.

1.3 SVR Virtual Motion Module

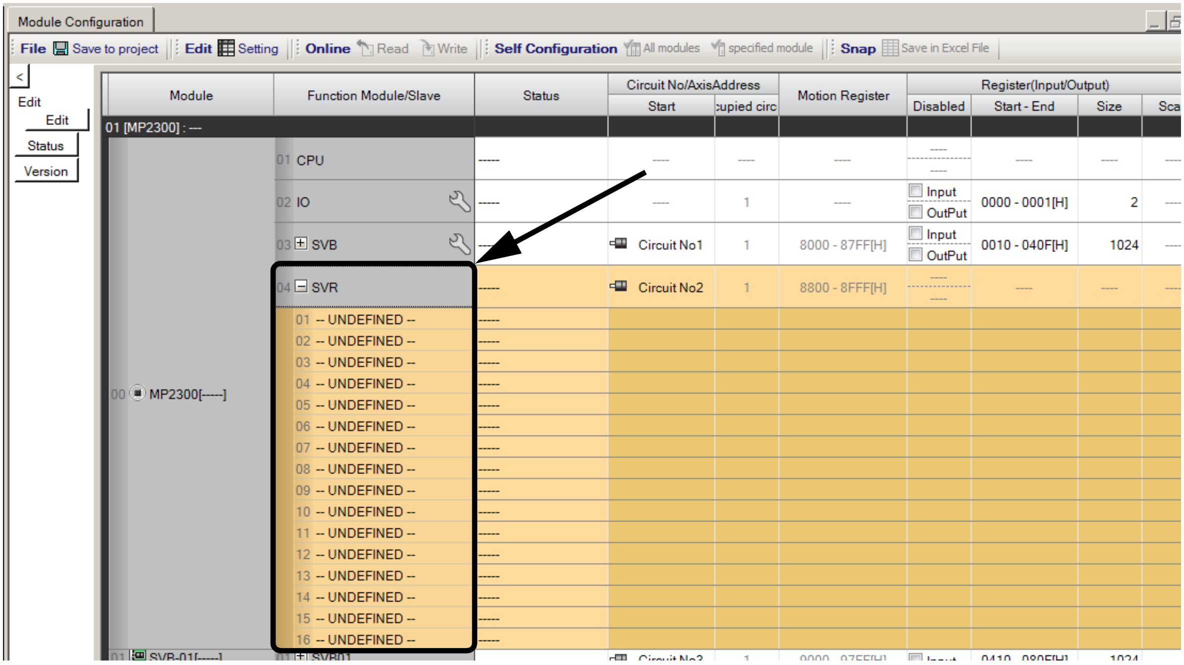
1.3.1 Overview

The Virtual Motion Module is a software module provided as a standard feature with the Machine Controllers. It is not connected to a motor, but provides a virtual axis interface.
The SVR is configured in the same way as the built-in SVB with fixed parameters, setting parameters, and monitoring parameters, and can be accessed from application programs using I/O registers.

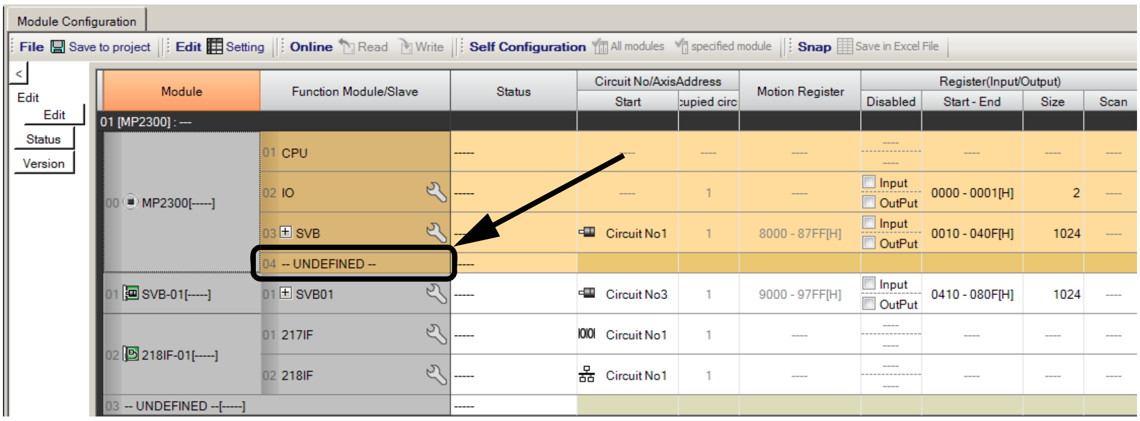
- Refer to items marked with R in *Chapter 4 Motion Parameters* for information on SVR motion parameters.
- Refer to *Chapter 6 Motion Commands* for information on how to use SVR motion commands.

The SVR can be used to control up to 16 virtual axes in the high-speed scan control cycle.

<Display Example of the Slot for SVR Module on the MP2300 Module Configuration Definition Window>



- If the SVR is not used, MP2300 processing time can be reduced by setting the *Module Type* for SVR to ***UNDEFINED*** in the Module Configuration Definition Window.



1.3.2 Example of SVR Usage

The SVR is used in the following two applications.

- **Program testing**: Results are easily obtained without mounting a motor.
- **Generating commands**: If the SVR is used in applications where motion modules are required only for generating commands, such as master axis for phase control or multi-axis synchronous control, then Motion Modules on real axes are no longer required.

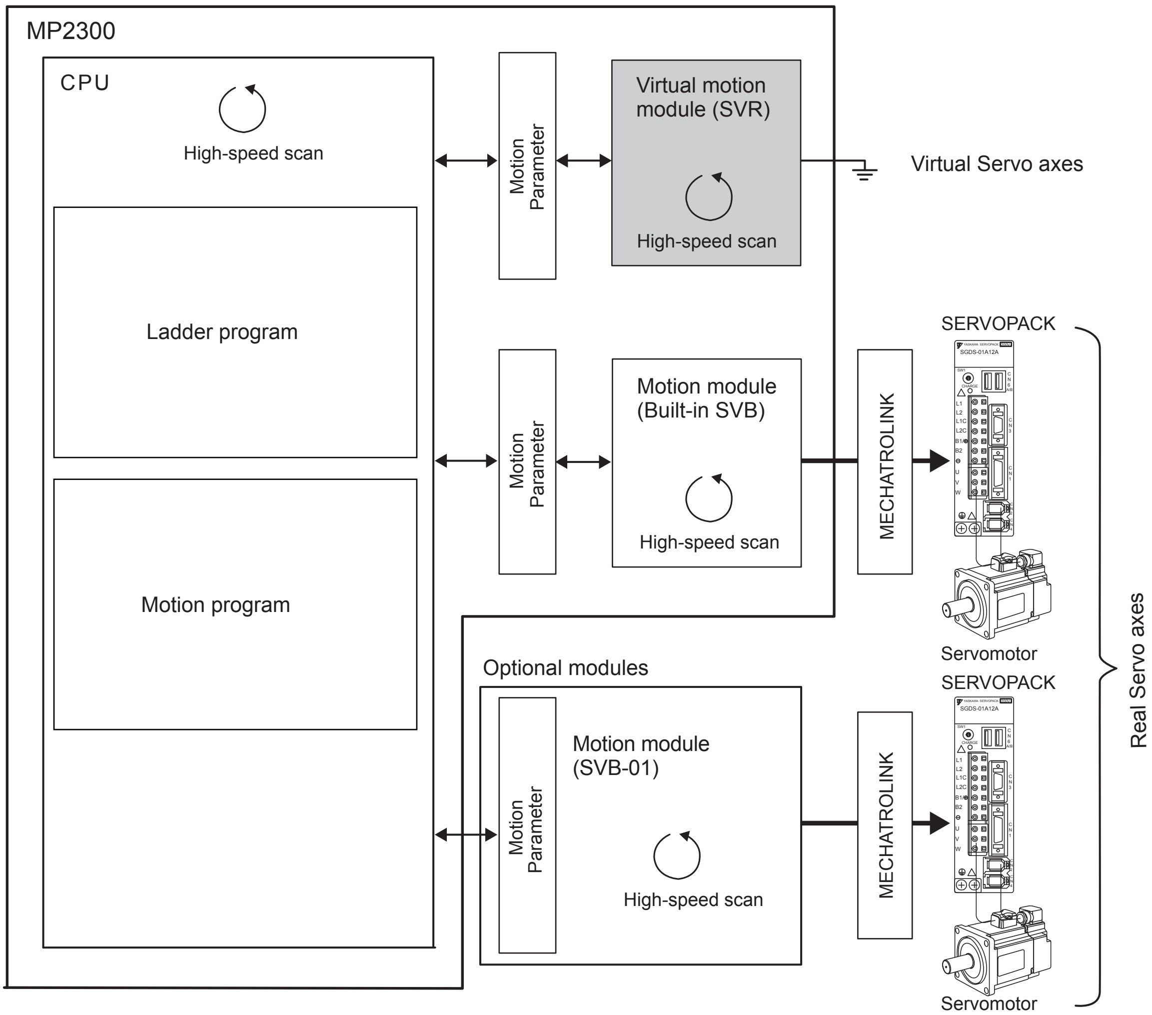
The following table lists application examples of the SVR.

Slot Number	Application Example	Application Method
1	Master axis for phase control	Electronic cam or shaft operation can be achieved by using the SVR for the virtual master axis.
2	Multi-axis synchronous control	Multi-axis synchronous control can be achieved by controlling the SVR from a motion program and then using the ladder program to copy position commands of the SVR to other axes.
3	Sine curve commands	If the motion program is used to perform circular interpolation with the SVR, the axis will operate with a sine curve command.

- The software limit function and machine lock function cannot be used with the SVR. The position error will always be 0.

1.3.3 System Configuration Example

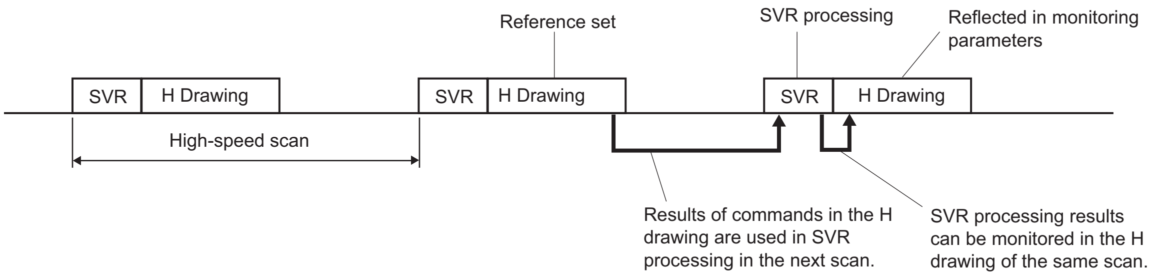
The following figure shows an example of system configuration using a Machine Controller MP2300 with a SVR Module mounted.



1.3.4 SVR Operation

(1) SVR Execution Timing

The SVR is processed at the beginning of the high-speed scan. SVR processing is performed in the next scan after specifying and the processing results are reflected in the monitoring parameters.



(2) Processing Time

When fixed parameter No.0 (Selection of Operation Modes) is set to 0 (Normal Operation Mode), services are started for each of the 16 SVR module virtual axes.

- The default for the Selection of Operation Modes parameter is 1 (Axis Unused).

The following table gives guidelines for the processing time required for each SVR axis.

Command	MP2300
NOP	35 +14 × Number of axes (μs)
POSING	35 +36 × Number of axes (μs)

- Number of axes: The number of axes (1 to 16) when Selection of Operation Modes (fixed parameter No.0) is set to Normal Operation Mode (0).
  The formula listed above do not apply when the number of axes is 0.

■ Differences from SVB Simulation Mode

Simulation mode does not have a positioning function, so the position data is refreshed in one scan to the final target position. The SVR has its own positioning function that performs distribution, so like a real module, position data is refreshed each scan for the final target position.

2

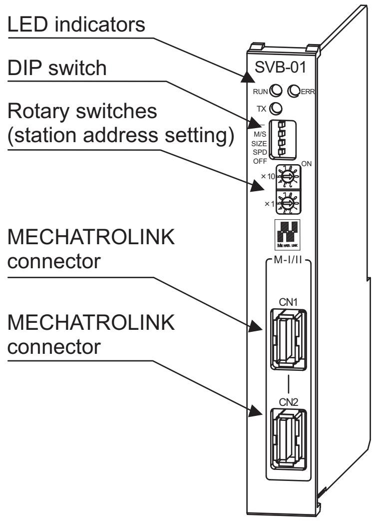
Settings and Installation

This chapter explains the LED indicators and switch settings of the SVB-01 Module and how to install or remove it.

2.1 LED Indicators and Switch Settings

2.1.1 External Appearance

The following figure shows the external appearance of the SVB-01 Module.



2.1.2 Indicators

The following table shows the indicators that show the operating status of the SVB-01 Module and error information.

- Refer to the relevant Machine Controller manual for the LED indicators on the built-in SVB Module.

Indicators	Indicator Name	Color	Significance when Lit	Significance when Not Lit
RUN ○ ○ ERR TX ○	RUN	Green	Lights during normal operation of the microprocessor used for control.	An error has occurred in the microprocessor for control.
	ERR	Red	Lights/blinks for failures. Not lit during normal operation.	Normally operating
	TX	Green	MECHATROLINK transmission in progress	MECHATROLINK transmission being stopped

2.1.3 SVB-01 Module Status Indication

The SVB-01 Module status is indicated by the combination of LED indicators as shown in the following table.

Status	Indication			SVB-01 Module Status	Description
	RUN	ERR	TX		
Initial Status	○	●	○	Power has just been turned ON.	Indicates that the power to the SVB-01 Module has been just turned ON. The ERR LED light will go out when the initialization process starts. If the status of the LED stays unchanged, a boot error has occurred. The SVB-01 firmware needs to be rewritten.
Normal Operation Status	○	○	○	Not defined	Indicates that the SVB-01 Module has not been registered in the Module Configuration Definition Window. Refer to *3.4 Self-configuration and Each Window* and make the settings for MECHATROLINK transmission definition and motion parameters.
	●	○	●	Operating normally	Indicates that the SVB-01 Module is operating normally and being connected for MECHATROLINK communications.
	●	○	○	Operating normally and waiting for connection	The SVB-01 Module is set as a slave, but the communications connection with the master is not established.
	★	○	●	CPU being stopped	The CPU is being stopped. Execute CPU RUN and the LED will indicate the normal status of the SVB-01 Module.

(cont'd)

Status	Indication			SVB-01 Module Status	Description
	RUN	ERR	TX		
Error	●	●	●	<In Master Mode> Servo axis error occurred in one of the servo axes. (1) Warning (Check the parameter IL□□02.) (2) Alarm (Check the parameter IL□□04.) (3) Command error completed status (Bit 3 of IW□□09 is ON, Bit 3 of IW□□0B is ON) <In Slave Mode> MECHATROLINK communications error	The indicated status differs depending on the mode, Master or Slave. <In Master Mode> Indicates that an error has occurred in one of the servo axes. Check the parameters shown on the left to find what kind of error has occurred. (1) Warning The cause of the error is written in each bit of IL□□02. Find the cause and remove it. Reset the alarm if necessary. (2) Alarm The cause of the error is written in each bit of IL□□04. Find the cause and remove it. Reset the alarm if necessary. (3) Command Error Completed Status Indicates that an error has occurred during execution of a motion command or motion subcommand. (Example: A command outside the setting range was sent.) Clear the command (OW□□08, OW□□0A). <In Slave Mode> A MECHATROLINK communication error has occurred. Check the MECHATROLINK cable connection.
	●	●	○	No communication from the master	In slave mode, no communication from the master has been received. Check the master station and the MECHATROLINK cable connection.
	★	★	–	Hardware error 1: - 2: ROM error 3. RAM error 4: CPU error 5: FPU error 6: Shared memory error 7: JL-080 error (Number indicates the number of times blinking)	Hardware failure of the SVB-01 Module occurred. Replace the Module.
	○	★	–	Software error 1: - 2: Watchdog time timeout 3: Address error (reading) exception 4: Address error (writing) exception 5: FPU exception 6: General illegal instruction exception 7: Slot illegal instruction exception 8: General FPU suppression exception 9: Slot FPU suppression exception 10: Watchdog time timeout (SVB) (Number indicates the number of times blinking)	Software failure of the SVB-01 Module occurred. Replace the Module.

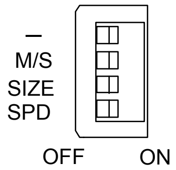
- ● : Lit
  ○ : Unlit
  ★ : Blinks
  - : Not specified

2.1.4 Switch Settings

Both the DIP switch and rotary switches set the operating conditions for the SVB-01 Module. Use the default settings when using the Module in Master Mode.

(1) DIP Switch

SIZE and SPD are valid only in Slave Mode. They will be ignored in Master Mode.



Name	Status	Operating Mode	Default Setting	Details
-	ON	Reserved.	OFF	Keep turned OFF.
	OFF	Reserved.		
M/S	ON	Slave Mode	OFF	Select Master or Slave Mode.
	OFF	Master Mode		
SIZE	ON	17 bytes	OFF	Select the number of send bytes. • Valid only in Slave Mode.
	OFF	32 bytes		
SPD	ON	4 Mbps	OFF	Select the baud rate. • Valid only in Slave Mode.
	OFF	10 Mbps		

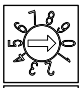
■ Setting Example

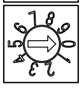
Communication Interface	Link Communication	Switch Settings
MECHATROLINK-I	17-byte	OFF ON ON ON
MECHATROLINK-II	17-byte	OFF ON ON OFF
	32-byte	OFF ON OFF OFF

(2) Rotary Switches

This rotary switch is valid only in Slave Mode.

- It will be ignored in Master Mode.

×10 

×1 

Name	Status	Operating Mode	Default Setting	Details
×10	0 to 9	Local address in Slave Mode (Tens digit)	0	Set the tens digit of the local slave address. Example: Turn to “1” for the address, 15.
×1	0 to 9	Local address in Slave Mode (Ones digit)	1	Set the ones digit of the local slave address. Example: Turn to “5” for the address, 15.

2.2 Applicable Machine Controllers for SVB-01 Modules

The following table lists the Machine Controllers on which the SVB-01 Module can be mounted.

2.2.1 MP2000 Series

<table>
<tr><th colspan="2" rowspan="2">Name</th><th rowspan="2">Model</th><th rowspan="2">Max. No. of Connectable Modules</th><th colspan="2">Applicable Version</th><th rowspan="2">Remarks</th></tr>
<tr><th>CPU Module</th><th>MPE720</th></tr>
<tr><td colspan="2">MP2300</td><td>JEPMC-MP2300 (-E)</td><td>2 modules</td><td>Ver. 2.44 or later</td><td rowspan="8">Ver. 5.33
Ver. 6.01
Ver. 7.10
or later</td><td>–</td></tr>
<tr><td colspan="2">MP2310</td><td>JEPMC-MP2310-E</td><td>3 modules</td><td rowspan="6">All versions</td><td>–</td></tr>
<tr><td colspan="2">MP2300S</td><td>JEPMC-MP2300S-E</td><td>1 module</td><td>–</td></tr>
<tr><td rowspan="4">MP2200[*1]</td><td>CPU-01</td><td>JAPMC-CP2200 (-E)</td><td rowspan="4">16 modules</td><td rowspan="4">The maximum number of connectable Modules is the total for the maximum expansion to four racks.[*2]</td></tr>
<tr><td>CPU-02</td><td>JAPMC-CP2210 (-E)</td></tr>
<tr><td>CPU-03</td><td>JAPMC-CP2220-E</td></tr>
<tr><td>CPU-04</td><td>JAPMC-CP2230-E</td></tr>
<tr><td colspan="2">MP2100M</td><td>JAPMC-MC2140 (-E)</td><td rowspan="3">14 modules</td><td>Ver. 2.44 or later</td><td rowspan="3">The maximum number of connectable Modules is the total for the maximum expansion to three racks.[*2]</td></tr>
<tr><td colspan="2">MP2101M</td><td>JAPMC-MC2142-E</td><td rowspan="2">All versions</td><td rowspan="2">Ver. 5.54
Ver. 6.24
Ver. 7.10
or later</td></tr>
<tr><td colspan="2">MP2101TM</td><td>JAPMC-MC2142T-E</td></tr>
</table>

* 1. Mount a CPU module on the following base units.

Name	Model	Remarks
MBU-01	JEPMC-BU2200 (-E)	100/200-VAC input base unit (9 slots)
MBU-02	JEPMC-BU2210 (-E)	24-VDC input base unit (9 slots)
MBU-03	JEPMC-BU2220-E	24-VDC input base unit (4 slots)

* 2. The following module or board is required between racks.

Name	Model	Remarks
EXIOIF	JAPMC-EX2200 (-E)	Inter-rack connection module
MP2100MEX	JAPMC-EX2100 (-E)	I/F board for MP2100M, MP2101M, and MP2101TM

2.2.2 MP3000 Series

<table>
<tr><th colspan="2" rowspan="2">Name</th><th rowspan="2">Model</th><th rowspan="2">Max. No. of Connectable Modules</th><th colspan="2">Applicable Version</th><th rowspan="2">Remarks</th></tr>
<tr><th>CPU Module</th><th>MPE720</th></tr>
<tr><td rowspan="2">MP3100</td><td>MP3100 (16 axes)</td><td>JAPMC-MC3100-1-E</td><td>15 modules</td><td rowspan="2">All versions</td><td rowspan="2">Ver. 7.38 or later</td><td rowspan="2">The maximum number of connectable Modules is the total for the maximum expansion to three racks.[*2]</td></tr>
<tr><td>MP3100 (32 axes)</td><td>JAPMC-MC3100-2-E</td><td>14 modules</td></tr>
<tr><td rowspan="2">MP3200</td><td>CPU-201</td><td>JEPMC-CP3201-E</td><td rowspan="2">14 modules</td><td>Ver. 1.01 or later</td><td rowspan="2">All versions</td><td rowspan="6">The maximum number of connectable Modules is the total for the maximum expansion to four racks.[*2]</td></tr>
<tr><td>CPU-202</td><td>JEPMC-CP3202-E</td><td rowspan="5">All versions</td></tr>
<tr><td rowspan="4">MP3300[*1]</td><td>CPU-301 (16 axes)</td><td>JAPMC-CP3301-1-E</td><td>15 modules</td><td>Ver. 7.26 or later</td></tr>
<tr><td>CPU-301 (32 axes)</td><td>JAPMC-CP3301-2-E</td><td>14 modules</td><td>Ver. 7.28 or later</td></tr>
<tr><td>CPU-302 (16 axes)</td><td>JAPMC-CP3302-1-E</td><td>15 modules</td><td rowspan="2">Ver. 7.33 or later</td></tr>
<tr><td>CPU-302 (32 axes)</td><td>JAPMC-CP3302-2-E</td><td>14 modules</td></tr>
</table>

* 1. Mount a CPU module on the following base units.

Name	Model	Remarks
MBU-301	JEPMC-BU3301-E	100/200-VAC input base unit (8 slots)
MBU-302	JEPMC-BU3302-E	24-VDC input base unit (8 slots)
MBU-303	JEPMC-BU3303-E	24-VDC input base unit (3 slots)
MBU-304	JEPMC-BU3304-E	24-VDC input base unit (1 slot)

* 2. The following module or board is required between racks.

Name	Model	Remarks
EXIOIF	JAPMC-EX2200 (-E)	Inter-rack connection module
MP3100EX	JAPMC-EX3100-E	Can be connected to the Expansion Interface Module and the EXIOIF Module.
MP3101EX	JAPMC-EX3101-E	Can be connected to the EXIOIF Module.

2.3 Mounting/Removing SVB-01 Modules

This section describes how to mount, replace, and add an SVB-01 Module.

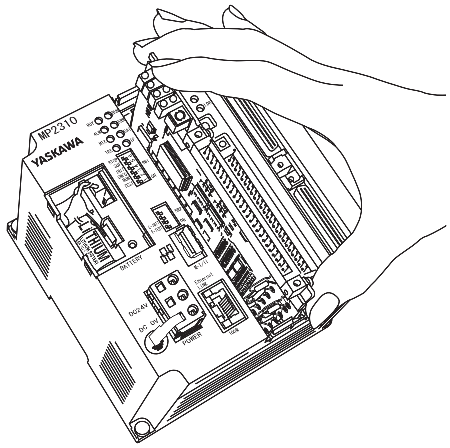
2.3.1 Mounting an SVB-01 Module

Mount an SVB-01 Module by using the following procedure.

- These diagrams show the procedure using the LIO-01 Module, but the procedure is the same for the SVB-01 Module.

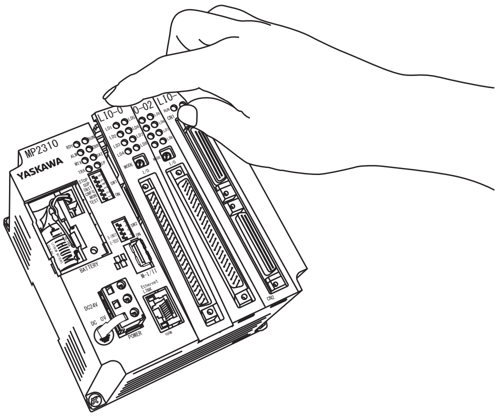
1. Hold the top and bottom of the Optional Module to be installed, line up the Module with the left side of the guide rail inside the option slot, and then insert the Module straight in.

- The FG bar inside and on the bottom may be damaged if the Module is not inserted along the guide rail.



2. After the Optional Module is completely inserted, place your hand on the front of the Optional Module and press the Optional Module firmly until it mates with the Mounting Base connectors in the Unit. The front of the Optional Module and the tabs will be aligned if the Optional Module has been installed properly.

3. Place the hole on the bottom of the panel of the Optional Module onto the tab on the bottom of the Unit. Next, hook the hole at the top of the panel of the Optional Module onto the tab on the Unit.



This completes the installation procedure.

- Always use Option Covers (model: JEPMC-OP2300) to cover unused slots.

2.3.2 Replacing and Adding an SVB-01 Module

Replace or add an SVB-01 Module by using the following procedure.

- These diagrams show the procedure using the LIO-01 Module, but the procedure is the same for the SVB-01 Module.

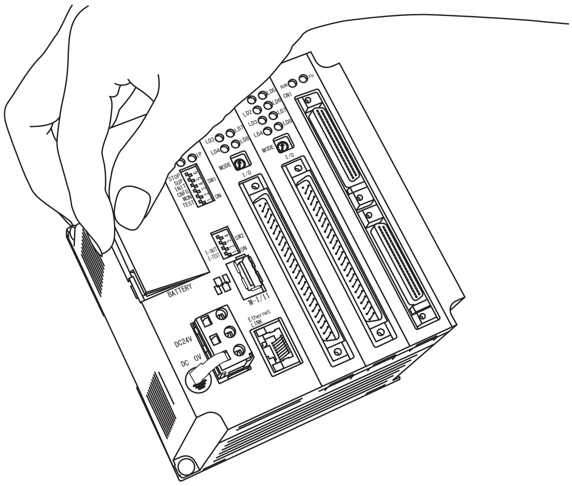
- Always create a backup before replacing or adding Optional Modules.
- Back up the program from the Machine Controller to the PC using the MPE720.

---

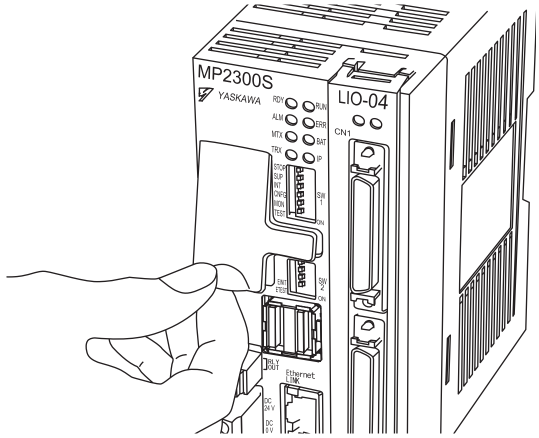
1. Turn OFF the power supply and disconnect all cables from the Machine Controller.

2. Pull the notch on the side toward you to remove the battery cover.

<MP2200/MP2300>

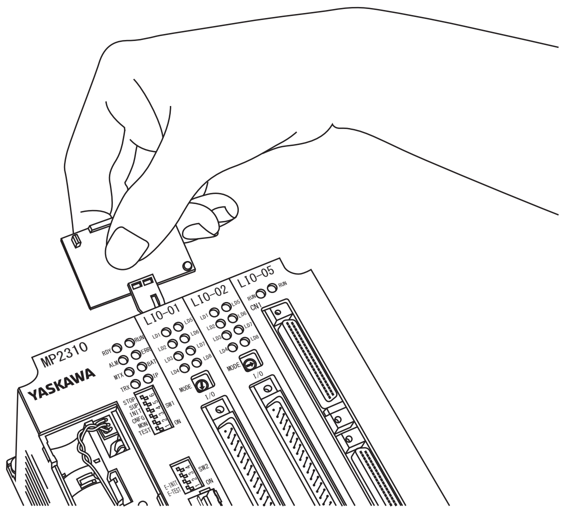


<MP2310/MP2300S>



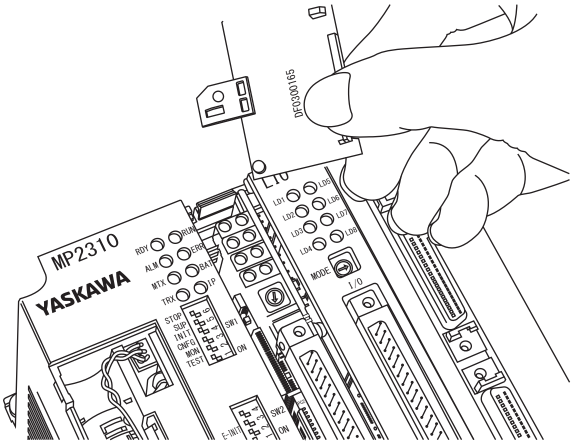
3. Insert the protruding part of the battery cover into the slot on top of the Optional Module panel to unhook the tab. Face the front of the battery cover toward you for this operation.

- Use the same method to remove the Option Cover from an unused slot before adding an Optional Module.

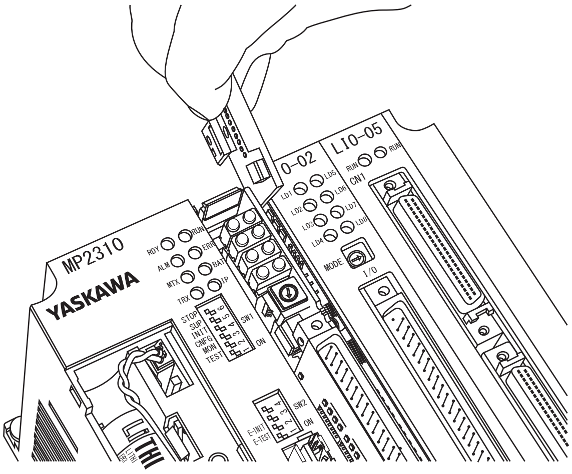


Unhook the bottom tab in the same way.

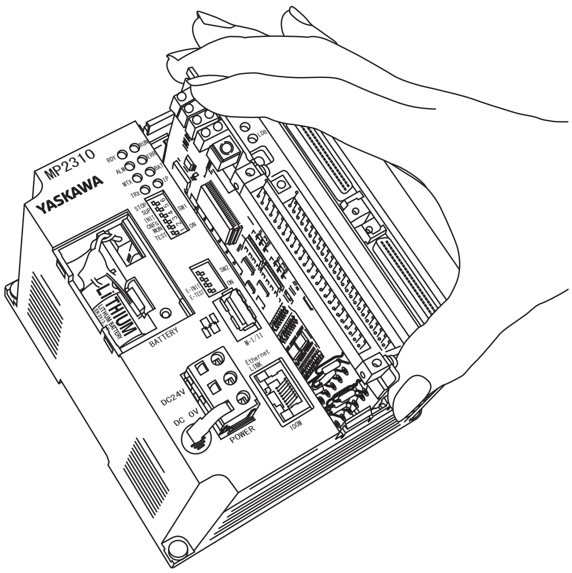
4. Pull the top of the Optional Module panel toward you and remove it. A notch on the Optional Module will be visible from the gap with the panel. Hook the round knob on the battery cover into the notch in the Optional Module.



5. Hold the center of the battery cover, and turn it around the round knob while pushing it toward the back to disconnect the Module from the Mounting Base connectors. Then, pull the Module forward.



6. Hold the Optional Module at the top and bottom and pull it straight out. Hold the edges of the Module and avoid touching the components on the Module.



- Put the Module that you removed into the bag that was supplied when you purchased it and store the Module in this bag.

3

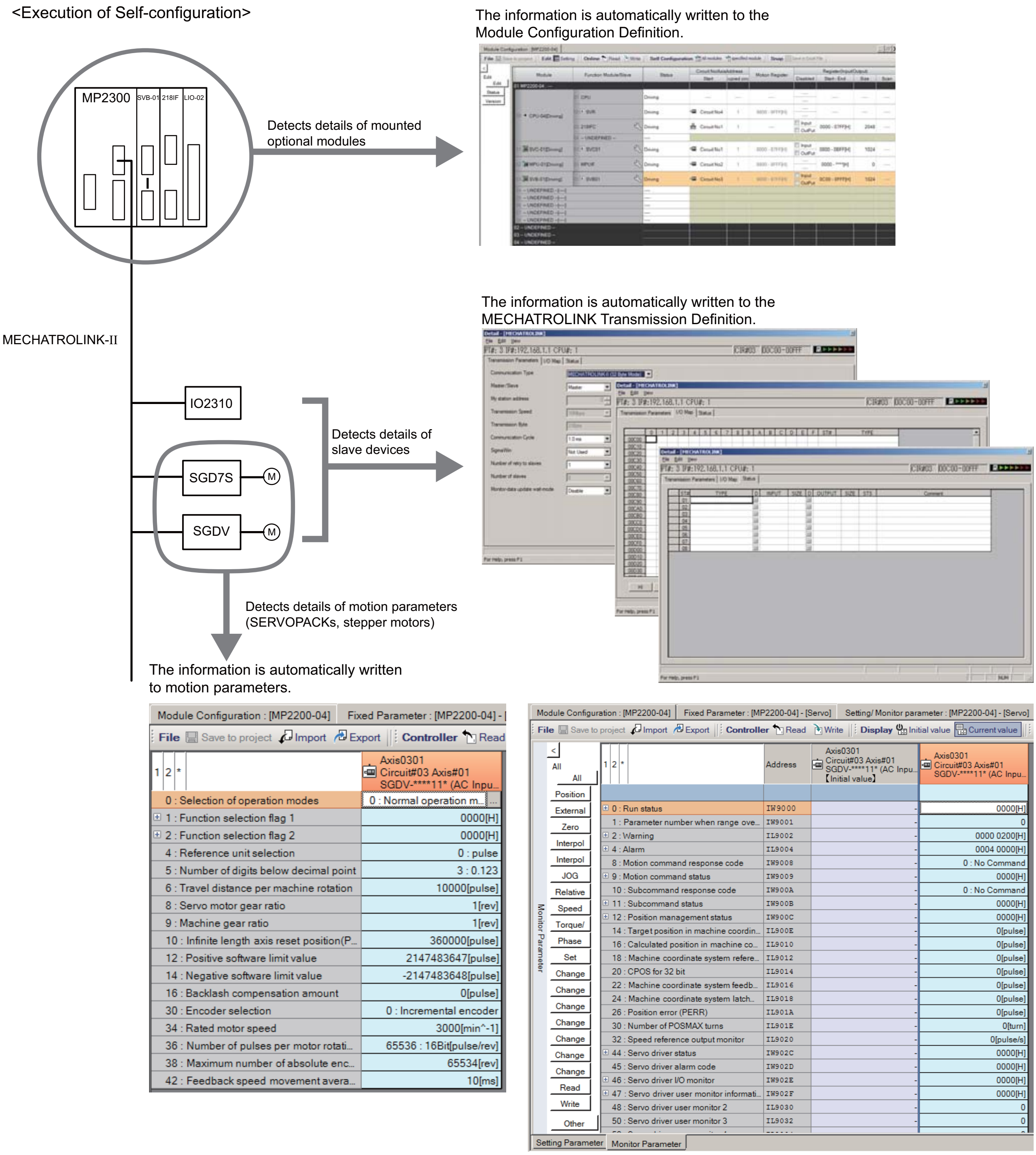
Self-configuration and Created Definition Files

This chapter describes the procedures for self-configuration and the definition files that will be created by self-configuration.

3.1 Self-configuration Overview

When the self-configuration function is implemented, the Machine Controller recognizes the mounted optional modules, and automatically creates files of the Module Configuration Definition, MECHATROLINK Transmission Definition, and motion parameters. The self-configuration function greatly reduces the system startup time.

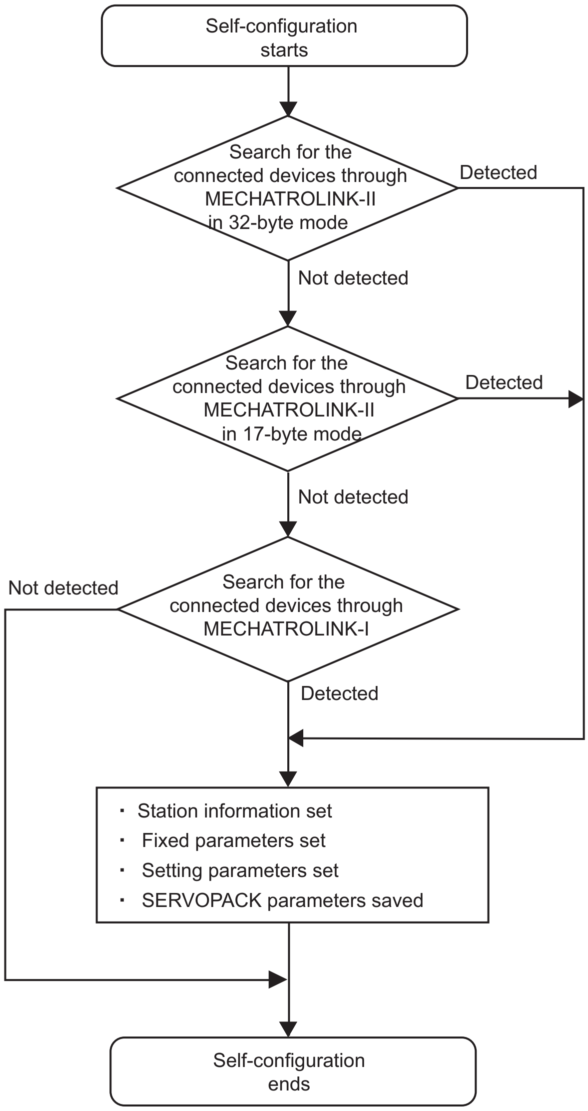
The following figure shows how the self-configuration function works.



- Refer to *3.4.1 Module Configuration Definition Window* for details on Module Configuration Definition, *3.4.2 MECHATROLINK Transmission Definition Window* for details on MECHATROLINK Transmission Definition, and *3.4.3 Motion Parameter Window* for details on motion parameters.

The SERVOPACK parameters will be written in the SERVOPACK's EEPROM or RAM when the self-configuration function is executed.

The self-configuration process is carried out in the following manner.



- The slave stations are detected in order of the servos, I/Os, and inverters for each MECHATROLINK connection.
- The station from which a communication error or no response is returned, because of a duplicated station address or cable disconnection, is recognized as an unconnected station.
- If no slave is detected, communications through MECHATROLINK-I will continue.

3.2 Executing Self-configuration

There are two ways to execute self-configuration.

■ Turning ON the Power After Setting the DIP switch "CNFG"

Set the DIP switch "CNFG" on the Machine Controller to ON, and then turn ON the power to execute self-configuration. The setting of the DIP switch "INIT" causes some differences in the results of self-configuration.

CNFG	INIT	Result
ON	ON	• Module Configuration Definition will be updated. • All the detected axes (slave devices) will be allocated to the MECHATROLINK Transmission Definition. • Some of the SERVOPACK parameters will be written in the motion parameters.
ON	OFF	• Module Configuration Definition will be updated. • The axes that have already been allocated to the MECHATROLINK Transmission Definition will stay unchanged. Only the axes that are newly detected by self-configuration will be newly allocated. • The column showing the deleted axis will appear blank in the MECHATROLINK Transmission Definition Window. • Some SERVOPACK parameters will be written to motion parameters for only the axes that are newly detected. The motion parameters for the axes that have already been allocated to the MECHATROLINK Transmission Definition Window will not be updated.

After execution of self-configuration, be sure to execute ***Save to Flash*** to save the results of self-configuration in the Machine Controller.

- For MP2100, MP2100M, MP2101T, and MP2101TM Machine Controllers, the DIP switch is not commonly used for self-configuration. Use an MPE720 as described below to execute self-configuration.
- For details on the parameters that are written in motion parameters when executing self-configuration, refer to *11.6.5 Parameters Updated during Self-configuration*.

■ Using an MPE720

Start the MPE720 and open the Module Configuration Definition Window. Click ***All modules*** of the Module Configuration Definition Window, or select a module for which self-configuration is to be executed in the Module Configuration Definition Window and then click ***specified module***.

- Refer to *3.4.1 (1) Opening the Module Configuration Definition Window* for information on how to open the Module Configuration Definition Window.

The results of configuration will be as follows.

Button Name of MPE720	Result
All modules (Self-configuration for all modules)	• Module Configuration Definitions will be updated. • The axes that have already been allocated to the MECHATROLINK Transmission Definition will remain unchanged. Only the axes that are newly detected by self-configuration will be newly allocated. • The column showing the deleted axis will appear blank in the MECHATROLINK Transmission Definition Window. • Some SERVOPACK parameters will be written to motion parameters for only the axes that are newly detected. The motion parameters for the axes that have already been allocated to the MECHATROLINK Transmission Definition Window will not be updated.
specified module (Self-configuration for individual module)	• The slave devices (slave axes) of the selected module will be detected. • The axes that have already been allocated to the MECHATROLINK Transmission Definition will stay unchanged. Only the axes that are newly detected by self-configuration will be newly allocated. • The column showing the deleted axis will appear blank in the MECHATROLINK Transmission Definition Window. • Some SERVOPACK parameters will be written to motion parameters for only the axes that are newly detected. The motion parameters for the axes that have already been allocated to the MECHATROLINK Transmission Definition Window will not be updated.

- For details on the parameters that are written in motion parameters when executing self-configuration, refer to *11.6.5 Parameters Updated during Self-configuration*.

3.3 System Startup Using Self-Configuration

System startup time can be reduced by using self-configuration.
This section describes system startup using self-configuration, in the following three circumstances.

- Starting the system for first time
- Adding an electronic device (e.g., SERVOPACK or optional module)
- Replacing electronic devices

3.3.1 Starting the System for First Time

Use the following procedure to startup a new system.

1. Wire and connect electronic devices.

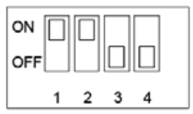
Correctly wire and connect all electronic devices to be used.

2. Make switch settings for MECHATROLINK slaves.

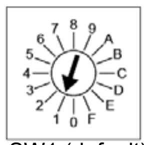
Set the MECHATROLINK communication specifications using the DIP switch and the station address on the rotary switch on each MECHATROLINK slaves.

Example of SERVOPACK Settings (SGDS-□□□1□□)

SW1	Name	Setting	Contents	Default
Bit 1	Baud rate	OFF	4 Mbps	ON
		ON	10 Mbps	
Bit 2	No. of transmission bytes	OFF	17	ON
		ON	32	
Bit 3	Station address	OFF	Station address = 40H+SW1	OFF
		ON	Station address = 50H+SW1	
Bit 4	Reserved (Reserved by the system.)	OFF	–	OFF



SW2 (default)



SW1 (default)

- Refer to each slaves manual for information on the setting details.

3. Start up MECHATROLINK slaves.

Turn ON the power to the MECHATROLINK slaves and check that the electronic devices start up normally.

- If using a new Absolute Encoder, the Absolute Encoder will need to be initialized. Refer to *Appendix C Initializing the Absolute Encoder* for details.
- The servo adjustment can be performed either in this step or after the self-configuration.

4. Complete the settings on each optional module.

Set the required items, such as communication specifications and station address, using the switches on each optional module mounted on the Machine Controller.

5. Execute self-configuration.

Make sure that all the MECHATROLINK slave devices have started, and then execute self-configuration.
With self-configuration, the Machine Controller recognizes the connected MECHATROLINK slave devices and optional modules, and assigns I/O registers. The motion parameters will automatically be set to enable the minimum standard motions.

- For information on how to execute self-configuration, refer to *3.2 Executing Self-configuration*.
- For the items allocated to each module, such as I/O register number, line number, motion register number, refer to *4.1.1 Motion Parameter Register Numbers for MP2000 Series Machine Controllers*.

- The SERVOPACK's overtravel function (see *11.2 Overtravel Function*) will automatically be disabled by executing self-configuration, because the self-configuration is intended to enable immediate operation of slave devices including servo drives. Before operating the machine after execution of self-configuration, enable each SERVOPACK's overtravel function by setting the parameters.

6. Make parameter settings to match the machinery.

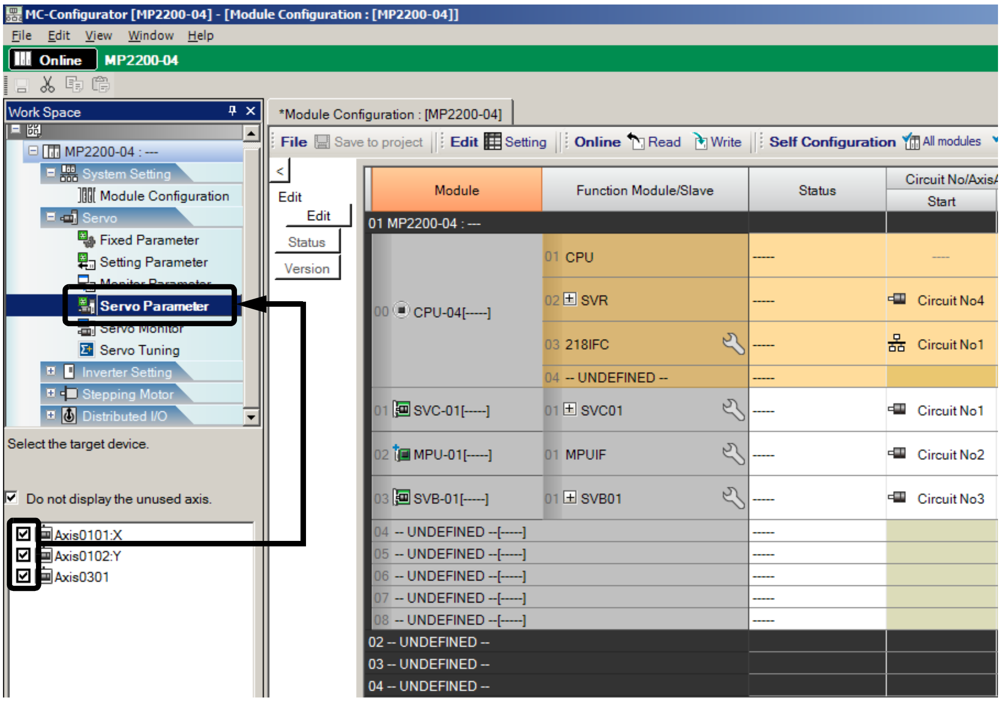
Start MPE720 and log on online, then set and save fixed parameters relating to reference units (fixed parameters 4, 5, 6, 8, and 9).
If the servo gain has not been adjusted in step 3, adjust the servo gain and make any other required adjustments.

- Refer to *4.3.1 Fixed Parameter List* and *4.4.1 Motion Fixed Parameter Details* for details on fixed parameters, and *5.1 Example Setting of Motion Parameters for the Machine* for the settings according to the connected machine specifications.
- Refer to the relevant SERVOPACK manual for information on servo adjustment.

7. Save SERVOPACK parameters to the Machine Controller and save Machine Controller data to flash memory.

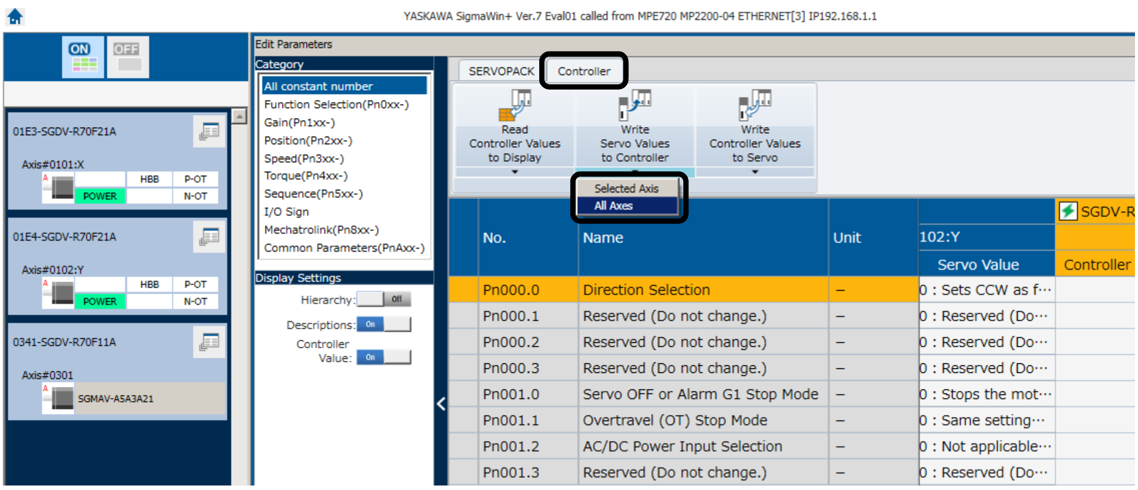
After completion of servo adjustment, save the SERVOPACK parameters for each axis to the Machine Controller.

a) Select the axis in the Work Space Pane of the Module Configuration Tab Page (refer to *3.4.1 Module Configuration Definition Window*), and then double-click ***Servo Parameter***.



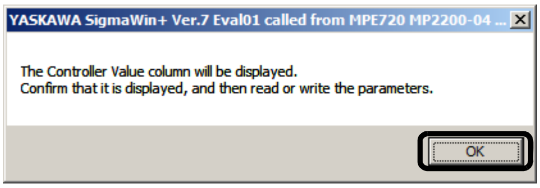
The SigmaWin+ will start and display the SERVOPACK parameters.

b) Click the **Controller** tab, click ▼ under ***Write Servo Values to Controller***, and then click ***All Axes***.



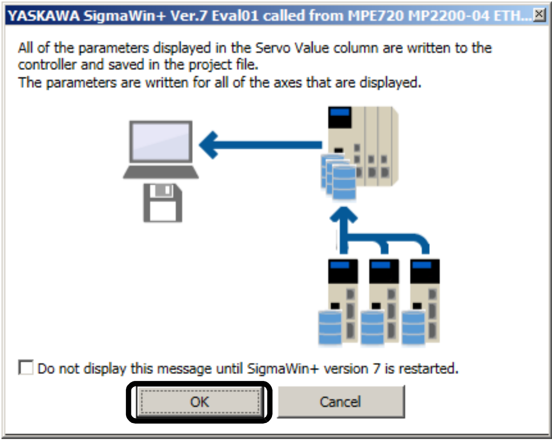
- The data in the *Controller Value* column is the SERVOPACK data saved to the Machine Controller and the data in the *Servo Value* column is the data set to the SERVOPACK.

- Refer to *3.4.4 SERVOPACK Parameter Window* for information on the relationship between *Controller Value* and *Servo Value*.
- If the ***Controller Value*** Column is not displayed, the following dialog box will be displayed. Click **OK**. The ***Controller Value*** Column will be displayed.



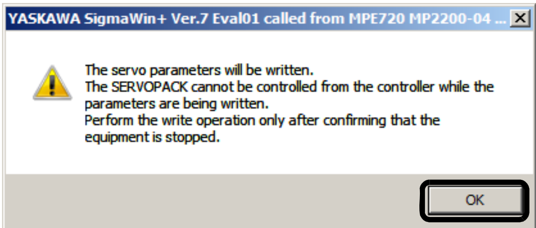
The message dialog box is displayed.

c) Click **OK**.



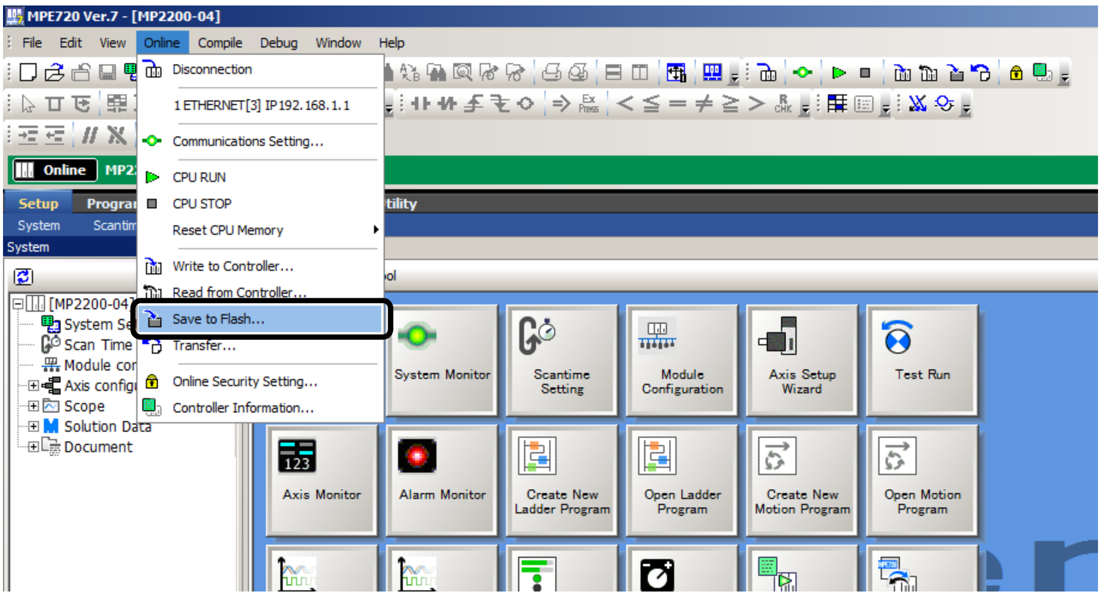
The MC-Configurator Dialog Box is displayed.

d) Confirm that the device has stopped, and then click **OK**.



The SERVOPACK values will be written to the RAM of the Machine Controller.

e) In the Main Window of the MPE720, click ***Online - Save to Flash***.



The data in the RAM of the Machine Controller will be written to flash memory.

8. Save ladder programs, and reboot the Machine Controller.

a) In the Main Window of the MPE720, click ***Online*** - ***Transfer*** - ***Write to Controller***, and then follow the instructions to transfer the ladder program to the Machine Controller.

b) In the Main Window of the MPE720, click ***Online*** - ***Save to Flash***.

The ladder program that was transferred and saved in the RAM of the Machine Controller will be written to flash memory.

c) Turn OFF all pins on the DIP switches of the Machine Controller and turn the power supply OFF and ON again.

This completes the system startup procedure.

- After changing the application by editing ladder programs or changing parameter settings, always save the changes to the flash memory. If the Machine Controller's power is turned OFF without having saved the changes in the application to the flash memory, the changed data will be lost from inside the Machine Controller. If this happens, load the application saved in the personal computer to the Machine Controller and save it to the flash memory.
- You are recommended to back up the application whenever convenient. The procedure is given below.
MPE720: Log on online to the Machine Controller, then select ***Online - Transfer - Read from Controller***.

3.3.2 System Startup when Adding Electronic Devices

Use the following procedure to start the system when adding SERVOPACKs, Optional Modules, and other electronic devices.

1. Back up applications.

Before adding the electronic devices, log on to the Machine Controller online using MPE720 and select ***Online - Transfer - Read from Controller*** to create a backup of the application.

2. Turn OFF the power to the Machine Controller.

After disconnecting MPE720 from the Machine Controller, turn OFF the Machine Controller power.

3. Start the electronic device to be added.

Make the DIP and rotary switch settings for the device to be added. For MECHATROLINK slaves, make the switch settings, and turn ON the power to the slave. Confirm that the device starts correctly and then turn OFF the power.

4. Connect the electronic device.

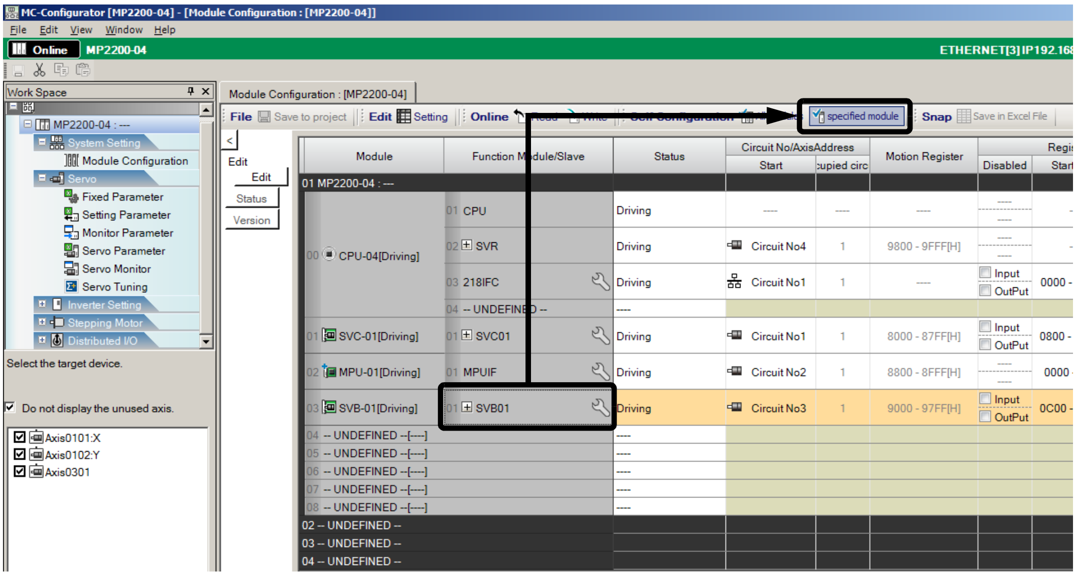
Connect the electronic device to the Machine Controller and turn ON the power to all the MECHATROLINK slaves.

5. Turn ON the Machine Controller power.

Turn ON the power of the Machine Controller.

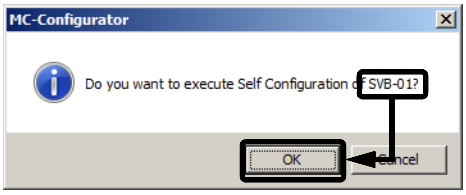
6. Executing Self-configuration per Module

a) Make an online connection between the MPE720 and Machine Controller, and open the Module Configuration Tab Page. Next, select the SVB-01 Module that was added or the SVB Module to which the SERVOPACKs were added, and then click ***specified module***.



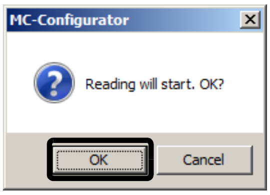
The MC-Configurator Dialog Box is displayed.

b) Confirm the module name and click **OK**.



Self-configuration will be executed for the specified module. When self-configuration is completed, an MC-Configurator Dialog Box similar to following screenshot will be displayed.

c) Click **OK**.



The results of the self-configuration will be saved in the MPE720.

- When executing the Module Self-configuration command, existing definitions for SERVOPACKs will not be refreshed and existing parameters will be saved. However, SERVOPACKs must be started up normally before self-configuration.

- If I/O addresses are changed for an existing application using MPE720 after the initial self-configuration has been executed, the I/O addresses are updated when self-configuration is subsequently executed. If SVR is set to disabled, the setting will return to enabled. It is recommended that settings are checked again, including settings for existing electronic devices, after self-configuration has been executed.

Refer to steps 7 to 9 under *3.3.1 Starting the System for First Time* for details of the rest of this procedure (steps 6 to 8).

7. Make parameter settings to match machinery.

8. Save SERVOPACK parameters to the Machine Controller and save Machine Controller data to flash memory.

9. Save ladder programs and reboot the Machine Controller.

This completes the system startup procedure when electronic devices have been added.

3.3.3 System Startup when Replacing Electronic Devices

Use the following procedure to start the system when replacing SERVOPACKs, Optional Modules, and other electronic devices due to malfunctions and other causes.

1. Back up applications.

Before replacing the electronic devices, log on to the Machine Controller online using MPE720 and select ***Online - Transfer - Read from Controller*** to create a backup of the application.

2. Turn OFF the power to the Machine Controller.

Once the application has been backed up, disconnect MPE720 from the Machine Controller, and turn OFF the Machine Controller power.

3. Start the electronic device to be added.

Make the DIP and rotary switch settings required for the device to be added.
For MECHATROLINK slaves, make the switch settings, and turn ON the power to the slave. Confirm that the device starts correctly and then turn OFF the power.

4. Replace the electronic device.

Remove the electronic device to be replaced, connect the new device to the Machine Controller, and turn ON the power to all MECHATROLINK slaves.

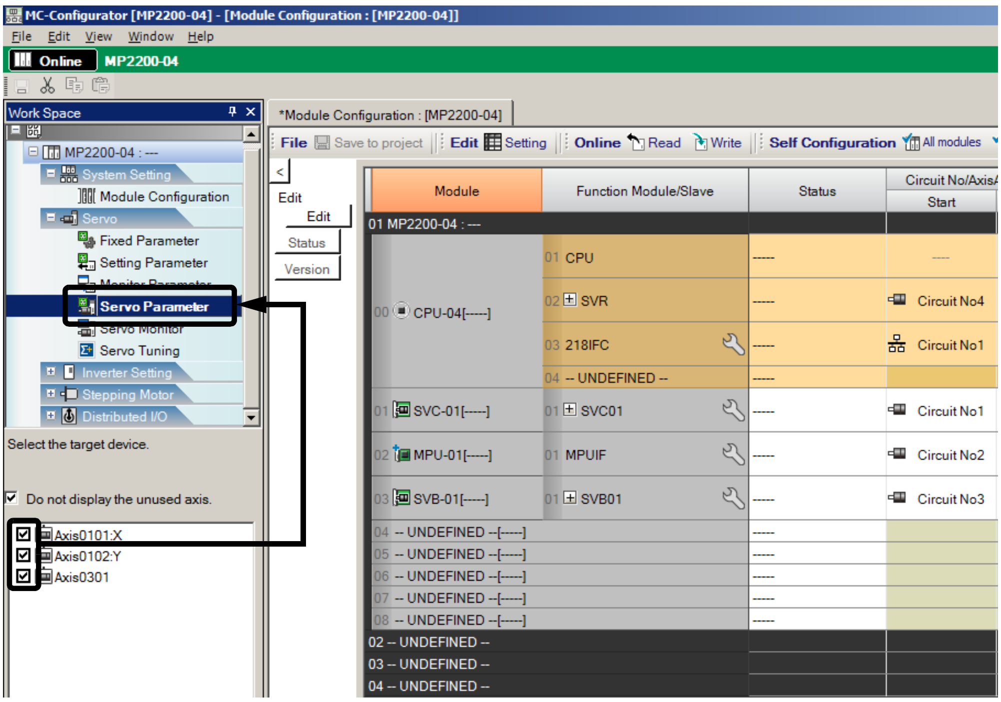
5. Turn ON the Machine Controller power.

Turn ON the power of the Machine Controller.

6. Save SERVOPACK parameters to the Machine Controller and save Machine Controller data to flash memory.

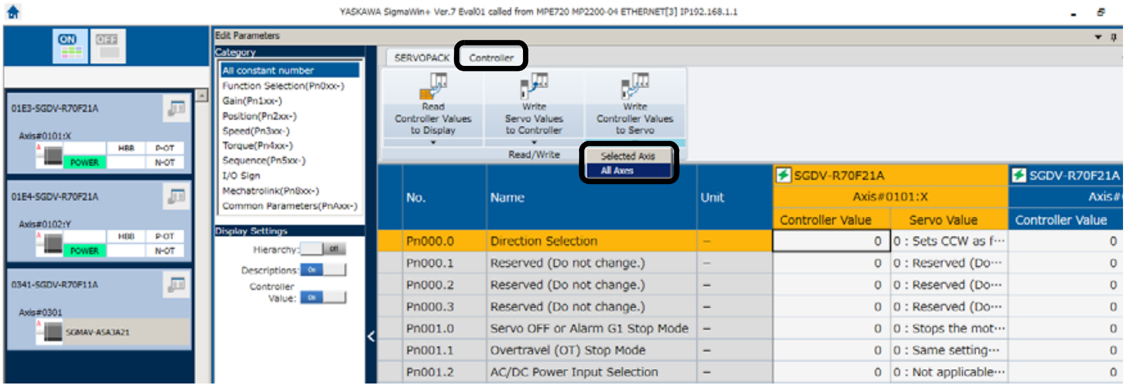
If a SERVOPACK has been replaced, use the following procedure to write the SERVOPACK parameters saved to the Machine Controller to the new SERVOPACK.

a) Select the axis in the Work Space Pane of the Module Configuration Tab Page (refer to *3.4.1 Module Configuration Definition Window*), and then double-click ***Servo Parameter.***

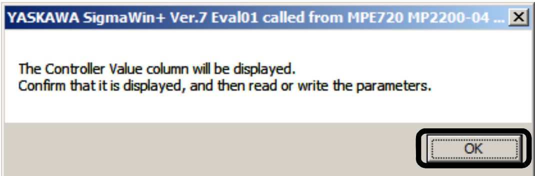


The SigmaWin+ will start and display the SERVOPACK parameters.

b) Click the **Controller** tab, click ▼ under ***Write Controller Values to Servo***, and then click ***All Axes***.

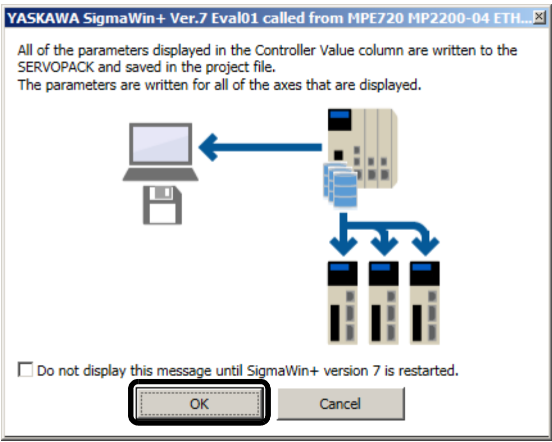


- The data in the *Controller Value* column is the SERVOPACK data saved to the Machine Controller and the data in the *Servo Value* column is the data set to the SERVOPACK.
- Refer to *3.4.4 SERVOPACK Parameter Window* for information on the relationship between *Controller Value* and *Servo Value*.
- If the ***Controller Value*** Column is not displayed, the following dialog box will be displayed. Click **OK**. The ***Controller Value*** Column will be displayed.



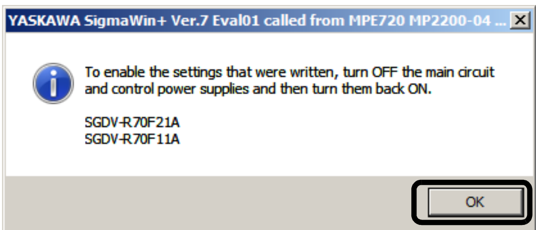
The message dialog box is displayed.

c) Click **OK**.



The SERVOPACK settings data for the Machine Controller will be written to all SERVOPACKs. When the data is written to the SERVOPACKs, a dialog box will be displayed.

d) Click **OK**.



The dialog box will be closed.

7. Turn ON the power to the Machine Controller and SERVOPACKs.

Turn ON (OFF to ON) the power to the Machine Controller and SERVOPACKs and then enable the parameters written to the SERVOPACKs.

This completes the system startup procedure when electric devices have been replaced.

3.4 Self-configuration and Each Window

When executing self-configuration, the Machine Controller automatically recognizes all the connected optional modules, and the files of the Module Configuration Definition, MECHATROLINK Transmission Definition, and motion parameters will accordingly be automatically created.
Each file contains the following information.

■ Module Configuration Definition

Information on all the optional modules connected to the Machine Controller
Refer to *3.4.1 Module Configuration Definition Window* for details.

■ MECHATROLINK Transmission Definition

Information of allocations related to MECHATROLINK transmission (master and slaves)
Refer to *3.4.2 MECHATROLINK Transmission Definition Window* for details.

■ Motion Parameters

Information on motion parameters to control axes such as SERVOPACKs, linear servomotors, inverters, and distributed I/Os that are connected to the SVB Module
Refer to *3.4.3 Motion Parameter Window* for details.

This section describes the setting window for each file.

- Refer to *Chapter 10 Inverter Operation* for information on the inverter settings.
- Refer to *Appendix B Settings When Connecting MECHATROLINK Compatible I/O Modules, MYVIS, and MP940* for information on MECHATROLINK slave module settings.
- Refer to *Appendix G Settings when Connecting MECHATROLINK-II Compatible Stepping Motor Drivers* for information on MECHATROLINK-II stepper motor settings.

3.4.1 Module Configuration Definition Window

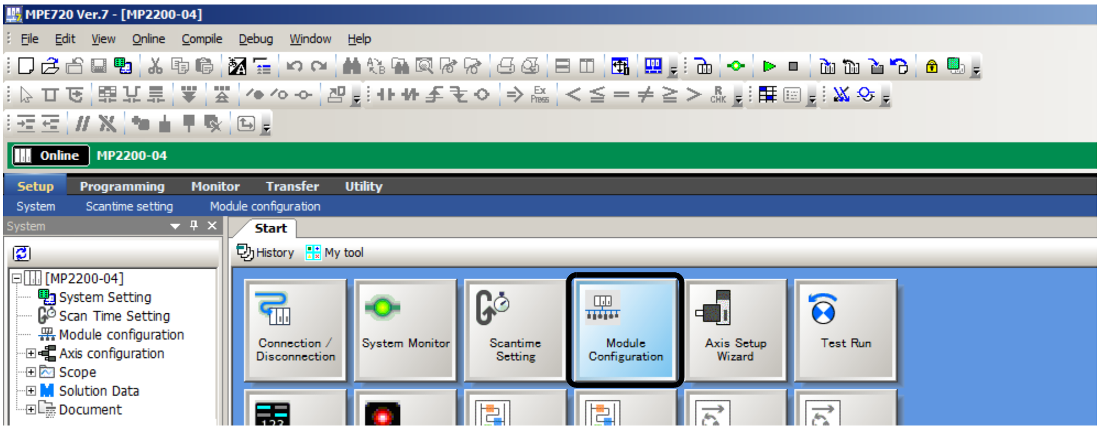
(1) Opening the Module Configuration Definition Window

Open the Module Configuration Definition Window by the following procedure.

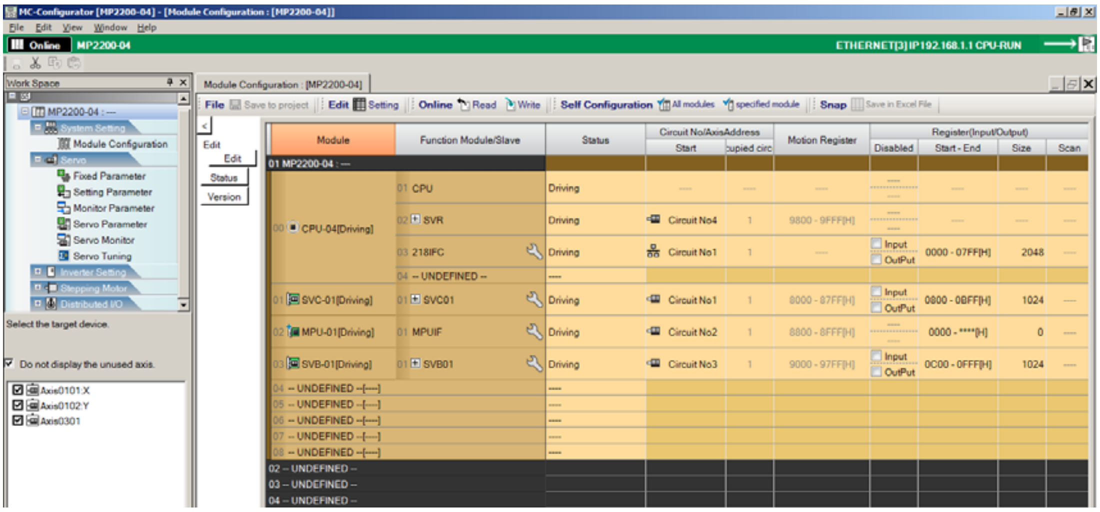
1. Make an online connection between the MPE720 and Machine Controller.

- For details, refer to *Machine Controller MP2000/MP3000 Series Engineering Tool MPE720 Version 7 User's Manual* (Manual No.: SIEP C880761 03).

2. Click ***Module Configuration*** on the My Tool View.

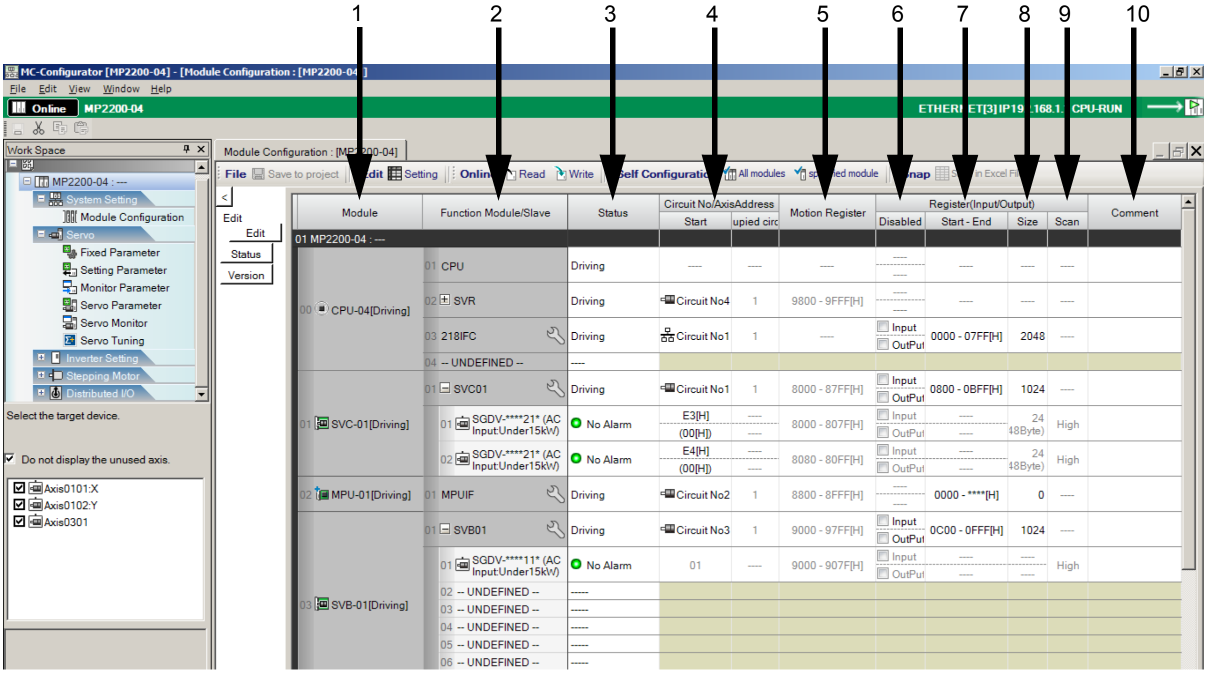


The Module Configuration Definition Window will open.



(2) Module Configuration Definition Window

The following table describes the items that are displayed in the Module Configuration Definition Window.



No.	Item		Display/Setting Item	Setting Range/Settings	Editing
①	Module		Displays the Module that is set for the slot.*1	Any Module	Possible
②	Function Module/Slave		Displays the Function Modules and slaves that are used by the Module.*1	Any Function Module or slave	Possible
③	Status		In Online Mode, displays the status of the Function Modules and the communications status of MECHATROLINK slave devices.	Refer to *3.4.1 (1) [a] Status Display Contents* on page 3-15.	Not possible
④	Circuit No./Axis Address	Start	Displays the first circuit number that is assigned to the Module.	Circuit No. 1 to 16	Possible
		Occupied circuits	Displays the number of circuits that are assigned to the Module.	1 to 2	Possible
⑤	Motion Register		Displays the first and last register numbers of the motion parameters.	The parameter is automatically set based on the circuit numbers.	Not possible
⑥	Register (Input/ Output)	Disabled	Used to disable inputs or outputs by selecting the check boxes.	Selected or not selected	Possible
⑦		Start - End	Displays the range of registers that is used as an I/O area by the Function Module. For the SVB, the first and last registers of the I/O Modules that are connected to MECHATROLINK are displayed.	0000H to 7FFFH max. 400H words per SVB Module *2	Possible
⑧		Size	Displays the number of words in the I/O area.	The size depends on the function of the Module.	Possible
⑨		Scan	Displays the scan in which the I/O service is performed for the I/O device.	High or Low	Possible
⑩	Comment		Displays the user comment.	You can enter up to 16 characters for a Function Module. You can enter up to 32 characters for a MECHATROLINK slave.	Possible

* 1. For the built-in SVB, CPU-01 is displayed for Module and SVB is displayed for Function Module/Slave.
For the Optional SVB, SVB-01 is displayed for Module and SVB01 is displayed for Function Module/Slave.

* 2. Set I/O registers so that the same registers are not used by more than one Function Module.

- Precautions When Setting the Parameters
  - Always save all settings to the flash memory after changing them.
  - When changing the settings, be careful not to set register numbers that overlap with other Modules.
  - Set I/O start and end registers even if a I/O Module is not connected to the MECHATROLINK network.

- *****I/O and *****SERVO in Function Module/Slave column
  The following slave devices (I/O Modules) do not have model codes. Therefore, "*****I/O"(wild card I/O) will be displayed in Function Module/Slave column for these devices after execution of self-configuration.
  - JEPMC-IO350
  - JAMSC-120DAI53330
  - JAMSC-120DAI73330
  - JAMSC-120DAO83330
  - JAMSC-120DRA83030

  For a servo with customized specifications that could not be recognized by self-configuration, "*****SERVO" (wild card servo) will be displayed in Function Module/Slave column.
  For a device displayed as "***** I/O" or "***** SERVO", right-click the ***Function Module/Slave*** Cell and click ***Select Device***. The ***Slaves*** Dialog Box will be displayed. Reassign the correct device.

[a] Status Display Contents

The following status is displayed for Function Modules.

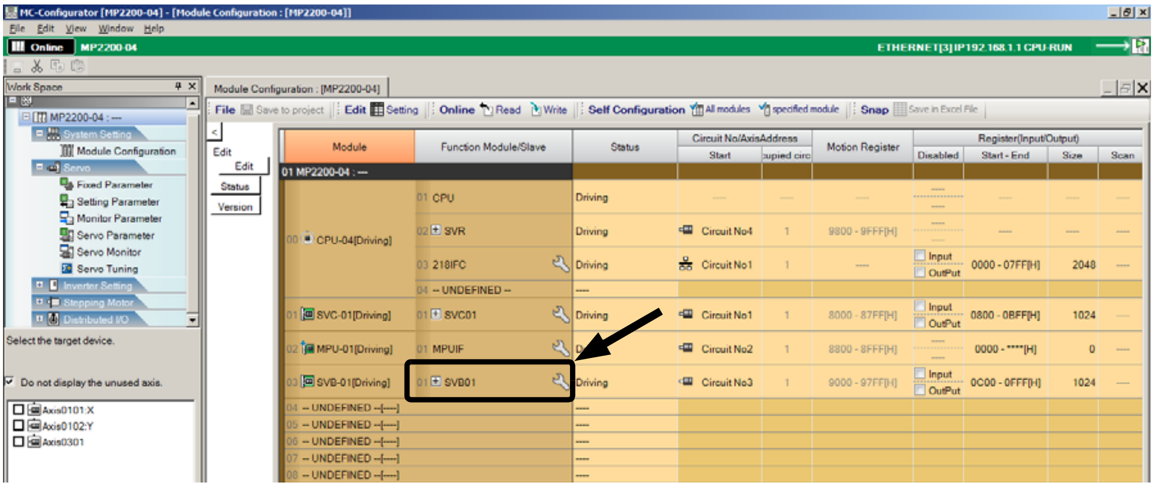
Display	Description
----	The Function Module is not defined.
Empty	The Function Module is defined, but it is not mounted.
Driving	The Function Module is operating normally.
Failure	An error was detected in the Function Module.
×	A Function Module is operating, but it is not the Function Module that was defined.
Initializing	The Function Module is defined, but there is no Detailed Function Module Definition.
Driving Stop	The CPU Module is stopped (The user programs are stopped).

3.4.2 MECHATROLINK Transmission Definition Window

(1) Opening the MECHATROLINK Transmission Definition Window

In the Module Configuration Definition Window, double-click the ***SVB*** or ***SVB01*** cell in the ***Function Module/Slave*** field. The MECHATROLINK Transmission Definition Window will open.

- If several SVB Modules are mounted, select the SVB Module to be checked.
- For the built-in SVB, CPU-01 is displayed for Module and SVB is displayed for Function Module/Slave.
  For the Optional SVB, SVB-01 is displayed for Module and SVB01 is displayed for Function Module/Slave.
- Clicking Icon displays the MECHATROLINK Transmission Definition Window too.



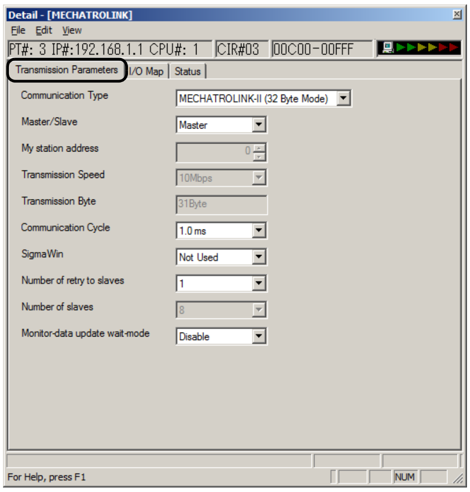
(2) MECHATROLINK Transmission Definition Window Details

The MECHATROLINK Transmission Definition Window has three tabs: Transmission Parameters, I/O Map, and Status. Click the tab to view each.

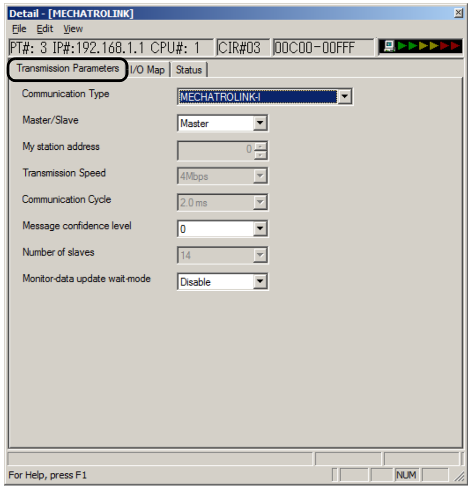
[a] Transmission Parameters Tab

The parameters required to use the MECHATROLINK transmission system are displayed.

<Communication Method in MECHATROLINK-II>



<Communication Method in MECHATROLINK-I>



The items shown on the Transmission Parameters Tab are described in the following table. For items whose input fields are available, the settings can be changed. Always save the settings to the flash memory after changing them.

Item	Display during Self-configuration	Options and Precautions on Settings
Communication Type	Displays the detected communication method.	Select ***MECHATROLINK-II (32 Byte Mode)***, ***MECHATROLINK-II (17 Byte Mode)***, or ***MECHATROLINK-I***.
Master/Slave	Displays whether the selected SVB Module is used as a Master station or Slave station.	Select either ***Master*** or ***Slave***. A built-in SVB is fixed to ***Master***.
My station address (Local station address)	Displays the local station address set by using the rotary switches.	For Master station, fixed to 0. For slave stations, set a number between 1 and the number of slave stations.
Transmission Speed	Displays the transmission speed: MECHATROLINK-II (32-byte mode): 10 Mbps MECHATROLINK-II (17-byte mode): 10 Mbps MECHATROLINK-I: 4 Mbps	Cannot be set.
Transmission Bytes (Hidden for MECHATROLINK-I)	Displays the number of transmission bytes. The number of transmission bytes depends on the communication type and the station type, Master or Slave. Refer to ■ *Transmission Bytes, Communication Cycle, Number of Retries to Slaves, Number of Slaves* for details.	Cannot be set.
Communication Cycle	Displays the communication cycle. The number of transmission bytes depends on the communication type and the station type, Master or Slave. Refer to ■ *Transmission Bytes, Communication Cycle, Number of Retries to Slaves, Number of Slaves* for details.	Can be set only for the Master station and when MECHATROLINK-II is selected as the communication type. The value that can be set differs depending on whether the SVB Module is a built-in SVB Module or optional SVB Module. Refer to ■ *Communication Cycle That Can be Set* for details.
Message Confidence Level (Hidden for MECHATROLINK-II)	Not used for MECHATROLINK transmission.	Set to 0 (default).
SigmaWin (Hidden for MECHATROLINK-I)	For MECHATROLINK-II communications, displays whether or not to use SigmaWin+ for communication via MECHATROLINK-II adapter such as JUSP-NP115.	Select either ***use*** or ***not use***.

(cont'd)

Item	Display during Self-configuration	Options and Precautions on Settings
Number of Retries Slaves (Hidden for MECHATROLINK-I)	Displays the maximum number of slave stations to which the Master can retry transmission in one transmission cycle when the Master has not received a normal response from a slave.	Only for Master station. Set a number between 0 and 7. Cannot set for Slaves.
Number of Slaves	Displays the number of slave stations that can be connected. Determined by communication type, communication cycle, use of SigmaWin+, and number of attempts to retry transmission to slaves.	Cannot be set.
Wait for Monitor Data Update (Hidden for built-in SVB Modules)	Displays whether or not to suspend CPU processing for the scan delay time of monitoring parameters of an optional SVB Module. Suspended when enabled, not suspended when disabled.	Select either ***Enable*** or ***Disable***. Refer to ■ *Wait for Monitor Data Update* for details on this function.

- For items whose input fields are available, the settings can be changed. Always save the settings to the flash memory after changing them.

■ Transmission Bytes, Communication Cycle, Number of Retries to Slaves, Number of Slaves

Transmission bytes, communication cycle, number of retries to slaves, and number of slaves at execution of self-configuration will be automatically set according to conditions including communication type, station type (Master or Slave), and the largest slave station number (the largest number among the detected slave station numbers).

<For Master Station>

Item	MECHATROLINK-II (32-byte mode)				MECHATROLINK-II (17-byte mode)		MECHATRO-LINK-I
Largest Slave Station Number	1 to 8	9	10 to 16	17 to 21	1 to 14	15	
Transmission Bytes	31 bytes				16 bytes		–
Communication Cycle	1 ms	1 ms	2 ms	2 ms	1 ms	1 ms	2 ms
Number of Retries to Slaves	1	0	5	21–The largest slave station number	1	0	14
Number of Slaves	8	9	16	The largest slave station number	14	15	14

<For Slave Stations>

Item	MECHATROLINK-II (32-byte mode)	MECHATROLINK-II (17-byte mode)	MECHATROLINK-I
Transmission Bytes	–	–	–
Communication Cycle	1 ms	1 ms	2 ms
Number of Slaves	30	30	15

■ Communication Cycle That Can be Set

The communication cycle that can be set will differ depending on the SVB Module type (built-in SVB or optional SVB) and the communication type as follows.

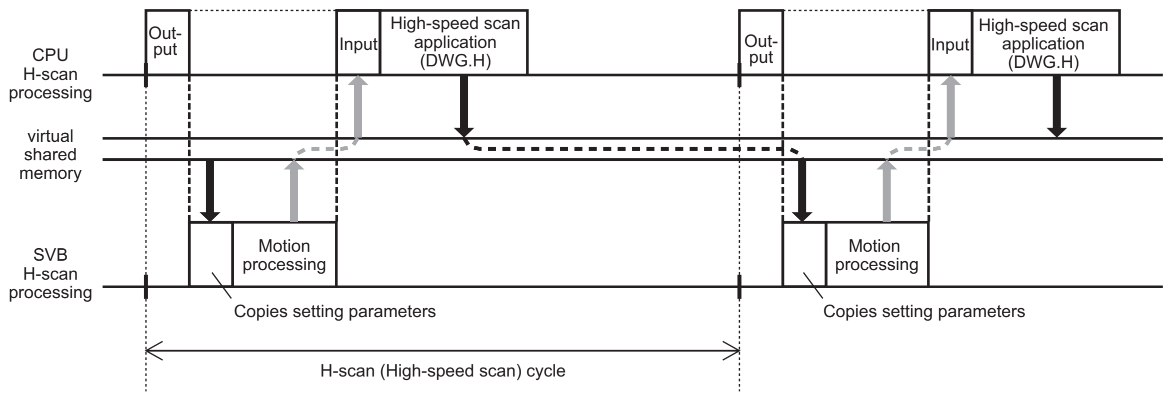
SVB Module Type	Built-in SVB		Optional SVB	
MECHATROLINK-II Communication Mode	32-byte mode	17-byte mode	32-byte mode	17-byte mode
Communication Cycle That Can be Set	1 ms, 1.5 ms, or 2 ms	Fixed to 1 ms	0.5 ms, 1 ms, 1.5 ms, or 2 ms	0.5 ms or 1 ms

- Communication Cycle can only be set for Master.
- The communication cycle for MECHATROLINK-I is fixed to 2 ms.

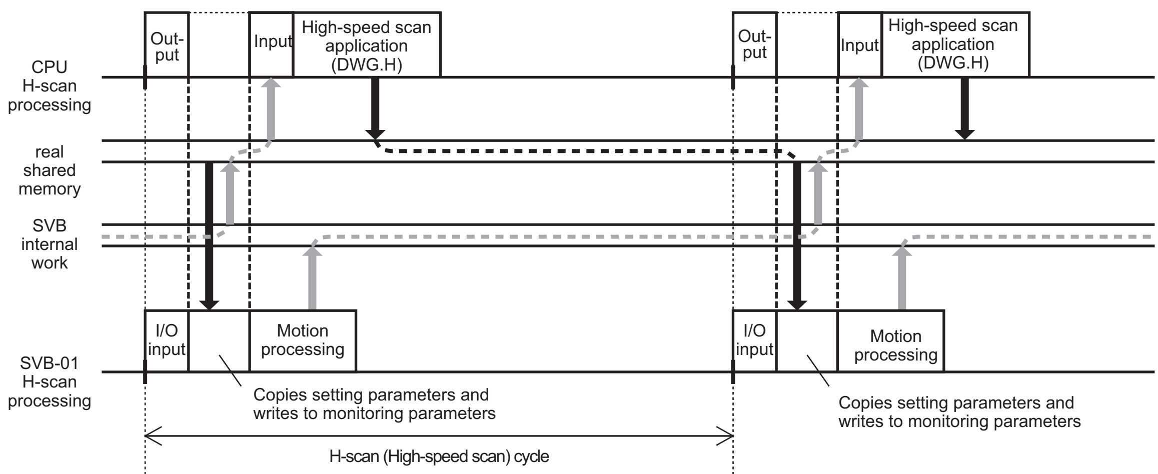
■ Wait for Monitor Data Update

The SVB-01 Module (optional SVB) exchanges data with the Machine Controller's CPU using the real shared memory. In this process, the time until the motion parameters created on the SVB-01 Module can be monitored in CPU applications is one scan longer than when using a built-in SVB Module. (See the following diagram.)

<Data Exchange Process with Built-in SVB Module>



<Data Exchange Process with Optional SVB Module>

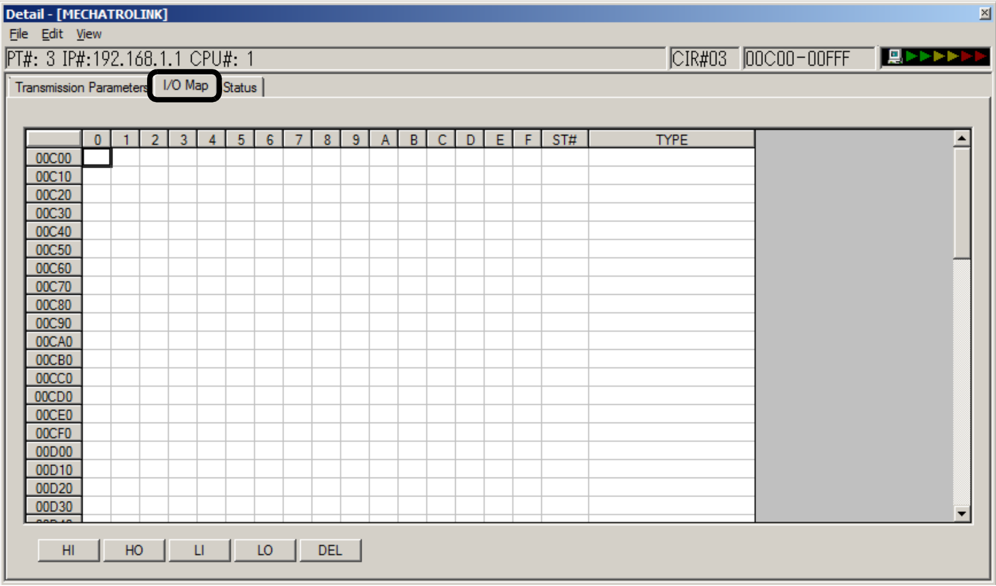


The Wait for Monitor Data Update Mode (when Wait for Monitor Data Update is enabled) solves the problem of this one-scan delay, so the motion monitoring parameters can be monitored with the same timing as a built-in SVB Module. The time required for CPU high-speed scan processing, however, will be longer because the CPU's application execution start time is suspended until the SVB-01 Module motion processing is completed.

[b] I/O Map Tab

The status allocated to I/O registers is displayed.

- The I/O Map Tab is used for monitoring (read-only). Do not change the displayed settings.

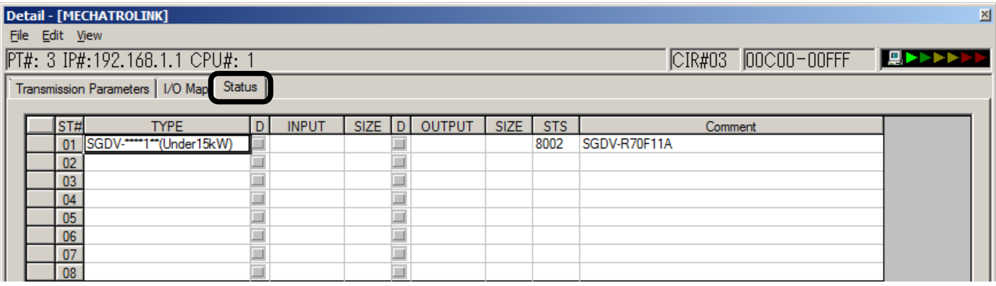


<Displayed Meaning>

HI: High-speed scan input
HO: High-speed scan output
LI: Low-speed scan input
LO: Low-speed scan output

[c] Status Tab Page

This tab page allows you to check the assignment settings for all slave devices that were detected during self-configuration (MECHATROLINK-connected devices, such as SERVOPACKs or distributed I/O).



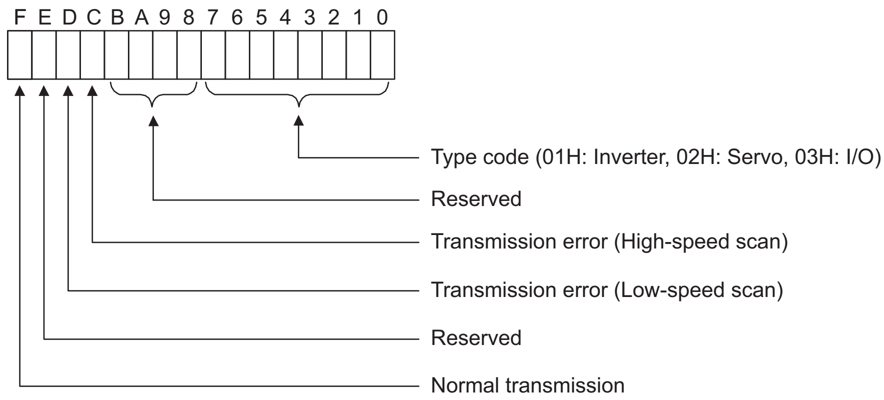
Item	Description
ST#	Station number Displays the number of lines which are set as ***Number of slaves*** in the Transmission Parameters Tab Page.
TYPE	Displays the slave device type.
D	Displays the I/O register's enable/disable status.  : Enabled  : Disabled
INPUT	Displays the leading input register number.
OUTPUT	Displays the leading output register number.
SIZE	Displays the number of input/output registers in words.
STS	Refer to ■ *STS.*
Comment	Displays the comment which is entered in ***Comment*** cell in the Module Configuration Definition Window.

■ STS

In online mode MECHATROLINK transmission status information is displayed in hexadecimal.

- In offline mode, nothing will be displayed.

The meaning of each bit is shown below.



3.4.3 Motion Parameter Window

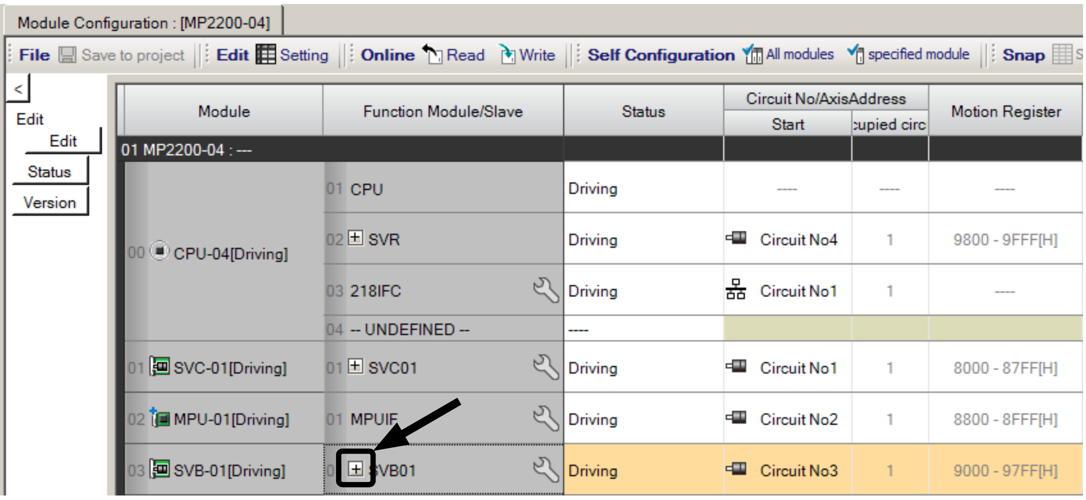
The motion parameters (motion fixed parameters, motion setting parameters, and motion monitoring parameters) control motion axes such as the SERVOPACK, inverter, and stepper.

- Refer to *Chapter 4 Motion Parameters* for details on motion parameters.

(1) Opening the Motion Parameter Window

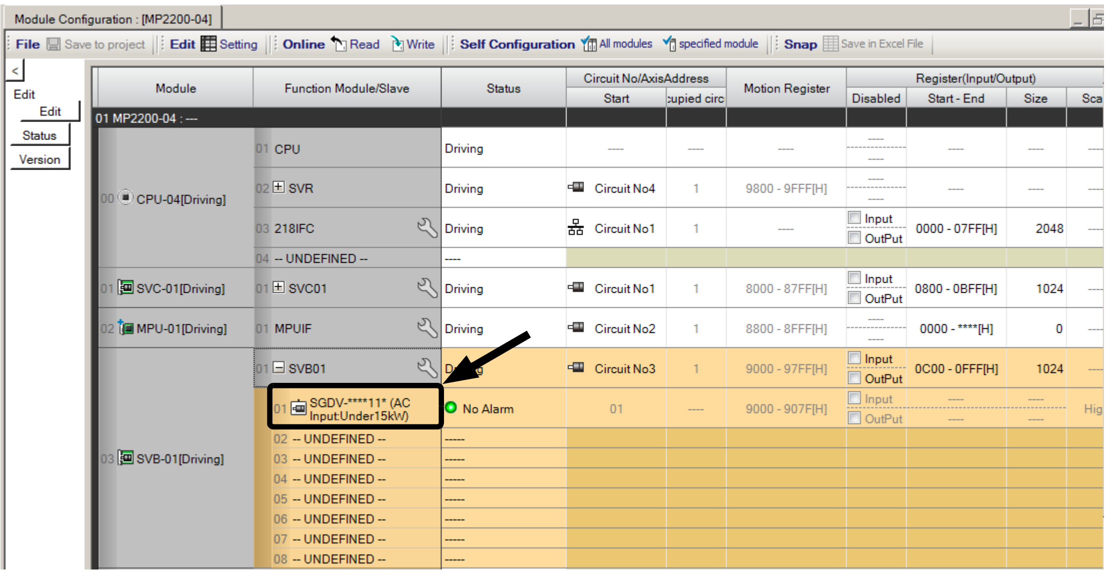
Open the Motion Parameter by the following procedure.

1. In the Module Configuration Tab Page (refer to *3.4.1 (1) Opening the Module Configuration Definition Window*), click the **[+]** Button for the ***Function Module/Slave*** Cell labeled SVB or SVB01.



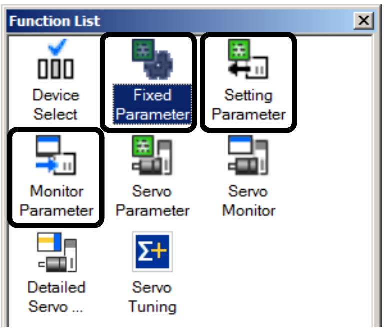
The slaves connected to that Module will be displayed.

2. Double-click the cell of the device with the Motion Parameter Tab Page to display.



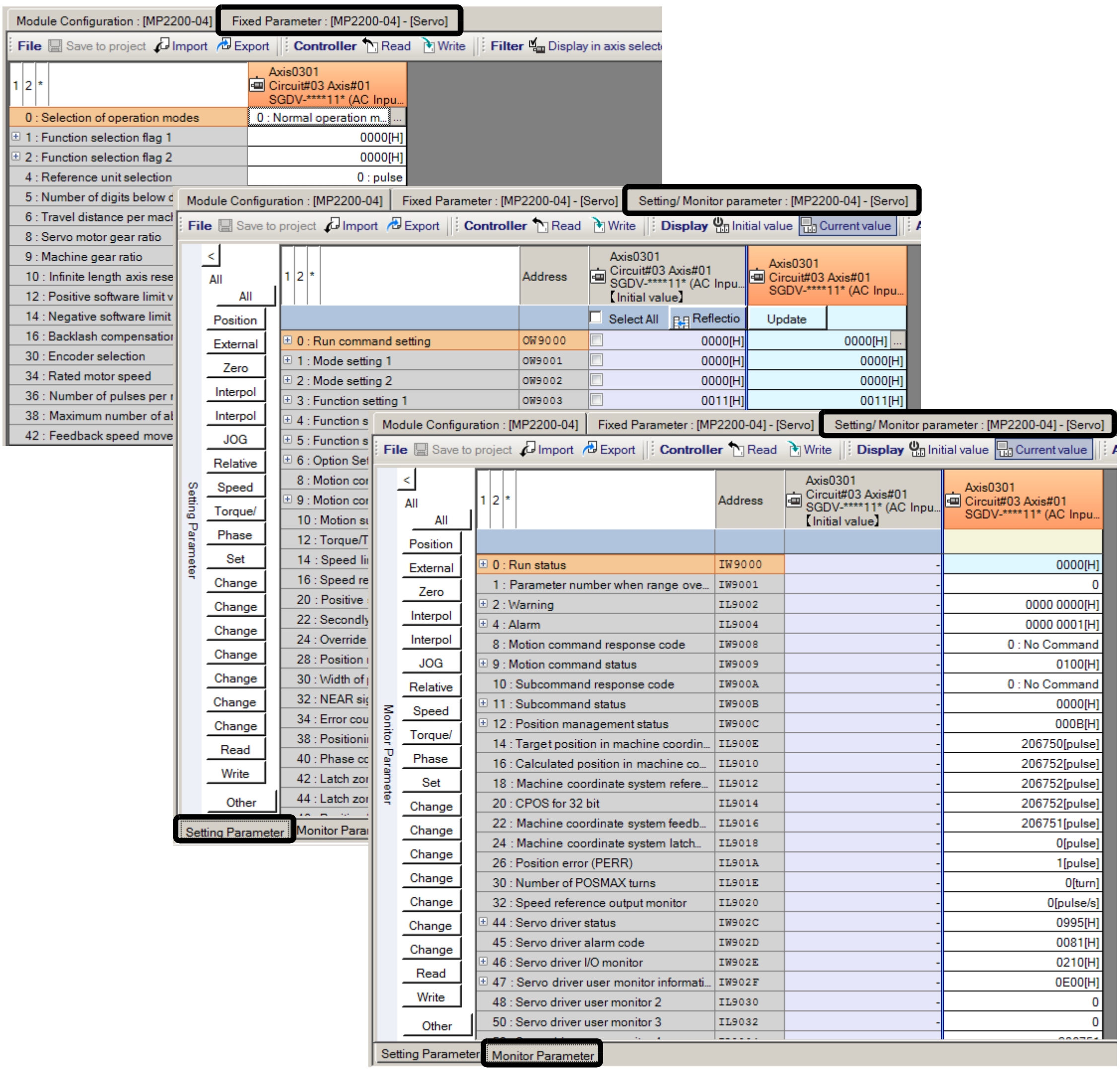
The Function List Dialog Box is displayed.

3. Click the motion parameters to display (***Fixed Parameter***, ***Setting Parameter***, or ***Monitor Parameter*** icon).



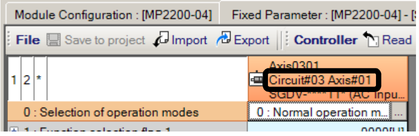
- Refer to the relevant SERVOPACK manual for details on the SERVOPACK.
- When the ***SteppingMotorDRV(M-I/M-II)*** Cell is double-clicked, the ***Stepping Motor Parameter*** icon is displayed in the Function List Dialog Box.
  Click this icon to display the parameter and monitor tabs for the stepping motor.

The selected motion parameters will be displayed in a new tab.

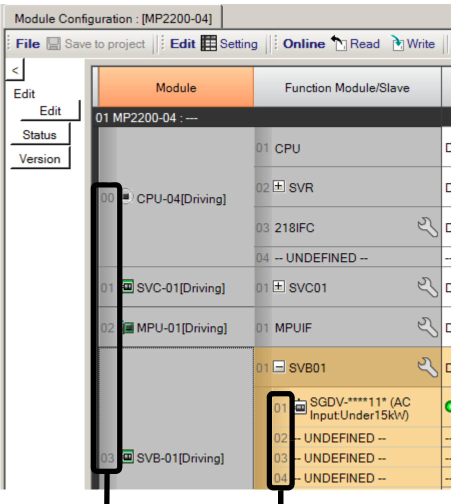


- ***Circuit #*** and ***Axis #*** displayed on the Motion Parameter Tab pages correspond to the following elements on the Module Configuration Tab Page.

<Motion Parameter Window>



<Module Configuration Definition Window>



The axis number is displayed here.

The circuit number is displayed here.

- The Monitor Parameter tab pages are for viewing parameters only.
- Refer to *3.4.4 SERVOPACK Parameter Window*.

(2) Environmental Requirements of SGDV SERVOPACKs

[a] Compatible Versions

■ When using Σ-V Series SERVOPACKs

Specification: Σ-V Series MECHATROLINK-II Communications Reference (Max. allowable motor capacity is 15 kW.)
Model: SGDV-□□□F1□□, -□□□A1□□, -□□□D1□□

Controller	Model	Version
MP2100	JAPMC-MC2100 (-E)	Version 2.61 or later
MP2100M	JAPMC-MC2140 (-E)	Version 2.61 or later
MP2300	JEPMC-MP2300 (-E)	Version 2.61 or later
MP2300S	JEPMC-MP2300S-E	Version 2.61 or later
MP2310	JEPMC-MP2310-E	Version 2.61 or later
MP2400	JEPMC-MP2400-E	Version 2.61 or later
MP2000 series SVB-01 module	JAPMC-MC2310 (-E)	Version 1.22 or later

Engineering Tool	Model	Version
MPE720 Version 5	CPMC-MPE720	Version 5.39 or later
MPE720 Version 6	CPMC-MPE770 (D)	Version 6.05 or later
MPE720 Version 7	CPMC-MPE780 (D)	Version 7.10 or later

■ When using Σ-V Series SERVOPACKs for Use with Large-Capacity

Specification: Σ-V Series for Use with Large-Capacity MECHATROLINK-II Communications Reference (Max. allowable motor capacity is 22 kW or higher.)
Model: SGDV-□□□J1□□

Controller	Model	Version
MP2100	JAPMC-MC2100 (-E)	Version 2.81 or later
MP2100M	JAPMC-MC2140 (-E)	Version 2.81 or later
MP2300	JEPMC-MP2300 (-E)	Version 2.81 or later
MP2300S	JEPMC-MP2300S-E	Version 2.81 or later
MP2310	JEPMC-MP2310-E	Version 2.81 or later
MP2400	JEPMC-MP2400-E	Version 2.81 or later
MP2000 series SVB-01 module	JAPMC-MC2310 (-E)	Version 1.30 or later

Engineering Tool	Model	Version
MPE720 Version 5	CPMC-MPE720	Not supported.
MPE720 Version 6	CPMC-MPE770 (D)	Version 6.33 or later.
MPE720 Version 7	CPMC-MPE780 (D)	Version 7.14 or later.

■ When using DC Power Input Σ-V Series SERVOPACKs

Specification: DC Power Input Σ-V Series MECHATROLINK-II Communications Reference
Model: SGDV-□□□E1□□

Controller	Model	Version
MP2100	JAPMC-MC2100 (-E)	Version 2.81 or later
MP2100M	JAPMC-MC2140 (-E)	Version 2.81 or later
MP2300	JEPMC-MP2300 (-E)	Version 2.81 or later
MP2300S	JEPMC-MP2300S-E	Version 2.81 or later
MP2310	JEPMC-MP2310-E	Version 2.81 or later
MP2400	JEPMC-MP2400-E	Version 2.81 or later
MP2000 series SVB-01 module	JAPMC-MC2310 (-E)	Version 1.30 or later

Engineering Tool	Model	Version
MPE720 Version 5	CPMC-MPE720	Not supported.
MPE720 Version 6	CPMC-MPE770 (D)	Version 6.32 or later
MPE720 Version 7	CPMC-MPE780 (D)	Version 7.13 or later

[b] Allocations

■ Communication Method and Cycle

○: Available, ×: Not available

Controller	M-I	M-II (17 bytes)	M-II (32 bytes)
MP2100	○	○	○
MP2100M	○	○	○
MP2300	○	○	○
MP2300S	○	○	○
MP2310	○	○	○
MP2400	○	○	○
MP2000 series SVB-01 module	○	○	○

M-II (17 bytes)

Controller	Communication Cycle	
	0.5 ms	1.0 ms
MP2100	×	○
MP2100M (built-in CPU)	×	○
MP2100M (option)	○	○
MP2300	×	○
MP2300S	○	○
MP2310	○	○
MP2400	○	○
MP2000 series SVB-01 module	○	○

M-II (32 bytes)

Controller	Communication Cycle			
	0.5 ms	1.0 ms	1.5 ms	2.0 ms
MP2100	×	○	○	○
MP2100M (built-in CPU)	×	○	○	○
MP2100M (option)	○	○	○	○
MP2300	×	○	○	○
MP2300S	○	○	○	○
MP2310	○	○	○	○
MP2400	○	○	○	○
MP2000 series SVB-01 module	○	○	○	○

- SVB modules for the MP2000 series are activated when the communication cycle and transmission cycle are the same length.

■ Allocation

Open the Module Configuration Tab Page in the MPE720, and set the model of the SERVOPACK that connects to the slave cell to assign to a ***Function Module/Slave*** Cell.
The settings depend on the model of SERVOPACK that is connected and the version of the MPE720.

Connected SERVOPACK Type	SERVOPACK Model	Version of MPE720	Displayed Setting of Function Module/Slave
Σ-V-series SERVOPACK (SERVOPACK with MECHATROLINK-II Communications with Maximum Motor Capacity of 15 kW)	SGDV-□□□F1□□ SGDV-□□□A1□□ SGDV-□□□D1□□	Ver. 5.62, Ver. 6.31, or Ver. 7.11 or earlier	SGDV-****1*
		Ver. 6.32 or Ver. 7.13 or later	SGDV-****1□* (AC input: under 15 kW)
Σ-V-series SERVOPACK for use with large-capacity (SERVOPACK with MECHATROLINK-II Communications with Maximum Motor Capacity of 22 kW or Higher)	SGDV-□□□J1□□	Ver. 5.62, Ver. 6.32, or Ver. 7.13 or earlier	****SERVO
		Ver. 6.33 or Ver. 7.14 or later	SGDV-****1□* (AC input: over 22 kW)
DC Power Input Σ-V-series SERVOPACK (SERVOPACK with MECHATROLINK-II Communications)	SGDV-□□□E1□□	Ver. 5.62, Ver. 6.31, or Ver. 7.11 or earlier	****SERVO
		Ver. 6.32 or Ver. 7.13 or later	<SVB-01 Module: Ver. 1.29 or earlier, Built-in SVB Module: Ver. 2.79 or earlier> ****SERVO
			<SVB-01 Module: Ver. 1.30 or later, Built-in SVB Module: Ver. 2.81 or later> SGDV-***E11* (DC input)

- Wrong assignments (SVB-01 Modules with version 1.24 or later and Built-in SVB Modules with version 2.64 or later)
  Even if the assignment is made incorrectly (e.g., if the SGDV-□□□E1□□ is connected but "SGDV-***1** (Over 22 kW)" is assigned), the SVB Module will recognize the unit correctly and process it as the SGDV-□□□E1□□. However, a Detected Servo Driver Type Error alarm (Monitoring Parameter IL□□04, bit 1D) will be detected, synchronized communications will not start, and the Motion Controller Operation Ready bit (Monitoring Parameter IW□□00, bit 0) will be 0 (operation not ready).
- Difference for rotary and linear servomotors
  Although the model number for SERVOPACKs are different for rotary and linear servomotors, allocate SGDV-****1** for both types in the Module Configuration Definition Window of the MPE720 Ver. 7.13 or earlier.

■ Self-configuration

If you execute self-configuration when a Σ-V-series SERVOPACK for use with large-capacity or a DC Power Input Σ-V-series SERVOPACK is connected, the setting that is displayed in the ***Function Module/Slave*** cell in the Module Configuration Definition Window will be as shown below depending on the version of the SVB Module and the MPE720.

Connected SERVOPACK Type	SERVOPACK Model	Version of SVB-01 Module or Built-in SVB Module	Version of MPE720	Displayed Setting of Function Module/Slave
Σ-V-series SERVOPACK for use with large-capacity (SERVOPACK with MECHATROLINK-II Communications with Maximum Motor Capacity of 22 kW or Higher)	SGDV-□□□J1□□	SVB-01 Module: Ver. 1.29 or earlier, Built-in SVB Module: Ver. 2.79 or earlier	–	****SERVO
		SVB-01 Module: Ver. 1.30 or later, Built-in SVB Module: Ver. 2.81 or later	Ver. 5.62, Ver. 6.32, or Ver. 7.13 or earlier	Nothing is displayed.
			Ver. 6.33 or Ver. 7.14 or later	SGDV-****11* (AC input: over 22 kW)
DC Power Input Σ-V-series SERVOPACK (SERVOPACK with MECHATROLINK-II Communications)	SGDV-□□□E1□□	SVB-01 Module: Ver. 1.29 or earlier, Built-in SVB Module: Ver. 2.79 or earlier	–	****SERVO
		SVB-01 Module: Ver. 1.30 or later, Built-in SVB Module: Ver. 2.81 or later	Ver. 5.62, Ver. 6.31, or Ver. 7.11 or earlier	Nothing is displayed.
			Ver. 6.32 or Ver. 7.13 or later	SGDV-***E11* (DC input)

[c] Restrictions

The following functions cannot be used with SGDV SERVOPACKs.

- Gain switching*1
- Backlash compensation*2
- Saving parameter bank data in the nonvolatile memory

* 1. Gain switching is different between SGDS and SGDV SERVOPACKs.
SGDS SERVOPACKs: 2 bits (4 points)
SGDV SERVOPACKs: 1 bit (2 points)
* 2. However, if you use an SGDV-****1** with software version 0023 or later, you can use the backlash compensation function in the SERVOPACK.

(3) Environmental Requirements of SGD7S SERVOPACKs

[a] Compatible Versions

Specification: Σ-7-series SERVOPACKs with MECHATROLINK-II Communications References
Model: SGD7S-□□□□10□

Controller	Model	Version	
		When Connected to Rotary Servomotor	When Connected to Linear Servomotor
MP2100	JAPMC-MC2100 (-E)	Version 2.89 or later	Version 2.92 or later
MP2100M	JAPMC-MC2140 (-E)	Version 2.89 or later	Version 2.92 or later
MP2101	JAPMC-MC2102-E	Version 2.89 or later	Version 2.92 or later
MP2101M	JAPMC-MC2142-E	Version 2.89 or later	Version 2.92 or later
MP2300	JEPMC-MP2300 (-E)	Version 2.89 or later	Version 2.92 or later
MP2300S	JEPMC-MP2300S-E	Version 2.89 or later	Version 2.92 or later
MP2310	JEPMC-MP2310-E	Version 2.89 or later	Version 2.92 or later
MP2400	JEPMC-MP2400-E	Version 2.89 or later	Version 2.92 or later
MP2000 series SVB-01 module	JAPMC-MC2310 (-E)	Version 1.33 or later	Version 1.34 or later

Engineering Tool	Model	Version	
		When Connected to Rotary Servomotor	When Connected to Linear Servomotor
MPE720 Version 6	CPMC-MPE770 (D)	Version 6.38 or later	Version 6.39 or later
MPE720 Version 7	CPMC-MPE780 (D)	Version 7.30 or later	Version 7.31 or later

[b] Allocations

■ Communication Method and Cycle

○: Available, ×: Not available

Controller	M-I	M-II (17 bytes)	M-II (32 bytes)
MP2100	○	○	○
MP2100M	○	○	○
MP2101	○	○	○
MP2101M	○	○	○
MP2300	○	○	○
MP2300S	○	○	○
MP2310	○	○	○
MP2400	○	○	○
MP2000 series SVB-01 module	○	○	○

M-II (17 bytes)

Controller	Communication Cycle	
	0.5 ms	1.0 ms
MP2100	×	○
MP2100M (built-in CPU)	×	○
MP2100M (option)	○	○
MP2101	○	○
MP2101M (built-in CPU)	○	○
MP2101M (option)	○	○
MP2300	×	○
MP2300S	○	○
MP2310	○	○
MP2400	○	○
MP2000 series SVB-01 module	○	○

M-II (32 bytes)

Controller	Communication Cycle			
	0.5 ms	1.0 ms	1.5 ms	2.0 ms
MP2100	×	○	○	○
MP2100M (built-in CPU)	×	○	○	○
MP2100M (option)	○	○	○	○
MP2101	○	○	○	○
MP2101M (built-in CPU)	○	○	○	○
MP2101M (option)	○	○	○	○
MP2300	×	○	○	○
MP2300S	○	○	○	○
MP2310	○	○	○	○
MP2400	○	○	○	○
MP2000 series SVB-01 module	○	○	○	○

■ Allocation

Open the Module Configuration Tab Page in the MPE720, and set the model of the SERVOPACK (SGD7S-****10* or SGD7S-****10* (Linear)) that connects to the slave cell to assign to a ***Function Module/Slave*** Cell.

- Wrong assignments
  Even if the assignment is made incorrectly (e.g., even if the SGD7S-□□□□10□ is connected but "SGDV-****1*" is assigned), the SVB Module will recognize the unit correctly and process it as the SGD7S-□□□□10□. However, a Detected Servo Driver Type Error alarm (Monitoring Parameter IL□□04, bit 1D) will be detected, synchronized communications will not start, and the Motion Controller Operation Ready bit (Monitoring Parameter IW□□00, bit 0) will be 0 (operation not ready).

- If you are using an SGD7S, confirm the setting methods for fixed parameters and the precautions. Refer to *11.8 Precautions When Using Σ-7-series SGD7S SERVOPACKs with Rotary Servomotors* for details.

3.4.4 SERVOPACK Parameter Window

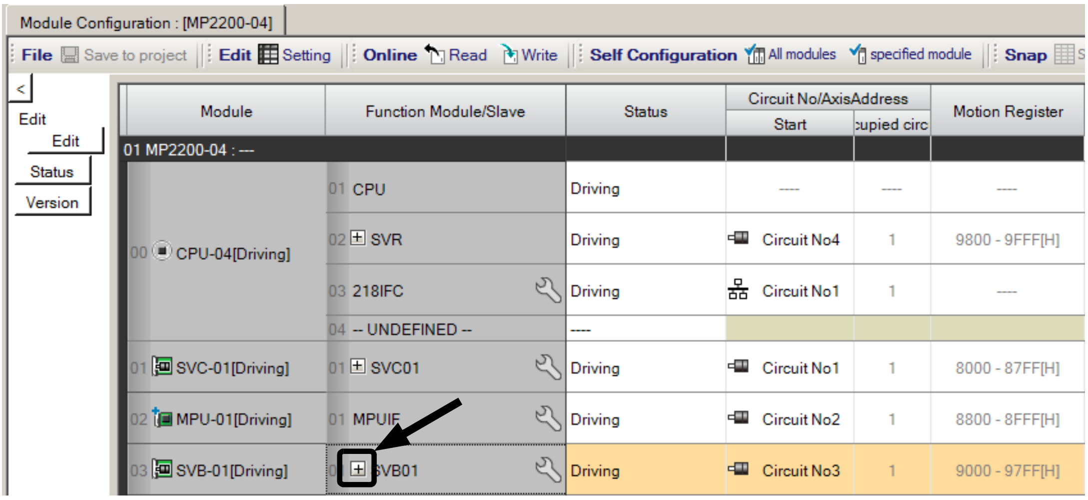
In systems connected to MECHATROLINK, SERVOPACK parameters can be read or written directly from the Machine Controller. (Refer to *11.6 Parameters That Are Automatically Updated.*) This means that parameters are saved in the memory areas of both the Machine Controller and the SERVOPACK. It is thus necessary to consider the relationship between the settings in both memory areas.

The following steps show how to display the Servo Parameters Window and the flow of SERVOPACK parameter data under various conditions.

(1) Opening the SERVOPACK Parameter Window

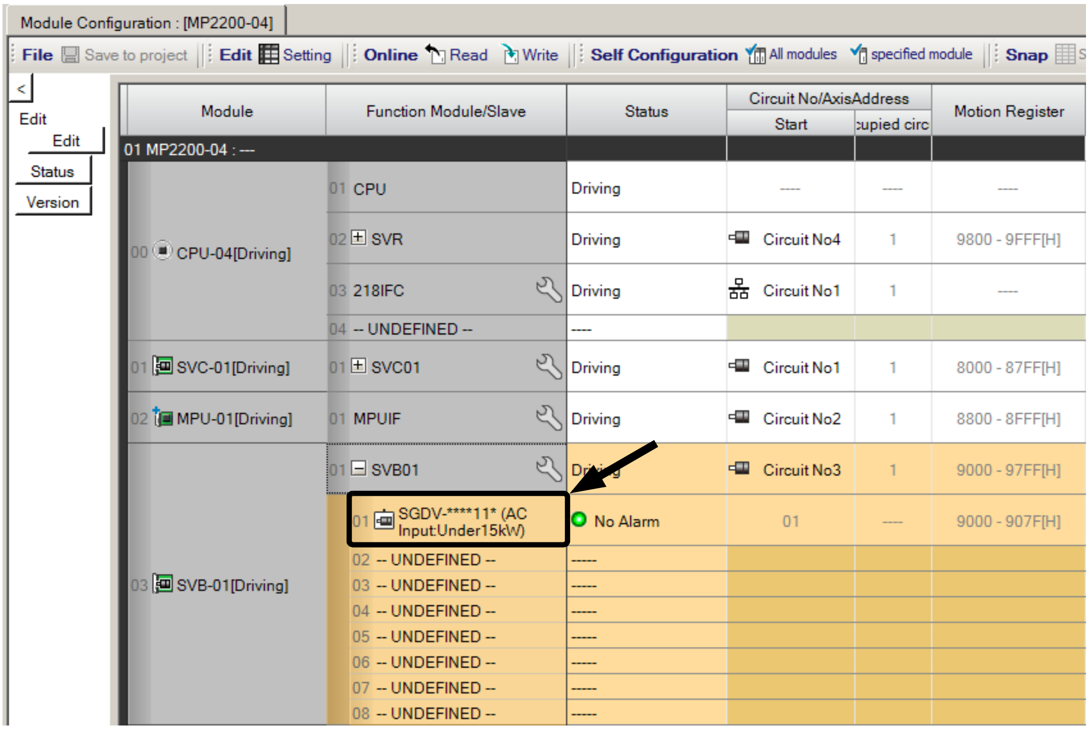
Open the SERVOPACK Parameter Window by the following procedure.

1. In the Module Configuration Tab Page (refer to *3.4.1 (1) Opening the Module Configuration Definition Window*), click the **[+]** Button for the ***Function Module/Slave*** Cell labeled SVB or SVB01.



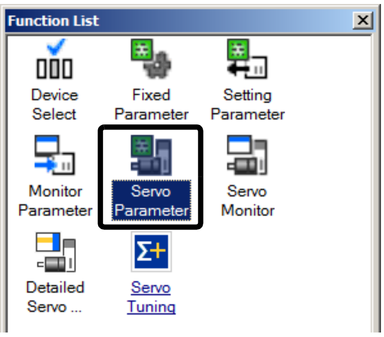
The slaves connected to that Module will be displayed.

2. Double-click the cell of the device with the Servo Parameter Tab Page to display.

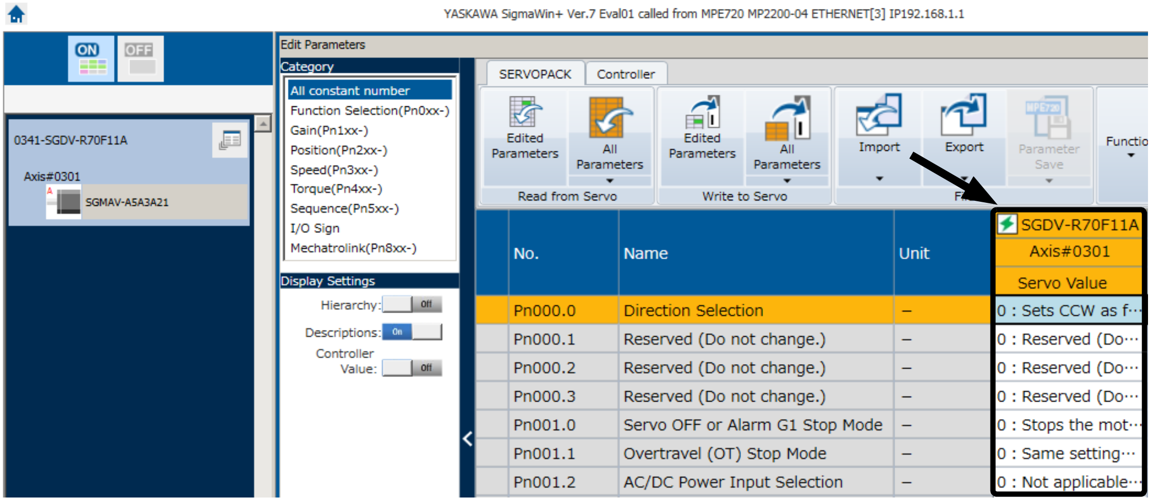


The Function List Dialog Box is displayed.

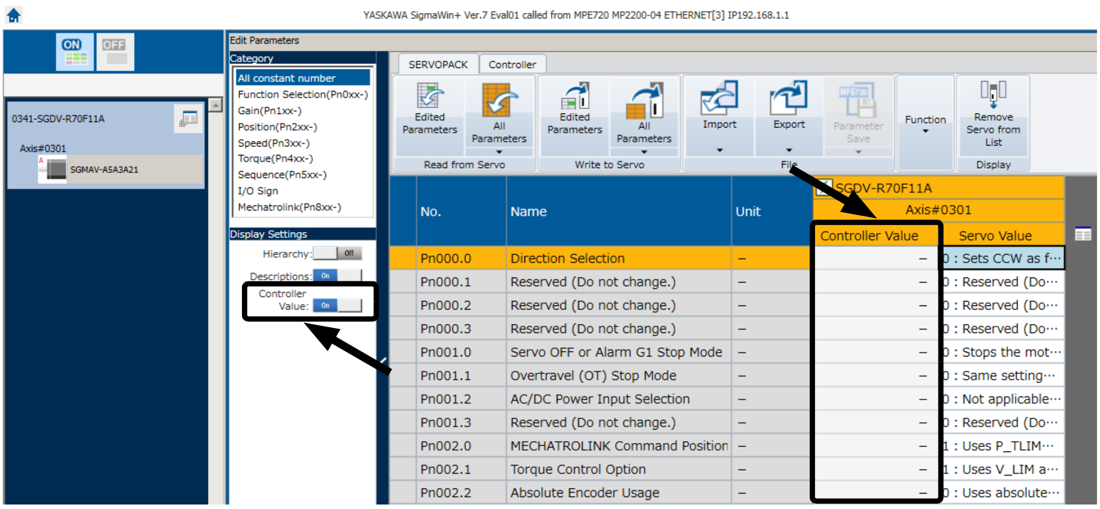
3. Click the ***Servo Parameter*** Icon.



The SigmaWin+ will start and display the servo parameters.



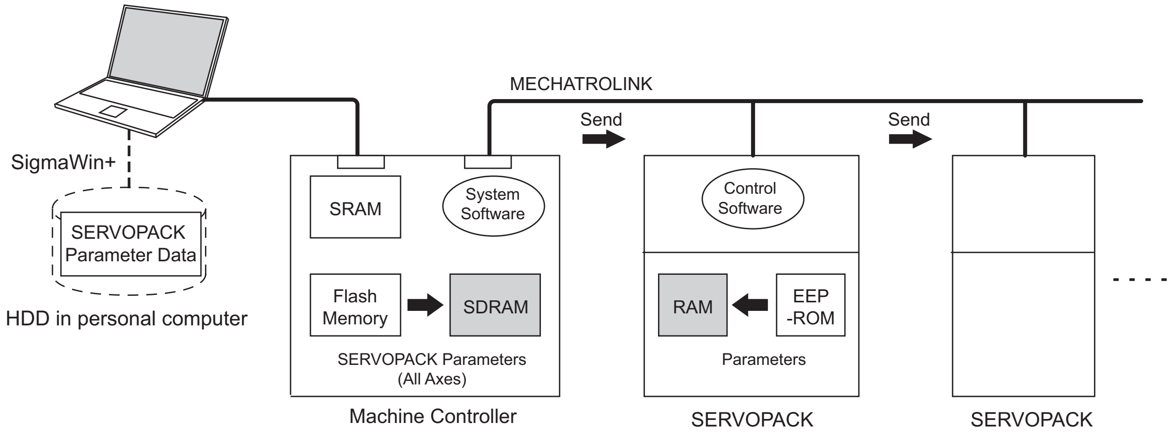
- Set ***Controller Value*** to **ON** to display the values saved in the Machine Controller. This makes it easy to compare the values saved in the Machine Controller with the values saved in the SERVOPACK.



(2) Flow of SERVOPACK Parameter Data

[a] Power ON

- Parameter data saved in the SERVOPACK's EEPROM*1 is copied to SERVOPACK's RAM.
- Parameter data saved in the Machine Controller's flash memory*1 for all axes is copied to SDRAM*2. Some gain-related settings are sent from the Machine Controller to SERVOPACK RAM*1.

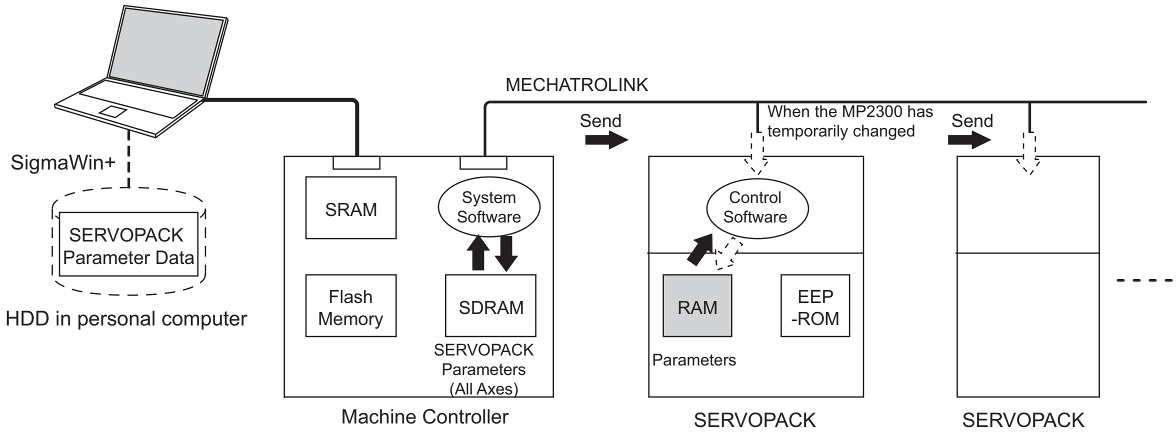


* 1. EEROM and flash memory: Can store data even when the power is turned OFF.
* 2. RAM, SRAM, and SDRAM: Can lose data when the power is turned OFF.

- ▭ indicates data has been written.

[b] Normal Operation

- Control software of the SERVOPACK operates in accordance with on the parameter data held in the SERVO-PACK's RAM.
- Some setting parameters and commands of the Machine Controller temporarily change SERVOPACK parameters. The RAM in the SERVOPACK is also changed. (Refer to *Chapter 4 Motion Parameters* for details.)



- Parameters held in the SERVOPACK's RAM are displayed on a Digital Operator connected to the SERVO-PACK. Press the DATE/ENTER Key to write the parameters to the EEPROM.
- ▭ indicates data has been written.

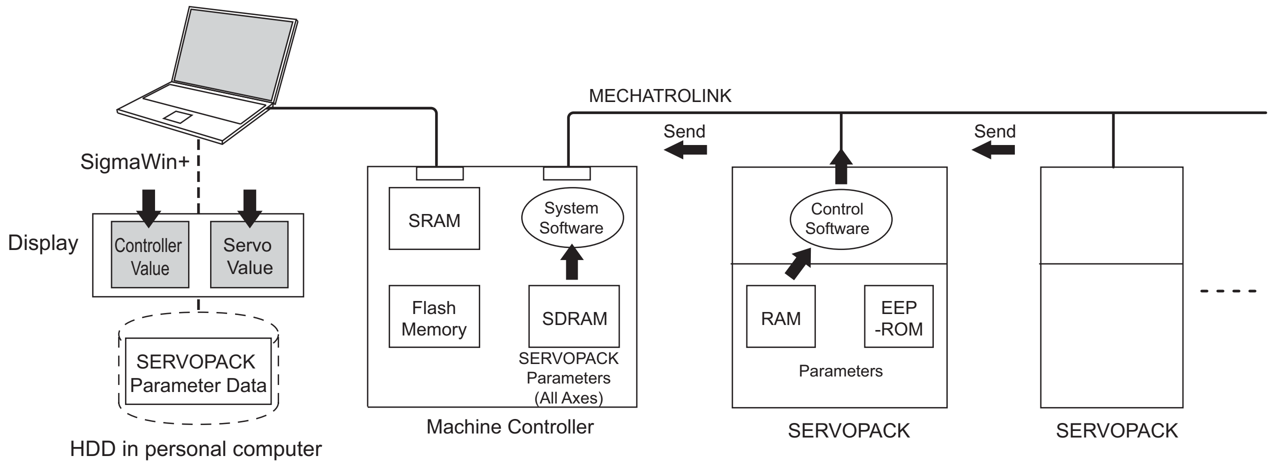
Self-configuration and Created Definition Files

3

[c] When the SERVOPACK Parameter Window Is Open

The data flow for SERVOPACK parameters is as follows when the SERVOPACK Parameter Window is open (refer to *3.4.3 (1) Opening the Motion Parameter Window* for details on how to open the SERVOPACK Parameter Window).

- The value of the SERVOPACK’s RAM for the relevant axis is displayed in the ***Servo Value*** column and the value of the Machine Controller's SDRAM is displayed in the ***Controller Value*** column.

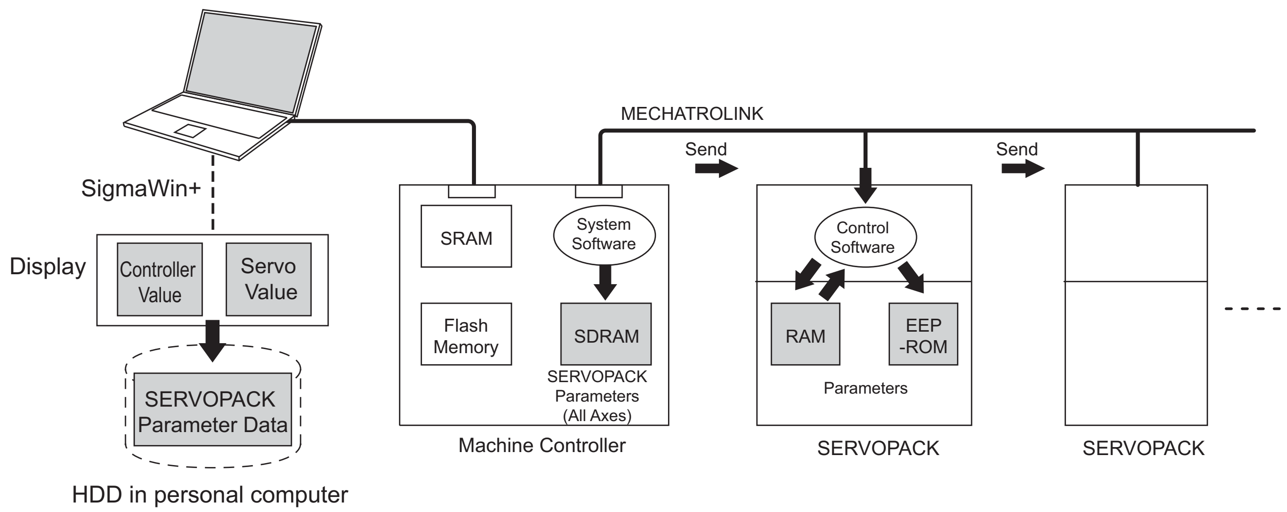


- ⬜ indicates data has been written.

[d] When Saving SERVOPACK Parameters

The data flow for SERVOPACK parameters is as follows when the parameters are saved on the SERVOPACK Parameter Window (refer to *3.4.4 (1) Opening the SERVOPACK Parameter Window* for details on how to open the SERVOPACK Parameter Window).

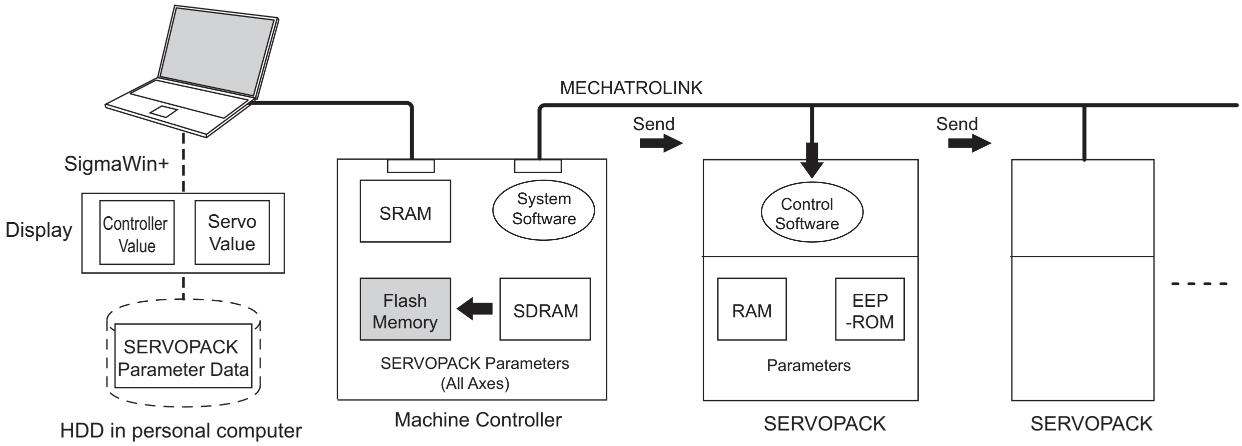
- The values in the ***Controller Value*** or ***Servo Value*** column displayed on the SERVOPACK Parameter Window of the relevant axis are written to the followings.
  - HDD (hard disk) of the personal computer
  - SDRAM of Machine Controller
  - RAM and EEPROM of the SERVOPACK
- The operation on the Servo Parameters Window determines whether to write the controller values or servo values. The Servo Parameters Window has the SERVOPACK Tab Page and the Controller Tab Page. Select the tab page with the parameters to write and follow the displayed instructions.



- ⬜ indicates data has been written (same as below).

[e] Saving Data to Flash Memory

The Machine Controller writes the parameters data held in SDRAM to flash memory.



- Save to flash memory also after having changed set data of SERVOPACK parameter.
- ▭ indicates data has been written.

4

Motion Parameters

This chapter explains each of the motion parameters.

4.1 Motion Parameters Register Numbers

4.1.1 Motion Parameter Register Numbers for MP2000 Series Machine Controllers

The leading motion parameter register numbers (I or O register numbers) are determined by the circuit number and axis number.
The leading register numbers for each axis's motion parameters can be obtained using the following equation.

Leading motion parameter register number
= I (or O)W8000 + (circuit number - 1) × 800h + (axis number - 1) × 80h

The following tables lists the motion parameters register numbers.

Circuit No.	Axis No. 1	Axis No. 2	Axis No. 3	Axis No. 4	Axis No. 5	Axis No. 6	Axis No. 7	Axis No. 8
1	8000 to 807F	8080 to 80FF	8100 to 817F	8180 to 81FF	8200 to 827F	8280 to 82FF	8300 to 837F	8380 to 83FF
2	8800 to 887F	8880 to 88FF	8900 to 897F	8980 to 89FF	8A00 to 8A7F	8A80 to 8AFF	8B00 to 8B7F	8B80 to 8BFF
3	9000 to 907F	9080 to 90FF	9100 to 917F	9180 to 91FF	9200 to 927F	9280 to 92FF	9300 to 937F	9380 to 93FF
4	9800 to 987F	9880 to 98FF	9900 to 997F	9980 to 99FF	9A00 to 9A7F	9A80 to 9AFF	9B00 to 9B7F	9B80 to 9BFF
5	A000 to A07F	A080 to A0FF	A100 to A17F	A180 to A1FF	A200 to A27F	A280 to A2FF	A300 to A37F	A380 to A3FF
6	A800 to A87F	A880 to A8FF	A900 to A97F	A980 to A9FF	AA00 to AA7F	AA80 to AAFF	AB00 to AB7F	AB80 to ABFF
7	B000 to B07F	B080 to B0FF	B100 to B17F	B180 to B1FF	B200 to B27F	B280 to B2FF	B300 to B37F	B380 to B3FF
8	B800 to B87F	B880 to B8FF	B900 to B97F	B980 to B9FF	BA00 to BA7F	BA80 to BAFF	BB00 to BB7F	BB80 to BBFF
9	C000 to C07F	C080 to C0FF	C100 to C17F	C180 to C1FF	C200 to C27F	C280 to C2FF	C300 to C37F	C380 to C3FF
10	C800 to C87F	C880 to C8FF	C900 to C97F	C980 to C9FF	CA00 to CA7F	CA80 to CAFF	CB00 to CB7F	CB80 to CBFF
11	D000 to D07F	D080 to D0FF	D100 to D17F	D180 to D1FF	D200 to D27F	D280 to D2FF	D300 to D37F	D380 to D3FF
12	D800 to D87F	D880 to D8FF	D900 to D97F	D980 to D9FF	DA00 to DA7F	DA80 to DAFF	DB00 to DB7F	DB80 to DBFF
13	E000 to E07F	E080 to E0FF	E100 to E17F	E180 to E1FF	E200 to E27F	E280 to E2FF	E300 to E37F	E380 to E3FF
14	E800 to E87F	E880 to E8FF	E900 to E97F	E980 to E9FF	EA00 to EA7F	EA80 to EAFF	EB00 to EB7F	EB80 to EBFF
15	F000 to F07F	F080 to F0FF	F100 to F17F	F180 to F1FF	F200 to F27F	F280 to F2FF	F300 to F37F	F380 to F3FF
16	F800 to F87F	F880 to F8FF	F900 to F97F	F980 to F9FF	FA00 to FA7F	FA80 to FAFF	FB00 to FB7F	FB80 to FBFF

Circuit No.	Axis No. 9	Axis No. 10	Axis No. 11	Axis No. 12	Axis No. 13	Axis No. 14	Axis No. 15	Axis No. 16
1	8400 to 847F	8480 to 84FF	8500 to 857F	8580 to 85FF	8600 to 867F	8680 to 86FF	8700 to 877F	8780 to 87FF
2	8C00 to 8C7F	8C80 to 8CFF	8D00 to 8D7F	8D80 to 8DFF	8E00 to 8E7F	8E80 to 8EFF	8F00 to 8F7F	8F80 to 8FFF
3	9400 to 947F	9480 to 94FF	9500 to 957F	9580 to 95FF	9600 to 967F	9680 to 96FF	9700 to 977F	9780 to 97FF
4	9C00 to 9C7F	9C80 to 9CFF	9D00 to 9D7F	9D80 to 9DFF	9E00 to 9E7F	9E80 to 9EFF	9F00 to 9F7F	9F80 to 9FFF
5	A400 to A47F	A480 to A4FF	A500 to A57F	A580 to A5FF	A600 to A67F	A680 to A6FF	A700 to A77F	A780 to A7FF
6	AC00 to AC7F	AC80 to ACFF	AD00 to AD7F	AD80 to ADFF	AE00 to AE7F	AE80 to AEFF	AF00 to AF7F	AF80 to AFFF
7	B400 to B47F	B480 to B4FF	B500 to B57F	B580 to B5FF	B600 to B67F	B680 to B6FF	B700 to B77F	B780 to B7FF
8	BC00 to BC7F	BC80 to BCFF	BD00 to BD7F	BD80 to BDFF	BE00 to BE7F	BE80 to BEFF	BF00 to BF7F	BF80 to BFFF
9	C400 to C47F	C480 to C4FF	C500 to C57F	C580 to C5FF	C600 to C67F	C680 to C6FF	C700 to C77F	C780 to C7FF
10	CC00 to CC7F	CC80 to CCFF	CD00 to CD7F	CD80 to CDFF	CE00 to CE7F	CE80 to CEFF	CF00 to CF7F	CF80 to CFFF
11	D400 to D47F	D480 to D4FF	D500 to D57F	D580 to D5FF	D600 to D67F	D680 to D6FF	D700 to D77F	D780 to D7FF
12	DC00 to DC7F	DC80 to DCFF	DD00 to DD7F	DD80 to DDFF	DE00 to DE7F	DE80 to DEFF	DF00 to DF7F	DF80 to DFFF
13	E400 to E47F	E480 to E4FF	E500 to E57F	E580 to E5FF	E600 to E67F	E680 to E6FF	E700 to E77F	E780 to E7FF
14	EC00 to EC7F	EC80 to ECFF	ED00 to ED7F	ED80 to EDFF	EE00 to EE7F	EE80 to EEFF	EF00 to EF7F	EF80 to EFFF
15	F400 to F47F	F480 to F4FF	F500 to F57F	F580 to F5FF	F600 to F67F	F680 to F6FF	F700 to F77F	F780 to F7FF
16	FC00 to FC7F	FC80 to FCFF	FD00 to FD7F	FD80 to FDFF	FE00 to FE7F	FE80 to FEFF	FF00 to FF7F	FF80 to FFFF

4.2 Motion Parameters Setting Window

Set or monitor the motion parameters in the Fixed Parameters, Setting Parameters, and Monitor Parameters tabs of the Module Configuration Definition Window.

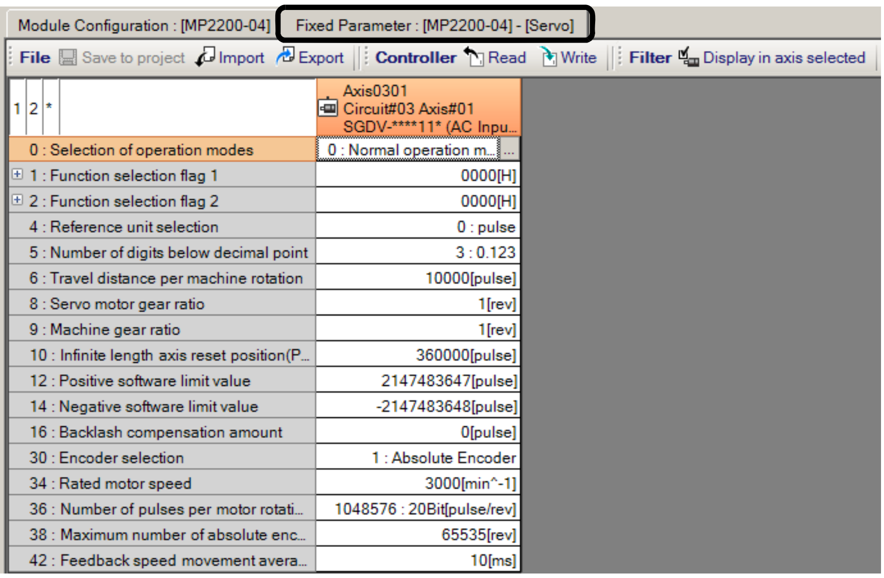


Fig. 4.1 Fixed Parameters Tab Page

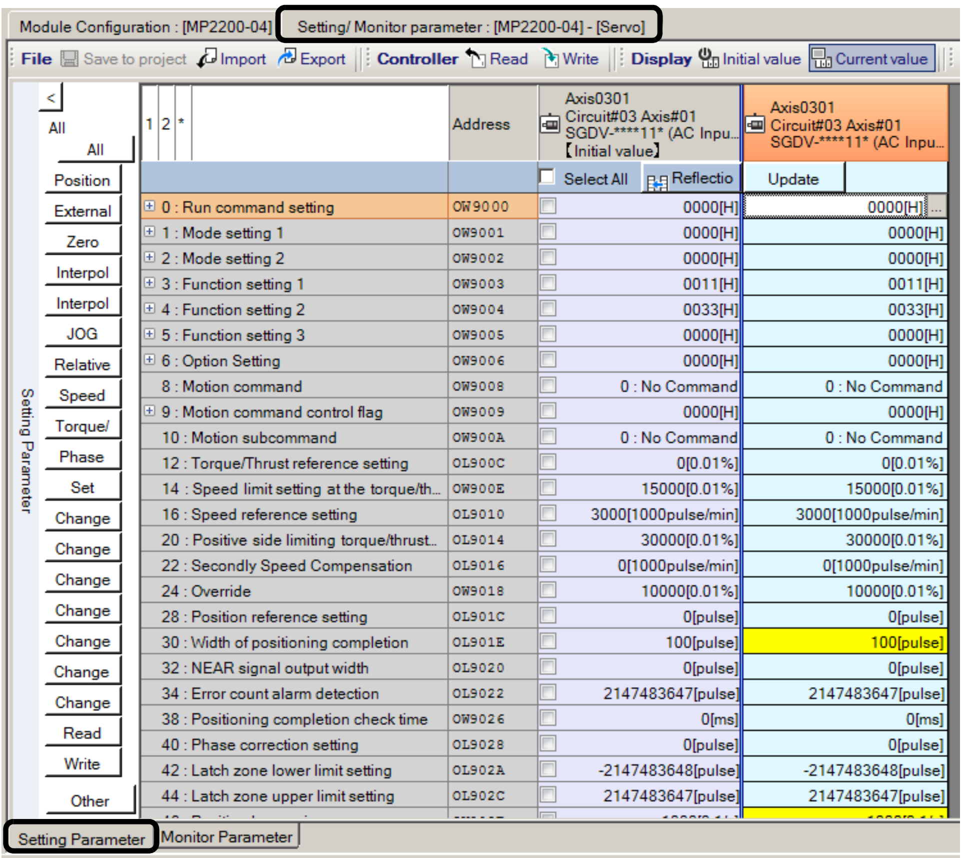


Fig. 4.2 Setting Parameters Tab Page

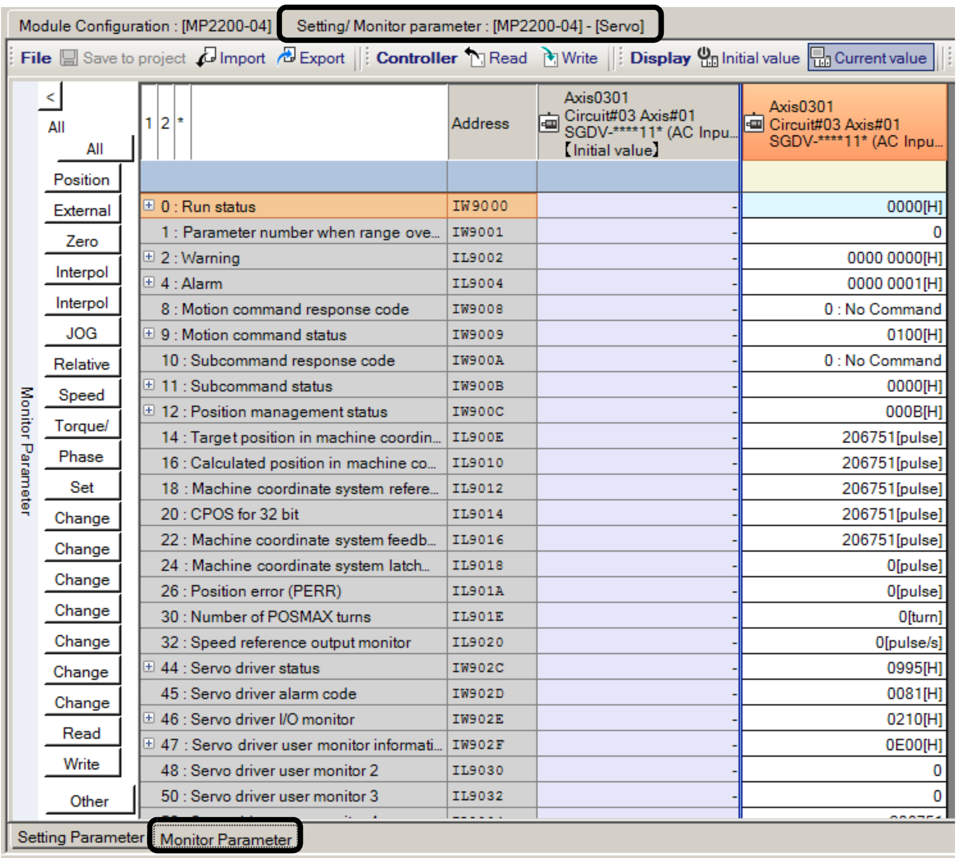


Fig. 4.3 Monitor Parameters Tab Page (Read-Only)

4.2.1 Opening the Motion Parameter Setting Windows

Refer to *3.4.1 Module Configuration Definition Window* and *3.4.3 Motion Parameter Window* for information on how to open motion parameter setting windows.

4.2.2 Motor Type and Related Alarms

(1) Alarm When Motor Type is Unmatched

If the following three settings do not match, an alarm* will activate.

- Servo Type in the SVB Definition Window
- Motor type for actually connected SERVOPACK

  The setting method differs depending on the SERVOPACK type.

SERVOPACK Type		Setting Method	Remark
SGDH (SGDH + NS100 or + NS115)	Σ-II	Pn000 = n.X□□□ (rotary/linear startup selection)	Pn000 = n.0□□□ (Started as a rotary SERVOPACK.) Pn000 = n.1□□□ (Started as a linear SERVOPACK.)
SGDS	Σ-III	SERVOPACK model	SGDS-***12A: Rotary SERVOPACK SGDS-***15A: Linear SERVOPACK
SJDE	JUNMA	–	Setup not required because only rotary-type SERVOPACKs are supported.
SGDV	Σ-V	SERVOPACK model	SGDV-****11*: Rotary SERVOPACK SGDV-****15*: Linear SERVOPACK
	Σ-V Large-Capacity Model	–	Setup not required because only rotary-type SERVOPACKs are supported.
	DC Power Input Σ-V Series		
SGD7S	Σ-7	–	Setup not required because the connected motor is determined automatically.

- Actually connected motor type

  * Two types of alarm: Monitoring parameter IL□□04, bit 1E (Motor Type Set Error) and bit 1F (Connected Encoder Type Error)

These alarms cannot be cleared by executing ***Alarm Clear***. The way to clear the alarm will differ depending on the situation. If either or both of these alarms occur, refer to the following table for how to clear the alarm.

Setting Value		Actually Connected Servomotor	Alarm That Can Occur	How to Clear Alarm
Module Configuration Definition Window	Motor Type for Actually Connected SERVOPACK *			
Rotary type	Linear type	Linear type	IL□□04, bit 1E and IL□□04, bit 1F	Change the motor type setting for the Module Configuration Definition Window, and then save the change.
Linear type	Rotary type	Rotary type		
Rotary type	Rotary type	Linear type	IL□□04, bit 1E (Motor Type Set Error)	• Change the SERVOPACK parameter Pn000 = n.X□□□ setting, and then save the change. Or replace the SERVOPACK with a correct model. • Change the motor type setting for the Module Configuration Definition Window, and then save the change. After saving the changes, restart the SERVOPACK and execute *Alarm Clear*.
Linear type	Linear type	Rotary type		
Rotary type	Linear type	Rotary type	IL□□04, bit 1F (Connected Encoder Type Error)	Change the SERVOPACK parameter Pn000 = n.X□□□ setting, and then save the change. Or replace the SERVOPACK with a correct model. Then, restart the SERVOPACK and execute ***Alarm Clear***.
Linear type	Rotary type	Linear type		

* The setting method of the supported Servomotor type depends on the SERVOPACK model. Refer to the previous table for details.

4.3 Motion Parameter Lists

4.3.1 Fixed Parameter List

The following table provides a list of SVB and SVR motion fixed parameters.

- Refer to the section numbers indicated in the Reference column for details of each fixed parameter.
- For information on SVR, refer to *1.3 SVR Virtual Motion Module*.

No.	Name	Contents	SVB	SVR	Reference
0	Selection of Operation Modes	0: Normal Operation Mode	Yes	Yes	4.4.1 (1)
		1: Axis unused	Yes	Yes	
		2: Simulation mode	Yes	–	
		3: Servo Driver Transmission Reference Mode	Yes	–	
		4 and 5: Reserved for system use.	–	–	
1	Function Selection Flag 1	Bit 0: Axis Selection (0: Finite length axis/1: Infinite length axis) • Set to 0 for linear type.	Yes	Yes	4.4.1 (2)
		Bit 1: Soft Limit (Positive Direction) Enable/Disable (0: Disabled/1: Enabled)	Yes	–	
		Bit 2: Soft Limit (Negative Direction) Enable/Disable (0: Disabled/1: Enabled)	Yes	–	
		Bit 3: Overtravel Positive Direction Enable/Disable (0: Disabled/1: Enabled)	Yes	–	
		Bit 4: Overtravel Negative Direction Enable/Disable (0: Disabled/1: Enabled)	Yes	–	
		Bits 5 to 7: Reserved for system use.	–	–	
		Bit 8: Interpolation Segment Distribution Processing	Yes	–	
		Bit 9: Simple ABS Rotary Pos. Mode (Simple absolute infinite axis position control) (0: Disabled/1: Enabled) • Set to 0 for linear type.	Yes	–	
		Bit A: User Constants Self-writing Function	Yes	–	
		Bits B to F: Reserved for system use.	–	–	
2	Function Selection Flag 2	Bit 0: Communication Abnormality Detection Mask	Yes	–	4.4.1 (3)
		Bit 1: WDT Abnormality Detection Mask	Yes	–	
		Bits 2 to 4: Reserved for system use.	–	–	
		Bit 5: Multiturn Limit Mismatch Detection Mask For Finite Length Axis	Yes	–	
		Bit 6 to F: Reserved for system use.	–	–	
3	–	Reserved for system use.	–	–	–
4	Reference Unit Selection	0: pulse 3: inch 1: mm 4: µm 2: deg • For linear type, 0 (pulse), 1 (mm), and 4 (µm) can be used. If 2 (deg.) or 3 (inch) is selected, the selected unit will be converted to mm.	Yes	Yes	4.4.1 (4)
5	Number of Digits below Decimal Point	1 = 1 digit	Yes	Yes	
6	Travel Distance per Machine Rotation (rotary motor)	1 = 1 user unit	Yes	Yes	
	Linear Scale Pitch (linear motor)	1 = 1 user unit	Yes	Yes	
8	Servo Motor Gear Ratio	1 = 1 rev • Invalid for linear type	Yes	Yes	
9	Machine Gear Ratio	1 = 1 rev • Invalid for linear type	Yes	Yes	
10	Infinite Length Axis Reset Position (POSMAX)	1 = 1 user unit • Invalid for linear type	Yes	Yes	4.4.1 (5)

(cont'd)

No.	Name	Contents	SVB	SVR	Reference
12	Positive Software Limit Value	1 = 1 user unit	Yes	–	4.4.1 (6)
14	Negative Software Limit Value	1 = 1 user unit	Yes	–	
16	Backlash Compensation Amount	1 = 1 user unit	Yes	–	4.4.1 (7)
18 to 29	–	Reserved for system use.	–	–	–
30	Encoder Selection	0: Incremental encoder 1: Absolute encoder 2: Absolute encoder (Incremental encoder is used.) 3: Reserved (External encoder)	Yes	–	4.4.1 (8)
31 to 33	–	Reserved for system use.	–	–	–
34	Rated Motor Speed (Rotary Motor)	1 = 1 min^{-1}	Yes	Yes	4.4.1 (9)
	Rated Speed (Linear Motor)	1 = 0.1 m/s, 0.1 mm/s	Yes	Yes	
36	Number of Pulses per Motor Rotation (Rotary Motor)	1 = 1 pulse/rev Set the value after multiplication.	Yes	Yes	
	Number of Pulses per Linear Scale Pitch (Linear Motor)	1 = 1 pulse/scale pitch	Yes	Yes	
38	Maximum Number of Absolute Encoder Turns Rotation	1 = 1 rev • Set to 0 when a direct drive motor is being used. • Invalid for linear type	Yes	–	
40 to 41	–	Reserved for system use.	–	–	–
42	Feedback Speed Movement Averaging Time Constant	1 = 1 ms	Yes	Yes	4.4.1 (9)

4.3.2 Setting Parameter List

The following table provides a list of SVB and SVR motion setting parameters.

- Refer to the section numbers indicated in the Reference column for details of each setting parameter.
- Refer to *1.3 SVR Virtual Motion Module* for information on SVR.
- The register number “OW□□00” indicates the leading output register number + 00. Refer to *4.1.1 Motion Parameter Register Numbers for MP2000 Series Machine Controllers* for information on how to obtain the leading output register number.

Register No.	Name	Contents	SVB	SVR	Reference
OW□□00	RUN Command Setting	Bit 0: Servo ON (0: OFF/1: ON)	Yes	Yes	4.4.2 (1)
		Bit 1: Machine Lock (0: Normal Operation/1: Machine Lock)	Yes	–	
		Bits 2 to 3: Reserved for system use	–	–	
		Bit 4: Latch Detection Demand (0: OFF/1: ON)	Yes	–	
		Bit 5: Reserved for system use	–	–	
		Bit 6: POSMAX Turn Number Presetting Demand (0: OFF/1:ON)	Yes	Yes	
		Bit 7: Request ABS Rotary Pos. Load (Absolute system infinite length position information LOAD) (0: OFF/1:ON) • Set to 0 for linear type	Yes	–	
		Bit 8: Forward Outside Limiting Torque/Thrust Input (Forward external torque/thrust input) (0: OFF/1: ON)	Yes	–	
		Bit 9: Reverse Outside Limiting Torque/Thrust Input (Forward external torque/thrust input) (0: OFF/1: ON)	Yes	–	
		Bit A: Reserved for system use	–	–	
		Bit B: Integration Reset (0: OFF/1: ON)	Yes	–	
		Bit C: Reserved for system use	–	–	
		Bit D: Latch Completion Status Clear Request (0: OFF/1: ON)	Yes	–	
		Bit E: Communication Reset (0: OFF/1: ON)	Yes	–	
		Bit F: Alarm Clear	Yes	Yes	
OW□□01	Mode Setting 1	Bit 0: Excessive Deviation Error Level Setting (0: Alarm/1: Warning)	Yes	–	4.4.2 (2)
		Bits 1 to 2: Reserved for system use.	–	–	
		Bit 3: Speed Loop P/PI Switch	Yes	–	
		Bit 4: Gain Switch	Yes	–	
		Bit 5: Gain Switch 2	Yes	–	
		Bit 6: Latch Mode Selection	Yes	–	
		Bits 7 to F: Reserved for system use.	–	–	
OW□□02	Mode Setting 2	Bit 0: Monitor 2 Enabled (0: Disabled/1: Enabled)	Yes	–	4.4.2 (3)
		Bits 1 to 7: Reserved for system use.	–	–	
		Bits 8 to F: Stop Mode Selection	Yes	–	

(cont'd)

Register No.	Name	Contents	SVB	SVR	Reference
OW□□03	Function Setting 1	Bits 0 to 3: Speed Unit Selection 0: Reference unit/s 1: 10^n reference unit/min 2: Percentage of rated speed (1 = 0.01%) 3: Percentage of rated speed (1 = 0.0001%)	Yes	Yes	4.4.2 (4)
		Bits 4 to 7: Acceleration/Deceleration Degree Unit Selection 0: Reference unit/s^2 1: ms	Yes	Yes	
		Bits 8 to B: Filter Type Selection 0: None 1: Exponential acceleration/deceleration filter 2: Moving average filter	Yes	Yes	
		Bits C to F: Torque Unit Selection 0: Percentage of rated toque (1 = 0.01%) 1: Percentage of rated toque (1 = 0.0001%)	Yes	Yes	
OW□□04	Function Setting 2	Bits 0 to 3: Latch Detection Signal Selection	–	–	4.4.2 (5)
		0: -	–	–	
		1: -	–	–	
		2: Phase-C pulse	Yes	–	
		3: /EXT1	Yes	–	
		4: /EXT2	Yes	–	
		5: /EXT3	Yes	–	
		Bits 4 to 7: External Positioning Signal Setting	–	–	
		0: –	–	–	
		1: –	–	–	
		2: Phase-C pulse	Yes	–	
		3: /EXT1	Yes	–	
		4: /EXT2	Yes	–	
		5: /EXT3	Yes	–	
		Bits 8 to B: Reserved for system use.	–	–	
		Bits C to F: Bank Selector	Yes	–	
OW□□05	Function Setting 3	Bit 1: Phase Reference Creation Calculation Disable (0: Enabled/ 1: Disabled)	Yes	–	4.4.2 (6)
		Bits 2 to A: Reserved for system use.	–	–	
		Bit B: Zero Point Return Input Signal (0: OFF/1: ON)	Yes	–	
		Bits C to F: Reserved for system use.	–	–	
OW□□06 to OW□□07	–	Reserved for system use.	–	–	–

(cont'd)

Register No.	Name	Contents	SVB	SVR	Reference
OW□□08	Motion Command	0: NOP (No Command) 1: POSING (Position Mode) (Positioning)* 2: EX_POSING (Latch Target Positioning) (External positioning)* 3: ZRET (Zero Point Return)* 4: INTERPOLATE (Interpolation)* 5: ENDOF_INTERPOLATE (Last Interpolation Segment) * (Reserved for the system) 6: LATCH (Interpolation Mode with Latch Input)* 7: FEED (Jog Mode)* 8: STEP (Relative Position Mode) (Step mode)* 9: ZSET (Set Zero Point) 10: ACC (Change Acceleration Time) 11: DCC (Change Deceleration Time) 12: SCC (Change Filter Time Constant) 13: CHG_FILTER (Change Filter Type) 14: KVS (Change Speed Loop Gain) 15: KPS (Change Position Loop Gain) 16: KFS (Change Feed-forward) 17: PRM_RD (Read User Constant) (Read SERVOPACK parameter) 18: PRM_WR (Write User Constant (Write SERVOPACK parameter) 19: ALM_MON (Alarm Monitor) 20: ALM_HIST (Alarm History Monitor) 21: ALMHIST_CLR (Clear Alarm History) 22: ABS_RST (Absolute Encoder Reset) 23: VELO (Speed Reference)* 24: TRQ (Torque/Thrust Reference)* 25: PHASE (Phase Reference)* 26: KIS (Change Position Loop Integral Time Constant) 27: PPRM_WR (Stored Parameter Write) 39: MLTTRN_SET (Multiturn Limit Setting)	Yes	Yes	4.4.2 (7)
OW□□09	Motion Command Control Flag	Bit 0: Holds a Command (0: OFF/1: ON)	Yes	Yes	4.4.2 (8)
		Bit 1: Interrupt a Command (0: OFF/1: ON)	Yes	Yes	
		Bit 2: Moving Direction (JOG/STEP) (0: Forward rotation/1: Reverse rotation)	Yes	Yes	
		Bit 3: Zero point Direction Selection (0: Reverse rotation/1: Forward rotation)	Yes	–	
		Bit 4: Latch Zone Effective Selection (0: Disabled/1: Enabled)	Yes	–	
		Bit 5: Position Reference Type (0: Incremental Value Add Method/1: Absolute Value Set Method)	Yes	Yes	
		Bit 6: Phase Compensation Type (0: Incremental Value Add Method/1: Absolute Value Set Method)	Yes	–	
		Bits 7 to F: Reserved for system use.	–	–	
OW□□0A	Motion Subcommand	0: NOP (No command)	Yes	Yes	4.4.2 (9)
		1: PRM_RD (Read User Constant) (Read SERVOPACK parameter) 2: PRM_WR (User Constant) (Write SERVOPACK parameter) 3: Reserved 4: SMON (Status monitor)	Yes	–	
		5: FIXPRM_RD (Read Fixed Parameters)	Yes	Yes	
OW□□0B	–	Reserved for system use.	–	–	–

* These commands are move commands.

(cont'd)

Register No.	Name	Contents	SVB	SVR	Reference
OL□□0C	Torque/Thrust Reference Setting	Unit is according to OW□□03, bits C to F (Torque Unit Setting).	Yes	Yes	4.4.2 (10)
OW□□0E	Speed Limit Setting at the Torque/Thrust Reference	1 = 0.01% (percentage of rated speed)	Yes	–	
OW□□0F	–	Reserved for system use.	–	–	–
OL□□10	Speed Reference Setting	Unit is according to OW□□03, bits 0 to 3 (Speed Unit Selection).	Yes	Yes	4.4.2 (11)
OW□□12 to OW□□13	–	Reserved for system use.	–	–	–
OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	Unit is according to OW□□03, bits C to F (Torque Unit).	Yes	–	4.4.2 (12)
OL□□16	Secondly Speed Compensation	Unit is according to OW□□03, bits 0 to 3 (Speed Unit Selection).	Yes	Yes	4.4.2 (13)
OW□□18	Override	1 = 0.01%	Yes	–	4.4.2 (14)
OW□□19 to OW□□1B	–	Reserved for system use.	–	–	–
OL□□1C	Position Reference Setting	1 = 1 reference unit	Yes	Yes	4.4.2 (15)
OL□□1E	Width of Positioning Completion	1 = 1 reference unit	Yes	–	4.4.2 (16)
OL□□20	NEAR Signal Output Width	1 = 1 reference unit	Yes	–	4.4.2 (17)
OL□□22	Error Count Alarm Detection	1 = 1 reference unit	Yes	–	4.4.2 (18)
OL□□24	–	Reserved for system use.	–	–	–
OW□□26	Positioning Completion Check Time	1 = 1 ms	Yes	–	4.4.2 (19)
OW□□27	–	Reserved for system use.	–	–	–
OL□□28	Phase Correction Setting	1 = 1 reference unit	Yes	–	4.4.2 (20)
OL□□2A	Latch Zone Lower Limit Setting	1 = 1 reference unit	Yes	–	4.4.2 (21)
OL□□2C	Latch Zone Upper Limit Setting	1 = 1 reference unit	Yes	–	
OW□□2E	Position Loop Gain	1 = 0.1/s	Yes	–	4.4.2 (22)
OW□□2F	Speed Loop Gain	1 = 1 Hz	Yes	–	
OW□□30	Speed Feedforward Amends	1 = 0.01% (percentage of distribution segment)	Yes	–	
OW□□31	Speed Compensation	1 = 0.01% (percentage of rated speed)	Yes	Yes	
OW□□32	Position Integration Time Constant	1 = 1 ms	Yes	–	
OW□□33	–	Reserved for system use.	–	–	–
OW□□34	Speed Integration Time Constant	1 = 0.01 ms	Yes	–	4.4.2 (22)
OW□□35	–	Reserved for system use.	–	–	–

(cont'd)

Register No.	Name	Contents	SVB	SVR	Reference
OL□□36	Straight Line Acceleration/ Acceleration Time Constant	Units depends on the setting of OW□□03, bits 4 to 7 (Acceleration/Deceleration Degree Unit Selection).	Yes	Yes	4.4.2 (23)
OL□□38	Straight Line Deceleration/ Deceleration Time Constant	Units depends on the setting of OW□□03, bits 4 to 7 (Acceleration/Deceleration Degree Unit Selection).	Yes	Yes	
OW□□3A	Filter Time Constant	1 = 0.1 ms	Yes	Yes	4.4.2 (24)
OW□□3B	Bias Speed for Exponential Acceleration/ Deceleration Filter	Unit is according to OW□□03, bits 0 to 3 (Speed Unit Selection).	–	Yes	
OW□□3C	Zero Point Return Method	0: DEC1 + C (DEC1 and C-Phase) 1: ZERO (Zero signal) 2: DEC1 + ZERO (DEC1 and ZERO Signal) 3: C (C-pulse)	Yes	–	4.4.2 (25)
		4 to 10: Reserved for system use.	–	–	
		11: C Pulse Only 12: POT & C Pulse 13: POT Only 14: HOME LS & C Pulse 15: HOME Only	Yes	–	
		16: NOT & C Pulse 17: NOT Only 18: INPUT & C Pulse 19: INPUT Only	Yes	–	
OW□□3D	Width of Starting Point Position Output	1 = 1 reference unit	Yes	Yes	
OL□□3E	Approach Speed	Unit is according to OW□□03, bits 0 to 3 (Speed Unit Selection).	Yes	–	
OL□□40	Creep Rate	Unit is according to OW□□03, bits 0 to 3 (Speed Unit Selection).	Yes	–	
OL□□42	Zero Point Return Travel Distance	1 = 1 reference unit	Yes	–	
OL□□44	Step Travel Distance	1 = 1 reference unit	Yes	Yes	4.4.2 (26)
OL□□46	External Positioning Final Travel Distance	1 = 1 reference unit	Yes	–	4.4.2 (27)
OL□□48	Zero Point Position in Machine Coordinate Offset	1 = 1 reference unit	Yes	Yes	4.4.2 (28)
OL□□4A	Work Coordinate System Offset	1 = 1 reference unit	Yes	Yes	
OL□□4C	Number of POSMAX Turns Presetting Data	1 = 1 turn • Invalid for liner type	Yes	Yes	
OW□□4E	Servo User Monitor Setting	Bits 0 to 3: Monitor 1 (Cannot be set.) Bits 4 to 7: Monitor 2 Bits 8 to B: Monitor 3 (Cannot be set.) Bits C to F: Monitor 4	Yes	–	4.4.2 (29)
OW□□4F	Servo Driver Alarm Monitor No.	Set the number of the alarm to monitor.	Yes	–	4.4.2 (30)
OW□□50	Servo Driver User Constant No. (SERVOPACK parameter No. for motion command)	Set the number of the SERVOPACK parameter.	Yes	–	

(cont'd)

Register No.	Name	Contents	SVB	SVR	Reference
OW□□51	Servo Driver User Constant Size (SERVOPACK parameter size for motion command)	Set the number of words in the SERVOPACK parameter.	Yes	–	4.4.2 (30)
OL□□52	Servo Driver User Constant Set Point (SERVOPACK parameter setting value for motion command	Set the setting for the SERVOPACK parameter.	Yes	–	
OW□□54	Servo Driver for Assistance User Constant No. (SERVOPACK parameter No. for motion subcommand)	Set the number of the SERVOPACK parameter number.	Yes	–	
OW□□55	Servo Driver for Assistance User Constant Size (SERVOPACK parameter size for motion subcommand)	Set the number of words in the SERVOPACK parameter.	Yes	–	
OL□□56	Servo Driver for Assistance User Constant Set Point (SERVOPACK parameter setting value for motion subcommand)	Set the setting for the SERVOPACK parameter.	Yes	–	
OW□□58 to OW□□5B	–	Reserved for system use.	–	–	–
OW□□5C	Fixed Parameter Number	Set the number of the fixed parameter to read with the FIXPRM_RD motion subcommand.	Yes	Yes	4.4.2 (31)
OW□□5D	–	Reserved for system use.	–	–	–
OL□□5E	Encoder Position When Power is OFF (Lower 2 words)	1 = 1 pulse ♦ For linear type, do not set this register.	Yes	–	4.4.2 (32)
OL□□60	Encoder Position When Power is OFF (Upper 2 words)	1 = 1 pulse ♦ For linear type, do not set this register.	Yes	–	
OL□□62	Pulse Position When Power is OFF (Lower 2 words)	1 = 1 pulse ♦ For linear type, do not set this register.	Yes	–	
OL□□64	Pulse Position When Power is OFF (Upper 2 words)	1 = 1 pulse ♦ For linear type, do not set this register.	Yes	–	
OL□□66 to OL□□6E	–	Reserved for system use.	–	–	–
OW□□70 to OW□□7F	Command Buffer for Servo Driver Transmission Reference Mode	This area is used for command data when MECHATROLINK servo commands are specified directly.	Yes	–	4.4.2 (33)

4.3.3 Monitoring Parameter List

The following table provides a list of SVB and SVR motion monitoring parameters.

- Refer to the section numbers indicated in the Reference column for details of each monitoring parameter.
- Refer to *1.3 SVR Virtual Motion Module* for information on SVR.
- Register number "IW☐☐00" indicates the leading input register number + 00.
- Refer to *4.1.1 Motion Parameter Register Numbers for MP2000 Series Machine Controllers* for information on how to find the leading input register number.

Register No.	Name	Contents	SVB	SVR	Reference
IW☐☐00	RUN Status	Bit 0 Motion Controller Operation Ready	Yes	Yes	4.4.3 (1)
		Bit 1: Running (At Servo ON)	Yes	Yes	
		Bit 2: System BUSY	Yes	–	
		Bit 3: Servo Ready	Yes	–	
		Bit 4: Latch Mode	Yes	–	
		Bits 5 to F: Reserved for system use.	–	–	
IW☐☐01	Parameter Number When Range Over is Generated	Setting parameters: 0 or higher Fixed Parameters: 1000 or higher	Yes	Yes	4.4.3 (2)
IL☐☐02	Warning	Bit 0: Excessive Deviation	Yes	–	4.4.3 (3)
		Bit 1: Set Parameter Error (Setting parameter error)	Yes	Yes	
		Bit 2: Fixed Parameter Error	Yes	Yes	
		Bit 3: Servo Driver Error	Yes	–	
		Bit 4: Motion Command Set Error	Yes	Yes	
		Bit 5: Reserved for system use.	–	–	
		Bit 6: Positive Direction Overtravel	Yes	–	
		Bit 7: Negative Direction Overtravel	Yes	–	
		Bit 8: Servo ON Incomplete	Yes	–	
		Bit 9: Servo Driver Communication Warning	Yes	–	
		Bit A: Servo Driver Stop Signal Input	Yes	–	
		Bits B to 1F: Reserved for system use.	–	–	
IL☐☐04	Alarm	Bit 0: Servo Driver Error	Yes	–	4.4.3 (4)
		Bit 1: Positive Direction Overtravel	Yes	–	
		Bit 2: Negative Direction Overtravel	Yes	–	
		Bit 3: Positive Direction Software Limit	Yes	–	
		Bit 4: Negative Direction Software Limit	Yes	–	
		Bit 5: Servo OFF	Yes	Yes	
		Bit 6: Positioning Time Over	Yes	–	
		Bit 7: Excessive Positioning Moving Amount	Yes	–	
		Bit 8: Excessive Speed	Yes	–	
		Bit 9: Excessive Deviation	Yes	–	
		Bit A: Filter Type Change Error	Yes	–	
		Bit B: Filter Time Constant Change Error	Yes	–	
		Bit C: Reserved for system use.	–	–	
		Bit D: Zero Point Unsetting • Invalid for linear type.	Yes	–	
		Bit E and F: Reserved for system use.	–	–	
		Bit 10: Servo Driver Synchronization Communications Error	Yes	–	
		Bit 11: Servo Driver Communication Error	Yes	–	
		Bit 12: Servo Driver Command Timeout Error	Yes	–	

(cont'd)

Register No.	Name	Contents	SVB	SVR	Reference
IL□□04 (Cont'd)	Alarm	Bit 13: Excessive ABS Encoder Rotations ♦ Invalid for linear type	Yes	–	4.4.3 (4)
		Bits 14 to 1C: Reserved for system use.	–	–	
		Bit 1D: Detected Servo Driver Type Error	Yes	–	
		Bit 1E: Motor Type Set Error	Yes	–	
		Bit 1F: Connected Encoder Type Error	Yes	–	
IL□□06	–	Reserved for system use.	–	–	–
IW□□08	Motion Command Response Code	Same as OW□□08 (Motion Command).	Yes	Yes	4.4.3 (5)
IW□□09	Motion Command Status	Bit 0: Command Execution Flag	Yes	Yes	4.4.3 (6)
		Bit 1: Command Hold Completed (HOLDL)	Yes	Yes	
		Bit 2: Reserved for system use.	–	–	
		Bit 3: Command Error Completed Status (FAIL) (Command Encoder Type Error)	Yes	Yes	
		Bits 4 to 6: Reserved for system use.	–	–	
		Bit 7: Reset Absolute Encoder Completed	Yes	–	
		Bit 8: Command Execution Completed (COMPLETE)	Yes	Yes	
		Bits 9 to F: Reserved for system use.	–	–	
IW□□0A	Motion Subcommand Response Code	Same as OW□□0A (Motion Subcommand).	Yes	Yes	4.4.3 (7)
IW□□0B	Subcommand Status	Bit 0: Command Executing Flag	Yes	Yes	4.4.3 (8)
		Bits 1 to 2: Reserved for system use.	–	–	
		Bit 3: Command Error Completed Status (Command Error Occurrence)	Yes	Yes	
		Bits 4 to 7: Reserved for system use.	–	–	
		Bit 8: Command Execution Completed	Yes	Yes	
		Bits 9 to F: Reserved for system use.	–	–	
IW□□0C	Position Management Status	Bit 0: Discharging Completed (DEN)	Yes	Yes	4.4.3 (9)
		Bit 1: Positioning Completed (POSCOMP)	Yes	Yes	
		Bit 2: Latch Complete (LCOMP)	Yes	–	
		Bit 3: NEAR Position (NEAR)	Yes	Yes	
		Bit 4: Zero Point Position (ZERO)	Yes	Yes	
		Bit 5: Zero Point Return (Setting) Completed (ZRNC)	Yes	Yes	
		Bit 6: During Machine Lock (MLKL)	Yes	–	
		Bit 7: Reserved for system use.	–	–	
		Bit 8: ABS Rotary Pos. LOAD Complete (ABS System Infinite Length Position Control Information Load Completed) (ABSLDE) ♦ Invalid for linear type	Yes	–	
		Bit 9: POSMAX Turn Preset Complete (TPRSE) ♦ Invalid for linear type	Yes	Yes	
		Bits A to F: Reserved for system use.	–	–	
IW□□0D	–	Reserved for system use.	–	–	–
IL□□0E	Target Position in Machine Coordinate System (TPOS)	1 = 1 reference unit	Yes	Yes	4.4.3 (10)
IL□□10	Calculated Position in Machine Coordinate System (CPOS)	1 = 1 reference unit	Yes	Yes	
IL□□12	Machine Coordinate System Reference Position (MPOS)	1 = 1 reference unit	Yes	Yes	
IL□□14	CPOS for 32 bit	1 = 1 reference unit	Yes	Yes	

(cont'd)

Register No.	Name	Contents	SVB	SVR	Reference
IL□□16	Machine Coordinate System Feedback Position (APOS)	1 = 1 reference unit	Yes	Yes	4.4.3 (10)
IL□□18	Machine Coordinate System Latch Position (LPOS)	1 = 1 reference unit	Yes	–	
IL□□1A	Position Error (PERR)	1 = 1 reference unit	Yes	–	
IL□□1C	Target Position Difference Monitor	1 = 1 reference unit	–	Yes	
IL□□1E	Number of POSMAX Turns	1 = 1 turn ♦ Invalid for linear type	Yes	Yes	
IL□□20	Speed Reference Output Monitor	pulse/s	Yes	–	4.4.3 (11)
IL□□22 to IL□□2A	–	Reserved for system use.	–	–	–
IW□□2C	Servo Driver Status	Bit 0: ALM (Alarm) Bit 1: WARN (Warning) Bit 2: CMDRY (Command Ready) Bit 3: SVON (Servo ON) Bit 4: PON (Main Power Supply ON) Bit 5: MLOCK (Machine Lock) Bit 6: ZPOINT (Zero Position) Bit 7: PSET (Locating Complete) (Positioning completed/V-CMP (Speed Coincidence) Bit 8: DEN (Commanded Profile Complete) (Distribution completed)/SZPD (Zero Speed) Bit 9: T_LIM (Torque Restriction) Bit A: L_CMP (Latch Complete) Bit B: NEAR (Locating Neighborhood) (NEAR Position)/V_LIM (Speed Limit) Bit C: P_SOT (Position Software Limit) Bit D: N_SOT (Negative Software Limit)	Yes	–	4.4.3 (12)
		Bits E and F: Reserved for system use	–	–	–
IW□□2D	Servo Driver Alarm Code	Stores the alarm code from the SERVOPACK.	Yes	–	4.4.3 (13)
IW□□2E	Servo Driver I/O Monitor	Bit 0: Forward Side Limit Switch Input Bit 1: Reverse Side Limit Switch Input Bit 2: Deceleration Dog Switch Input Bit 3: Encoder Phase-A Signal Input Bit 4: Encoder Phase-B Signal Input Bit 5: Encoder Phase-C Signal Input Bit 6: EXT1 Signal Input Bit 7: EXT2 Signal Input Bit 8: EXT3 Signal Input Bit 9: Brake State Output Bit A: Stop Signal (HWBB), Available only for SGDV and SGD7S SERVOPACKs except for SGDV-□□□E1□□ SERVOPACKs. Bit B: Reserved for system use Bit C: CN1 Input Signal (IO12) Bit D: CN1 Input Signal (IO13) Bit E: CN1 Input Signal (IO14) Bit F: CN1 Input Signal (IO15)	Yes	–	4.4.3 (14)
IW□□2F	Servo Driver User Monitor Information	Bits 0 to 3: Monitor 1 Bits 4 to 7: Monitor 2 Bits 8 to B: Monitor 3 Bits C to F: Monitor 4	Yes	–	4.4.3 (15)

(cont'd)

Register No.	Name	Contents	SVB	SVR	Reference
IL□□30	Servo Driver User Monitor 2	Stores the result of the selected monitor.	Yes	–	4.4.3 (16)
IL□□32	Servo Driver User Monitor 3	Reserved for system use.	–	–	
IL□□34	Servo Driver User Monitor 4	Stores the result of the selected monitor.	Yes	–	
IW□□36	Servo Driver User Constant No.	Stores the number of the parameter being processed.	Yes	–	
IW□□37	Supplementary Servo Driver User Constant No.	Stores the number of the parameter being processed.	Yes	–	
IL□□38	Servo Driver User Constant Reading Data	Stores the data of the parameter being read.	Yes	–	
IL□□3A	Supplementary Servo Driver User Constant Reading Data	Stores the data of the parameter being read.	Yes	–	
IW□□3F	Motor Type	Stores the type of motor actually connected. 0: Rotation type motor 1: Linear motor	Yes	–	
IL□□40	Feedback Speed	Unit is according to OW□□03, bits 0 to 3 (Speed Unit Selection).	Yes	Yes	
IL□□42	Feedback Torque/ Thrust	Unit is according to OW□□03, bits C to F (Torque Unit Selection).	Yes	Yes	
IL□□44	Latch Completion Sequence Number	1 = 1 time	Yes	–	
IL□□45	Number of Continu-ous Latch Sequence Completion Cycles	1 = 1 cycle	Yes	–	
IW□□46 to IW□□55	–	Reserved for system use.	–	–	–
IL□□56	Fixed Parameter Monitor	Stores the data of the fixed parameter when FIXPRM_RD has been specified in the Motion Subcommand.	Yes	Yes	4.4.3 (17)
IW□□58 to IW□□5C	–	Reserved for system use.	–	–	–
IL□□5E	Encoder Position When the Power is OFF (Lower 2 words)	1 = 1 pulse	Yes	–	4.4.3 (18)
IL□□60	Encoder Position When the Power is OFF (Upper 2 words)	1 = 1 pulse	Yes	–	
IL□□62	Pulse Position When the Power is OFF (Lower 2 Words)	1 = 1 pulse	Yes	–	
IL□□64	Pulse Position When the Power is OFF (Upper 2 Words)	1 = 1 pulse	Yes	–	
IW□□66 to IW□□6F	–	Reserved for system use.	–	–	–
IW□□70 to IW□□7F	Response Buffer for Servo Driver Transmission Reference Mode	Stores the response data when MECHATROLINK Servo commands are specified directly.	Yes	–	4.4.3 (19)

4.4 MP2000 Series Machine Controller Parameter Details

This section provides details for each motion parameter (fixed parameters, setting parameters, and monitoring parameters).

4.4.1 Motion Fixed Parameter Details

The following tables provide details of motion fixed parameters.

- Refer to *4.3.1 Fixed Parameter List* for a list of motion fixed parameters.
- R in the following tables indicates that the item is also compatible with SVR.
- The software versions with which the parameters for linear type can be set for SVR are limited to:
  - MP2000 series Machine Controller software version 2.50 or later
  - MPE720 version 5.37 or later

(1) Run Mode

No. 0 Selection of Operation Modes		Setting Range	Setting Unit	Default Value
		0 to 3	–	0
Description	Specify the application method of the axis. 0: Normal Operation Mode (default) R Use this setting when actually using an axis. 1: Axis Unused R No control will be performed for an axis set to this mode, and monitoring parameters will not be updated. If an axis is changed from any other run mode to this mode, the monitoring parameters will be held at the current status except for the RUN Status (monitoring parameter IW□□00), which will be cleared to zeros. Set any axis that is not being used to this mode (Axis Unused) to reduce the processing time. 2: Simulation Mode In Simulation Mode, position information will be stored in the monitoring parameters even if a Servo Driver is not connected. This mode is used to virtually check the operation of the applications program. • In Simulation Mode, axis motions cannot be simulated. If a positioning command is executed, for example, the execution of the command will enter completed status at the next scan. Use an SVR Module to check axis motions. 3: Servo Driver Transmission Reference Mode Servo Driver Transmission Reference Mode is used to directly control the command-response communication with the MECHATROLINK SERVOPACK from the application. No processing other than communication processing with the SERVOPACK will be performed in this mode. Position control and other processing must be performed in the application. Commands to the SERVOPACK are set in the area starting with setting parameter OW□□70 or later and responses are stored in the area starting with monitoring parameter IW□□70 or later. • Refer to *Appendix I Servo Driver Transmission Reference Mode* for details on Servo Driver Transmission Reference Mode.			

■ Terminology: Store

The use of “store” here refers to information that is automatically transferred by the CPU system without any action by the user. This term is mainly used with this meaning in describing motion monitoring parameters.

Motion Parameters

4

(2) Function Selection 1

No. 1 Function Selection Flag 1			Setting Range	Setting Unit	Default Value
			–	–	0000H
Description	Bit 0	Axis Selection R Set whether or not there is a limit on controlled axis travel. 0: Finite length axis (default); The axis will have limited movement. The software limit function is enabled. 1: Infinite length axis; The axis will have unlimited movement. The software limit function is disabled. If an infinite length axis is set, the position information will be reset each time the position exceeds the value set for the Infinite Length Axis Reset Position (fixed parameter 10). • Set to 0 for linear type.			
	Bit 1	Soft Limit (Positive Direction) Enabled/Disabled Set whether or not to use the software limit function in the positive direction. Set the software limit as the Positive Software Limit Value (fixed parameter 12). This setting is disabled if the axis is set as an infinite length axis. The software limit function is enabled only after completing a Zero Point Return or Zero Point Setting operation (IW☐☐0C, bit 5 is ON). 0: Disabled (default) 1: Enabled • Refer to *11.3 Software Limit Function* for details of the software limit function.			
	Bit 2	Soft Limit (Negative Direction) Enabled/Disabled Set whether or not to use the software limit function in the negative direction. Set the software limit as the Negative Software Limit Value (fixed parameter 14). This setting is disabled if the axis is set as an infinite length axis. The software limit function is enabled only after completing a Zero Point Return or Zero Point Setting operation (IW☐☐0C, bit 5 is ON). 0: Disabled (default) 1: Enabled • Refer to *11.3 Software Limit Function* for details of the Software Limit Function.			
	Bit 3	Overtravel Positive Direction Enabled/Disabled Set whether or not to use the overtravel detection function in the positive direction. A setting must also be made in the SERVOPACK. If this function is disabled and the positive OT signal is input, an alarm will not occur, but a warning will occur. 0: Disabled (default) 1: Enabled • Refer to *11.2 Overtravel Function* on details of the overtravel function.			
	Bit 4	Overtravel Negative Direction Enabled/Disabled Set whether or not to use the overtravel detection function in the negative direction. A setting must also be made in the SERVOPACK. If this function is disabled and the negative OT signal is input, an alarm will not occur, but a warning will occur. 0: Disabled (default) 1: Enabled • Refer to *11.2 Overtravel Function* for details of the overtravel function.			
	Bit 8	Interpolation Segment Distribution Processing When executing an interpolation command (INTERPOLATE, LATCH or PHASE), converts reference value that is generated with high-speed scan to a reference value for the MECHATROLINK communication cycle. Set to 0 when using an interpolation command. 0: Enabled (default) 1: Disabled			

(cont'd)

No. 1 Function Selection Flag 1 (cont'd)		Setting Range	Setting Unit	Default Value
		–	–	0000H
Description	Bit 9	Simple ABS Rotary Pos. Mode Set whether or not the infinite length position control function is used, on the condition that the number of turns that the encoder can count is a multiple of the number of turns corresponding to the reference unit reset frequency. With this function, it is not necessary to save and load absolute infinite axis information, eliminating the need for a ladder program and thus simplifying handling. It is recommended that the Simple ABS Rotary Pos. Mode is set to *Enabled* for ABS infinite length axes. 0: Disabled (default) 1: Enabled • Refer to *9.4.2 (2) Machine Controller Fixed Parameters for Absolute Position Detection* and *9.4.1 (2) Conditions to Enable the Simple Absolute Infinite Axis Position Control* for details. • Set to 0 for linear type.		
	Bit A	User Constants Self-Writing Function Set whether or not to use the function that automatically writes Machine Controller setting parameters to the SERVOPACK parameters when a MECHATROLINK communication connection is established. Also, the automatic writing is triggered by changing the setting parameters or starting execution of a motion command. 0: Enabled (default) 1: Disabled • Refer to *11.6 Parameters That Are Automatically Updated* for details.		

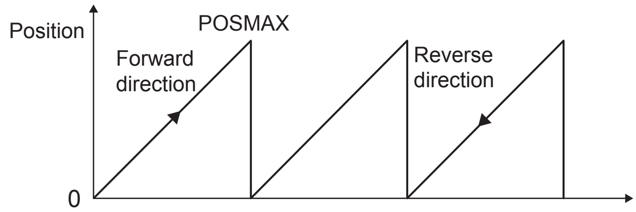
(3) Function Selection Flag 2

No. 2 Function Selection Flag 2		Setting Range	Setting Unit	Default Value
		–	–	0000H
Description	Bit 0	Communication Abnormality Detection Mask Masks MECHATROLINK communication errors detected at the Machine Controller. 0: Disabled (default) 1: Enabled		
	Bit 1	WDT Abnormality Detection Mask Masks MECHATROLINK watchdog timeout errors detected at the Machine Controller. 0: Disabled (default) 1: Enabled		
	Bit 5	Multiturn Limit Mismatch Detection Mask For Finite Length Axis (Valid for SVB-01 module version 1.33 or later and built-in SVB version 2.89 or later) When using the axis as a finite length axis, set whether or not to detect a multiturn limit mismatch alarm. 0: Not detected (default) 1: Detected		

(4) Reference Unit Selection

Parameter	Setting Range	Setting Unit	Default Value
No. 4 R Reference Unit Selection	0 to 4	–	0
Description	Set the unit for the reference. The minimum reference unit is determined by this parameter and the Number of Digits Below Decimal Point setting (fixed parameter No.5). If pulse is selected, the Electronic Gear Ratio (fixed parameters 8 and 9) will be disabled. 0: pulse (electronic gear disabled) 1: mm 2: deg 3: inch 4: μm ◆ Refer to *5.1.1 Reference Unit* for details. ◆ For linear type, 0 (pulse), 1 (mm), and 4 (μm) can be used. If 2 (deg) or 3 (inch) is selected, the selected unit will be converted to mm.		
No. 5 R Number of Digits Below Decimal Point	0 to 5	–	3
Description	Set the number of digits below the decimal point in the reference unit. The minimum reference unit is determined by this parameter and the Reference Unit Selection (fixed parameter 4). Example: When the Reference Unit Selection is set to mm and the Number of Digits Below Decimal Point is set to 3, a reference unit of 1 will be 0.001 mm. The setting of this parameter is disabled if the Reference Unit Selection is set to pulse in fixed parameter 4. ◆ Refer to *5.1.1 Reference Unit* for details.		
No. 6 (Rotary Motors) R Travel Distance per Machine Rotation	1 to 2^{31}-1	User unit	10000
Description	Specify the amount of travel in the load as the number of reference units for each turn of the load shaft. ◆ Refer to *5.1.2 Electronic Gear* for details.		
No. 6 (Linear Motors) R Linear Scale Pitch	1 to 2^{31}-1	User unit	10000
Description	Set a value in accordance with the linear scale specifications. When the reference unit is set to pulse, set the scale pitch in units of either μm or nm.		
No. 8 R Servo Motor Gear Ratio No. 9 R Machine Gear Ratio	1 to 65535	rev (revolutions)	1
Description	Set the gear ratio between the motor and the load. The following two values are set for a configuration in which the load shaft will turn n times in response to m turns of the motor shaft. • Servo motor gear ratio • Machine gear ratio The setting of this parameter is disabled if the Reference Unit Selection is set to pulse in fixed parameter 4. ◆ Refer to *5.1.2 Electronic Gear* for details. ◆ Invalid for linear type.		

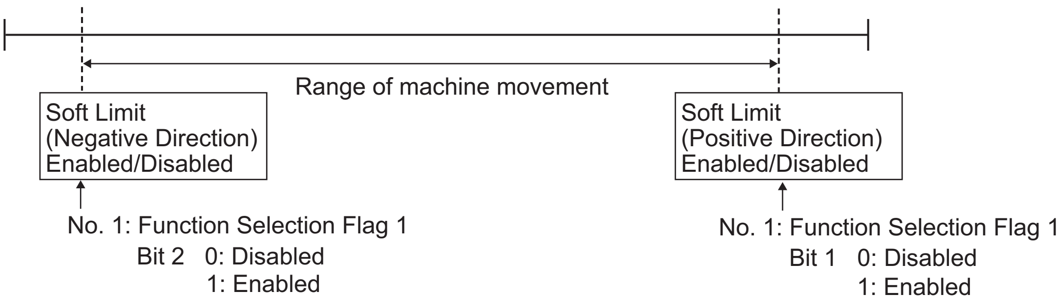
(5) Infinite Length Axis Reset Position

No. 10 R Infinite Length Axis Reset Position (POSMAX)	Setting Range	Setting Unit	Default Value
	1 to 2^{31}-1	User unit	360000
Description	Set the reset position when an infinite length axis is set. Enabled when bit 0 of the Function Selection Flag 1 (fixed parameter 1) is set to infinite axis. The position data for infinite axes is controlled in the range from 0 to POSMAX. 		

(6) Software Limits

No. 12 Positive Software Limit Value	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	User unit	$2^{31}-1$
Description	Set the position to be detected for the software limit in the positive direction at the Machine Controller. If an axis attempts to move in the positive direction past the position set here, a positive direction software limit alarm (IL□□04, bit 3) will occur. Enabled when bit 1 of the Soft Limit (Positive Direction) Enabled/Disabled (fixed parameter 1, bit 1) is set to 1 (enabled).		
No. 14 Negative Software Limit Value	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	User unit	-2^{31}
Description	Set the position to be detected for the software limit in the negative direction at the Machine Controller. If an axis attempts to move in the negative direction past the position set here, a negative direction software limit alarm (IL□□04, bit 4) will occur. Enabled when bit 2 of the Soft Limit (Negative Direction) Enabled/Disabled (fixed parameter 1, bit 2) is set to 1 (enabled).		

Outline of Software Limit



- The software limit function is enabled only after completing a Zero Point Return or Zero Point Setting operation (IW□□0C, bit 5 is ON).
- For details, refer to *11.3 Software Limit Function*.

(7) Backlash Compensation

No. 16 Backlash Compensation Amount	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	User unit	0

Description

Set the backlash compensation in reference units. Backlash compensation can not be performed by setting this parameter to 0.

For backlash compensation, use the backlash compensation function in the SERVOPACK. You can perform backlash compensation only when you use one of the following SERVOPACK models.

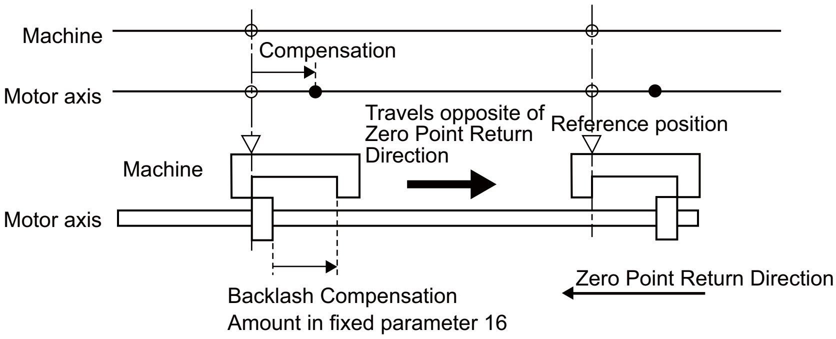
- SGDH + NS115
- SGDS
- SGDV-****1** with software version 0023 or later
- SGD7S

If you use any other SERVOPACK model, this parameter is disabled and the parameter setting is ignored.

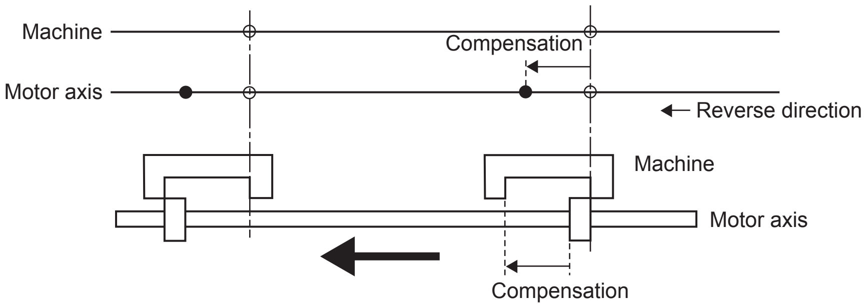
If you use the SGDH + NS115, the SGDS, or the SGD7S, use this fixed parameter. The setting of this fixed parameter will be automatically written to the SERVOPACK parameter (SGDH + NS115: Pn81B, SGDS: Pn214, SGD7S: Pn231) when communications are established with the SERVOPACK.

If you use the SGDV-****1** with software version 0023 or later, set both this fixed parameter and the following SERVOPACK parameters: Pn230, Pn231, and Pn233.

<Using Backlash Compensation in the Forward Direction>



<Using Backlash Compensation in the Reverse Direction>



(8) Servo Driver Settings

Fixed Parameter 30 Encoder Selection	Setting Range	Setting Unit	Default Value
	0 to 3	–	0

Description

Set the type of encoder that is being used.

0: Incremental encoder
1: Absolute encoder)
2: Absolute encoder (Incremental encoder is used.)
3: Reserved (External encoder)

- For linear motors, set the encoder type that matches the settings of the linear scale and SERVOPACK being used.

(9) Encoder Settings

No. 34 (Rotary Motor) R Rated Motor Speed	Setting Range	Setting Unit	Default Value
	1 to 32000	min^{-1}	3000

Description

Set the rated motor speed in 1 min^{-1} units.

Set this parameter based on the specifications of the motor that is used.

No.34 (Linear Motor) R Rated Speed	Setting Range	Setting Unit	Default Value
	1 to 32000	0.1m/s, 0.1mm/s	3000

Description

Set the rated speed.

Set the rated speed in accordance with the specifications of the linear servomotor to be used.

- When the reference unit is set to pulse: The setting unit is either 0.1 m/s or 0.1 mm/s.
  Use units of 0.1 m/s when the linear scale pitch is set in units of µm.
  Use units of 0.1 mm/s when the linear scale pitch is set in units of nm.
- When reference unit is set to mm: The setting unit is 0.1 m/s.
- When reference unit is set to µm: The setting unit is 0.1 mm/s.

♦ Refer to *5.1.8 Linear Scale Pitch and Rated Speed* for details.

No. 36 (Rotary Motor) R Number of Pulses per Motor Rotation	Setting Range	Setting Unit	Default Value
	1 to $2^{31}-1$	pulse	65536

Description

Set the number of feedback pulses per motor rotation.

Set the value after multiplication to match the specifications of the motor used.

(For example, if a 16-bit encoder is used, set 2^{16} = 65536.)

No.36 (Linear Motor) R Number of pulses per Linear Scale Pitch	Setting Range	Setting Unit	Default Value
	1 to $2^{31}-1$	pulses/scale pitch	65536

Description

Set the number of pulses equivalent to the value set for No.6: Linear Scale Pitch.

Set the value in accordance with the specifications of the linear motor to be used

No. 38 Maximum Number of Absolute Encoder Turns Rotation	Setting Range	Setting Unit	Default Value
	1 to $2^{31}-1$	rev	65534

Description

Set the maximum number of rotations for the absolute encoder to the highest number that the encoder can manage.

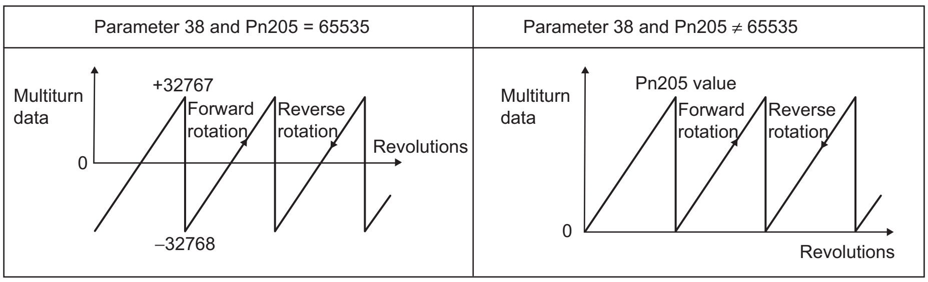
Set this parameter to match the settings of the encoder being used.

- Σ-I series: Set to 99999 (fixed).
- Σ-II, Σ-III, Σ-V, or Σ-7 Series: Set to the same value as the multiturn limit in the SERVOPACK.

<Example>

For axes set as infinite axes (bit 0 of fixed parameter Function Selection Flag 1 set to 1), set to 65534 max. (same value as Pn205).

Finite Axes　　　Infinite Axes



No. 42 R Feedback Speed Movement Averaging Time Constant	Setting Range	Setting Unit	Default Value
	0 to 32	ms	10

Description

Set the moving average time constant for the feedback speed.

The Feedback Speed (monitoring parameter IL□□40) is the value determined by this parameter and the unit-converted difference between feedback positions of each high-speed scan.

Motion Parameters

4

4.4.2 Motion Setting Parameter Details

The following tables provide details of motion setting parameters.

- Refer to *4.3.2 Setting Parameter List* for a list of the motion setting parameters.
- Register number "OW□□00" indicates the leading output register number + 00.Other register numbers listed below indicate output register numbers in the same way. Refer to *4.1.1 Motion Parameter Register Numbers for MP2000 Series Machine Controllers* for information on how to find the leading output register number.
- R in the following tables indicates that the item is also compatible with SVR.
- Position Phase Speed Torque in the following descriptions indicate that parameter is enabled in position control, phase control, speed control, or torque control.
- Similarly, Position Phase Speed Torque in the following descriptions indicate that parameter is disabled in position control, phase control, speed control, or torque control.

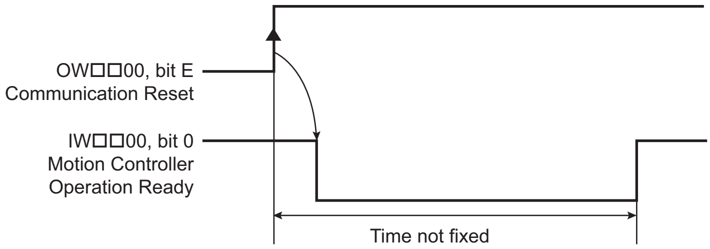
(1) RUN Command Setting

OW□□00 RUN Command Setting (Position Phase Speed Torque)			Setting Range	Setting Unit	Default Value
			–	–	0000H
Description	Bit 0	Servo ON R Sends a SERVO ON command to the SERVOPACK. 0: Servo OFF (default) 1: Servo ON			
	Bit 1	Machine Lock 0: Machine lock mode released (default) 1: Machine lock mode During the machine lock mode, the Calculated Position in Machine Coordinate System (CPOS) (monitoring parameter IL□□10) will be updated but no movement will occur on the axis. A change in the machine lock mode is valid after all pulses have been distributed. The machine lock mode cannot be changed during speed or torque control.			
	Bit 4	Latch Detection Demand 0: OFF (default) 1: ON When this bit is set to 1 (ON), the position at the moment the latch signal turns ON will be reported to the monitoring parameter IL□□18 "Machine Coordinate System Latch Position (LPOS)." When the position is detected and reported, bit 2 "Latch Completed" of the monitoring parameter IW□□0C "Position Management Status" will turn ON. To detect the position again, reset this bit to 0 (OFF) and then set to 1 (ON) again. Use bits 0 to 3 (Latch Detection Signal Selection) of the setting parameter OW□□04 (Function Setting 2) to set the latch signal to be used. This function is enabled only through MECHATROLINK-II in 32-byte mode because this function is implemented using the servo command expanded area. During processing, the following values will be stored in monitoring parameter IW□□0A "Motion Subcommand Response Code." Latch request: IW□□0A = 25 Cancel latch request: IW□□0A = 26 • Do not set this bit to 1 (ON) while the motion commands "Zero Point Return," "External Positioning," or "Latch" are being executed. Otherwise, a warning may occur in the SERVOPACK. • With SVB-01 module version 1.20 or later and built-in SVB version 2.50 or later, the subcommands "Latch request" and "Cancel latch request" have priority over other subcommands. Care must be taken in an application where the ON/OFF operation of the latch request is repeated because processing for other subcommands may be suspended. • Refer to *11.4 Modal Latch Function* for details of the latch function.			

(cont'd)

<table>
<tr><td colspan="2">OW□□00
RUN Command Setting (cont'd)</td><td>Position Phase
Speed Torque</td><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td colspan="3"></td><td>–</td><td>–</td><td>0000H</td></tr>
<tr><td rowspan="6">Description</td><td>Bit 6</td><td colspan="4">POSMAX Turn Number Presetting Demand R
0: OFF (default)
1: ON
Preset the Number of POSMAX Turns (monitoring parameter IL□□1E) to the value set for the Number of POSMAX Turns Presetting Data (setting parameter OL□□4C).
• Set to 0 for linear type.</td></tr>
<tr><td>Bit 7</td><td colspan="4">Request ABS Rotary Pos. Load
When an infinite length axis is used with an absolute encoder, this bit can be set to 1 to reset the position information with the data (encoder position and pulse position) that was set when the power was last turned OFF.
When processing has been completed for this bit, the ABS Rotary Pos. LOAD Complete bit will be turned ON in the Position Management Status (monitoring parameter IW□□0C bit 8).
0: OFF (default)
1: ON
• Refer to 9.4.5 [b] Turning the System Back ON (Turning the Servo Back ON) for details on how to use.
• Set to 0 for linear type.</td></tr>
<tr><td>Bit 8</td><td colspan="4">Forward Outside Limiting Torque/Thrust Input
Limit the torque by the value set in the SERVOPACK parameters.
The setting is enabled when the move command or the SERVO ON command is sent.
There is no torque limit switch parameter in the Servo command option area in the SGD-N, SGDB-N, or SGDH+NS100/NS115 SERVOPACKs, so the torque limit input cannot be used.
0: OFF (default)
1: ON</td></tr>
<tr><td>Bit 9</td><td colspan="4">Reverse Outside Limiting Torque/Thrust Input
Limit the torque by the value set in the SERVOPACK parameters.
The setting is enabled when the move command or the SERVO ON command is sent.
There is no torque limit switch parameter in the Servo command option area in the SGD-N, SGDB-N, or SGDH+NS100 SERVOPACKs, so the torque limit input cannot be used.
0: OFF (default)
1: ON</td></tr>
<tr><td>Bit B</td><td colspan="4">Integration Reset
Reset the position loop integral items for the SERVOPACK.
The setting is enabled when the move command or the SERVO ON command is sent.
The Integration Reset (Position Loop Integration Reset) is supported only by the SGDS SERVOPACK and cannot be used for other SERVOPACKs.
0: Integration Reset OFF (default)
1: Integration reset ON</td></tr>
<tr><td>Bit D</td><td colspan="4">Latch Completion Status Clear Request
0: OFF
1: ON
Available only for SGDV and SGD7S SERVOPACKs.</td></tr>
</table>

(cont'd)

<table>
<tr><td colspan="3">OW□□00
RUN Command Setting (cont'd) Position Phase Speed Torque</td><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td colspan="3"></td><td>–</td><td>–</td><td>0000H</td></tr>
<tr><td rowspan="2">Description</td><td>Bit E</td><td colspan="4">Communication Reset (Valid for SVB-01 module version 1.20 or later and built-in SVB version 2.50 or later)
0: Communication reset OFF (default)
1: Communication reset ON
At the rising edge of this bit, communications with the servo will be disconnected and then reestablished.
The communication reset function enables the following:
• Validation of a change in the setting of the servo nonvolatile parameter without turning the power OFF and then ON again.
• Clearing of phase-C position data saved in the interpolator for the linear scale (when using a linear scale manufactured by Magnescale Co. Ltd.)
This function can be executed regardless of communication status and alarm status.
The completion of the communication reset operation can be confirmed by bit 0 (Motion Controller Operation Ready) of the monitoring parameter IW□□00 (Drive Status).


• Do not execute the communication reset function during axis movement using a motion command. If executed, the axis will stop immediately. A sudden stop of the axis may affect machine operation or cause damage to the machine.</td></tr>
<tr><td>Bit F</td><td colspan="4">Alarm Clear R
0: Alarm clear OFF (default)
1: Alarm clear ON
At the rising edge of this bit, an alarm is cleared. Additionally, turns ON the /ALMRST signal connected to the SERVOPACK to clear the SERVOPACK alarm.
If a communication error occurs, communication can be reestablished by clearing the alarm.
• The following warning cannot be cleared by Alarm Clear. Remove the cause of the alarm. IW□□02, bit 2: Fixed Parameter Error
• Do not execute Alarm Clear during axis movement using motion commands. Using Alarm Clear may affect axis movement.</td></tr>
</table>

(2) Mode Setting 1

OW□□01 Mode Setting 1	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		–	–	0000H

Description	Bit 0	Excessive Deviation Error Level Setting Set whether excessively following errors are treated as warnings or as alarms. 0: Alarm (default): Axis stops operating when an excessively following error is detected. 1: Warning: Axis continues to operate even if an excessively following error is detected. ■ Related Parameters OL□□22: Error Count Alarm Detection IL□□02, bit 0: Warning (Excessive deviation) IL□□04, bit 9: Alarm (Excessive deviation)
	Bit 3	Speed Loop P/PI Switch Switch the SERVOPACK's speed loop between PI control and P control. The setting is enabled when the move command or the SERVO ON command is sent. 0: PI control (default) 1: P control
	Bit 4	Gain Switch Switch the gain to the Second Gain set in the SERVOPACK parameters. The setting is enabled when the move command or the SERVO ON command is sent. There is no gain switch parameter in the Servo command option area in the SGD-N, SGDB-N, or SGDH+NS100 SERVOPACKs, so the Gain Switch cannot be used. When SGDV or SGD7S SERVOPACKs are used and the tuning-less function is available, this setting is ignored. 0: Gain switch OFF (default) 1: Gain switch ON
	Bit 5	Gain Switch 2 (Valid with SVB-01 module version 1.20 or later and built-in SVB version 2.50 or later) 0: Gain switch OFF (default) 1: Gain switch ON Can be used only when using an SGDS SERVOPACK. (Not available for SGDV and SGD7S SERVOPACKs.) In combination with bit 4, four types of gain switches can be set.
	Bit6	Latch Mode Selection 0: Usual latch 1: Continuous latch Available only for SGDV and SGD7S SERVOPACKs.

[a] Continuous Latch Function of SGDV and SGD7S SERVOPACKs

By selecting Latch Detection Demand in the parameter RUN Command Setting (OW□□00, bit 4), the Continuous Latch Function is enabled.
This function is for SGDV and SGD7S SERVOPACKs, so the appropriate parameter settings must be made in the SGDV and SGD7S SERVOPACKs.

■ Related Parameters

- Motion setting parameters

Register No.	Name	Setting Range	Default Value	Meaning	Description
OW□□00	RUN Command Setting	Bit setting	0	Bit 4: Latch Detection Demand	0: OFF 1: ON
				Bit D: Latch Completion Status Clear Request	0: OFF 1: ON
OW□□01	Mode Setting 1	Bit setting	0	Bit 6: Latch Mode Selection	0: Usual latch 1: Continuous latch
OW□□04	Function Setting 2	2 to 5	3	Bits 0 to 3: Latch Detection Signal Selection	2: Phase-C pulse input signal 3: /EXT1 4: /EXT2 5: /EXT3

- Monitoring parameters

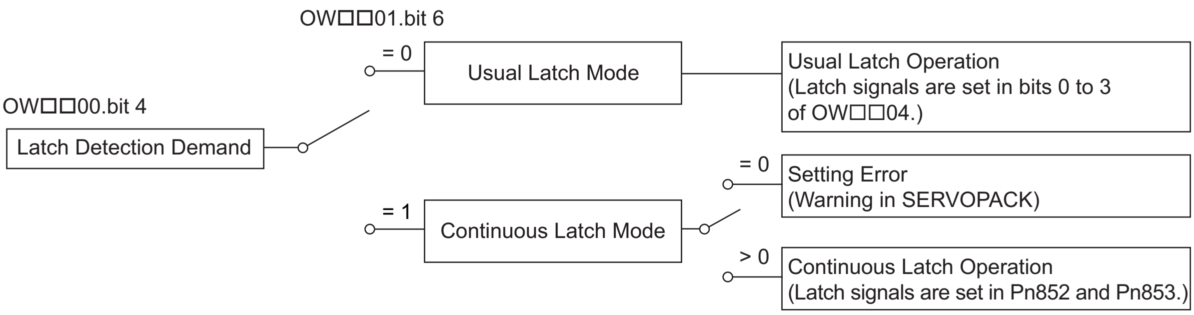
Register No.	Name	Setting Range	Meaning	Description
IW□□00	RUN Status	Bit setting	Bit 4: Latch Mode	–
IW□□0C	Position Management Status	Bit setting	Bit 2: Latch Complete (LCOMP)	–
IL□□18	Machine Coordinate System Latch Position (LPOS)	-2^{31} to $2^{31}-1$	1 = 1 reference unit	–
IW□□44	Latch Completion Sequence Number	0 to 32767	1 = 1 time	Available for SGDV and SGD7S SERVOPACKs with MECHATROLINK-II communications (32 bytes).
IW□□45	Number of Continuous Latch Sequence Completion Cycles	0 to 32767	–	Available for SGDV and SGD7S SERVOPACKs with MECHATROLINK-II communications (32 bytes).

- Servo parameters

Parameter No.	Digit	Name		Size	Description	Default Value
Pn850		Latch Sequence Number		2	Min.= 0, Max.= 8	0
Pn851		Continuous Latch Count		2	Min.= 0, Max.= 255	0
Pn852	Latch Sequence Signal 1 to 4 Setting			2	Min.= 0000H, Max.= 3333H	0000H
	0	Latch sequence 1 signal selection	0	–	Phase C	0
			1	–	EXT1 signal	
			2	–	EXT2 signal	
			3	–	EXT3 signal	
	1	Latch sequence 2 signal selection		–	Same as latch sequence 1 signal selection.	0
	2	Latch sequence 3 signal selection		–	Same as latch sequence 1 signal selection.	0
	3	Latch sequence 4 signal selection		–	Same as latch sequence 1 signal selection.	0
Pn853	Latch Sequence Signal 5 to 8 Setting			2	Min.= 0000H, Max.= 3333H	0000H
	0	Latch sequence 5 signal selection	0	–	Phase C	0
			1	–	EXT1 signal	
			2	–	EXT2 signal	
			3	–	EXT3 signal	
	1	Latch sequence 6 signal selection		–	Same as latch sequence 5 signal selection.	0
	2	Latch sequence 7 signal selection		–	Same as latch sequence 5 signal selection.	0
	3	Latch sequence 8 signal selection		–	Same as latch sequence 5 signal selection.	0

The latch mode can be set to Usual or Continuous with the Latch mode selection (bit 6) of the motion setting parameter, Mode Setting 1 (OW□□01).

In the continuous latch mode, set the continuous latch with Pn850. The latch signal settings can be set in Pn852 and Pn853. Bits 0 to 3 of OW□□04 are not required to set latch signals.



Pn850 Setting	Latch Operation	Latch Single Setting
= 0	– (Error)	–
> 0	Continuous Latch Operation	Setting with Pn852 and Pn853

[b] Details of Latch Operations

■ Usual Latch Operation

Check the completion of the latch with bit 2 of IW□□0C.
To repeat latching again, set bit 4 of OW□□00 to 1.

<Example>

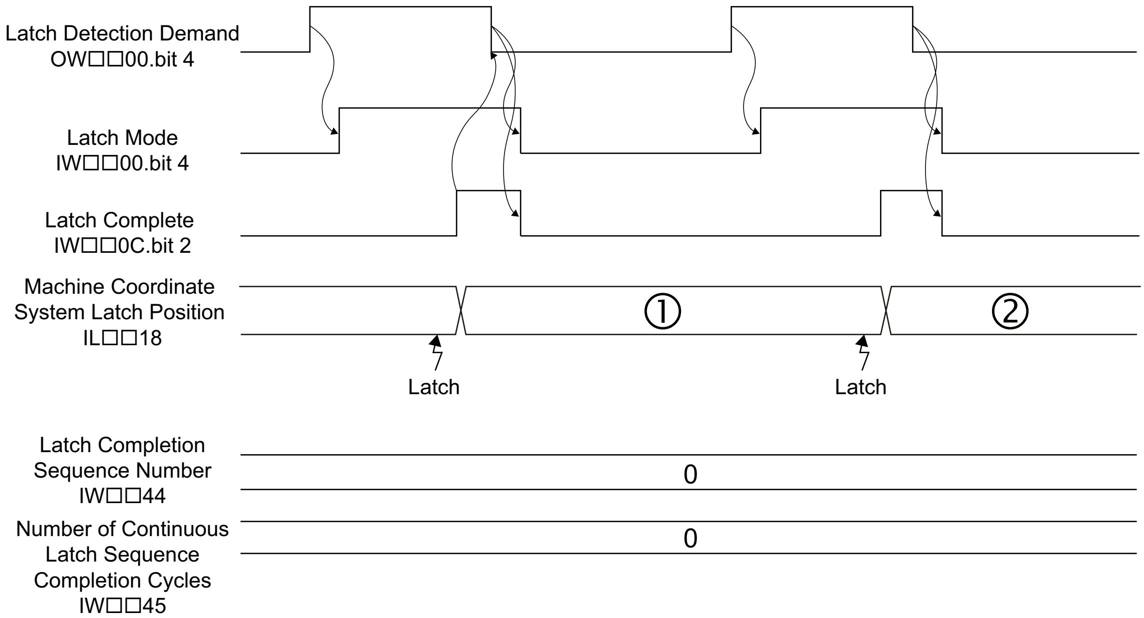
- Condition: Latch at phase-C pulse
- Settings:
  Motion setting parameters

Register No.	Name	Setting value
OW□□01	Mode Setting 1	Bit 6: Latch mode selection = 0 (usual latch)
OW□□04	Function Setting 2	Bits 0 to 3: Latch Detection Signal Selection = 2 (Phase-C pulse)

Servo parameters

Parameter No.	Name	Setting value
Pn850	Latch Sequence Number	Disabled
Pn851	Continuous Latch Count	Disabled
Pn852	Latch Sequence Signal 1 to 4 Setting	Disabled
Pn853	Latch Sequence Signal 5 to 8 Setting	Disabled

- Operation
  To repeat latch operations, set bit 4 of OW□□00 to 1.
  For usual latch operations, IW□□44 and IW□□45 are set to 0.



[c] Continuous Latch Operation

For continuous latch operations, bit 2 of IW□□0C is set to 1. With this setting, however, the parameters IL□□18, IW□□44, and IW□□45 are updated when latching, so the completion of latching can be checked with those parameters.

If checking the completion with bit 2 of IW□□0C, reset the bit settings with the following procedures.

- When bit 2 of IW□□0C is detected as 1, set bit D of OW□□00 to 1 to clear the Latch Complete bit.

■ Precautions

When continuous latching is done for a short time, the sign of latch completion may not be detected because the update of the communication cycle or H scan cycle is delayed.
To check if the latch was successfully completed, use IW□□44 or IW□□45.
If the current value is one greater than that of the previous cycle, then latching was successfully completed.

Example 1

- Condition: Latch at phase-C pulse
- Settings:

Motion setting parameters

Register No.	Name	Setting value
OW□□01	Mode Setting 1	Bit 6: Latch mode selection = 1 (Continuous latch)
OW□□04	Function Setting 2	Bits 0 to 3: Latch detection signal selection = Disabled*

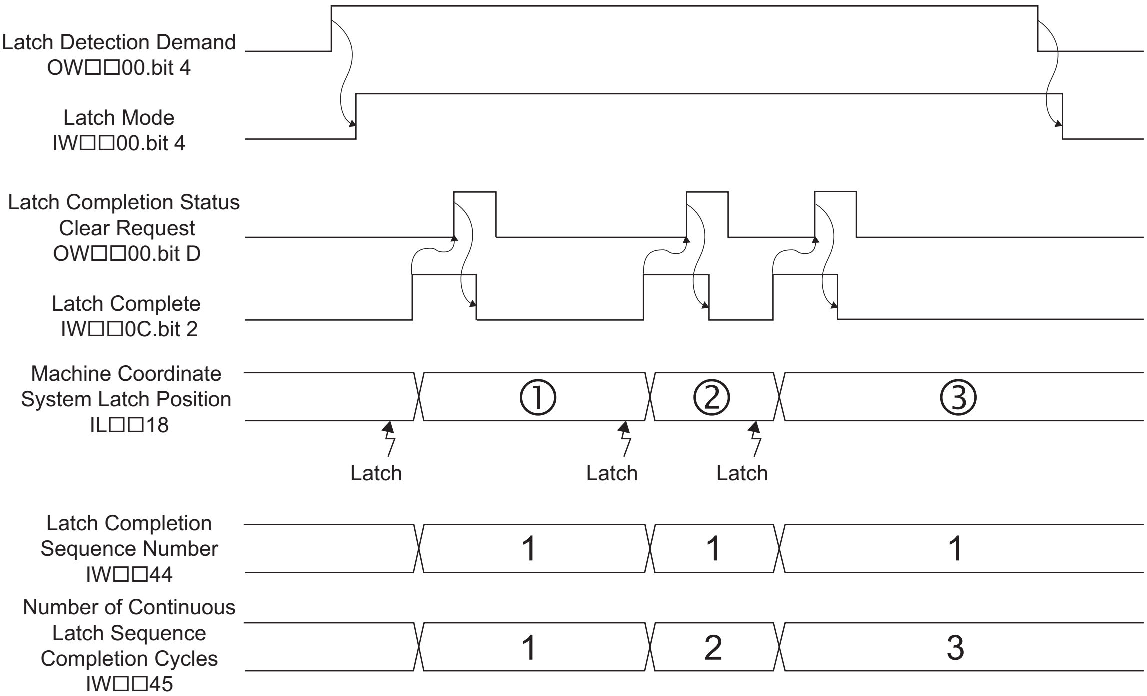
* When using a continuous latch, the settings of bits 0 to 3 are disabled.

Servo parameters

Parameter No.	Name	Setting value
Pn850	Latch Sequence Number	1
Pn851	Continuous Latch Count	0 (No limit)
Pn852	Latch Sequence Signal 1 to 4 Setting	□□□0h
Pn853	Latch Sequence Signal 5 to 8 Setting	□□□□h

- A square (□) indicates an unspecified value.

- Operation
  For continuous latch operations, bit 4 of OW□□00 is set to 1. After the latch has been confirmed as being completed, set bit 10 of OW□□00 to 1 and bit 2 of IW□□0C is forced OFF.



Example 2

- Condition: Sequence latch at phase-C pulse and EXT1 signal
- Settings:
  Motion setting parameters

Register No.	Name	Setting value
OW□□01	Mode Setting 1	Bit 6: Latch mode selection = 1 (Continuous latch)
OW□□04	Function Setting 2	Bits 0 to 3: Latch detection signal selection = Disabled*

* When using a continuous latch, the settings of bits 0 to 3 are disabled.

Servo parameters

Parameter No.	Name	Setting value
Pn850	Latch Sequence Number	2
Pn851	Continuous Latch Count	0 (No limit)
Pn852	Latch Sequence Signal 1 to 4 Setting	□□10h
Pn853	Latch Sequence Signal 5 to 8 Setting	□□□□h

- A square (□) indicates an unspecified value.

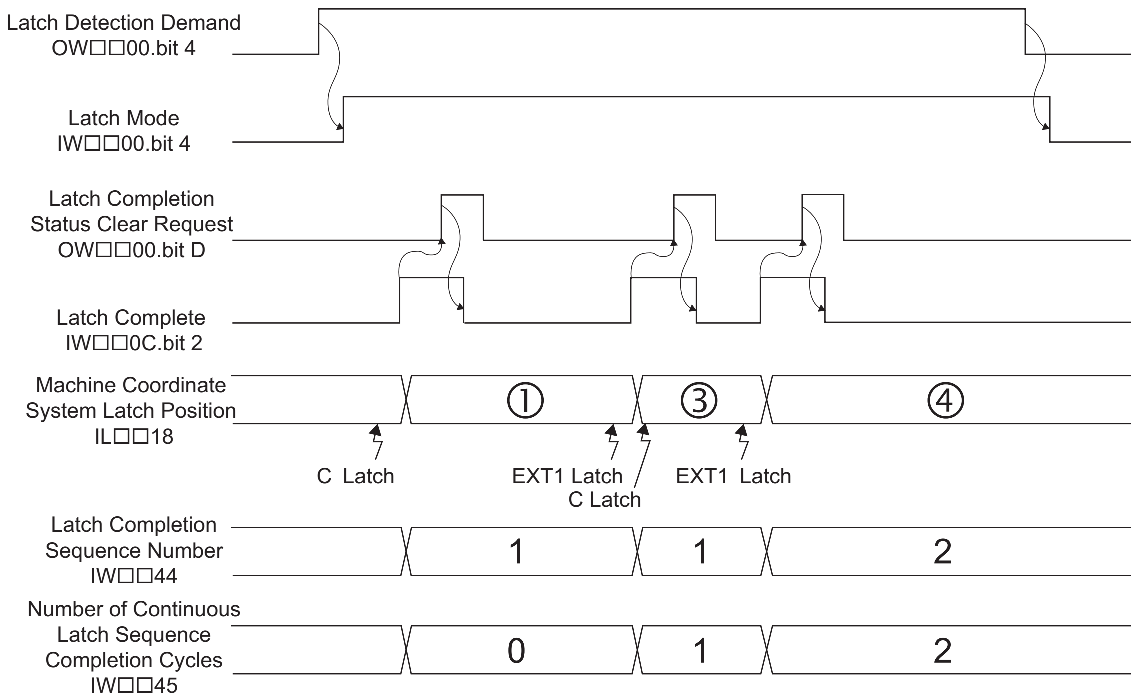
Motion Parameters

4

• Operation

For continuous latch operations, bit 4 of OW□□00 is set to 1. After the latch has been confirmed as being completed, set bit 10 of OW□□00 to 1 and bit 2 of IW□□0C is forced OFF.

If the latch cycle is too short to match the scan cycle, the latch positions may not be recognized. To check if the latch was successfully completed in the set sequence, use IW□□44 or IW□□45.



* This example shows when the output for the phase-C and EXT1 latches are constant and the latching action of the EXT1 latch is bypassed.
The reported latching position (③) is created by the phase-C latch and it can be checked at IW□□44.
If the EXT latch is executed, the setting of IW□□45 changes from 0 to 1.

(3) Mode Setting 2

OW□□02 Mode Setting 2	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		–	–	0000H

Description	Bit 0	Monitor 2 Enabled Disable/enable Monitor 2 in the Servo User Monitor Setting (setting parameter OW□□4E, bits 4 to 7). 0: Disabled (default) 1: Enabled This bit is valid only when the communication mode is MECHATROLINK-I or MECHATROLINK-II 17-byte Mode. This bit is ignored for MECHATROLINK-II 32-byte Mode.
	Bit 8 to Bit F	Stop Mode Selection SVB-01 modules: Available for SVB module version 1.21 or later Built-in SVB modules: Available for SVB module version 2.60 or later Selects the stopping method for the axes controlled by move commands. This function is only available for MECHATROLINK compatible SERVOPACKs. For details on functions that can be used with the SERVOPACK, refer to the section on the HOLD command in the manual of the SERVOPACK being used. • When using the speed reference (VELO) (OW□□08 = 23) 0: Decelerate to a stop according to the linear deceleration time constant (default) 1: Stop immediately ♦ When using the speed reference and this setting is set to a value other than 0 or 1, the motor will stop in accordance with the action specified for the 0 setting. • When using any move commands other than the speed reference (VELO) 0: Decelerate to a stop according to the linear deceleration time constant (default) 1: Stop immediately 2: Stop in accordance with the value of Linear Deceleration Constant 1 for Stopping* * The relevant servo parameter (Pn827 when Pn883.0 = 0 and Pn840 when Pn883.0 = 1) must be set beforehand.

[a] SERVOPACKs with Stop Mode Selection (OW□□02, bit 8 to F)

SERVOPACK	Stop Mode Selections			Remarks
	0: Decelerate to a stop according to the linear deceleration time constant	1: Stop immediately	2: Stop in accordance with the value of Linear Deceleration Constant 1 for Stopping	
SGD-□□□N	○	×	×	When setting 1 or 2 is unavailable, the default setting (0) will be used and the motor will stop in accordance with the specified for the 0 setting.
SGDB-□□AN	○	×	×	When setting 1 or 2 is unavailable, the default setting (0) will be used and the motor will stop in accordance with the specified for the 0 setting.
SGDH-□□□E+NS100	○	×	×	When setting 1 or 2 is unavailable, the default setting (0) will be used and the motor will stop in accordance with the specified for the 0 setting.
SGDH-□□□E+NS115	○	○	×	When setting 1 or 2 is unavailable, the default setting (0) will be used and the motor will stop in accordance with the specified for the 0 setting.
SGDS-□□□12□	○	○	○*1 (Pn827)	–
SGDS-□□□15□	○	○	○*1 (Pn827)	–
SJDE-□□AN□	○	○	×	When setting 1 or 2 is unavailable, the default setting (0) will be used and the motor will stop in accordance with the specified for the 0 setting.
SGDV-□□□□11□	○	○	○*3 (Pn827/Pn840)	–
SGDV-□□□□15□	○	○	○*3 (Pn827/Pn840)	–
SGD7S-□□□□10□	○	○	○*3 (Pn827/Pn840)	–
MECHATROLINK-II Compatible Stepping Motor Driver	*2	*2	*2	–

* 1. Available for SERVOPACKs with MECHATROLINK Communications interface version 0011 or later.
* 2. This product's stopping modes differ from those of other SERVOPACKs.
* 3. The setting of Pn827 is used if Pn883.0 is set to 0 and Pn840 is used if Pn883.0 is set to 1.

- ○: Available, ×: Not available
- When a move command other than the speed reference (VELO) is executed and the stop mode is changed, the timing in which the setting is enabled will vary depending on the SERVOPACK being used.

[b] Timing of Stop Mode Selection (OW□□02, bit 8 to F)

The following table shows when the selected stop mode will be enabled while a move command is executed.

Move Commands	When a command is interrupted. (OW□□09 Bit 1 = ON)	When a command is changed.	When an error occurs.
POSING (Positioning)	Stops according to the stop mode selected.	Stops according to the stop mode selected.	Stops according to the stop mode selected.
EX_POSING (External input positioning)			
ZRET (Zero point return)			
INTERPOLATE (Interpolation)	–	–	Stops according to the stop mode selected.
ENDOF_INTERPOLATE (For system use)			
LATCH (Latch)			
FEED (JOG operation)	Stops according to the stop mode selected.	Stops according to the stop mode selected.	Stops according to the stop mode selected.
STEP (STEP operation)			
VELO (Speed reference)	Stops according to the stop mode selected. Only available when the stop mode is set to 0 or 1.	Stops according to the stop mode selected. Only available when the stop mode is set to 0 or 1.	Stops according to the stop mode selected. Only available when the stop mode is set to 0 or 1.
TRQ (Torque/thrust reference)	Stops according to the stop mode selected.	Stops according to the stop mode selected.	Stops according to the stop mode selected.
PHASE (Phase reference)	–	–	Stops according to the stop mode selected.

(4) Function Setting 1

OW□□03 Function Setting 1		Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
			–	–	0011H
Description	Bit 0 to Bit 3	**Speed Unit Selection** R Set the unit for speed references. 0: Reference unit/s 1: 10^n reference unit/min (default) (n = number of decimal places/fixed parameter 5) 2: 0.01% 3: 0.0001% • Refer to *5.1.5 Speed Reference* for setting examples when also setting of the combination with the number of digits below the decimal point.			
	Bit 4 to Bit 7	**Acceleration/Deceleration Degree Unit** R Set whether to specify acceleration/deceleration rates or acceleration/deceleration time constants for acceleration/deceleration commands. 0: Reference units/s^2 1: ms (default)			
	Bit 8 to Bit B	**Filter Type Selection** R Set the acceleration/deceleration filter type. The set filter type changes when the motion command Change Filter Type is executed. 0: None (default) 1: Exponential acceleration/deceleration filter 2: Moving average filter • When a filter is used, set the type in this parameter and execute the motion command Change Filter Type. For details, refer to *6.2.12 Change Filter Type (CHG_FILTER)*.			
	Bit C to Bit F	**Torque Unit Selection** R Set the unit for torque references. 0: 0.01% (default) 1: 0.0001%			

(5) Function Setting 2

<table>
<tr><td colspan="2" rowspan="2">OW□□04
Function Setting 2</td><td rowspan="2">Position Phase
Speed Torque</td><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>–</td><td>–</td><td>0033H</td></tr>
<tr><td rowspan="3">Description</td><td>Bit 0 to Bit 3</td><td colspan="4">Latch Detection Signal Selection
Set the latch signal type.
0: -
1: -
2: Phase-C pulse
3: /EXT1 (default)
4: /EXT2
5: /EXT3
• The signal is input to the SERVOPACK. The SGD-N and SGDB-N SERVOPACKs support only the /EXT1 latch signal, so the /EXT2 and /EXT3 latch signals cannot be used. If a signal that is not supported is selected, the following warning will occur: Setting Parameter Error.
• This setting is enabled when executing the motion command Latch and when using the modal latch function.</td></tr>
<tr><td>Bit 4 to Bit 7</td><td colspan="4">External Positioning Signal Setting
Set the external signal for external positioning.
0: -
1: -
2: Phase-C pulse
3: /EXT1 (default)
4: /EXT2
5: /EXT3
• The signal is input to the SERVOPACK. The SGD-N and SGDB-N SERVOPACKs support only the /EXT1 latch signal, so the /EXT2 and /EXT3 latch signals cannot be used. If a signal that is not supported is selected, the following warning will occur: Setting Parameter Error.</td></tr>
<tr><td>Bit C to Bit F</td><td colspan="4">Bank Selector
Select a parameter bank number from the parameter bank numbers set in the SERVOPACK parameter No. 900 (Number of Parameter Banks) in the range between 0 to 14.
• Refer to 11.5 Bank Switching Function for details of parameter bank.</td></tr>
</table>

(6) Function Setting 3

<table>
<tr><td colspan="2" rowspan="2">OW□□05
Function Setting 3</td><td rowspan="2">Position Phase
Speed Torque</td><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>–</td><td>–</td><td>0000H</td></tr>
<tr><td rowspan="2">Description</td><td>Bit 1</td><td colspan="4">Phase Reference Creation Calculation Disable
Set whether to disable or enable phase reference generation processing when executing phase reference commands.
Enable this processing when an electronic shaft is being used. Disable the processing when an electronic cam is being used.
0: Enabled (default)
1: Disabled
Speed feed forward compensation cannot be used for the SGD-N or SGDB-N SERVOPACK, so the Phase Reference Creation Calculation Disable setting cannot be used.</td></tr>
<tr><td>Bit B</td><td colspan="4">Zero Point Return Input Signal
This bit functions as the INPUT signal when the INPUT & C pulse method or INPUT Only method is being used for the Zero Point Return operation.
0: OFF (default)
1: ON</td></tr>
</table>

(7) Motion Commands

OW□□08 R Motion Commands	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 39	–	0
Description	Set motion command. 0: NOP — No command 1: POSING* — Position Mode (Positioning) 2: EX_POSING* — Latch Target Positioning (External Positioning) 3: ZRET* — Zero Point Return 4: INTERPOLATE* — Interpolation 5: ENDOF_ INTERPOLATE* — Reserved for system use. 6: LATCH* — Interpolation Mode with Latch Input 7: FEED* — Jog Mode 8: STEP* — Relative position Mode (Step Mode) 9: ZSET — Set Zero Point 10: ACC — Change Acceleration Time 11: DCC — Change Deceleration Time 12: SCC — Change Filter Time Constant 13: CHG_FILTER — Change Filter Type 14: KVS — Change Speed Loop Gain 15: KPS — Change Position Loop Gain 16: KFS — Change Feed Forward 17: PRM_RD — Read user Constant (Read SERVOPACK parameter) 18: PRM_WR — Write user Constant (Write SERVOPACK parameter) 19: ALM_MON — Alarm Monitor 20: ALM_HIST — Alarm History Monitor 21: ALMHIST_CLR — Clear Alarm History 22: ABS_RST — Absolute Encoder Reset 23: VELO* — Speed Reference 24: TRQ* — Torque/Thrust Reference 25: PHASE* — Phase Reference 26: KIS — Change Position Loop Integral Time Constant 27: PPRM_WR — Stored Parameter Write 39: MLTTRN_SET — Multiturn Limit Setting ♦ Refer to *Chapter 6 Motion Commands* for details.				

* These commands are move commands.

(8) Motion Command Control Flag

OW□□09 Motion Command Control Flag	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		–	–	0000H

Description	Bit 0	Holds a Command R The axis will decelerate to a stop if this bit is changed to 1 while an axis is moving during positioning, external positioning, STEP operation, speed reference, or torque reference. While this bit is 1, the command is held. When this bit is changed to 0, the hold is canceled and positioning restarts. After the axis has been stopped, the Command Hold Completed bit will turn ON in the Motion Command Status (monitoring parameter IW□□09, bit 1). 0: OFF (default) 1: ON
	Bit 1	Interrupt a Command R The axis will decelerate to a stop if this bit is changed to 1 while an axis is moving during positioning, external positioning, zero point return, JOG operation, STEP operation, speed reference, or torque reference, and the remaining movement will be canceled. 0: OFF (default) 1: ON
	Bit 2	Moving Direction (JOG/STEP) R Set the movement direction for JOG or STEP. 0: Forward (default) 1: Reverse
	Bit 3	Zero Point Return Direction Selection Set the direction to move for zero point return. This setting is valid for zero point returns using DEC1 + C, ZERO, DEC1 + ZERO, or phase-C. 0: Reverse (default) 1: Forward
	Bit 4	Latch Zone Effective Selection Disable/enable the area where the external signal is valid for external positioning (called the latch zone). This parameter writes the set values for OL□□2A/OL□□2C in the SERVOPACK parameters (Pn820, Pn822) when it is enabled. This setting is valid each time a new external positioning command is executed. When this parameter is disabled, sets the SERVOPACK parameters Pn820 and Pn822 to the same value (zero). 0: Disabled (default) 1: Enabled Always disable this parameter when sending latch commands (latch, zero point return) other than those for external positioning. ■ Related Parameters Latch Zone Lower Limit Setting (setting parameter OL□□2A) and Latch Zone Upper Limit Setting (setting parameter OL□□2C)
	Bit 5	Position Reference Type R Specify whether the value set for the Position Reference Setting (setting parameter OL□□1C) is an Incremental Addition Mode value (calculated by adding the movement amount to the current position) or an Absolute Mode value (an absolute position). Always select Incremental Addition Mode if the SVB-01 module is mounted to an MP2000-series Machine Controller, a motion program is used, and an infinite length axis is used. For details, refer to *5.1.4 Position Reference*. 0: Incremental Value Add Method (default) 1: Absolute Value Set Method

(cont'd)

OW□□09 Motion Command Control Flag (cont'd)		Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
			–	–	0000H
Description	Bit 6	Phase Compensation Type (Valid with SVB-01 module version 1.13 or later and built-in SVB version 2.40 or later) Select a setting method for Phase Correction Setting (OL□□28). 0: Incremental Value Add Method (default) 1: Absolute Value Set Method This bit is valid when the electronic cam function is enabled (setting: OW□□05, bit 1 = 1). If using an electronic shaft (OW□□05, bit 1 = 0), the incremental value of Phase Correction Setting (OL□□28), which is the difference between the values from the previous H scan and the current H scan, is added to the target position regardless of the setting of this bit. ■ Precautions if using as an electronic cam (OW□□05, bit 1 = 1) • If Absolute value 1 is selected for the Phase Compensation Type when using an electronic cam, always take measures to prevent a sudden and extreme change in the target position before executing the move command. For example, set the Phase Correction Setting (OL□□28) to the same value as CPOS in 32 bit (IL□□14). If preventive measures are not taken, the axis may abruptly move, resulting in a serious situation. • If using the electronic cam function, do not change the setting of this bit while the move command is being executed. Although the setting of this bit can be changed at any time, changing the setting while the move command is being executed may move the axis abruptly, resulting in serious situation. ■ Precautions if using as an electronic shaft (OW□□05, bit 1 = 0) • The setting method of Phase Correction Setting (OL□□28) for the SVA-01 Module and that for the SVB/SVB-01 Modules are different. For the SVA-01 Module, the set value of Phase Correction Setting (OL□□28) is simply added to the target position.			

(9) Motion Subcommands

OW□□0A Motion Subcommands	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 5	–	0
Description	Set the motion subcommands that can be used with the motion command. R 0: NOP — No command 1: PRM_RD — Read User Constant 2: PRM_WR — Write User Constant 3: Reserved — Reserved 4: SMON — Status Monitor R 5: FIXPRM_RD — Read Fixed Parameter • These commands can be used only with MECHATROLINK-II in 32-byte mode, except for Read Fixed Parameters. For details, refer to *6.3 Motion Subcommands* and *6.4 Motion Subcommand Details*.			

(10) Torque Reference

OL□□0C R Torque/Thrust Reference Setting /Torque Feed Forward Compensation	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Depends on the torque unit set in Function Setting 1 (setting parameter OW□□03, bits C to F).	0

Description

The meaning will depend on the command.

- Set the torque reference for torque reference commands.
  Refer to *6.2.23 Torque /Thrust Reference (TRQ)* for details.
- Set the torque feed forward gain* for interpolation commands.
  - * Torque Feed Forward Gain Function
    Torque feed forward gain can be used when interpolation commands (INTERPOLATE, LATCH) are sent using SGDS, SGDV, and SGD7S SERVOPACKs.
    <Conditions of Use>
  - SERVOPACK parameter Pn002.0 = 2
  - SGDS communication interface version 8 or later
- The setting unit for this parameter depends on the Torque Unit Selection (OW□□03, bits C to F), but the result of applying the torque unit setting is not shown here.

OW□□0E Speed Limit Setting at the Torque/ Thrust Reference	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		−32768 to 32767	0.01%	15000

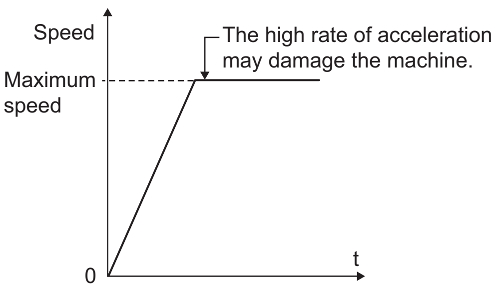
Description

Set the speed limit for torque/thrust references as a percentage of the rated speed.

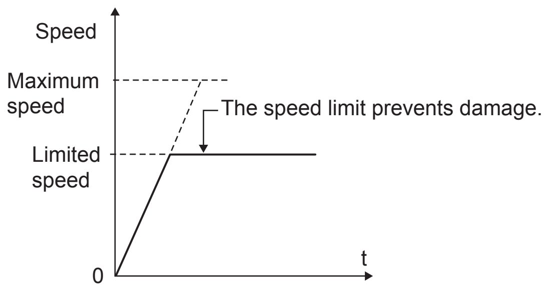
Torque control is used to control the Servomotor to output the specified torque, so it does not control the motor speed. Therefore, when an excessive reference torque is set relative to the load torque of the machine, the machine's torque is overpowered by the torque reference and the motor speed rapidly increases.
The torque reference speed limit functions to limit the Servomotor speed during torque control to protect the machine.

- The setting is enabled when a torque reference command is executed.
- The absolute value of the setting is the speed limit value.

<No speed limit>



<Speed limit used>



■ Related Parameters

For SGDS, SGDH+NS115, SGDH+NS110, SGDV, SGD7S SERVOPACKs:
Pn002.1

For SGD-N, SGDB-N SERVOPACKs:
Cn-02, bit 2
Cn-14

(11) Speed Reference

		Setting Range	Setting Unit	Default Value
OL□□10 R Speed Reference Setting	Position Phase Speed Torque	-2^{31} to $2^{31}-1$	Depends on the speed unit set in Function Setting 1 (setting parameter OW□□03, bits 0 to 3).	3000
Description	Set the speed reference. This parameter is used by the following motion commands. Refer to *Chapter 6 Motion Commands* for details. 1: POSING Positioning 2: EX_POSING External Positioning 3: ZRET Zero Point Return 7: FEED JOG operation 8: STEP STEP operation 23: VELO Speed Reference 25: PHASE Phase Reference • The setting unit for this parameter depends on the Speed Unit Selection (OW□□03, bits 0 to 3), but the result of applying the speed unit setting is not shown here.			

(12) Positive Side Limiting Torque/Thrust Setting at the Speed Reference

		Setting Range	Setting Unit	Default Value
OL□□14 Positive Side Limiting Torque/Thrust Setting at the Speed Reference	Position Phase Speed Torque	-2^{31} to $2^{31}-1$	Depends on the torque unit set in Function Setting 1 (setting parameter OW□□03, bits C to F).	30000
Description	Set the torque limit for the speed reference command. The same value is used for both the forward and reverse directions. This parameter is used when a torque limit is required at specific timing during operation of the machine, such as applications for pushing a load to stop it or holding a workpiece. • The setting unit for this parameter depends on the Torque Unit Selection (OW□□03, bits C to F), but the result of applying the torque unit setting is not shown here. • The setting is enabled when a speed reference command is executed. • When the SGDV or SGD7S SERVOPACK is used and the SERVOPACK parameters are set, the torque limit is enabled when the following motion commands are executed: POSING, EX_POSING, ZRET, INTERPOLATE, LATCH, FEED, STEP and PHASE			

■ Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations

The torque limit can be set or changed during SERVOPACK operations if the following parameter settings have been made.

- Pn81F.1 = 1 (Position Control Command TFF/TLIM Function Allocation is enabled.)
- Pn002.0 = 1 (PTLIM and NTLIM operate as the torque limit values.)

Or

- Pn81F.1 = 1 (Position Control Command TFF/TLIM Function Allocation is enabled.)
- Pn002.0 = 3 (When P-CL and N-CL are available, PTLIM and NTLIM operate as the torque limit value.)

Specify the torque limit value with the motion setting parameter OL□□14.
The torque limit can be set or changed during the execution of one of the following motion commands.

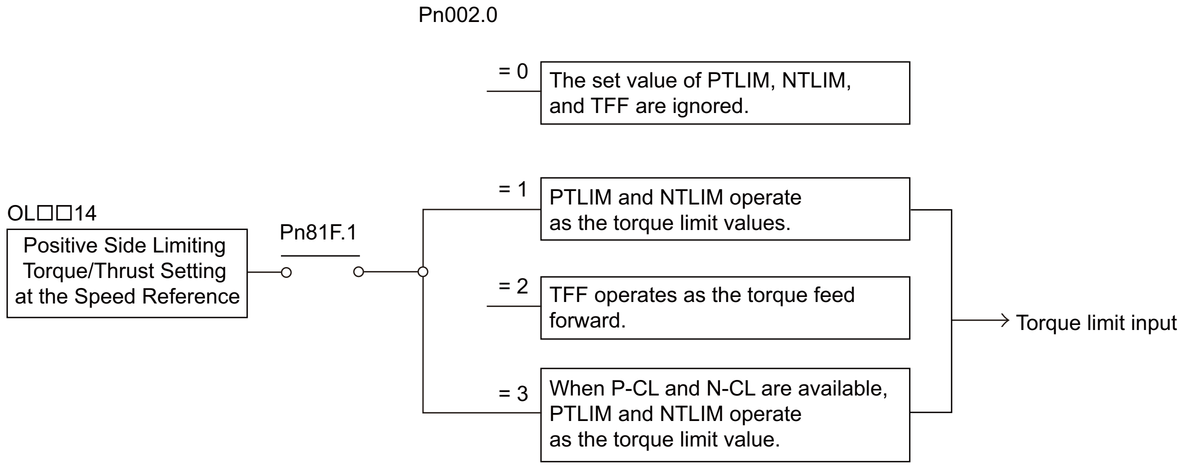
- Positioning (POSING)
- External input positioning (EX_POSING)
- Zero Point Return (ZRET)
- Interpolation (INTERPOLATE)
- Last Interpolation Segment (ENDOF_INTERPOLATE)
- Latch (LATCH)
- JOG operation (FEED)
- STEP operation (STEP)
- Speed control
- Position control

Related parameters

- Setting parameters

Register No.	Name	Setting Range	Default Value	Setting Unit	Remarks
OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	-2^{31} to $2^{31}-1$	30000	1 = 0.01% or 0.0001%	To enable the setting, the SERVOPACK parameter also needs to be set.

SERVOPACK Parameter Setting



The actual torque limit is the lowest one of the values listed in a category in the following table.

Pn002 Setting	Forward Torque Limit		Reverse Torque Limit	
	When OPTION.P_CL = 0	When OPTION.P_CL = 1	When OPTION.N_CL = 0	When OPTION.N_CL = 1
n.□□□0 or n.□□□2	Pn402 setting	Pn402 setting, Pn404 setting	Pn403 setting	Pn403 setting value, Pn405 setting value,
n.□□□1	Pn402 setting, PTLIM (TLIM)	Pn402 setting, Pn404 setting, PTLIM (TLIM)	Pn403 setting, NTLIM (TLIM)	Pn403 setting value, Pn405 setting value, NTLIM (TLIM)
n.□□□3	Pn402 setting	Pn402 setting, Pn404 setting, PTLIM (TLIM)	Pn403 setting	Pn403 setting value, Pn405 setting value, NTLIM (TLIM)

- For linear servomotors, the parameter numbers are different. Use Pn482 instead of Pn402 and Pn483 instead of Pn403.

(13) Secondly Speed Compensation

OL□□16 R Secondly Speed Compensation — Position Phase Speed Torque		Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Depends on the speed unit set in Function Setting 1 (setting parameter OW□□03, bits 0 to 3).	0
Description	Set the speed feed forward amount for the Phase Reference (PHASE), Interpolation (INTERPOLATE), and Latch (LATCH) commands. The setting unit for Speed Compensation (setting parameter OW□□31) is 0.01% (fixed). The unit for this parameter, however, can be selected using Speed Unit Selection. When used at the same time as OW□□31, speed compensation can be performed twice. • The setting unit for this parameter depends on the Speed Unit Selection (OW□□03, bits 0 to 3), but the result of applying the speed unit setting is not shown here.			

(14) Override

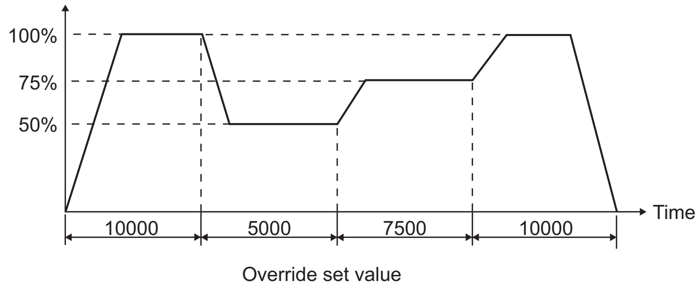
OW□□18 Override	Position / Phase / Speed / Torque	Setting Range	Setting Unit	Default Value
		0 to 32767	0.01%	10000

Description

Set the percentage of the Speed Reference Setting (OL□□10) to output in units of 0.01%.
The override value is always enabled. Set to 10000 (fixed) when not using the override function.

Speed reference setting (OL□□10) × Override (OW□□18) = Output speed

This parameter can be changed at any time to any value during execution of speed reference, and acceleration/deceleration is performed immediately according to the set value.



When the override is set to 0, the output speed is 0 and the motor will not operate.

(15) Position Reference Setting

OL□□1C R Position Reference Setting	Position / Phase / Speed / Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Reference unit	0

Description

Set the position reference.

This parameter is used for the following motion commands.

1: POSING	Position Mode (Positioning)
2: EX_POSING	Latch Target Positioning (External positioning)
4: INTERPOLATE	Interpolation
6: LATCH	Interpolation Mode with Latch Input

■ Related Parameters

OW□□09, bit 5: Position Reference Type

(16) Width of Positioning Completion

OL□□1E Width of Positioning Completion	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 65535	Reference unit	100

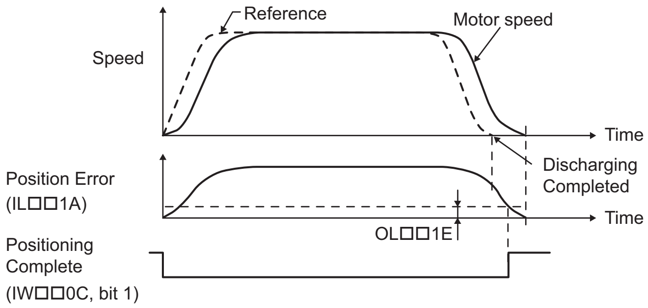
Description

This bit shows the set value of a SERVOPACK parameter.

Refer to *11.6 Parameters That Are Automatically Updated* for details.

When the Positioning Completed Signal (IW□□2C, bit 7) turns ON after position reference distribution has completed for position control, the Positioning Completed bit (IW□□0C, bit 1) turns ON.

Set values that are appropriate for all machines in the system. If the value is too small, a long time will be required for positioning to complete.



■ Related Parameters

Fixed Parameter 4: Reference Unit Selection
Fixed Parameter 5: Number of Digits below Decimal Point
Fixed Parameter 6: Travel Distance per Machine Rotation
Fixed Parameter 8: Servo Motor Gear Ratio
Fixed Parameter 9: Machine Gear Ratio
OW□□2E: Position Loop Gain
IW□□0C, bit 0: Discharging Completed
IW□□0C, bit 1: Positioning Completed (POSCOMP)

(17) NEAR Signal Output Width

OL□□20 NEAR Signal Output Width	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 65535	Reference unit	0

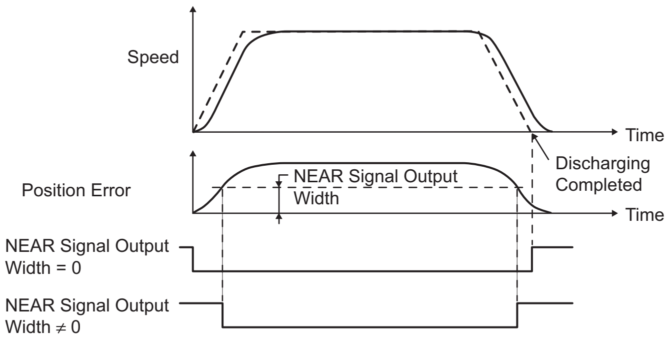
Description

NEAR Position (IW□□0C, bit 3) will be turned ON when the absolute value of the difference between the command position and the feedback position is less than the value set here.

If the NEAR Signal Output Width is set to 0, the NEAR Position bit (monitoring parameter IW□□0C, bit 3) will be turned ON when reference pulses have been distributed. (monitoring parameter IW□□0C, bit 0).

If the NEAR Signal Output Width is set to a value other than 0, this bit will be turned ON when the result of subtracting the Machine Coordinate System Feedback Position (APOS) (monitoring parameter IL□□16) from the Machine Coordinate System Reference Position (MPOS) (monitoring parameter IL□□12) is less than the NEAR Signal Output width, even if the reference pulses have not been distributed.

This parameter has no relation to the SERVOPACK parameter Position Proximity (NEAR) Signal Width.



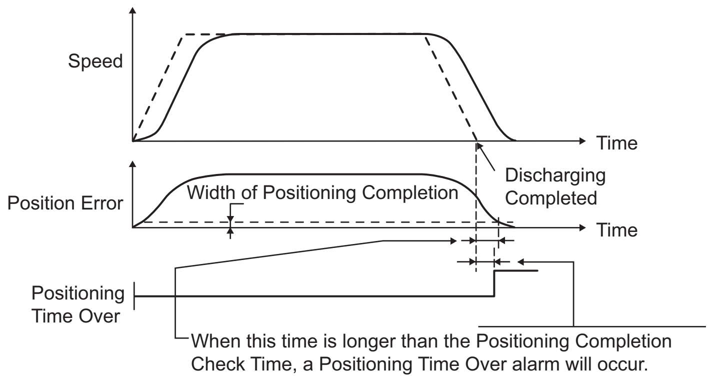
■ Related Parameter

IW□□0C, bit 3: NEAR Position

(18) Error Count Alarm Detection

OL□□22 Error Count Alarm Detection	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 2^{31}–1	Reference unit	2^{31}–1
Description	Set the value to detect an excessively following error during position control. The Excessive Deviation (IL□□04, bit 9) is set to 1 (ON) if the Position Error (monitoring parameter IL□□1A) is greater than the Error Count Alarm Detection. An excessive error will not be detected if this value is set to 0. ■ Related Parameters An excessive error can be set to be treated either as a warning or as an alarm in the Excessive Deviation Error Level Setting in Mode Setting 1 (setting parameter OW□□01, bit 0). OW□□01, bit 0 = 0: Alarm (default) (stops axis operation) OW□□01, bit 0 = 1: Warning (continues axis operation)			

(19) Positioning Completion Check Time

OW□□26 Position Completion Check Time	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 65535	ms	0
Description	Set the time to detect a positioning time over error. If the Positioning Completed bit does not turn ON within the time set here after reference pulses have been distributed during position control, a Positioning Time Over alarm (monitoring parameter IL□□04, bit 6) will occur. The completion of positioning will not be checked if this parameter is set to 0. 			

(20) Phase Correction Setting

OL□□28 Phase Correction Setting	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to 2^{31}–1	Reference unit	0
Description	Set the phase correction amount in reference units for phase reference commands. <Using as Electronic Shaft> Use this parameter to compensate for reference pulses in control systems without rigidity, in which higher gain cannot be applied. <Using as Electronic Cam> Use this parameter as the target position for the cam pattern with incremental addition. • Refer to *6.2.24 Phase References (PHASE)* for details on phase reference commands.			

(21) Latch

		Setting Range	Setting Unit	Default Value
OL□□2A Latch Zone Lower Limit Setting	Position Phase Speed Torque	-2^{31} to $2^{31}-1$	Reference unit	-2^{31}
Description	Set the range in which the latch signal is valid (position from the zero position) for external positioning. The set value here is written to the SERVOPACK parameters each time an external positioning command is executed as long as the latch zone is enabled in the Latch Zone Effective Selection bit in Motion Command Control Flag (setting parameter OW□□09, bit 4). The SERVOPACK parameters for the latch zone setting can be used for SGDS, SGDV, and SGD7S SERVOPACKs. Latching Area Lower Limit: Pn822 Latching Area Upper Limit: Pn820			
OL□□2C Latch Zone Upper Limit Setting	Position Phase Speed Torque	-2^{31} to $2^{31}-1$	Reference unit	$2^{31}-1$
Description	Same as for OL□□2A.			

(22) Gain and Bias Settings

		Setting Range	Setting Unit	Default Value
OW□□2E Position Loop Gain	Position Phase Speed Torque	0 to 32767	0.1/s	300
Description	Determine the responsiveness for the SERVOPACK's position loop. If the position loop gain is set high, the responsiveness is high and the positioning time is short. Set the optimum value for the machine rigidity, inertia, and type of Servomotor. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *11.6 Parameters That Are Automatically Updated* for information on user constants self-writing function. If this parameter changes, the corresponding SERVOPACK parameter will change automatically. This function is achieved using the Servo command expansion area and can be executed when using the MECHATROLINK-II (32-byte Mode) communication method. The motion command KPS must be used to make changes to this parameter. • When SGDV or SGD7S SERVOPACKs are used and the tuning-less function is available, this setting is ignored.			
OW□□2F Speed Loop Gain	Position Phase Speed Torque	1 to 2000	Hz	40
Description	Determine the responsiveness for the SERVOPACK's speed loop. The servo system will be more stable the higher this parameter is set, as long as the value is within the range in which the mechanical system does not oscillate. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *11.6 Parameters That Are Automatically Updated* for information on user constants self-writing function. If this parameter changes, the corresponding SERVOPACK parameter will change automatically. This function is achieved using the Servo command expansion area and can be executed when using the MECHATROLINK-II (32-byte Mode) communication method. The motion command KVS must be used to make changes to this parameter. • When SGDV or SGD7S SERVOPACKs are used and the tuning-less function is available, this setting is ignored.			
OW□□30 Speed Feedforward Amends	Position Phase Speed Torque	0 to 32767	0.01%	0
Description	Reduces positioning time by applying feed forward compensation. This setting is effective for positioning control commands. Always set this parameter to 0 for phase control. If this parameter changes, the corresponding SERVOPACK parameter will change automatically. This function is achieved using the Servo command expansion area and can be executed when using the MECHATROLINK-II (32-byte Mode) communication method. The motion command KFS must be used to make changes to this parameter. • When SGDV or SGD7S SERVOPACKs are used and the tuning-less function is available, this setting is ignored.			

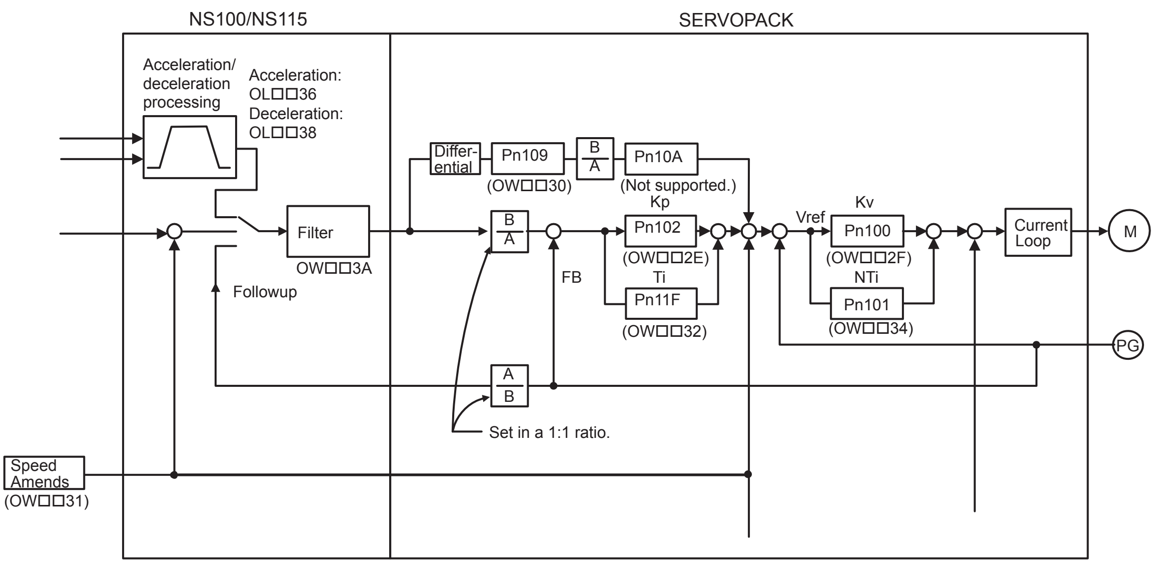
(cont'd)

OW□□31 R Speed Compensation	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-32768 to 32767	0.01%	0
Description	Set the speed feed forward gain as a percentage of the rated speed for the interpolation (INTERPOLATE), phase reference (PHASE), and latch (LATCH) commands. The setting unit for this parameter is 0.01% (fixed). • Secondly Speed Compensation (OL□□16) can be used with the phase reference command (PHASE), and the unit can be selected for OL□□16. When used at the same time as OL□□16, speed compensation can be applied twice.			

OW□□32 Position Integration Time Constant	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 32767	ms	0
Description	Set the position integration time constant. Use this parameter to improve the following precision in applications such as electronic cams or shafts. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *11.6 Parameters That Are Automatically Updated* for information on user constants self-writing function. If this parameter changes, the corresponding SERVOPACK parameter will change automatically. This function is achieved using the Servo command expansion area and can be executed when using the MECHATROLINK-II (32-byte Mode) communication method. The motion command KIS must be used to make changes to this parameter. There is no parameter to set the integration time constant in the SGD-N or SGDB-N SERVOPACK, so the Position Integration Time Constant cannot be used. • When SGDV or SGD7S SERVOPACKs are used and the tuning-less function is available, this setting is ignored.			

OW□□34 Speed Integration Time Constant	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		15 to 65535	0.01 ms	2000
Description	The speed loop has an integral element to enable responding to minute inputs. This element, however, causes a delay in the servo system, adversely affecting the response if the time constant is set too large. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *11.6 Parameters That Are Automatically Updated* for information on user constants self-writing function. • When SGDV or SGD7S SERVOPACKs are used and the tuning-less function is available, this setting is ignored.			

The following figure shows the relationship between the above related parameters.



(23) Acceleration/Deceleration Settings

		Setting Range	Setting Unit	Default Value
OL□□36 R Straight Line Acceleration/Acceleration Time Constant	Position Phase Speed Torque	0 to $2^{31}-1$	Acceleration/Deceleration Degree Unit Selection (setting parameter OW□□03, bits 4 to 7)	0
Description	Set the linear acceleration rate or linear acceleration time constant. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *11.6 Parameters That Are Automatically Updated* for information on user constants self-writing function. • The setting unit for this parameter depends on the Acceleration/Deceleration Degree Unit Selection (OW□□03, bits 4 to 7), but the result of applying the acceleration/deceleration units setting is not shown here.			
OL□□38 R Straight Line Deceleration/Deceleration Time Constant	Position Phase Speed Torque	0 to $2^{31}-1$	Acceleration/Deceleration Degree Unit Selection (setting parameter OW□□03, bits 4 to 7)	0
Description	Set the linear deceleration rate or linear deceleration time constant. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *11.6 Parameters That Are Automatically Updated* for information on user constants self-writing function. • The setting unit for this parameter depends on the Acceleration/Deceleration Degree Unit Selection (OW□□03, bits 4 to 7), but the result of applying the acceleration/deceleration units setting is not shown here.			

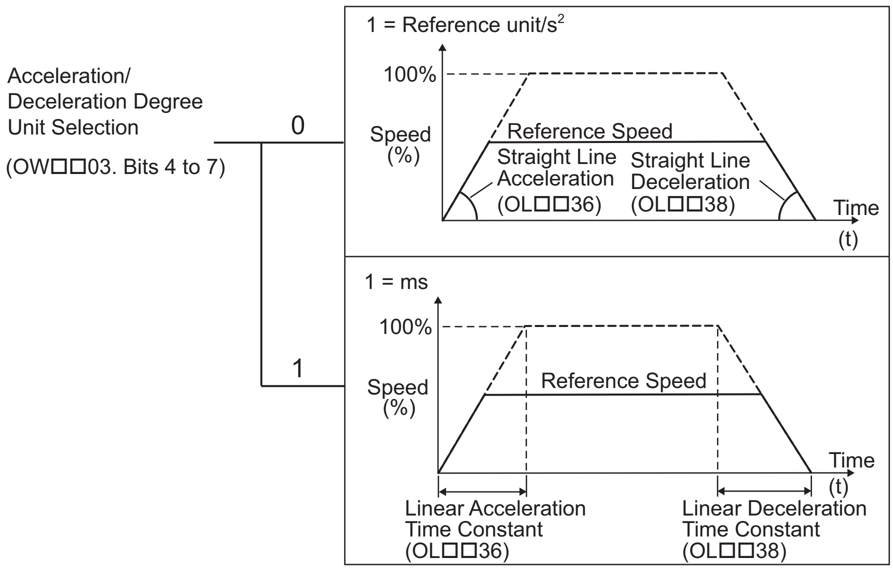
The following two methods can be used to specify the acceleration/deceleration speed.

1. Setting the acceleration/deceleration speed

Set the speed within the range of 0 to 2147483647 reference units/s^2.
When a negative value is set, the setting parameter warning will be generated and the axis will move at the maximum acceleration or maximum deceleration speed.

2. Setting the time to reach the rated speed from zero speed.

Set the time within the range of 0 to 32767 ms.
When a negative value is set, the setting parameter warning will be generated and the axis will move as it does when 0 is set.
When a value larger than 32767 is set, the setting parameter warning will be generated and the axis will move as it does when 32767 is set.



• For details on each acceleration/deceleration parameter, refer to *5.1.6 Acceleration/Deceleration Settings* and *5.1.7 Acceleration/Deceleration Filter Settings*.

■ Changing the maximum value of acceleration and deceleration for SGDV or SGD7S SERVOPACKs

When the SERVOPACK parameter Pn833.0 is set to 1 (Accel/Decel Constant Selection = Uses Pn834 to Pn840), a wilder range of speed for acceleration and deceleration can be obtained by raising the upper limit of acceleration and deceleration for the following motion commands.

- Positioning (POSING)
- External input positioning (EX_POSING)
- Zero Point Return (ZRET)
- JOG operation (FEED)
- STEP operation (STEP)

After communications have been established between the SVB module and SERVOPACK, the SVB module reads the setting of Pn833.0 and changes the applicable parameters. Use the following SERVOPACK parameters to set the acceleration and deceleration.

- Parameters to set acceleration and deceleration when Pn833 = n.□□□0

Parameter No.	Name	Size	Min.	Max.	Unit	Default Value
Pn80A	1st Linear Acceleration Constant	2	1	65535	10000 Reference unit/s^2	100
Pn80B	2nd Linear Acceleration Constant	2	1	65535	10000 Reference unit/s^2	100
Pn80C	Acceleration Constant Switching Speed	2	0	65535	100 Reference unit/s	0
Pn80D	1st Linear Deceleration Constant	2	1	65535	10000 Reference unit/s^2	100
Pn80E	2nd Linear Deceleration Constant	2	1	65535	10000 Reference unit/s^2	100
Pn80F	Deceleration Constant Switching Speed	2	0	65535	100 Reference unit/s	0
Pn827	Linear Deceleration Constant 1 for Stopping	2	0	65535	10000 Reference unit/s^2	100

- Parameters to set acceleration and deceleration when Pn833 = n.□□□1

Parameter No.	Name	Size	Min.	Max.	Unit	Default Value
Pn834	1st Linear Acceleration Constant 2	4	1	20971520	10000 Reference unit/s^2	100
Pn836	2nd Linear Acceleration Constant 2	4	1	20971520	10000 Reference unit/s^2	100
Pn838	Acceleration Constant Switching Speed 2	4	0	2097152000	Reference unit/s	0
Pn83A	1st Linear Deceleration Constant 2	4	1	20971520	10000 Reference unit/s^2	100
Pn83C	2nd Linear Deceleration Constant 2	4	1	20971520	10000 Reference unit/s^2	100
Pn83E	Deceleration Constant Switching Speed 2	4	0	2097152000	Reference unit/s	0
Pn840	Linear Deceleration Constant 2 for Stopping	4	0	20971520	10000 Reference unit/s^2	100

- To enable the new setting for Pn833, the SERVOPACK must be restarted.
- When connecting SGDV or SGD7S SERVOPACKs and executing self-configuration for the first time, set Pn833.0 to 1.

Example: Total time until the reference reaches the rated 3000 min^{-1} when using a 17 bit encoder.

The maximum acceleration of Pn80B: 65535 × 10000 pulse/s^2 = 10 ms

The maximum acceleration of Pn836: 20971520 × 10000 pulse/s^2 = 30 µs

Motion Parameters 4

(24) Filter

OW□□3A R Filter Time Constant	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 65535	0.1 ms	0
Description	Set the acceleration/deceleration filter time constant. Always make sure that pulse distribution has been completed (i.e., that monitoring parameter IW□□0C, bit 0 is ON) before changing the time constant. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *11.6 Parameters That Are Automatically Updated* for information on user constants self-writing function. The setting range is limited by the specifications of the SERVOPACK being used. • When using SGD-N, SGDB-N, SGDH+NS100/115, SGDS, SGDV, or SGD7S SERVOPACK, the setting range is between 0 and 5100. Change the time constant for the filter set using the motion command Change Filter Type. After setting the filter type to be used, change the time constant. The overall flow for setting the filter time constant is as follows: 1. Select the filter type in Function Setting 1 (setting parameter OW□□03, bits 8 to B). ↓ 2. Execute the motion command Change Filter Type. ↓ 3. Set the Filter Time Constant (setting parameter OW□□3A). ↓ 4. Execute the motion command Change Filter Time Constant. Once the filter type is set using the motion command, the setting is held until the power is turned OFF or the filter type is changed.			

OW□□3B (R only) Bias Speed for Exponential Acceleration/Deceleration Filter	Setting Range	Setting Unit	Default Value
	0 to 32767	Speed Unit Selection (setting parameter OW□□03, bits 0 to 3)	0
Description	Set the bias speed for the exponential acceleration/deceleration filter. • The setting unit for this parameter depends on the Speed Unit Selection (OW□□03, bits 0 to 3), but the result of applying the speed unit setting is not shown here.		

- There are two types of acceleration/deceleration filter: an exponential acceleration/deceleration filter and a moving average filter.
- For details on each acceleration/deceleration parameter, refer to *5.1.6 Acceleration/Deceleration Settings* and *5.1.7 Acceleration/Deceleration Filter Settings*.

(25) Zero Point Return

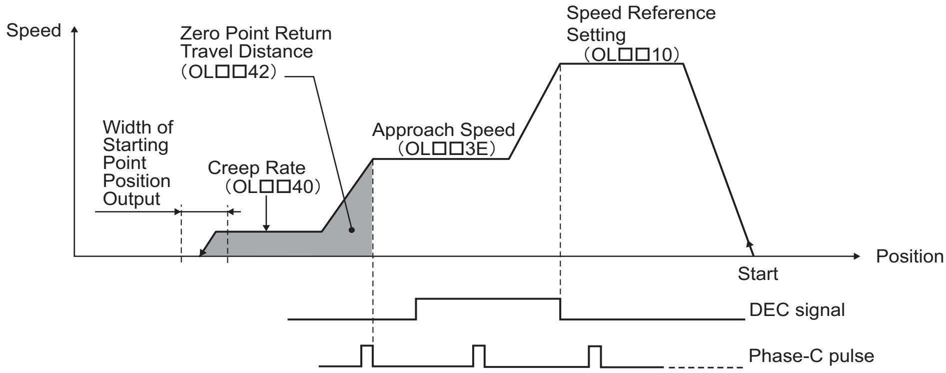
OW□□3C Zero Point Return Method	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 19	–	0
Description	Set the operation method when the Zero Point Return (ZRET) motion command is executed. With an incremental encoder, there are 13 different methods that can be performed for the Zero Point Return operation. • Refer to *6.2.3 Zero Point Return (ZRET)* for information on each method. With an absolute encoder, the axis is returned to the zero point of the machine coordinate system regardless of which method is being used.			
OW□□3D R Width of Starting Point Position Output	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 65535	Reference unit	100
Description	Set the width in which the Zero Point Position bit (monitoring parameter IW□□0C, bit 4) will be ON.			
OL□□3E Approach Speed	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Depends on Speed Units.	1000
Description	Set the approach speed for a zero point return operation after the deceleration LS is passed. • The setting unit for this parameter depends on the Speed Unit Selection (OW□□03, bits 0 to 3), but the result of applying the speed unit setting is not shown here.			

(cont'd)

OL□□40 Creep Rate	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Depends on Speed Units.	500
Description	Set the creep speed for a zero point return operation after the ZERO signal is detected. • The setting unit for this parameter depends on the Speed Unit Selection (OW□□03, bits 0 to 3), but the result of applying the speed unit setting is not shown here.			
OL□□42 Zero Point Return Travel Distance	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Reference unit	0
Description	Set the distance from where the signal is detected to the zero point position.			

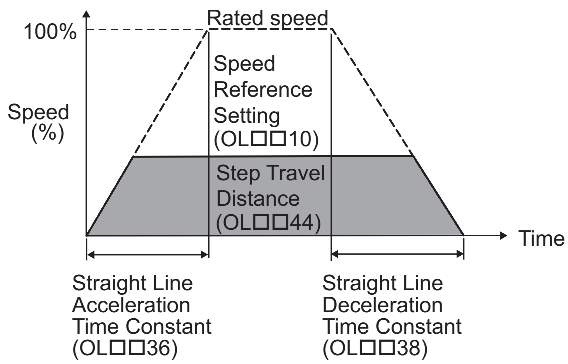
A typical example of a zero point return operation is shown below.

- Refer to *6.2.3 Zero Point Return (ZRET)* for details.



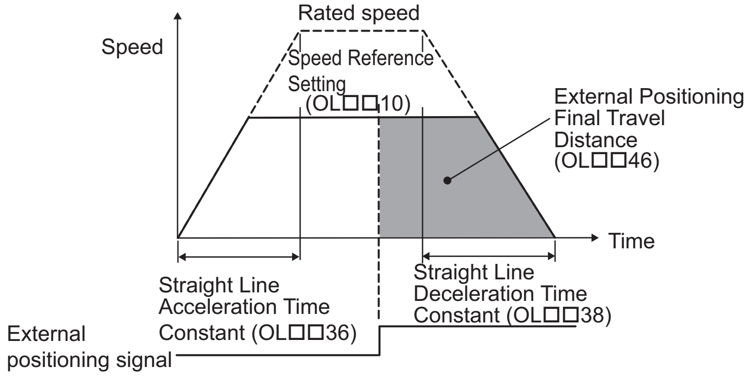
(26) Step Travel Distance

OL□□44 R Step Travel Distance	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to $2^{31}-1$	Reference unit	1000
Description	Set the moving amount for STEP commands.			



- Refer to *6.2.7 Relative Position Mode (STEP) (Step Mode)* for details on STEP commands.

(27) External Positioning Final Travel Distance

OL□□46 External Positioning Final Travel Distance	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Reference unit	0
Description	Set the distance from the time the external signal is input for external positioning command (EX_POSING).  • Refer to *6.2.2 Latch Target Positioning (EX_POSING) (External Positioning)* for details.			

(28) Coordinate System Settings

OL□□48 R Zero Point Position in Machine Coordinate System Offset	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Reference unit	0
Description	Set the offset to shift the machine coordinate system. • This parameter is always enabled, so be sure that the setting is correct.			
OL□□4A R Work Coordinate System Offset	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Reference unit	0
Description	Set the offset to shift the work coordinate system. • This parameter is always enabled, so be sure that the setting is correct.			
OL□□4C R Number of POSMAX Turns Presetting Data	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Turn	0
Description	When the POSMAX Turn Number Presetting Demand bit (setting parameter OW□□00, bit 6) is set to 1, the value set here will be preset as the Number of POSMAX Turns (monitoring parameter IL□□1E). This parameter is invalid for linear type.			

• For information on how to use these functions, refer to *Chapter 9 Absolute Position Detection*.

(29) SERVOPACK User Monitor

OW□□4E Servo User Monitor Setting		Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
			–	–	0E00H
Description	Bit 4 to Bit 7	Monitor 2 Monitor 2 is used with the MECHATROLINK-I and the MECHATROLINK-II in 17-byte Mode when bit 0 of OW□□02 is 1. 0: Reference position in command coordinate system (reference unit) (default) 1: Reference position in machine coordinate system (reference unit) 2: Following error (reference unit) 3: Feedback position in machine coordinate system (reference unit) 4: Feedback latch position in machine coordinate system (reference unit) 5: Reference position in command coordinate system (reference unit) 6: Target position in command coordinate system (reference unit) 7: 8: Feedback speed (position/torque control: reference units/s, speed control: maximum speed/40000000H) 9: Command speed (position/torque control: reference units/s, speed control: maximum speed/40000000H) A: Target speed (position/torque control: reference units/s, speed control: maximum speed/40000000H) B: Torque reference (position/speed control: reference units/s, torque control: maximum torque/40000000H) C: D: E: Option Monitor 1 F: Option Monitor 2 (The information that can be monitored will differ depending on individual SERVOPACK specifications. Refer to the relevant SERVOPACK user's manual for details.)			
	Bit C to Bit F	Monitor 4 Monitor 4 is used only with the MECHATROLINK-II in 32-byte Mode. 0 to F: Same as for Monitor 2.			

(30) SERVOPACK Commands

Parameter	Applicable	Setting Range	Setting Unit	Default Value
OW□□4F Servo Driver Alarm Monitor No.	Position Phase Speed Torque	0 to 9	–	0
Description	Set the number of the alarm to monitor. Set the number of the alarm or warning to monitor for the ALM_MON or ALM_HIST motion command. The result of monitoring will be stored as the Servo Driver Alarm Code (monitoring parameter IW□□2D). • Refer to *Chapter 6 Motion Commands* for details.			

Parameter	Applicable	Setting Range	Setting Unit	Default Value
OW□□50 Servo Driver User Constant No.	Position Phase Speed Torque	0 to 65535	–	0
Description	Set the number of the SERVOPACK parameter. Set the number of the SERVOPACK parameter to be processed for the PRM_RD, PRM_WR or PPRM_WR motion command. • Refer to *Chapter 6 Motion Commands* for details.			

Parameter	Applicable	Setting Range	Setting Unit	Default Value
OW□□51 Servo Driver User Constant Size	Position Phase Speed Torque	1, 2	–	1
Description	Set the number of words in the SERVOPACK parameter. Set the number of words in the SERVOPACK parameter to be processed for the PRM_RD, PRM_WR or PPRM_WR motion command. • Refer to *Chapter 6 Motion Commands* for details.			

Parameter	Applicable	Setting Range	Setting Unit	Default Value
OL□□52 Servo Driver User Constant Set Point	Position Phase Speed Torque	-2^{31} to $2^{31}-1$	–	0
Description	Set the setting for the SERVOPACK parameter. Set the setting value to be written to the SERVOPACK parameter with the PRM_WR, PPRM_WR motion command. • Refer to *Chapter 6 Motion Commands* for details.			

Parameter	Applicable	Setting Range	Setting Unit	Default Value
OW□□54 Servo Driver for Assistance User Constant No.	Position Phase Speed Torque	0 to 65535	–	0
Description	Set the number of the SERVOPACK parameter. Set the number of the SERVOPACK parameter to be processed for the PRM_RD or PRM_WR motion subcommand. • Refer to *Chapter 6 Motion Commands* for details.			

Parameter	Applicable	Setting Range	Setting Unit	Default Value
OW□□55 Servo Driver for Assistance User Constant Size	Position Phase Speed Torque	1, 2	–	1
Description	Set the number of words in the SERVOPACK parameter. Set the number of words in the SERVOPACK parameter to be processed for the PRM_RD or PRM_WR motion subcommand. • Refer to *Chapter 6 Motion Commands* for details.			

Parameter	Applicable	Setting Range	Setting Unit	Default Value
OL□□56 Servo Driver for Assistance User Constant Set Point	Position Phase Speed Torque	-2^{31} to $2^{31}-1$	–	0
Description	Set the setting for the SERVOPACK parameter. Set the setting value to be written to the SERVOPACK parameter with the PRM_WR motion subcommand. • Refer to *Chapter 6 Motion Commands* for details.			

(31) Supplemental Settings

Parameter	Applicable	Setting Range	Setting Unit	Default Value
OW□□5C R Fixed Parameter Number	Position Phase Speed Torque	0 to 65535	–	0
Description	Set the number of the fixed parameter to be read with the motion subcommand FIXPRM_RD. The results of the Read Fixed Parameters operation are stored in the Fixed Parameter Monitor (monitoring parameter IW□□56). • For details, refer to *6.3 Motion Subcommands* and *6.4 Motion Subcommand Details*.			

(32) Absolute Infinite Length Axis Position Control Information

OL□□5E Encoder Position when Power is OFF (Lower 2 words)	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	pulse	0
Description	This is the information for infinite length axis position control when an absolute encoder is used. The encoder position is stored in 4 words. If the Request ABS Rotary Pos LOAD bit is set to 1 in the RUN Command Setting (setting parameter OW□□00, bit 7), the position information will be recalculated with the values set here and the Pulse Position when Power is OFF (OL□□62 and OL□□64). • Refer to *9.4 Absolute Position Detection for Infinite Length Axes* for details. • Set to 0 for linear type.			
OL□□60 Encoder Position when Power is OFF (Upper 2 words)	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	pulse	0
Description	Same as for OL□□5E. • Refer to *9.4 Absolute Position Detection for Infinite Length Axes* for details. • Set to 0 for linear type.			
OL□□62 Pulse Position When Power is OFF (Lower 2 words)	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	pulse	0
Description	This is the information for infinite length axis position control when an absolute encoder is used. The axis position in pulses managed internally by the controller is stored in 4 words. If the Request ABS Rotary Pos. LOAD bit is set to 1 in the Run Command Setting (setting parameter OW□□00, bit 7), the position information will be recalculated with the values set here and the Encoder Position when Power is OFF (OL□□5E and OL□□60). • Refer to *9.4 Absolute Position Detection for Infinite Length Axes* for details. • Set to 0 for linear type.			
OL□□64 Pulse Position When Power is OFF (Upper 2 words)	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	pulse	0
Description	Same as for OL□□62. • Refer to *9.4 Absolute Position Detection for Infinite Length Axes* for details. • Set to 0 for linear type.			

(33) Command Buffer for Servo Driver Transmission Reference Mode

OW□□70 to OW□□7E Command Buffer for Servo Driver Transmission Reference Mode	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		–	–	0
Description	This area is used for response data when MECHATROLINK Servo commands are specified directly. • MECHATROLINK-I and MECHATROLINK-II, 17-byte Mode: Data area = OW□□70 to OW□□77 • MECHATROLINK- II, 32-byte Mode: Data area = OW□□70 to OW□□7E			

Motion Parameters

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4.4.3 Motion Monitoring Parameter Details

The motion monitoring parameter details are listed in the following table.

- Refer to *4.3.3 Monitoring Parameter List* for a list of motion monitoring parameters.
- Register number IW□□00 indicates the leading input register number + 00. Other register numbers listed below indicate input register numbers in the same way.
- Refer to *4.1.1 Motion Parameter Register Numbers for MP2000 Series Machine Controllers* for information on how to find the leading input register number.
- R in the following tables indicates that the item is also compatible with SVR.

(1) RUN Status

<table>
<tr><td colspan="2" rowspan="2">IW□□00
Run Status</td><td>Range</td><td>Unit</td></tr>
<tr><td>–</td><td>–</td></tr>
<tr><td rowspan="5">Description</td><td>Bit 0</td><td colspan="2">Motion Controller Operation Ready R
0: Operation not ready
1: Operation ready
This bit turns ON when RUN preparations for the Motion Module have been completed.
This bit will be OFF under the following conditions:
• Major damage has occurred.
• Axis that is not used was selected.
• Motion fixed parameter setting error
• Motion fixed parameters are being changed.
• Communication is not synchronized.
• SERVOPACK parameters are being accessed by a command from an MPE720.
• The Motion Parameter Window is being opened.
• Configure an OR circuit with IW□□00, bit 2 when using as a Servo ON interlock.</td></tr>
<tr><td>Bit 1</td><td colspan="2">Running (At Servo ON) R
This bit is ON while the axis is in Servo ON status.
0: Stopped
1: Running (Servo ON)</td></tr>
<tr><td>Bit 2</td><td colspan="2">System BUSY
0: System not busy
1: System busy
This bit is ON when the system is processing and cannot execute a motion command. This bit is ON for the following conditions.
• Fixed parameters are being changed.
• SERVOPACK parameters are being read by a command from an MPE720.
• SERVOPACK parameters are being written by a command from an MPE720.</td></tr>
<tr><td>Bit 3</td><td colspan="2">Servo Ready
0: Servo not ready
1: Servo ready
This bit is ON when all of the following conditions are satisfied.
• Communication is synchronized.
• The main power supply for the SERVOPACK is ON.
• There are no alarms in the SERVOPACK.</td></tr>
<tr><td>Bit 4</td><td colspan="2">Latch Mode (Valid with SVB-01 module version 1.20 or later and built-in SVB version 2.50 or later)
0: Latch detection demand reception not completed, 1: Latch detection demand reception completed
This bit turns ON when the request by the setting parameter OW□□00, bit 4 (Latch Detection Demand) has been accepted.</td></tr>
</table>

(2) Over Range Parameter Number

<table>
<tr><td colspan="2" rowspan="2">IW□□01 R
Parameter Number When Range Over is Generated</td><td>Range</td><td>Unit</td></tr>
<tr><td>0 to 65535</td><td>–</td></tr>
<tr><td>Description</td><td colspan="3">Stores the number of a parameter set outside the setting range.
• Setting parameters: 0 or higher
• Fixed Parameters: 1000 or higher
This parameter stores the number of the setting or fixed parameter that exceeds the setting range either individually or in combination with the settings of other parameters.
When motion fixed parameters are used, the parameter stores the parameter number plus 1000.</td></tr>
</table>

(3) Warning

IL□□02 Warning		Range	Unit
		–	–
Description	Bit 0	Excessive Deviation 0: In normal deviation range 1: Abnormal deviation detected This bit turns ON if the following error exceeds the value set for the Error Count Alarm Detection (setting parameter OL□□22) when Excessive Deviation is set to be treated as an warning by setting the Excessive Deviation Error Level Setting Error Level Setting to 0 in Mode Setting 1 (setting parameter OW□□01, bit 0).	
	Bit 1	Set Parameter Error R 0: In setting range 1: Outside setting range This bit turns ON when one or more motion setting parameters is set outside the setting range. The number of the parameter for which the value is out of range is stored as the Parameter Number When Range Over is Generated (monitoring parameter IW□□01).	
	Bit 2	Fixed Parameter Error R 0: In setting range 1: Outside setting range This bit turns ON when one or more motion setting parameters is set outside the motion fixed parameter setting range. The number of the most recent out-of-range parameter is stored as the Parameter Number When Range Over is Generated (monitoring parameter IW□□01).	
	Bit 3	Servo Driver Error 0: No warning 1: Warning This bit turns ON when there is a warning in the SERVOPACK for MECHATROLINK communication. The content of the warning can be confirmed using the Servo Driver Alarm Code (monitoring parameter IW□□2D).	
	Bit 4	Motion Command Set Error R 0: Command setting normal 1: Command setting error This bit turns ON when a motion command that cannot be used is set.	
	Bit 6	Positive Direction Overtravel* 0: No positive overtravel 1: Positive overtravel This bit turns ON when positive overtravel is disabled in the fixed parameter settings and the positive overtravel signal is input.	
	Bit 7	Negative Direction Overtravel* 0: No negative overtravel 1: Negative overtravel This bit turns ON when negative overtravel is disabled in the fixed parameter settings and the negative overtravel signal is input.	
	Bit 8	Servo ON Incomplete 0: Servo ON 1: Servo not ON This bit turns ON when the Servo ON bit in the RUN Command Setting (setting parameter OW□□00, bit 0) set to 1 but the SERVOPACK is not in the Servo ON condition.	
	Bit 9	Servo Driver Communication Warning 0: Communication normal 1: Communication error detected This bit turns ON if a communication error is detected in communication with the SERVOPACK for MECHATROLINK communication. This bit is cleared automatically when communication is performed normally.	
	Bit A	Servo Driver Stop Signal Input Available only when using HWBB function.	

* The bits for the positive/negative direction overtravel warnings will be turned ON in the following conditions on the next page.

- For an SGDV or SGD7S SERVOPACK, the following servo parameter settings must be used.
  The setting of Pn50A is equal to that of H2881 (A P-OT warning is activated when Cn1-8 is low).
  The setting of Pn50B is equal to that of H8881 (A N-OT warning is activated when Cn1-7 is low).
- The fixed parameters of the MP2300 machine controller use the following settings.
  Fixed parameter No.1: Bit 3 is set to 0 (disabled).
  Bit 4 is set to 0 (disabled).
  The bits for the positive/negative direction overtravel warnings will be turned ON in the following order.

  1. The servomotor power is ON.
  2. A motion command, such as one for positioning or constant feed, is executed.
  3. The servomotor moves in the forward (P-OT) or reverse (N-OT) direction.
  4. A SERVOPACK P-OT or N-OT signal is input.

■ Stop Signal Input Warning for SGDV and SGD7S SERVOPACKs

When an HWBB signal (stop signal) is input, bit A of IL□□02 is turned ON, and a warning is issued.
The warning (Servo Driver Stop Signal Input) indicates that the SERVOPACK is being stopped forcibly.
This warning is cleared automatically when the HWBB signal turns OFF.
The status of the HWBB signal can be checked with the stop signal (HWBB) of the Servo Driver I/O Monitor.

- Monitoring Parameters

Register No.	Name	Meaning
IL□□02	Warning	Bit A: Servo Driver Stop Signal Input
IW□□2E	Servo Driver I/O Monitor	Bit A: Stop signal (HWBB)

When an HWBB signal (stop signal) is sent, the SERVOPACK cannot be ON. Also, if an HWBB signal is sent when the SERVOPACK is running, the SERVOPACK is turned OFF.

- Servo ON and NOP mid-operation
  When the SERVOPACK is ON and a No Operation (NOP) motion command is issued during operations, a warning is issued (IL□□02, bit 8 = 1). To clear the warning, turn the HWBB signal OFF, and set bit 0 of OW□□00 to 1.
- Axis Movement by the Motion Command
  When axis movement results from a motion command being issued, and the following warnings or alarms will occur.
  - Servo Driver Error (IL□□02, bit 3)
  - Servo ON Incomplete (IL□□02, bit 8)
  - Servo OFF (IL□□04, bit 5)

  And then the following motion command will be executed: Command Error Completed Status (IW□□09, bit 3).
  To clear the error, turn the HWBB signal OFF and do the following procedures.

  1. Change the motion command to NOP (OW□□08 = 0)
  2. Servo OFF (OW□□00, bit 0 to 0)
  3. Clear the alarm (OW□□00, bit F = 0 → 1 → 0)
  4. Servo ON (OW□□00, bit 0 to 1)

(4) Alarm

IL□□04 Alarm		Range	Unit
		–	–
Description	Bit 0	Servo Driver Error 0: No Servo Driver alarm 1: Servo Driver alarm occurred This bit turns ON when there is a alarm in the SERVOPACK for MECHATROLINK communication. The content of the alarm can be confirmed using the Servo Driver Alarm Code (monitoring parameter IW□□2D).	
	Bit 1	Positive Direction Overtravel 0: No positive overtravel 1: Positive overtravel occurred This bit turns ON when the positive overtravel signal has been input and a move command is executed in the positive direction. • Refer to *11.2 Overtravel Function* for details.	
	Bit 2	Negative Direction Overtravel 0: No negative overtravel 1: Negative overtravel occurred This bit turns ON when the negative overtravel signal is input and a move command is executed in the negative direction. • Refer to *11.2 Overtravel Function* for details.	
	Bit 3	Positive Direction Software Limit 0: In positive software limit range 1: Not in positive software limit range This bit turns ON if a move command that exceeds the positive software limit is executed with the following conditions: A finite axis is selected, the positive software limit is enabled, and a Zero Point Return operation has been completed. • Refer to *11.3 Software Limit Function* for details.	
	Bit 4	Negative Direction Software Limit 0: In negative software limit range 1: Not in negative software limit range This bit turns ON if a move command that exceeds the negative software limit is executed with the following conditions: A finite axis is selected, the negative software limit is enabled, and a Zero Point Return operation has been completed. • Refer to *11.3 Software Limit Function* for details.	
	Bit 5	Servo OFF R 0: Servo ON 1: Servo OFF This bit turns ON when a move command is executed during Servo OFF status.	
	Bit 6	Positioning Time Over 0: No timeout 1: Timeout occurred This bit turns ON when positioning is not completed within the specified time after the end of pulse distribution. The time is set for the Positioning Completion Check Time (setting parameter OW□□26).	
	Bit 7	Excessive Positioning Moving Amount 0: Moving amount normal 1: Excessive moving amount This bit turns ON when a moving amount is specified that exceeds the setting range for the positioning moving amount. (When the amount of movement in pulses exceeds 31 bits)	
	Bit 8	Excessive Speed 0: Speed normal 1: Excessive speed This bit turns ON when the set speed exceeds the maximum allowable speed, which varies in accordance with the SERVOPACK model.	

Motion Parameters

4

(cont'd)

IL□□04 Alarm (cont'd)			Range	Unit
			–	–
Description	Bit 9	Excessive Deviation 0: In normal deviation range 1: Abnormal deviation detected This bit turns ON if the following error exceeds the value set for the Error Count Alarm Detection (setting parameter OL□□22) when an Excessive Deviation is set to be treated as an alarm by setting the Excessive Deviation Error Level Setting to 0 in Mode Setting 1 (setting parameter OW□□01, bit 0).		
	Bit A	Filter Type Change Error 0: No change error 1: Change error occurred This bit turns ON if the filter type is changed while the pulses are still distributing.		
	Bit B	Filter Time Constant Change Error 0: No change error 1: Change error occurred This bit turns ON if the filter type is changed while the pulses are still distributing.		
	Bit D	Zero Point Unsetting 0: Zero point set 1: Zero point not set error This bit turns ON if a move command (except for JOG or STEP) is performed when an infinite length axis is set and the zero point has not been set.		
	Bit 10	Servo Driver Synchronization Communications Error 0: No synchronization communication error 1: Synchronization communication error This bit turns ON if a synchronization communication error is detected with the SERVOPACK for MECHATROLINK communication.		
	Bit 11	Servo Driver Communication Error 0: No consecutive synchronization communication error 1: Consecutive synchronization communication errors This bit turns ON if two communication errors are detected consecutively in communication with the SERVOPACK for MECHATROLINK communication.		
	Bit 12	Servo Driver Command Timeout Error 0: Servo Driver command completed within specified time. 1: Servo Driver command not completed within specified time. This bit turns ON if a command sent to the SERVOPACK for MECHATROLINK communication is not completed within a specific amount of time.		
	Bit 13	Excessive ABS Encoder Rotations 0: In count range 1: Outside count range This bit turns ON if the number of turns from the absolute encoder exceeds the range that the SVB module can handle. This parameter is valid when using an absolute encoder and a finite-length axis. This bit also turns ON if the result of the operation converting the current position to reference units when the power is turned ON exceeds 32 bits. • This parameter is invalid for linear type.		
	Bit 1D	Detected Servo Driver Type Error (Valid only when an SGDV-□□□□1□□ or SGD7S-□□□□10 SERVOPACK is used with an SVB-01 Module with version 1.24 or later or with a Built-in SVB Module with version 2.64 or later.) 0: Matched (OFF) 1: Unmatched (ON) This bit turns ON when the SERVOPACK model that is assigned in the Module Configuration Definition Window does not match with the model of the SERVOPACK that is actually connected.		
	Bit 1E	Motor Type Set Error 0: Matched (OFF) 1: Unmatched (ON) This bit turns ON when the motor type set in the Module Configuration Definition Window does not match the motor type set for the SERVOPACK parameter Pn100 = n.X□□□ "Rotary/Linear Start Selection." • Refer to *4.2.2 (1) Alarm When Motor Type is Unmatched* for corrective action when this alarm occurs.		

(cont'd)

IL□□04 Alarm (cont'd)		Range	Unit
		–	–
Description	Bit 1F	Connected Encoder Type Error 0: Matched (OFF) 1: Unmatched (ON) This bit turns ON when the motor type set in the Module Configuration Definition Window does not match the connected motor type. • Refer to *4.2.2 (1)* for corrective action when this alarm occurs.	

(5) Motion Command Response Code

IW□□08 R Motion Command Response Code	Range	Unit
	0 to 65535	–
Description	Stores the motion command code for the command that is currently being executed. This is the motion command code that is currently being executed and is not necessarily the same as the Motion Command (setting parameter OW□□08). Response codes are also stored when the following processing is executed. • Servo ON: 29 • Servo OFF: 30 • Alarm Clear: 31	

(6) Motion Command Status

IW□□09 Motion Command Status		Range	Unit
		–	–
Description	Bit 0	Command Execution Flag R 0: READY (completed) 1: BUSY (processing) This bit indicates the servo module command status. Refer to *Chapter 6 Motion Commands* for details on command timing charts. This bit turns ON during execution of commands that have been completed or during abort processing.	
	Bit 1	Command Hold Completed (HOLDL) R 0: Command hold processing not completed 1: Command hold completed This bit turns ON when command hold processing has been completed. Refer to *Chapter 6 Motion Commands* for details on command timing charts.	
	Bit 3	Command Error Completed Status (FAIL) R 0: Normal completion 1: Abnormal completion This bit turns ON if motion command processing does not complete normally. If motion command execution ends in an error, the axis will stop any motion. Refer to *Chapter 6 Motion Commands* for details on command timing charts.	
	Bit 7	Reset Absolute Encoder Completed 0: Reset not completed 1: Reset completed This bit turns ON when the Reset Absolute Encoder command (ABS_RST) is executed and initialization is completed. Refer to *Chapter 6 Motion Commands* for details on command timing charts.	
	Bit 8	Command Execution Completed (COMPLETE) R 0: Normal execution not completed 1: Normal execution completed This bit turns ON when motion command processing was completed normally. Refer to *Chapter 6 Motion Commands* for details on command timing charts.	

(7) Motion Subcommand Response Code

IW□□0A R Motion Subcommand Response Code	Range	Unit
	0 to 65535	–
Description	Stores the motion subcommand code for the command that is being executed. This is the motion subcommand code that is currently being executed and is not necessarily the same as the Motion Subcommand (setting parameter OW□□0A). • Subcommands are used by the system for latch commands and reading/writing parameters.	

(8) Subcommand Status

IW□□0B Subcommand Status		Range	Unit
		–	–
Description	Bit 0	Command Execution Flag R 0: READY (completed) 1: BUSY (processing) This bit indicates the motion subcommand status. This bit turns ON during execution of commands that have been completed or during abort processing.	
	Bit 3	Command Error Completed Status (FAIL) R 0: Normal completion 1: Abnormal completion This bit turns ON if motion subcommand processing does not complete normally.	
	Bit 8	Command Execution Completed (COMPLETE) R 0: Normal execution not completed 1: Normal execution completed This bit turns ON when motion subcommand processing was completed normally.	

(9) Position Management Status

IW□□0C Position Management Status		Range	Unit
		–	–
Description	Bit 0	Discharging Completed R 0: Distributing pulses. 1: Distribution completed. This bit turns ON when pulse distribution has been completed for a move command. This bit turns ON when the SERVOPACK parameter DEN (Command Profile Complete) (monitoring parameter IW□□2C, bit7) turns ON and the SVB module's internal distribution processing is completed.	
	Bit 1	Positioning Completed R 0: Outside Positioning Completed Width. 1: In Positioning Completed Width. This bit turns ON when pulse distribution has been completed and the current position is within the Width of Positioning Completion (i.e., after SERVOPACK Parameter PSET (IL□□28, bitE) turns ON).	
	Bit 2	Latch Completed 0: Latch not completed. 1: Latch completed. This bit turns OFF when a new latch command is executed and turns ON when the latch has been completed. The latched position is stored as the Machine Coordinate System Latch Position System (LPOS) (monitoring parameter IL□□18).	
	Bit 3	NEAR Position R 0: Outside position proximity range. 1: In position proximity range. The operation of this bit depends on the setting of NEAR Signal Output Width (setting parameter OL□□20). • OL□□20 = 0: This bit turns ON when pulse distribution has been completed (monitoring parameter IW□□0C, bit 0). • OL□□20 ≠ 0: This bit turns ON when the result of subtracting the Machine Coordinate System Feedback Position (APOS) (IL□□16) from the Machine Coordinate System Reference Position (MPOS) (IL□□12) is less than the NEAR Signal Output Width, even if pulse distribution has not been completed.	

(cont'd)

<table>
<tr><td colspan="3">IW□□0C
Position Management Status (cont'd)</td><td>Range
–</td><td>Unit
–</td></tr>
<tr><td rowspan="5">Description</td><td>Bit 4</td><td colspan="3">Zero Point Position R
0: Outside zero point position range
1: In zero point position range.
This bit turns ON when the Machine Coordinate System Reference Position (MPOS) (monitoring parameter IL□□16) is within the Width of Starting Point Position Output (setting parameter OW□□3D) after a Zero Point Return (Zero Point Setting) has been completed.</td></tr>
<tr><td>Bit 5</td><td colspan="3">Zero Point Return (Setting) Completed
0: Zero point return (setting) not completed.
1: Zero point return (setting) completed.
This bit turns ON when a zero point return (setting) has been completed.
This bit turns OFF when a new zero point return (setting) operation is started, when communication with the SERVOPACK stop, or when a Servo alarm related to the encoder occurs.</td></tr>
<tr><td>Bit 6</td><td colspan="3">During Machine Lock
0: Machine lock mode released.
1: Machine lock mode.
This bit turns ON when the Machine Lock bit is set to 1 in the RUN Command Setting (setting parameter OW□□00, bit 1) and the axis has actually entered machine lock mode.</td></tr>
<tr><td>Bit 8</td><td colspan="3">ABS Rotary Pos. LOAD Complete
0: LOAD not completed.
1: LOAD completed.
This bit turns ON when the Request ABS Rotary Pos. Load bit is set to 1 in the Run Command Setting (setting parameter OW□□00, bit 7) and loading of the information has been completed.
• Invalid for linear type</td></tr>
<tr><td>Bit 9</td><td colspan="3">POSMAX Turn Preset Complete R
0: Preset not completed.
1: Preset completed.
This bit turns ON when the POSMAX Turn Number Presetting Demand bit in the Run Commands (setting parameter OW□□00, bit 6) is set to 1 and the Number of POSMAX Turns has been preset with the Number of POSMAX Turns Presetting Data (setting parameter OL□□4C).
• Invalid for linear type</td></tr>
</table>

(10) Position Information

<table>
<tr><td colspan="2">IL□□0E R
Target Position in Machine Coordinate System (TPOS)</td><td>Range
-2^{31} to $2^{31}-1$</td><td>Unit
Reference unit</td></tr>
<tr><td>Description</td><td colspan="3">Stores the target position in the machine coordinate system managed by the Motion Module.
This is the target position per scan for INTERPOLATE or LATCH commands.
• This parameter will be set to 0 when the power supply is turned ON.
• The data is refreshed even when the machine lock mode is enabled.
• This parameter will not be reset even when an infinite length axis type is selected.</td></tr>
<tr><td colspan="2">IL□□10 R
Calculated Position in Machine Coordinate System (CPOS)</td><td>Range
-2^{31} to $2^{31}-1$</td><td>Unit
Reference unit</td></tr>
<tr><td>Description</td><td colspan="3">Stores the calculated position in the machine coordinate system managed by the Motion Module.
The position data stored in this parameter is the target position for each scan.
• This parameter will be set to 0 when the power supply is turned ON.
• The data is updated even when the machine lock mode is enabled.
• When an infinite length axis type is selected, a range of 0 to (Infinite Length Axis Reset Position (POSMAX) – 1) is stored.
• Refer to Chapter 9 Absolute Position Detection when using an absolute encoder.</td></tr>
</table>

(cont'd)

Parameter	Range	Unit
IL□□12 R Machine Coordinate System Reference Position (MPOS)	-2^{31} to $2^{31}-1$	Reference unit
Description	Stores the reference position in the machine coordinate system managed by the Motion Module. • This parameter will be set to 0 when the power supply is turned ON. • This data is not updated when the machine lock mode is enabled. (When the machine lock mode is enabled, the position reference data is not output externally.) • When the machine lock mode function is not used, this position is the same as that in IL□□10.	
IL□□14 CPOS for 32 bit (DPOS)	-2^{31} to $2^{31}-1$	Reference unit
Description	Stores the reference position in the machine coordinate system managed by the Motion Module. For a finite length axis, this is the same as the target position (CPOS). For both finite and infinite length axes, the value is refreshed between -2^{31} and $2^{31}-1$.	
IL□□16 R Machine Coordinate System Feedback Position (APOS)	-2^{31} to $2^{31}-1$	Reference unit
Description	Stores the feedback position in the machine coordinate system managed by the Motion Module. • This parameter will be set to 0 when a Zero Point Return (ZRET) is executed. • When an infinite length axis type is selected, a range of 0 to (Maximum Value of Rotary Counter (POSMAX) – 1) is stored. • Refer to *Chapter 9 Absolute Position Detection* when using an absolute encoder.	
IL□□18 Machine Coordinate System Latch Position (LPOS)	-2^{31} to $2^{31}-1$	Reference unit
Description	Stores the latch position when the latch has been completed.	
IL□□1A Position Error (PERR)	-2^{31} to $2^{31}-1$	Reference unit
Description	Stores the following error (the result of Machine Coordinate System Reference Position (MPOS) (IL□□12) – Machine Coordinate System Feedback Position (APOS) (IL□□16) converted to reference unit) managed by the Motion Module.	
IL□□1C (R only) Target Position Difference Monitor	-2^{31} to $2^{31}-1$	Reference unit
Description	Stores the number of pulses distributed each scan.	
IW□□1E R Number of POSMAX Turns	-2^{31} to $2^{31}-1$	turn
Description	This parameter is valid for an infinite length axis. The count stored in this parameter goes up and down every time the current position exceeds the Infinite Length Axis Reset Position (POSMAX). ♦ Invalid for linear type	

■ Terminology: Machine Coordinate System

The basic coordinate system that is set according to Zero Point Return (ZRET) command execution or Zero Point Setting (ZSET) command execution. The Machine Controller manages the positions using this machine coordinate system.

(11) Reference Monitor

Parameter	Range	Unit
IL□□20 Speed Reference Output Monitor	-2^{31} to $2^{31}-1$	pulse/s
Description	Stores the speed reference that is being output. This parameter monitors the speed being output to the MECHATROLINK. This parameter will be 0 for interpolation or phase control.	

(12) Servo Driver

IW□□2C Servo Driver Status		Range	Unit
		–	–
Description	Bit 0	Alarm (ALM) 0: No alarm occurred. 1: Alarm occurred.	
	Bit 1	Warning (WARNING) 0: No warning occurred. 1: Warning occurred.	
	Bit 2	Command Ready (CMDRDY) 0: Command cannot be received. 1: Command can be received.	
	Bit 3	Servo ON (SVON) 0: Servo OFF. 1: Servo ON.	
	Bit 4	Main Power Supply ON (PON) 0: Main power OFF. 1: Main power ON.	
	Bit 5	Machine Lock (MLOCK) 0: Machine lock mode released. 1: Machine lock mode.	
	Bit 6	Zero Position (ZPOINT) 0: Outside Zero Point Position Range. 1: In Zero Point Position Range.	
	Bit 7	Locating Completed (PSET) 0: Outside Width of Positioning Completion 1: In Width of Positioning Completion (for position control).	
		Speed Coincidence (V-CMP) 0: Speed does not agree. 1: Speed agrees (for speed control).	
	Bit 8	Commanded Profile Complete (DEN) 0: Distributing pulses. 1: Distribution completed (for position control).	
		Zero Speed (ZSPD) 0: Zero speed not detected. 1: Zero speed detected (for speed control).	
	Bit 9	Torque Restriction (T_LIM) 0: Torque not being limited. 1: Torque being limited.	
	Bit A	Latch Complete (L_CMP) 0: Latch not completed. 1: Latch completed.	
	Bit B	Locating Neighborhood (NEAR) 0: Outside NEAR Signal Output Width. 1: In NEAR Signal Output Width.	
		Speed Limit (V_LIM) 0: Speed limit not detected. 1: Speed limit detected.	
	Bit C	Position Software Limit (P_SOT) 0: In Positive Direction Software Limit Range. 1: Outside Positive Direction Software Limit Range.	
	Bit D	Negative Software Limit (N_SOT) 0: In Negative Direction Software Limit Range. 1: Outside Negative Direction Software Limit Range.	

(13) Servo Driver Information

IW□□2D Servo Driver Alarm Code		Range	Unit
		–32768 to 32767	–
Description	Stores the alarm code (leftmost 2 digits) from the SERVOPACK in hexadecimal Example: The code for a communication error that occurs in an SGDS, SGDV, or SGD7S SERVOPACK is E6. Refer to the manual for the SERVOPACK for details on alarms. • When the motion command ALM_MON (Monitor SERVOPACK Alarms) or ALM_HIST (Monitor SERVOPACK History) is executed, the monitored alarm code will be written as it is. (Three digits for a SGDS, SGDV, or SGD7S SERVOPACK.) • When in Simulation Mode, the alarm code will be H99.		

(14) Servo Driver I/O Monitor

Stores I/O information of the SERVOPACK.

IW□□2E Servo Driver I/O Monitor		Range	Unit
		–	–
Description	Bit 0	Forward Side Limit Switch Input (P_OT) 0: OFF 1: ON	
	Bit 1	Negative Reverse Side Limit Switch Input (N_OT) 0: OFF 1: ON	
	Bit 2	Deceleration Dog Switch Input (DEC) 0: OFF 1: ON	
	Bit 3	Encoder Phase-A Signal Input (PA) 0: OFF 1: ON	
	Bit 4	Encoder Phase-B Signal Input (PB) 0: OFF 1: ON	
	Bit 5	Encoder Phase-C Signal Input (PC) 0: OFF 1: ON	
	Bit 6	EXT 1 Signal Input 0: OFF 1: ON	
	Bit 7	EXT 2 Signal Input 0: OFF 1: ON	
	Bit 8	EXT 3 Signal Input (EXT3) 0: OFF 1: ON	
	Bit 9	Brake State Output (BRK) 0: OFF 1: ON	
	Bit A	Stop Signal (HWBB), Available only for SGDV and SGD7S SERVOPACKs except for SGDV-□□□E1□□ SERVOPACKs. 0: OFF 1: ON	
	Bit C	CN1 Input Signal (IO12) selected in parameter Pn81E.0 0: OFF 1: ON	
	Bit D	CN1 Input Signal (IO13) selected in parameter Pn81E.1 0: OFF 1: ON	
	Bit E	CN1 Input Signal (IO14) selected in parameter Pn81E.2 0: OFF 1: ON	
	Bit F	CN1 Input Signal (IO15) selected in parameter Pn81E.3 0: OFF 1: ON	

(15) Servo Driver User Monitor Information

The Monitor Selection made by the user when using a SERVOPACK for MECHATROLINK communication is stored in this parameter.

IW□□2F Servo Driver User Monitor Information		Range	Unit
		–	–
Description	Bit 0 to Bit 3	Monitor 1	
	Bit 4 to Bit 7	Monitor 2	
	Bit 8 to Bit B	Monitor 3	
	Bit C to Bit F	Monitor 4	

(16) Servo Driver Information 2

Parameter	Description	Range	Unit
IL□□30 Servo Driver User Monitor 2	Stores the result of the selected monitor. This parameter stores the result of the monitor selected for Monitor 2 in the Servo User Monitor Setting (setting parameter OW□□4E, bits 4 to 7). This parameter can be used when the communication method is MECHATROLINK-I or MECHATROLINK-II, 17-byte Mode and bit 0 of OW□□02 is set to 1 (1: Enabled).	-2^{31} to $2^{31}-1$	–
IL□□32 Servo Driver User Monitor 3	Used by the system.	-2^{31} to $2^{31}-1$	–
IL□□34 Servo Driver User Monitor 4	Stores the result of the selected monitor. This parameter stores the result of the monitor selected for Monitor 4 of the Servo User Monitor Setting (setting parameter OW□□4E, bits C to F).	-2^{31} to $2^{31}-1$	–
IW□□36 Servo Driver User Constant No.	Stores the number of the parameter being processed. This parameter stores the number of the SERVOPACK parameter being read or written using the MECHATROLINK command area. Refer to *Chapter 6 Motion Commands* for details.	0 to 65535	–
IW□□37 Supplementary Servo Driver User Constant No.	Stores the number of the parameter being processed. This parameter stores the number of the SERVOPACK parameter being read or written using the MECHATROLINK subcommand area. Refer to *Chapter 6 Motion Commands* for details.	0 to 65535	–
IL□□38 Servo Driver User Constant Reading Data	Stores the data of the parameter being read. This parameter stores the data of the SERVOPACK parameter read using the MECHATROLINK command area. Refer to *Chapter 6 Motion Commands* for details.	-2^{31} to $2^{31}-1$	–
IL□□3A Supplementary Servo Driver User Constant Reading Data	Stores the data of the parameter being read. This parameter stores the data of the SERVOPACK parameter read using the MECHATROLINK subcommand area. Refer to *Chapter 6 Motion Commands* for details.	-2^{31} to $2^{31}-1$	–
IW□□3F Motor Type	Stores the type of motor that is actually connected. 0: Rotation type motor 1: Linear motor	0, 1	–

Motion Parameters

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(cont'd)

IL□□40 R Feedback Speed		Range	Unit
		-2^{31} to $2^{31}-1$	Depends on speed unit.
Description	Stores the feedback speed. The value is determined by the moving average time constant (fixed parameter 42) and unit set from the difference with the Machine Coordinate System Feedback Position (APOS) (monitoring parameter IL□□16) in each scan. • The setting unit for this parameter depends on the Speed Unit Selection (OW□□03, bits 0 to 3), but the result of applying the speed unit setting is not shown here.		

IL□□42 R Feedback Torque/Thrust		Range	Unit
		-2^{31} to $2^{31}-1$	Depends on the Torque Unit
Description	Stores the value of the torque reference. The Feedback Torque/Thrust is achieved using the Servo command expansion area and can be executed only with the MECHATROLINK-II, 32-byte Mode communication method. • The setting unit for this parameter depends on the Torque Unit Selection (OW□□03, bits C to F), but the result of applying the torque unit setting is not shown here. • To use this parameter, the relevant servo parameter must be set to the value given in the following table. The Controller will automatically set the parameter when the MECHATROLINK connection is established between the Controller and SERVOPACK. Do not change the automatically set value.		

SERVOPACK	Relevant Servo Parameter	Set Value
SGDH + NS100 or SGDH + NS115	Pn003 (Function Selection Application Switches 3)	0002H
SGDS, SGDV, or SGD7S	Pn824 (Option Monitor 1 Selection)	

IW□□44 Latch Completion Sequence Number		Range	Unit
		0 to 32767	1 = 1 time
Description	Available for SGDV and SGD7S SERVOPACKs with MECHATROLINK-II communications (32 bytes).		

IW□□45 Latch Completion Sequence Number		Range	Unit
		0 to 32767	1 = 1 cycle
Description	Available for SGDV and SGD7S SERVOPACKs with MECHATROLINK-II communications (32 bytes).		

(17) Additional Information

IL□□56 R Fixed Parameter Monitor		Range	Unit
		-2^{31} to $2^{31}-1$	–
Description	Stores the data of the specified fixed parameter number. This parameter stores the data of the fixed parameter when the Read Fixed Parameter (FIXPRM-RD) is selected in the Motion Subcommand (setting parameter OW□□0A).		

(18) Absolute Infinite Length Axis Position Control Information

		Range	Unit
IL□□5E Encoder Position When the Power is OFF (Lower 2 words)		-2^{31} to $2^{31}-1$	pulse
Description	Stores information used for infinite length axis position control when an absolute encoder is used. The encoder position is normally stored in 4 words.		
IL□□60 Encoder Position When the Power is OFF (Upper 2 words)		-2^{31} to $2^{31}-1$	pulse
Description	Same as for IL□□5E.		
IL□□62 Pulse Position When the Power is OFF (Lower 2 words)		-2^{31} to $2^{31}-1$	pulse
Description	Stores information used for infinite length axis position control when an absolute encoder is used. These parameters store the axis position managed by the Machine Controller in pulses in 4 words.		
IL□□64 Pulse Position When the Power is OFF (Upper 2 words)		-2^{31} to $2^{31}-1$	pulse
Description	Same as for IL□□62.		

(19) Servo Driver Transmission Reference Mode

		Range	Unit
IW□□70 to IW□□7E Response Buffer for Servo Driver Transmission Reference Mode		–	–
Description	This area is used for response data when MECHATROLINK Servo commands are specified directly. • MECHATROLINK-I and MECHATROLINK-II, 17-byte Mode: Data area = IW□□70 to IW□□77 • MECHATROLINK-II, 32-byte Mode: Data area = IW□□70 to IW□□7E		

5

Motion Parameter Setting Examples

This chapter gives setting examples of the motion parameters for each machine.

5.1 Example Setting of Motion Parameters for the Machine

Set the following eight motion parameters to enable motion control that suits the machine's specifications.

- Reference unit
- Electronic gear
- Axis Type Selection
- Position Reference
- Speed Reference
- Acceleration/Deceleration Settings
- Acceleration/Deceleration Filter Settings
- Linear Scale Pitch/Rated Speed (When using a linear motor.)

The following tables provide details of setting examples for the above items.

5.1.1 Reference Unit

Pulses, millimeters, degrees, inches, or micrometers can be used as the reference unit for motion control. The reference unit is specified in Reference Unit Selection (motion fixed parameter 4).
The minimum reference unit that can be specified is determined by the setting of Number of Digits below Decimal Point (motion fixed parameter 5).

Motion Fixed Parameter 5: Number of Digits below Decimal Point R	Motion Fixed Parameter 4: Reference Unit Selection R				
	0: pulse	1: mm	2: deg	3: inch	4: µm
0: 0 digits	1 pulse	1 mm	1 deg	1 inch	1µm
1: 1 digits	1 pulse	0.1 mm	0.1 deg	0.1 inch	0.1 µm
2: 2 digits	1 pulse	0.01 mm	0.01 deg	0.01 inch	0.01µm
3: 3 digits	1 pulse	0.001 mm	0.001 deg	0.001 inch	0.001 µm
4: 4 digits	1 pulse	0.0001 mm	0.0001 deg	0.0001 inch	0.0001µm
5: 5 digits	1 pulse	0.00001 mm	0.00001 deg	0.00001 inch	0.00001µm

Minimum reference unit

5.1.2 Electronic Gear

In contrast to the reference unit input to the Machine Controller, the moving unit in the mechanical system is called the "output unit." The electronic gear converts position or speed units from reference units to output units for the mechanical system without going through an actual mechanism, such as a gear.
When the axis at the motor has rotated m times and the mechanical configuration allows the axis at the load to rotate n times, this electronic gear function can be used to make the reference unit equal to the output unit.
The electronic gear function is enabled when the following settings are made:

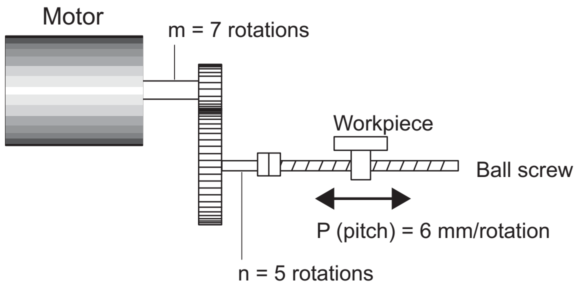
- Fixed Parameter 6: Travel Distance per Machine Rotation R
- Fixed Parameter 8: Servo Motor Gear Ratio R
- Fixed Parameter 9: Machine Gear Ratio R

- The electronic gear is disabled when pulse is specified for the Reference Unit Selection.

The following setting example uses ball screw and rotating table workpieces.

(1) Parameter Setting Example Using Ball Screw

- Machine specifications: Ball screw axis rotates 5 times for each 7 rotations of the motor axis (Refer to the following figure.)
- Reference unit: 0.001 mm

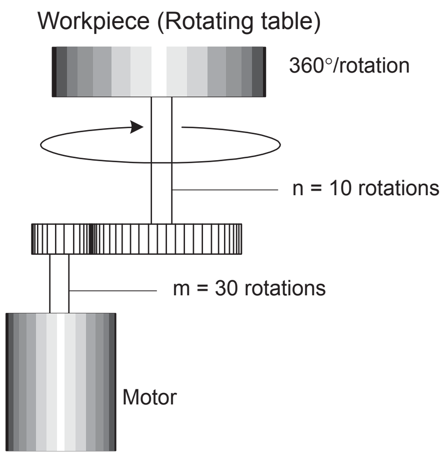


To move the workpiece 0.001 mm for 1 reference unit input under the conditions outlined above, i.e., for 1 reference unit = 1 output unit, make the following settings for fixed parameters 6, 8, and 9.

- Fixed Parameter 6: Travel Distance per Machine Rotation = 6 mm/0.001 mm = 6000 (reference units)
- Fixed Parameter 8: Servo Motor Gear Ratio = m = 7
- Fixed Parameter 9: Machine Gear Ratio = n = 5
  - Set the SERVOPACK gear ratio to 1:1. However, if you are using a Σ-7-series SERVOPACK, refer to *11.8 Precautions When Using Σ-7-series SGD7S SERVOPACKs with Rotary Servomotors* and set the SERVOPACK's electronic gear.

(2) Parameter Setting Example Using Rotating Table

- Machine specifications: Rotating table axis rotates 10 times for each 30 rotations of the motor axis (Refer to the following figure.)
- Reference unit: 0.1°



To rotate the table 0.1° for 1 reference unit input under the conditions outlined above, i.e., for 1 reference unit = 1 output unit, make the following settings for fixed parameters 6, 8, and 9.

- Fixed Parameter 6: Travel Distance per Machine Rotation = 360°/0.1° = 3600 (reference units)
- Fixed Parameter 8: Servo Motor Gear Ratio = m = 30
- Fixed Parameter 9: Machine Gear Ratio = n = 10
  - The gear ratio for fixed parameters 8 and 9 (m/n) may be constant, e.g., m = 3 and n = 1.
  - Set the SERVOPACK gear ratio to 1:1. However, if you are using a Σ-7-series SERVOPACK, refer to *11.8 Precautions When Using Σ-7-series SGD7S SERVOPACKs with Rotary Servomotors* and set the SERVOPACK's electronic gear.

Motion Parameter Setting Examples

5

5.1.3 Axis Type Selection

There are two types of position control: Finite length position control for return and other operations that are performed only within a specified range, and infinite length position control, which is used for moving in one direction only. Infinite length position control can reset the position to 0 after one rotation, e.g., belt conveyors, or move in one direction only, without resetting position after one rotation. The axis type selection sets which of these types of position control is to be used.
The details of the Axis Type Selection are listed in the following table.

Parameter Type	Parameter No. (Register No.)	Name	Description	Default Value
Motion Fixed Parameters	No. 1, bit 0 R	Function Selection Flag 1, Axis Selection	Specify the position control method for the controlled axis. 0: Finite Length Axis Set a finite length axis if control is performed within a limited length or for an axis that uses infinite length control in one moving direction only without resetting the position every rotation. When an absolute encoder is used with the infinite position control method for motion in one direction, set the reference unit to pulse. If it is set to anything other than pulse, position error may occur. 1: Infinite Length Axis Set an infinite length axis for an axis that uses infinite length control while resetting the position every rotation.	0
	No. 10 R	Infinite Length Axis Reset Position (POSMAX)	Set the reset position of the position data when an infinite length axis has been set for the axis type using the reference unit.	360000

5.1.4 Position Reference

The target position value for position control is set for the Position Reference Setting (motion setting parameter OL□□1C). There are two methods that can be set for using the Position Reference Setting: Directly setting the coordinate of the target position value as an absolute value or adding the moving amount from the previous command position as a incremental value.
The following table lists the parameter details relating to position references.

Parameter Type	Parameter No. (Register No.)	Name	Description	Default Value
Motion Setting Parameters	OW□□09, bit 5 R	Position Reference Type	Specify the type of position data. 0: Incremental Addition Mode Adds the present moving amount value to the previous value of OL□□1C and sets the result in OL□□1C. 1: Absolute Mode Sets the coordinate of the target position in OL□□1C. • Always select 0 if the SVB-01 module is mounted to an MP2000-series Machine Controller and a motion program is used.	0
	OL□□1C R	Position Reference Setting	Set the position data. • Incremental Addition Mode (OW□□09, bit 5 = 0) The moving amount (incremental distance) specified this time will be added to the previous value of OL□□1C. OL□□1C ← Previous OL□□1C + Incremental distance Example: If a travel distance of 500 is specified and the previous value of OL□□1C is 1000, the following will occur: OL□□1C ← 1000 + 500 = 1500 • Absolute Mode (OW□□09, bit 5 = 1) The coordinate value of the target position is set. Example: Set 10000 to move to a coordinate value of 10000. OL□□1C ← 10000	0

The following table compares the advantage and disadvantage of incremental addition mode and absolute mode.

Position Reference Type	Advantage	Disadvantage
Incremental Addition Mode	It is not necessary to consider the relationship between OL□□1C and the current position when canceling a move. Incremental addition mode can be used for finite or infinite length axis type.	OL□□1C does not necessarily equal the coordinate value of the target position, so the position reference can be difficult to understand intuitively.
Absolute Mode	The coordinate of the target position is specified directly, making it easy to understand intuitively.	The current position must be set in OL□□1C whenever the power supply is turned ON or a move is canceled. If this is not done, the axis may move suddenly when a move command is started.

Setting of the target position when using an infinite length axis is described below.

(1) Setting the Target Position When Using an Infinite Length Axis: Method 1

Executing a POSING command while no command (NOP) is being executed

- When the incremental addition mode is selected for the Position Reference Type (OW□□09, bit 5 = 0), execute a POSING command in distribution completed status (IW□□0C, bit 0 = 1).
  When the absolute mode is selected for the Position Reference Type (OW□□09, bit 5 = 1), a POSING command can be executed whether or not the distribution is completed (IW□□0C, bit 0 = 0).

■ Incremental Addition Mode (OW□□09, bit 5 = 0)

Incremental value = Target position (a value between 0 and POSMAX) − IL□□10 (CPOS) + POSMAX × n
OL□□1C = OL□□1C + Incremental value

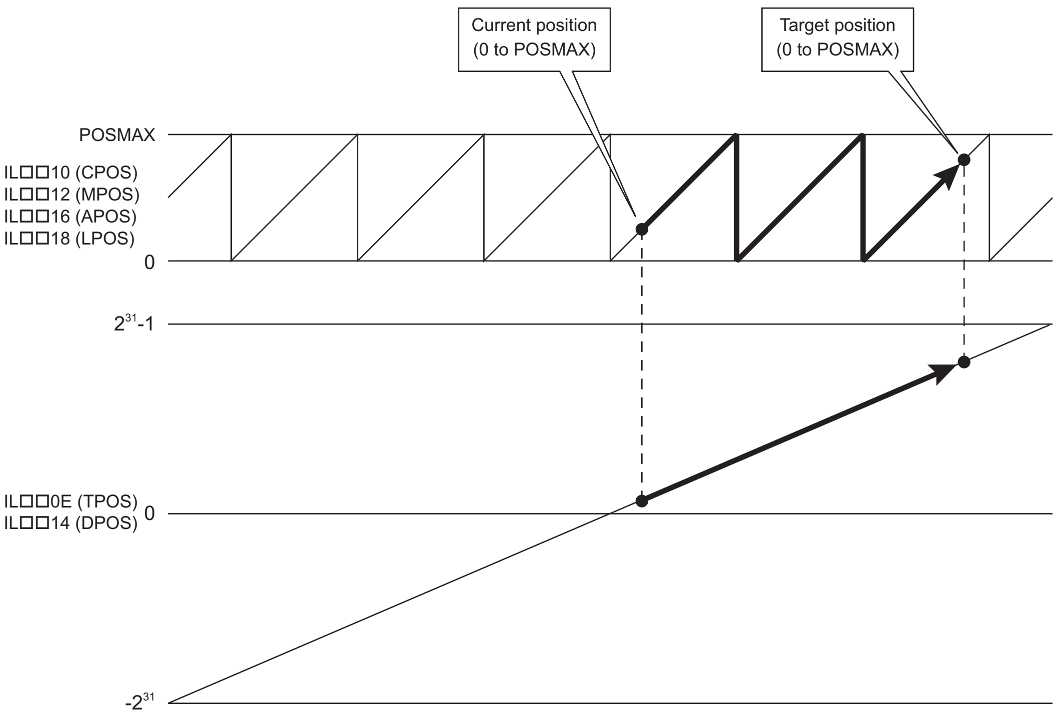
- n refers to the number of POSMAX complete turns needed to move from the current position (CPOS) to the target position. When the distance between the target position and the current position is within the first turn, n is 0.

■ Absolute Mode (OW□□09, bit 5 = 1)

Incremental value = Target position (a value between 0 and POSMAX) − IL□□10 (CPOS) + POSMAX × n
OL□□1C = IL□□14 (DPOS) + Incremental value

- n refers to the number of POSMAX complete turns needed to move from the current position (CPOS) to the target position. When the distance between the target position and the current position is within the first turn, n is 0.

<Example when n = 2>



(2) Setting the Target Position When Using an Infinite Length Axis: Method 2
Changing the target position while a POSING command is being executed by specifying another target position on the base of the original target position

- When the absolute mode has been set for the Reference Position Type (OW□□09, bit 5 = 1), the absolute mode must also be set after having changed the target position.

■ Incremental Addition Mode (OW□□09, bit 5 = 0)

Incremental value = New target position (a value between 0 and POSMAX) − Original target position before change (a value between 0 and POSMAX) + POSMAX × n

OL□□1C = OL□□1C + Incremental value

- Original target position before change: The value that was directly designated or the value that was stored in M register, etc.
- n refers to the number of POSMAX complete turns needed to move from the current position (CPOS) to the target position. When the distance between the target position and the current position is within the first turn, n is 0.

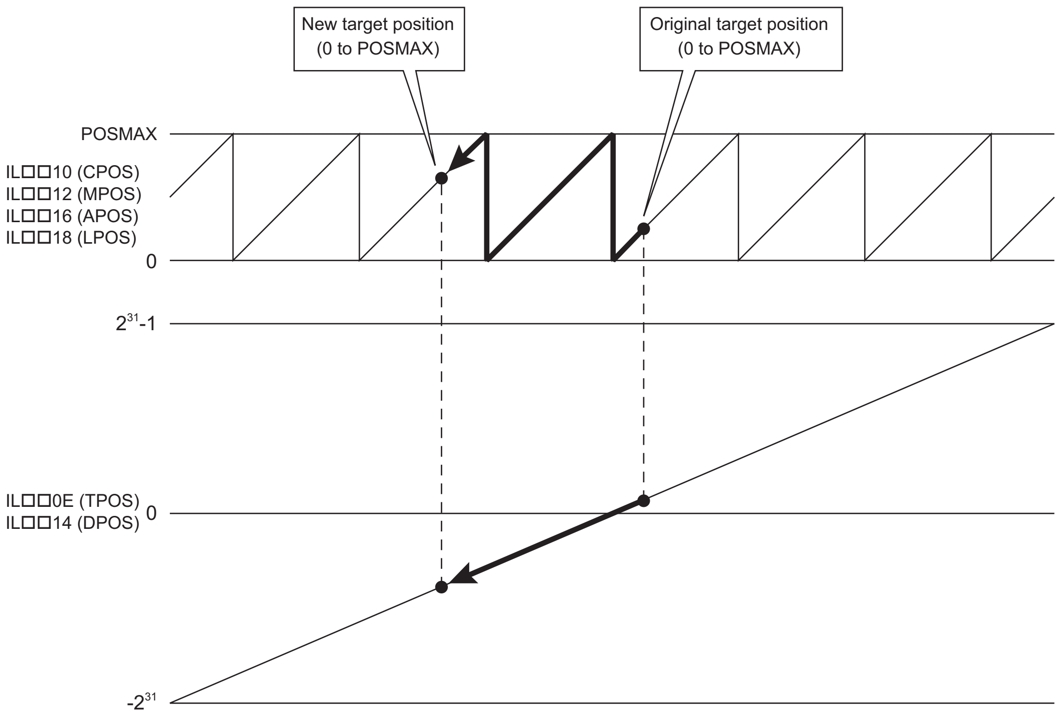
■ Absolute Mode (OW□□09, bit 5 = 1)

Incremental value = New target position (a value between 0 and POSMAX) − Original target position before change (a value between 0 and POSMAX) + POSMAX × n

OL□□1C = OL□□1C + Incremental value

- Original target position before change: The value that was directly designated or the value that was stored in M register, etc.
- n refers to the number of POSMAX complete turns needed to move from the current position (CPOS) to the target position. When the distance between the target position and the current position is within the first turn, n is 0.

<Example when n = 2>



(3) Setting the Target Position When Using an Infinite Length Axis: Method 3
Changing the target position while a POSING command is being executed by specifying another target position on the base of the current position

- When the incremental addition mode is selected for Position Reference Type (OW□□09, bit 5 = 0), execute a POSING command in distribution completed status (IW□□0C, bit 0 = 1).
  When the absolute mode is selected for Position Reference Type (OW□□09, bit 5 = 1), a POSING command can be executed if the distribution is not completed (IW□□0C, bit 0 = 0).

The method is the same as for *(1) Setting the Target Position When Using an Infinite Length Axis: Method 1*.

(4) Setting the Target Position When Using an Infinite Length Axis: Method 4
Switching a command that is being executed to a POSING command

- When the incremental addition mode is selected for Position Reference Type (OW□□09, bit 5 = 0), execute a POSING command in distribution completed status (IW□□0C, bit 0 = 1).
  When the absolute mode is selected for Position Reference Type (OW□□09, bit 5 = 1), a POSING command can be executed if the distribution is not completed (IW□□0C, bit 0 = 0).

The method is the same as for *(1) Setting the Target Position When Using an Infinite Length Axis: Method 1*.

5.1.5 Speed Reference

There are two methods of setting the speed reference for the feed speed or other speeds. One method involves using reference units and the other method involves setting the percentage (%) of the rated speed.
The following table shows the parameters relating to speed references.

Parameter Type	Parameter No. (Register No.)	Name	Description	Default Value
Motion Fixed Parameters	No. 5 R	Number of Digits below Decimal Point	Set the number of digits below the decimal point in the reference unit being input. The minimum reference unit is determined by this parameter and the Reference Unit Selection (fixed parameter 4). Example: Reference Unit Selection = mm, Number of Digits below Decimal Point = 3 1 reference unit = 0.001 mm	3
	No. 34 R	Rated Motor Speed	Set the number of rotations when the motor is rotated at the rated speed (100% speed). Confirm the motor specifications before setting this parameter.	3000
	No. 36 R	Number of Pulses per Motor Rotation	Set the number of pulses (the value after multiplication) per motor rotation. Example: For a 16-bit encoder, set 2^{16} = 65536.	65536
Motion Setting Parameters	OW□□03 Bits 0 to 3 R	Speed Unit Selection	Set the unit for reference speeds. 0: Reference unit/s 1:10^n reference units/min (n: Number of Digits below Decimal Point) 2: 0.01% 3: 0.0001%	1
	OL□□10 R	Speed Reference Setting	Set the feed speed. The unit for this parameter is set in OW□□03, bits 0 to 3. Example: When the Number of Digits below Decimal Point is set to 3, units are as follows for the setting of the Speed Unit: • Speed Unit Set to 0: Reference units/s pulse unit: 1 = 1 pulse/s mm unit: 1 = 0.001 mm/s deg unit: 1 = 0.001 deg/s inch unit: 1 = 0.001 inch/s μm unit: 1 = 0.001 μm/s • Speed Unit Set to 1: 10^n reference units/min pulse unit: 1 = 1000 pulse/min mm unit: 1 = 1 mm/min deg unit: 1 = 1 deg/min inch unit: 1 = 1 inch/min μm unit: 1 = 1 μm/min • Speed Unit Set to 2: 0.01% Set as a percentage of the rated speed (1 = 0.01%) unrelated to the reference unit setting.	3000
	OW□□18	Override	Setting an output ratio (%) for the setting allows the positioning speed to be changed without changing the Speed Reference setting. Setting unit: 1 = 0.01%	10000

(1) Speed Reference (OL☐☐10) Setting Examples

- No. 5: Number of digits below decimal point = 3
- No. 34: Rated motor speed = 3000 R/min
- No. 36: Number of pulses per motor rotation = 65536 P/R

The following table shows examples of settings for Speed Reference Setting (OL☐☐10) to obtain the target feed speed (reference speed).

Speed Unit Setting	Reference Unit	Reference Speed	Speed Reference Parameter Settings (OL☐☐10) Method
0 Reference unit/s	pulse	500 R/s	500 (R/s) × 65536 (pulse/R) = 37268000 (pulse/s)
		1500 R/min	1500 (R/min) × 65536 (pulse/R) ÷ 60 (s) = 1638400 (pulse/s)
	mm	Feed speed of 500 mm/s with a machine that travels 10 mm for each rotation	500 (mm/s) ÷ 0.001 = 500000 (0.001 mm/s) Determined by feed speed and number of digits below decimal point (0.001 in the above equation), regardless of machine configuration.
		Feed speed of 900 mm/min with a machine that travels 10 mm for each rotation	900 (mm/min) ÷ 0.001 ÷ 60 (s) = 15000 (0.001 mm/s) Determined by feed speed and number of digits below decimal point (0.001 in the above equation), regardless of machine configuration.
1 10^n reference units/min (n: Number of digits below decimal point) (= 3)	pulse*	500 R/s	500 (R/s) × 65536 (pulse/R) ÷ 1000 × 60 (s) = 1966080 (1000 pulse/min)
		1500 R/min	1500 (R/min) × 65536 (pulse/R) ÷ 1000 = 98304 (1000 pulse/min)
	mm	Feed speed of 500 mm/s with a machine that travels 10 mm for each rotation	500 (mm/s) × 0.001 × 1000 × 60 (s) = 30000 (mm/min) Determined by feed speed and number of digits below decimal point (0.001 in the above equation), regardless of machine configuration.
		Feed speed of 900 mm/min with a machine that travels 10 mm for each rotation	900 (mm/min) × 0.001 × 1000 = 900 (mm/min) Determined by feed speed, regardless of machine configuration.
2 0.01%	–	1500 R/min	1500 (R/min) ÷ 3000 (R/min) × 100 (%) ÷ 0.01 = 5000 (0.01%) Determined by what percentage the feed speed is of the rated speed.

* When reference unit is set to “pulse” and Speed Unit is set to “10n reference units/min,” the unit for OL☐☐10 will be 1000 pulses/min, regardless of the number of places after the decimal point.

(2) Override (OW☐☐18) Setting Example

The Override parameter (OW☐☐18) can set the speed as a percentage (output ratio) of the target feed speed, in 0.01% units. Override is set independently of Reference Unit Selection, Number of Digits below Decimal Point, and other parameters.

- Override cannot be set for SVR (Virtual Motion Module).

A typical example of Override setting is shown below.

Setting Example

Output ratio 25%: 25 ÷ 0.01 = 2500
50%: 50 ÷ 0.01 = 5000
75%: 75 ÷ 0.01 = 7500
100%: 100 ÷ 0.01 = 10000

5.1.6 Acceleration/Deceleration Settings

The acceleration/deceleration can be set to either the rate of acceleration/deceleration or the time required to reach the rated speed from 0. The settings method used depends on the related parameter settings.
The parameters related to acceleration/deceleration settings are listed in the following table.

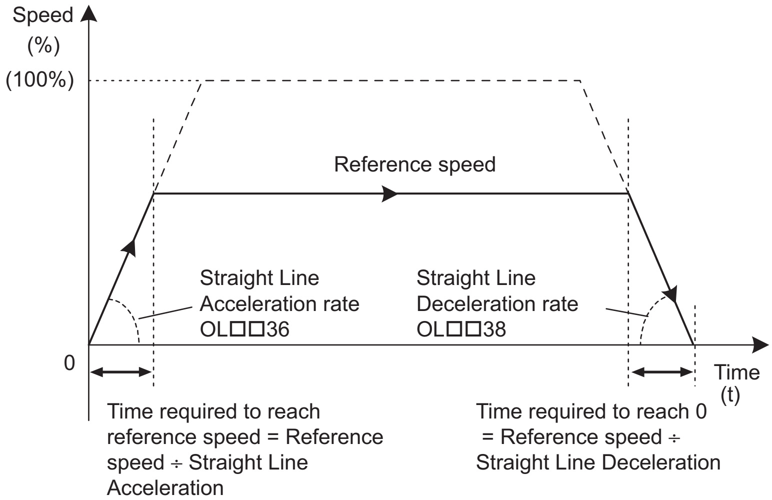
Parameter Type	Parameter No. (Register No.)	Name	Description	Default Value
Motion Fixed Parameters	No. 5 R	Number of Digits below Decimal Point	Set the number of digits below the decimal point in the input reference unit. The minimum reference unit is determined by this parameter and the Reference Unit Selection (fixed parameter 4). Example: Reference Unit Selection = mm, Number of Digits below Decimal Point = 3 1 reference unit = 0.001 mm	
	No. 34 R	Rated Motor Speed	Set the number of rotations when the motor is rotated at the rated speed (100% speed). Confirm the motor specifications before setting this parameter.	3000
	No. 36 R	Number of Pulses per Motor Rotation	Set the number of pulses (the value after multiplication) per motor rotation. Example: For a 16-bit encoder, set 2^{16} = 65536.	65536
Motion Setting Parameters	OW□□03 Bits 4 to 7 R	Acceleration/ Deceleration Degree Unit Selection	Set the unit for acceleration/deceleration. 0: Reference units/s^2 1: ms	1
	OL□□36 R	Straight Line Acceleration/ Acceleration Time Constant	Set the rate of acceleration or acceleration time constant according to the setting of OW□□03, bits 4 to 7. • Acceleration/Deceleration Degree Unit Selection is set to 0 (Reference units/s^2), set the rate of acceleration. pulse unit: 1 = 1 pulse/s^2 mm unit: 1 = 1 reference unit/s^2 deg unit: 1 = 1 reference unit/s^2 inch unit: 1 = 1 reference unit/s^2 μm unit: 1 = 1 reference unit/s^2 Example: Number of Digital below Decimal Point = 3 mm unit: 1 = 0.001 mm/s^2 deg unit: 1 = 0.001 deg/s^2 inch unit: 1 = 0.001 inch/s^2 μm unit: 1 = 0.001 μm/s^2 • When Acceleration/Deceleration Degree Unit Selection is set to 1 (ms), set the time constant to go from 0 to the rated speed without relation to the reference unit.	0
	OL□□38 R	Straight Line Deceleration/ Deceleration Time Constant	Set the rate of deceleration or deceleration time constant according to the setting of OW□□03, bits 4 to 7. • Acceleration/Deceleration Degree Unit Selection is set to 0 (Reference units/s^2), set the rate of deceleration. pulse unit: 1 = 1 pulse/s^2 mm unit: 1 = 1 reference unit/s^2 deg unit: 1 = 1 reference unit/s^2 inch unit: 1 = 1 reference unit/s^2 μm unit: 1 = 1 reference unit/s^2 • When Acceleration/Deceleration Degree Unit Selection is set to 1 (ms), set the time constant to go from 0 to the rated speed without relation to the reference unit.	0

(1) Acceleration/Deceleration Degree Unit Selection and Speed Changes Over Time

The Straight Line Acceleration Time Constant (OL□□36) and Straight Line Deceleration Time Constant (OL□□38) settings change depending on the Acceleration/Deceleration Degree Unit Selection (OW□□03, bits 4 to 7) setting as shown in the following figure.

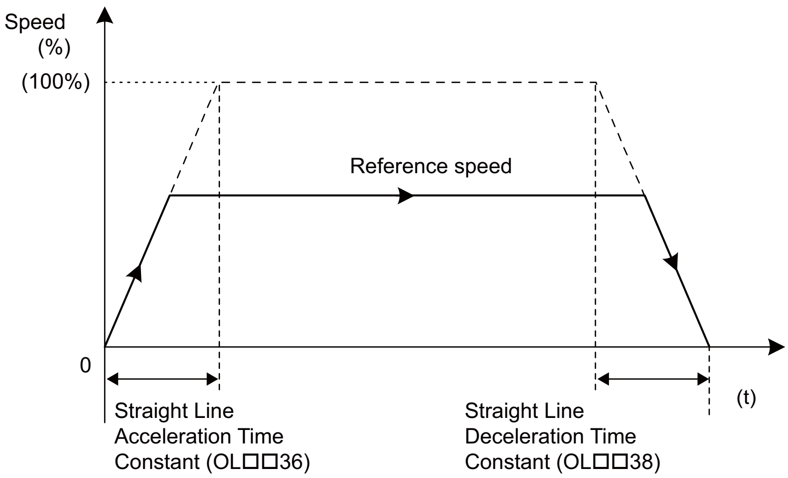
■ When the Acceleration/Deceleration Degree Unit Selection (OW□□03, Bits 4 to 7) Set to 0: Reference Unit/s^2

Set values of OL□□36 and OL□□38 are handled as the linear acceleration rate and linear deceleration rate.



■ When the Acceleration/Deceleration Degree Unit Selection (OW□□03, Bits 4 to 7) Set to 1: ms

Set value of OL□□36 is handled as the linear acceleration time constant required to reach rated speed from zero using linear acceleration. Set value of OL□□38 is handled as the linear deceleration time constant required to reach zero from the rated speed using linear deceleration.



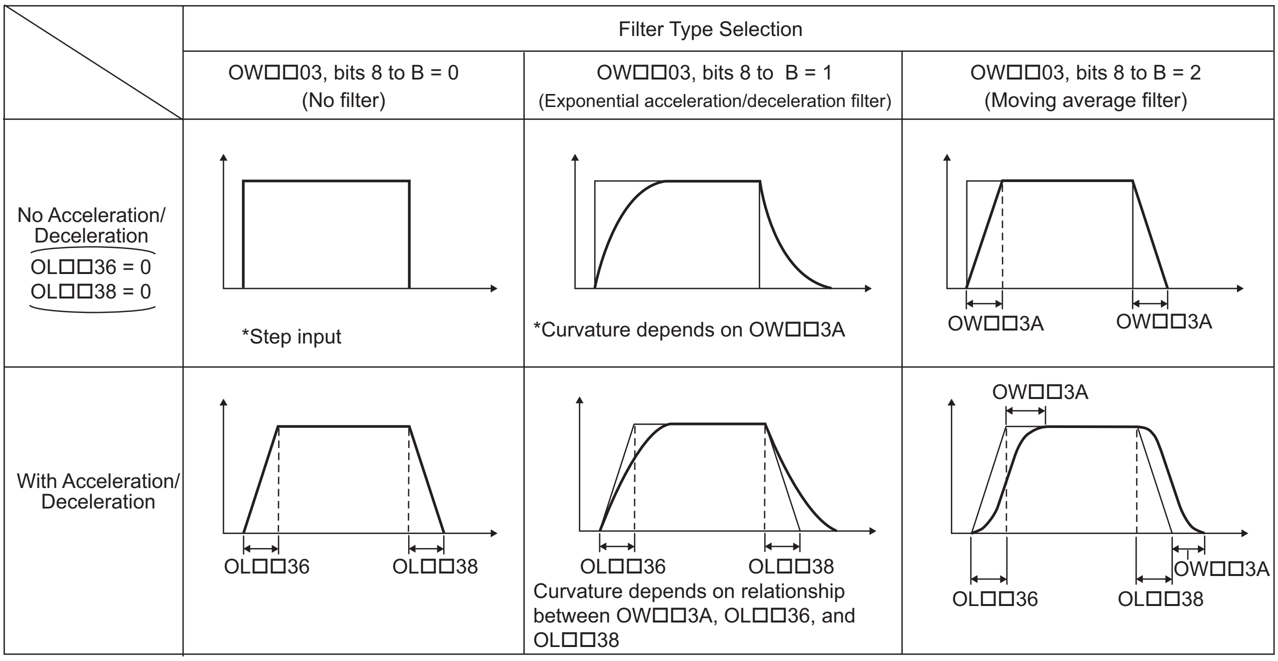
- For the following commands, acceleration/deceleration processing is carried out by the SERVOPACK.
  1: POSING
  2: EX_POSING
  3: ZRET
  7: FEED
  8: STEP
  The unit conversion is applied to the linear acceleration time constant and linear deceleration time constant specified in the setting parameters, and the converted values will be written in the corresponding SERVOPACK parameters "2nd-step Linear Acceleration Constant" and "2nd-step Deceleration Constant."
  The actual acceleration/deceleration will be restricted by the corresponding SERVOPACK parameter setting range and the unit, so the actual axis motion may not be exactly as specified by the setting parameters.

5.1.7 Acceleration/Deceleration Filter Settings

There are two types of acceleration/deceleration filter: **The exponential acceleration/deceleration filter** and **the moving average filter**. These filter settings can be used to set non-linear acceleration/deceleration curves. The parameters related to the acceleration/deceleration filter settings are listed in the following table.

Parameter Type	Parameter No. (Register No.)	Name	Description	Default Value
Motion Setting Parameters	OW□□03 Bits 8 to B R	Filter Type Selection	Set the acceleration/deceleration filter type. 0: None 1: Exponential acceleration/deceleration filter 2: Moving average filter • The Change Filter Type command (OW□□08 = 13) must be executed in advance to enable the Filter Type.	0
	OW□□3A R	Filter Time Constant	Sets the acceleration/deceleration filter time constant. Always make sure that pulse distribution has been completed (i.e., that monitoring parameter IW□□0C, bit 0 is ON (1)) before changing the time constant.	0

The following figure shows the relationship between acceleration/deceleration patterns and each parameter.



5.1.8 Linear Scale Pitch and Rated Speed

When using a linear motor, set the linear scale pitch (fixed parameter No. 6), the rated speed (fixed parameter No. 34), and the number of pulses per scale pitch (fixed parameter No. 36) according to the linear motor specifications.

(1) Setting Example 1

The following table gives a setting example for these linear motor specifications.

- Linear scale pitch: 20 (μm)
- Serial converter resolution: 8 (bit)
- Rated speed: 1.5 (m/s)

Command Unit	Linear Scale Pitch and Rated Speed Setting Units/ Number of Digits below Decimal Point	Settings of Linear Scale Pitch, Rated Speed, and Number of Pulses per Scale Pitch
pulse	Linear scale pitch: μm, Rated speed: 0.1 m/s *	Linear Scale Pitch: 20 (μm) Rated Speed: 15 (0.1 m/s) Number of Pulses per Scale Pitch: 256 (pulse) = 2^8
mm	Number of Digits below Decimal Point: 3	Linear Scale Pitch: 20 (μm) Rated Speed: 15 (0.1 m/s) Number of Pulses per Scale Pitch: 256 (pulse) = 2^8
μm	Number of Digits below Decimal Point: 0	Linear Scale Pitch: 20 (μm) Rated Speed: 15000 (0.1 mm/s) Number of Pulses per Scale Pitch: 256 (pulse) = 2^8

* When pulse is selected as a reference unit and the Linear Scale Pitch (fixed parameter No. 6) is set in units of μm, set the Rated Speed (fixed parameter No. 34) in units of 0.1 m/s.
When pulse is selected as a reference unit and the Linear Scale Pitch (fixed parameter No. 6) is set in units of nm, set the Rated Speed (fixed parameter No. 34) in units of 0.1 mm/s.

(2) Setting Example 2

The following table gives a setting example for these linear motor specifications.

- Linear scale pitch: 400 (nm)
- Serial converter resolution: 9 (bit)
- Rated speed: 1.5 (m/s)

Command Unit	Linear Scale Pitch and Rated Speed Setting Units/ Number of Digits below Decimal Point	Settings of Linear Scale Pitch, Rated Speed, and Number of Pulses per Scale Pitch
pulse	Linear scale pitch: nm Rated speed: 0.1 mm/s*	Linear Scale Pitch: 400 (nm) Rated Speed: 15000 (0.1 mm/s) Number of Pulses per Scale Pitch: 512 (pulses) = 2^9
mm	Number of Digits below Decimal Point: 5	Linear Scale Pitch: 40 (user units) 400 (nm) = 40 (0.00001 mm) Rated Speed: 15 (0.1 m/s) Number of Pulses per Scale Pitch: 512 (pulse) = 2^9
μm	Number of Digits below Decimal Point: 3	Linear Scale Pitch: 400 (user unit) 400 (nm) = 400 (0.001 μm) Rated Speed: 15000 (0.1 mm/s) Number of Pulses per Scale Pitch: 512 (pulse) = 2^9

* When pulse is selected as a reference unit and the Linear Scale Pitch (fixed parameter No. 6) is set in units of μm, set the Rated Speed (fixed parameter No. 34) in units of 0.1 m/s.
When pulse is selected as a reference unit and the Linear Scale Pitch (fixed parameter No. 6) is set in units of nm, set the Rated Speed (fixed parameter No. 34) in units of 0.1 mm/s.

6

Motion Commands

This chapter explains each motion command's operation, related parameters, and timing charts.

6.1 Motion Commands

6.1.1 Motion Command Table

This table shows the motion commands that are supported by the MP2000 series Machine Controllers. Refer to the section numbers indicated in the Reference column for additional command information.

Command Code		Command	Name	Description	Reference
0	R	NOP	No command	–	–
1	R	POSING *	Position Mode (Positioning)	Positions to the specified position using the specified acceleration/deceleration times and the specified speed.	6.2.1
2	R	EX_POSING *	Latch Target Positioning (External positioning)	Positions by moving the external positioning travel distance from the point an external positioning signal was input when already performing a positioning operation.	6.2.2
3	R	ZRET *	Zero Point Return	Returns to the zero point in the machine coordinate system. When using an incremental encoder, there are 13 different zero point return methods that can be used.	6.2.3
4	R	INTERPOLATE *	Interpolation	Performs interpolation feeding using positioning data distributed consecutively from the CPU Module.	6.2.4
5	–	ENDOF_ INTERPOLATE *	Reserved	–	–
6	R	LATCH *	Interpolation Mode with Latch Input	Memorizes the current position when the latch signal is input during an interpolation feed operation.	6.2.5
7	R	FEED *	JOG Mode	Moves the axis at the specified speed in the specified direction until the command is canceled.	6.2.6
8	R	STEP *	Relative Position Mode (Step up mode)	Positions the specified travel distance in the specified direction at the specified speed.	6.2.7
9	R	ZSET	Set Zero Point	Sets the zero point in the machine coordinate system and enables the software limit function.	6.2.8
10	R	ACC	Change Acceleration Time	Changes the acceleration time for linear acceleration/deceleration.	6.2.9
11	R	DCC	Change Deceleration Time	Changes the deceleration time for linear acceleration/deceleration.	6.2.10
12	R	SCC	Change Filter Time Constant	Changes the time constant for a moving average filter for acceleration/deceleration.	6.2.11
13	R	CHG_FILTER	Change Filter Type	Changes the acceleration/deceleration filter type.	6.2.12
14	R	KVS	Change Speed Loop Gain	Changes the speed loop gain.	6.2.13
15	R	KPS	Change Position Loop Gain	Changes the position loop gain.	6.2.14
16	R	KFS	Change Feed Forward	Changes the feed forward control gain.	6.2.15
17	R	PRM_RD	Read User Constant	Reads a SERVOPACK parameter.	6.2.16
18	R	PRM_WR	Write User Constant	Write a SERVOPACK parameter.	6.2.17
19	R	ALM_MON	Alarm Monitor	Monitors SERVOPACK alarms.	6.2.18
20	R	ALM_HIST	Alarm History Monitor	Monitors SERVOPACK alarm history.	6.2.19
21	R	ALMHIST_CLR	Clear Alarm History	Clears SERVOPACK alarm history data.	6.2.20
22	R	ABS_RST	Absolute Encoder Reset	Initializes an absolute encoder.	6.2.21
23	R	VELO *	Speed Reference	Operates with speed control mode.	6.2.22
24	R	TRQ *	Torque/Thrust Reference	Operates with torque control mode.	6.2.23
25	R	PHASE *	Phase Reference	Operates with phase control mode.	6.2.24
26	–	KIS	Change Position Loop Integral Time Constant	Changes the integration time constant for the position loop.	6.2.25
27	–	PPRM_WR	Stored Parameter Write	Change a SERVOPACK parameter in the nonvolatile memory.	6.2.26
39	–	MLTTRN_SET	Multiturn Limit Setting	Sets the multiturn limit.	6.2.27

* These commands are move commands.

- Commands in the table displaying an R are supported by the Virtual Motion Module (SVR).
- Refer to *1.3 SVR Virtual Motion Module* for details on the Virtual Motion Module (SVR).

6.1.2 Motion Commands Supported by SERVOPACK Models

The following table shows the motion commands supported by each model of SERVOPACK.
A Motion Command Setting Error warning will occur if an unsupported command is specified.

Motion Command		SERVOPACK				
		SGD-□□□N SGDB-□□AN	SGDH-□□□E +NS100	SJDE-□□AN	SGDH-□□□E+NS115 SGDS-□□□1□□ SGDV-□□□□1□□ SGD7S-□□□10□ M-I	M-II
Main Command (OW□08)	NOP	○	○	○	○	○
	POSING	○	○	○	○	○
	EX_POSING	○	○	○	○	○
	ZRET	○	○	○	○	○
	INTERPOLATE	○	○	○	○	○
	ENDOF_INTERPOLATE	○	○	○	○	○
	LATCH	○	○	○	○	○
	FEED	○	○	○	○	○
	STEP	○	○	○	○	○
	ZSET	○	○	○	○	○
	ACC	○	○	○	○	○
	DCC	×	○	○	○	○
	SCC	○	○	×	○	○
	CHG_FILTER	○	○	×	○	○
	KVS	○	○	×	○	○
	KPS	○	○	×	○	○
	KFS	○	○	×	○	○
	PRM_RD	○	○	○	○	○
	PRM_WR	○	○	○	○	○
	ALM_MON	○	○	○	○	○
	ALM_HIST	○	○	○	○	○
	ALMHIST_CLR	○	○	○	○	○
	ABS_RST	×	○	×	○	○
	VELO	×	×	×	×	○
	TRQ	×	×	×	×	○
	PHASE	×	○	×	○	○
	KIS	×	○	×	○	○
	MLTTRN_SET	×	○	×	○	○
Subcommand (OW□0A)	NOP	○	○	○	○	○
	PRM_RD	×	×	Δ	×	Δ
	PRM_WR	×	×	Δ	×	Δ
	SMON	×	×	Δ	×	Δ
	FIXPRM_RD	○	○	○	○	○

- M-I: MECHATROLINK-I
  M-II: MECHATROLINK-II
- ○: Can be specified. ×: Cannot be specified. Δ: Can be specified only in 32-byte mode.

6.2 Motion Command Details

The following describes the procedure for executing motion commands.

- All the following command names and items in the Parameter List displaying an R are supported by the Virtual Motion Module (SVR).

6.2.1 Position Mode (POSING) (Positioning) R

The POSING command positions the axis to the target position using the specified target position and speed. Parameters related to acceleration and deceleration are set in advance.

When using an SGDV or SGD7S SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations* of *4.4.2 (12)*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IW□□00, bit 1 is ON.
3	Motion command execution has been completed.*	IW□□08 is 0 and IW□□09, bit 0 is OFF.

* This condition is a basic execution condition. Refer to *Chapter 7 Switching Commands during Execution* when changing the command that is being executed to a POSING command.

2. Set the following motion setting parameters.

Speed Reference Setting: OL□□10
Filter Type Selection: OW□□03, bits 8 to B
Speed Loop P/PI Switch: OW□□01

- The speed reference can be changed during operation.
- An override of between 0% to 327.67% can be set for the speed reference.

3. Set OW□□08 to 1 to execute the POSING motion command.

4. Set the target position (OL□□1C).

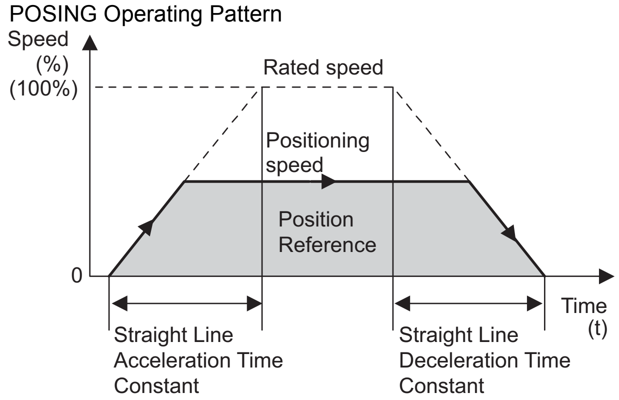
Positioning will start. IW□□08 will be 1 during the positioning.
IW□□0C, bit 3 will turn ON when the axis approaches the target position.
IW□□0C, bit 1 will turn ON when the axis reaches the target position and the positioning has been completed.

- If the Position Reference Type (OW□□09, bit 5) is set for an absolute mode, the target position can be set before executing the command.
- The target position can be changed during operation.
- When the target position is changed so that there is not sufficient deceleration distance or after the new target position has already been passed, the system will first decelerate to a stop and then reposition according to the new target position.

Motion Commands

6

5. Set OW□□08 to 0 to execute the NOP motion command to complete the positioning operation.



■ Terminology: Command execution

When a command code is stored in the motion command register (OW□□08), execution of the motion command corresponding to that code is started. Used in describing motion command operations.

---

(2) Holding

Axis travel can be stopped during command execution and then the remaining travel can be restarted. A command is held by setting the Holds a Command bit (OW□□09, bit 0) to 1.

- Set the Holds a Command bit (OW□□09, bit 0) to 1. The axis will decelerate to a stop.
- When the axis has stopped, the Command Hold Completed bit (IW□□09, bit 1) will turn ON.
- Reset the Command Pause bit (OW□□09, bit 0) to 0. The command hold status will be cleared and the remaining portion of the positioning will be restarted.

(3) Aborting

Axis travel can be stopped during command execution and the remaining travel canceled by aborting execution of a command. A command is aborted by setting the Interrupt a Command bit (OW□□09, bit 1) to 1.

- Set the Interrupt a Command bit (OW□□09, bit 1) to 1. The axis will decelerate to a stop.
- When the axis has stopped, the remaining distance to be traveled will be canceled, and the Positioning Completed bit (IW□□0C, bit 1) will turn ON.
- The positioning will restart if the Interrupt a Command bit (OW□□09, bit 1) is reset to 0 while the command is being aborted.
- ♦ This type of operation will also be performed if the motion command is changed during axis movement.

■ Precautions

Be careful to stop the movement during an axis operation by limiting the torque at OL□□14 (Positive Side Limiting Torque Setting at the Speed Reference). When the movement is stopped, the torque is no longer limited and may rapidly increase just after stopping. To abort positioning while the torque is limited, use one of the following settings.

- Set the speed reference to 0
- Set bit 0 of OW□□09 (Motion Command Control Flag) to 0 and set OW□□08 (Motion Command) to 0 for a No Operation (NOP) command when the axes stop or turn ON the abort request.

For more information on the maximum allowable value for acceleration and deceleration, refer to ■ *Changing the maximum value of acceleration and deceleration for SGDV or SGD7S SERVOPACKs* of *4.4.2 (23)*.

(4) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command (OW□□08) to 1.	R
OW□□01 Bit 3	Speed Loop P/PI Switch	Switch the speed control loop between PI control and P control. 0: PI control, 1: P control	–
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.	R
OW□□08	Motion Command	The positioning starts when this parameter is set to 1. The operation will be canceled if this parameter is set to 0 during POSING command execution.	R
OW□□09 Bit 0	Holds a Command	The axis will decelerate to a stop if this bit is set to 1 during POSING command execution. The positioning will restart if this bit is reset to 0 when a command is being held.	R
OW□□09 Bit 1	Interrupt a Command	The axis will decelerate to a stop if this bit is set to 1 during POSING command execution. When this bit is reset to 0 after decelerating to a stop, the operation depends on the setting of the Position Reference Type (OW□□09, bit 5).	R
OW□□09 Bit 5	Position Reference Type	Switch the type of position reference. 0: Incremental addition mode, 1: Absolute mode Set this bit before setting the Motion Command (OW□□08) to 1.	R
OL□□10	Speed Reference Setting	Specify the speed for the positioning. Only a positive value can be set. This setting can be changed during operation. The unit depends on the Function Setting 1 setting (OW□□03, bits 0 to 3).	R
OW□□18	Override	This parameter allows the positioning speed to be changed without changing the Speed Reference Setting (OL□□10). Set the speed as a percentage of the Speed Reference Setting. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%) Setting unit: 1 = 0.01% Example: Setting for 50%: 5000	–
OL□□1C	Position Reference Setting	Set the target position for positioning. This setting can be changed during operation. The meaning of the setting depends on the status of the Position Reference Type bit OW□□09, bit 5.	R
OL□□1E	Width of Positioning Completion	Set the width in which to turn ON the Positioning Completed bit (IW□□0C, bit 1).	–
OL□□20	NEAR Signal Output Width	Set the range in which the NEAR Position bit (IW□□0C, bit 3) will turn ON. The NEAR Position bit will turn ON when the absolute value of the difference between the reference position and the feedback position is less than the value set here.	–
OL□□36	Straight Line Acceleration/ Acceleration Time Constant	Set the rate of acceleration or acceleration time constant for positioning.	R
OL□□38	Straight Line Deceleration/ Deceleration Time Constant	Set the rate of deceleration or deceleration time constant for positioning.	R
OW□□3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/ deceleration or a moving average filter can be selected in the Function Setting 1 bit (OW□□03, bits 8 to B). Change the setting only after pulse distribution has been completed for the command (IW□□0C, bit 0 is ON).	R

■ Terminology: Pulse distribution

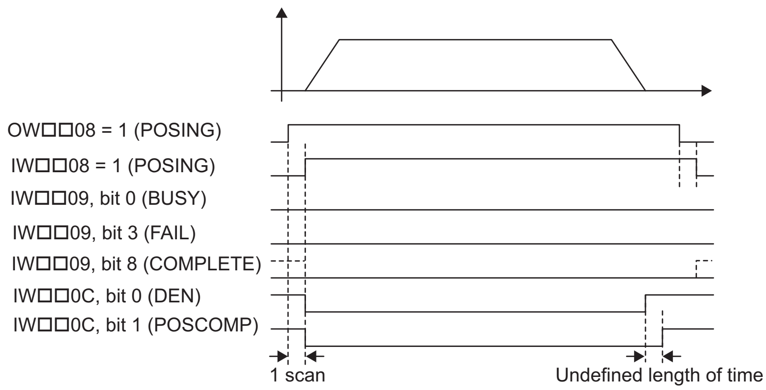
Pulse distribution transfers reference values from the Machine Controller registers to the SERVOPACK registers every scan. Used in describing motion command operation.

[b] Monitoring Parameters

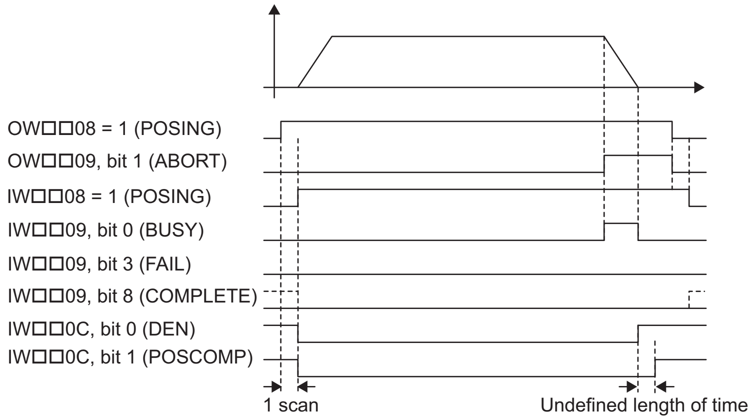
Parameter	Name	Monitor Contents	SVR
IW☐☐00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL☐☐02	Warning	Stores the most current warning.	R
IL☐☐04	Alarm	Stores the most current alarm.	R
IW☐☐08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 1 during POSING command execution.	R
IW☐☐09 Bit 0	Command Execution Flag	Turns ON when abort processing is being performed for POSING command. Turns OFF when abort processing has been completed.	R
IW☐☐09 Bit1	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of setting the Holds a Command (OW☐☐09, bit 0) bit to 1 during POSING command execution.	R
IW☐☐09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during POSING command execution. The axis will decelerate to a stop if it is moving. Turns OFF when another command is executed.	R
IW☐☐09 Bit 8	Command Execution Completed	Always OFF for POSING command. Use the Positioning Completed bit (IW☐☐0C, bit 1) to confirm completion of this command.	R
IW☐☐0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of the move command.	R
IW☐☐0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Width of Positioning Completion. OFF in all other cases.	R
IW☐☐0C Bit 3	NEAR Position	The operation depends on the setting of the NEAR Signal Output Width (setting parameter OL☐☐20). OL☐☐20 = 0:Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL☐☐20 ≠ 0:Turns ON when the absolute value of the difference between MPOS (IL☐☐12) and APOS (IL☐☐16) is less than the NEAR Signal Output Width even if pulse distribution has not been completed. OFF in all other cases.	R

(5) Timing Charts

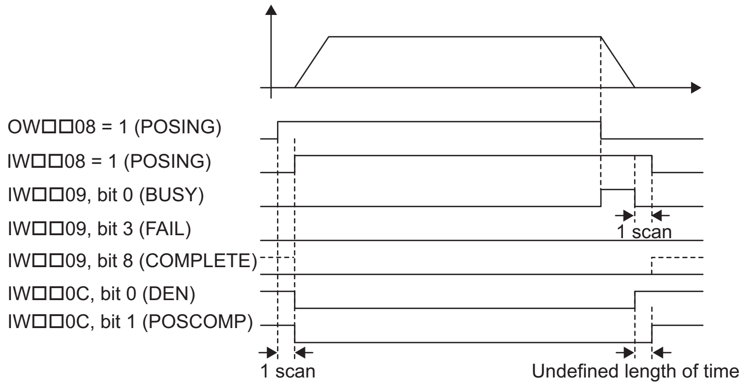
[a] Normal Execution



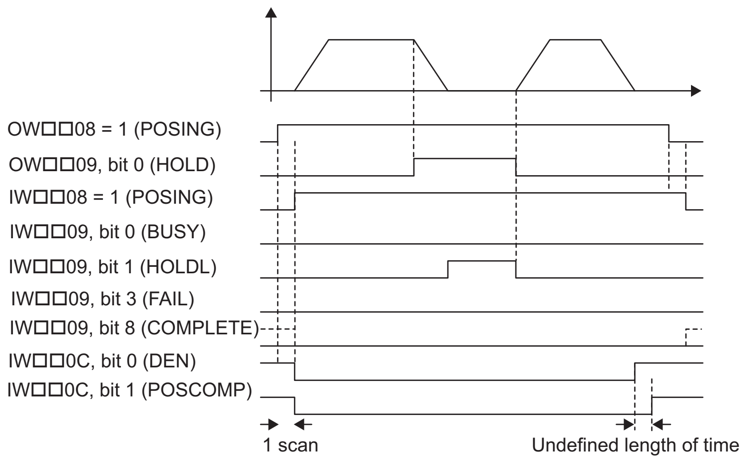
[b] Execution when Aborted



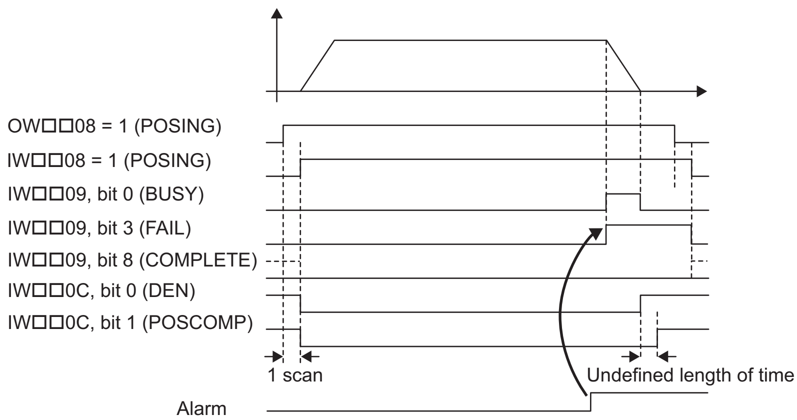
[c] Execution when Aborting by Changing the Command



[d] Command Hold



[e] Execution when an Alarm Occurs



6.2.2 Latch Target Positioning (EX_POSING) (External Positioning) R

The EX_POSING command positions the axis to the target position using the specified target position and speed. Parameters related to acceleration and deceleration are set in advance.
If the external positioning signal turns ON during axis movement, the axis will move the distance specified for the External Positioning Final Travel Distance from the point at which the external positioning signal turned ON, and then stop. If the external positioning signal does not turn ON, positioning will be completed to the original target position.

When using an SGDV or SGD7S SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations* of *4.4.2 (12)*. Also, refer to ■ *Precautions* of *6.2.1 (3)*.
When using a DC Power Input Σ-V Series SERVOPACK (Model: SGDV-□□□E1□□), refer to *11.7.4 Motion Command Operation for External Latches with DC Power Input Σ-V-series SERVOPACKs*.
For more information on the maximum allowable value for acceleration and deceleration, refer to ■ *Changing the maximum value of acceleration and deceleration for SGDV or SGD7S SERVOPACKs* of *4.4.2 (23)*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IW□□00, bit 1 is ON.
3	Motion command execution has been completed.*	IW□□08 is 0 and IW□□09, bit 0 is OFF.

* This condition is a basic execution condition. Refer to *Chapter 7 Switching Commands during Execution* when changing the command that is being executed to an EX_POSING command.

2. Set the following motion setting parameters.

External Positioning Final Travel Distance: OL□□46
External Positioning Signal Setting: OW□□04
Speed Reference Setting: OL□□10
Filter Type Selection: OW□□03, bits 8 to B
Speed Loop P/PI Switch: OW□□01
Position Reference Setting: OL□□1C

- The Speed Reference Setting can be changed during operation.
- An override of between 0% to 327.67% can be set for the speed reference.
- A latch zone can be set as long as it is supported by the SERVOPACK being used.

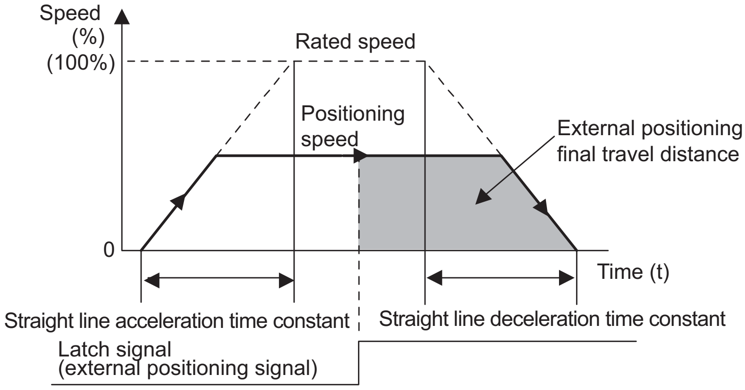
3. Set OW□□08 to 2 to execute the EX_POSING motion command to use the preceding settings in the same scan.

4. Turn ON the external positioning signal.

The axis will be moved the External Positioning Final Travel Move Distance and decelerate to a stop.
IW□□09, bit 8 will turn ON when the axis stops and external positioning has been completed.

5. Set OW☐☐08 to 0 to execute the NOP motion command to complete the external positioning operation.

EX_POSING Operating Pattern



(2) Holding

Axis travel can be stopped during command execution and then the remaining travel can be restarted. A command is held by setting the Holds a Command bit (OW☐☐09, bit 0) to 1.

- Set the Holds a Command bit (OW☐☐09, bit 0) to 1. The axis will decelerate to a stop.
- When the axis has stopped, the Command Hold Completed bit (IW☐☐09, bit 1) will turn ON.
- Reset the Holds a Command bit (OW☐☐09, bit 0) to 0.
  The command hold status will be cleared and the remaining portion of the positioning will be restarted.

(3) Aborting

Axis travel can be stopped during command execution and the remaining travel canceled by aborting execution of a command. A command is aborted by setting the Interrupt a Command bit (OW☐☐09, bit 1) to 1.

- Set the Interrupt a Command bit (OW☐☐09, bit 1) to 1. The axis will decelerate to a stop.
- When the axis has stopped, the remain travel will be canceled and the Positioning Completed bit (IW☐☐0C, bit 1) will turn ON.

⬩ This type of operation will also be performed if the motion command is changed during axis movement.

(4) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting	SVR
OW☐☐00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command (OW☐☐08) to 2.	R
OW☐☐01 Bit 3	Speed Loop P/PI Switch	Switch the speed control loop between PI control and P control. 0: PI control, 1: P control	–
OW☐☐03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.	R
OW☐☐04	Function Setting 2	Set the external positioning signal. 2: phase-C pulse, 3: /EXT1, 4: /EXT2, 5: /EXT3	R
OW☐☐08	Motion Command	The positioning starts when this parameter is set to 2. The operation will be canceled if this parameter is set to 0 during EX_POSING command execution.	R
OW☐☐09 Bit 0	Holds a Command	The axis will decelerate to a stop if this bit is set to 1 during execution of EX_POSING command execution. The positioning will restart if this bit is reset to 0 when a command is being held.	R
OW☐☐09 Bit 1	Interrupt a Command	The axis will decelerate to a stop if this bit is set to 1 during EX_POSING command execution.	R

(cont'd)

Parameter	Name	Setting	SVR
OW□□09 Bit 4	Latch Zone Effective Selection	Enable or disable the area where the external positioning signal is valid. If the latch zone is enabled, the external positioning signal will be ignored if it is input outside of the latch zone. 0: Disable, 1: Enable	–
OW□□09 Bit 5	Position Reference Type	Switch the type of position reference. 0: Incremental addition mode, 1: Absolute mode Set this parameter before setting the Motion Command (OW□□08) to 2.	R
OL□□10	Speed Reference Setting	Specify the speed for the positioning. Only a positive value can be set. This setting can be changed during operation. The unit depends on the Function Setting 1 setting (OW□□03, bits 0 to 3).	R
OW□□18	Override	This parameter allows the positioning speed to be changed without changing the Speed Reference Setting (OL□□10). Set the speed as a percentage of the Speed Reference Setting. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%) Setting unit: 1 = 0.01%	–
OL□□1C	Position Reference Setting	Set the target position for positioning. This setting can be changed during operation. The meaning of the setting depends on the status of the Position Reference Type bit (OW□□09, bit 5).	R
OL□□1E	Width of Positioning Completion	Set the width in which to turn ON the Positioning Completed bit (IW□□0C, bit 1).	–
OL□□20	NEAR Signal output Width	Set the range in which the NEAR Position bit (IW□□0C, bit 3) will turn ON. The NEAR Position bit will turn ON when the absolute value of the difference between the reference position and the feedback position is less than the value set here.	–
OL□□2A	Latch Zone Lower Limit Setting	Set the boundary in the negative direction of the area in which the external positioning signal is to be valid.	–
OL□□2C	Latch Zone Upper Limit Setting	Set the boundary in the positive direction of the area in which the external positioning signal is to be valid.	–
OL□□36	Straight Line Acceleration/Acceleration Time Constant	Set the rate of acceleration or acceleration time constant for positioning.	R
OL□□38	Straight Line Deceleration/Deceleration Time Constant	Set the rate of deceleration or deceleration time constant for positioning.	R
OW□□3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03, bits 8 to B. Change the setting only after pulse distribution has been completed for the command (IW□□0C, bit 0 is ON).	R
OL□□46	External Positioning Final Travel	Set the moving amount after the external positioning signal is input.	–

[b] Monitoring Parameters

Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 2 during EX_POSING command execution.	R
IW□□09 Bit 0	Command Execution Flag	The Command Executing Flag bit will turn ON during EX_POSING command execution and then turn OFF when command execution has been completed.	R
IW□□09 Bit 1	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of setting the Holds a Command bit to 1 (OW□□09, bit 1) during EX_POSING command execution (IW□□08 = 2).	R
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during EX_POSING command execution. The axis will decelerate to a stop if it is moving. Turns OFF when another command is executed.	R

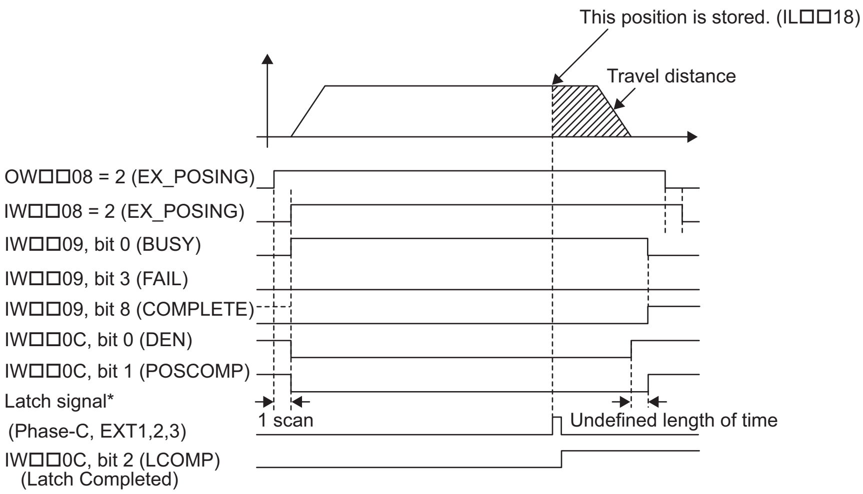
(cont'd)

Parameter	Name	Monitor Contents	SVR
IW□□09 Bit 8	Command Execution Completed	Turns ON when EX_POSING command execution has been completed.	R
IW□□0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW□□0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Width of Positioning Completion. OFF in all other cases.	R
IW□□0C Bit 2	Latch Complete	This bit turns OFF when a new latch command is executed and turns ON when the latch has been completed. The latched position is stored as the Machine Coordinate System Latch Position (LPOS) (monitoring parameter IL□□18).	–
IW□□0C Bit 3	NEAR Position	The operation depends on the setting of the NEAR Signal Output Width (setting parameter OL□□20). OL□□20 = 0:Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL□□20 ≠ 0:Turns ON when the absolute value of the difference between MPOS (IL□□12) and APOS (IL□□16) is less the NEAR Signal Output Width even if pulse distribution has not been completed. OFF in all other cases.	R
IL□□18	Machine Coordinate System Latch Position (LPOS)	Stores the current position in the machine coordinate system when the latch signal turned ON.	–

(5) Timing Charts

- With an External Position command (EX_POSING), the value for the External Positioning Final Travel Distance (OL□□46) is written to the parameters of the SERVOPACK before the axes move. For this reason, a slight time lag occurs before the axes start moving.

[a] Normal Execution

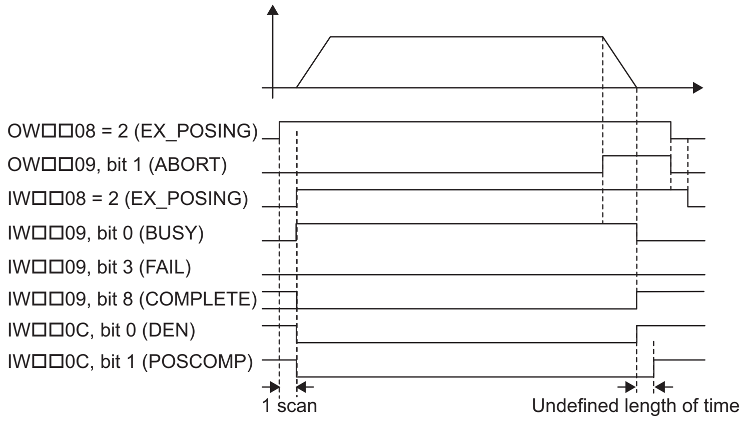


* Latch signal: Phase-C pulse, EXT1, EXT2, or EXT3 signal

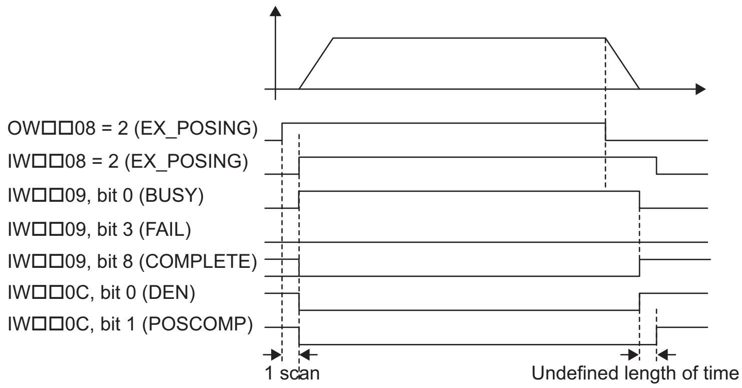
Motion Commands

6

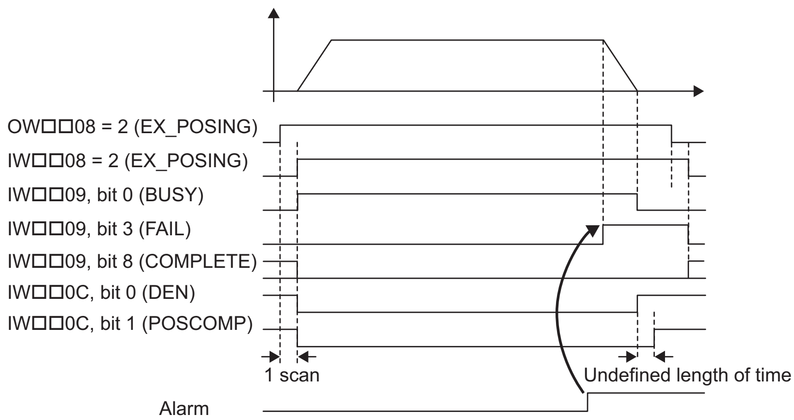
[b] Execution when Aborted



[c] Execution when Aborting by Changing the Command



[d] Execution when an Alarm Occurs



6.2.3 Zero Point Return (ZRET) R

When the Zero Point Return command (ZRET) is executed, the axis will return to the zero point of the machine coordinate system.
The operation to detect the position of the zero point is different between an absolute encoder and an incremental encoder.
With an absolute encoder, positioning is performed to the zero point of the machine coordinate system and command execution is completed.
With an incremental encoder, there are 13 different methods (see below) that can be performed for the zero point return operation.
For SVR, the machine coordinate system is initialized and the coordinates of the axis are set to show the axis being at the zero point. As a result, a Zero Point Return operation will not be executed.

When using an SGDV or SGD7S SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations* of *4.4.2 (12)*.
When using a DC Power Input Σ-V Series SERVOPACK (Model: SGDV-☐☐☐E1☐☐), refer to *11.7.4 Motion Command Operation for External Latches with DC Power Input Σ-V-series SERVOPACKs*.
For more information on the maximum allowable value for acceleration and deceleration, refer to ■ *Changing the maximum value of acceleration and deceleration for SGDV or SGD7S SERVOPACKs* of *4.4.2 (23)*.

(1) Selecting the Zero Point Return Method (with an Incremental Encoder)

When an incremental encoder is selected for the Encoder Selection by fixed parameter No. 30 to 0, the coordinate system data will be lost when the power supply is turned OFF. This command must be executed when the power supply is turned ON again to establish a new coordinate system.
The following table lists the 13 zero point return methods that are supported by the MP2000 Series Machine Controller. Select the best method for the machine according to the setting parameters. Refer to the section numbers indicated in the Reference column for additional command information.

Setting Parameter OW☐☐3C	Name	Method	Signal Meaning	Reference
0	DEC1 + C	Applies a 3-step deceleration method using the deceleration limit switch and phase-C pulse.	DEC1 signal: SERVOPACK DEC signal	6.2.3 (7) [a]
1	ZERO	Uses the ZERO signal.	ZERO signal: SERVOPACK EXT1 signal	6.2.3 (7) [b]
2	DEC1 + ZERO	Applies a 3-step deceleration method using the deceleration limit switch and ZERO signal.	DEC1 signal: SERVOPACK DEC signal ZERO signal: SERVOPACK EXT1 signal	6.2.3 (7) [c]
3	C	Uses the phase-C pulse.	–	6.2.3 (7) [d]
4 to 10	Not used	–	–	–
11	C pulse Only	Uses only the phase-C pulse.	–	6.2.3 (7) [e]
12	POT & C pulse	Uses the positive overtravel signal and phase-C pulse.	P-OT: SERVOPACK P-OT signal	6.2.3 (7) [f]
13	POT Only	Uses only the positive overtravel signal.	P-OT: SERVOPACK P-OT signal This method must not be used if repeat accuracy is required.	6.2.3 (7) [g]
14	Home LS & C pulse	Uses the home signal and phase-C pulse.	HOME: SERVOPACK EXT1 signal	6.2.3 (7) [h]
15	Home Only	Uses only the home signal.	HOME: SERVOPACK EXT1 signal	6.2.3 (7) [i]
16	NOT & C pulse	Uses the negative overtravel signal and phase-C pulse.	N-OT: SERVOPACK N-OT signal	6.2.3 (7) [j]

(cont'd)

Setting Parameter OW□□3C	Name	Method	Signal Meaning	Reference
17	NOT Only	Uses only the negative overtravel signal.	N-OT: SERVOPACK N-OT signal This method must not be used if repeat accuracy is required.	6.2.3 (7) [k]
18	INPUT & C pulse	Uses the INPUT signal and phase-C pulse.	INPUT: Setting parameter OW□□05, bit B	6.2.3 (7) [l]
19	INPUT Only	Uses only the INPUT signal.	With this method, a zero point return can be performed without connecting an external signal using setting parameter OW□□05, bit B. This method must not be used if repeat accuracy is required.	6.2.3 (7) [m]

(2) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IW□□00, bit 1 is ON.
3	Motion command execution has been completed.*	IW□□08 is 0 and IW□□09, bit 0 is OFF.

* This condition is a basic execution condition. Refer to *Chapter 7 Switching Commands during Execution* when changing the command that is being executed to a ZRET command.

2. When an incremental encoder is selected for the Encoder Selection Type by setting fixed parameter No. 30 to 0, set the zero point return method that will be used in the Zero Point Return Method Home (motion setting parameter OW□□3C) as described on the previous page.

- The software limit function will be enabled after the zero point return operation has been completed.

3. Refer to *6.2.3 (7) Zero Point Return Operation and Parameters* and set the required parameters.

4. Set OW□□08 to 3 to execute the ZRET motion command.

The zero point return operation will start. IW□□08 will be 3 during the operation.
IB□□0C, bit5 will turn ON when the axis reaches the zero point and zero point return has been completed.

5. Set OW□□08 to 0 to execute the NOP motion command and then complete the zero point return operation.

(3) Holding

Holding execution is not possible during zero point return operation. The Holds a Command bit (OW□□09, bit 0) is ignored.

(4) Aborting

The zero point return can be canceled by aborting execution of a command. A command is aborted by setting the Interrupt a Command bit (OW□□09, bit 1) to 1.

- Set the Interrupt a Command bit (OW□□09, bit 1) to 1. The axis will decelerate to a stop.
- When the axis has decelerated to a stop the remain travel will be canceled and the Positioning Completed bit (IW□□0C, bit 1) will turn ON.
- This type of operation will also be performed if the motion command is changed during axis movement.

(5) Related Parameters

[a] Setting Parameters

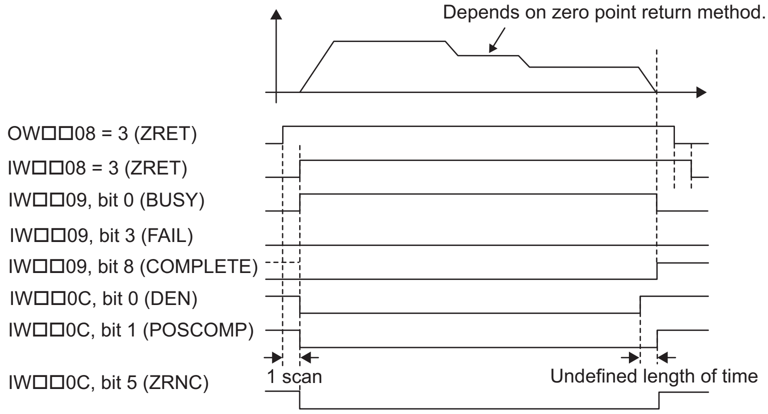
Parameter	Name	Setting	SVR
OW☐☐00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command (OW☐☐08) to 3.	R
OW☐☐01 Bit 3	Speed Loop P/PI Switch	Switches the SERVOPACK's speed loop between PI control and P control. 0: PI control, 1: P control	–
OW☐☐03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.	R
OW☐☐08	Motion Command	Positioning starts when this parameter is set to 3. The operation will be canceled if this parameter is set to 0 during ZRET command execution.	R
OW☐☐09 Bit 1	Holds a Command	The axis will decelerate to a stop if this bit is set to 1 during ZRET command execution.	R
OL☐☐36	Straight Line Acceleration/Acceleration Time Constant	Set the rate of acceleration or acceleration time constant for positioning.	R
OL☐☐38	Straight Line Deceleration/Deceleration Time Constant	Set the rate of deceleration or deceleration time constant for positioning.	R
OW☐☐3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW☐☐03, bits 8 to B. Change the setting only after pulse distribution has been completed for the command (IW☐☐0C, bit 0 is ON).	R
OW☐☐3D	Width of Starting Point Position Output	Set the width in which the Zero Position bit (IW☐☐0C, bit 4) will turn ON.	R

[b] Monitoring Parameters

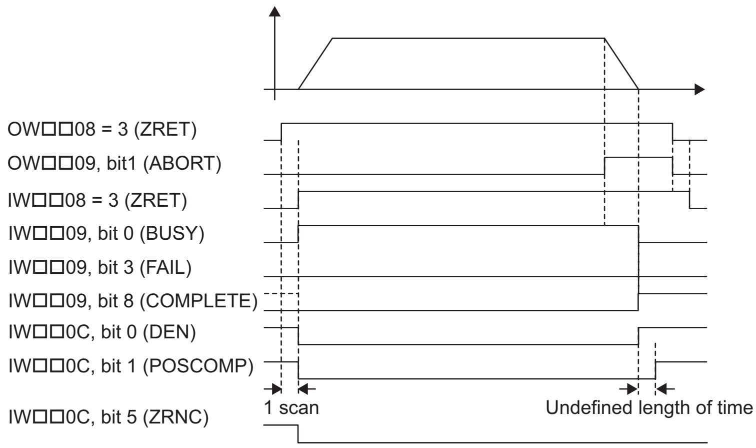
Parameter	Name	Monitor Contents	SVR
IW☐☐00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL☐☐02	Warning	Stores the most current warning.	R
IL☐☐04	Alarm	Stores the most current alarm.	R
IW☐☐08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 3 during ZRET command execution.	R
IW☐☐09 Bit 0	Command Execution Flag	The Command Execution Flag bit will turn ON during ZRET command execution and then turn OFF when command execution has been completed.	R
IW☐☐09 Bit 1	Command Hold Completed	Always OFF for ZRET command.	R
IW☐☐09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during ZRET command execution. The axis will decelerate to a stop if it is moving. Turns OFF when another command is executed.	R
IW☐☐09 Bit 8	Command Execution Completed	Turns ON when ZRET command execution has been completed.	R
IW☐☐0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW☐☐0C Bit 3	NEAR Position	The operation depends on the setting of the NEAR Signal Output Width (setting parameter OL☐☐20). OL☐☐20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL☐☐20 ≠ 0: Turns ON when the absolute value of the difference between MPOS (IL☐☐12) and APOS (IL☐☐16) is less than the NEAR Signal Output Width even if pulse distribution has not been completed. OFF in all other cases.	R
IW☐☐0C Bit 4	Zero Position	Turns ON if the current position after the zero point return operation has been completed is within the Width of Starting Point Position Output from the zero point position. Otherwise, it turns OFF.	R
IW☐☐0C Bit 5	Zero Point Return (Setting) Completed	Turns ON when the zero point return has been completed.	R

(6) Timing Charts

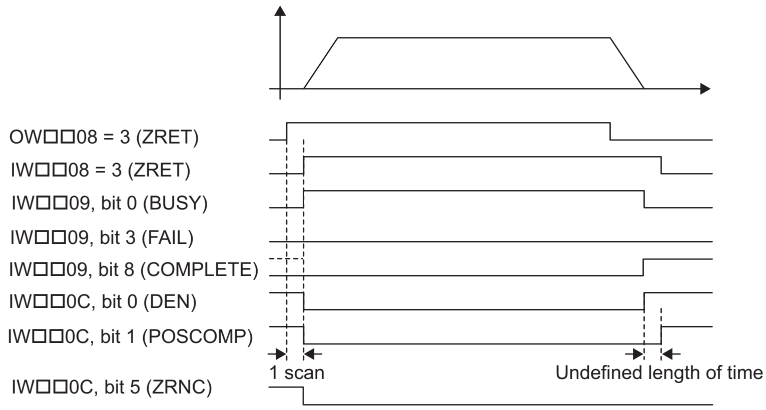
[a] Normal Execution



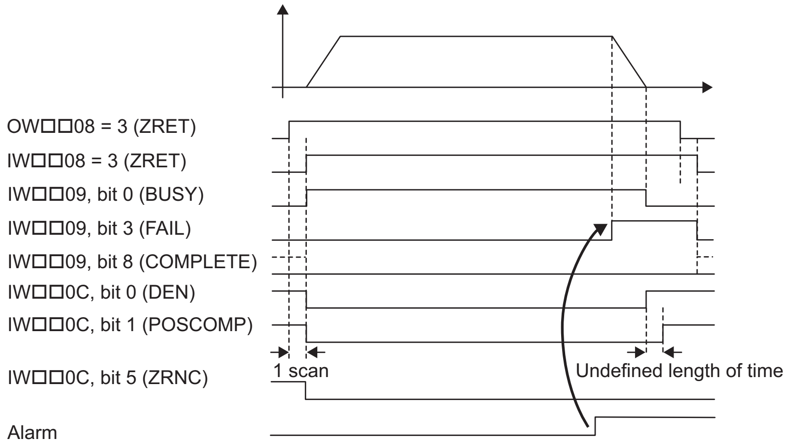
[b] Execution when Aborted



[c] Execution when Aborting by Changing the Command



[d] Execution when an Alarm Occurs



(7) Zero Point Return Operation and Parameters

With an incremental encoder, there are 13 different methods that can be performed for the zero point return operation. This section explains the operation that occurs after starting a zero point return and the parameters that need to be set before executing the command.

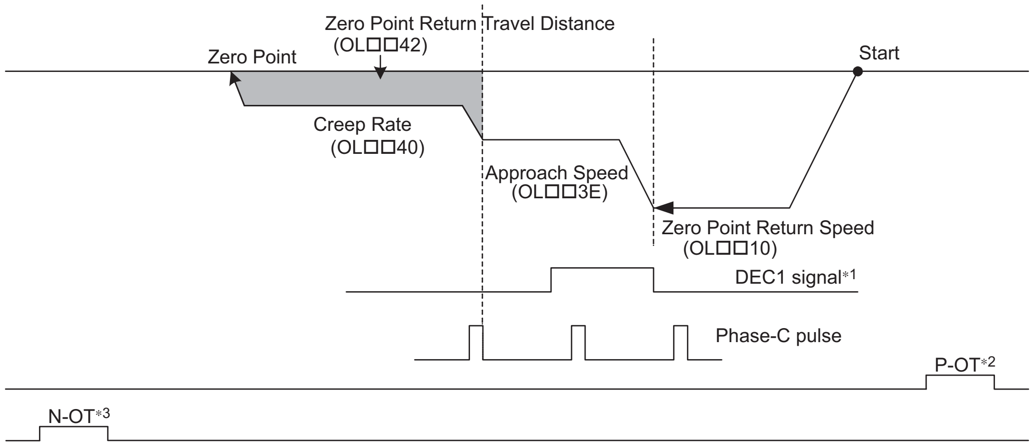
- None of the methods shown here are available with the SVR because it only supports absolute encoders.

[a] DEC1 + C Method (OW☐☐3C = 0)

■ Operation after Zero Point Return Starts

Travel is started at the zero point return speed in the direction specified in the parameters.
When the rising edge of the DEC1 signal is detected, the speed is reduced to the approach speed.
When the first phase-C pulse is detected after passing the DEC1 signal at the approach speed, the speed is reduced to the creep speed and positioning is performed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the phase-C pulse is detected is set in the Zero Point Return Travel Distance (OL☐☐42).
- If an OT signal is detected during the zero point return operation, an OT alarm will occur.



* 1. The SERVOPACK DEC signal.
* 2. The SERVOPACK P-OT signal.
* 3. The SERVOPACK N-OT signal.

■ Setting Parameters

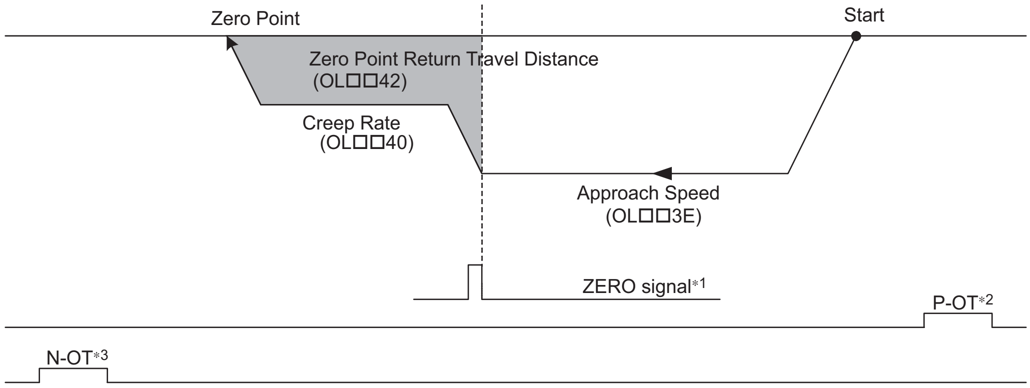
Parameter	Name	Setting
OW☐☐3C	Zero Point Return Method	0: DEC1 + Phase-C
OW☐☐09, Bit 3	Zero Point Return Direction Selection	Set the zero point return direction.
OL☐☐10	Speed Reference Setting	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative value will result in an error.
OW☐☐18	Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference Setting (OL☐☐10). Set the speed as a percentage of the Speed Reference Setting. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%) Setting unit: 1 = 0.01% Example: Setting for 50%: 5000
OL☐☐3E	Approach Speed	Set the speed to use after detecting the DEC1 signal. Only a positive value can be set; a negative value will result in an error.
OL☐☐40	Creep Rate	Set the speed to use after detecting the first phase-C pulse after passing the DEC1 signal. Only a positive value can be set; a negative value will result in an error.
OL☐☐42	Zero Point Return Travel Distance	Set the travel distance from the point where the first phase-C pulse is detected after passing the DEC1 signal. If the sign is positive, travel will be toward the zero point return direction; if the sign is negative, travel will be away from the zero point return direction.

[b] ZERO Method (OW□□3C = 1)

■ Operation after Zero Point Return Starts

Travel is started at the approach speed in the direction specified in the parameters.
When the rising edge of the ZERO signal is detected, the speed is reduced to the creep speed and positioning is performed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the ZERO signal is detected is set in the Zero Point Return Travel Distance (OL□□42).
- If an OT signal is detected during the zero point return operation, an OT alarm will occur.



* 1. The SERVOPACK EXT1 signal.
* 2. The SERVOPACK P-OT signal.
* 3. The SERVOPACK N-OT signal.

■ Setting Parameters

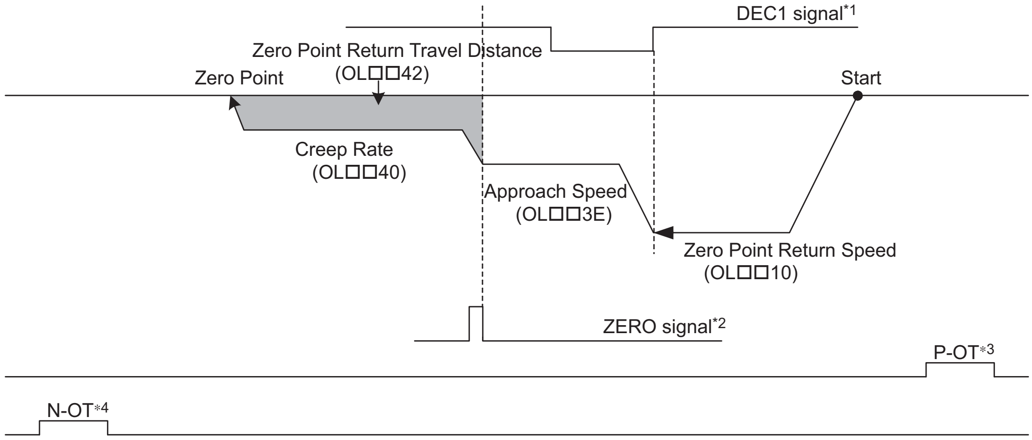
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	1: ZERO Signal Method
OW□□09, Bit 3	Zero Point Return Direction Selection	Set the zero point return direction.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative value will result in an error.
OL□□40	Creep Rate	Set the speed to use after detecting the ZERO signal. Only a positive value can be set; a negative value will result in an error.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where the ZERO signal is detected. If the sign is positive, travel will be toward the zero point return direction; if the sign is negative, travel will be away from the zero point return direction.

[c] DEC1 + ZERO Method (OW□□3C = 2)

■ Operation after Zero Point Return Starts

Travel is started at the zero point return speed in the direction specified in the parameters.
When the rising edge of the DEC1 signal is detected, the speed is reduced to the approach speed.
When the rising edge of the ZERO signal is detected after passing the DEC1 signal at the approach speed, the speed is reduced to the creep speed and positioning is performed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the ZERO signal is detected is set in the Zero Point Return Travel Distance (OL□□42).
- If an OT signal is detected during the zero point return operation, an OT alarm will occur.



* 1. The SERVOPACK DEC signal.
* 2. The SERVOPACK EXT1 signal.
* 3. The SERVOPACK P-OT signal.
* 4. The SERVOPACK N-OT signal.

■ Setting Parameters

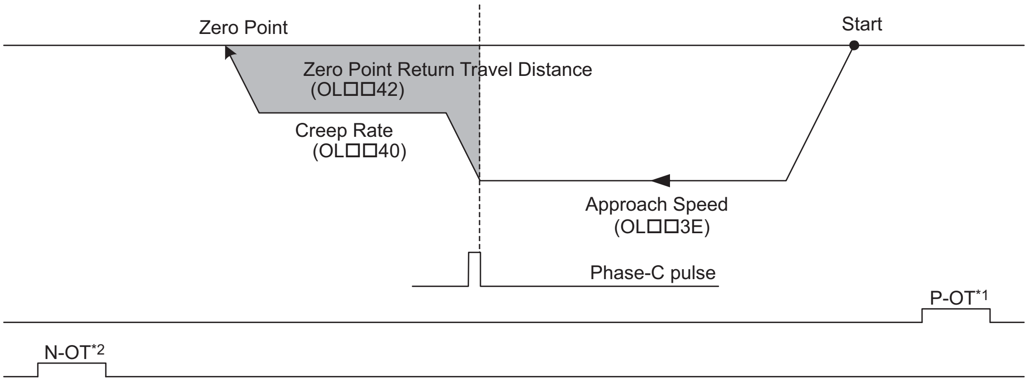
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	2: DEC1 + ZERO Signal Method
OW□□09, Bit 3	Zero Point Return Direction Selection	Set the zero point return direction.
OL□□10	Speed Reference Setting	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative value will result in an error.
OW□□18	Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference Setting (OL□□10). Set the speed as a percentage of the Speed Reference Setting. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%) Setting unit: 1 = 0.01% Example: Setting for 50%: 5000
OL□□3E	Approach Speed	Set the speed to use after detecting the DEC1 signal. Only a positive value can be set; a negative value will result in an error.
OL□□40	Creep Rate	Set the speed to use after detecting the ZERO signal after passing the DEC1 signal. Only a positive value can be set; a negative value will result in an error.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where the ZERO signal is detected after passing the DEC1 signal. If the sign is positive, travel will be toward the zero point return direction; if the sign is negative, travel will be away from the zero point return direction.

[d] C Method (OW□□3C = 3)

■ Operation after Zero Point Return Starts

Travel is started at the approach speed in the direction specified in the parameters.
When the rising edge of the phase-C pulse is detected, the speed is reduced to the creep speed and positioning is performed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the phase-C pulse is detected is set in the Zero Point Return Travel Distance (OL□□42).
- If an OT signal is detected during the zero point return operation, an OT alarm will occur.



* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.

■ Setting Parameters

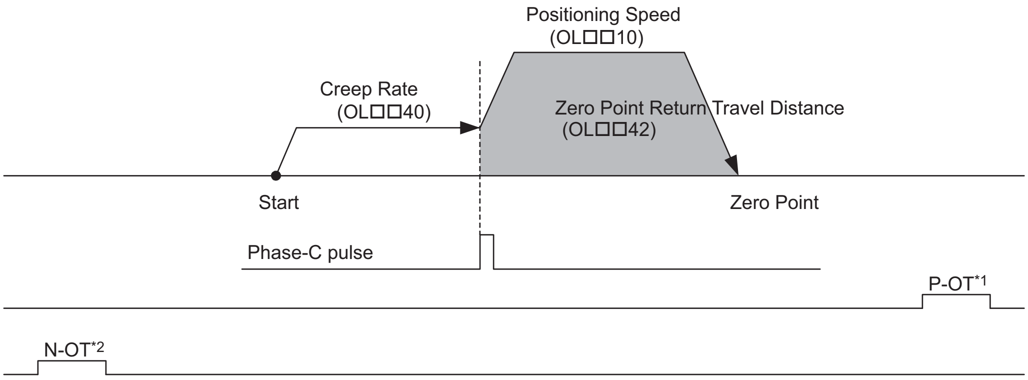
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	3: Phase-C Method
OW□□09, Bit 3	Zero Point Return Direction Selection	Set the zero point return direction.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative value will result in an error.
OL□□40	Creep Rate	Set the speed to use after detecting the phase-C pulse. Only a positive value can be set; a negative value will result in an error.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where a phase-C pulse is detected. If the sign is positive, travel will be toward the zero point return direction; if the sign is negative, travel will be away from the zero point return direction.

[e] C Pulse Only Method (OW□□3C = 11)

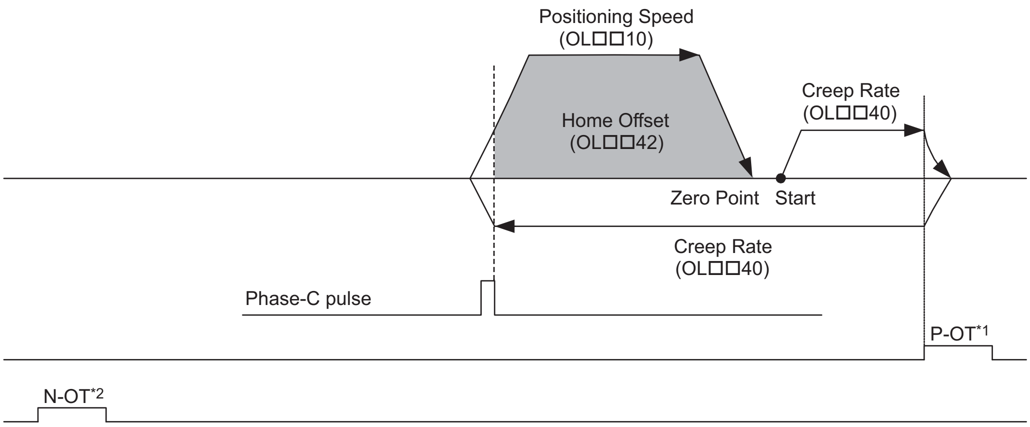
■ Operation after Zero Point Return Starts

Travel is started at the creep speed in the direction specified by the sign of the creep speed. When the rising edge of the phase-C pulse is detected, positioning is performed at the positioning speed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the phase-C pulse is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference.
- If an OT signal is detected during creep speed operation, an OT alarm will not occur, the direction will be reversed, and a search will be made for the phase-C pulse.
- If an OT signal is detected during positioning speed operation, an OT alarm will occur.



<OT Signal Detected during Creep Speed Operation>



* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

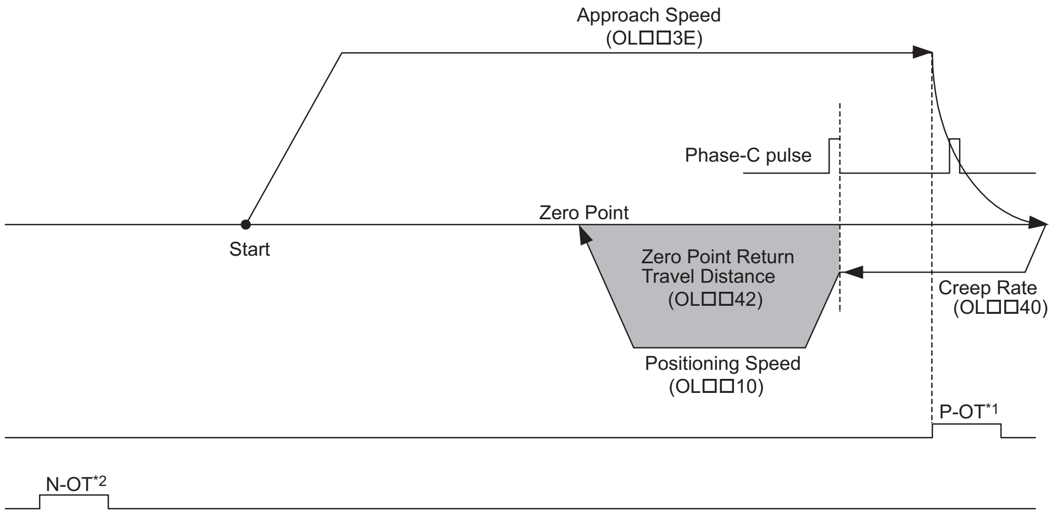
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	11: C Pulse Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction will depend on the sign of the Home Offset.
OL□□40	Creep Rate	Set the speed and travel direction (sign) to use when starting a zero point return.
OL□□42	Zero Point Return Method	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.

[f] POT & C Pulse Method (OW□□3C = 12)

■ Operation after Zero Point Return Starts

Travel is started at the approach speed in the positive direction until the stroke limit is reached.
When the P-OT signal is detected, the direction is reversed to return at creep speed.
When the phase-C pulse is detected during the return after passing the P-OT signal, the positioning is performed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the phase-C pulse is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference.
- If a negative value is set for the approach speed, the command will end in an error.
- If an OT signal is detected during the positioning speed operation, an OT alarm will occur.



* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

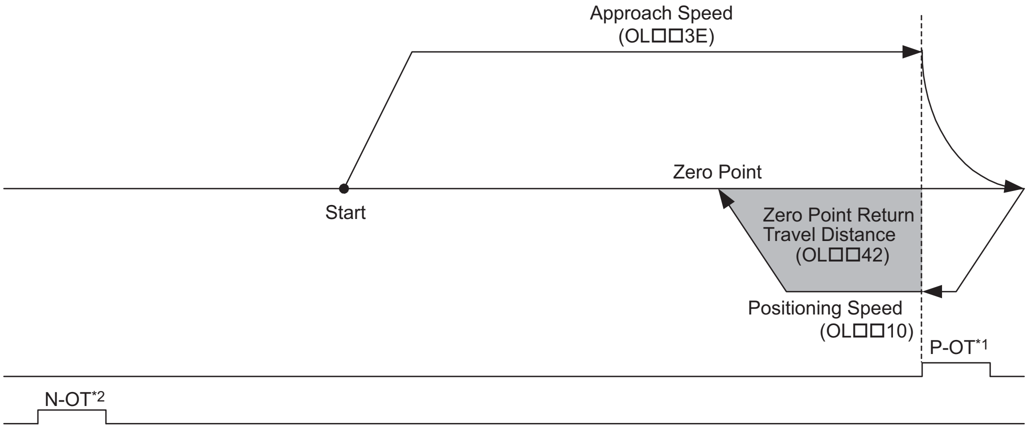
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	12: P-OT & C pulse method
OL□□10	Speed Reference Setting	Set the positioning to use after detecting the phase-C pulse. The sign is ignored. The zero point return direction will depend on the sign of the Home Offset.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. Add a sign so that the travel direction will be positive.
OL□□40	Creep Rate	Set the reverse speed to use at after detecting the P-OT signal. The sign is ignored. The travel direction will be negative.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.

[g] POT Only Method (OW□□3C = 13)

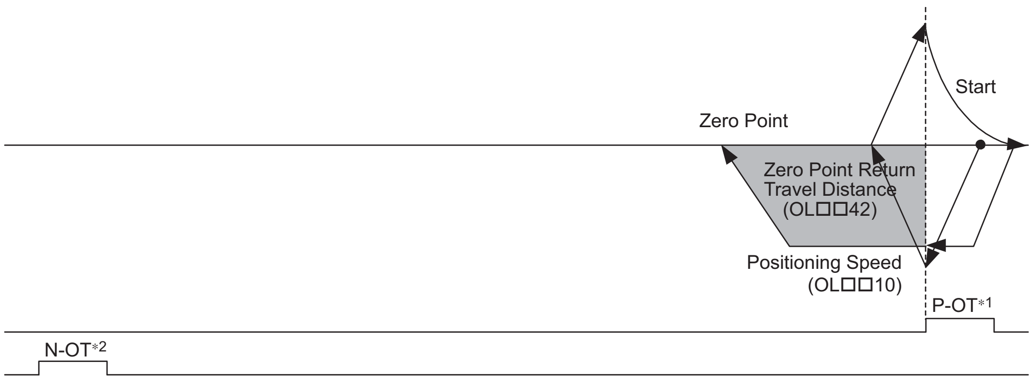
■ Operation after Zero Point Return Starts

Travel is started at the approach speed in the positive direction until the stroke limit is reached.
When the P-OT signal is detected, the direction is reversed to return at Positioning speed.
When a change in the P-OT signal status from ON to OFF is detected during the return, the positioning is performed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after a change in the P-OT signal status is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference.
- If a negative value is set for the approach speed, the command will end in an error.
- If an OT signal is detected during the positioning speed operation, an OT alarm will occur.
- Detecting the change in the OT signal status is performed using software processing. The position where positioning is completed will depend on the high-speed scan setting, positioning speed, etc. Do not use this method if repeat accuracy is required in the position where the zero point return operation is completed.



<Starting on the Positive Stroke Limit (P-OT)>



* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

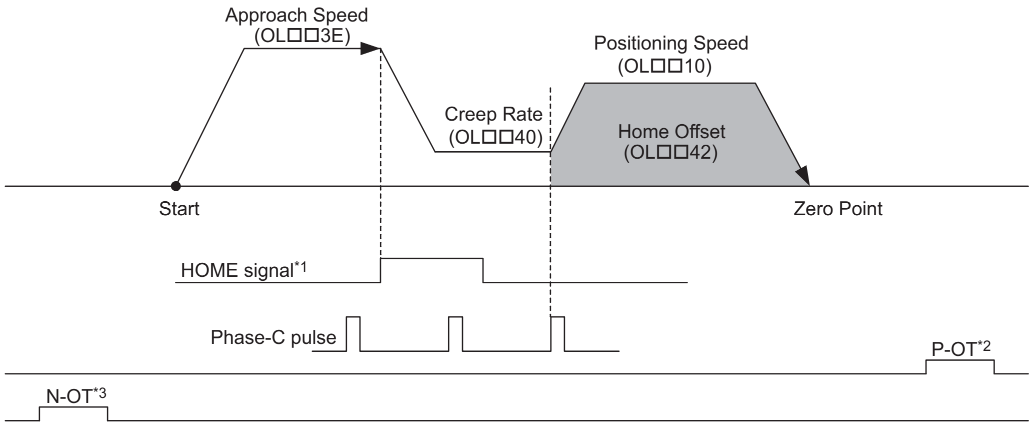
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	13: P-OT Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the P-OT signal. The sign is ignored. The travel direction will depend on the sign of the Zero Point Travel Distance.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. Add a sign so that the travel direction will be positive.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where the P-OT signal is detected. The travel direction will depend on the sign.

[h] HOME LS & C Pulse Method (OW□□3C = 14)

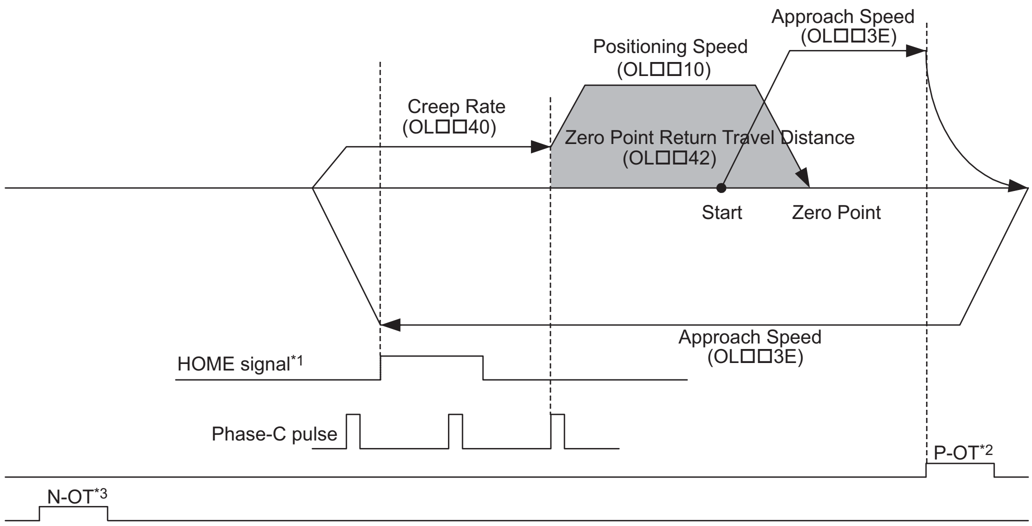
■ Operation after Zero Point Return Starts

Travel is started at the approach speed in the direction specified by the sign of the approach speed.
When the rising edge of the home signal is detected, the speed is reduced to creep speed.
When the first phase-C pulse is detected after the falling edge of the home signal, the positioning is performed at positioning speed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the phase-C pulse is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference.
- If an OT signal is detected during approach speed operation, an alarm will not occur, the direction will be reversed, and a search will be made for the home signal.
- If an OT signal is detected during positioning speed operation, an OT alarm will occur.



<Detecting the OT Signal during Approach Speed Movement>



* 1. The SERVOPACK EXT1 signal.
* 2. The SERVOPACK P-OT signal.
* 3. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

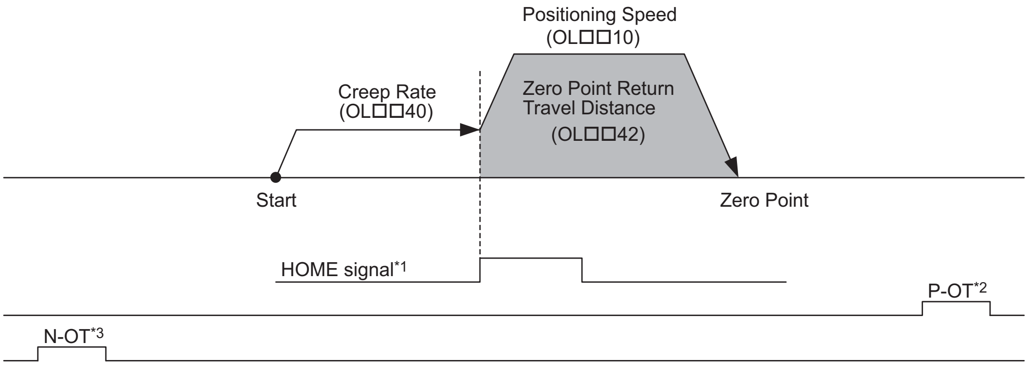
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	14: HOME LS & C pulse method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction depends on the sign of the Zero Point Return Travel Distance.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. The travel direction will depend on the sign of the approach speed.
OL□□40	Creep Rate	Set the speed to use after detecting the home signal and the travel direction (sign).
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.

[i] HOME Only Method (OW□□3C = 15)

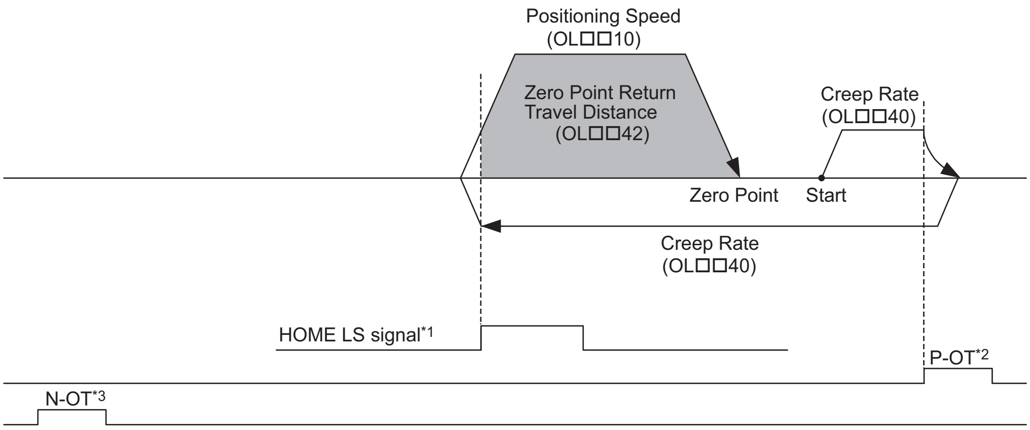
■ Operation after Zero Point Return Starts

Travel is started at the creep speed in the direction specified by the sign of the creep speed.
When the rising edge of the home signal is detected, positioning is performed at the positioning speed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the rising edge of the home signal is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference Setting.
- If an OT signal is detected during creep speed operation, an alarm will not occur, the direction will be reversed, and a search will be made for the home signal.
- If an OT signal is detected during positioning speed operation, an OT alarm will occur.



<Detecting the OT Signal during Creep Rate Movement>



* 1. The SERVOPACK EXT1 signal.
* 2. The SERVOPACK P-OT signal.
* 3. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

Parameter	Name	Setting
OW□□3C	Zero Point Return Method	15: HOME LS Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the home signal. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance.
OL□□40	Creep Rate	Set the speed and the travel direction (sign) to use when starting a zero point return.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where the home signal is detected. The travel direction will depend on the sign.

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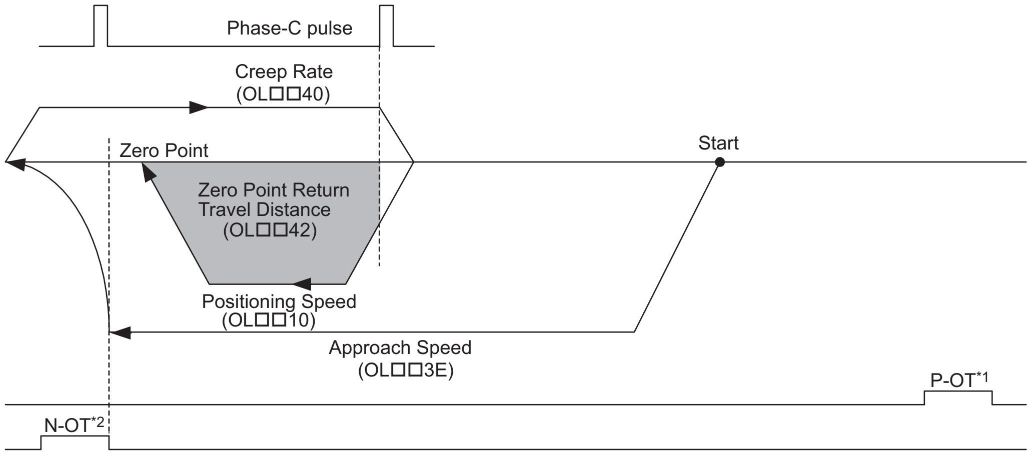
[j] NOT & C Pulse Method (OW□□3C = 16)

■ Operation after Zero Point Return Starts

Travel is started at the approach speed in the negative direction until the stroke limit is reached.
When the N-OT signal is detected, the direction is reversed to return at the creep speed.
When the phase-C pulse is detected during the return after passing the N-OT signal, the positioning is performed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the phase-C pulse is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference.
- If a positive value is set for the approach speed, the command will end in an error.
- If an OT signal is detected during the positioning speed operation, an OT alarm will occur.



* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

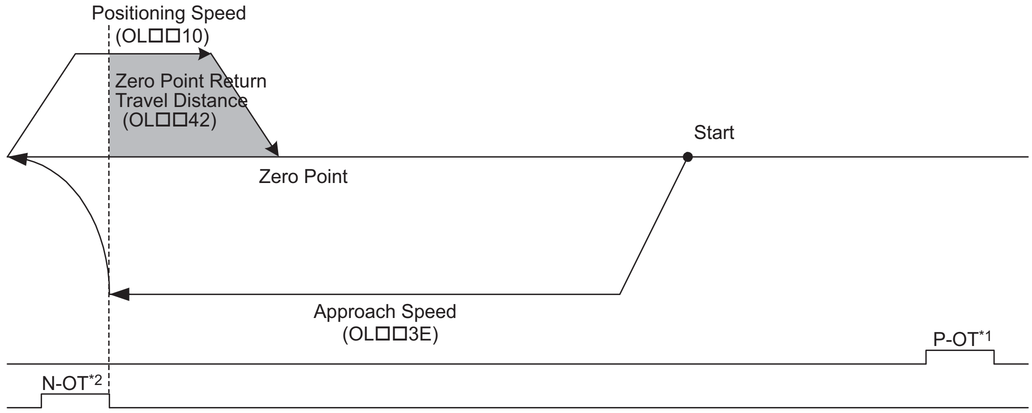
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	16: N-OT & C pulse Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. Add a sign so that the travel direction will be negative.
OL□□40	Creep Rate	Set the speed to use after detecting the N-OT signal. The travel direction will be positive.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.

[k] NOT Only Method (OW□□3C = 17)

■ Operation after Zero Point Return Starts

Travel is started at the approach speed in the negative direction until the stroke limit is reached.
When the N-OT signal is detected, the direction is reversed to return at the positioning speed.
When a change in the N-OT signal status from ON to OFF is detected during the return, the positioning is performed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the change of the N-OT signal status is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference.
- If a positive value is set for the approach speed, the command will end in an error.
- If an OT signal is detected during the positioning speed operation, an OT alarm will occur.
- Detecting the change in the OT signal status is performed using software processing. The position where positioning is completed will depend on the high-speed scan setting, positioning speed, etc. Do not use this method if repeat accuracy is required in the position where the zero point return operation is completed.



* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

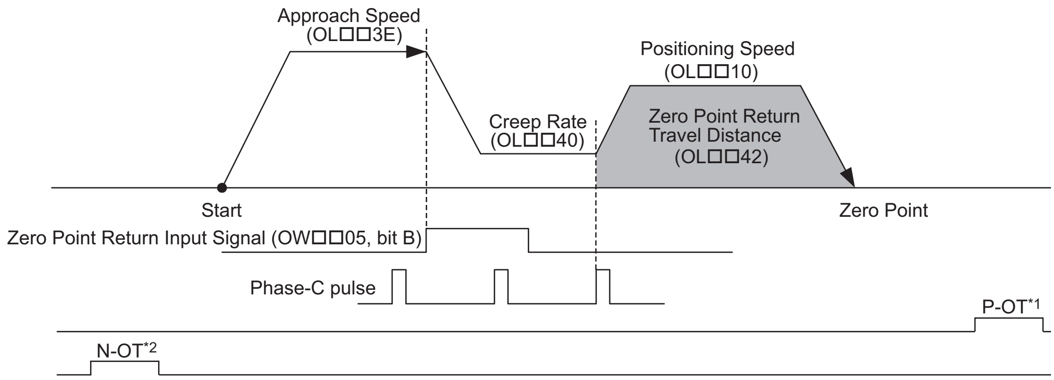
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	17: N-OT Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the N-OT signal. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. Add a sign so that the travel direction will be negative.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where the N-OT signal is detected. The travel direction will depend on the sign.

[I] INPUT & C Pulse Method (OW☐☐3C = 18)

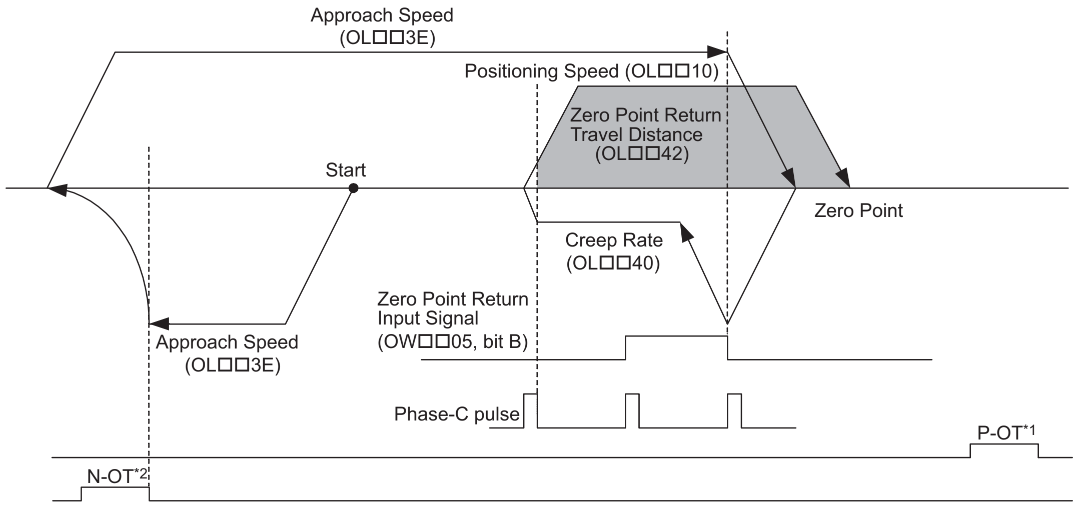
■ Operation after Zero Point Return Starts

Travel is started at the approach speed in the direction specified by the sign of the approach speed.
When the rising edge of the INPUT signal is detected, the speed is reduced to the creep speed.
When the first phase-C pulse is detected after the falling edge of the INPUT signal, the positioning is performed at positioning speed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the phase-C pulse is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference Setting.
- If an OT signal is detected during approach speed operation, an OT alarm will not occur, the direction will be reversed, and a search will be made for the Zero Point Return Input Signal.
- If an OT signal is detected during positioning speed operation, an OT alarm will occur.



<Detecting the OT Signal during Approach Speed Movement>



* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

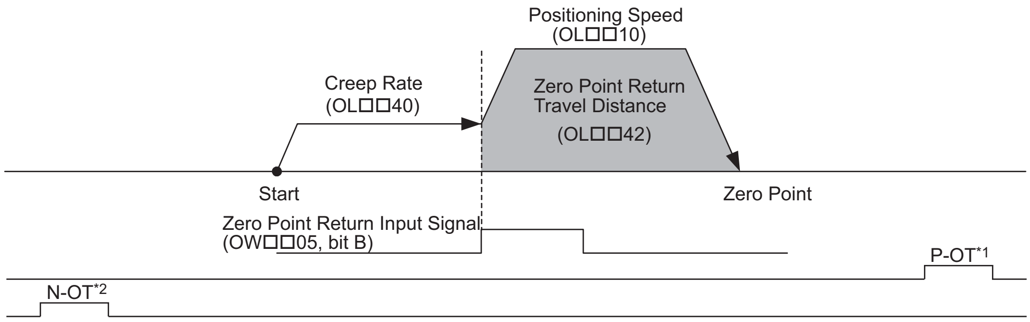
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	18: INPUT & C pulse Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. The travel direction will depend on the sign of the approach speed.
OL□□40	Creep Rate	Set the speed and the travel direction (sign) to use after detecting the Zero Point Return Input Signal.
OL□□42	Zero Point Return Travel Distance	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.
OW□□05, Bit B	Zero Point Return Input Signal	This signal must be turned ON from the ladder program.

[m] INPUT Only Method (OW□□3C = 19)

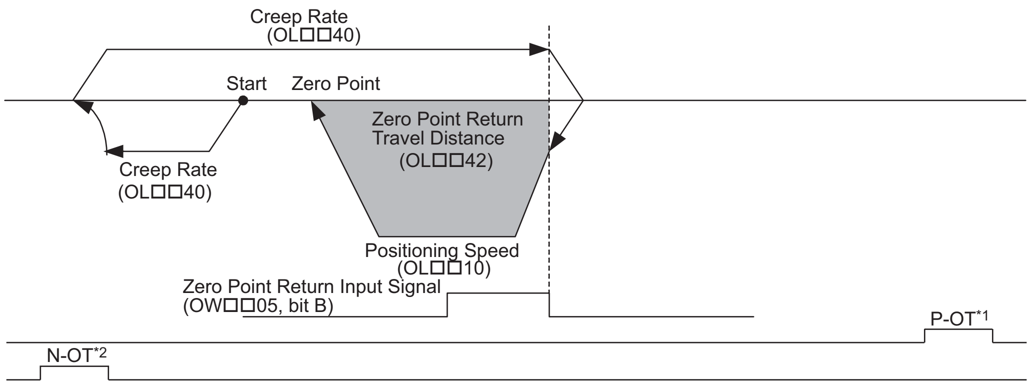
■ Operation after Zero Point Return Starts

Travel is started at the creep speed in the direction specified by the sign of the creep speed.
When the rising edge of the INPUT signal is detected, the positioning is performed at the positioning speed.
When the positioning has been completed, a machine coordinate system is established with the final position as the zero point.

- The moving amount after the rising edge of the Zero Point Return Input Signal is detected is set in the Zero Point Return Travel Distance. The positioning speed is set in the Speed Reference Setting.
- If an OT signal is detected during creep speed operation, an OT alarm will not occur, the direction will be reversed, and a search will be made for the Zero Point Return Input Signal.
- If an OT signal is detected during positioning speed operation, an OT alarm will occur.
- The Zero Point Return Input Signal is allocated to the motion setting parameter OW□□05 bit B, allowing the zero point return operation to be performed without actually wiring a signal. This method can thus be used to temporarily set the zero point during trial operation.
- Detecting the rising edge of the Zero Point Return Input Signal is performed using software processing. The position where positioning is completed will depend on the high-speed scan setting, positioning speed, etc. Do not use this method if repeat accuracy is required in the position where the zero point return operation is completed.



<Detecting the OT Signal during Creep Rate Movement>



* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.

- The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

■ Setting Parameters

Parameter	Name	Setting
OW□□3C	Zero Point Return Method	19: INPUT Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the Zero Point Return Input Signal. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance.
OL□□40	Creep Rate	Set the speed and the travel direction (sign) to use when starting a zero point return.
OL□□42	Zero Point Return Travel Distance	Set the distance to travel from the point the Zero Point Return Input Signal is detected. The travel direction will depend on the sign.
OW□□05, Bit B	Zero Point Return Input Signal	This signal must be turned ON from the ladder program.

6.2.4 Interpolation (INTERPOLATE) R

The INTERPOLATE command positions the axis according to the target position that changes in sync with the high-speed scan. The positioning data is generated by a ladder program.

- Speed feed forward compensation can be applied.
- Torque feed forward gain can be used when interpolation commands (INTERPOLATE) are sent using SGDS, SGDV, and SGD7S SERVOPACKs.
  Torque feed forward gain is set in Torque/Thrust Reference Setting (setting parameter OL□□0C). The required conditions are as follows:
  - SERVOPACK parameter Pn002.0 = 2
  - SGDS communication interface version 8 or later

When using an SGDV or SGD7S SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations* of *4.4.2 (12).*

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IW□□00, bit 1 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set the following motion setting parameters.

Position Reference Setting: OL□□1C
Filter Type Selection: OW□□03, bits 8 to B
Speed Loop P/PI Switch: OW□□01
Speed Feed Forward Amends: OW□□30

3. Set the parameter OW□□08 to 4 to execute an INTERPOLATE command.

4 is stored in IW□□08 during positioning.

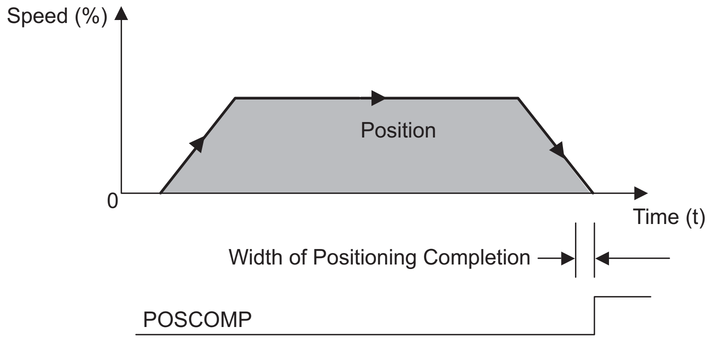
4. Refresh the value of OL□□1C (Position Reference Setting) at every high-speed scan.

The target position is updated to the refreshed value of OL□□1C at every high-speed scan.*
The difference between the target position of one high-speed scan and that of the next high-speed scan will be the moving speed.
When the axis reaches the target position, bit 1 of IW□□0C will turn ON and positioning will be completed.

* When the incremental addition mode is set for bit 5 of OW□□09 "Position Reference Type," the following value will be set to the current target position: Previous target position + Difference between the current value and the previous value of the Position Reference Setting

5. Set OW□□08 to 0 to execute the NOP motion command and then complete the positioning operation.

INTERPOLATE Operating Pattern



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(2) Holding and Aborting

The axis will decelerate to a stop if there is no change in the target position each high-speed scan.
The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.
Change a motion command to stop the interpolation execution.

(3) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turns the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON this bit before setting the Motion Command (OW□□08) to 4.	R
OW□□03	Function Setting 1	Sets the speed unit, acceleration/deceleration units, and filter type.	R
OW□□08	Motion Command	The positioning starts when this parameter is set to 4.	R
OW□□09 Bit 5	Position Reference Type	Switch the type of position reference. 0: Incremental addition mode, 1: Absolute mode Set this parameter before setting the Motion Command (OW□□08) to 4.	R
OL□□1C	Position Reference Setting	Set the target position for positioning. The setting can be updated every high-speed scan.	R
OL□□1E	Width of Positioning Completion	Set the width in which to turn ON the Positioning Completed bit (IW□□0C, bit 1).	–
OL□□20	NEAR Signal Output Width	Set the range in which the NEAR Position bit (IW□□0C, bit 3) will turn ON. The NEAR Position bit will turn ON when the absolute value of the difference between the reference position and the feedback position is less than the value set here.	R
OW□□31	Speed Compensation	Set the feed forward amount as a percentage of the rated speed. The setting unit for this parameter is 0.01% (fixed).	R
OL□□38	Straight Line Deceleration/Deceleration Time Constant	Set the rate of deceleration or deceleration time constant for positioning. Used for deceleration stops when an alarm has occurred.	–
OW□□3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in the Function Setting 1 (OW□□03, bits 8 to B). Change the setting only after pulse distribution has been completed for the command (IW□□0C, bit 0 is ON).	R

[b] Monitoring Parameters

Parameter	Name	Monitor Contents	SVR
IW☐☐00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL☐☐02	Warning	Stores the most current warning.	R
IL☐☐04	Alarm	Stores the most current alarm.	R
IW☐☐08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 4 during INTERPOLATE command execution.	R
IW☐☐09 Bit 0	Command Executing Flag	Always OFF for INTERPOLATE command.	R
IW☐☐09 Bit 1	Command Hold Completed	Always OFF for INTERPOLATE command.	R
IW☐☐09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during INTERPOLATE command execution. The axis will decelerate to a stop if it is moving. Turns OFF when another command is executed.	R
IW☐☐09 Bit 8	Command Execution Completed	Always OFF for INTERPOLATE command.	R
IW☐☐0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW☐☐0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Width of Positioning Completion. OFF in all other cases.	R
IW☐☐0C Bit 3	NEAR Position	The operation depends on the setting of the NEAR Signal Output Width (setting parameter OL☐☐20). OL☐☐20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL☐☐20 ≠ 0: Turns ON when the absolute value of the difference between MPOS (IL☐☐12) and APOS (IL☐☐16) is less than the NEAR Signal Output Width even if pulse distribution has not been completed. OFF in all other cases.	R

Motion Commands

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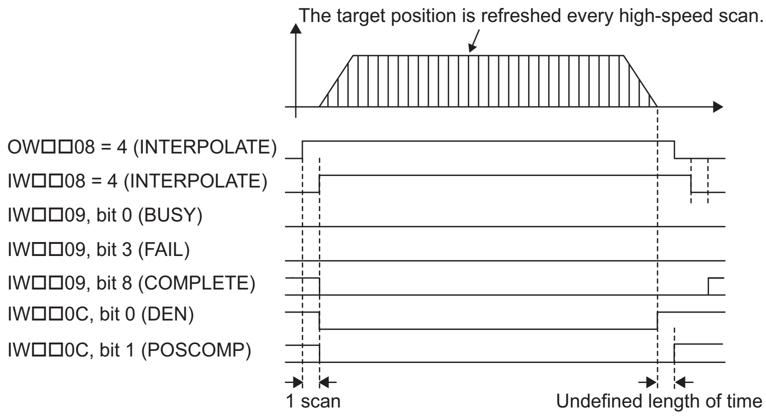
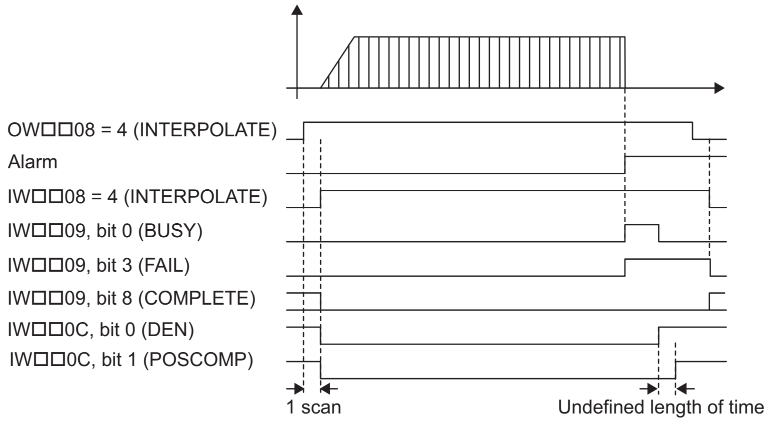
(4) Timing Charts

[a] Normal Execution



[b] Execution when an Alarm Occurs



6.2.5 Interpolation Mode with Latch Input (LATCH) R

The LATCH command saves in a register the current position when the latch signal is detected during interpolation positioning.

The latch signal type is set in setting register OW☐☐04 and can be set to the phase-C pulse, /EXT1 signal, /EXT2 signal, or /EXT3 signal.

- Speed feed forward compensation can be applied.
- When executing the LATCH command more than once after latching the current position by the LATCH command, change the Motion Command to NOP for at least one scan before executing LATCH again.
- Torque feed forward gain can be used when LATCH commands are sent using SGDS, SGDV, and SGD7S SERVOPACKs.
  Torque feed forward gain is set in Torque/Thrust Reference Setting (setting parameter OL☐☐0C). The required conditions are as follows:
  - SERVOPACK parameter Pn002.0 = 2
  - SGDS communication interface version 8 or later

When using an SGDV or SGD7S SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations* of *4.4.2 (12)*.

When using a DC Power Input Σ-V Series SERVOPACK (Model: SGDV-☐☐☐E1☐☐), refer to *11.7.4 Motion Command Operation for External Latches with DC Power Input Σ-V-series SERVOPACKs*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL☐☐02 and IL☐☐04 are 0.
2	The Servo ON condition.	IW☐☐00, bit 1 is ON.
3	Motion command execution has been completed.	IW☐☐08 is 0 and IW☐☐09, bit 0 is OFF.

2. Set the following motion setting parameters.

Position Reference Setting: OL☐☐1C
Filter Type Selection: OW☐☐03, bits 8 to B
Speed Loop P/PI Switch: OW☐☐01
Speed Feed Forward Amends: OW☐☐30
Function Setting 2: OW☐☐04

3. Set OW☐☐08 to 6 (Latch) to execute a LATCH motion command.

6 is stored in IW☐☐08 during positioning.

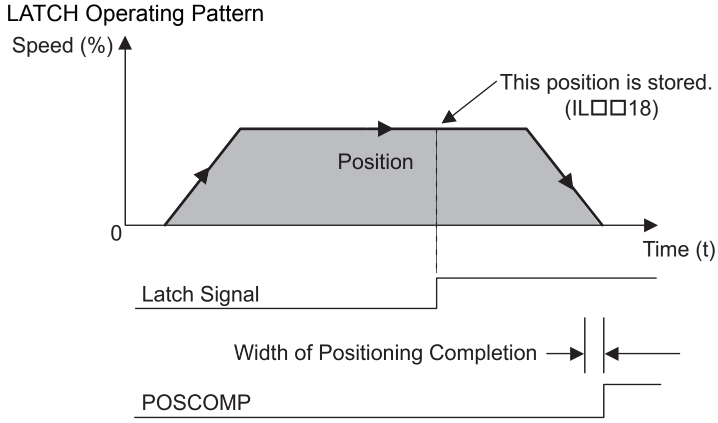
4. Refresh the value of OL☐☐1C "Position Reference Setting."

The target position is updated to the refreshed value of OL☐☐1C at every high-speed scan.*
The difference between the target position of one high-speed scan and that of the next high-speed scan will be the moving speed.
When the axis reaches the target position, bit 1 of IW☐☐0C will turn ON and positioning will be completed.

* When the incremental addition mode is set for bit 5 of OW☐☐09 "Position Reference Type," the following value will be set to the current target position: Previous target position + Difference between the current value and the previous value of the Position Reference Setting

- Execute a LATCH command considering the latch process time obtained by the following equation.
  Latch process time = 2 scans + MECHATROLINK communication cycle + SERVOPACK's processing time (4 ms max.)

5. Set OW□□08 to 0 to execute the NOP motion command and then complete the positioning operation.



(2) Holding and Aborting

The axis will decelerate to a stop if there is no change in the target position each high-speed scan.
The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.
Change a motion command to stop the interpolation execution.

(3) Related Parameters

[a] Setting Parameters

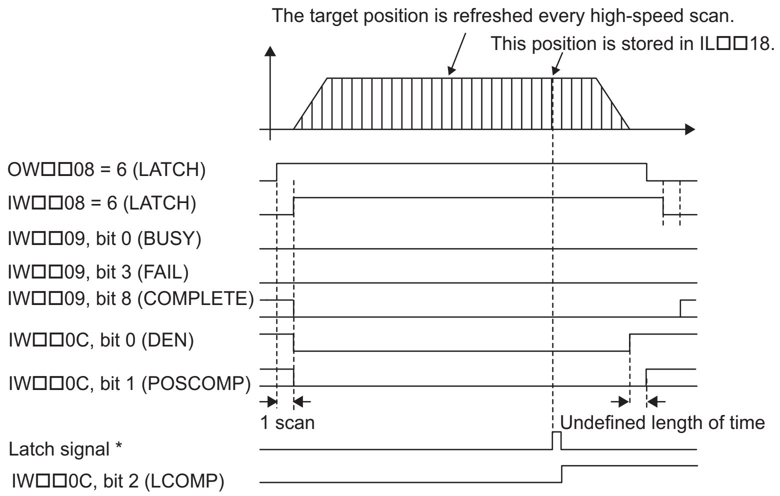
Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Set this bit to 1 before setting the Motion Command (OW□□08) to 6.	R
OW□□03	Function Setting 1	Sets the speed unit, acceleration/deceleration units, and filter type.	R
OW□□04	Function Setting 2	Set the latch signal type.	–
OW□□08	Motion Command	The positioning starts when this parameter is set to 6.	R
OW□□09 Bit 5	Position Reference Type	Switch the type of position reference. 0: Incremental addition mode, 1: Absolute mode Set this parameter before setting the Motion Command (OW□□08) to 6.	R
OL□□1C	Position Reference Setting	Set the target position for positioning. The setting can be updated every high-speed scan.	R
OL□□1E	Width of Positioning Completion	Set the width in which to turn ON the Positioning Completed bit (IW□□0C, bit 1).	–
OL□□20	NEAR Signal Output Width	Set the range in which the NEAR Position bit (IW□□0C, bit 3) will turn ON. The NEAR Position bit will turn ON when the absolute value of the difference between the reference position and the feedback position is less than the value set here.	–
OW□□31	Speed Compensation	Set the feed forward amount as a percentage of the rated speed. The setting unit for this parameter is 0.01% (fixed).	R
OL□□38	Straight Line Deceleration/Deceleration Time Constant	Set the rate of deceleration or deceleration time constant for positioning. Used for deceleration stops when an alarm has occurred.	–
OW□□3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in the Function Setting 1 (OW□□03, bits 8 to B). Change the setting only after pulse distribution has been completed for the command (IW□□0C, bit 0 is ON).	R

[b] Monitoring Parameters

Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	Indicates any alarms that have occurred during execution. The response code is 6 during LATCH operation.	R
IW□□09 Bit 0	Command Execution Flag	Always OFF for LATCH operation.	R
IW□□09 Bit 1	Command Hold Completed	Always OFF for LATCH operation.	R
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during LATCH operation. The axis will decelerate to a stop if it is moving. Turns OFF when another command is executed.	R
IW□□09 Bit 8	Command Execution Completed	Always OFF for LATCH operation.	R
IW□□0C Bit 0	Discharging Completed	Turns ON when distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW□□0C Bit 1	Positioning Completed	Turns ON when distribution has been completed and the current position is within the Width of Positioning Completion. OFF in all other cases.	R
IW□□0C Bit 2	Latch Complete	This bit turns OFF when a new latch command is executed and turns ON when the latch has been completed. The latched position is stored as the Machine Coordinate System Latch Position (LPOS) (monitoring parameter IL□□18).	–
IW□□0C Bit3	NEAR Position	The operation depends on the setting of the NEAR Signal Output Width (setting parameter OL□□20). OL□□20 = 0:Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL□□20 ≠ 0:Turns ON when the absolute value of the difference between MPOS (IL□□12) and APOS (IL□□16) is less than the NEAR Signal Output Width even if pulse distribution has not been completed. OFF in all other cases.	R
IL□□18	Machine Coordinate System Latch Position (LPOS)	Stores the current position in the machine coordinate system when the latch signal turned ON.	–

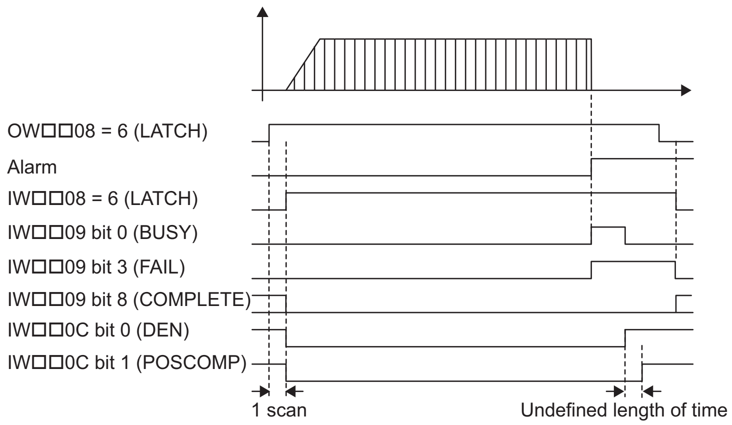
(4) Timing Charts

[a] Normal Execution



* Latch signal: Phase-C pulse, /EXT1, /EXT2, or /EXT3 signal

[b] Execution when an Alarm Occurs



6.2.6 Jog Mode (FEED) R

The FEED command starts movement in the specified travel direction at the specified travel speed. Execute the NOP motion command to stop the operation.
Parameters related to acceleration and deceleration are set in advance.

When using an SGDV or SGD7S SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations* of *4.4.2 (12)*. Also, refer to ■ *Precautions* of *6.2.1 (3)*.
For more information on the maximum allowable value for acceleration and deceleration, refer to ■ *Changing the maximum value of acceleration and deceleration for SGDV or SGD7S SERVOPACKs* of *4.4.2 (23)*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IW□□00, bit 1 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

* This condition is a basic execution condition. Refer to *Chapter 7 Switching Commands during Execution* when changing the command being executed to a FEED command.

2. Set the following motion setting parameters.

Moving Direction (JOG/STEP): OW□□09, bit 2
Speed Reference Setting: OL□□10
Filter Type Selection: OW□□03, bits 8 to B
Speed Loop P/PI Switch: OW□□01

- The speed reference can be changed during operation.

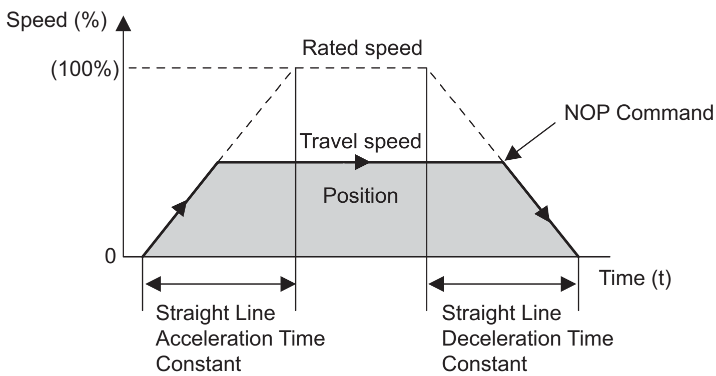
3. Set OW□□08 to 7 to execute the FEED motion command.

JOG operation will start. IW□□08 will be 7 during the execution.

4. Set OW□□08 to 0 to execute the NOP motion command.

IW□□0C, bit 1 turns ON and the JOG operation has been completed.

FEED Operating Pattern



(2) Holding

Holding execution is not possible during FEED command execution. The Holds a Command bit (OW□□09, bit 0) is ignored.

(3) Aborting

Axis travel can be stopped during FEED command execution by aborting execution of a command. A command is aborted by setting the Interrupt a Command bit (OW□□09, bit 1) to 1.

- Set the Interrupt a Command bit (OW□□09, bit 1) to 1. The axis will decelerate to a stop.
- When the axis has stopped, the Positioning Completed bit (IW□□0C, bit 1) will turn ON.
- The JOG operation will restart if the Interrupt a Command bit (OW□□09, bit 1) is reset to 0 during abort processing.*

♦ This type of operation will also be performed if the motion command is changed during axis movement.

* Because a delay occurs when sending or receiving commands and responses to and from the CPU and the SVB module, the abort processing may have been completed although an attempt was made to restart the JOG operation. In this case, IW□□08 (Motion Command Response Code) is set to 7, and bit 8 (Command Execution Completed) of IW□□09 (Motion Command Status) is set to 1. The JOG operation cannot be restarted under these conditions.
To reset the JOG operation, set OW□□08 (Motion Command) to any value other than 7 (such as NOP=0) and then reset it to 7. If an operation is to be frequently aborted and restarted within a short interval, remember to take this delay into consideration.

(4) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command (OW□□08) to 7.	R
OW□□01 Bit 3	Speed Loop P/PI Switch	Switches the speed control loop between PI control and P control. 0: PI control, 1: P control	–
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.	R
OW□□08	Motion Command	The JOG operation starts when this parameter is set to 7. The axis is decelerated to a stop and the JOG operation is completed if this parameter is set to 0 during the execution of a FEED command.	R
OW□□09 Bit 1	Interrupt a Command	The axis is decelerated to a stop if this bit is set to 1 during JOG operation.	R
OW□□09 Bit 2	Moving Direction (JOG/STEP)	Set the travel direction for JOG operation. 0: Positive direction, 1: Negative direction	R
OL□□10	Setting Reference Setting	Specify the speed for the positioning operation. Only a positive value can be set. This setting can be changed during operation. The unit depends on the Function Setting 1 setting (OW□□03, bits 0 to 3).	R
OW□□18	Override	This parameter allows the feed speed to be changed without changing the Speed Reference Setting (OL□□10). Set the speed as a percentage of the Speed Reference Setting. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%) Setting unit: 1 = 0.01% Example: Setting for 50%: 5000	–
OL□□1E	Width Positioning Completion	Set the width in which to turn ON the Positioning Completed bit (IW□□0C, bit 1).	–
OL□□20	NEAR Signal Output Width	Set the range in which the NEAR Position bit (IW□□0C, bit 3) will turn ON. The NEAR Position bit will turn ON when the absolute value of the difference between the reference position and the feedback position is less than the value set here.	–
OL□□36	Straight Line Acceleration/Acceleration Time Constant	Set the feed acceleration in acceleration rate or acceleration time.	R
OL□□38	Straight Line Deceleration/Deceleration Time Constant	Set the feed deceleration in deceleration rate or deceleration time.	R
OW□□3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in the Function Setting 1 (OW□□03, bits 8 to B). Change the setting only after pulse distribution has been completed for the command (IW□□0C, bit 0 is ON).	R

[b] Monitoring Parameters

Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 7 during FEED command execution.	R
IW□□09 Bit 0	Command Execution Flag	Turns ON when abort processing is being performed for FEED command. Turns OFF when abort processing has been completed.	R
IW□□09 Bit 1	Command Hold Completed	Always OFF for FEED command.	R
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during FEED command execution. The axis will decelerate to a stop if it is moving. Turns OFF when another command is executed.	R
IW□□09 Bit 8	Command Execution Completed	Always OFF for FEED command.	R
IW□□0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW□□0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Width of Positioning Completion. OFF in all other cases.	R
IW□□0C Bit 3	NEAR Position	The operation depends on the setting of the NEAR Signal Output Width (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL□□20 ≠ 0: Turns ON when the absolute value of the difference between MPOS (IL□□12) and APOS (IL□□16) is less than the NEAR Signal Output Width even if pulse distribution has not been completed. OFF in all other cases.	R

Motion Commands

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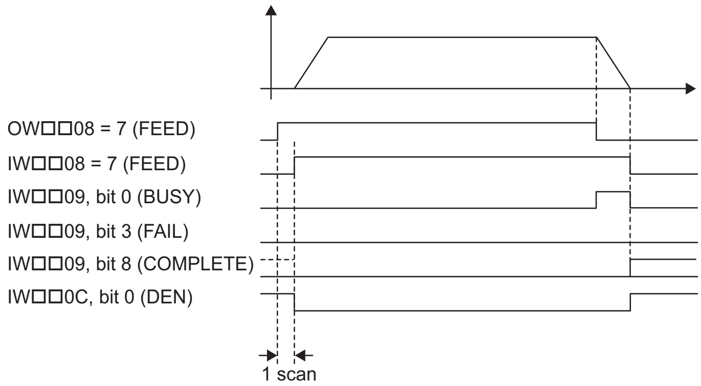
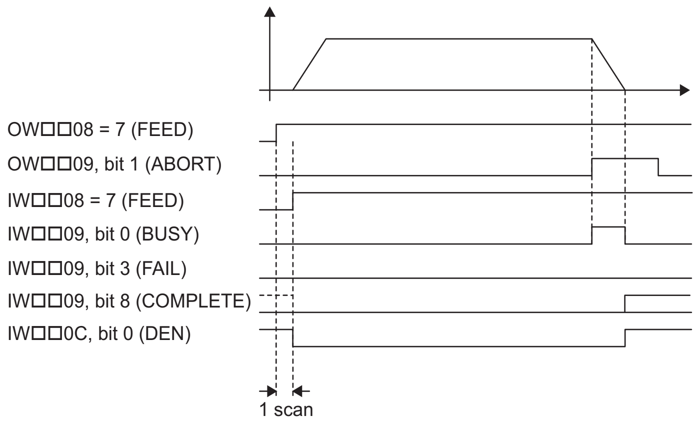
(5) Timing Charts

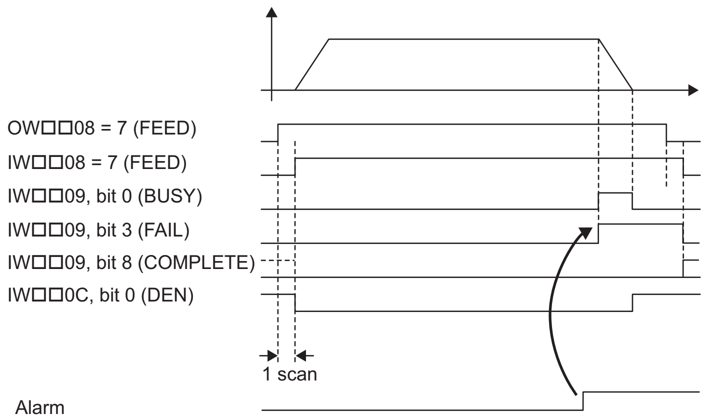
[a] Normal Execution



[b] Execution when Aborted



[c] Execution when an Alarm Occurs



6.2.7 Relative Position Mode (STEP) (Step Mode) R

The STEP command executes a positioning for the specified travel direction, moving amount, and travel speed. Parameters related to acceleration and deceleration are set in advance.
When using an SGDV or SGD7S SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations* of *4.4.2 (12)*. Also, refer to ■ *Precautions* of *6.2.1 (3)*.
For more information on the maximum allowable value for acceleration and deceleration, refer to ■ *Changing the maximum value of acceleration and deceleration for SGDV or SGD7S SERVOPACKs* of *4.4.2 (23)*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL☐☐02 and IL☐☐04 are 0.
2	The Servo ON condition.	IW☐☐00, bit 1 is ON.
3	Motion command execution has been completed.	IW☐☐08 is 0 and IW☐☐09, bit 0 is OFF.

2. Set the following motion setting parameters.

STEP Travel Distance: OL☐☐44
Moving Direction (JOG/STEP): OW☐☐09, bit 2
Speed Reference Setting: OL☐☐10
Filter Type Selection: OW☐☐03, bits 8 to B
Speed Loop P/PI Switch: OW☐☐01

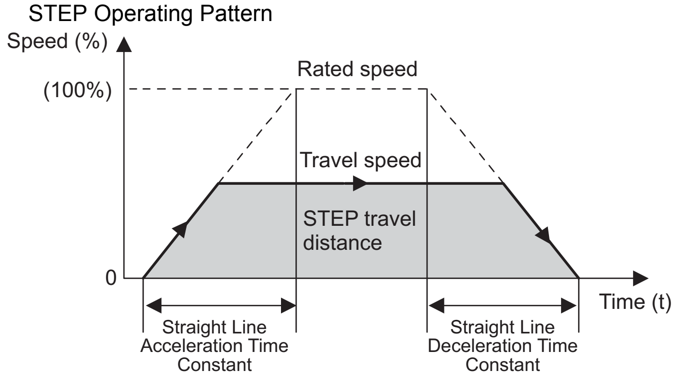
- The speed reference Setting bit OL☐☐10 can be changed during operation.
- An override of between 0% to 327.67% can be set for the travel speed.

3. Set OW☐☐08 to 8 to execute the STEP motion command.

STEP operation will start. IW☐☐08 will be 8 during execution.
IW☐☐0C, bit 3 will turn ON when the axis reaches the target position.
IW☐☐0C, bit 1 will turn ON when the axis reaches the target position and the positioning has been completed.

4. Set OW☐☐08 to 0 to execute the NOP motion command and then complete the STEP operation.

STEP Operating Pattern



(2) Holding

Axis travel can be stopped during command execution and then the remaining travel can be restarted. A command is held by setting the Holds a Command (OW☐☐09, bit 0) to 1.

- Set the Holds a Command bit (OW☐☐09, bit 0) to 1. The axis will decelerate to a stop.
- When the axis has stopped, the Command Hold Completed bit (IW☐☐09, bit 1) will turn ON.
- Turn OFF the Holds a Command bit (OW☐☐09, bit 0).
  The command hold status will be cleared and the remaining portion of the positioning will be restarted.

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(3) Aborting

Axis travel can be stopped during command execution and the remaining travel canceled by aborting execution of a command. A command is aborted by setting the Interrupt a Command bit (OW□□09, bit 1) to 1.

- Set the Interrupt a Command bit (OW□□09, bit 1) to 1. The axis will decelerate to a stop.
- When the axis has stopped, the Positioning Completed bit (IW□□0C, bit 1) will turn ON.
- This type of operation will also be performed if the motion command is changed during axis movement.

(4) Related Parameters

[a] Setting Parameters

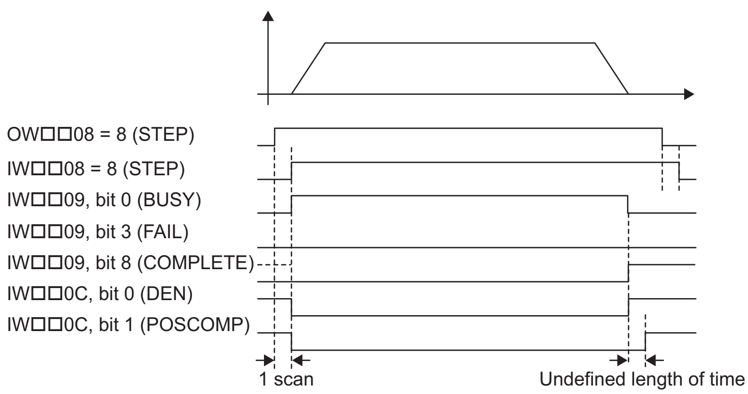
Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command (OW□□08) to 8.	R
OW□□01 Bit 3	Speed Loop P/PI Switch	Switch the speed control loop between PI control and P control. 0: PI control, 1: P control	–
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.	R
OW□□08	Motion Command	The STEP operation starts when this parameter is set to 8. The axis will decelerate to a stop and the JOG operation is completed if this parameter is set to 0 during STEP command execution.	R
OW□□09 Bit 0	Holds a Command	The axis will decelerate to a stop if this bit is set to 1 during STEP operation. The operation will restart if this bit is turned OFF when a command is being held.	R
OW□□09 Bit 1	Interrupt a Command	The axis will decelerate to a stop if this bit is set to 1 during the positioning. The operation depends on the setting of the Position Reference Type (OW□□09, bit 5) when turning ON after decelerating to a stop.	R
OW□□09 Bit 2	Moving Direction (JOG/STEP)	Set the travel direction for STEP operation. 0: Positive direction, 1: Negative direction	R
OL□□10	Speed Reference Setting	Specify the speed for the positioning operation. Only a positive value can be set. This setting can be changed during operation. The unit depends on the setting of the Function 1 (OW□□03, bits 0 to 3).	R
OW□□18	Override	This parameter allows the travel speed to be changed without changing the Speed Reference Setting (OL□□10). Set the value as a percentage of the Speed Reference Setting. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%) Setting unit: 1 = 0.01% Example: Setting for 50%: 5000	–
OL□□1E	Width Positioning Completion	Set the width in which to turn ON the Positioning Completed bit (IW□□0C, bit 1).	–
OL□□20	NEAR Signal Output Width	Set the range in which the NEAR Position bit (IW□□0C, bit 3) will turn ON. The NEAR Position bit will turn ON when the absolute value of the difference between the reference position and the feedback position is less than the value set here.	–
OL□□36	Straight Line Acceler-ation/Acceleration Time Constant	Set the positioning acceleration in acceleration rate or acceleration time.	R
OL□□38	Straight Line Deceler-ation/Deceleration Time Constant	Set the positioning deceleration in deceleration rate or deceleration time.	R
OW□□3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in the Function Setting 1 (OW□□03, bits 8 to B). Change the setting only after pulse distribution has been completed for the com-mand (IW□□0C, bit 0 = 1).	R
OL□□44	Step Travel Distance	Set the moving amount for STEP operation.	–

[b] Monitoring Parameters

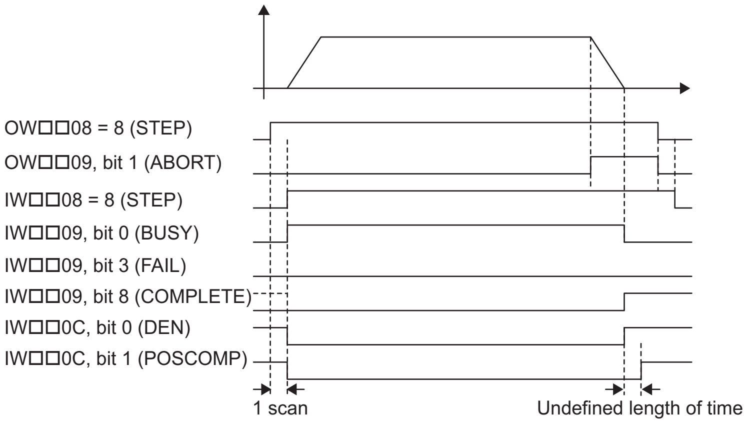
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 8 during STEP command execution.	R
IW□□09 Bit 0	Command Execution Flag	The Command Execution Flag bit will turn ON during STEP command execution and then turn OFF when STEP command execution has been completed.	R
IW□□09 Bit 1	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of setting the Holds a Command (OW□□09, Bit1) bit to 1 during STEP command execution (IW□□08 = 8).	R
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during STEP command execution. The axis will decelerate to a stop if it is moving. Turns OFF when another command is executed.	R
IW□□09 Bit 8	Command Execution Completed	Turns ON when STEP command execution has been completed.	R
IW□□0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW□□0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Width of Positioning Completion. OFF in all other cases.	R
IW□□0C Bit 3	NEAR Position	The operation depends on the setting of the NEAR Signal Output Width (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL□□20 ≠ 0: Turns ON when the absolute value of the difference between MPOS (IL□□12) and APOS (IL□□16) is less than the NEAR Signal Output Width even if pulse distribution has not been completed. OFF in all other cases.	R

(5) Timing Charts

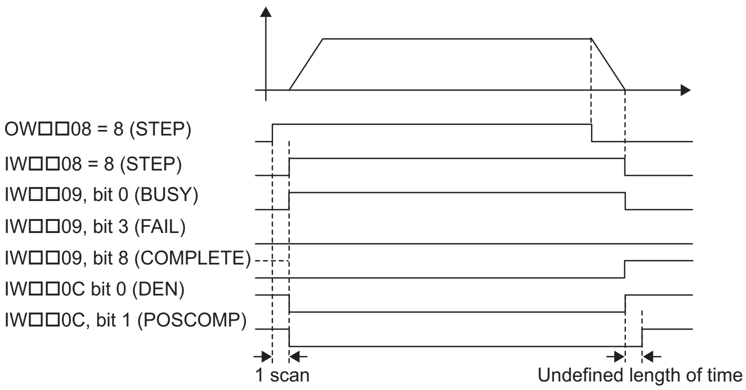
[a] Normal Execution



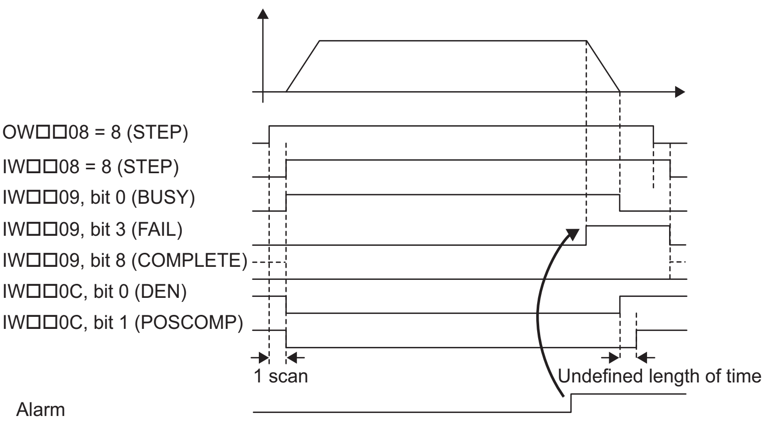
[b] Execution when Aborted



[c] Execution when Aborting by Changing the Command



[d] Execution when an Alarm Occurs



6.2.8 Set Zero Point (ZSET) R

The ZSET command sets the current position as the zero point of the machine coordinate system. This enables setting the zero point without performing a zero point return operation.

- When using software limits, always execute the zero point or zero point return operation. The software limit function will be enabled after the zero point setting operation has been completed.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 9 to execute the ZSET motion command.

A new machine coordinate system will be established with the current position as the zero point. IW□□08 will be 9 during the zero point setting operation. IW□□0C, bit 5 will turn ON when zero point setting has been completed.
The position data when the zero point setting is completed will differ depending on the axis setting, as shown in the following table.

Axis Setting	Position Data When Zero Point Setting is Completed
With incremental encoder, finite length axis or infinite length axis	Initialized with the zero point offset of the machine coordinate system.
With absolute (ABS) encoder, finite length axis	Unchanged
With absolute (ABS) encoder, simple ABS infinite length axis	Unchanged
With absolute (ABS) encoder, infinite length axis	Initialized with the zero point offset of the machine coordinate system.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the zero point setting.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting	SVR
OW□□08	Motion Command	Set to 9 for ZSET command.	R
OW□□09 Bit 0	Command Pause	This parameter is ignored for ZSET command.	R
OW□□09 Bit 1	Holds a Command	This parameter is ignored for ZSET command.	R
OL□□48	Interrupt a Command	Sets the position offset from the zero point in the machine coordinate system after the setting of the zero point has been completed.	R

Motion Commands

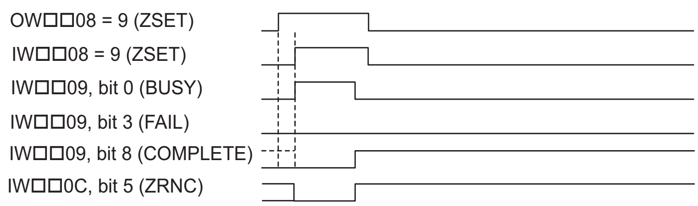
6

[b] Monitoring Parameters

Parameter	Name	Monitor Contents	SVR
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 9 during ZSET command execution.	R
IW□□09 Bit 0	Command Execution Flag	Turns ON during ZSET command execution and turns OFF when ZSET command execution has been completed.	R
IW□□09 Bit 1	Command Hold Completed	Always OFF for ZSET command.	R
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during ZSET command execution. Turns OFF when another command is executed.	R
IW□□09 Bit 8	Command Execution Completed	Turns ON when ZSET command execution has been completed.	R
IW□□0C Bit 5	Zero Point Return (Setting) Completed	Turns ON when the setting of the zero point has been completed.	R

(4) Timing Charts

[a] Normal Execution



6.2.9 Change Acceleration Time (ACC)

The ACC command transfers the setting of the Straight Line Acceleration Time Constant (motion setting parameter OL□□36) to the Second-step Linear Acceleration Time Constant in the SERVOPACK and enables the setting.

- For the SGD-□□□N and SGDB-□□AN SERVOPACKs, the deceleration time constant will be the same as the acceleration time constant.
- MECHATROLINK-II has a function that automatically updates setting parameters if a parameter changes. There is no need to execute the ACC command with this function. For details, refer to bit A (User Constants Self-writing Function) in the *4.4.1 (2) Function Selection 1*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Pulse distribution has been completed for the SERVOPACK.	IW□□0C, bit 0 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 10 to execute the ACC motion command.

The ACC command will transfer the setting of the Straight Line Acceleration Time Constant (motion setting parameter OL□□36) to the Second-step Linear Acceleration Time Constant in the SERVOPACK and enable the setting.
IW□□08 will be 10 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the change of the linear acceleration time constant.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

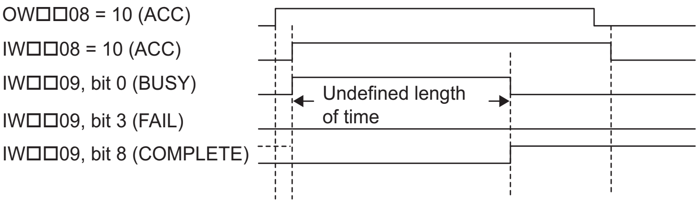
Parameter	Name	Setting
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.
OW□□08	Motion Command	The linear acceleration time constant is changed when this parameter is set to 10.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for ACC command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for ACC command.
OL□□36	Straight Line Acceleration/Acceleration Time Constant	Set the linear acceleration rate or acceleration time constant. The setting unit is specified by OW□□03.

[b] Monitoring Parameters

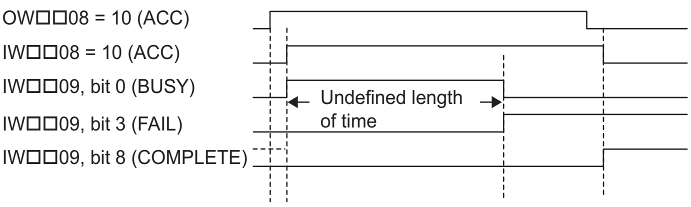
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 10 during ACC command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during ACC command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for ACC command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during ACC command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when ACC command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.10 Change Deceleration Time (DCC)

The DCC command transfers the setting of the Straight Line Deceleration Time Constant (motion setting parameter OL□□38) to the Second-step Linear Deceleration Time Constant in the SERVOPACK and enables the setting.

- For the SGD-□□□N and SGDB-□□N SERVOPACKs, this command cannot be used because these SERVOPACKs does not have the parameters for setting the deceleration time constant.
- MECHATROLINK-II has a function that automatically updates setting parameters if a parameter changes. There is no need to execute the DCC command with this function. For details, refer to bit A (User Constants Self-writing Function) in the *4.4.1 (2) Function Selection 1*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Pulse distribution has been completed for the SERVOPACK.	IW□□0C, bit 0 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 11 to execute the DCC motion command.

The DCC command will transfer the setting of the Straight Line Deceleration Time Constant (motion setting parameter OL□□38) to the Second-step Linear Deceleration Time Constant in the SERVOPACK and enables the setting.
IW□□08 will be 11 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the change of the linear deceleration time constant.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

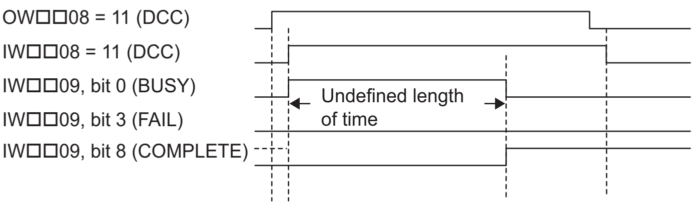
Parameter	Name	Setting
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.
OW□□08	Motion Command	The linear deceleration time constant is changed when this parameter is set to 11.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for DCC command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for DCC command.
OL□□38	Straight Line Deceleration/ Deceleration Time Constant	Set the linear deceleration rate or deceleration time constant. The setting unit is specified by OW□□03.

[b] Monitoring Parameters

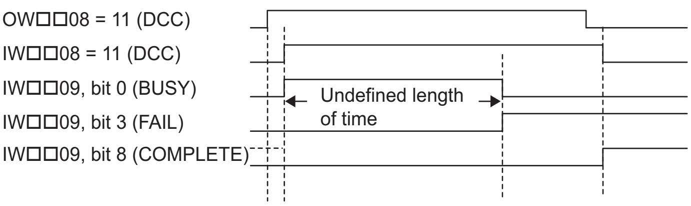
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 11 during DCC command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during DCC command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for DCC command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during DCC command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when DCC command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.11 Change Filter Time Constant (SCC)

The SCC command transfers the setting of the Filter Time Constant (motion setting parameter OW□□3A) to the Moving Average Time or Exponential Acceleration/Deceleration Time Constant in the SERVOPACK and enables the setting.

- Always execute the CHG_FILTER command before executing the SCC command. The setting of the servo parameter to be transferred will depend on the set filter type.
- MECHATROLINK-II has a function that automatically updates setting parameters if a parameter changes. There is no need to execute the SCC command with this function. For details, refer to bit A (User Constants Self-writing Function) in *4.4.1 (2) Function Selection 1*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Pulse distribution has been completed for the SERVOPACK.	IW□□0C, bit 0 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 12 to execute the SCC motion command.

The parameter to which the value of OW□□3A is transferred will depend on the set filter type:
Without filter or with moving average filter: Moving Average Time
With exponential acceleration/deceleration filter: Exponential Acceleration/Deceleration Time Constant
IW□□08 will be 12 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the change of the linear deceleration time constant.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

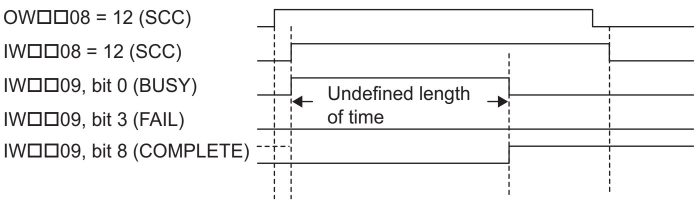
Parameter	Name	Setting
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.
OW□□08	Motion Command	The filter time constant is changed when this parameter is set to 12.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for SCC command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for SCC command.
OW□□3A	Filter Time Constant	Set the filter time constant for acceleration/deceleration.

[b] Monitoring Parameters

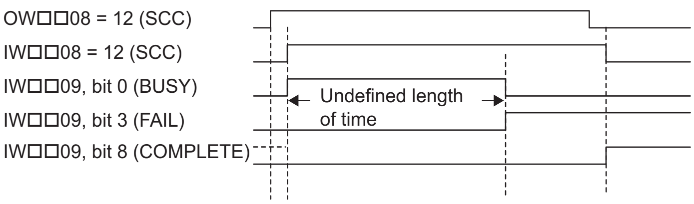
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 12 during SCC command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during SCC command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for SCC command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during SCC command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when SCC command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.12 Change Filter Type (CHG_FILTER)

The CHG_FILTER command enables the current setting of the Filter Type Selection (motion setting parameter OW□□03, bits 8 to B) for execution of the following motion commands with the movement: POSING, EX_POSING, ZRET, INTERPOLATE, LATCH, FEED, and STEP.

- Always execute the CHG_FILTER command after changing the setting of OW□□03, bits 8 to B. If this is not executed, the change in the Filter Type setting will not be validated.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Pulse distribution has been completed for the SERVOPACK.	IW□□0C, bit 0 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 13 to execute the CHG_FILTER motion command.

The Filter Type Selection (motion setting parameter OW□□03 Bit8 to B) will be enabled.
IW□□08 will be 13 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the change of the filter type.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

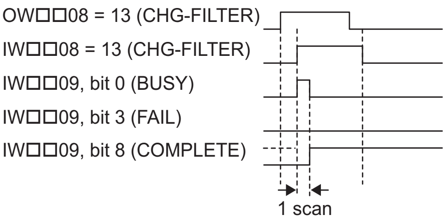
Parameter	Name	Setting
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.
OW□□08	Motion Command	The filter type is changed when this parameter is set to 13.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for CHG_FILTER command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for CHG_FILTER command.

[b] Monitoring Parameters

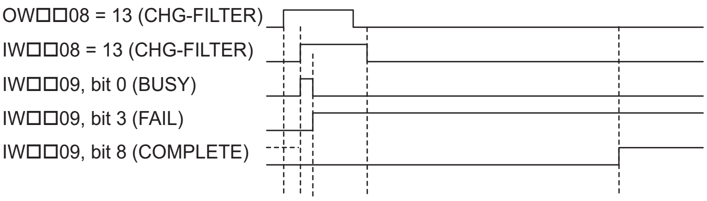
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 13 during CHG_FILTER command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during CHG_FILTER command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for CHG_FILTER command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during CHG_FILTER command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when CHG_FILTER command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.13 Change Speed Loop Gain (KVS)

The KVS command transfers the setting of the Speed Loop Gain (motion setting parameter OW☐☐2F) to the Speed Loop Gain in the SERVOPACK and enables the setting.

- MECHATROLINK-II has a function that automatically updates setting parameters if a parameter changes. There is no need to execute the KVS command with this function. For details, refer to bit A (User Constants Self-writing Function) in *4.4.1 (2) Function Selection 1*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL☐☐02 and IL☐☐04 are 0.
2	Motion command execution has been completed.	IW☐☐08 is 0 and IW☐☐09, bit 0 is OFF.

2. Set OW☐☐08 to 14 to execute the KVS motion command.

The KVS command will transfer the setting of the Speed Loop Gain (motion setting parameter OW☐☐2F) to the Speed Loop Gain in the SERVOPACK and enables the setting.
IW☐☐08 will be 14 during command execution.
IW☐☐09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW☐☐08 to 0 to execute the NOP motion command and then complete the change of the speed loop gain.

(2) Holding and Aborting

The Holds a Command bit (OW☐☐09, bit 0) and the Interrupt a Command bit (OW☐☐09, bit 1) cannot be used.
When the tuning-less function of the SGDV or SGD7S SERVOPACK is enabled or when the SERVOPACK parameter Pn170.0 is set to 1 (Tuning-less Function Selection is enabled), these settings are disabled and ignored.

(3) Related Parameters

[a] Setting Parameters

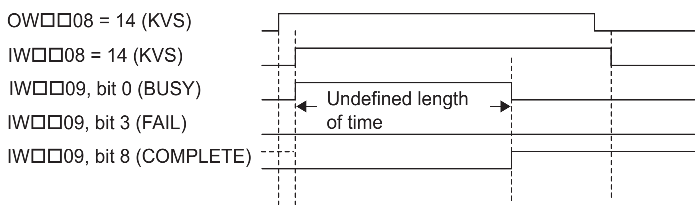
Parameter	Name	Setting
OW☐☐08	Motion Command	The speed loop gain is changed when this parameter is set to 14.
OW☐☐09 Bit 0	Holds a Command	This parameter is ignored for KVS command.
OW☐☐09 Bit 1	Interrupt a Command	This parameter is ignored for KVS command.
OW☐☐2F	Speed Loop Gain	Set the gain for the SERVOPACK speed control loop.

[b] Monitoring Parameters

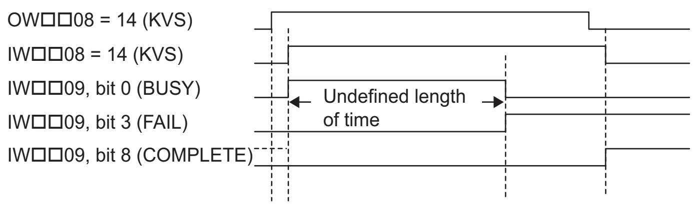
Parameter	Name	Monitor Contents
IL☐☐02	Warning	Stores the most current warning.
IL☐☐04	Alarm	Stores the most current alarm.
IW☐☐08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 14 during KVS command execution.
IW☐☐09 Bit 0	Command Execution Flag	Turns ON during KVS command execution and turns OFF when execution has been completed.
IW☐☐09 Bit 1	Command Hold Completed	Always OFF for KVS command.
IW☐☐09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during KVS command execution. Turns OFF when another command is executed.
IW☐☐09 Bit 8	Command Execution Completed	Turns ON when KVS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.14 Change Position Loop Gain (KPS)

The KPS command transfers the setting of the Position Loop Gain (motion setting parameter OW□□2E) to the Position Loop Gain in the SERVOPACK and enables the setting.

- MECHATROLINK-II has a function that automatically updates setting parameters if a parameter changes. There is no need to execute the KPS command with this function. For details, refer to bit A (User Constants Self-writing Function) in *4.4.1 (2) Function Selection 1*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 15 to execute the KPS motion command.

The KPS command will transfer the setting of the Position Loop Gain (motion setting parameter OW□□2E) to the Position Loop Gain in the SERVOPACK and enables the setting.
IW□□08 will be 15 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command to change the position loop gain.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.
When the tuning-less function of the SGDV or SGD7S SERVOPACK is enabled or when the SERVOPACK parameter Pn170.0 is set to 1 (Tuning-less Function Selection is enabled), these settings are disabled and ignored.

(3) Related Parameters

[a] Setting Parameters

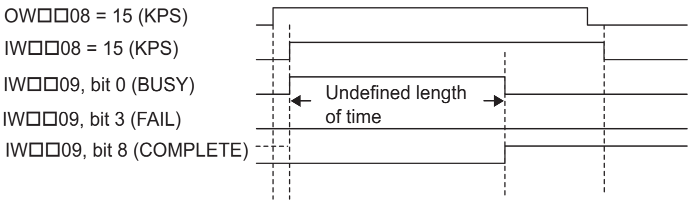
Parameter	Name	Setting
OW□□08	Motion Command	The position loop gain is changed when this parameter is set to 15.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for KPS command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for KPS command.
OW□□2E	Position Loop Gain	Set the gain for the SERVOPACK position control loop.

[b] Monitoring Parameters

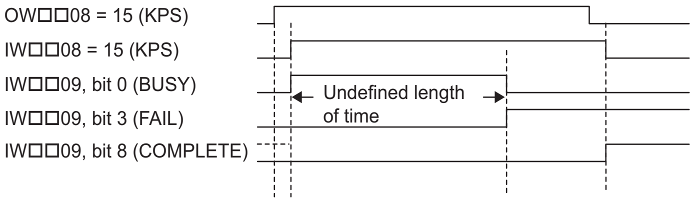
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 15 during KPS command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during KPS command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for KPS command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during KPS command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when KPS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.15 Change Feed Forward (KFS)

The KFS command transfers the setting of the Speed Feed Forward Amends (motion setting parameter OW☐☐30) to the Feed Forward in the SERVOPACK and enables the setting.

- MECHATROLINK-II has a function that automatically updates setting parameters if a parameter changes. There is no need to execute the KFS command with this function. For details, refer to bit A (User Constants Self-writing Function) in *4.4.1 (2) Function Selection 1*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL☐☐02 and IL☐☐04 are 0.
2	Motion command execution has been completed.	IW☐☐08 is 0 and IW☐☐09, bit 0 is OFF.

2. Set OW☐☐08 to 16 to execute the KFS motion command.

The KFS command will transfer the setting of the Speed Feed Forward Amends (motion setting parameter OW☐☐30) to the Feed Forward in the SERVOPACK and enables the setting.
IW☐☐08 will be 16 during command execution.
IW☐☐09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW☐☐08 to 0 to execute the NOP motion command and then complete the change of the feed forward.

(2) Holding and Aborting

The Holds a Command bit (OW☐☐09, bit 0) and the Interrupt a Command bit (OW☐☐09, bit 1) cannot be used.
When the tuning-less function of the SGDV or SGD7S SERVOPACK is enabled or when the SERVOPACK parameter Pn170.0 is set to 1 (Tuning-less Function Selection is enabled), these settings are disabled and ignored.

(3) Related Parameters

[a] Setting Parameters

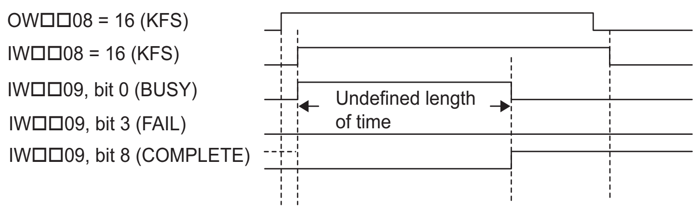
Parameter	Name	Setting
OW☐☐08	Motion Command	The feed forward value is changed when this parameter is set to 16.
OW☐☐09 Bit 0	Holds a Command	This parameter is ignored for KFS command.
OW☐☐09 Bit 1	Interrupt a Command	This parameter is ignored for KFS command.
OW☐☐30	Speed Feed Forward Amends	Set the amount of Servo feed forward (%).

[b] Monitoring Parameters

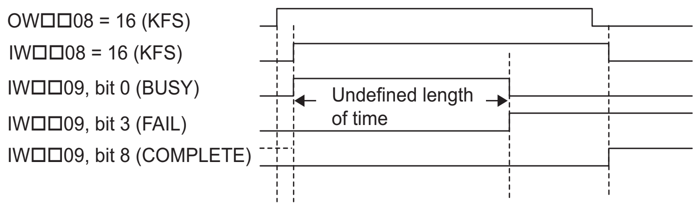
Parameter	Name	Monitor Contents
IL☐☐02	Warning	Stores the most current warning.
IL☐☐04	Alarm	Stores the most current alarm.
IW☐☐08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 16 during KFS command execution.
IW☐☐09 Bit 0	Command Execution Flag	Turns ON during KFS command execution and turns OFF when execution has been completed.
IW☐☐09 Bit 1	Command Hold Completed	Always OFF for KFS command.
IW☐☐09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during KFS command execution. Turns OFF when another command is executed.
IW☐☐09 Bit 8	Command Execution Completed	Turns ON when KFS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.16 Read User Constant (PRM_RD)

The PRM_RD command reads the setting of the SERVOPACK parameter with the specified parameter number and parameter size. It stores the parameter number in Servo Driver User Constants No. (monitoring parameter IW☐☐36) and the setting in Servo Driver User Constant Reading Data (monitoring parameter IL☐☐38).

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL☐☐02 and IL☐☐04 are 0.
2	Motion command execution has been completed.	IW☐☐08 is 0 and IW☐☐09, bit 0 is OFF.

2. Set OW☐☐08 to 17 to execute the PRM_RD motion command.

The PRM_RD command will store the specified parameter number in the Servo Driver User Constants No. (monitoring parameter IW☐☐36) and the parameter setting in Servo Driver User Constant Reading Data (monitoring parameter IL☐☐38).
IW☐☐08 will be 17 during command execution.
IW☐☐09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW☐☐08 to 0 to execute the NOP motion command and then complete the reading operation.

(2) Holding and Aborting

The Holds a Command bit (OW☐☐09, bit 0) and the Interrupt a Command bit (OW☐☐09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

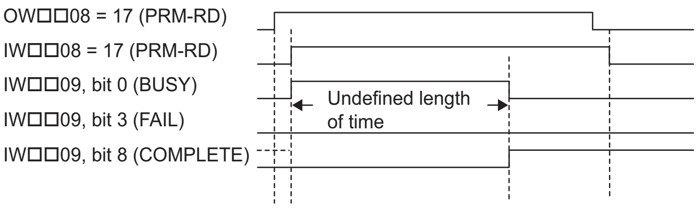
Parameter	Name	Setting
OW☐☐08	Motion Command	The SERVOPACK parameter is read when this parameter is set to 17.
OW☐☐09 Bit 0	Hold a Command	This parameter is ignored for PRM_RD command.
OW☐☐09 Bit 1	Interrupt a Command	This parameter is ignored for PRM_RD command.
OW☐☐50	Servo Driver User Constant No.	Set the number of the SERVOPACK parameter to be read.
OW☐☐51	Servo Driver User Constant Size	Set the size of the SERVOPACK parameter to be read. Set the size as the number of words. Example: For 4 bytes, set “2.”

[b] Monitoring Parameters

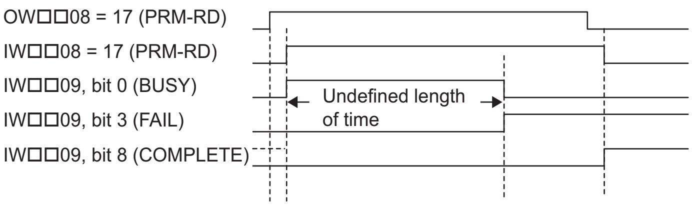
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 17 during PRM_RD command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during PRM_RD command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for PRM_RD command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during PRM_RD command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when PRM_RD command execution has been completed.
IW□□36	Servo Driver User Constant No.	Stores the number of the SERVOPACK parameter that was read.
IL□□38	Servo Driver User Constant Reading Data	Stores the data of the SERVOPACK parameter that was read.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.17 Write User Constant (PRM_WR)

The PRM_WR command writes the setting value the relevant SERVOPACK parameter using the specified SERVOPACK parameter number, parameter size, and setting data.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 18 to execute the PRM_WR motion command.

The SERVOPACK parameter will be written.
IW□□08 will be 18 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the writing operation.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

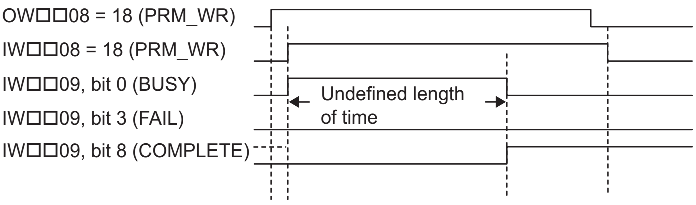
Parameter	Name	Setting
OW□□08	Motion Command	The SERVOPACK parameter is written when this parameter is set to 18.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for PRM_WR command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for PRM_WR command.
OW□□50	Servo Driver User Constant No.	Set the number of the SERVOPACK parameter to be written.
OW□□51	Servo Driver User Constant Size	Set the size of the SERVOPACK parameter to be written. Set the size as the number of words. Example: For 4 bytes, set “2.”
OL□□52	Servo Driver User Constant Set Point	Set the data to be set to the SERVOPACK parameter to be written.

[b] Monitoring Parameters

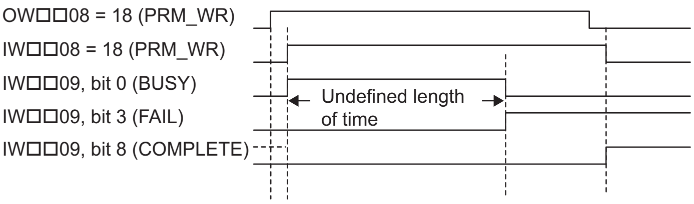
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 18 during PRM_WR command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during PRM_WR command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for PRM_WR command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during PRM_WR command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when PRM_WR command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.18 Alarm Monitor (ALM_MON)

The ALM_MON command reads the alarm or warning that has occurred in the SERVOPACK and stores it in Servo Driver Alarm Code (monitoring parameter IW□□2D). Three-digit alarm codes, such as SGDS, SGDV, or SGD7S SERVOPACK alarm codes, can also be read out by using this command.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 19 to execute the ALM_MON motion command.

The ALM_MON command will read the alarm or warning that has occurred in the SERVOPACK and store it in Servo Driver Alarm Code (monitoring parameter IW□□2D).
IW□□08 will be 19 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the monitoring operation.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

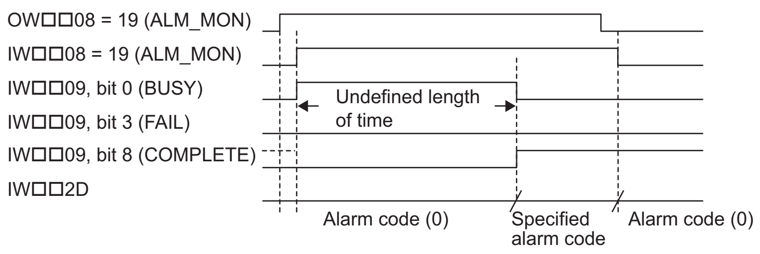
Parameter	Name	Setting
OW□□08	Motion Command	Alarms are monitored when this parameter is set to 19.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for ALM_MON command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for ALM_MON command.
OW□□4F	Servo Driver Alarm Monitor No.	When several alarms and warnings occur at the same time, set the number of the alarm or warning to be monitored.

[b] Monitoring Parameters

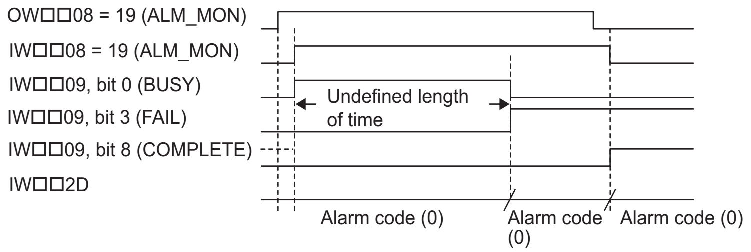
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 19 during ALM_MON command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during ALM_MON command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for ALM_MON command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during ALM_MON command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when ALM_MON command execution has been completed.
IW□□2D	Servo Driver Alarm Code	Stores the SERVOPACK alarm or warning code that was read.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.19 Alarm History Monitor (ALM_HIST)

The ALM_HIST command reads the alarm history stored in the SERVOPACK and stores it in the Servo Driver Alarm Code (monitor parameter IW□□2D).

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 20 to execute the ALM_HIST motion command.

The ALM_HIST command will read the alarm or warning history that is stored in the SERVOPACK and store it in Servo Driver Alarm Code (monitoring parameter IW□□2D).
IW□□08 will be 20 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the monitoring operation.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

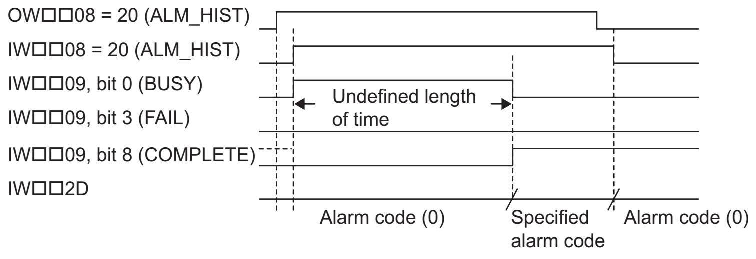
Parameter	Name	Setting
OW□□08	Motion Command	The alarm history is monitored when this parameter is set to 20.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for ALM_HIST command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for ALM_HIST command.
OW□□4F	Servo Driver Alarm Monitor No.	Sets the number of the alarm to be monitored.

[b] Monitoring Parameters

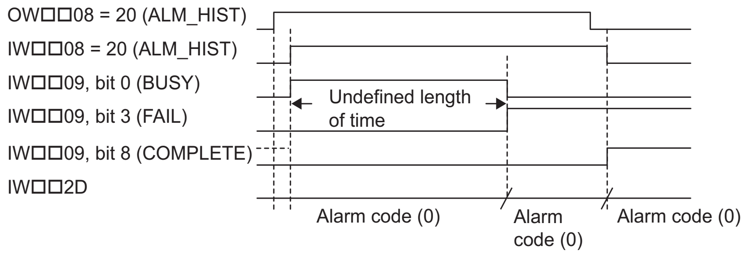
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 20 during ALM_HIST command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during ALM_HIST command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for ALM_HIST command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during ALM_HIST command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when ALM_HIST command execution has been completed.
IW□□2D	Servo Driver Alarm Code	Stores the SERVOPACK alarm code that was read.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.20 Clear Alarm History (ALMHIST_CLR)

The ALMHIST_CLR command clears the alarm history in the SERVOPACK.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 21 to execute the ALMHIST_CLR motion command.

The ALMHIST_CLR command will clear the alarm history stored in the SERVOPACK.
IW□□08 will be 21 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then clear the alarm history.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

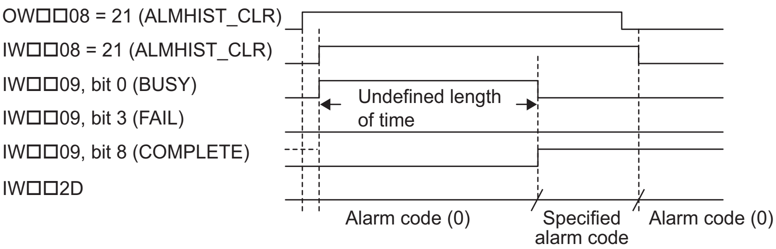
Parameter	Name	Setting
OW□□08	Motion Command	The alarm history is cleared when this parameter is set to 21.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for ALMHIST_CLR command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for ALMHIST_CLR command.

[b] Monitoring Parameters

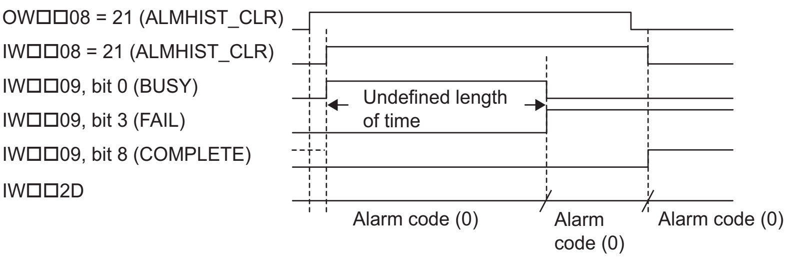
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 21 during ALMHIST_CLR command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during ALMHIST_CLR command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for ALMHIST_CLR command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during ALMHIST_CLR command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when ALMHIST_CLR command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.21 Absolute Encoder Reset (ABS_RST)

The ABS_RST command initializes the absolute encoder via MECHATROLINK.
Initialization of the absolute encoder is required in the following cases.

- Before initial operation of a machine
- When the alarm A.81 “Encoder Backup Alarm” has occurred.
- When the alarm A.82 “Encoder Checksum Error” has occurred.

- The ABS_RST command is valid for Σ-II, Σ-III, Σ-V, and Σ-7 Series SERVOPACKs with absolute encoders. A command error will occur if the ABS_RST command is executed for a Σ-I Series SERVOPACK. A command error will occur if the ABS_RST command is executed for a Σ-I Series SERVOPACK. A command error will also occur if the ABS_RST command is executed when an incremental encoder is being used with a Σ-II, Σ-III, Σ-V, or Σ-7 Series SERVOPACK (even if it is being used as an absolute encoder).

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Communication with the SERVOPACK must be synchronized.	IW□□00, bit 0 is ON.
2	The Servo OFF condition.	IW□□00, bit 1 is OFF.
3	Motion command execution has been completed.	IW□□08 is 0, and IW□□09, bit 0 is OFF.

- If there is an Encoder Backup Alarm or Encoder Checksum Alarm in the SERVOPACK, communications cannot be synchronized just by turning ON the power supply to the controller. Use the Alarm Clear bit (OW□□00, bit F) to synchronize communications.

2. Set OW□□08 to 22 to execute the ABS_RST motion command.

The ABS_RST command will clear any alarms that have occurred and resets the multiturn data in the absolute encoder to 0.
IW□□08 will be 22 and IW□□09 Bit0 will turn ON during command processing.
IW□□09 bit 0, IW□□09 bit 3, and IW□□00 bit 0 will turn OFF and IW□□09 bit 7 will turn ON when the command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command to initialize the absolute encoder.

- When using an SGD7S, SGDV, or SGDH+NS115 SERVOPACK:
  Always turn OFF the power to the SERVOPACK and then turn it ON again after executing the ABS_RST command.
- When using an SGDS SERVOPACK:
  It is not necessary to turn OFF the power to the SERVOPACK and then turn it ON again after executing the ABS_RST command. Just use the Alarm Clear bit (OW□□00, bit F) to synchronize communications. If the ABS_RST command is executed while there is an Encoder Backup Alarm (A.81), the alarm clear operation will have to be performed twice before communications can be synchronized again.

- When the absolute encoder has been reset, communication will be disconnected between the Machine Controller and the SERVOPACK. The zero point setting completed and zero point return completed status will thus be cleared. Use the Alarm Clear bit (OW□□00, bit F) after executing the ABS_RST command, re-establish communications, and then execute the ZRET or ZSET command.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.
Processing will be canceled if a communication error occurs while the command is being executed and a command error will occur.

- SGDV and SGDH+ NS115 SERVOPACKs need to be restarted after this function is executed.
- SGDS SERVOPACKs, however, can be used after resetting the absolute encoder and clearing the alarm.

(3) Related Parameters

[a] Setting Parameters

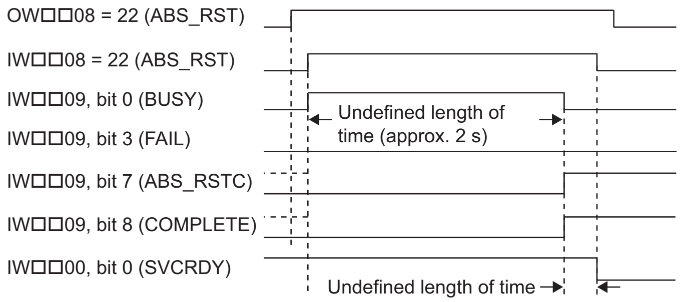
Parameter	Name	Setting
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor; 0: Power OFF to Servomotor Turn OFF the power before setting the Motion Command (OW□□08) to 22.
OW□□08	Motion Command	Starts resetting the absolute encoder when this parameter is set to 22. Even if this parameter is set to 0 during command processing, it will be ignored and execution will be continued.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for the ABS_RST command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for the ABS_RST command.

[b] Monitoring Parameters

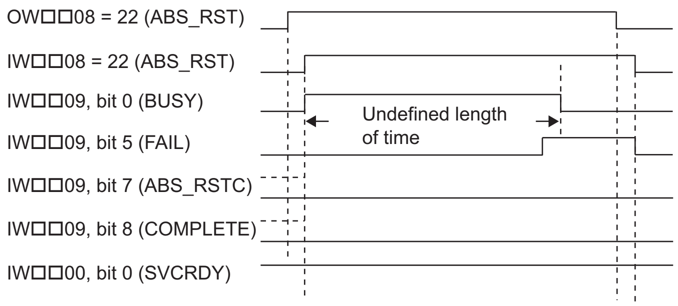
Parameter	Name	Monitor Contents
IW□□00 Bit 0	Motion Controller Operation Ready	Indicates the communication status between the Machine Controller and SERVOPACK. 1: Communication synchronized, 0: Communication disconnected
IW□□00 Bit 1	Servo ON	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 22 during ABS_RST command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during ABS_RST command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for the ABS_RST command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error, such as a communication error, occurs during ABS_RST command execution. Command execution will be canceled.
IW□□09 Bit 7	Absolute Encoder Reset Completed	Turns ON when resetting the absolute encoder has been completed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when ABS_RST command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.22 Speed Reference (VELO) R

With the MECHATROLINK-II, the VELO command is used to operate the SERVOPACK in the speed control mode for the same type of operation as when using the analog speed reference input of the SERVOPACK.

- The VELO command is stipulated in MECHATROLINK-II command specifications and cannot be used for MECHATROLINK-I.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Motion command execution has been completed.*	IW□□08 is 0 and IW□□09, bit0 is OFF.

* This condition is a basic execution condition. Refer to *Chapter 7 Switching Commands during Execution* when changing the command being executed to a VELO command.

2. Set the following motion setting parameters.

Speed Reference Setting: OL□□10
Positive Side Limiting Torque/Thrust Setting at the Speed Reference: OL□□14
Filter Type Selection: OW□□03, bits 8 to B
Speed Loop P/PI Switch: OW□□01

- The speed reference setting bit OL□□10 can be changed during operation.
- An override of between 0% to 327.67% can be set for the reference speed.

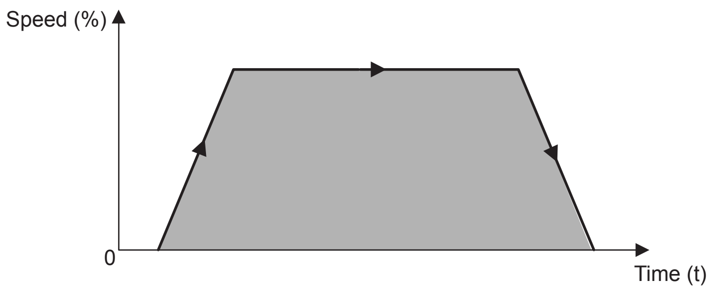
3. Set OW□□08 to 23 to execute the VELO motion command.

The control mode in the SERVOPACK will be switched to speed control.
IW□□08 will be 23 during command execution.

- This command can be executed even when the Servo is OFF.
- Position management using the position feedback is possible during operation with speed control mode.

4. Execute another motion command to cancel the speed control mode.

VELO Operating Pattern



(2) Holding

To pause the axis movement temporarily, and then restart movement, set the Holds a Command bit of the Motion Command Control Flag (OW□□09, bit 0) to 1 (ON).

- The axis will decelerate to a stop when bit 0 of OW□□09 is turned ON.
- When the axis stops, bit 1 (Command Hold Completed) of IW□□09 (Motion Command Status) will turn ON.
- To cancel the holding status, set the bit 0 of OW□□09 to 0 (OFF).
  The holding status will be canceled, and the axis will start moving again.

(3) Aborting

The speed control mode can be canceled by aborting execution of a command. A command is aborted by setting the Interrupt a Command bit (OW□□09, bit 1) to 1.

- Set the Interrupt a Command bit (OW□□09, bit 1) to 1. The axis will decelerate to a stop. The abort processing will be completed when the axis has decelerated to a stop.
- The speed control mode operation will restart if the Interrupt a Command bit (OW□□09, bit 1) is reset to 0 during abort processing.*
- This type of operation will also be performed if the motion command is changed during operation with speed control mode.

* Because a delay occurs when sending or receiving commands and responses to and from the CPU and the SVB module, the abort processing may have been completed although an attempt was made to restart the operation in speed control mode. In this case, IW□□08 (Motion Command Response Code) is set to 23, and bit 8 (Command Execution Completed) of IW□□09 (Motion Command Status) is set to 1. The operation in speed control mode cannot be restarted under these conditions.
To reset the operation in speed control mode, set OW□□08 (Motion Command) to any value other than 23 (such as NOP=0) and then reset it to 23. If an operation is to be frequently aborted and restarted within a short interval, remember to take this delay into consideration.

(4) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Motor will start to rotate when this bit is set to 1 under the speed control data mode.	R
OW□□01 Bit 3	Speed Loop P/PI Switch	Switch the speed control loop between PI control and P control. 0: PI control, 1: P control	–
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.	R
OW□□08	Motion Command	The mode is changed to speed control mode when this parameter is set to 23.	R
OW□□09 Bit 0	Holds a Command	The axis will decelerate to a stop if this bit is set to 1 during speed command operation. The positioning operation will restart if this bit is set to 0 while the command is being held.	R
OW□□09 Bit 1	Interrupt a Command	The axis will decelerate to a stop if this bit is set to 1 during operation.	R
OL□□10	Speed Reference Setting	Specify the speed. This setting can be changed during operation. The unit depends on the setting of the Function Setting 1 (OW□□03, bits 0 to 3).	R
OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	Set the torque limit for the speed reference. The same value is used for both the positive and negative directions.	–
OW□□18	Override	This parameter allows the motor speed to be changed without changing the Speed Reference Setting (OL□□10). Set the speed as a percentage of the Speed Reference Setting. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%) Setting unit: 1 = 0.01% Example: Setting for 50%: 5000	–
OL□□36	Straight Line Acceleration/ Acceleration Time Constant	Set the linear acceleration rate or acceleration time.	R
OL□□38	Straight Line Deceleration/Decelerate Time Constant	Set the linear deceleration rate or deceleration time.	R
OW□□3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in the Function Setting 1 (OW□□03, bits 8 to B). Change the setting only after pulse distribution has been completed for the command (IW□□0C bit 0 is ON).	R

Motion Commands

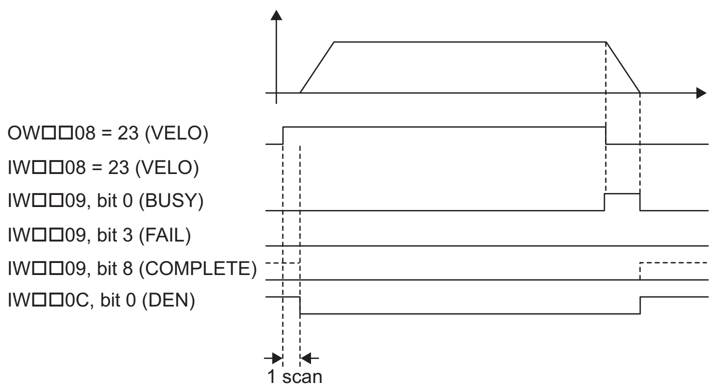
6

[b] Monitoring Parameters

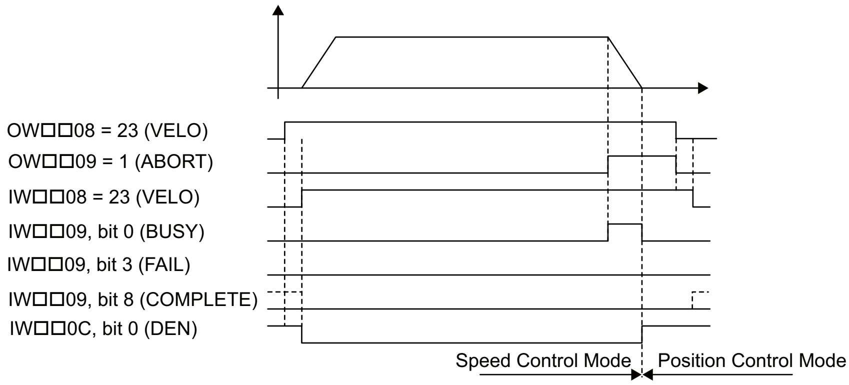
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 23 during VELO command execution.	R
IW□□09 Bit 0	Command Execution Flag	Turns ON when abort processing is being performed for VELO command. Turns OFF when abort processing has been completed.	R
IW□□09 Bit 1	Command Hold Completed	Always OFF for VELO command.	R
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during VELO command execution. The axis will decelerate to a stop if it is operating. Turns OFF when another command is executed.	R
IW□□09 Bit 8	Command Execution Completed	Always OFF for VELO command.	R
IW□□0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW□□0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the width of Positioning Completion. OFF in all other cases.	R
IW□□0C Bit 3	NEAR Position	The operation of this bit depends on the setting of NEAR Signal Output Width (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL□□20 ≠ 0: Turns ON when the absolute value of the difference between MPOS (IL□□12) and APOS (IL□□16) is less than the NEAR Signal Output Width, even if pulse distribution has not been completed. OFF in all other cases.	R

(5) Timing Charts

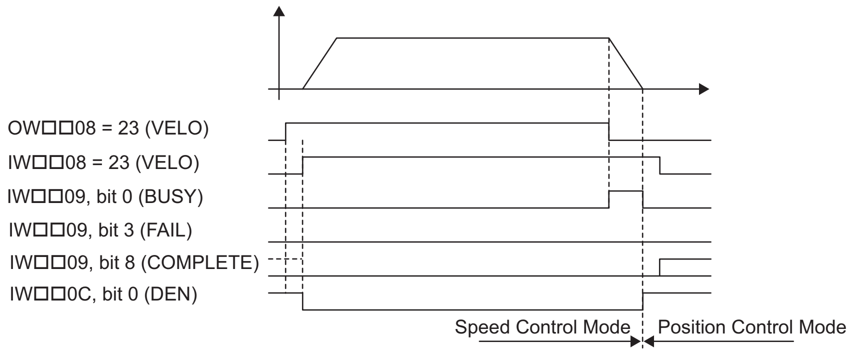
[a] Normal Execution



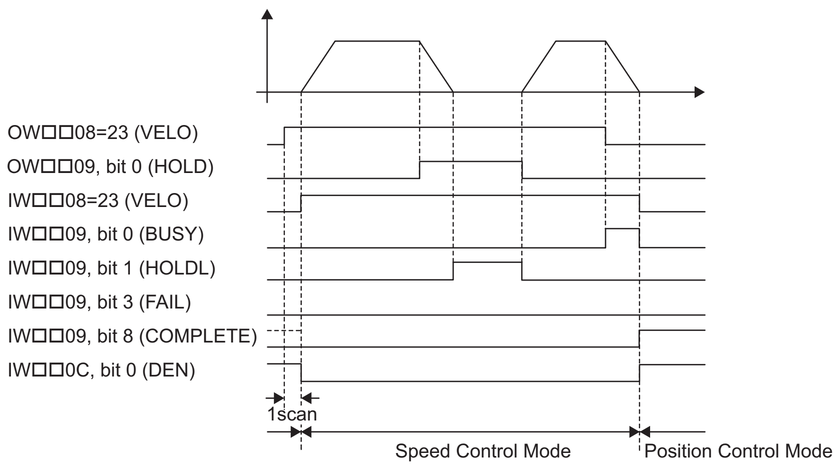
[b] Execution when Aborted



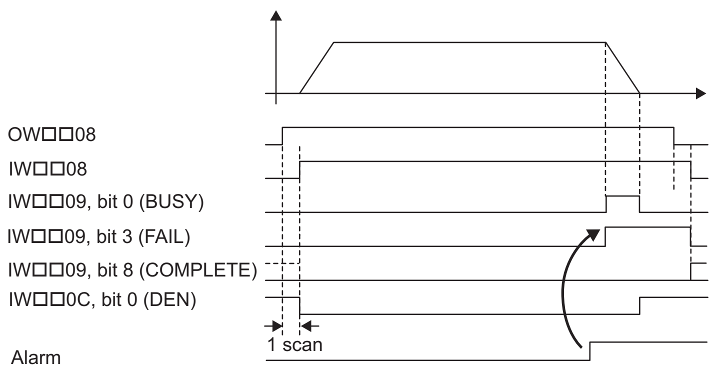
[c] Execution when Aborting by Changing the Command



[d] Command Hold



[e] Execution when an Alarm Occurs



6.2.23 Torque /Thrust Reference (TRQ) R

With the MECHATROLINK-II, the TRQ command is used to operate the SERVOPACK in the torque control mode for the same type of operation as when using the analog torque reference input of the SERVOPACK.
For SVR, the torque reference can be monitored, but position data cannot be updated.

- The TRQ command is stipulated in MECHATROLINK-II command specifications and cannot be used for MECHATROLINK-I.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Motion command execution has been completed.*	IW□□08 is 0 and IW□□09, bit 0 is OFF.

* This condition is a basic execution condition. Refer to *Chapter 7 Switching Commands during Execution* when changing the command being executed to a TRQ command.

2. Set the following motion setting parameters.

Torque Reference: OL□□0C
Speed Limit Setting at the Torque/Thrust Reference: OW□□0E
Torque List Selection: OW□□03, bits C to F
Speed Loop P/PI Switch: OW□□01

- The torque reference OL□□0C can be changed during operation.

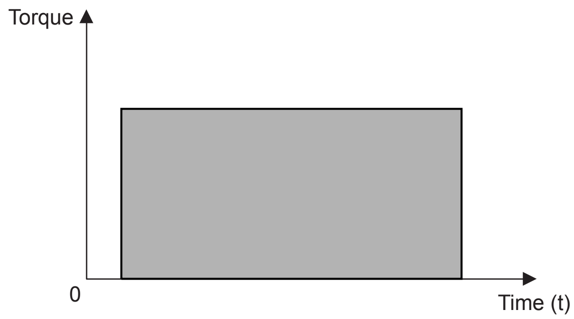
3. Set OW□□08 to 24 to execute the TRQ motion command.

The control mode in the SERVOPACK will be changed to torque control.
IW□□08 will be 24 during command execution.

- This command can be executed even when the Servo is OFF.
- Position management using the position feedback is possible during operation with torque control mode.

4. Execute another motion command to cancel the torque control mode.

TRQ Operating Pattern



(2) Holding

To pause the axis movement temporarily and then restart moving, set the Holds a Command bit of Motion Command Control Flag (OW□□09, bit 0) to 1 (ON).

- The axis will decelerate to a stop when bit 0 of OW□□09 is turned ON.
- When the axis stops, bit 1 (Command Hold Completed) of IW□□09 (Motion Command Status) will turn ON.
- To cancel the holding status, set bit 0 of OW□□09 to 0 (OFF).
  The holding status will be canceled, and the axis will start moving again.

(3) Aborting

The torque control mode can be canceled by aborting execution of a command. A command is aborted by setting the Interrupt a Command Abort bit (OW☐☐09 Bit1) to 1.

- Set the Interrupt a Command bit (OW☐☐09, bit 1) to 1. The axis will decelerate to a stop. The abort processing will be completed when the axis has decelerated to a stop.
- The torque control mode operation will restart if the Interrupt a Command bit (OW☐☐09, bit 1) is reset to 0 during abort processing.
- This type of operation will also be performed if the motion command is changed during operation with torque control mode.

(4) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting	SVR
OW☐☐00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Motor torque will start to rotate when the Servo is turned ON after switching to Torque Control Mode.	R
OW☐☐03	Function Setting 1	Set the unit for torque reference.	R
OW☐☐08	Motion Command	The mode is changed to torque control when this parameter is set to 24.	R
OW☐☐09 Bit 0	Holds a Command	The axis will stop when this bit is changed to ON while the axis is moving for the torque reference. The axis will start moving again when this bit is changed to OFF while the command is being held.	R
OW☐☐09 Bit 1	Interrupt a Command	A deceleration stop is performed when this bit set to 1 during operation.	R
OL☐☐0C	Torque Reference	Set the torque reference. This setting can be changed during operation. The unit depends on the Function Setting 1 (OW☐☐03, bits C to F).	R
OW☐☐0E	Speed Limit Setting at the Torque/Thrust Reference	Set the speed limit for torque references. The speed limit is set as a percentage of the rated speed.	–
OL☐☐38	Straight Line Deceleration/Deceleration Time Constant	Set the rate of deceleration or deceleration time for positioning.	R
OW☐☐3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in the Function Setting 1 (OW☐☐03, bits 8 to B). Change the setting only after pulse distribution has been completed for the command (IW☐☐0C, bit 0 is ON).	R

[b] Monitoring Parameters

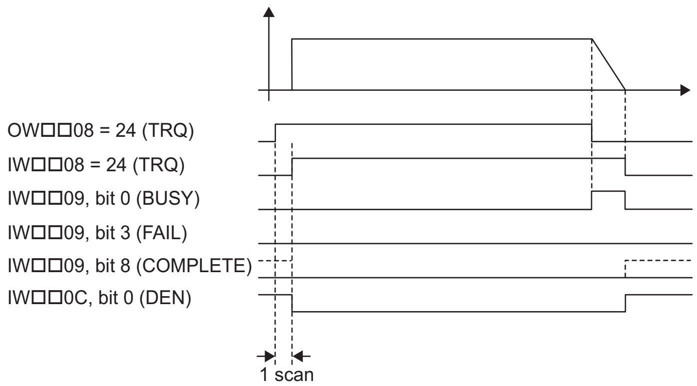
Parameter	Name	Monitor Contents	SVR
IW☐☐00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor	R
IL☐☐02	Warning	Stores the most current warning.	R
IL☐☐04	Alarm	Stores the most current alarm.	R
IW☐☐08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 24 during TRQ command execution.	R
IW☐☐09 Bit 0	Command Execution Flag	Turns ON when abort processing is being performed for TRQ command. Turns OFF when abort processing has been completed.	R
IW☐☐09 Bit 1	Command Hold Completed	Always OFF for TRQ command.	R
IW☐☐09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during TRQ command execution. The axis will decelerate to a stop if it is operating. Turns OFF when another command is executed.	R

(cont'd)

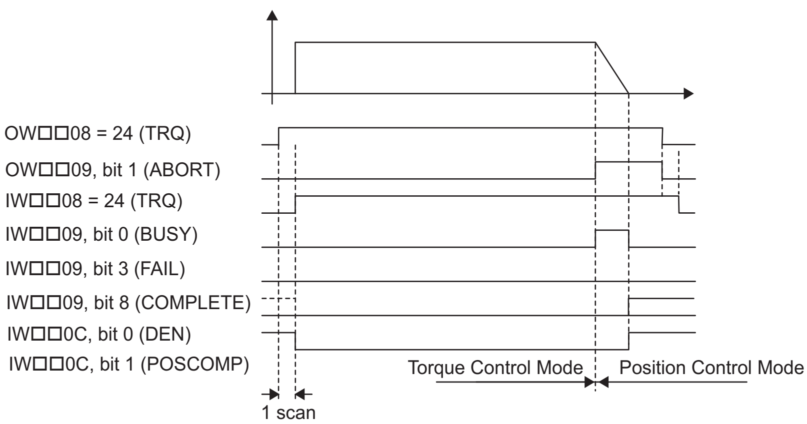
Parameter	Name	Monitor Contents	SVR
IW□□09 Bit 8	Command Execution Completed	Always OFF for TRQ command.	R
IW□□0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW□□0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the width of Positioning Completion. OFF in all other cases.	R
IW□□0C Bit 3	NEAR Position	The operation of this bit depends on the setting NEAR Signal Output Width (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL□□20 ≠ 0: Turns ON when the absolute value of the difference between MPOS (IL□□12) and APOS (IL□□16) is less than the NEAR Signal Output Width, even if pulse distribution has not been completed. OFF in all other cases.	R

(5) Timing Charts

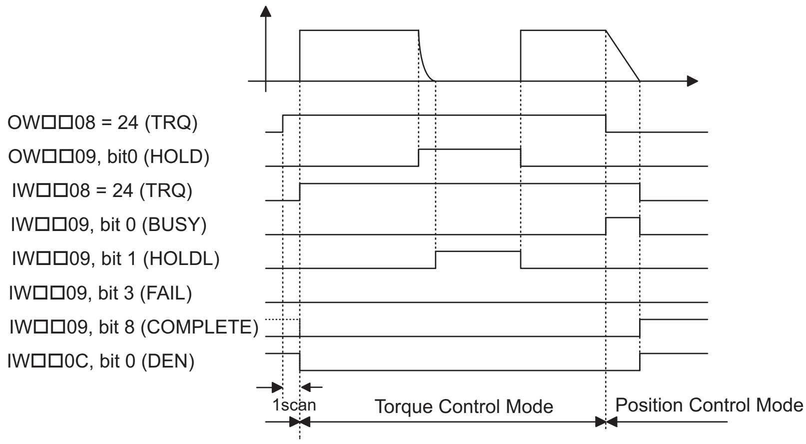
[a] Normal Execution



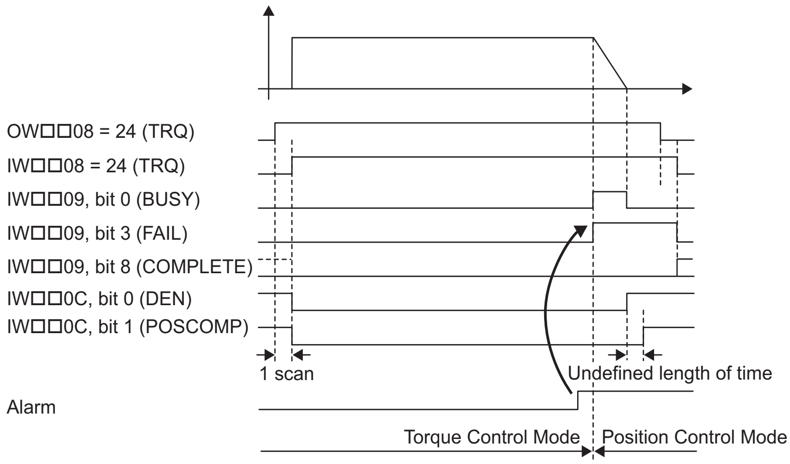
[b] Executed when Aborted



[c] Command Hold



[d] Execution when an Alarm Occurs



6.2.24 Phase References (PHASE) R

The PHASE command is used for the synchronized operation of multiple axes under phase control mode, using the specified speed, phase bias, and speed compensation value.
For SVR, the position data and the feedback speed can be monitored.

- Speed feed forward compensation cannot be used for the SGD-N or SGDB-N SERVOPACK, so the PHASE command cannot be used.

When using an SGDV or SGD7S SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV or SGD7S SERVOPACK Operations* of *4.4.2 (12)*.

- If you use the SVB Module to synchronously operate more than one axis as electronic shafts, make sure that the command resolution is the same for all of the axes.
  Example:
  If you use a SERVOPACK with a 17-bit encoder together with a SERVOPACK with a 20-bit encoder to control more than one axis, change the electronic gear ratio of the SERVOPACK with the 20-bit encoder so that it operates as a 17-bit encoder.

■ Precautions When Using Σ-V or Σ-7 Series SERVOPACKs

⚠ CAUTION

- When the tuning or vibration suppression functions are used to perform Servo adjustments and model following control is enabled (i.e., when Pn140.0 = 1), the SERVOPACK cannot be properly controlled by phase references. When using phase references, change the settings to the following values.
  - Set the model-following control to disabled (Pn140.0=0).
  - When using the utility functions for adjustment, select the following modes.
    - Advanced Autotuning and Advanced Autotuning by References: Mode=1
    - One-parameter Tuning: Tuning mode=0 or 1

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IW□□00, bit 1 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set the following motion setting parameters.

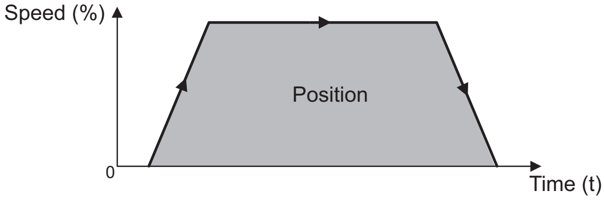
Speed Reference Setting: OL□□10
Filter Type Selection: OW□□03, bits 8 to B
Speed Loop P/PI Switch: OW□□01
Phase Correction Setting: OL□□28
Speed Compensation: OW□□31

3. Set OW□□08 to 25 to execute the PHASE motion command.

Synchronized operation using phase control will start.
IW□□08 will be 25 during the execution.

4. Execute another motion command to cancel the phase control mode.

PHASE Operating Pattern



(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

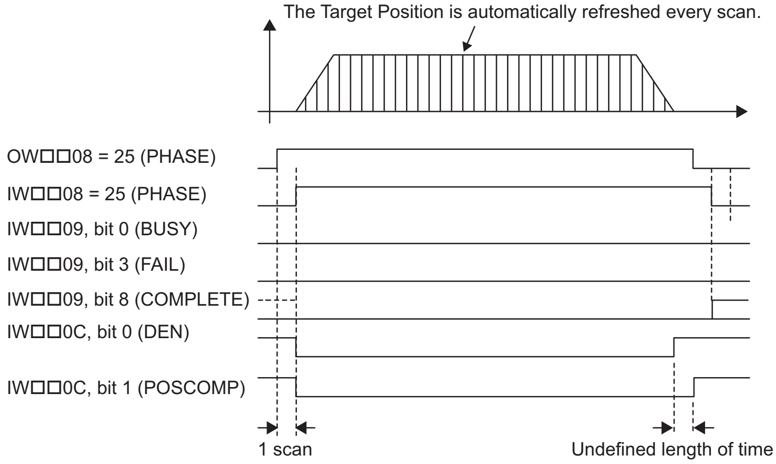
Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turns the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command (OW□□08) to 25.	R
OW□□03	Function Setting 1	Sets the speed unit, acceleration/deceleration units, and filter type.	R
OW□□05 Bit 1	Phase Reference Creation Calculation Disable	Disables/enables phase reference generation processing when executing phase reference commands. This parameter enables setting processing appropriate to an electronic shaft or electronic cam. • Enable this processing when an electronic shaft is being used, and disable it when an electronic cam is being used.	–
OW□□08	Motion Command	Phase control operation is started when this parameter is set to 25.	R
OW□□09 Bit 6	Phase Compensation Type	If using a system with an electronic cam, select a setting method for the phase compensation for the reference value of the cam pattern. 0: Incremental addition mode, 1: Absolute mode	–
OL□□10	Speed Reference Setting	Set the speed reference. The setting can be changed during operation. The unit depends on the Function Setting 1 setting (OW□□03, bits 0 to 3).	R
OL□□16	Second Speed Compensation	Set the speed feed forward amount for the Phase Reference command (PHASE). The setting unit for Speed Compensation (setting parameter OW□□31) is 0.01% (fixed). The unit for this parameter, however, can be selected by the user. When used at the same time as OW□□31, speed compensation can be performed twice.	R
OL□□28	Phase Correction Setting	Set the phase correction amount in reference units. • Set the number of pulses for phase compensation in pulses when an electronic shaft is being used. • Use the incremental addition mode to calculate the cam pattern target position when an electronic cam is being used.	–
OW□□31	Speed Compensation	Set the speed feed forward gain as a percentage of the rated speed. The setting units for this parameter is 0.01% (fixed).	R
OW□□3A	Filter Time Constant	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in the Function Setting 1 (OW□□03, bits 8 to B). Change the setting only after pulse distribution has been completed for the command (IW□□0C, bit 0 is ON).	R

[b] Monitoring Parameters

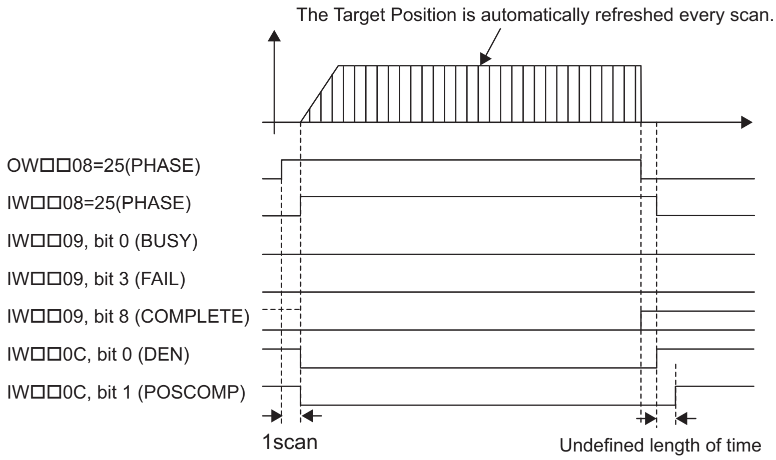
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 25 during PHASE command execution.	R
IW□□09 Bit 0	Command Execution Flag	Always OFF for PHASE command.	R
IW□□09 Bit 1	Command Hold Completed	Always OFF for PHASE command.	R
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during PHASE command execution. The axis will decelerate to a stop if it is moving. Turns OFF when another command is executed.	R
IW□□09 Bit 8	Command Execution Completed	Always OFF for PHASE command.	R
IW□□0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW□□0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the width of Positioning Completion. OFF in all other cases.	R
IW□□0C Bit 3	NEAR Position	The operation of this bit depends on the setting of NEAR Signal Output Width (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). Otherwise, it turns OFF. OL□□20 ≠ 0: Turns ON when the absolute value of the difference between MPOS (IL□□12) and APOS (IL□□16) is less than the NEAR Signal Output Width, even if pulse distribution has not been completed. OFF in all other cases.	R

(4) Timing Charts

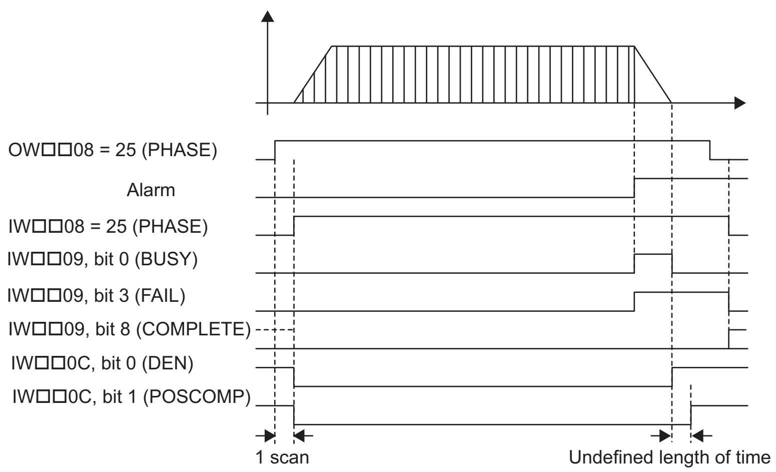
[a] Normal Execution



[b] Execution when Aborted



[c] Execution when an Alarm Occurs



6.2.25 Change Position Loop Integral Time Constant (KIS)

The KIS command transfers the setting of the Position Integration Time Constant (motion setting parameter OW□□32) to the Position Integration Time Constant in the SERVOPACK and enables the setting.

- MECHATROLINK-II has a function that automatically updates setting parameters if a parameter changes. There is no need to execute the KIS command with this function. For details, refer to bit A (User Constants Self-writing Function) in *4.4.1 (2) Function Selection 1*.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Motion command execution has been completed.	IW□□08 is 0 and IW□□09 bit0 is OFF.

2. Set OW□□08 to 26 to execute the KIS motion command.

The KIS command will transfer the setting of the Position Integration Time Constant (motion setting parameter OW□□32) to the Position Integration Time Constant in the SERVOPACK and enables the setting.
IW□□08 will be 26 during command execution.
IW□□09, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP motion command and then complete the change of the position loop integration time.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.
When the tuning-less function of the SGDV or SGD7S SERVOPACK is enabled or when the SERVOPACK parameter Pn170.0 is set to 1 (Tuning-less Function Selection is enabled), these settings are disabled and ignored.

(3) Related Parameters

[a] Setting Parameters

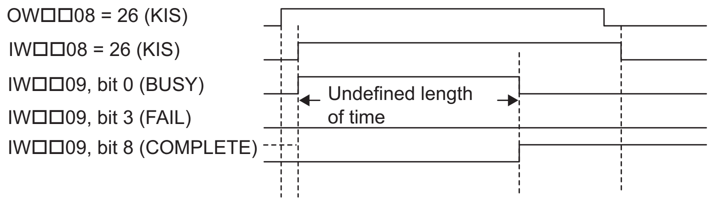
Parameter	Name	Setting
OW□□08	Motion Command	The feed forward is changed when this parameter is set to 26.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for KIS command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for KIS command.
OW□□32	Position Integration Time Constant	Set the integration time constant for the position loop in milliseconds.

[b] Monitoring Parameters

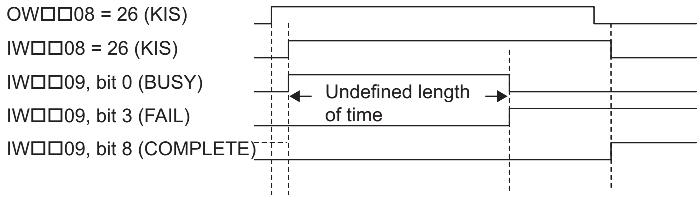
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Cable	Indicates the motion command that is being executed. The response code will be 26 during KIS command execution.
IW□□09 Bit 0	Command Execution Flag	Turns ON during KIS command execution and turns OFF when execution has been completed.
IW□□09 Bit 1	Command Hold Completed	Always OFF for KIS command.
IW□□09 Bit 3	Command Error Completed Status	Turns ON if an error occurs during KIS command execution. Turns OFF when another command is executed.
IW□□09 Bit 8	Command Execution Completed	Turns ON when KIS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



6.2.26 Stored Parameter Write (PPRM_WR)

Specify the parameters of the SERVOPACK, size of parameters, and the setting values, then execute this command. The PPRM_WR command writes the specified data in the specified SERVOPACK parameter number of the specified size in the SERVOPACK's nonvolatile memory. The specified data will be written not only in the parameters in the SERVOPACK's nonvolatile memory but also in the parameters in the SERVOPACK's RAM.

- The number of times you can save to SERVOPACK's nonvolatile memory is limited by the memory device specifications. Use the PPRM_WR command only when it is really necessary. Otherwise, use the PRM_WR (Write SERVOPACK Parameter) command for writing to a parameter.
- Special care must be taken to set OW□□50 (Servo Driver User Constant No.) to the correct number. Setting an incorrect number may result in adverse operation.
- For some parameters, the power must be turned OFF and then ON again to validate a change in the parameters. After having changed the settings of parameters, always turn the power OFF and then ON again. Refer to the user's manual of the corresponding SERVOPACK for details regarding parameters.

(1) Executing/Operating Procedure

1. Confirm all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	Motion command execution has been completed.	IW□□08 is 0 and IW□□09, bit 0 is OFF.

2. Set OW□□08 to 27 to execute the PPRM_WR motion command.

The SERVOPACK parameter will be overwritten.
IW□□08 will be 27 during command execution.
IW□□09, bit 0 will turn ON during command processing and will turn OFF when command processing is completed.

3. Set OW□□08 to 0 to execute the NOP command and complete non-volatile parameter writing.

(2) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used.

(3) Related Parameters

[a] Setting Parameters

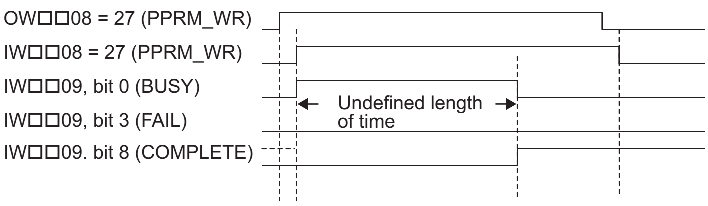
Parameter	Name	Setting
OW□□08	Motion Command	Set this parameter to 27 to write the parameter in the SERVOPACK's nonvolatile memory.
OW□□09 Bit 0	Holds a Command	This command is ignored by the PPRM_WR command.
OW□□09 Bit 1	Interrupt a Command	This command is ignored by the PPRM_WR command.
OW□□50	Servo Driver User Constant No.	Set the SERVOPACK parameter number to which the data will be written.
OW□□51	Servo Driver User Constant Size	Set the size of the SERVOPACK parameter to which the data will be written. Set the size in number of words. Example: Set 2 for 4 bytes.
OL□□52	Servo Driver User Constant Set Point	Set the data to be written in the specified SERVOPACK parameter.

[b] Monitoring Parameters

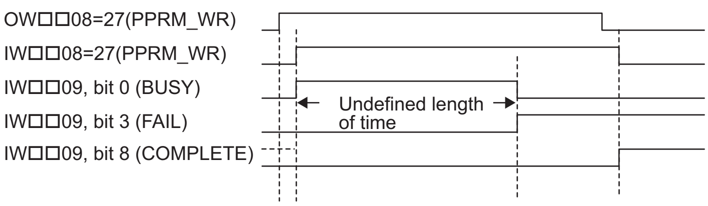
Parameter	Name	Monitor Contents
IL☐☐02	Warning	Stores the currently occurring warning.
IL☐☐04	Alarm	Stores the currently occurring alarm.
IW☐☐08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 27 during execution of the PPRM_WR command.
IW☐☐09 Bit 0	Command Execution Execution Flag	ON during PPRM_WR command execution. Turns OFF when the execution is completed.
IW☐☐09 Bit 1	Command Hold Completed	Always OFF for PPRM_WR command.
IW☐☐09 Bit 3	Command Error Completed Status	Turns ON when an error occurs during PPRM_WR command execution. Turns OFF when another command is executed.
IW☐☐09 Bit 8	Command Execution Completed	Turns ON when PPRM_WR command execution has been completed.

(4) Timing Diagram

[a] Normal End



[b] Error End



Motion Commands

6

6.2.27 Multiturn Limit Setting (MLTTRN_SET)

On executing the MLTTRN_SET command, the SERVOPACK auxiliary function Fn013 “multiturn limit setting”* is automatically executed via MECHATROLINK. Execute this command when the SERVOPACK alarm “A.CC0 Multiturn Limit Mismatch” has occurred.

- The MLTTRN_SET command is valid for Σ-II, Σ-III, Σ-V, and Σ-7 Series SERVOPACKs with absolute encoders. A command error will occur if the MLTTRN_SET command is executed when an incremental encoder is being used with a Σ-II, Σ-III, Σ-V, or Σ-7 Series SERVOPACK (even if it is being used as an absolute encoder).

* Fn013 “multiturn limit setting” is a function that matches the value of SERVOPACK parameter Pn205 “multiturn limit” with the multiturn limit of the absolute encoder.
For more information, refer to the manual for the SERVOPACK that you are using.

(1) Compatible Versions

The firmware and engineering tool versions that allow multiturn limit setting to be used with MP2000 series SVB modules are shown in the table below.

Controller	Model	Version
MP2100	JAPMC-MC2100 (-E)	Version 2.73 or later
MP2100M	JAPMC-MC2140 (-E)	
MP2300	JEPMC-MP2300 (-E)	
MP2300S	JEPMC-MP2300S-E	
MP2310	JEPMC-MP2310-E	
MP2400	JEPMC-MP2400-E	
MP2000 series SVB-01 module	JAPMC-MC2310 (-E)	Version 1.27 or later

Engineering Tool	Model	Version
MPE720 Version 5	CPMC-MPE720	Version 5.53 or later
MPE720 Version 6	CPMC-MPE770 (D)	Version 6.23 or later
MPE720 Version 7	CPMC-MPE780 (D)	Version 7.10 or later

The table below indicates whether or not the function can be executed depending on the combination of the versions of the MP2000 series SVB module and MPE720.

Version		MPE720	
		Version 5.52, Version 6.22 or earlier	Version 5.53, Version 6.23 or later
Controller	MP2000 series Version 2.72, SVB-01 module Version 1.26 or earlier	• Cannot be executed. • IL□□02, bit 4 “Motion Command Set Error” = ON	• Cannot be executed. • IL□□02, bit 4 “Motion Command Set Error” = ON
	MP2000 Version 2.73, SVB-01 module Version 1.27 or later	• Can be executed. (However, motion commands are not displayed in the module configuration.)	• Can be executed.

(2) Compatible SERVOPACK Models

The SERVOPACK models that allow multiturn limit setting are shown in the table below.

SERVOPACK Model	Details
SGDH-□□□E JUSP-NS100	SGDH SERVOPACKs NS100 MECHATROLINK-I Interface Module
SGDH-□□□E JUSP-NS115	SGDH SERVOPACKs NS115 MECHATROLINK-II Interface Module
SGDS-□□□1□□	SGDS SERVOPACKs
SGDV-□□□□1□□	SGDV SERVOPACKs
SGD7S-□□□□10□	SGD7S SERVOPACKs
JUSP-I□□□□MR□	MECHATROLINK-II-compatible SERVOPACKs IDM (rotational motor)

If an attempt is made to execute multiturn limit setting with any SERVOPACK model other than those above, the command is completed in an error status (IW□□09, bit 3 "FAIL" = ON).

(3) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Communication with the SERVOPACK must be synchronized.	IW□□00, bit 0 is ON.
2	The Servo OFF condition.	IW□□00, bit 1 is OFF.
3	Motion command execution has been completed.	IW□□08 is 0, and IW□□09, bit 0 is OFF.

- If there is a Multiturn Limit Mismatch alarm (A.CC0) in the SERVOPACK, communications cannot be synchronized just by turning ON the power supply to the controller. Use the Alarm Clear bit (OW□□00, bit F) to synchronize communications.

2. Set OW□□08 to 39 to execute the MLTTRN_SET command.

The SERVOPACK alarm "A.CC0 Multiturn Limit Mismatch" will be cleared, and the multiturn limit of the absolute encoder will be set to the value set for SERVOPACK parameter Pn205.
IW□□08 "Motion Command Response Code" will be 39 and IW□□09, bit 0 "BUSY" will turn ON during command processing.
IW□□09, bit 0 "BUSY", IW□□09, bit 3 "FAIL", and IW□□00, bit 0 "Motion Controller Operation Ready" will turn OFF, and IW□□09, bit 8 "COMPLETE" will turn ON, when command processing has been completed.

3. Set OW□□08 to 0 to execute the NOP command to complete multiturn limit setting.

4. When using an SGDH, SGDV, or SGD7S SERVOPACK, turn OFF the power to the SERVOPACK and then turn it back ON.

5. Execute Alarm Clear (OW□□00, bit F) and re-establish communications.

When multiturn limit setting has been completed, communication will be disconnected between the Machine Controller and the SERVOPACK. The zero point setting completed and zero point return completed status will thus be cleared.

6. Execute zero point setting or zero point return.

For details, refer to *6.2.8 Set Zero Point (ZSET)* or *6.2.3 Zero Point Return (ZRET)*.

(4) Holding and Aborting

The Holds a Command bit (OW□□09, bit 0) and the Interrupt a Command bit (OW□□09, bit 1) cannot be used. Processing will be canceled if a communication error occurs while the command is being executed and the command is completed in an error status (IW□□09, bit 3 = ON) will occur.

(5) Related Parameters

[a] Setting Parameters

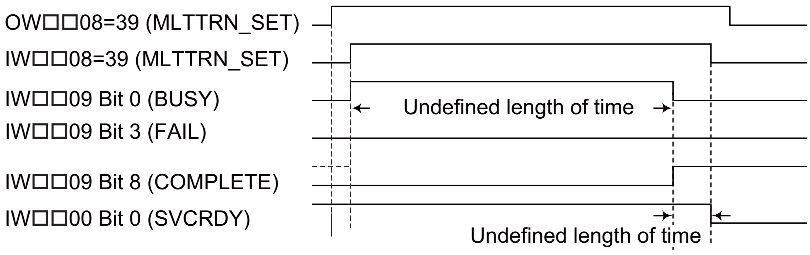
Parameter	Name	Setting
OW□□00, bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor; 0: Power OFF to Servomotor Turn OFF the power before setting the Motion Command (OW□□08) to 39.
OW□□08	Motion Command	Multiturn limit setting is started when this parameter is set to “39”. Even if this parameter is set to 0 during command processing, it will be ignored and execution will be continued.
OW□□09, bit 0	Holds a Command	This parameter is ignored for the MLTTRN_SET command.
OW□□09, bit 1	Interrupt a Command	This parameter is ignored for the MLTTRN_SET command.

[b] Monitoring Parameters

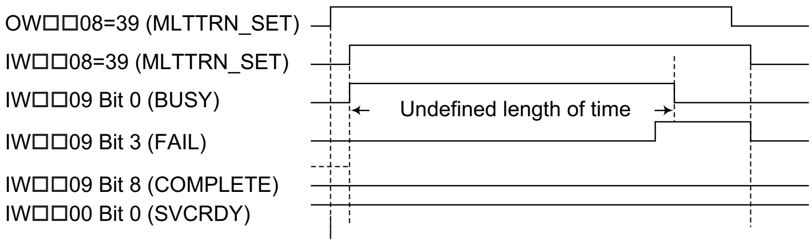
Parameter	Name	Monitor Contents
IW□□00, bit 0	Motion Controller Operation Ready	Indicates the communication status between the Machine Controller and SERVOPACK. 1: Communication synchronized, 0: Communication disconnected
IW□□00, bit 1	Servo ON	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 39 during MLTTRN_SET command execution.
IW□□09, bit 0	Command Execution Flag	Turns ON during MLTTRN_SET command execution and turns OFF when execution has been completed.
IW□□09, bit 3	Command Error Completed Status	Turns ON if any error occurs during MLTTRN_SET command execution. Turns OFF upon execution of another command.
IW□□09, bit 8	Command Execution Completed	Turns ON when MLTTRN_SET command execution has been completed.

(6) Timing Charts

[a] Normal End



[b] Error End



6.3 Motion Subcommands

6.3.1 Motion Subcommand Table

This table shows the motion subcommands that are supported by the MP2000-series Machine Controller. Refer to the section numbers indicated in the Reference column for additional command information.

Command Code		Command	Name	Function	Reference
0	R	NOP	No Command	This is a null command. When a subcommand is not being specified, set this “no command” code.	6.4.1
1	–	PRM_RD	Read User Constant	Reads the specified SERVOPACK parameter and stores it in the monitoring parameters.	6.4.2
2	–	PRM_WR	Write User Constant	Changes the specified SERVOPACK parameter's set value.	6.4.3
3	–	Reserved	Reserved by system.	–	–
4	–	SMON	Status Monitor	Stores the servo driver's status in the monitoring parameters.	6.4.4
5	R	FIXPRM_RD	Read Fixed Parameters	Reads the specified fixed parameter’s current value and stores it in the monitoring parameters.	6.4.5

- Commands in the table displaying an R are supported by the Virtual Motion Module (SVR).

6.3.2 Motion Subcommand Settings

It may not be possible to execute some subcommands, depending on the motion command and motion subcommand combination being used. Refer to *7.1 Switchable Motion Commands and Subcommands* for details on which command combinations are allowed.
In addition, some motion subcommands can not be executed with the MECHATROLINK-I and MECHATROLINK-II communication. See the following table.

Subcommand \ Communication method	MECHATROLINK-I	MECHATROLINK-II (17-byte)	MECHATROLINK-II (32-byte)
No Command (NOP) R	✓	✓	✓
Read User Constant (PRM_RD)	×	×	✓
Write User Constant (PRM_WR)	×	×	✓
Status Monitor (SMON)	×	×	✓
Read Fixed Parameters (FIXPRM_RD) R	✓	✓	✓

✓: Can be executed.
×: Cannot be executed.

6.4 Motion Subcommand Details

The following provides a detailed description of the types of motion subcommands that are available.

- All the following command names and items in the Parameter List displaying an R are supported by the Virtual Motion Module (SVR).

6.4.1 No Command (NOP) R

Set this command when a subcommand is not being specified.
When the MECHATROLINK-II 32-byte Mode communication method is being used, User Monitor 4 can be used, just as with the Status Monitor (SMON) subcommand. Refer to *6.4.4 Status Monitor (SMON)* for details.

(1) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting Contents	SVR
OW☐☐0A	Motion Subcommand	Set to 0 to specify no command (NOP).	R
OW☐☐4E	Servo User Monitor Setting	Set the information to manage the servo driver that will be monitored.	–

[b] Monitoring Parameters

Parameter	Name	Monitoring Contents	SVR
IW☐☐0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 0 during NOP command execution.	R
IW☐☐0B Bit 0	Command Execution Flag	Turns ON during NOP command execution and turns OFF when execution has been completed.	R
IW☐☐0B Bit 3	Command Error Completed Status	Turns ON if an error occurs during NOP command execution. Turns OFF when another command is executed.	R
IW☐☐0B Bit 8	Command Execution Completed *	Turns ON when NOP command execution has been completed.	R
IW☐☐2F	Servo Driver User Monitor Information	Stores either the data actually being monitored in the user monitor or the monitor selection.	–
IL☐☐34	Servo Driver User Monitor 4	Stores the result of the selected monitor.	–

* The NOP command's subcommand status stored in Command Execution Completed (COMPLETE) is not defined.

6.4.2 Read User Constant (PRM_RD)

The PRM_RD command reads the setting of the parameter with the specified parameter number and parameter size from SERVOPACK RAM. It stores the parameter number in the Supplementary Servo Driver User Constant No. (monitoring parameter IW□□37) and the setting in the Supplementary Servo Driver User Constant Reading Data (monitoring parameter IL□□3A)

- This command will end with a Command Error Completed Status if it is executed with a communication method other than MECHATROLINK-II 32-byte Mode.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Motion subcommand execution has been completed.	IW□□0A is 0 and IW□□0B, bit 0 is OFF.
2	No alarms have occurred.	IL□□02 is 0 and IL□□04 = 0

2. Set OW□□0A to 1 to execute the PRM_RD motion subcommand.

The PRM_RD command will read the SERVOPACK parameter and store it in the monitoring parameters.
IW□□0A will be 1 during command execution.
IW□□0B bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□0A to 0 to execute the NOP motion command and then complete the reading operation.

(2) Related Parameters

[a] Setting Parameters

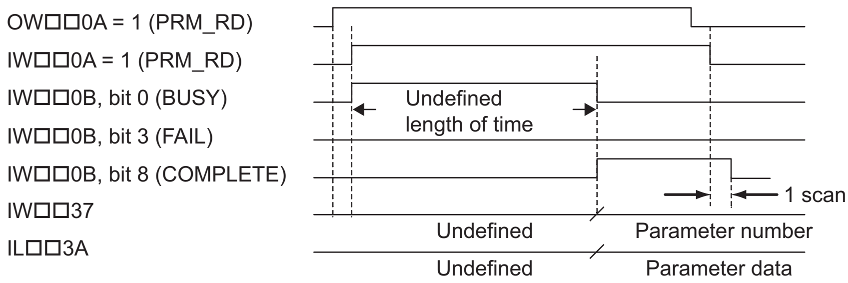
Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	The SERVOPACK parameter is read when this parameter is set to 1.
OW□□54	Servo Driver for Assistance User Constant No.	Set the parameter number of the SERVOPACK parameter to be read.
OW□□55	Servo Driver for Assistance User Constant Size	Set the size of the SERVOPACK parameter to be read. Set the size in words. • The SERVOPACK's user manual lists the size in bytes, so those values must be converted to words.

[b] Monitoring Parameters

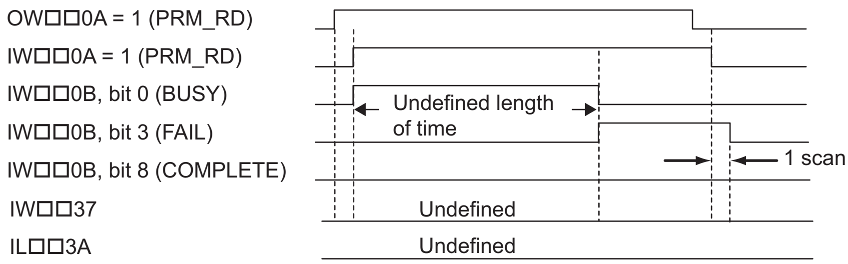
Parameter	Name	Monitoring Contents
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 1 during PRM_RD command execution.
IW□□0B Bit 0	Command Execution Flag	Turns ON during PRM_RD command execution and turns OFF when execution has been completed.
IW□□0B Bit 3	Command Error Completed Status	Turns ON if an error occurs during PRM_RD command execution. Turns OFF when another command is executed.
IW□□0B Bit 8	Command Execution Completed	Turns ON when PRM_RD command execution has been completed.
IW□□37	Supplementary Servo Driver User Constant No.	Stores the parameter number of the SERVOPACK parameter being read.
IL□□3A	Supplementary Servo Driver User Constant Reading Data	Stores the SERVOPACK parameter data that was read.

(3) Timing Charts

[a] Normal End



[b] Error End



6.4.3 Write User Constant (PRM_WR)

The PRM_WR command writes the setting of the SERVOPACK parameter using the specified parameter number, parameter size, and setting data. The write destination is in the SERVOPACK's RAM.

- This command will end with a Command Error Completed Status if it is executed with a communication method other than MECHATROLINK-II 32-byte Mode.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Motion subcommand execution has been completed.	IW□□0A is 0 and IW□□0B, bit 0 is OFF.
2	The OW□□54, OW□□55, and OL□□56 settings have been completed. • Refer to *6.4.3 (1) [a] Setting Parameters* below for details.	–

2. Set OW□□0A to 2 to execute the PRM_WR motion subcommand.

The PRM_WR command will write the SERVOPACK parameter.
IW□□0A will be 2 during command execution.
IW□□0B, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□0A to 0 to execute the NOP motion command and then complete the writing operation.

(2) Related Parameters

[a] Setting Parameters

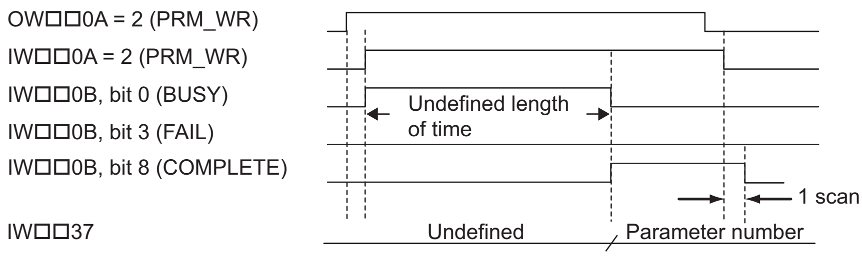
Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	The SERVOPACK parameter is written when this parameter is set to 2.
OW□□54	Servo Driver for Assistance User Constant No.	Set the number of the SERVOPACK parameter to be written.
OW□□55	Servo Driver for Assistance User Constant Size	Set the size of the SERVOPACK parameter to be written. Set the size in words. • The SERVOPACK's user manual lists the size in bytes, so those values must be converted to words.
OL□□56	Servo Driver for Assistance User Constant Set Point	Set the set value for the SERVOPACK parameter to be written.

[b] Monitoring Parameters

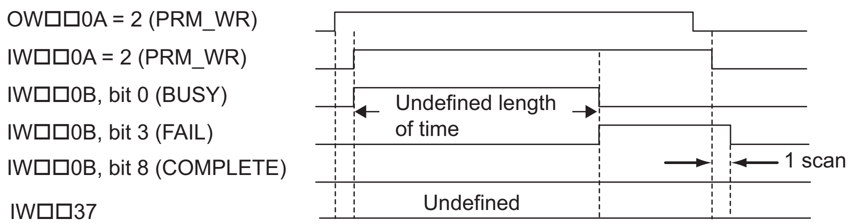
Parameter	Name	Monitoring Contents
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 2 during PRM_WR command execution.
IW□□0B Bit 0	Command Execution Flag	Turns ON during PRM_WR command execution and turns OFF when execution has been completed.
IW□□0B Bit 3	Command Error Completed Status	Turns ON if an error occurs during PRM_WR command execution. Turns OFF when another command is executed.
IW□□0B Bit 8	Command Execution Completed	Turns ON when PRM_WR command execution has been completed.
IW□□37	Supplementary Servo Driver User Constant No.	Stores the parameter number of the SERVOPACK parameter that was written.

(3) Timing Charts

[a] Normal End



[b] Error End



6.4.4 Status Monitor (SMON)

The SMON command stores, the data specified in Monitor 4 of the Servo User Monitor is stored in Servo Driver User Monitor 4 (monitoring parameter IL□□34).

- This command will end with a Command Error Occurrence if it is executed with a communication method other than MECHATROLINK-II 32-byte Mode.

The following table shows the data that can be specified in the User Monitor.

Set Value	Name	Description
0	POS	Reference coordinate system's reference position (after reference filter)
1	MPOS	Machine coordinate system's reference position
2	PERR	Following error
3	APOS	Machine coordinate system's feedback position
4	LPOS	Machine coordinate system's feedback latch position
5	IPOS	Reference coordinate system's reference position (before reference filter)
6	TPOS	Reference coordinate system's target position
7	–	–
8	FSPD	Feedback speed
9	CSPD	Reference speed
A	TSPD	Target speed
B	TRQ	Torque reference (Rated torque is 100%.)
C	–	–
D	–	–
E	OMN1	Optional monitor 1 (Actual content set in parameters.)
F	OMN2	Optional monitor 2 (Actual content set in parameters.)

- Refer to your SERVOPACK's users manual for details on the monitored data.
- With some SERVOPACK models, not all items cannot be monitored.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Motion subcommand execution has been completed.	IW□□0A is 0 and IB□□0B, bit0 is OFF.

2. Set OW□□0A to 4 to execute the SMON motion subcommand.

The SMON command will read the information managed by the Servo Driver and store the code in the monitoring parameter.
IW□□0A will be 4 during command execution.
IW□□0B, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□0A to 0 to execute the NOP motion command and then complete the monitoring operation.

(2) Related Parameters

[a] Setting Parameters

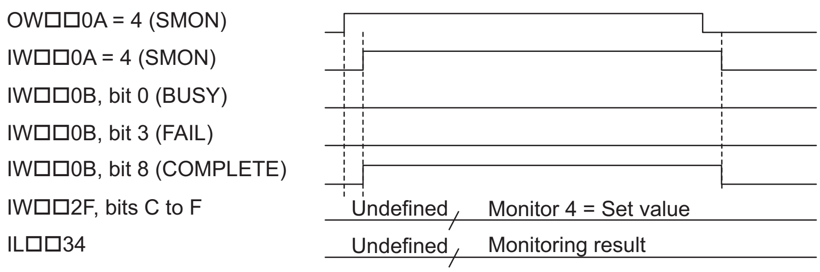
Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	The Monitor Status command is executed when this parameter is set to 4.
OW□□4E	Servo User Monitor Setting	Set the information managed by the Servo Driver to be monitored.

[b] Monitoring Parameters

Parameter	Name	Monitoring Contents
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 4 during SMON command execution.
IW□□0B Bit 0	Command Execution Flag	Always OFF during SMON command execution.
IW□□0B Bit 3	Command Error Completed Status	Turns ON if an error occurs during SMON command execution. Turns OFF when another command is executed.
IW□□0B Bit 8	Command Execution Completed	Turns ON when SMON command execution has been completed.
IW□□2F	Servo Driver User Monitor Information	Stores either the data actually being monitored in the user monitor or the monitor selection.
IL□□34	Servo Driver User Monitor 4	Stores the result of the selected monitor operation.

(3) Timing Charts

[a] Normal End



6.4.5 Read Fixed Parameters (FIXPRM_RD) R

The FIXPRM_RD command reads the current value of the specified fixed parameter and stores the value in the Fixed Parameter Monitor monitoring parameter.

(1) Executing/Operating Procedure

1. Check to see if all the following conditions are satisfied.

No.	Execution Conditions	Confirmation Method
1	Motion subcommand execution has been completed.	IW□□0A is 0 and IW□□0B, bit 0 is OFF.

2. Set OW□□0A to 5 to execute the FIXPRM_RD motion subcommand.

The FIXPRM_RD will read the specified fixed parameter's current value and store the code in the monitoring parameter.
IW□□0A will be 5 during command execution.
IW□□0B, bit 0 will turn ON during the command processing and will turn OFF when the command processing has been completed.

3. Set OW□□0A to 0 to execute the NOP motion command and then complete the monitoring operation.

(2) Related Parameters

[a] Setting Parameters

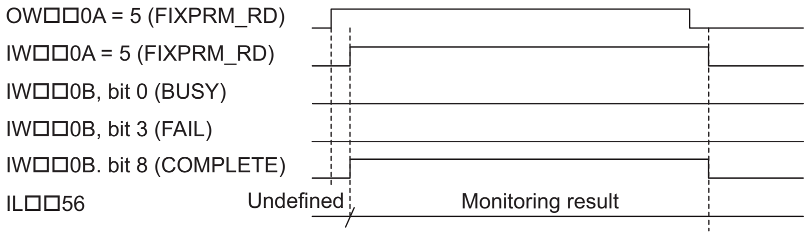
Parameter	Name	Setting Contents	SVR
OW□□0A	Motion Subcommand	The Read Fixed Parameter subcommand is executed when this parameter is set to 5.	R
OW□□5C	Fixed Parameter Number	Set the parameter number of the fixed parameter to be read.	R

[b] Monitoring Parameters

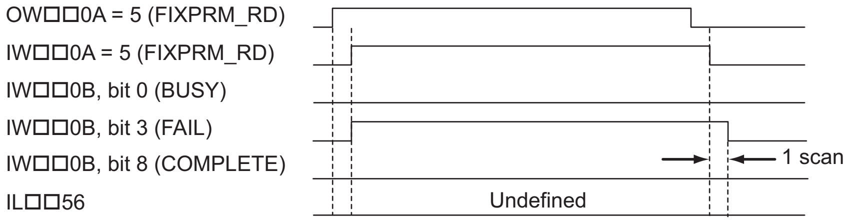
Parameter	Name	Monitoring Contents	SVR
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 5 during FIXPRM_RD command execution.	R
IW□□0B Bit 0	Command Execution Flag	Always OFF during FIXPRM_RD command execution.	R
IW□□0B Bit 3	Command Error Completed Status	Turns ON if an error occurs during FIXPRM_RD command execution. Turns OFF when another command is executed.	R
IW□□0B Bit 8	Command Execution Completed	Turns ON when FIXPRM_RD command execution has been completed.	R
IL□□56	Fixed Parameter Monitor	Stores the data of the specified fixed parameter number.	R

(3) Timing Charts

[a] Normal End



[b] Error End



7

Switching Commands during Execution

This chapter describes commands and subcommands that can be switched during execution and how the axis will move when they are switched.

7.1 Switchable Motion Commands and Subcommands

7.1.1 Switching Between Motion Commands

The following table shows motion commands that can be switched during execution when using the MP2000-series Machine Controller.

Code	Switched From (Command in Execution)	Switched To (Newly Set Command)															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		NOP	POS	EX_P	ZRET	INTE	ENDO	LATC	FEED	STEP	ZSET	ACC	DCC	SCC	CHG	KVS	KPS
0	NOP	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1	POSING	×	—	○	○	×	×	×	○	×	○	×	×	×	×	○	○
2	EX_POSING	×	Δ	—	○	×	×	×	○	×	Δ	×	×	×	×	Δ	Δ
3	ZRET	×	×	×	—	×	×	×	×	×	×	×	×	×	×	×	×
4	INTERPO-LATE	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○
5	ENDOF_IN-TERPO-LATE	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○
6	LATCH	○	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○
7	FEED	×	Δ	Δ	○	×	×	×	—	×	○	×	×	×	×	×	×
8	STEP	×	○	○	○	×	×	×	○	—	○	×	×	×	×	○	○
9	ZSET	○	○	○	○	○	○	○	○	○	—	○	○	○	○	○	○
10	ACC	●	●	●	●	●	●	●	●	●	●	—	●	●	●	●	●
11	DCC	●	●	●	●	●	●	●	●	●	●	●	—	●	●	●	●
12	SCC	●	●	●	●	●	●	●	●	●	●	●	●	—	●	●	●
13	CHG_FIL-TER	○	○	○	○	○	○	○	○	○	○	○	○	○	—	○	○
14	KVS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	—	●
15	KPS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	—
16	KFS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
17	PRM_RD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
18	PRM_WR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
19	ALM_MON	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
20	ALM_HIST	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
21	ALMHIST_CLR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
22	ABS_RST	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
23	VELO	×	○	○	×	×	×	×	○	○	×	×	×	×	×	×	×
24	TRQ	×	○	○	×	×	×	×	○	○	×	×	×	×	×	×	×
25	PHASE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
26	KIS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
27	PPRM_WR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
29	SV_ON	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
30	SV_OFF	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
31	ALM_CLR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
39	MLTTRN_SET	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- Switching the command INTERPOLATE, ENDOF_INTERPOLATE, LATCH, or PHASE to ACC, DCC, SCC, or CHG_FILTER before the pulse distribution is completed will cause a Command Error.

Code	Switched From (Command in Execution)	Switched To (Newly Set Command)													
		16	17	18	19	20	21	22	23	24	25	26	29	30	31
		KFS	PRM_	PRM_	ALM_	ALM_	ALMH	ABS_	VELO	TRQ	PHAS	KIS	SV_ON	SV_OF	ALM
0	NOP	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1	POSING	○	○	○	○	○	○	×	○	○	○	○	×	–	○
2	EX_POSING	Δ	Δ	Δ	Δ	Δ	Δ	×	×	×	×	Δ	×	–	○
3	ZRET	×	×	×	×	×	×	×	×	×	×	×	×	–	○
4	INTERPO-LATE	○	○	○	○	○	○	○	○	○	○	○	○	–	○
5	ENDOF_IN-TERPO-LATE	○	○	○	○	○	○	○	○	○	○	○	○	–	○
6	LATCH	○	○	○	○	○	○	○	○	○	○	○	○	–	○
7	FEED	×	×	×	×	×	×	×	○	○	○	×	×	–	○
8	STEP	○	○	○	○	○	○	×	○	○	○	○	×	–	○
9	ZSET	○	○	○	○	○	○	○	○	○	○	○	○	×	○
10	ACC	●	●	●	●	●	●	●	●	●	●	●	●	×	○
11	DCC	●	●	●	●	●	●	●	●	●	●	●	●	×	○
12	SCC	●	●	●	●	●	●	●	●	●	●	●	●	×	○
13	CHG_ FILTER	○	○	○	○	○	○	○	○	○	○	○	○	×	○
14	KVS	●	●	●	●	●	●	●	●	●	●	●	●	×	○
15	KPS	●	●	●	●	●	●	●	●	●	●	●	●	×	○
16	KFS	–	●	●	●	●	●	●	●	●	●	●	●	×	○
17	PRM_ RD	●	–	●	●	●	●	●	●	●	●	●	●	×	○
18	PRM_ WR	●	●	–	●	●	●	●	●	●	●	●	●	×	○
19	ALM_ MON	●	●	●	–	●	●	●	●	●	●	●	●	×	○
20	ALM_ HIST	●	●	●	●	–	●	●	●	●	●	●	●	×	○
21	ALMHIST_-CLR	●	●	●	●	●	–	●	●	●	●	●	●	×	○
22	ABS_ RST	●	●	●	●	●	●	–	●	●	●	●	●	×	●
23	VELO	×	×	×	×	×	×	×	–	○	○	×	×	○	○
24	TRQ	×	×	×	×	×	×	×	○	–	○	×	×	○	○
25	PHASE	○	○	○	○	○	○	○	○	○	–	○	○	–	○
26	KIS	●	●	●	●	●	●	●	●	●	●	–	●	×	○
27	PPRM_WR	●	●	●	●	●	●	●	●	●	●	●	–	×	○
29	SV_ON	●	●	●	●	●	●	●	●	●	●	●	●	–	○
30	SV_OFF	●	●	●	●	●	●	●	●	●	●	●	●	×	–
31	ALM_CLR	●	●	●	●	●	●	●	●	●	●	●	●	×	○
39	MLT-TRN_SET	●	●	●	●	●	●	●	●	●	●	●	●	×	●

- ○ : Possible
  Δ : Possible in Absolute Mode. In Incremental Addition mode, the axis will stop when the command is switched.
  × : The command will be aborted. The axis will be decelerated to a stop.
  ● : A newly set command will be ignored and the processing for the command in execution will continue.

7.1.2 Setting a Subcommand During Command Execution

The following table shows motion subcommands that can be executed while a motion command is being executed.

Code	Motion Command in Execution	Subcommand				
		0	1	2	4	5
		NOP	PRM_RD	PRM_WR	SMON	FIXPRM_RD
0	NOP	○	○	○	○	○
1	POSING	○	○	○	○	○
2	EX_POSING	○	×	×	○	○
3	ZRET	○	×	×	○	○
4	INTERPOLATE	○	○	○	○	○
5	ENDOF_INTERPOLATE	○	○	○	○	○
6	LATCH	○	○	○	○	○
7	FEED	○	○	○	○	○
8	STEP	○	○	○	○	○
9	ZSET	○	○	○	○	○
10	ACC	○	×	×	○	○
11	DCC	○	×	×	○	○
12	SCC	○	×	×	○	○
13	CHG_FILTER	○	○	○	○	○
14	KVS	○	×	×	○	○
15	KPS	○	×	×	○	○
16	KFS	○	×	×	○	○
17	PRM_RD	○	×	×	○	○
18	PRM_WR	○	×	×	○	○
19	ALM_MON	○	×	×	○	○
20	ALM_HIST	○	×	×	○	○
21	ALMHIST_CLR	○	×	×	○	○
22	ABS_RST	○	×	×	○	○
23	VELO	○	○	○	○	○
24	TRQ	○	○	○	○	○
25	PHASE	○	○	○	○	○
26	KIS	○	×	×	○	○
27	PPRM_WR	○	×	×	○	○
39	MLTTRN_SET	○	×	×	○	○

- ○: Possible
  ×: Not possible

7.2 Motions After Switching Motion Commands

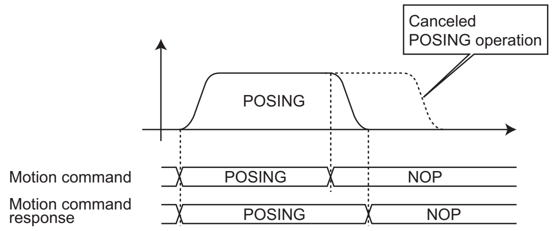
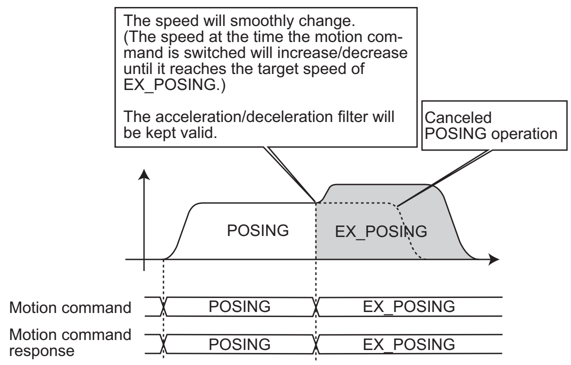
The details of motion changes enacted when the command in execution is switched to another command (listed in the following table) are described in *7.2.1 Switching from POSING*.

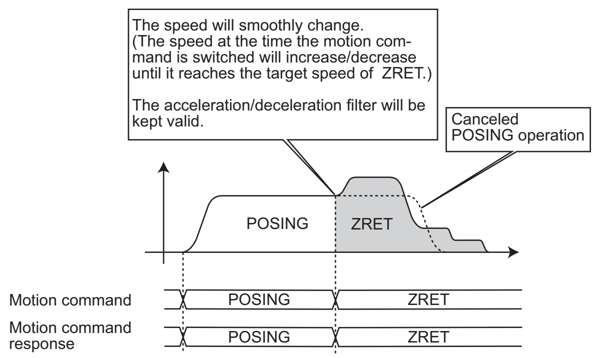
<Switching Between Commands>

			Switched To (Newly Set Command)												
			0	1	2	3	4	5	6	7	8	9	23	24	25
			NOP	POS	EX_P	ZRET	INTE	ENDO	LAT	FEED	STEP	ZSET	VELO	TRQ	PHAS
Switched From (Command in Execution)	0	NOP	–	○	○	○	○	○	○	○	○	○	○	○	○
	1	POSING	×	–	○	○	×	×	×	○	×	○	○	○	○
	2	EX_POSING	×	○	–	○	×	×	×	○	×	○	○	○	○
	3	ZRET	×	×	×	–	×	×	×	×	×	×	×	×	×
	4	INTERPOLATE	○	○	○	○	–	○	○	○	○	○	○	○	○
	5	ENDOF_ INTERPOLATE	○	○	○	○	○	–	○	○	○	○	○	○	○
	6	LATCH	○	○	○	○	○	○	–	○	○	○	○	○	○
	7	FEED	×	○	○	○	×	×	×	–	×	○	○	○	○
	8	STEP	×	○	○	○	×	×	×	○	–	○	○	○	○
	9	ZSET	○	○	○	○	○	○	○	○	×	–	○	○	○
	23	VELO	×	○	○	×	×	×	×	○	○	×	–	○	○
	24	TRQ	×	○	○	×	×	×	×	○	○	×	○	–	○
	25	PHASE	○	○	○	○	○	○	○	○	○	○	○	○	–

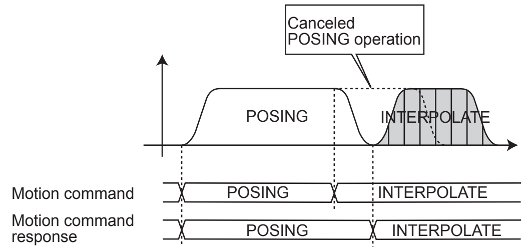
- ○: Available
  ×: The command in execution is aborted (the axis will be decelerated to a stop), and the newly set command will be executed.

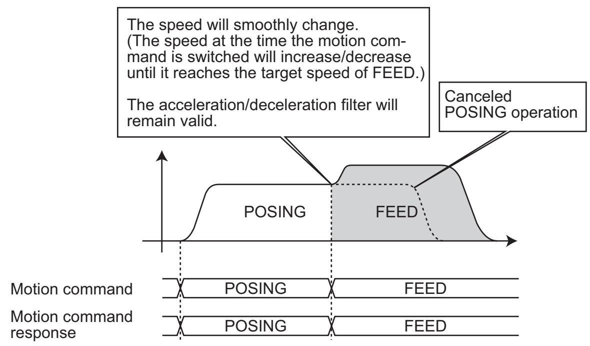
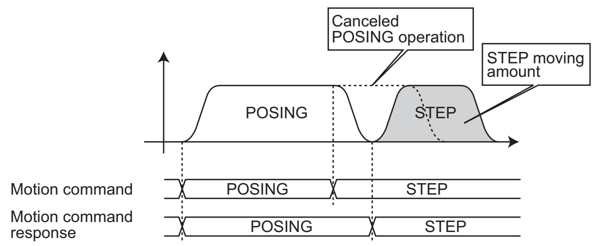
7.2.1 Switching from POSING

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="4">POSING</td><td>NOP</td><td>POSING will switch to NOP when the axis stops after deceleration.

</td></tr>
<tr><td>POSING</td><td>POSING operation continue.</td></tr>
<tr><td>EX_POSING</td><td>POSING will immediately switch to EX_POSING. When this happens, the amount of motion stored in the acceleration/deceleration filter will be output. When execution of EX_POSING is started, values are written to the related servo parameters and then the positioning operation starts.


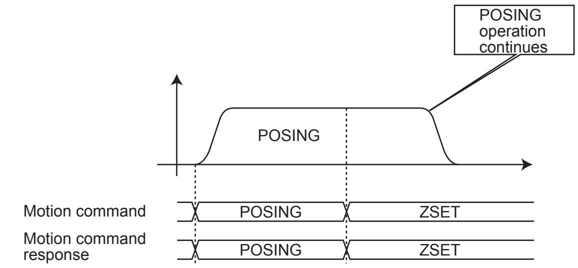
<Change in Position Reference Setting (OL□□1C) during Deceleration>
• In Incremental Addition Mode (OW□□09, bit 5 = 0)
Any change in the Position Reference Setting (OL□□1C) will be ignored.
• In Absolute Mode (OW□□09 Bit5 = 1) the value of the Position Reference Setting (OL□□1C) when EX_POSING execution starts will be the target position.
◆ Do not change the Position Reference Setting during deceleration unless it is absolutely necessary.
Values are written to the related parameters when execution of EX_POSING starts, so the speed may drop.</td></tr>
<tr><td>ZRET</td><td>POSING will immediately switch to ZRET. When this happens, the amount of motion stored in the acceleration/deceleration filter will be output. When execution of ZRET is started, values are written to the related servo parameters and then the zero point return operation starts.

</td></tr>
</table>

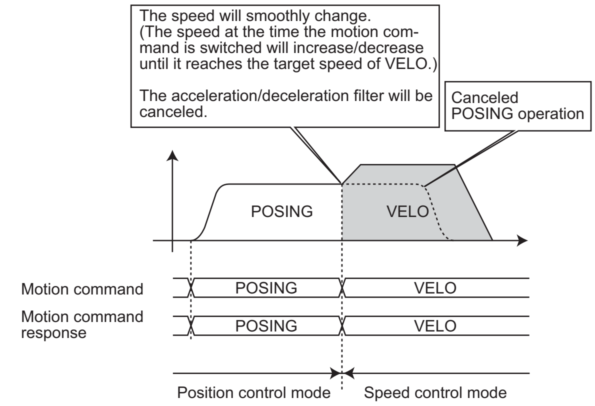
(cont'd)

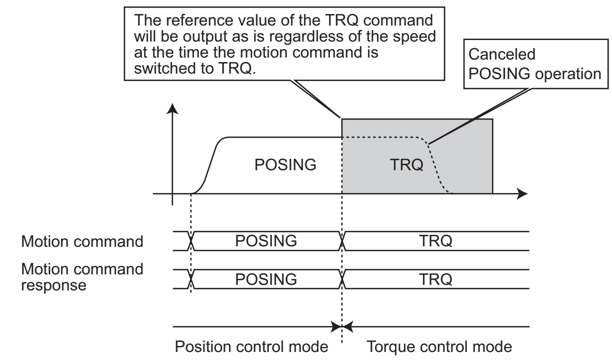
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="5">POSING</td><td>INTERPOLATE</td><td>POSING will switch to INTERPOLATE when the axis stops after deceleration.


<Change in Position Reference Setting (OL□□1C) during Deceleration>
• In Incremental Addition Mode (OW□□09, bit 5 = 0)
Any change in the Position Reference Setting (OL□□1C) will be ignored.
• In Absolute Mode (OW□□09, bit 5 = 1)
The change in the Position Reference Setting (OL□□1C) will be output as soon as the the first high-speed scan after the INTERPOLATE command execution starts.
♦ Do not change the Position Reference Setting unless it is absolutely necessary.</td></tr>
<tr><td>ENDOF_INTERPOLATE</td><td>Same as INTERPOLATE</td></tr>
<tr><td>LATCH</td><td>Same as INTERPOLATE</td></tr>
<tr><td>FEED</td><td>POSING will immediately switch to FEED, and the moving amount stored in the acceleration/deceleration filter will be maintained.

</td></tr>
<tr><td>STEP</td><td>POSING will switch to STEP when the axis stops after deceleration.

</td></tr>
</table>

(cont'd)

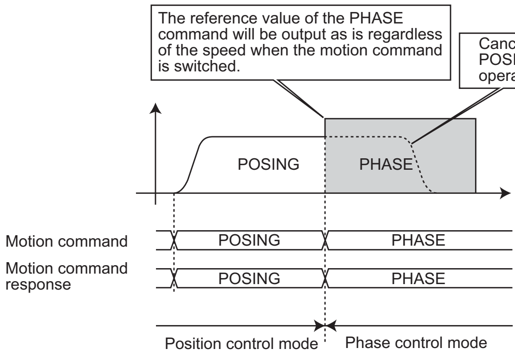
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">POSING</td><td>ZSET</td><td>POSING will immediately switch to ZSET, and positioning will continue.


• In actual operation, set the zero point by executing ZSET in the positioning completed status.</td></tr>
<tr><td>VELO</td><td>POSING will immediately switch to VELO and the control mode will change from position control mode to speed control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.


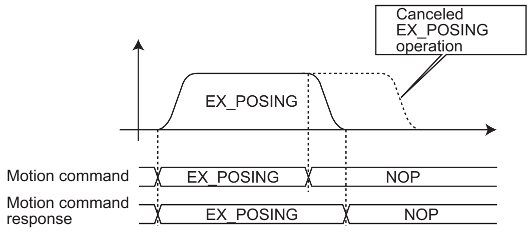
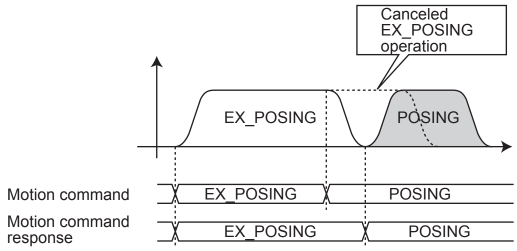
• After POSING has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the POSING operation by executing an NOP command, or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute the VELO command.</td></tr>
<tr><td>TRQ</td><td>POSING will immediately switch to TRQ and the control mode will switch from position control mode to torque control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.


• After POSING has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
</table>

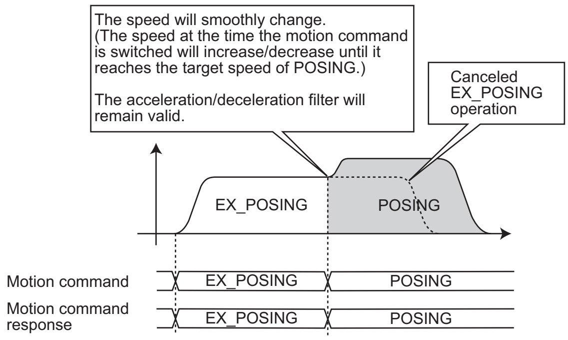
(cont'd)

Switched From	Switched To	Operation
POSING	PHASE	POSING will immediately switch to PHASE, and the control mode will change from position control mode to phase control mode. 

7.2.2 Switching from EX_POSING

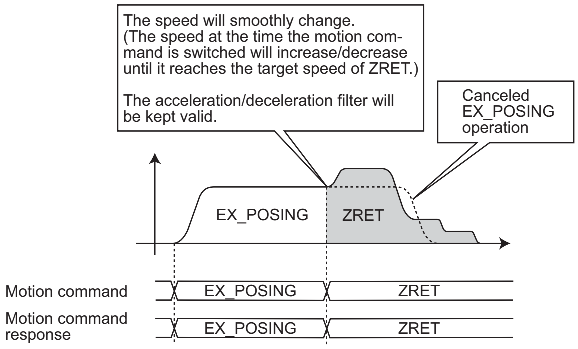
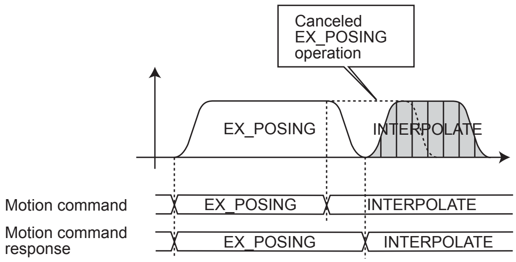
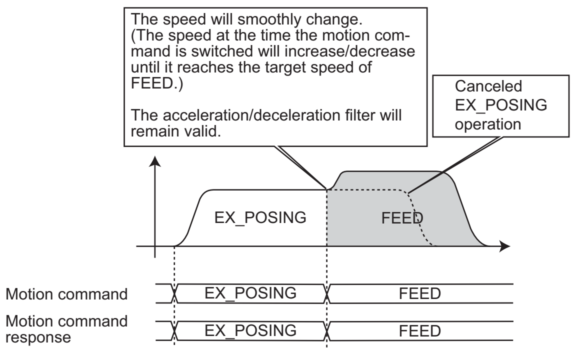
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">EX_POSING</td><td>NOP</td><td>EX_POSING will switch to NOP when the axis stops after deceleration.

</td></tr>
<tr><td>POSING</td><td><In Incremental Addition Mode (OW□□09, bit 5 = 0)>
EX_POSING will switch to POSING when the axis stops after deceleration.


Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C + Incremental value
• Any change in the Position Reference Setting (OL□□1C) during deceleration will be ignored.

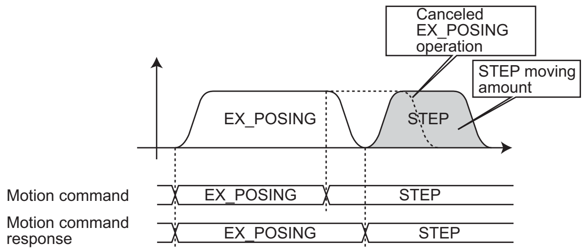
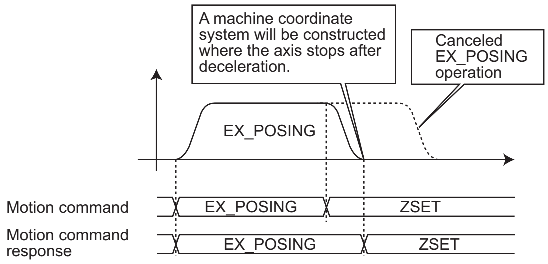
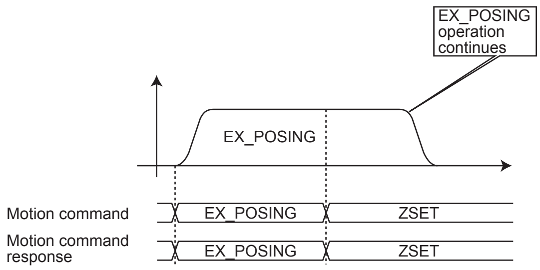
<In Absolute Mode (OW□□09, bit 5 = 1)>
EX_POSING will immediately switch to POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.


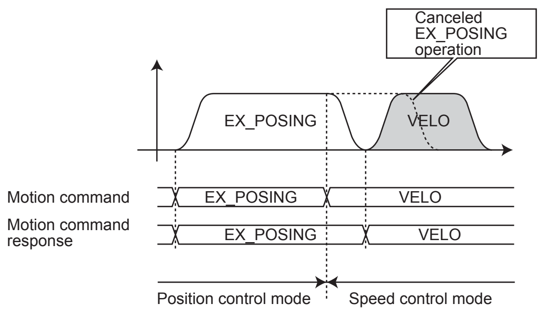
The set value of the Position Reference Setting (OL□□1C) will be:
OL□□1C = Target position</td></tr>
<tr><td>EX_POSING</td><td>The EX_POSING operation will continue.</td></tr>
</table>

(cont'd)

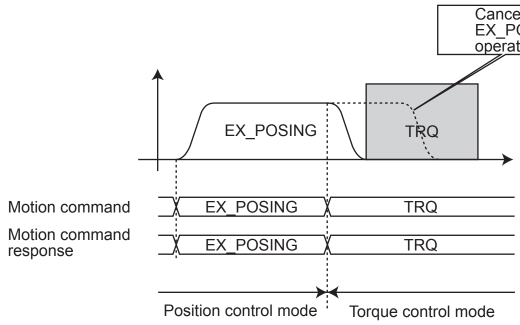
Switched From	Switched To	Operation
EX_POSING	ZRET	EX_POSING will immediately switch to ZRET, and the moving amount stored in the acceleration/deceleration filter will be maintained. 
	INTERPOLATE	EX_POSING will switch to INTERPOLATE when the axis stops after deceleration.  <Change in Position Reference Setting (OL□□1C) during Deceleration> • In Incremental Addition Mode (OW□□09, bit 5 = 0)> Any change in the Position Reference Setting (OL□□1C) will be ignored. • In Absolute Mode (OW□□09, bit 5 = 1) The change in the Position Reference Setting (OL□□1C) will be output as soon as the first high-speed scan after the INTERPOLATE execution starts. ♦ Do not change the setting of the Position Reference Setting during deceleration unless it is absolutely necessary.
	ENDOF_INTERPOLATE	Same as INTERPOLATE
	LATCH	Same as INTERPOLATE
	FEED	EX_POSING will be immediately switch to FEED, and the moving amount stored in the acceleration/deceleration filter will be maintained. 

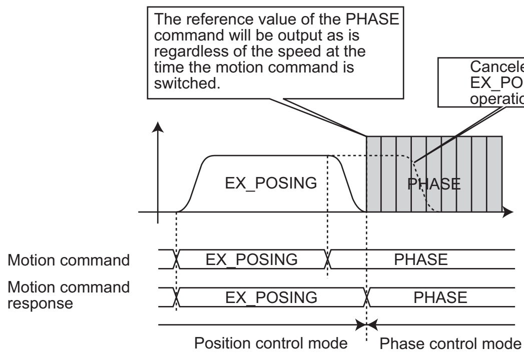
(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="4">EX_POSING</td><td>STEP</td><td>EX_POSING will switch to STEP when the axis stops after deceleration.

</td></tr>
<tr><td rowspan="2">ZSET</td><td><In Incremental Addition Mode (OW□□09, bit 5 = 0)>
EX_POSING will switch to ZSET when the axis stops after deceleration.

</td></tr>
<tr><td><In Absolute Mode (OW□□09, bit 5 = 1)>
EX_POSING will immediately switch to ZSET, and positioning will continue.


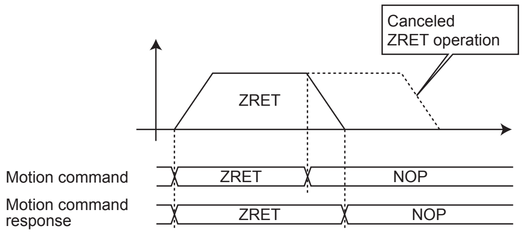
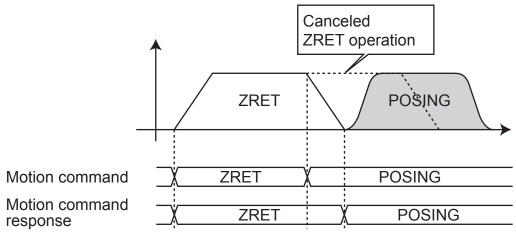
• In actual operation, set the zero point by executing ZSET in the positioning completed status.</td></tr>
<tr><td>VELO</td><td>EX_POSING will switch to VELO when the axis stops after deceleration, and the control mode will change from position control mode to speed control mode.

</td></tr>
</table>

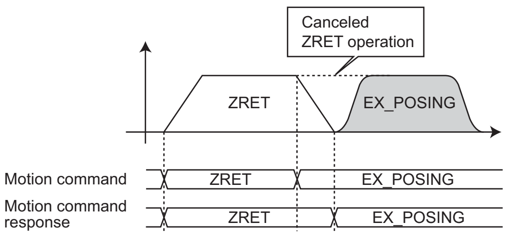
(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">EX_POSING</td><td>TRQ</td><td>EX_POSING will switch to TRQ when the axis stops after deceleration, and the control mode will change from position control mode to torque control mode.


• After EX_POSING has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
<tr><td>PHASE</td><td>EX_POSING will switch to PHASE when the axis stops after deceleration, and the control mode will change from the position control mode to phase control mode.

</td></tr>
</table>

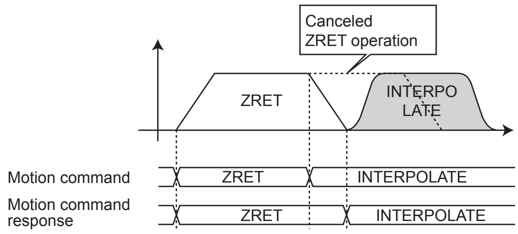
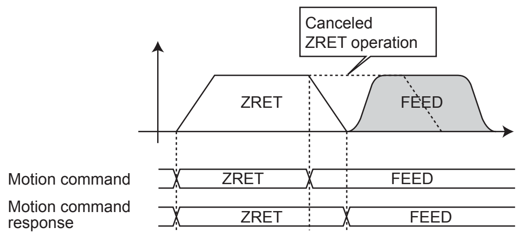
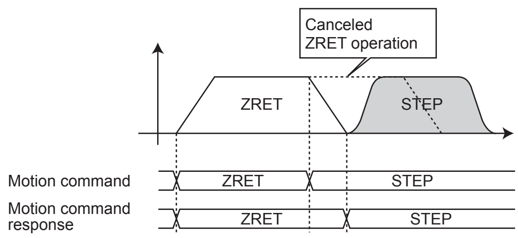
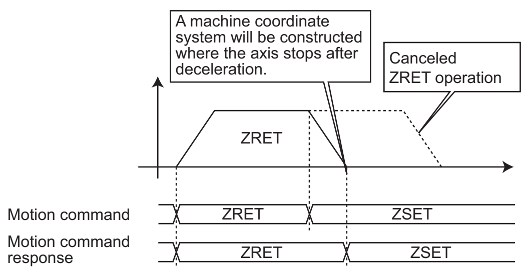
7.2.3 Switching from ZRET

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="4">ZRET</td><td>NOP</td><td>ZRET will be switched to NOP when the axis stops after deceleration.

</td></tr>
<tr><td>POSING</td><td>ZRET will switch to POSING when the axis stops after deceleration.


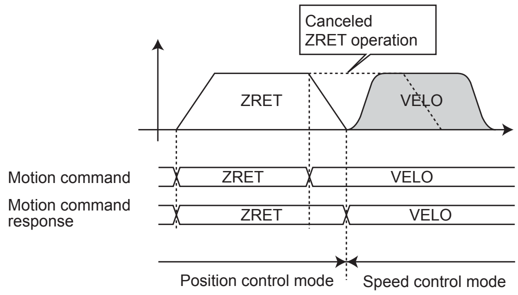
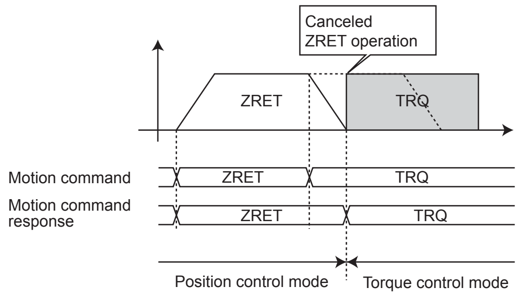
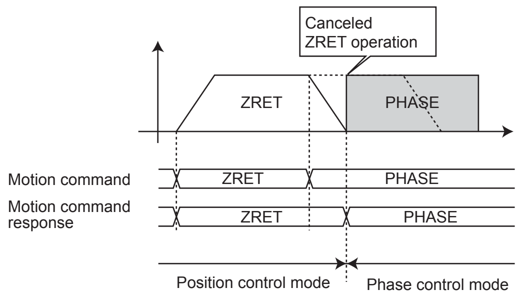
<Change in Position Reference Setting (OL□□1C) during Deceleration>
• In Incremental Addition Mode (OW□□09, bit 5 = 0)
Any change in the Position Reference Setting (OL□□1C) will be ignored.
• In Absolute Mode (OW□□09, bit 5 = 1)
The value of the Position Reference Setting (OL□□1C) when POSING execution starts will be the target position.
♦ Do not change the Position Reference Setting during deceleration unless it is absolutely necessary.</td></tr>
<tr><td>EX_POSING</td><td>ZRET will switch to EX_POSING when the axis stops after deceleration.
When execution of EX_POSING is started, values are written to the related servo parameters and then the positioning operation starts.


<Change in Position Reference Setting (OL□□1C) during Deceleration>
• In Incremental Addition Mode (OW□□09, bit 5 = 0)
Any change in the Position Reference Setting (OL□□1C) will be ignored.
• In Absolute Mode (OW□□09, bit 5 = 1)
The value of the Position Reference Setting (OL□□1C) when EX_POSING execution starts will be the target position
♦ Do not change the Position Reference Setting during deceleration unless it is absolutely necessary.</td></tr>
<tr><td>ZRET</td><td>ZRET operation will continue.</td></tr>
</table>

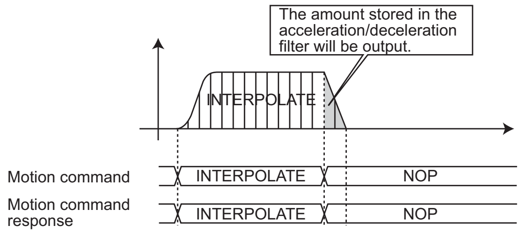
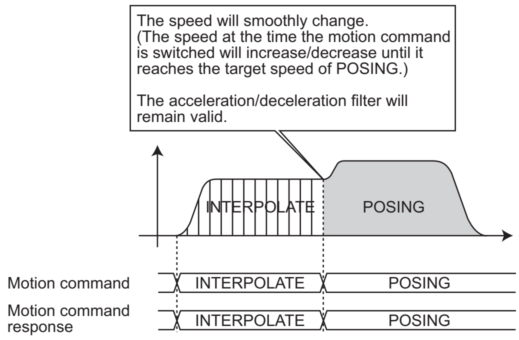
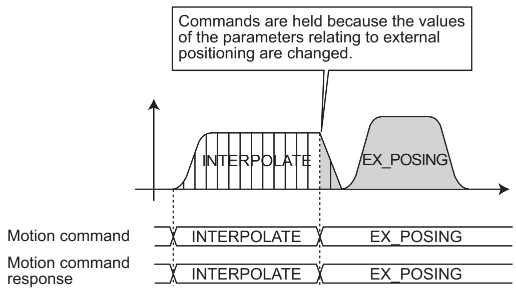
(cont'd)

Switched From	Switched To	Operation
ZRET	INTERPOLATE	ZRET will switch to INTERPOLATE when the axis stops after deceleration.  <Change in Position Reference Setting (OL□□1C) during Deceleration> • In Incremental Addition Mode (OW□□09, bit 5 = 0) Any change in the Position Reference Setting (OL□□1C) will be ignored. • In Absolute Mode (OW□□09, bit 5 = 1) The change in the Position Reference Setting (OL□□1C) will be output as soon as the first high-speed scan after INTERPOLATE execution starts. ♦ Do not change the Position Reference Setting during deceleration unless it is absolutely necessary.
	ENDOF_IN-TERPOLATE	Same as INTERPOLATE
	LATCH	Same as INTERPOLATE
	FEED	ZRET will switch to FEED when the axis stops after deceleration. 
	STEP	ZRET will switch to STEP when the axis stops after deceleration. 
	ZSET	ZSET command will be executed when the axis stops after deceleration. 

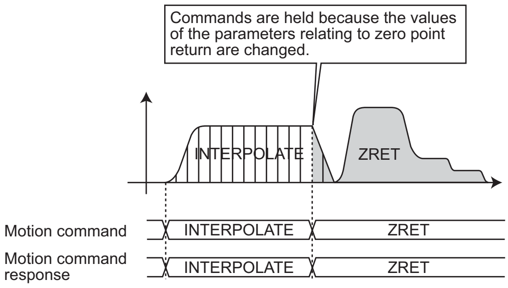
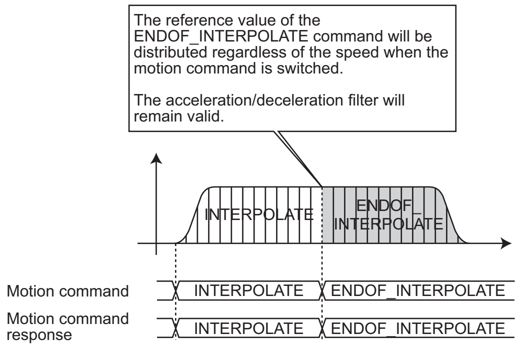
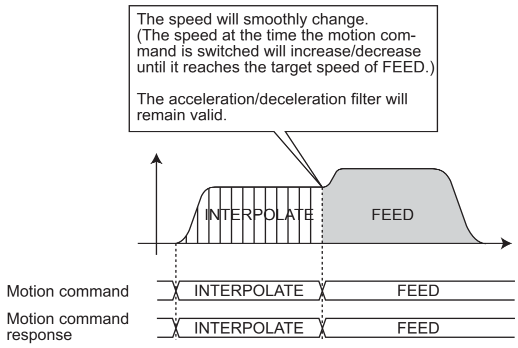
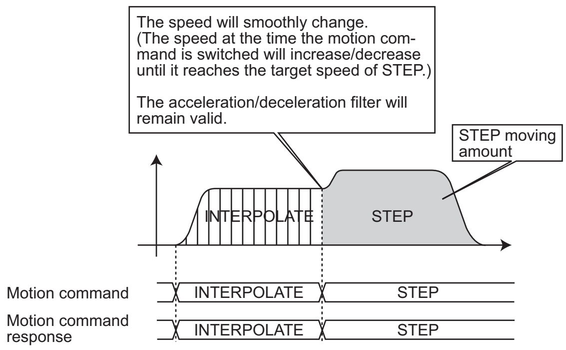
(cont'd)

Switched From	Switched To	Operation
ZRET	VELO	ZRET will switch to VELO when the axis stops after deceleration. 
	TRQ	ZRET will switch to TRQ when the axis stops after deceleration. 
	PHASE	ZRET will switch to PHASE when the axis stops after deceleration. 

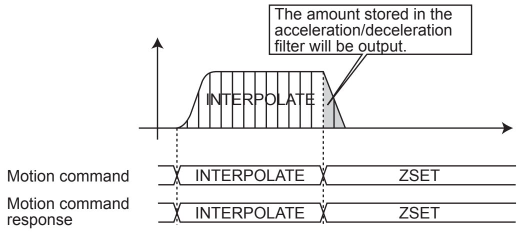
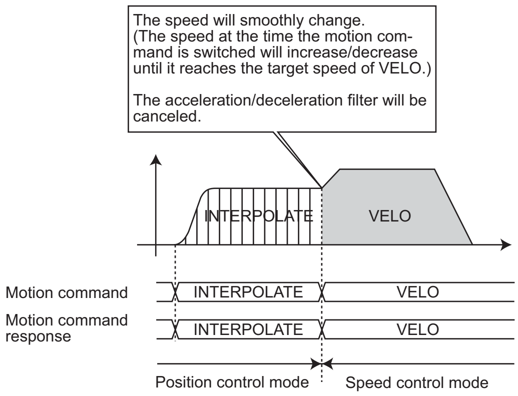
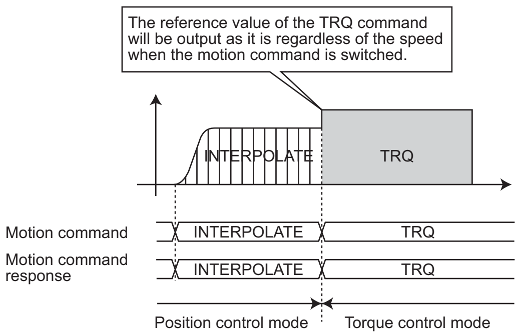
7.2.4 Switching from INTERPOLATE

Switched From	Switched To	Operation
INTERPOLATE	NOP	INTERPOLATE will immediately switch to NOP, and the moving amount stored in the acceleration/deceleration filter will be output. 
	POSING	INTERPOLATE will immediately switch to POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.  The value of Position Reference Setting (OL□□1C) when the motion command is switched will be as follows. <In Incremental Addition Mode (OW□□09, bit 5 = 0)> Incremental value = Target position – IL□□14 (DPOS) OL□□1C = OL□□1C+ Incremental value <In Absolute Mode (OW□□09, bit 5 = 1)> OL□□1C = Target position
	EX_POSING	INTERPOLATE will immediately switch to EX_POSING, and the amount of motion stored in the acceleration/deceleration filter will be output. When execution of EX_POSING is started, values are written to the related servo parameters and then the positioning operation starts.  The value of Position Reference Setting (OL□□1C) when the motion command is switched will be as follows. <In Incremental Addition Mode (OW□□09, bit 5 = 0)> Incremental value = Target position – IL□□14 (DPOS) OL□□1C = OL□□1C+ Incremental value <In Absolute Mode (OW□□09, bit 5 = 1)> OL□□1C = Target position

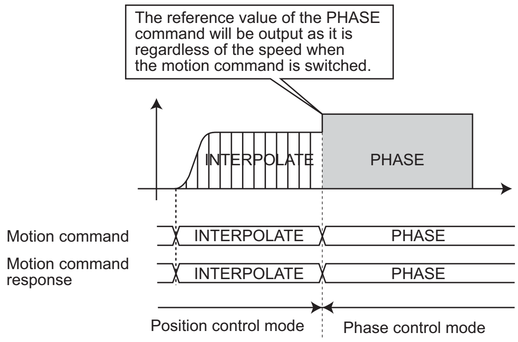
(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="6">INTERPOLATE</td><td>ZRET</td><td>INTERPOLATE will immediately switch to ZRET, and the amount of motion stored in the acceleration/deceleration filter will be output.
When execution of ZRET is started, values are written to the related servo parameters and then the zero return operation starts.

</td></tr>
<tr><td>INTERPOLATE</td><td>INTERPOLATE operation will continue.</td></tr>
<tr><td>ENDOF_IN-TERPOLATE</td><td>INTERPOLATE will immediately switch to ENDOF_INTERPOLATE, and the moving amount stored in the acceleration/deceleration filter will be maintained.

</td></tr>
<tr><td>LATCH</td><td>Same as ENDOF_INTERPOLATE</td></tr>
<tr><td>FEED</td><td>INTERPOLATE will immediately switch to FEED, and the moving amount stored in the acceleration/deceleration filter will be maintained.

</td></tr>
<tr><td>STEP</td><td>INTERPOLATE will immediately switch to STEP, and the moving amount stored in the acceleration/deceleration filter will be maintained.

</td></tr>
</table>

(cont'd)

Switched From	Switched To	Operation
INTERPOLATE	ZSET	INTERPOLATE will immediately switch to ZSET, and the moving amount stored in the acceleration/deceleration filter will be output.  • In actual operation, set the zero point by executing ZSET in the positioning completed status.
	VELO	INTERPOLATE will immediately switch to VELO, and the control mode will change from position control mode to speed control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.  • After INTERPOLATE has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the INTERPOLATE operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute the VELO command.
	TRQ	INTERPOLATE will immediately switch to TRQ, and the control mode will change from position control mode to torque control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.  • After INTERPOLATE has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.

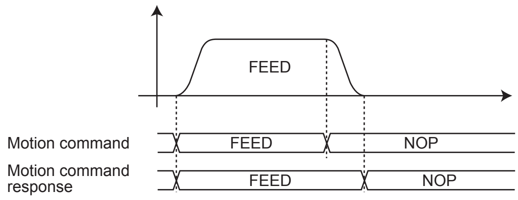
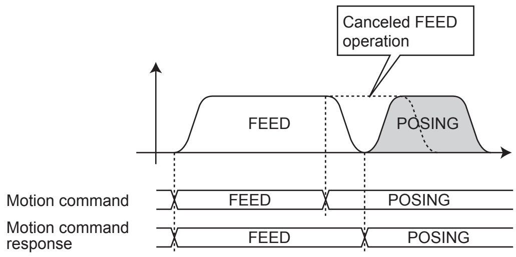
(cont'd)

Switched From	Switched To	Operation
INTERPOLATE	PHASE	INTERPOLATE will immediately switch to PHASE, and the control mode will change from position control mode to phase control mode. 

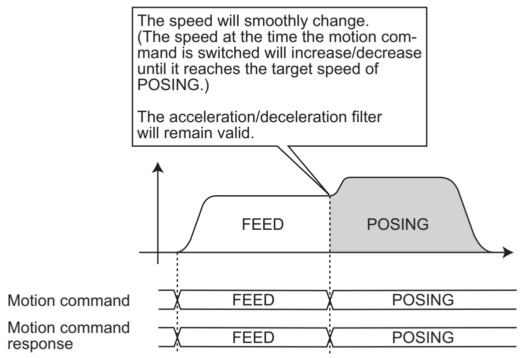
7.2.5 Switching from ENDOF_INTERPOLATE or LATCH

The operations are the same as are described in *7.2.4 Switching from INTERPOLATE*.

7.2.6 Switching from FEED

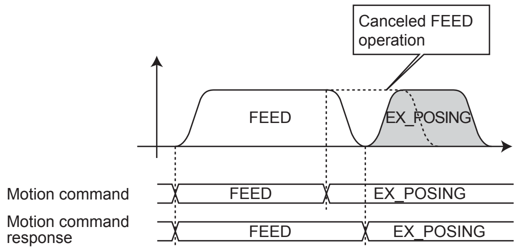
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">FEED</td><td>NOP</td><td>FEED will switch to NOP when the axis stops after deceleration.

</td></tr>
<tr><td>POSING</td><td><In Incremental Addition Mode (OW□□09, bit 5 = 0)>
FEED will switch to POSING when the axis stops after deceleration.


Incremental value = Target position − IL□□14 (DPOS)
OL□□1C = OL□□1C + Incremental value
• Any change in the Position Reference Setting (OL□□1C) during deceleration will be ignored.

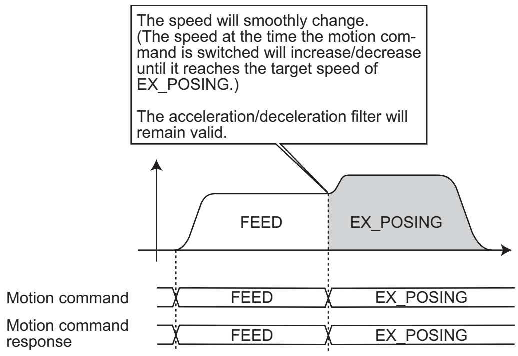
<In Absolute Mode (OW□□09, bit 5 = 1)>
FEED will immediately switch to POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.


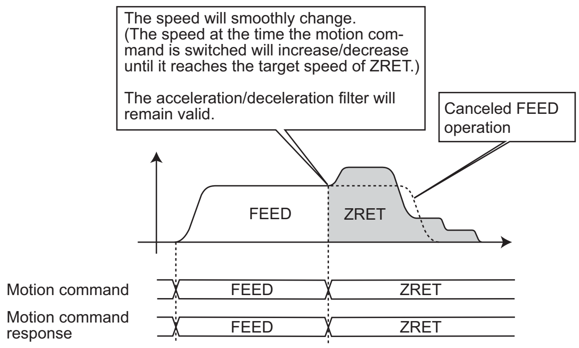
The set value of Position Reference Setting (OL□□1C) will be:
OL□□1C = Target position</td></tr>
</table>

(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">FEED</td><td>EX_POSING</td><td>
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
FEED will switch to EX_POSING when the axis stops after deceleration.
When execution of EX_POSING is started, values are written to the related servo parameters and then the positioning operation starts.


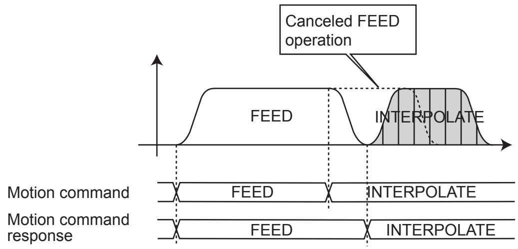
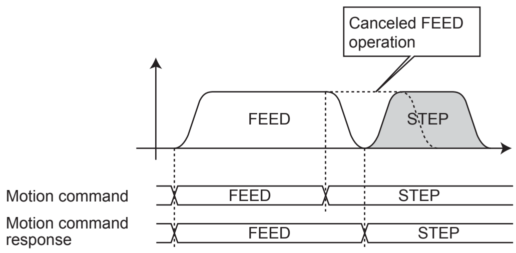
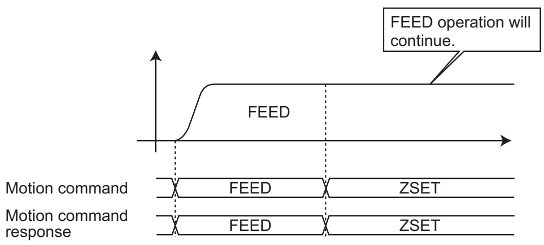
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C + Incremental value
• Any change in Position Reference Setting (OL□□1C) during deceleration will be ignored.

<In Absolute Mode (OW□□09, bit 5 = 1)>
FEED will immediately switch to EX_POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.


The set value of Position Reference Setting (OL□□1C) will be:
OL□□1C = Target position
</td></tr>
<tr><td>ZRET</td><td>
FEED will immediately switch to ZRET, and the moving amount stored in the acceleration/deceleration filter will be maintained.


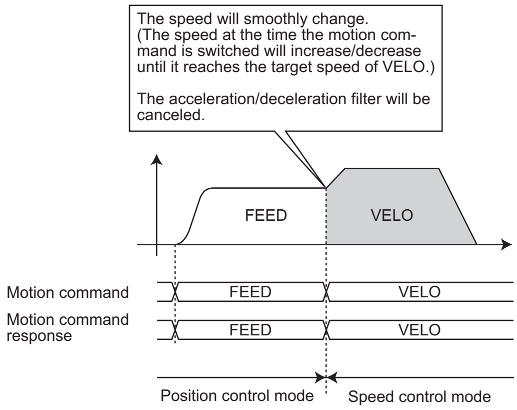
</td></tr>
</table>

(cont'd)

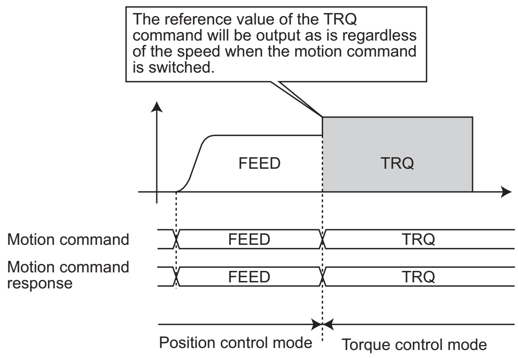
Switched From	Switched To	Operation
FEED	INTERPOLATE	FEED will switch to INTERPOLATE when the axis stops after deceleration.  <Change in Position Reference Setting (OL□□1C) during Deceleration> • In Incremental Addition Mode (OW□□09, bit 5 = 0) Any change in the Position Reference Setting (OL□□1C) will be ignored. • In Absolute Mode (OW□□09, bit 5 = 1) The change in the Position Reference Setting (OL□□1C) will be output at as soon as at the timing of the first high-speed scan after INTERPOLATE execution starts. ♦ Do not change the Position Reference Setting during deceleration unless it is absolutely necessary.
	ENDOF_INTERPOLATE	Same as INTERPOLATE
	LATCH	Same as INTERPOLATE
	FEED	FEED operation will continue.
	STEP	FEED will switch to STEP when the axis stops after deceleration. 
	ZSET	FEED will immediately switch to ZSET, and the FEED operation will continue.  ♦ In actual operation, set the zero point by executing ZSET in the positioning completed status.

(cont'd)

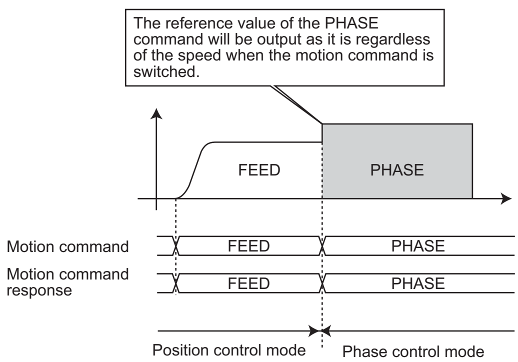
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">FEED</td><td>VELO</td><td>FEED will immediately switch to VELO, and the control mode will change from position control mode to speed control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.



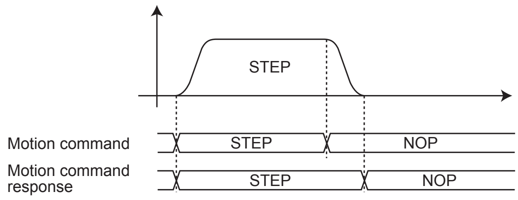
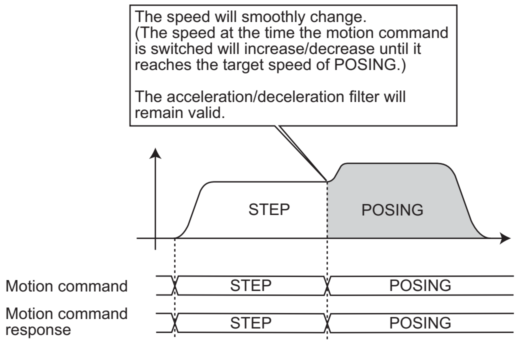
- After FEED has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the FEED operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute the VELO command.</td></tr>
<tr><td>TRQ</td><td>FEED will immediately switch to TRQ, and the control mode will change from position control mode to torque control mode.
The moving amount stored in the acceleration/deceleration filter will be reset to 0.

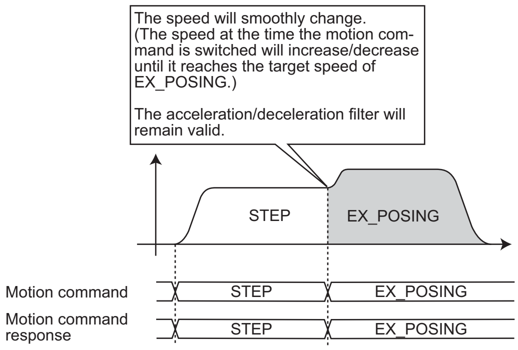


- After FEED has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
<tr><td>PHASE</td><td>FEED will immediately switch to PHASE, and the control mode will change from position control mode to phase control mode.


</td></tr>
</table>

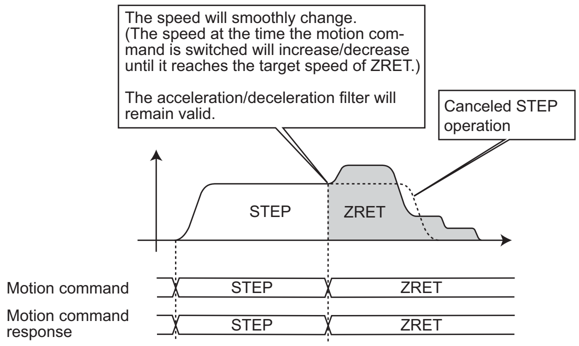
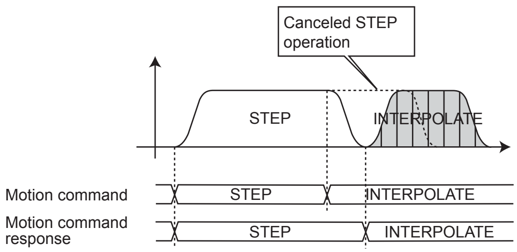
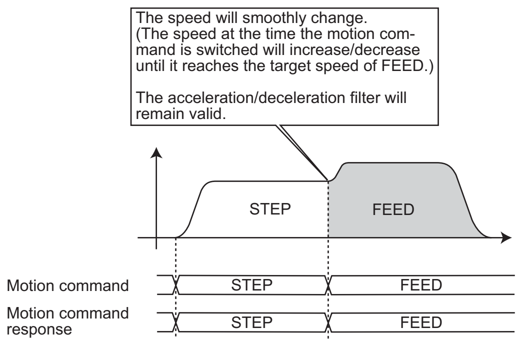
7.2.7 Switching from STEP

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">STEP</td><td>NOP</td><td>STEP will switch to NOP when the axis stops after deceleration.

</td></tr>
<tr><td>POSING</td><td>STEP will immediately switch to POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.


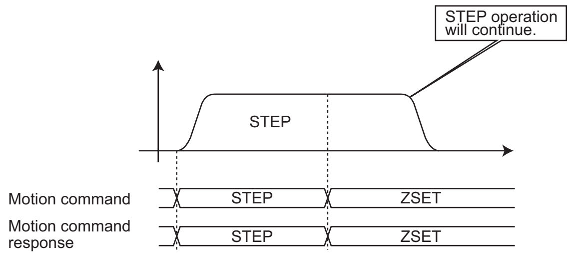
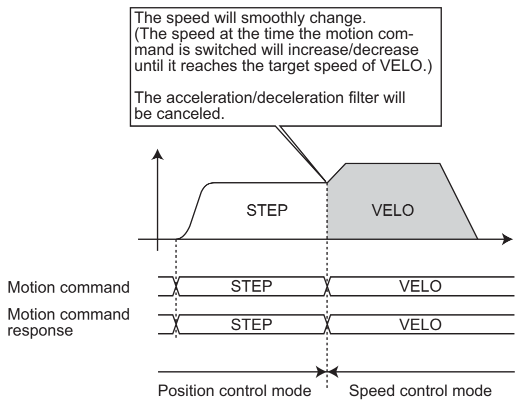
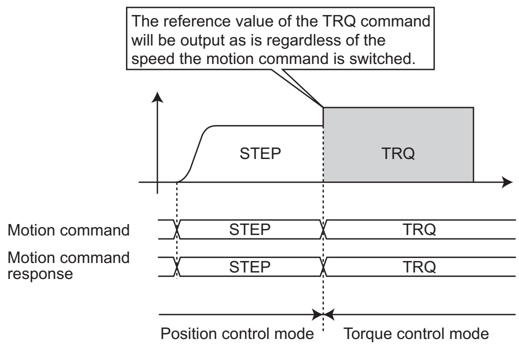
The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C+ Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target position</td></tr>
<tr><td>EX_POSING</td><td>STEP will immediately switch to EX_POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.


The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C+ Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target position</td></tr>
</table>

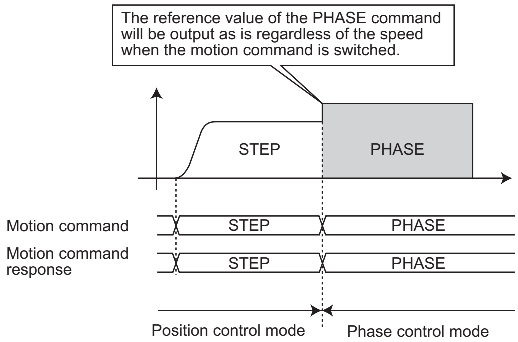
(cont'd)

Switched From	Switched To	Operation
STEP	ZRET	STEP will immediately switch to ZRET, and the moving amount stored in the acceleration/deceleration filter will be maintained. 
	INTERPOLATE	STEP will switch to INTERPOLATE when the axis stops after deceleration.  <Change in Position Reference Setting (OL□□1C) during Deceleration> • In Incremental Addition Mode (OW□□09, bit 5 = 0) Any change in the Position Reference Setting (OL□□1C) will be ignored. • In Absolute Mode (OW□□09, bit 5 = 1) The change in the Position Reference Setting (OL□□1C) will be output as soon as the first high-speed scan after INTERPOLATE execution starts. ♦ Do not change the Position Reference Setting during deceleration unless it is absolutely necessary.
	ENDOF_INTERPOLATE	Same as INTERPOLATE
	LATCH	Same as for INTERPOLATE
	FEED	STEP will immediately switch to FEED, and the moving amount stored in the acceleration/deceleration filter will be maintained. 
	STEP	STEP operation will continue.

(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">STEP</td><td>ZSET</td><td>STEP will immediately switch to ZSET, and positioning will continue.

• In actual operation, set the zero point by executing ZSET in the positioning completed status.</td></tr>
<tr><td>VELO</td><td>STEP will immediately switch to VELO, and the control mode will change from position control mode to speed control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.

• After STEP has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the STEP operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW☐☐0C, bit 0) turns ON, execute the VELO command.</td></tr>
<tr><td>TRQ</td><td>STEP will immediately switch to TRQ, and the control mode will change from position control mode to torque control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.

• After STEP has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
</table>

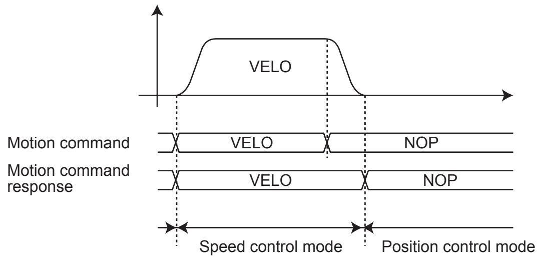
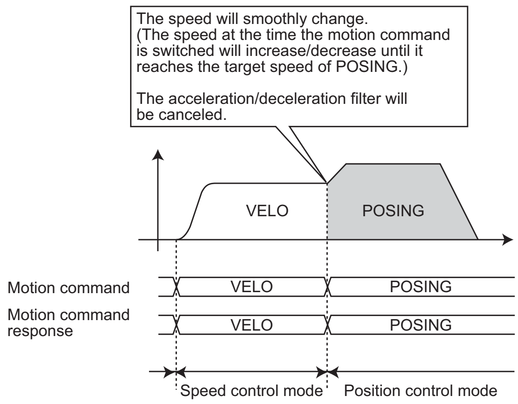
(cont'd)

Switched From	Switched To	Operation
STEP	PHASE	STEP will immediately switch to PHASE, and the control mode will change from position control mode to phase control mode. 

7.2.8 Switching from ZSET

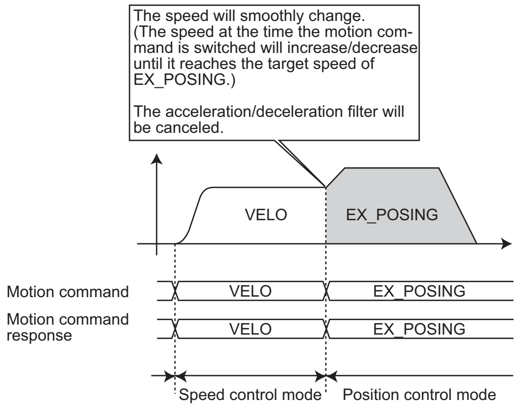
The execution of the ZSET command is completed in one scan if neither Absolute Mode nor infinite length axis are selected. So, a motion command that is set to run while the ZSET command is being carried out as soon as it is issued.

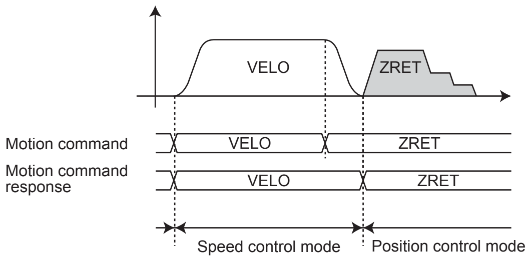
7.2.9 Switching from VELO

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">VELO</td><td>NOP</td><td>VELO will switch to NOP when the axis stops after deceleration, and the control mode will change from speed control mode to position control mode.

</td></tr>
<tr><td>POSING</td><td>VELO will immediately switch to POSING, and the control mode will change from speed control mode to position control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.


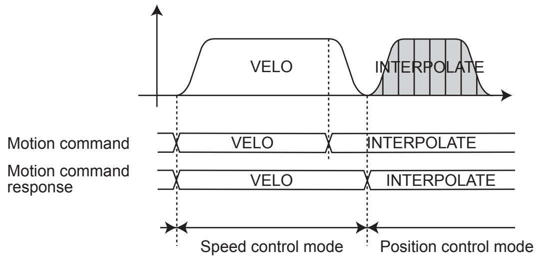
• After VELO has switched to POSING, the POSING command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the VELO operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute a POSING command.
The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C+ Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target position</td></tr>
</table>

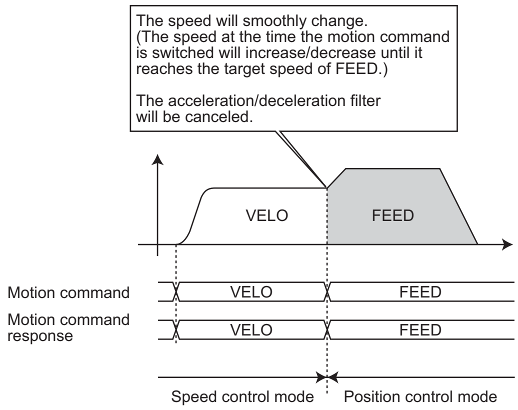
(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">VELO</td><td>EX_POSING</td><td>VELO will immediately switch to EX_POSING, and the control mode will change from speed control mode to position control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.


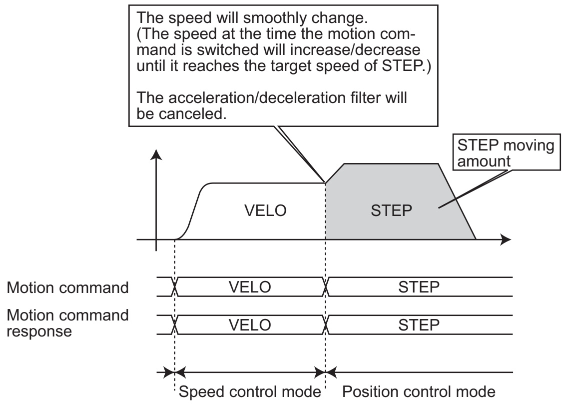
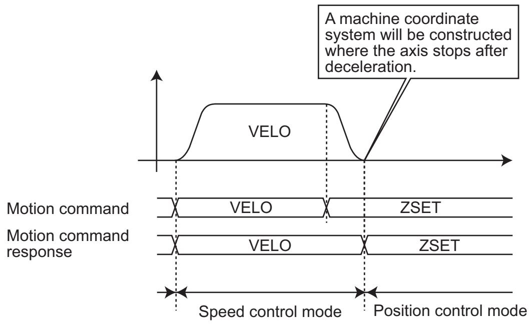
♦ After VELO has switched to EX_POSING, the EX_POSING command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the VELO operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute an EX_POSING command.
The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C + Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target position</td></tr>
<tr><td>ZRET</td><td>VELO will switch to ZRET when the axis stops after deceleration, and the control mode will change from speed control mode to position control mode.

</td></tr>
</table>

(cont'd)

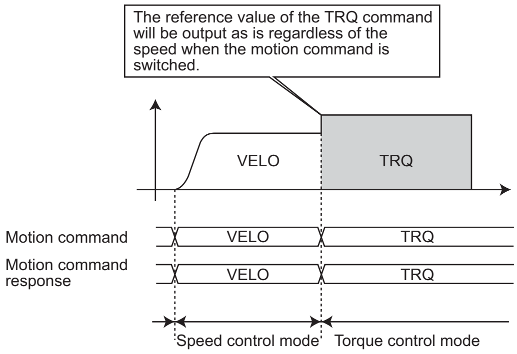
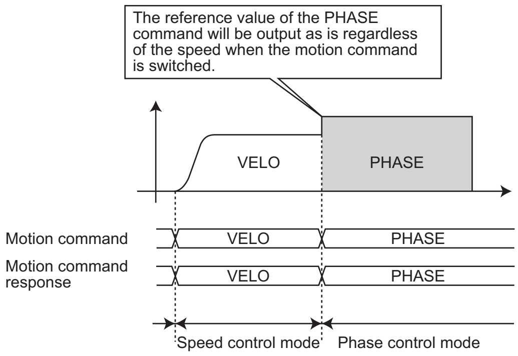
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="4">VELO</td><td>INTERPOLATE</td><td>VELO will switch to INTERPOLATE when the axis stops after deceleration, and the control mode will change from speed control mode to position control mode after the axis deceleration is completed.


<Change in Position Reference Setting (OL□□1C) during Deceleration>
• In Incremental Addition Mode (OW□□09, bit 5 = 0)
Any change in the Position Reference Setting (OL□□1C) will be ignored.
• In Absolute Mode (OW□□09, bit 5 = 1)
The change in Position Reference Setting (OL□□1C) will be output as soon as the first high-speed scan after INTERPOLATE execution starts.
◆ Do not change the Position Reference Setting during deceleration unless it is absolutely necessary.</td></tr>
<tr><td>ENDOF_INTERPOLATE</td><td>Same as INTERPOLATE</td></tr>
<tr><td>LATCH</td><td>Same as INTERPOLATE</td></tr>
<tr><td>FEED</td><td>VELO will immediately switch to FEED, and the control mode will change from speed control mode to position control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.

</td></tr>
</table>

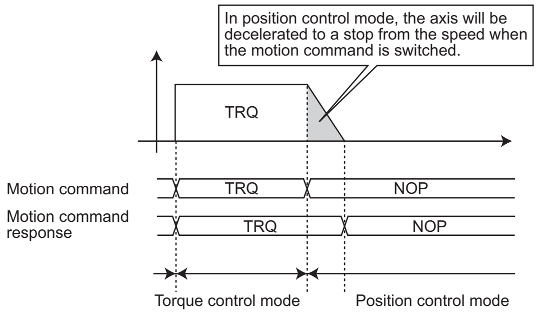
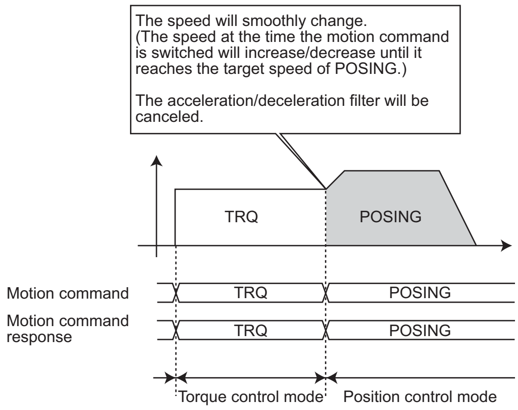
(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">VELO</td><td>STEP</td><td>VELO will immediately switch to STEP, and the control mode will change from speed control mode to position control mode. The moving amount stored in the acceleration/ deceleration filter will be reset to 0.

</td></tr>
<tr><td>ZSET</td><td>ZSET command will be executed when the axis stops after deceleration.

</td></tr>
<tr><td>VELO</td><td>VELO operation will continue.</td></tr>
</table>

(cont'd)

Switched From	Switched To	Operation
VELO	TRQ	VELO will immediately switch to TRQ, and the control mode will change from speed control mode to torque control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.  • After VELO has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.
	PHASE	VELO will immediately switch to PHASE, and the control mode will change from speed control mode to phase control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0. 

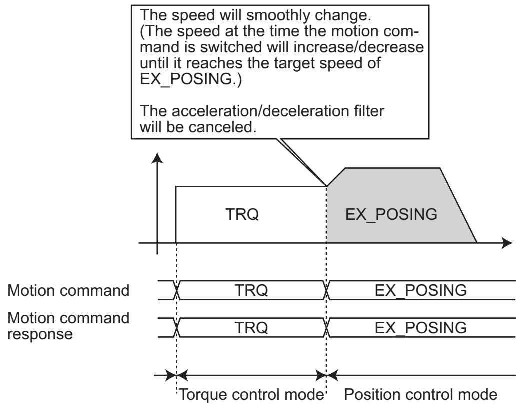
7.2.10 Switching from TRQ

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">TRQ</td><td>NOP</td><td>The axis will decelerate to a stop from the speed when the motion command is switched in position control mode.
TRQ will be switched to NOP when the axis stops after deceleration.

</td></tr>
<tr><td>POSING</td><td>TRQ will immediately switch to POSING, and the control mode will change from torque control mode to position control mode.


The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C+ Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target position</td></tr>
</table>

(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">TRQ</td><td>EX_POSING</td><td>
TRQ will immediately switch to EX_POSING, and the control mode will change from torque control mode to position control mode.



* After TRQ has switched to EX_POSING, the EX_POSING command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the TRQ operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute an EX_POSING command.

The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.

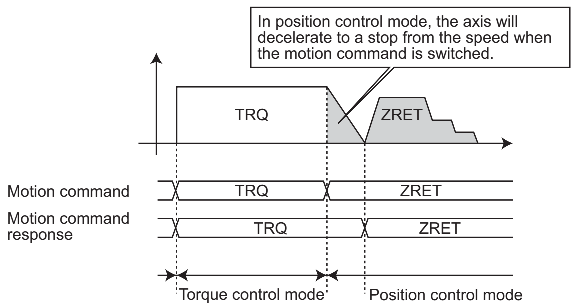
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>

Incremental value = Target position – IL□□14 (DPOS)

OL□□1C = OL□□1C + Incremental value

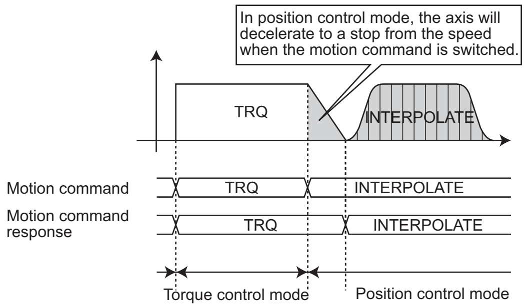
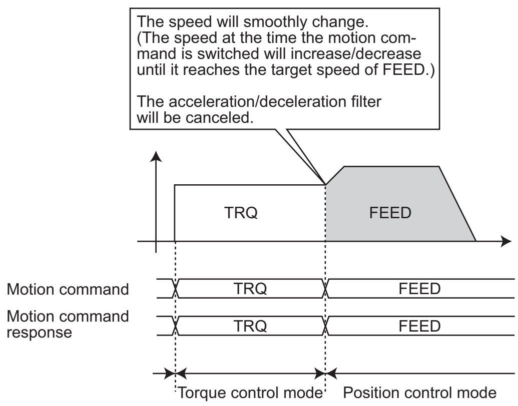
<In Absolute Mode (OW□□09, bit 5 = 1)>

OL□□1C = Target position
</td></tr>
<tr><td>ZRET</td><td>
The axis will decelerate to a stop in position control mode. When the axis stops, TRQ will switch to ZRET.

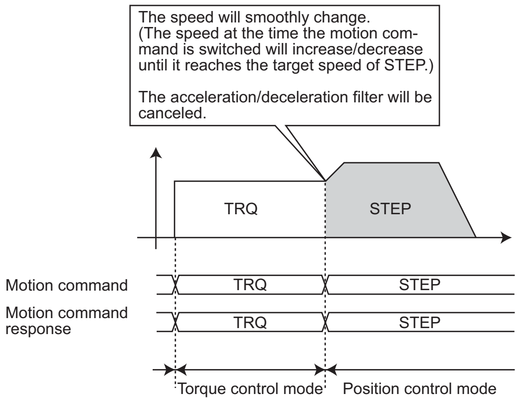


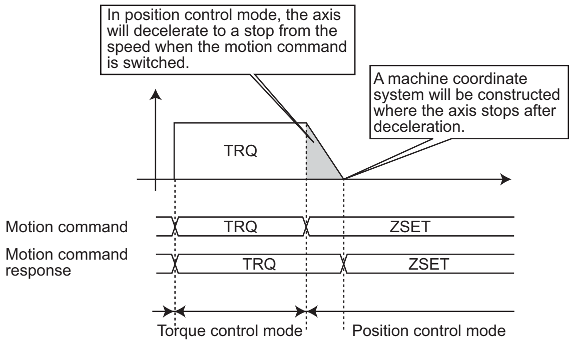
</td></tr>
</table>

(cont'd)

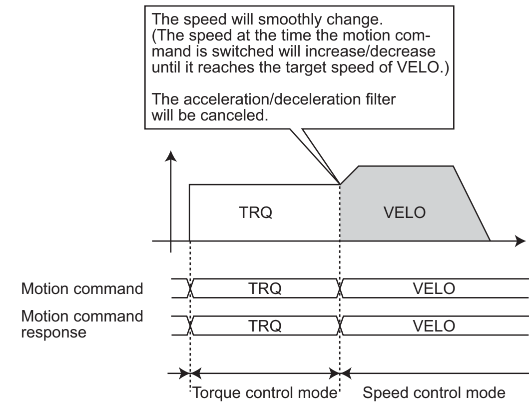
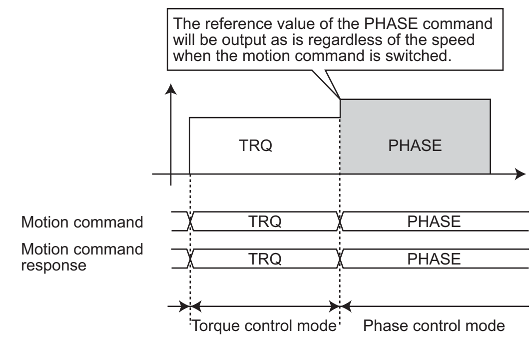
Switched From	Switched To	Operation
TRQ	INTERPOLATE	The axis will decelerate to a stop in position control mode. When the axis stops, TRQ will switch to INTERPOLATE.  <Change in Position Reference Setting (OL□□1C) during Deceleration> • In Incremental Addition Mode (OW□□09, bit 5 = 0) Any change in the Position Reference Setting (OL□□1C) will be ignored. • In Absolute Mode (OW□□09, bit 5 = 1) The change in the Position Reference Setting (OL□□1C) will be output as soon as the first high-speed scan after INTERPOLATE execution starts. ♦ Do not change the Position Reference Setting during deceleration unless it is absolutely necessary.
	ENDOF_INTERPOLATE	Same as INTERPOLATE
	LATCH	Same as INTERPOLATE
	FEED	TRQ will immediately switch to FEED, and the control mode will change from torque control mode to position control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.  ♦ After TRQ has switched to FEED, the FEED command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the TRQ operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute a FEED command.

(cont'd)

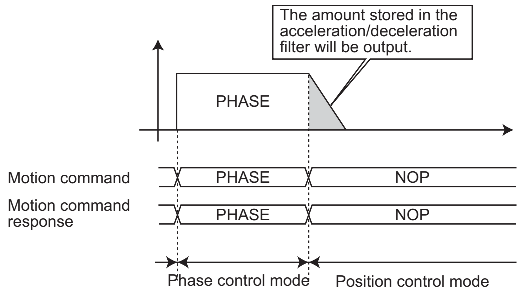
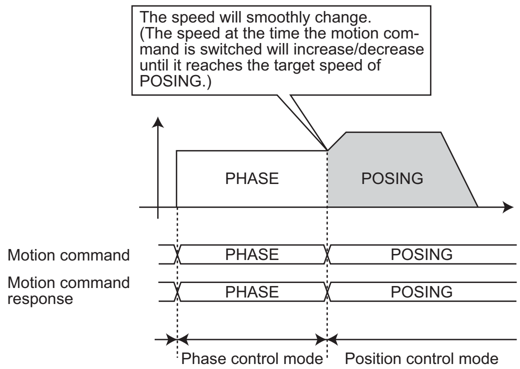
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">TRQ</td><td>STEP</td><td>TRQ will immediately switch to STEP, and the control mode will change from torque control mode to position control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.


• After TRQ is switched to STEP, the STEP command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the TRQ operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute a STEP command.</td></tr>
<tr><td>ZSET</td><td>The axis will decelerate to a stop in position control mode. When the axis stops, ZSET command execution will start.

</td></tr>
</table>

(cont'd)

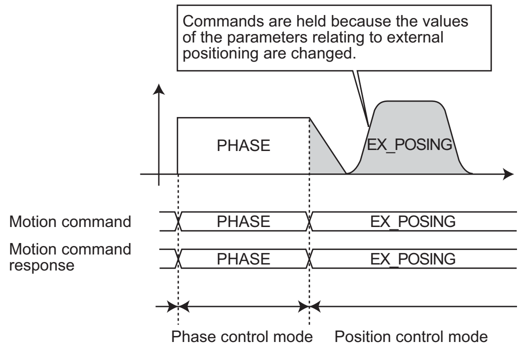
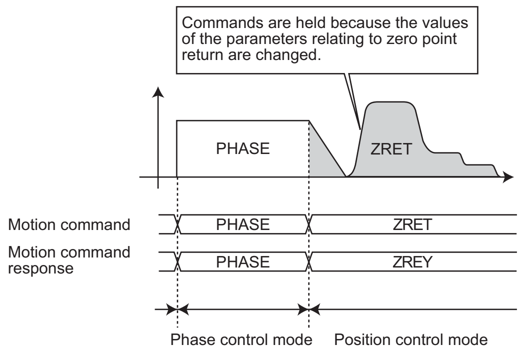
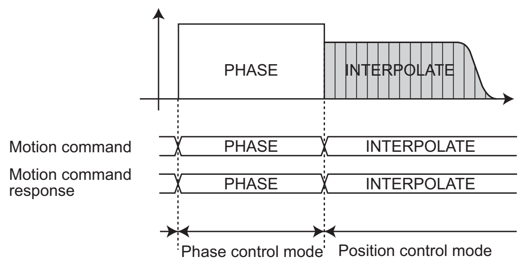
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">TRQ</td><td>VELO</td><td>TRQ will immediately switch to VELO, and the control mode will change from torque control mode to speed control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.

• After TRQ has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the TRQ operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute a VELO command.</td></tr>
<tr><td>TRQ</td><td>TRQ operation will continue.</td></tr>
<tr><td>PHASE</td><td>TRQ will immediately switch to PHASE, and the control mode will change from torque control mode to phase control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.

• After TRQ has switched to PHASE, the PHASE command will be executed without the acceleration/deceleration filter. This is because PHASE is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
</table>

7.2.11 Switching from PHASE

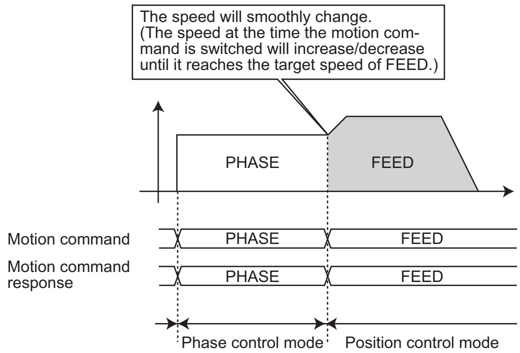
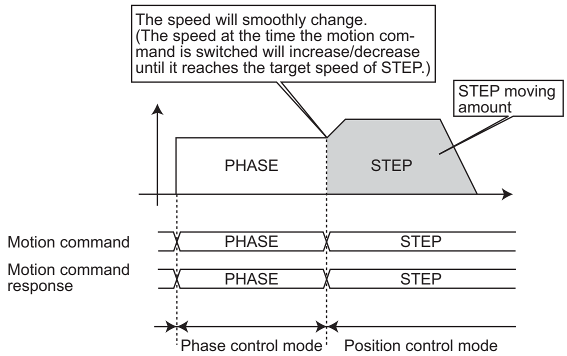
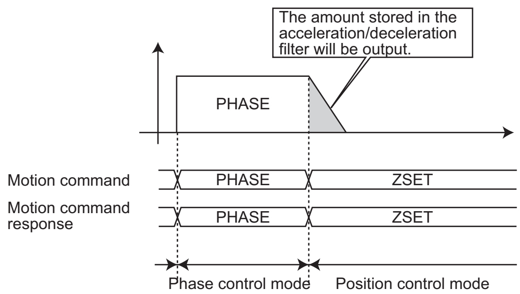
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">PHASE</td><td>NOP</td><td>PHASE will immediately switch to NOP, and the moving amount stored in the acceleration/deceleration filter will be output.

</td></tr>
<tr><td>POSING</td><td>PHASE will immediately switch to POSING, and the control mode will change from phase control mode to position control mode.


The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C+ Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target position</td></tr>
</table>

(cont'd)

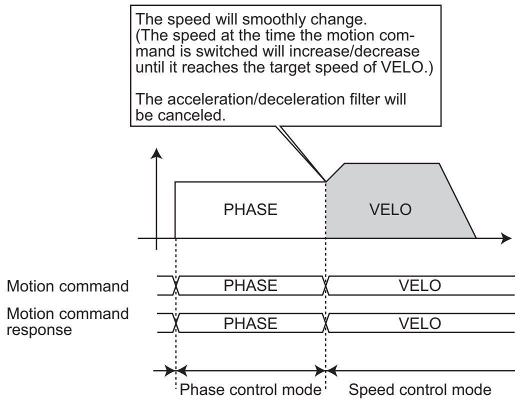
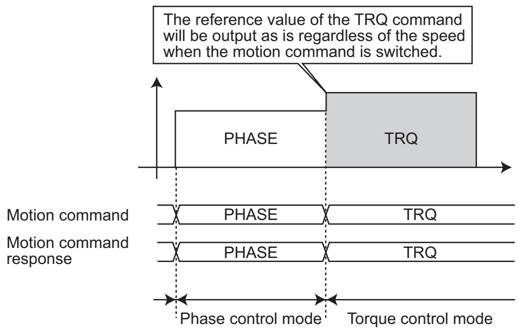
Switched From	Switched To	Operation
PHASE	EX_POSING	PHASE will immediately switch to EX_POSING, and the control mode will change from phase control mode to position control mode. When this happens, the amount of motion stored in the acceleration/deceleration filter will be output. When execution of EX_POSING is started, values are written to the related servo parameters and then the positioning operation starts.  The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows. <In Incremental Addition Mode (OW□□09, bit 5 = 0)> Incremental value = Target position – IL□□14 (DPOS) OL□□1C = OL□□1C+ Incremental value <In Absolute Mode (OW□□09, bit 5 = 1)> OL□□1C = Target position
	ZRET	PHASE will immediately switch to ZRET, and the control mode will change from phase control mode to position control mode. When this happens, the amount of motion stored in the acceleration/deceleration filter will be output. When execution of ZRET is started, values are written to the related servo parameters and then the zero return operation starts. 
	INTERPOLATE	PHASE will immediately switch to INTERPOLATE, and the control mode will change from phase control mode to position control mode. 
	ENDOF_INTERPOLATE	Same as INTERPOLATE
	LATCH	Same as INTERPOLATE

(cont'd)

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">PHASE</td><td>FEED</td><td>PHASE will immediately switch to FEED, and the control mode will change from phase control mode to position control mode.

</td></tr>
<tr><td>STEP</td><td>PHASE will immediately switch to STEP, and the control mode will change from phase control mode to position control mode.

</td></tr>
<tr><td>ZSET</td><td>PHASE will immediately switch to ZSET, and the control mode will change from phase control mode to position control mode.


• In actual operation, set the zero point by executing ZSET in the positioning completed status.</td></tr>
</table>

(cont'd)

Switched From	Switched To	Operation
PHASE	VELO	PHASE will immediately switch to VELO, and the control mode will change from phase control mode to speed control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.  • After PHASE has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the PHASE operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute a VELO command.
	TRQ	PHASE will immediately switched to TRQ, and the control mode will be changed from phase control mode to torque control mode. 
	PHASE	PHASE operation will continue.

8

Control Block Diagrams

This chapter explains the control block diagrams.

8.1 Position Control

8.1.1 Motion Parameters for Position Control

- : These parameters are ignored.

(1) Fixed Parameters

No.	Name	Setting Unit	Default Value	Setting Range
0	Selection of Operation Modes	–	1	0 to 5
1	Function Selection Flag 1	–	0000h	Bit setting
2	Function Selection Flag 2	–	0000h	Bit setting
4	Reference Unit Selection	–	0	0 to 3
5	Number of Digits below Decimal Point	–	3	0 to 5
6	Travel Distance per Machine Rotation	Reference unit	10000	1 to $2^{31}-1$
	Linear Scale Pitch (Linear Motor)	Reference unit	10000	1 to $2^{31}-1$
8	Servo Motor Gear Ratio	–	1	1 to 65535
9	Machine Gear Ratio	–	1	1 to 65535
10	Infinite Length Axis Reset Position (POSMAX)	Reference unit	360000	1 to $2^{31}-1$
12	Positive Software Limit Value	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
14	Negative Software Limit Value	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
16	Backlash Compensation Amount	Reference unit	0	-2^{31} to $2^{31}-1$
30	Encoder Selection	–	0	0 to 3
34	Rated Motor Speed (Rotary Motor)	min^{-1}	3000	1 to 32000
	Rated Speed (Linear Motor)	0.1 m/s, 0.1 mm/s	3000	1 to 32000
36	Number of Pulses per Motor Rotation (Rotary Motor)	pulse	65536	1 to $2^{31}-1$
	Number of Pulses per Linear Scale Pitch (Linear Motor)	pulses/linear scale pitch	65536	1 to $2^{31}-1$
38	Maximum Number of Absolute Encoder Turns Rotation	Rev	65534	0 to $2^{31}-1$
42	Feedback Speed Moving Average Time Constant	ms	10	0 to 32

(2) Setting Parameters

No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Command Setting	–	0000h	Bit setting
OW□□01	Mode Setting 1	–	0000h	Bit setting
OW□□02	Mode Setting 2	–	0000h	Bit setting
OW□□03	Function Setting 1	–	0011h	Bit setting
OW□□04	Function Setting 2	–	0033h	Bit setting
OW□□05	Function Setting 3	–	0000h	Bit setting
OW□□08	Motion Command	–	0	0 to 39
OW□□09	Motion Command Control Flag	–	0000h	Bit setting
OW□□0A	Motion Subcommand	–	0	0 to 65535
OL□□0C	Torque Feed Forward Gain for Interpolation Feeding Commands	Depends on torque unit.	0	-2^{31} to $2^{31}-1$
OW□□0E	Speed Limit Setting at the Torque/Thrust Reference	0.01%	15000	-32768 to 32767
OL□□10	Speed Reference Setting	Depends on speed unit.	3000	-2^{31} to $2^{31}-1$
OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	Depends on torque unit.	30000	-2^{31} to $2^{31}-1$
OL□□16	Secondly Speed Compensation	Depends on speed unit.	0	-2^{31} to $2^{31}-1$
OW□□18	Override	0.01%	10000	0 to 32767
OL□□1C	Position Reference Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□1E	Width of Positioning Completion	Reference unit	100	0 to 65535
OL□□20	NEAR Signal Output Width	Reference unit	0	0 to 65535
OL□□22	Error Count Alarm Detection	Reference unit	$2^{31}-1$	0 to $2^{31}-1$
OW□□26	Positioning Completion Check Time	ms	0	0 to 65535
OL□□28	Phase Correction Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□2A	Latch Zone Lower Limit Setting (for External Positioning)	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
OL□□2C	Latch Zone Upper Limit Setting (for External Positioning)	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
OW□□2E	Position Loop Gain	0.1/s	300	0 to 32767
OW□□2F	Speed Loop Gain	Hz	40	1 to 2000
OW□□30	Speed Feed Forward Amends	0.01%	0	0 to 32767
OW□□31	Speed Amends	0.01%	0	-32768 to 32767
OW□□32	Position Integration Time Constant	ms	0	0 to 32767
OW□□34	Speed Integration Time Constant	0.01 ms	2000	15 to 65535
OL□□36	Straight Line Acceleration/Acceleration Time Constant	Depends on acceleration/deceleration speed unit.	0	0 to $2^{31}-1$
OL□□38	Straight Line Deceleration/Deceleration Time Constant	Depends on acceleration/deceleration speed unit.	0	0 to $2^{31}-1$
OW□□3A	Filter Time Constant	0.1 ms	0	0 to 65535
OW□□3C	Zero Point Return Method	–	0	0 to 19
OW□□3D	Width of Starting Point Position Output	Reference unit	100	0 to 65535
OL□□3E	Approach Speed	Depends on speed unit.	1000	-2^{31} to $2^{31}-1$
OL□□40	Creep Rate	Depends on speed unit.	500	-2^{31} to $2^{31}-1$
OL□□42	Zero Point Return Travel Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□44	STEP Travel Distance	Reference unit	1000	0 to $2^{31}-1$
OL□□46	External Positioning Final Travel Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□48	Zero Point Position in Machine Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□4A	Work Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$

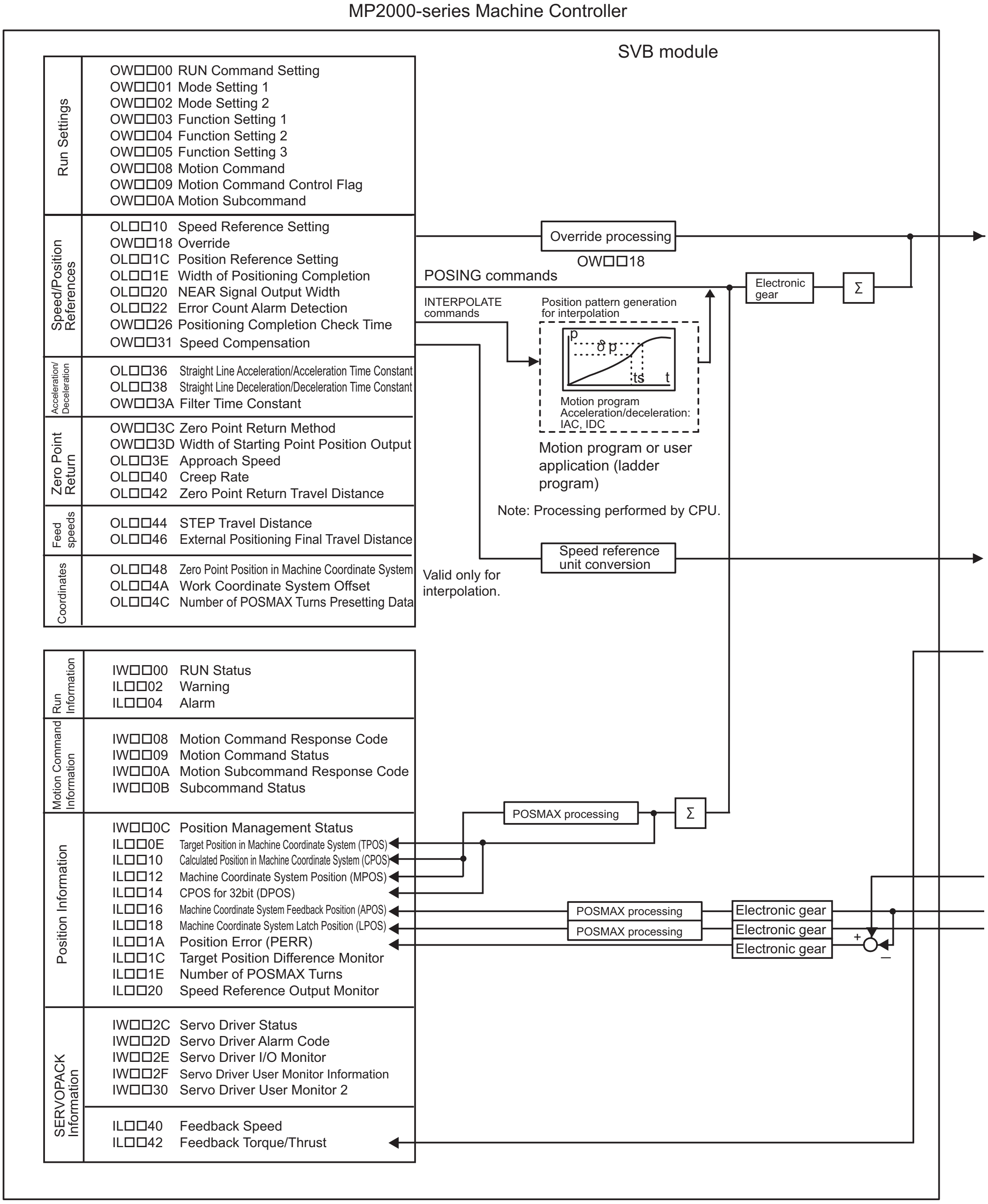
(cont'd)

No.	Name	Setting Unit	Default Value	Setting Range
OL□□4C	Number of POSMAX Turns Presetting Data	Rev	0	-2^{31} to $2^{31}-1$
OW□□4E	Servo User Monitor Setting	–	0E00H	Bit setting
OW□□4F	Servo Driver Alarm Monitor No.	–	0	0 to 9
OW□□50	Servo Driver User Constant No.	–	0	0 to 65535
OW□□51	Servo Driver User Constant Size	–	1	1, 2
OL□□52	Servo Driver User Constant Set Point	–	0	-2^{31} to $2^{31}-1$
OW□□54	Servo Driver for Assistance User Constant No.	–	0	0 to 65535
OW□□55	Servo Driver for Assistance User Constant Size	–	1	1, 2
OL□□56	Servo Driver for Assistance User Constant Set Point	–	0	-2^{31} to $2^{31}-1$
OW□□5C	Fixed Parameter Number	–	0	0 to 65535
OL□□5E	Encoder Position When Power is OFF (Lower 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□60	Encoder Position When Power is OFF (Upper 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□62	Pulse Position When Power is OFF (Lower 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□64	Pulse Position When Power is OFF (Upper 2 words)	pulse	0	-2^{31} to $2^{31}-1$

(3) Monitoring Parameters

No.	Name	Unit	Default Value	Range
IW□□00	RUN Status	–	–	Bit setting
IW□□01	Parameter Number When Range Over is Generated	–	–	0 to 65535
IL□□02	Warning	–	–	Bit setting
IL□□04	Alarm	–	–	Bit setting
IW□□08	Motion Command Response Code	–	–	0 to 65535
IW□□09	Motion Command Status	–	–	Bit setting
IW□□0A	Motion Subcommand Response Code	–	–	0 to 65535
IW□□0B	Subcommand Status	–	–	Bit setting
IW□□0C	Position Management Status	–	–	Bit setting
IL□□0E	Target Position in Machine Coordinate System (TPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□10	Calculated Position in Machine Coordinate System (CPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□12	Machine Coordinate System Reference Position (MPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□14	CPOS for 32bit (DPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□16	Machine Coordinate System Feedback Position (APOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□18	Machine Coordinate System Latch Position (LPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1A	Position Error (PERR)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1C	Target Position Difference Monitor	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1E	Number of POSMAX Turns	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□20	Speed Reference Output Monitor	pulse/s	–	-2^{31} to $2^{31}-1$
IW□□2C	Servo Driver Status	–	–	Bit setting
IW□□2D	Servo Driver Alarm Code	–	–	-32768 to 32767
IW□□2E	Servo Driver I/O Monitor	–	–	Bit setting
IW□□2F	Servo Driver User Monitor Information	–	–	Bit setting
IL□□30	Servo Driver User Monitor 2	–	–	-2^{31} to $2^{31}-1$
IL□□34	Servo Driver User Monitor 4	–	–	-2^{31} to $2^{31}-1$
IW□□36	Servo Driver User Constant No.	–	–	0 to 65535
IW□□37	Supplementary Servo Driver User Constant No.	–	–	0 to 65535
IL□□38	Servo Driver User Constant Reading Data	–	–	-2^{31} to $2^{31}-1$
IL□□3A	Supplementary Servo Driver User Constant Reading Data	–	–	-2^{31} to $2^{31}-1$
IW□□3F	Motor Type	–	–	0, 1
IL□□40	Feedback Speed	Depends on speed unit.	–	-2^{31} to $2^{31}-1$
IL□□42	Feedback Torque/Thrust	Depends on torque unit.	–	-2^{31} to $2^{31}-1$
IL□□56	Fixed Parameter Monitor	–	–	-2^{31} to $2^{31}-1$
IL□□5E	Encoder Position When the Power is OFF (Lower 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□60	Encoder Position When the Power is OFF (Upper 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□62	Pulse Position When the Power is OFF (Lower 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□64	Pulse Position When the Power is OFF (Upper 2 words)	pulse	–	-2^{31} to $2^{31}-1$

8.1.2 Control Block Diagram for Position Control



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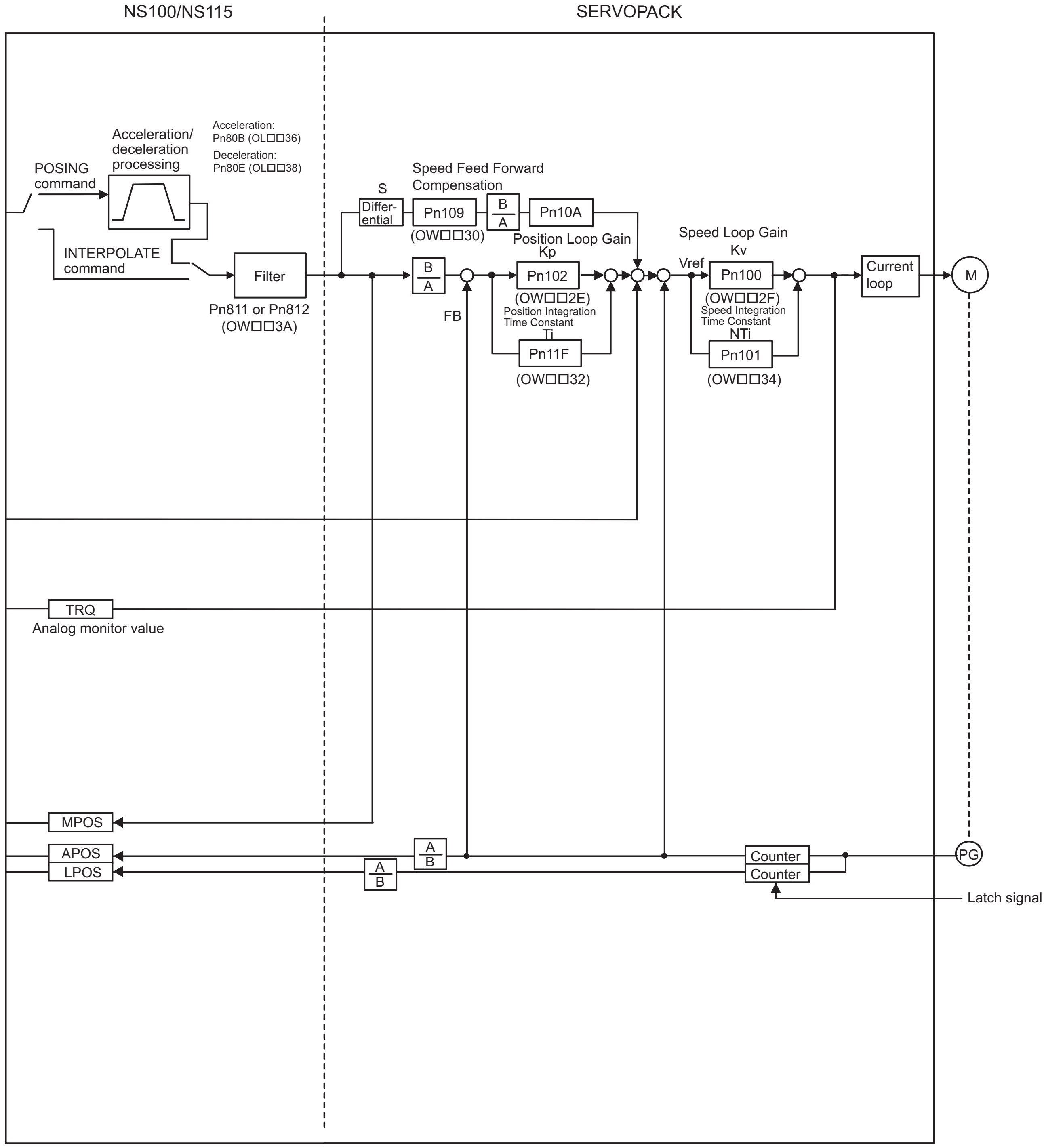

NS100/NS115
SERVOPACK
POSING command
Acceleration/ deceleration processing
Acceleration: Pn80B (OL□□36)
Deceleration: Pn80E (OL□□38)
INTERPOLATE command
Filter
Pn811 or Pn812 (OW□□3A)
S
Differ-ential
Speed Feed Forward Compensation
Pn109
(OW□□30)
B/A
Pn10A
Position Loop Gain Kp
Pn102
(OW□□2E)
Position Integration Time Constant Ti
Pn11F
(OW□□32)
FB
Speed Loop Gain Kv
Vref
Pn100
(OW□□2F)
Speed Integration Time Constant NTi
Pn101
(OW□□34)
Current loop
M
TRQ
Analog monitor value
MPOS
APOS
LPOS
A/B
Counter
Counter
PG
Latch signal

8.2 Phase Control

■ Precautions When Using Σ-V or Σ-7 Series SERVOPACKs

CAUTION

- When the tuning or vibration suppression functions are used to perform Servo adjustments and model following control is enabled (i.e., when Pn140.0 = 1), the SERVOPACK cannot be properly controlled by phase references. When using phase references, change the settings to the following values.
  - Set the model-following control to disabled (Pn140.0=0).
  - When using the utility functions for adjustment, select the following modes.
    - Advanced Autotuning and Advanced Autotuning by References: Mode=1
    - One-parameter Tuning: Tuning mode=0 or 1

8.2.1 Motion Parameters for Phase Control

- ▒ : These parameters are ignored.

(1) Fixed Parameters

No.	Name	Setting Unit	Default Value	Setting Range
0	Selection of Operation Modes	–	1	0 to 5
1	Function Selection Flag 1	–	0000h	Bit setting
2	Function Selection Flag 2	–	0000h	Bit setting
4	Reference Unit Selection	–	0	0 to 3
5	Number of Digits below Decimal Point	–	3	0 to 5
6	Travel Distance per Machine Rotation	Reference unit	10000	1 to $2^{31}-1$
	Linear Scale Pitch (Linear Motor)	Reference unit	10000	1 to $2^{31}-1$
8	Servo Motor Gear Ratio	–	1	1 to 65535
9	Machine Gear Ratio	–	1	1 to 65535
10	Infinite Length Axis Reset Position (POSMAX)	Reference unit	360000	1 to $2^{31}-1$
12	Positive Software Limit Value	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
14	Negative Software Limit Value	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
16	Backlash Compensation Amount	Reference unit	0	-2^{31} to $2^{31}-1$
30	Encoder Selection	–	0	0 to 3
34	Rated Motor Speed (Rotary Motor)	min^{-1}	3000	1 to 32000
	Rated Speed (Linear Motor)	0.1 m/s, 0.1 mm/s	3000	1 to 32000
36	Number of Pulses per Motor Rotation (Rotary Motor)	pulse	65536	1 to $2^{31}-1$
	Number of Pulses per Linear Scale Pitch (Linear Motor)	pulses/linear scale pitch	65536	1 to $2^{31}-1$
38	Maximum Number of Absolute Encoder Turns Rotation	Rev	65534	0 to $2^{31}-1$
42	Feedback Speed Moving Average Time Constant	ms	10	0 to 32

(2) Setting Parameters

No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Command Setting	–	0000h	Bit setting
OW□□01	Mode Setting 1	–	0000h	Bit setting
OW□□02	Mode Setting 2	–	0000h	Bit setting
OW□□03	Function Setting 1	–	0011h	Bit setting
OW□□04	Function Setting 2	–	0033h	Bit setting
OW□□05	Function Setting 3	–	0000h	Bit setting
OW□□08	Motion Command	–	0	0 to 39
OW□□09	Motion Command Control Flag	–	0000h	Bit setting
OW□□0A	Motion Subcommand	–	0	0 to 65535
OL□□0C	Torque/Thrust Reference Setting	Depends on torque unit.	0	-2^{31} to $2^{31}-1$
OW□□0E	Speed Limit Setting at the Torque/Thrust Reference	0.01%	15000	-32768 to 32767
OL□□10	Speed Reference Setting	Depends on speed unit.	3000	-2^{31} to $2^{31}-1$
OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	Depends on torque unit.	30000	-2^{31} to $2^{31}-1$
OL□□16	Secondly Speed Compensation	Depends on speed unit.	0	-2^{31} to $2^{31}-1$
OW□□18	Override	0.01%	10000	0 to 32767
OL□□1C	Position Reference Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□1E	Width of Positioning Completion	Reference unit	100	0 to 65535
OL□□20	NEAR Signal Output Width	Reference unit	0	0 to 65535
OL□□22	Error Count Alarm Detection	Reference unit	$2^{31}-1$	0 to $2^{31}-1$
OW□□26	Positioning Completion Check Time	ms	0	0 to 65535
OL□□28	Phase Correction Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□2A	Latch Zone Lower Limit Setting (for External Positioning)	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
OL□□2C	Latch Zone Upper Limit Setting (for External Positioning)	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
OW□□2E	Position Loop Gain	0.1/s	300	0 to 32767
OW□□2F	Speed Loop Gain	Hz	40	1 to 2000
OW□□30	Speed Feed Forward Amends	0.01%	0	0 to 32767
OW□□31	Speed Amends	0.01%	0	-32768 to 32767
OW□□32	Position Integration Time Constant	ms	0	0 to 32767
OW□□34	Speed Integration Time Constant	0.01 ms	2000	15 to 65535
OL□□36	Straight Line Acceleration/Acceleration Time Constant	Depends on acceleration/deceleration speed unit.	0	0 to $2^{31}-1$
OL□□38	Straight Line Deceleration/Deceleration Time Constant	Depends on acceleration/deceleration speed unit.	0	0 to $2^{31}-1$
OW□□3A	Filter Time Constant	0.1 ms	0	0 to 65535
OW□□3C	Zero Point Return Method	–	0	0 to 19
OW□□3D	Width of Starting Point Position Output	Reference unit	100	0 to 65535
OL□□3E	Approach Speed	Depends on speed unit.	1000	-2^{31} to $2^{31}-1$
OL□□40	Creep Rate	Depends on speed unit.	500	-2^{31} to $2^{31}-1$
OL□□42	Zero Point Return Travel Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□44	STEP Travel Distance	Reference unit	1000	0 to $2^{31}-1$
OL□□46	External Positioning Final Travel Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□48	Zero Point Position in Machine Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□4A	Work Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$

Control Block Diagrams

8

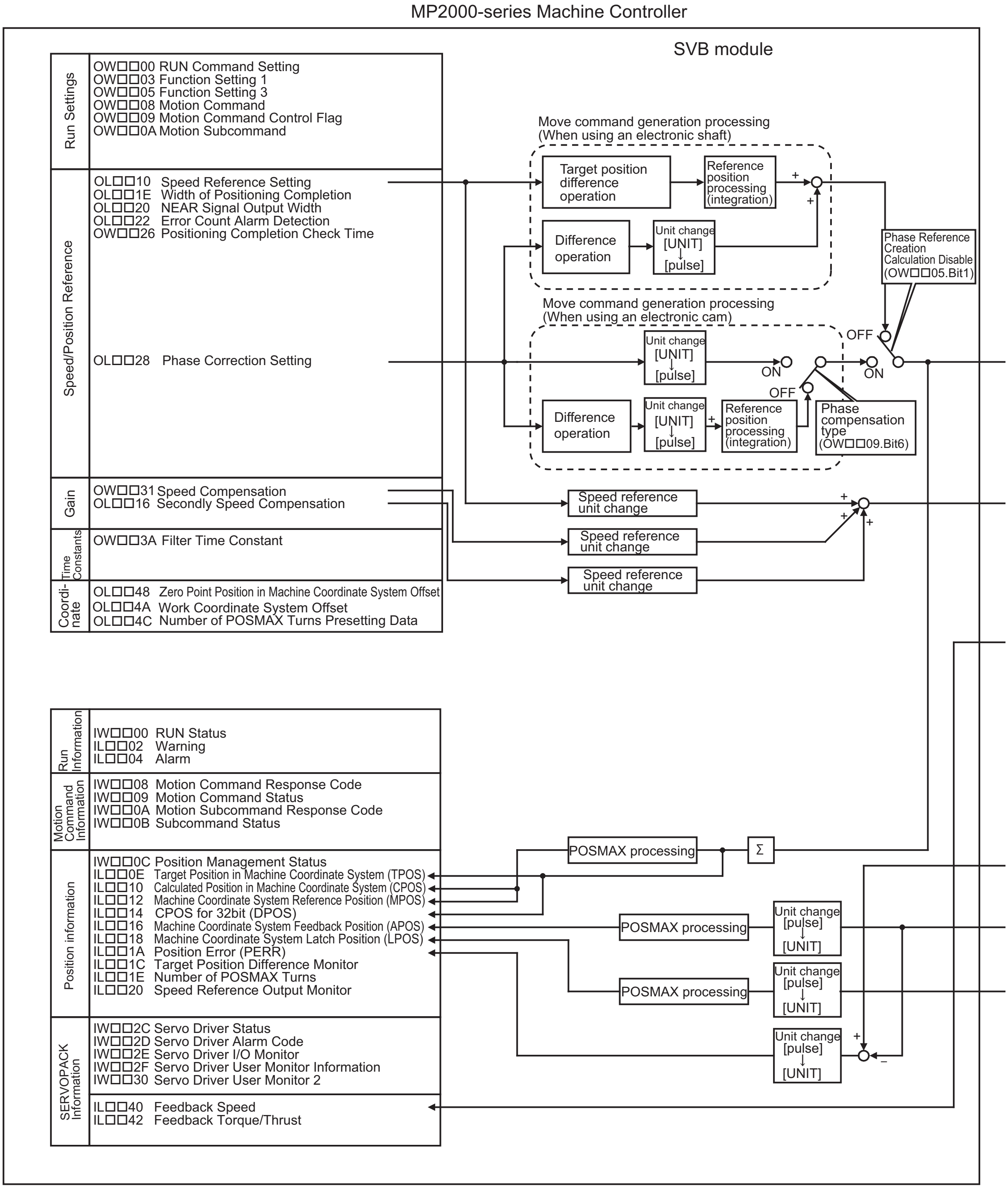
(cont'd)

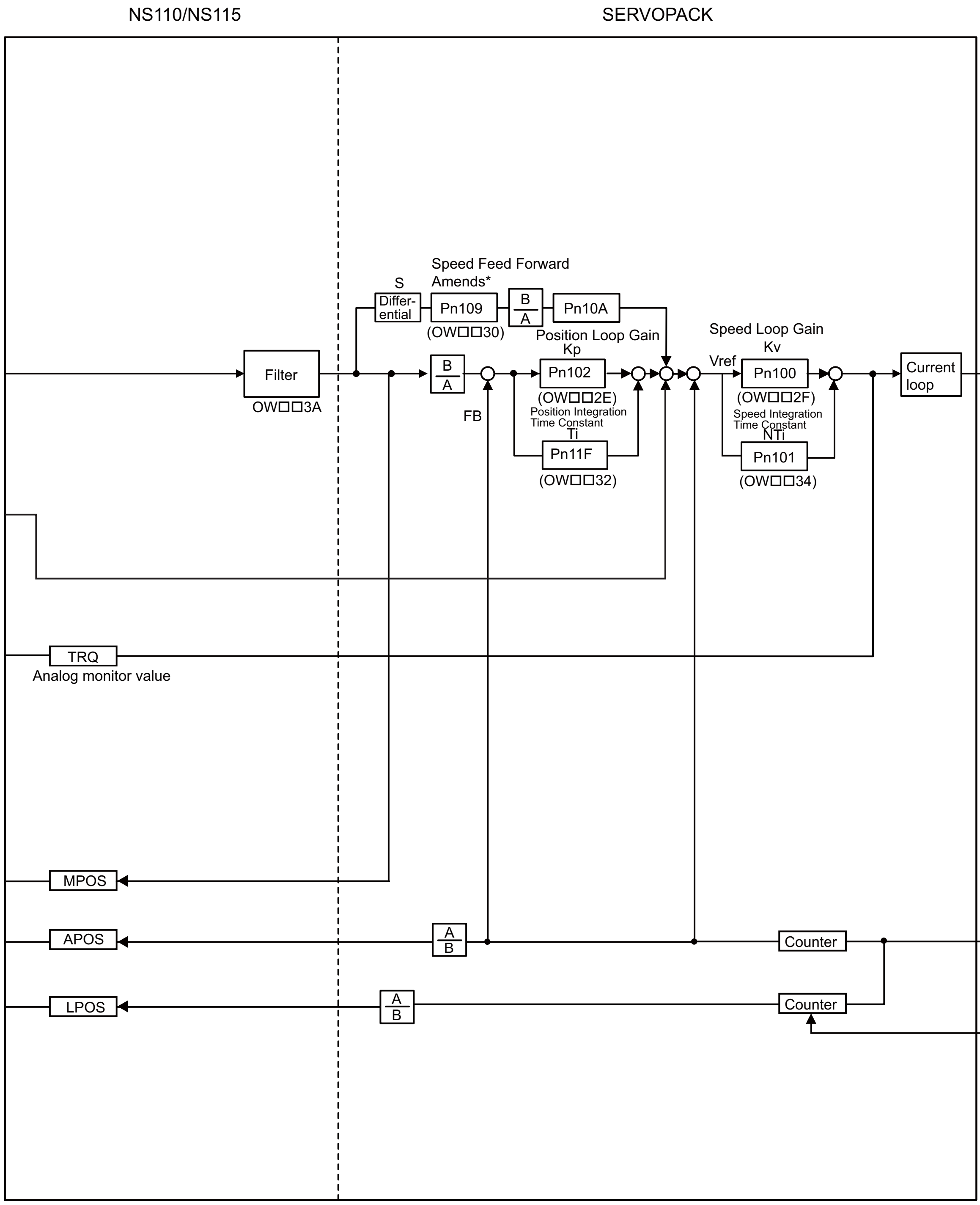
No.	Name	Setting Unit	Default Value	Setting Range
OL□□4C	Number of POSMAX Turns Presetting Data	Rev	0	-2^{31} to $2^{31}-1$
OW□□4E	Servo User Monitor Setting	–	0E00H	Bit setting
OW□□4F	Servo Driver Alarm Monitor No.	–	0	0 to 9
OW□□50	Servo Driver User Constant No.	–	0	0 to 65535
OW□□51	Servo Driver User Constant Size	–	1	1, 2
OL□□52	Servo Driver User Constant Set Point	–	0	-2^{31} to $2^{31}-1$
OW□□54	Servo Driver for Assistance User Constant No.	–	0	0 to 65535
OW□□55	Servo Driver for Assistance User Constant Size	–	1	1, 2
OL□□56	Servo Driver for Assistance User Constant Set Point	–	0	-2^{31} to $2^{31}-1$
OW□□5C	Fixed Parameter Number	–	0	0 to 65535
OL□□5E	Encoder Position When Power is OFF (Lower 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□60	Encoder Position When Power is OFF (Upper 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□62	Pulse Position When Power is OFF (Lower 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□64	Pulse Position When Power is OFF (Upper 2 words)	pulse	0	-2^{31} to $2^{31}-1$

(3) Monitoring Parameters

No.	Name	Unit	Default Value	Range
IW□□00	RUN Status	–	–	Bit setting
IW□□01	Parameter Number When Range Over is Generated	–	–	0 to 65535
IL□□02	Warning	–	–	Bit setting
IL□□04	Alarm	–	–	Bit setting
IW□□08	Motion Command Response Code	–	–	0 to 65535
IW□□09	Motion Command Status	–	–	Bit setting
IW□□0A	Motion Subcommand Response Code	–	–	0 to 65535
IW□□0B	Subcommand Status	–	–	Bit setting
IW□□0C	Position Management Status	–	–	Bit setting
IL□□0E	Target Position in Machine Coordinate System (TPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□10	Calculated Position in Machine Coordinate System (CPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□12	Machine Coordinate System Reference Position (MPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□14	CPOS for 32bit (DPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□16	Machine Coordinate System Feedback Position (APOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□18	Machine Coordinate System Latch Position (LPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1A	Position Error (PERR)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1C	Target Position Difference Monitor	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1E	Number of POSMAX Turns	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□20	Speed Reference Output Monitor	pulse/s	–	-2^{31} to $2^{31}-1$
IW□□2C	Servo Driver Status	–	–	Bit setting
IW□□2D	Servo Driver Alarm Code	–	–	-32768 to 32767
IW□□2E	Servo Driver I/O Monitor	–	–	Bit setting
IW□□2F	Servo Driver User Monitor Information	–	–	Bit setting
IL□□30	Servo Driver User Monitor 2	–	–	-2^{31} to $2^{31}-1$
IL□□34	Servo Driver User Monitor 4	–	–	-2^{31} to $2^{31}-1$
IW□□36	Servo Driver User Constant No.	–	–	0 to 65535
IW□□37	Supplementary Servo Driver User Constant No.	–	–	0 to 65535
IL□□38	Servo Driver User Constant Reading Data	–	–	-2^{31} to $2^{31}-1$
IL□□3A	Supplementary Servo Driver User Constant Reading Data	–	–	-2^{31} to $2^{31}-1$
IW□□3F	Motor Type	–	–	0, 1
IL□□40	Feedback Speed	Depends on speed unit.	–	-2^{31} to $2^{31}-1$
IL□□42	Feedback Torque/Thrust	Depends on torque unit.	–	-2^{31} to $2^{31}-1$
IL□□56	Fixed Parameter Monitor	–	–	-2^{31} to $2^{31}-1$
IL□□5E	Encoder Position When the Power is OFF (Lower 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□60	Encoder Position When the Power is OFF (Upper 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□62	Pulse Position When the Power is OFF (Lower 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□64	Pulse Position When the Power is OFF (Upper 2 words)	pulse	–	-2^{31} to $2^{31}-1$

8.2.2 Control Block Diagram for Phase Control





*   The speed feedback gain is 0 for phase references.

8.3 Torque Control

8.3.1 Motion Parameters for Torque Control

- : These parameters are ignored.

(1) Fixed Parameters

No.	Name	Setting Unit	Default Value	Setting Range
0	Selection of Operation Modes	–	1	0 to 5
1	Function Selection Flag 1	–	0000h	Bit setting
2	Function Selection Flag 2	–	0000h	Bit setting
4	Reference Unit Selection	–	0	0 to 3
5	Number of Digits below Decimal Point	–	3	0 to 5
6	Travel Distance per Machine Rotation	Reference unit	10000	1 to $2^{31}-1$
	Linear Scale Pitch (Linear Motor)	Reference unit	10000	1 to $2^{31}-1$
8	Servo Motor Gear Ratio	–	1	1 to 65535
9	Machine Gear Ratio	–	1	1 to 65535
10	Infinite Length Axis Reset Position (POSMAX)	Reference unit	360000	1 to $2^{31}-1$
12	Positive Software Limit Value	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
14	Negative Software Limit Value	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
16	Backlash Compensation Amount	Reference unit	0	-2^{31} to $2^{31}-1$
30	Encoder Selection	–	0	0 to 3
34	Rated Motor Speed (Rotary Motor)	min^{-1}	3000	1 to 32000
	Rated Speed (Linear Motor)	0.1 m/s, 0.1 mm/s	3000	1 to 32000
36	Number of Pulses per Motor Rotation (Rotary Motor)	pulse	65536	1 to $2^{31}-1$
	Number of Pulses per Linear Scale Pitch (Linear Motor)	pulses/linear scale pitch	65536	1 to $2^{31}-1$
38	Maximum Number of Absolute Encoder Turns Rotation	Rev	65534	0 to $2^{31}-1$
42	Feedback Speed Moving Average Time Constant	ms	10	0 to 32

(2) Setting Parameters

No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Command Setting	–	0000h	Bit setting
OW□□01	Mode Setting 1	–	0000h	Bit setting
OW□□02	Mode Setting 2	–	0000h	Bit setting
OW□□03	Function Setting 1	–	0011h	Bit setting
OW□□04	Function Setting 2	–	0033h	Bit setting
OW□□05	Function Setting 3	–	0000h	Bit setting
OW□□08	Motion Command	–	0	0 to 39
OW□□09	Motion Command Control Flag	–	0000h	Bit setting
OW□□0A	Motion Subcommand	–	0	0 to 65535
OL□□0C	Torque/Thrust Reference Setting	Depends on torque unit.	0	-2^{31} to $2^{31}-1$
OW□□0E	Speed Limit Setting at the Torque/Thrust Reference	0.01%	15000	-32768 to 32767
OL□□10	Speed Reference Setting	Depends on speed unit.	3000	-2^{31} to $2^{31}-1$
OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	Depends on torque unit.	30000	-2^{31} to $2^{31}-1$
OL□□16	Secondly Speed Compensation	Depends on speed unit.	0	-2^{31} to $2^{31}-1$
OW□□18	Override	0.01%	10000	0 to 32767
OL□□1C	Position Reference Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□1E	Width of Positioning Completion	Reference unit	100	0 to 65535
OL□□20	NEAR Signal Output Width	Reference unit	0	0 to 65535
OL□□22	Error Count Alarm Detection	Reference unit	$2^{31}-1$	0 to $2^{31}-1$
OW□□26	Positioning Completion Check Time	ms	0	0 to 65535
OL□□28	Phase Correction Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□2A	Latch Zone Lower Limit Setting (for External Positioning)	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
OL□□2C	Latch Zone Upper Limit Setting (for External Positioning)	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
OW□□2E	Position Loop Gain	0.1/s	300	0 to 32767
OW□□2F	Speed Loop Gain	Hz	40	1 to 2000
OW□□30	Speed Feed Forward Amends	0.01%	0	0 to 32767
OW□□31	Speed Amends	0.01%	0	-32768 to 32767
OW□□32	Position Integration Time Constant	ms	0	0 to 32767
OW□□34	Speed Integration Time Constant	0.01 ms	2000	15 to 65535
OL□□36	Straight Line Acceleration/Acceleration Time Constant	Depends on acceleration/deceleration speed unit.	0	0 to $2^{31}-1$
OL□□38	Straight Line Deceleration/Deceleration Time Constant	Depends on acceleration/deceleration speed unit.	0	0 to $2^{31}-1$
OW□□3A	Filter Time Constant	0.1 ms	0	0 to 65535
OW□□3C	Zero Point Return Method	–	0	0 to 19
OW□□3D	Width of Starting Point Position Output	Reference unit	100	0 to 65535
OL□□3E	Approach Speed	Depends on speed unit.	1000	-2^{31} to $2^{31}-1$
OL□□40	Creep Rate	Depends on speed unit.	500	-2^{31} to $2^{31}-1$
OL□□42	Zero Point Return Travel Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□44	STEP Travel Distance	Reference unit	1000	0 to $2^{31}-1$
OL□□46	External Positioning Final Travel Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□48	Zero Point Position in Machine Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□4A	Work Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$

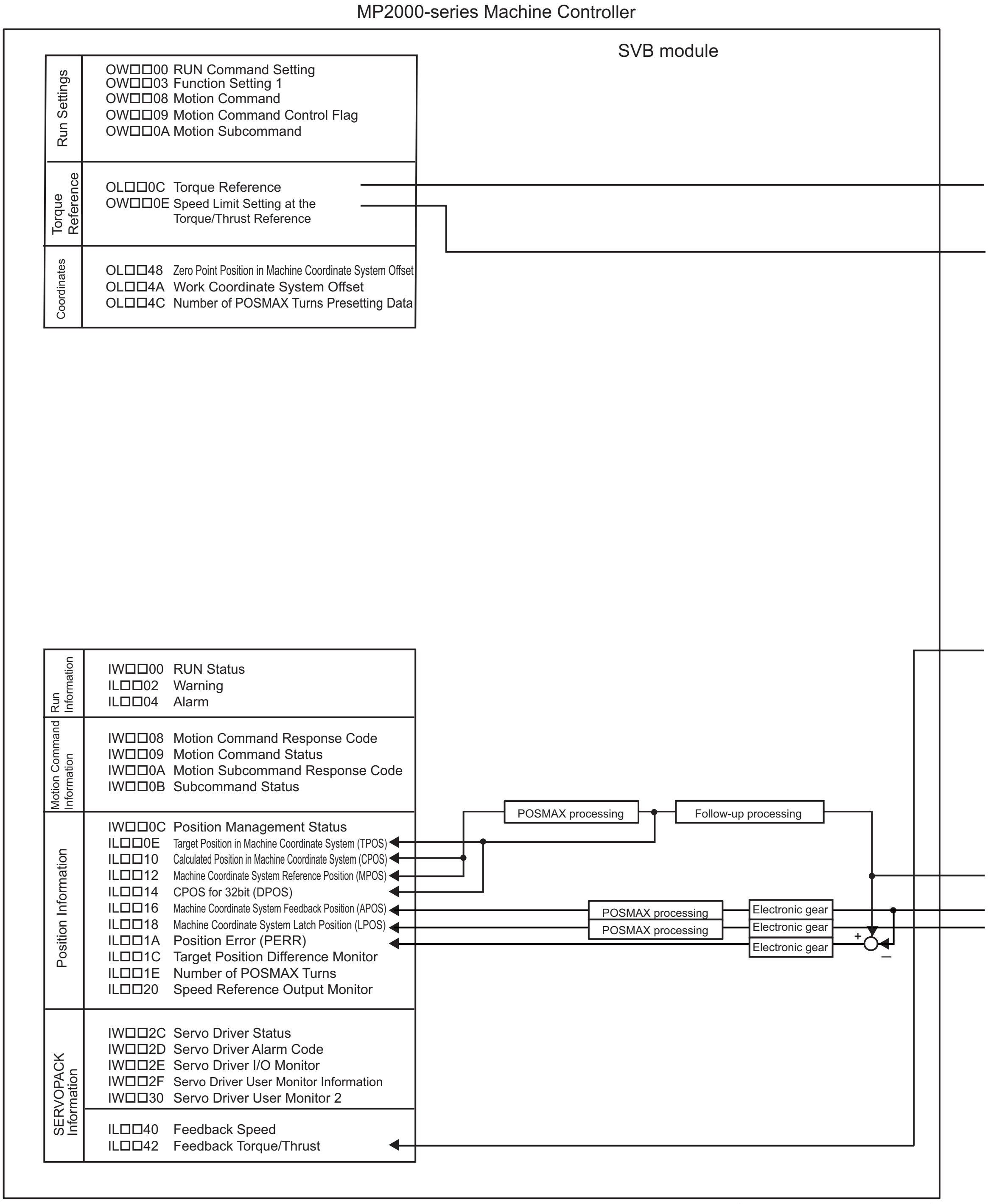
(cont'd)

No.	Name	Setting Unit	Default Value	Setting Range
OL□□4C	Number of POSMAX Turns Presetting Data	Rev	0	-2^{31} to $2^{31}-1$
OW□□4E	Servo User Monitor Setting	–	0E00H	Bit setting
OW□□4F	Servo Driver Alarm Monitor No.	–	0	0 to 9
OW□□50	Servo Driver User Constant No.	–	0	0 to 65535
OW□□51	Servo Driver User Constant Size	–	1	1, 2
OL□□52	Servo Driver User Constant Set Point	–	0	-2^{31} to $2^{31}-1$
OW□□54	Servo Driver for Assistance User Constant No.	–	0	0 to 65535
OW□□55	Servo Driver for Assistance User Constant Size	–	1	1, 2
OL□□56	Servo Driver for Assistance User Constant Set Point	–	0	-2^{31} to $2^{31}-1$
OW□□5C	Fixed Parameter Number	–	0	0 to 65535
OL□□5E	Encoder Position When Power is OFF (Lower 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□60	Encoder Position When Power is OFF (Upper 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□62	Pulse Position When Power is OFF (Lower 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□64	Pulse Position When Power is OFF (Upper 2 words)	pulse	0	-2^{31} to $2^{31}-1$

(3) Monitoring Parameters

No.	Name	Unit	Default Value	Range
IW□□00	RUN Status	–	–	Bit setting
IW□□01	Parameter Number When Range Over is Generated	–	–	0 to 65535
IL□□02	Warning	–	–	Bit setting
IL□□04	Alarm	–	–	Bit setting
IW□□08	Motion Command Response Code	–	–	0 to 65535
IW□□09	Motion Command Status	–	–	Bit setting
IW□□0A	Motion Subcommand Response Code	–	–	0 to 65535
IW□□0B	Subcommand Status	–	–	Bit setting
IW□□0C	Position Management Status	–	–	Bit setting
IL□□0E	Target Position in Machine Coordinate System (TPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□10	Calculated Position in Machine Coordinate System (CPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□12	Machine Coordinate System Reference Position (MPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□14	CPOS for 32bit (DPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□16	Machine Coordinate System Feedback Position (APOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□18	Machine Coordinate System Latch Position (LPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1A	Position Error (PERR)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1C	Target Position Difference Monitor	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1E	Number of POSMAX Turns	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□20	Speed Reference Output Monitor	pulse/s	–	-2^{31} to $2^{31}-1$
IW□□2C	Servo Driver Status	–	–	Bit setting
IW□□2D	Servo Driver Alarm Code	–	–	-32768 to 32767
IW□□2E	Servo Driver I/O Monitor	–	–	Bit setting
IW□□2F	Servo Driver User Monitor Information	–	–	Bit setting
IL□□30	Servo Driver User Monitor 2	–	–	-2^{31} to $2^{31}-1$
IL□□34	Servo Driver User Monitor 4	–	–	-2^{31} to $2^{31}-1$
IW□□36	Servo Driver User Constant No.	–	–	0 to 65535
IW□□37	Supplementary Servo Driver User Constant No.	–	–	0 to 65535
IL□□38	Servo Driver User Constant Reading Data	–	–	-2^{31} to $2^{31}-1$
IL□□3A	Supplementary Servo Driver User Constant Reading Data	–	–	-2^{31} to $2^{31}-1$
IW□□3F	Motor Type	–	–	0, 1
IL□□40	Feedback Speed	Depends on speed unit.	–	-2^{31} to $2^{31}-1$
IL□□42	Feedback Torque/Thrust	Depends on torque unit.	–	-2^{31} to $2^{31}-1$
IL□□56	Fixed Parameter Monitor	–	–	-2^{31} to $2^{31}-1$
IL□□5E	Encoder Position When the Power is OFF (Lower 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□60	Encoder Position When the Power is OFF (Upper 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□62	Pulse Position When the Power is OFF (Lower 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□64	Pulse Position When the Power is OFF (Upper 2 words)	pulse	–	-2^{31} to $2^{31}-1$

8.3.2 Control Block Diagram for Torque Control



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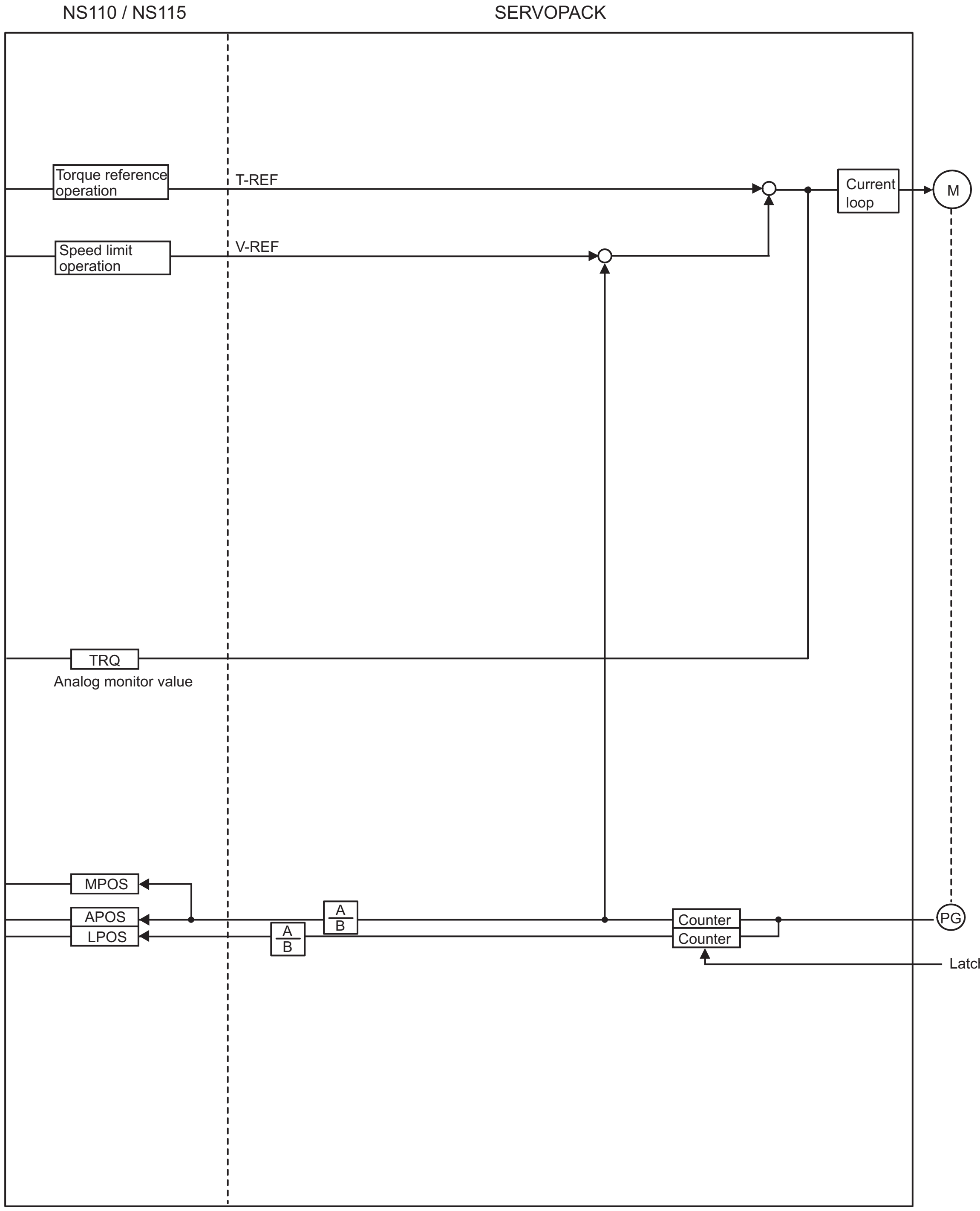

NS110 / NS115
SERVOPACK
Torque reference operation
T-REF
Current loop
M
Speed limit operation
V-REF
TRQ
Analog monitor value
MPOS
APOS
LPOS
A
B
A
B
Counter
Counter
PG
Latch signal

8.4 Speed Control

8.4.1 Motion Parameters for Speed Control

- : These parameters are ignored.

(1) Fixed Parameters

No.	Name	Setting Unit	Default Value	Setting Range
0	Selection of Operation Modes	–	1	0 to 5
1	Function Selection Flag 1	–	0000h	Bit setting
2	Function Selection Flag 2	–	0000h	Bit setting
4	Reference Unit Selection	–	0	0 to 3
5	Number of Digits below Decimal Point	–	3	0 to 5
6	Travel Distance per Machine Rotation	Reference unit	10000	1 to $2^{31}-1$
	Linear Scale Pitch (Linear Motor)	Reference unit	10000	1 to $2^{31}-1$
8	Servo Motor Gear Ratio	–	1	1 to 65535
9	Machine Gear Ratio	–	1	1 to 65535
10	Infinite Length Axis Reset Position (POSMAX)	Reference unit	360000	1 to $2^{31}-1$
12	Positive Software Limit Value	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
14	Negative Software Limit Value	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
16	Backlash Compensation Amount	Reference unit	0	-2^{31} to $2^{31}-1$
30	Encoder Selection	–	0	0 to 3
34	Rated Motor Speed (Rotary Motor)	min^{-1}	3000	1 to 32000
	Rated Speed (Linear Motor)	0.1 m/s, 0.1 mm/s	3000	1 to 32000
36	Number of Pulses per Motor Rotation (Rotary Motor)	pulse	65536	1 to $2^{31}-1$
	Number of Pulses per Linear Scale Pitch (Linear Motor)	pulses/linear scale pitch	65536	1 to $2^{31}-1$
38	Maximum Number of Absolute Encoder Turns Rotation	Rev	65534	0 to $2^{31}-1$
42	Feedback Speed Moving Average Time Constant	ms	10	0 to 32

(2) Setting Parameters

No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Command Setting	–	0000h	Bit setting
OW□□01	Mode Setting 1	–	0000h	Bit setting
OW□□02	Mode Setting 2	–	0000h	Bit setting
OW□□03	Function Setting 1	–	0011h	Bit setting
OW□□04	Function Setting 2	–	0033h	Bit setting
OW□□05	Function Setting 3	–	0000h	Bit setting
OW□□08	Motion Command	–	0	0 to 39
OW□□09	Motion Command Control Flag	–	0000h	Bit setting
OW□□0A	Motion Subcommand	–	0	0 to 65535
OL□□0C	Torque/Thrust Reference Setting	Depends on torque unit.	0	-2^{31} to $2^{31}-1$
OW□□0E	Speed Limit Setting at the Torque/Thrust Reference	0.01%	15000	-32768 to 32767
OL□□10	Speed Reference Setting	Depends on speed unit.	3000	-2^{31} to $2^{31}-1$
OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	Depends on torque unit.	30000	-2^{31} to $2^{31}-1$
OL□□16	Secondly Speed Compensation	Depends on speed unit.	0	-2^{31} to $2^{31}-1$
OW□□18	Override	0.01%	10000	0 to 32767
OL□□1C	Position Reference Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□1E	Width of Positioning Completion	Reference unit	100	0 to 65535
OL□□20	NEAR Signal Output Width	Reference unit	0	0 to 65535
OL□□22	Error Count Alarm Detection	Reference unit	$2^{31}-1$	0 to $2^{31}-1$
OW□□26	Positioning Completion Check Time	ms	0	0 to 65535
OL□□28	Phase Correction Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□2A	Latch Zone Lower Limit Setting (for External Positioning)	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
OL□□2C	Latch Zone Upper Limit Setting (for External Positioning)	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
OW□□2E	Position Loop Gain	0.1/s	300	0 to 32767
OW□□2F	Speed Loop Gain	Hz	40	1 to 2000
OW□□30	Speed Feed Forward Amends	0.01%	0	0 to 32767
OW□□31	Speed Amends	0.01%	0	-32768 to 32767
OW□□32	Position Integration Time Constant	ms	0	0 to 32767
OW□□34	Speed Integration Time Constant	0.01 ms	2000	15 to 65535
OL□□36	Straight Line Acceleration/Acceleration Time Constant	Depends on acceleration/deceleration speed unit.	0	0 to $2^{31}-1$
OL□□38	Straight Line Deceleration/Deceleration Time Constant	Depends on acceleration/deceleration speed unit.	0	0 to $2^{31}-1$
OW□□3A	Filter Time Constant	0.1 ms	0	0 to 65535
OW□□3C	Zero Point Return Method	–	0	0 to 19
OW□□3D	Width of Starting Point Position Output	Reference unit	100	0 to 65535
OL□□3E	Approach Speed	Depends on speed unit.	1000	-2^{31} to $2^{31}-1$
OL□□40	Creep Rate	Depends on speed unit.	500	-2^{31} to $2^{31}-1$
OL□□42	Zero Point Return Travel Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□44	STEP Travel Distance	Reference unit	1000	0 to $2^{31}-1$
OL□□46	External Positioning Final Travel Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□48	Zero Point Position in Machine Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□4A	Work Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$

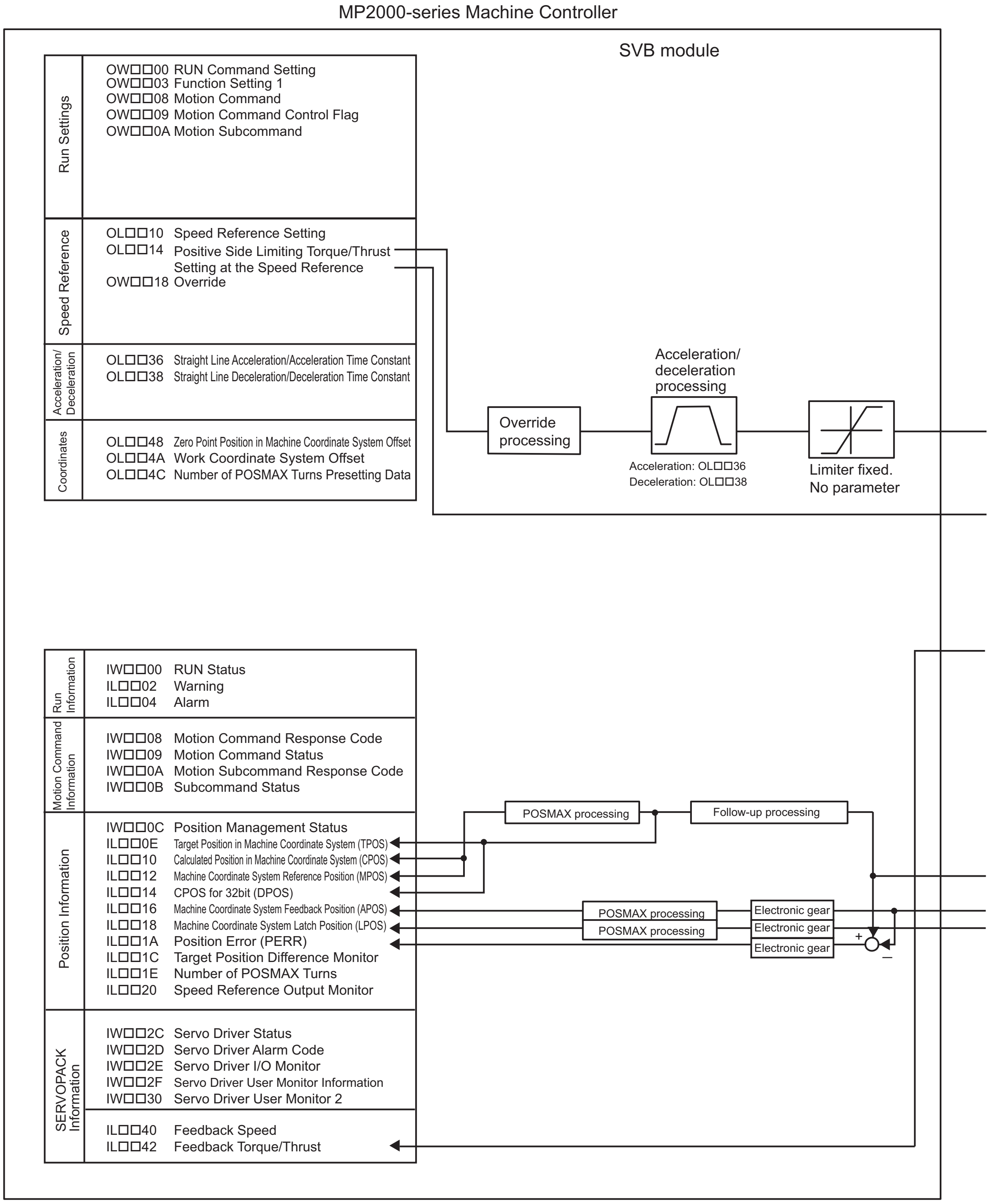
(cont'd)

No.	Name	Setting Unit	Default Value	Setting Range
OL□□4C	Number of POSMAX Turns Presetting Data	Rev	0	-2^{31} to $2^{31}-1$
OW□□4E	Servo User Monitor Setting	–	0E00H	Bit setting
OW□□4F	Servo Driver Alarm Monitor No.	–	0	0 to 9
OW□□50	Servo Driver User Constant No.	–	0	0 to 65535
OW□□51	Servo Driver User Constant Size	–	1	1, 2
OL□□52	Servo Driver User Constant Set Point	–	0	-2^{31} to $2^{31}-1$
OW□□54	Servo Driver for Assistance User Constant No.	–	0	0 to 65535
OW□□55	Servo Driver for Assistance User Constant Size	–	1	1, 2
OL□□56	Servo Driver for Assistance User Constant Set Point	–	0	-2^{31} to $2^{31}-1$
OW□□5C	Fixed Parameter Number	–	0	0 to 65535
OL□□5E	Encoder Position When Power is OFF (Lower 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□60	Encoder Position When Power is OFF (Upper 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□62	Pulse Position When Power is OFF (Lower 2 words)	pulse	0	-2^{31} to $2^{31}-1$
OL□□64	Pulse Position When Power is OFF (Upper 2 words)	pulse	0	-2^{31} to $2^{31}-1$

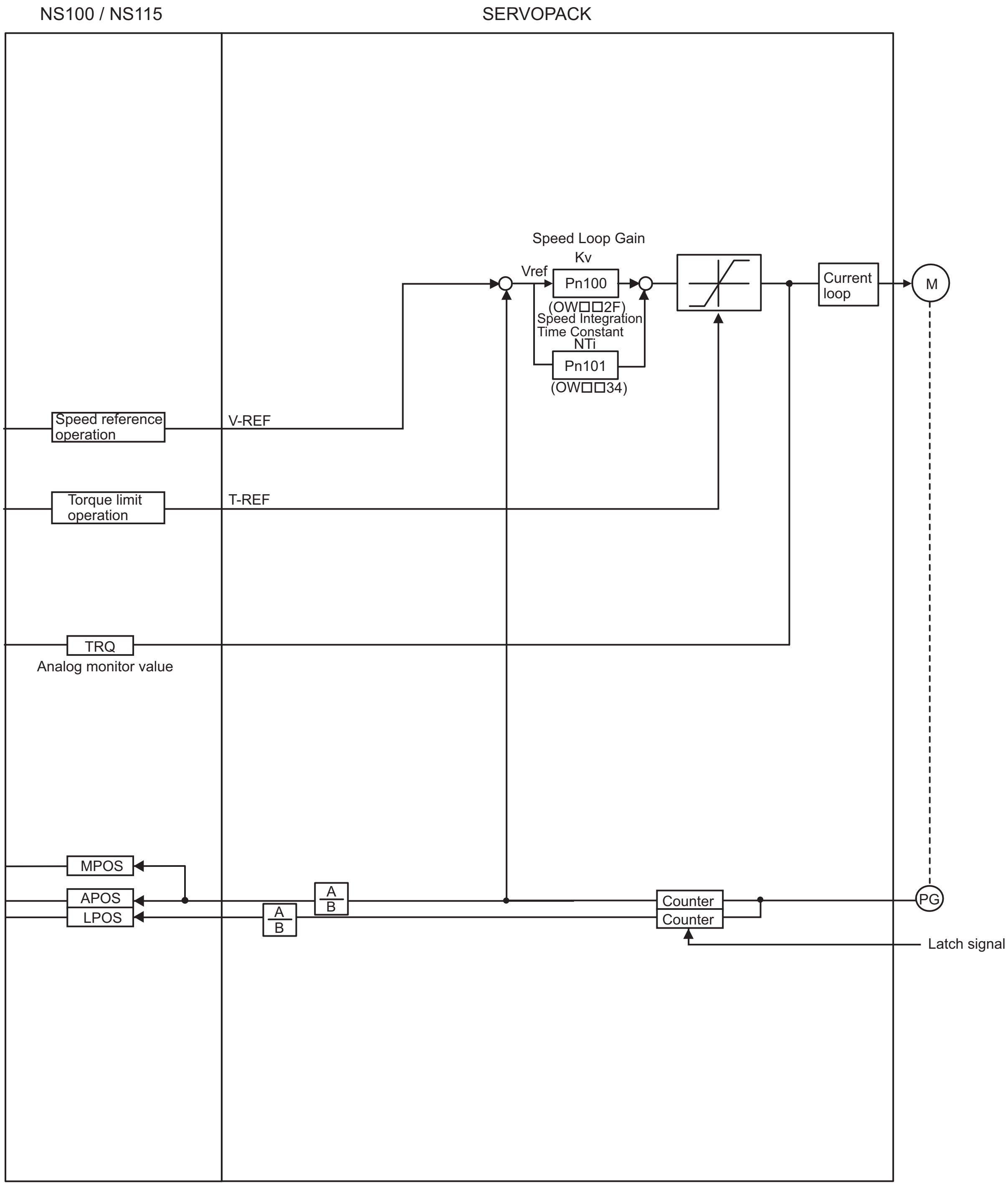
(3) Monitoring Parameters

No.	Name	Unit	Default Value	Range
IW□□00	RUN Status	–	–	Bit setting
IW□□01	Parameter Number When Range Over is Generated	–	–	0 to 65535
IL□□02	Warning	–	–	Bit setting
IL□□04	Alarm	–	–	Bit setting
IW□□08	Motion Command Response Code	–	–	0 to 65535
IW□□09	Motion Command Status	–	–	Bit setting
IW□□0A	Motion Subcommand Response Code	–	–	0 to 65535
IW□□0B	Subcommand Status	–	–	Bit setting
IW□□0C	Position Management Status	–	–	Bit setting
IL□□0E	Target Position in Machine Coordinate System (TPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□10	Calculated Position in Machine Coordinate System (CPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□12	Machine Coordinate System Reference Position (MPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□14	CPOS for 32bit (DPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□16	Machine Coordinate System Feedback Position (APOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□18	Machine Coordinate System Latch Position (LPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1A	Position Error (PERR)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1C	Target Position Difference Monitor	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□1E	Number of POSMAX Turns	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□20	Speed Reference Output Monitor	pulse/s	–	-2^{31} to $2^{31}-1$
IW□□2C	Servo Driver Status	–	–	Bit setting
IW□□2D	Servo Driver Alarm Code	–	–	-32768 to 32767
IW□□2E	Servo Driver I/O Monitor	–	–	Bit setting
IW□□2F	Servo Driver User Monitor Information	–	–	Bit setting
IL□□30	Servo Driver User Monitor 2	–	–	-2^{31} to $2^{31}-1$
IL□□34	Servo Driver User Monitor 4	–	–	-2^{31} to $2^{31}-1$
IW□□36	Servo Driver User Constant No.	–	–	0 to 65535
IW□□37	Supplementary Servo Driver User Constant No.	–	–	0 to 65535
IL□□38	Servo Driver User Constant Reading Data	–	–	-2^{31} to $2^{31}-1$
IL□□3A	Supplementary Servo Driver User Constant Reading Data	–	–	-2^{31} to $2^{31}-1$
IW□□3F	Motor Type	–	–	0, 1
IL□□40	Feedback Speed	Depends on speed unit.	–	-2^{31} to $2^{31}-1$
IL□□42	Feedback Torque/Thrust	Depends on torque unit.	–	-2^{31} to $2^{31}-1$
IL□□56	Fixed Parameter Monitor	–	–	-2^{31} to $2^{31}-1$
IL□□5E	Encoder Position When the Power is OFF (Lower 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□60	Encoder Position When the Power is OFF (Upper 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□62	Pulse Position When the Power is OFF (Lower 2 words)	pulse	–	-2^{31} to $2^{31}-1$
IL□□64	Pulse Position When the Power is OFF (Upper 2 words)	pulse	–	-2^{31} to $2^{31}-1$

8.4.2 Control Block Diagram for Speed Control



(continued on next page)


NS100 / NS115
SERVOPACK
Speed Loop Gain
Kv
Vref
Pn100
(OW□□2F)
Speed Integration
Time Constant
NTi
Pn101
(OW□□34)
Current
loop
M
Speed reference
operation
V-REF
Torque limit
operation
T-REF
TRQ
Analog monitor value
MPOS
APOS
LPOS
A
B
A
B
Counter
Counter
PG
Latch signal

9

Absolute Position Detection

This chapter explains an absolute position detection system that uses an absolute encoder. Be sure to read this chapter carefully when using a Servomotor equipped with an absolute encoder.

9.1 Absolute Position Detection Function

This section explains the Absolute Position Detection Function in the MP2000-series Machine Controller.

- Refer to *Appendix E Fixed Parameter Setting According to Encoder Type and Axis Type* together with this section.

9.1.1 Outline of the Function

The **Absolute Position Detection Function** detects the position of the machine (axis) even if the power is turned OFF. This allows it to establish the machine coordinate system automatically and to begin operating automatically without having to execute the zero point return (ZRET) command after power is turned ON.
Absolute position detection is performed using an absolute encoder built into a Servomotor.
The following are features of the system for detection of the absolute position.

- If eliminates the need for a zero point return after the power is turned ON.
- If eliminates the need for a zero point dog and overtravel limit switch.

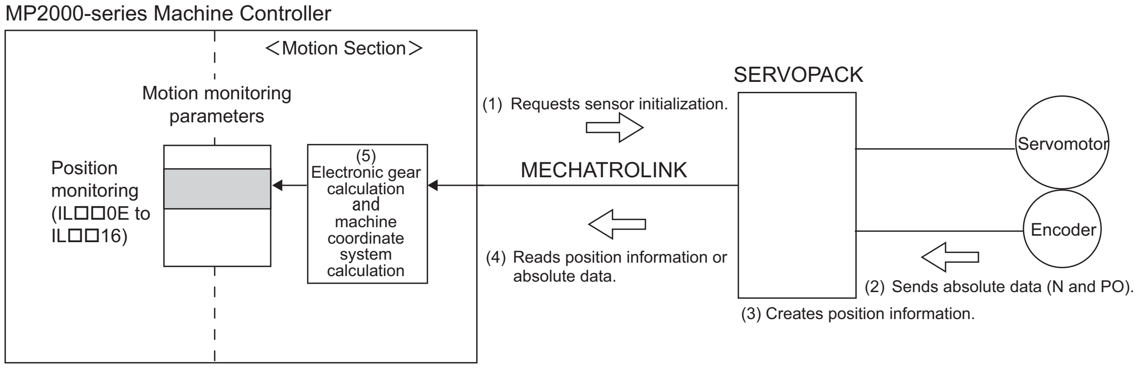
■ Terminology: Absolute Encoder

There are two types of encoders available. An incremental encoder detects position by calculating the zero point difference. An absolute encoder detects the absolute position relative to a reference position.
The absolute encoder uses a battery connected to the battery terminals of the SERVOPACK to maintain absolute data at all times even though power is turned OFF. It also updates absolute data if the position changes while the power is OFF.
The absolute encoder is comprised of a detector that is used to detect absolute position within one rotation and a counter that is used to count the number of rotations.

- After the automatic operation starts, the absolute encoder operates in the same way as an incremental encoder.

9.1.2 Reading Absolute Data

Turn ON the Machine Controller and the SERVOPACK at the same time or turn ON the SERVOPACK first to read the absolute data loaded from the absolute encoder to the Machine Controller.
The following diagram shows an overview of the absolute data read operation.



(1) Machine Controller requests SERVOPACK to initialize the sensor when MECHATROLINK communication is established.

(2) SERVOPACK obtains the multiturn data (N) and initial incremental pulses (PO) at reception of the sensor initialization request from Machine Controller.

(3) SERVOPACK creates the position data according to the obtained multiturn data and initial incremental pulses.

(4) Machine Controller reads out the position data or absolute data from SERVOPACK.

(5) Machine Controller automatically sets a machine coordinate system* according to the electronic gear ratio converted from the absolute value calculated on the base of the read information and the data of Zero Point Position in Machine Coordinate System Offset (OL□□48).

* Refer to *9.3.2 (1) Calculating the Zero Point of the Machine Coordinate System* for information on how to calculate the zero point of machine coordinate system.

This way the absolute machine position can be detected and automatic operation can begin immediately after power is turned ON with an automatic position detection system.

■ Terminology: Absolute Data

Absolute data that is stored in an absolute encoder has two types of data: the absolute reference position (initial incremental pulses; PO) and the number of rotations (multi-turn data; N) from the absolute reference position.
The absolute reference position is the phase-C position when the absolute encoder is initialized and is the reference position for absolute-position detection.
Only the number of rotations (N) can be cleared when the absolute encoder is initialized, and the initial incremental pulses will not change.

■ Information: Calculation of Absolute Position

We can determine the absolute position (P) using the following data.

Data stored in an absolute encoder

- Absolute reference position (initial incremental pulses): PO
- Number of rotations from the absolute reference position (multi-turn data): N

Parameter determined according to the number of bits of servomotor

- Feedback pulses per motor rotation: RP

Equation to calculate the absolute position

- Absolute position (P) = N × RP + PO

9.1.3 Finite Length/Infinite Length Axes and Absolute Position Detection

There are two types of axes. An infinite length axis resets the current position to a specified value every rotation, and the finite length axis does not.
Set a finite length axis if return and other operations are performed only within a specified range or for an axis that moves in one direction only without resetting the position every rotation.
Set an infinite length axis for conveyor belts and other operations that require the position to be reset every rotation. There are two types of position control available with an infinite length axis. Simple Absolute Infinite Length position control and Infinite Length position control are available if Simple Absolute Infinite Length position control is not used.
An absolute encoder performs absolute position detection with a finite or infinite length axis depending on the Axis Selection setting (fixed parameter 1, bit 0) of the Machine Controller
Set the Machine Controller fixed parameters and SERVOPACK parameters to select the absolute position detection function with an absolute encoder. The setting procedures are different for finite and infinite length axes. Refer to *9.2.1 System Startup Flowchart* for details.

9.2 Setting Procedure of Absolute Position Detection Function

This section explains the procedure for setting the Absolute Position Detection Function.

9.2.1 System Startup Flowchart

Start up the system using the following procedure.

1	Check Devices Check to see if the SERVOPACK, Servomotor, and cables are the right products and models for the absolute encoder.

↓

2	Initialize the Absolute Encoder Follow the setup procedure to set the absolute encoder to default values. (→ *9.2.2 Initializing the Absolute Encoder*, and *Appendix C Initializing the Absolute Encoder*)

↓

<table>
<tr><td rowspan="3">3</td><td colspan="3">Setting Parameters Related to the Machine Controller and the SERVOPACKs
Set all parameters related to the Absolute Position Detection Function of the Machine Controller and SERVOPACKs.
The setting procedure for a finite length axis is different from that for an infinite length axis.</td></tr>
<tr><td rowspan="2">When using the axis as a Finite Length Axis
→ 9.3.1 Parameter Settings for Finite Length Axes</td><td colspan="2">When using the axis as an Infinite Length Axis
→ 9.4.1 (2) Conditions to Enable the Simple Absolute Infinite Axis Position Control*</td></tr>
<tr><td>With simple absolute infinite length position control
→ 9.4.2 Parameter Settings for Simple Absolute Infinite Length Position Control</td><td>Without simple absolute infinite length position control*
→ 9.4.5 Infinite Length Position Control without Simple Absolute Positions</td></tr>
</table>

↓

<table>
<tr><td rowspan="2">4</td><td colspan="3">Zero Point Setting
Set the zero point as well as the absolute zero point, that is, the machine coordinate zero point.
The setting procedure for a finite length axis is different from that of an infinite length axis.</td></tr>
<tr><td>When using the axis as a Finite Length Axis
→ 9.3.2 Setting the Zero Point for a Finite Length Axis</td><td>With simple absolute infinite length position control
→ 9.4.3 Setting the Zero Point and Turning ON Power as Simple Absolute Positions</td><td>Without simple absolute infinite length position control*
→ 9.4.5 (3) Setting the Zero Point for an Infinite Length Axis without Simple Absolute Positions</td></tr>
</table>

* If the system does not satisfy the conditions described in *9.4.1 (2) Conditions to Enable the Simple Absolute Infinite Axis Position Control* when using the axis as an infinite length axis, the Machine Controller carries out the operation without using simple absolute length position control.

After the steps 2 to 4 described above are successfully completed, the absolute position detection system will be ready for operation.

- Always perform the startup procedure of the absolute position detection system in the following situations.
  - When starting up the absolute position detection system for the first time
  - When the Servomotor is changed
  - When an absolute encoder-related alarm occurs

9.2.2 Initializing the Absolute Encoder

Absolute encoders can be initialized as follows:

- SERVOPACK Procedure
  - Refer to the manual for the SERVOPACK for details.
- Panel Operator or Digital Operator Procedure
  - Refer to the manual for the SERVOPACK for details.
- ABS_RST Command Procedure
  - Refer to *6.2.21 Absolute Encoder Reset (ABS_RST)* for details.

For details on the procedure for initializing SERVOPACKS, refer to *Appendix C Initializing the Absolute Encoder*.

- Initialize the absolute encoder in the following situations.
  - When the absolute position detection system is started up for the first time
  - When number of rotations from the absolute reference position needs to be initialized to 0
  - When a Servomotor has been left with no battery connected to the absolute encoder
  - When an alarm which is related the absolute position detection system occurs

9.3 Absolute Position Detection for Finite Length Axes

This section describes the procedure for setting parameters and precautions on setting zero-point and turning ON the power supply when using the axis as a finite length axis.

9.3.1 Parameter Settings for Finite Length Axes

The following parameters must be set to enable the absolute position detection function when using an axis as a finite length axis.

⚠ CAUTION

- The parameters for which precautions are provided must be set referring to *9.3.1 (3) Detailed Descriptions*. Set these parameters carefully. If they are not set correctly, the current position may not be correct after the power is turned ON. Machine damage may occur.

(1) Machine Controller Fixed Parameters for Absolute Position Detection

Fixed Parameter No.	Name	Setting/Range	Units	Reference	Caution
1, bit 0	Axis Selection	0: Finite length axis, 1: Infinite length axis	–	9.3.1 (3) [a]	
30	Encoder Selection	• Incremental encoder • Absolute encoder • Absolute encoder (used as incremental encoder)	–	9.3.1 (3) [b]	
36	Number of Pulses per Motor Rotation	1 to 2^{31}–1 Set the value after multiplication. (For a 16-bit encoder, set 2^{16} = 65536.)	pulse	9.3.1 (3) [c]	
38	Maximum Number of Absolute Encod-er Turns Rotation	0 to 2^{31}–1	1 = 1 rota-tion	9.3.1 (3) [d]	

(2) SERVOPACK Parameters for Absolute Position Detection

SERVOPACK Model	Parameter	Name	Setting Range	Units	Reference	Caution
Σ-III, Σ-V, and Σ-7 Series	Pn000.0	Direction Selection	0: Sets counterclockwise (CCW) rotation as forward direction. 1: Sets clockwise (CW) rotation as forward direction (reverse rotation mode).	–	–	–
	Pn205	Multiturn Limit Setting	0 to 65535	Rev	9.3.1 (3) [d]	
	Pn002.2	Absolute Encoder Usage	0: Uses absolute encoder as an absolute encoder. 1: Uses absolute encoder as an incremental encoder.	–	9.3.1 (3) [b]	
Σ-II Series	Pn000.0	Direction Selection	0: Sets counterclockwise (CCW) rotation as forward direction. 1: Sets clockwise (CW) rotation as forward direction (reverse rotation mode).	–	–	–
	Pn205	Multiturn Limit Setting	0 to 65535	Rev	9.3.1 (3) [d]	
	Pn002.2	Absolute Encoder Usage	0: Uses absolute encoder as an absolute encoder. 1: Uses absolute encoder as an incremental encoder.	–	9.3.1 (3) [b]	
Σ-I Series	Cn-0001, Bit E	Encoder Type	0: Incremental encoder 1: Absolute encoder	–	9.3.1 (3) [b]	
	Cn-0002, bit 0	Rotation Direction Selection	0: Sets counterclockwise (CCW) rotation as forward rotation. 1: Sets clockwise (CW) rotation as forward rotation (reverse rotation mode).	–	–	–

(3) Detailed Descriptions

[a] Axis Selection (Machine Controller Fixed Parameter No.1, Bit 0)

This setting is used to select either an finite or infinite length axis.
Set to 0 when using the axis as a finite length axis.

[b] Encoder Type and Absolute Encoder Usage

For an axis performing absolute position detection, set the parameters as shown in the following table.

Model	Parameter	Setting
Machine Controller	Fixed parameter 30 (Encoder Selection)	1: Absolute encoder
Σ-II, Σ-III, Σ-V, or Σ-7 Series	Parameter: Pn002.2 (Absolute Encoder Usage)	0: Uses absolute encoder as an absolute encoder.
Σ-I Series	Parameter: Cn-0001 Bit E (Encoder Type)	1: Absolute encoder

- If the above settings are not used, correct motion control will not be performed. Set the parameters carefully.
- Be sure to set both the Machine Controller and SERVOPACK parameters.

[c] Number of Pulses per Motor Rotation

Refer to the following table and set the fixed parameter 36 (Number of Pulses per Motor Rotation) according to the number of servomotor (encoder) bits. The settings can be used for all SERVOPACK models.

Number of Bits	Machine Controller Fixed Parameter 36 (Number of Pulses per Motor Rotation)
12	4096
13	8192
15	32768
16	65536
17	131072
20	1048576

- If the above settings are not used, correct motion control will not be performed. Set the parameters carefully.

[d] Max. Revolutions of Absolute Encoder/Multiturn Limit Setting

These parameters determine the maximum value of the number of encoder turns managed by the SERVOPACK and Machine Controller.
The setting is determined by the SERVOPACK that is used and the type of axis (Machine Controller fixed parameter 1, bit 0). Set the parameters as shown in the following table when using an axis as a finite length axis.

Applicable SERVOPACK	Machine Controller Fixed Parameter 38 (Maximum Number of Absolute Encoder Turns Rotation)	SERVOPACK Parameter Pn205 (Multiturn Limit Setting)
Σ-II, Σ-III, Σ-V, or Σ-7 Series	65535	65535
Σ-I Series	99999	–

- If the above settings are not used, the position may be offset. Set the parameters carefully.

9.3.2 Setting the Zero Point for a Finite Length Axis

This section describes the procedure for setting the zero point (i.e., the absolute zero point or the zero point of the machine coordinate system) for a finite length axis. It also describes the procedures for storing the zero point offset.

(1) Calculating the Zero Point of the Machine Coordinate System

The Machine Controller calculates the axis position (i.e., current position for the machine coordinate system) as follows when power is turned ON if an absolute encoder is used for positioning.

Current position for the machine coordinate system (monitoring parameter IL□□10*1 or IL□□16*1) = Encoder position when servo power is turned ON*2 + Zero Point Position in Machine Coordinate System Offset (setting parameter OL□□48)

To set the current position of the machine coordinate system as the zero position, set OL□□48 to the difference between OL□□48 and IL□□10 (or IL□□16).

* 1. Use IL□□10 to select a positive value for the reference position for the machine coordinates, and use IL□□16 to make the current position of the machine coordinates into a positive position.
* 2. The encoder position when servo power is turned ON is as follows: Multiturn data × Number of encoder pulses + initial increment pulses. Refer to your SERVOPACK manual for information on the initial increment pulses.

Example: IL□□10 = 10,000 and OL□□48 = 100

Set the encoder position when servo power is turned ON to a negative value as shown below.

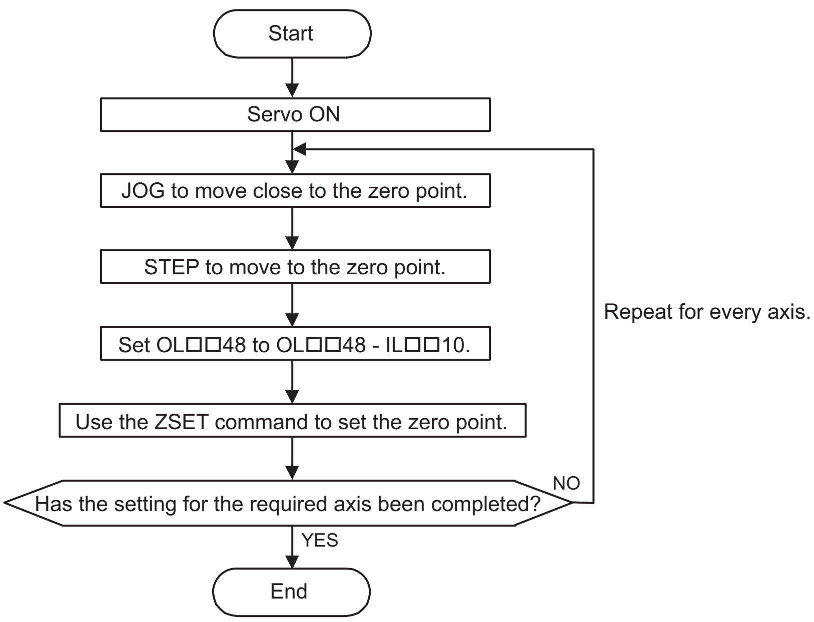
OL□□48 − IL□□10 = 100 − 10000
= − 9900

Set OL□□48 to -9900 to make the current position in the machine coordinate system the zero point.

(2) Setting the Zero Point of the Machine Coordinate System

⚠ CAUTION
• OL□□48 is always valid for a finite length axis. Do not change the Zero Point Position in Machine Coordinate System Offset (OL□□48) during the operation of a machine with a finite length axis. Otherwise the machine may be damaged or an accident may occur.

Set the zero point after initializing the absolute encoder to set the zero point of the machine coordinate system and to create the machine coordinate system. The following illustration shows the procedure for setting the zero point for a finite length axis.



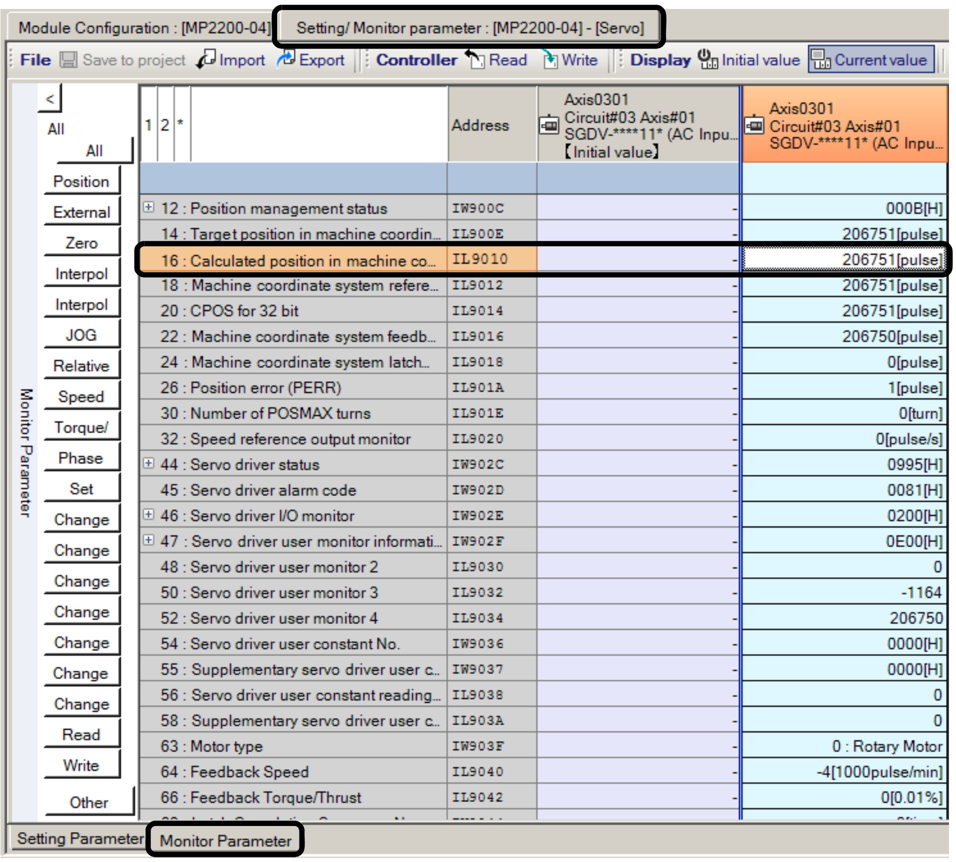
(3) Saving OL□□48 Values before Power OFF

After having set the zero point, save the value of OL□□48 before turning OFF the power of Machine Controller so that the value will be written in OL□□48 the next time the power is turned ON.
There are two ways to save the Zero Point Position in Machine Coordinate System Offset (OL□□48) value. It can be saved through a ladder program in an M Register backed up by battery or from the MPE720 Parameter Window. These ways are described below.

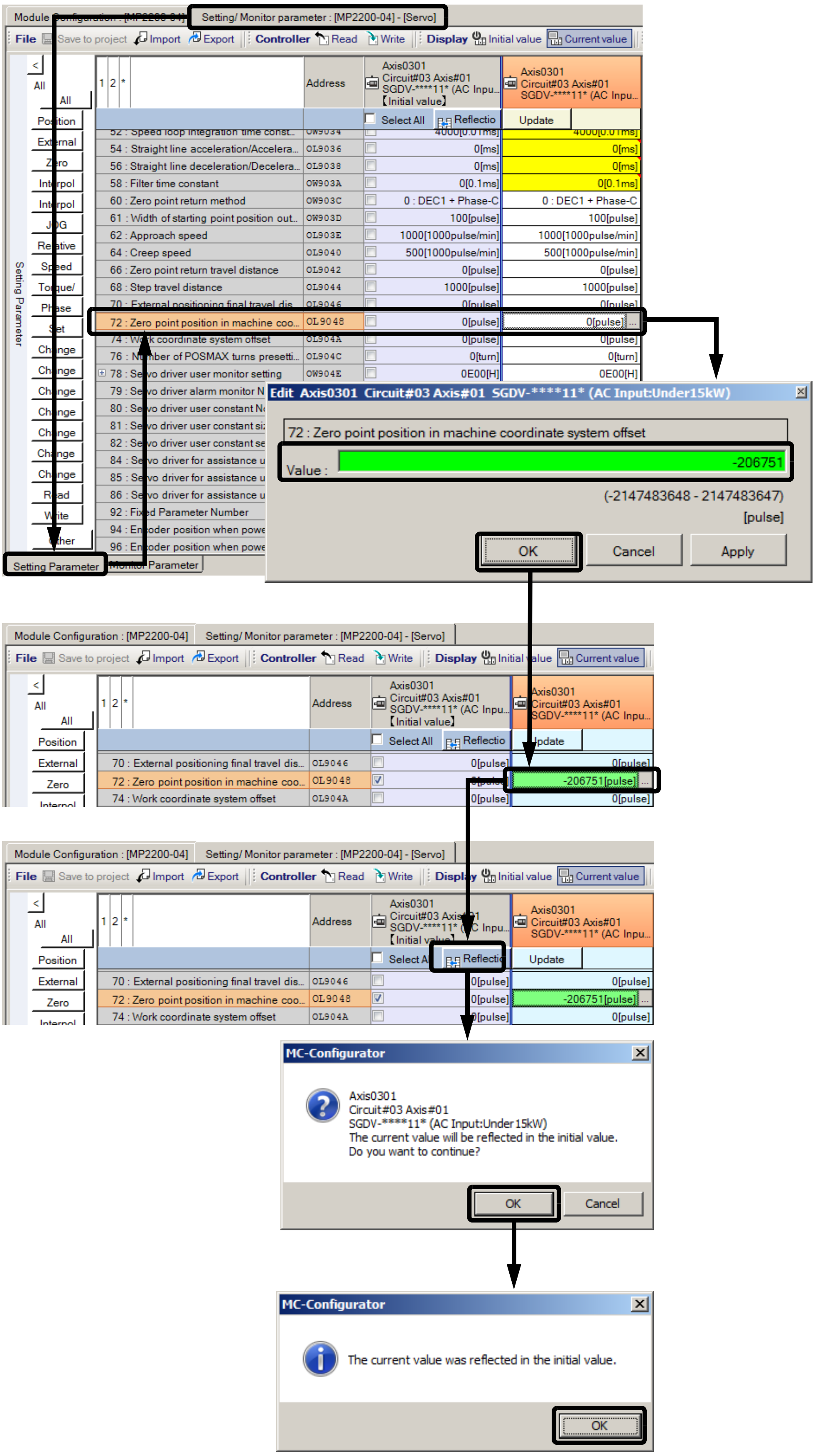
■ Method 1: Saving the Zero Point Position in Machine Coordinate System Offset (OL□□48) from the MPE720 Parameter Window

Open the Monitor Parameter Window (refer to *3.4.3 Motion Parameter Window*) for the specified axis on the MPE720 and use the following procedure to save the Zero Point Offset.

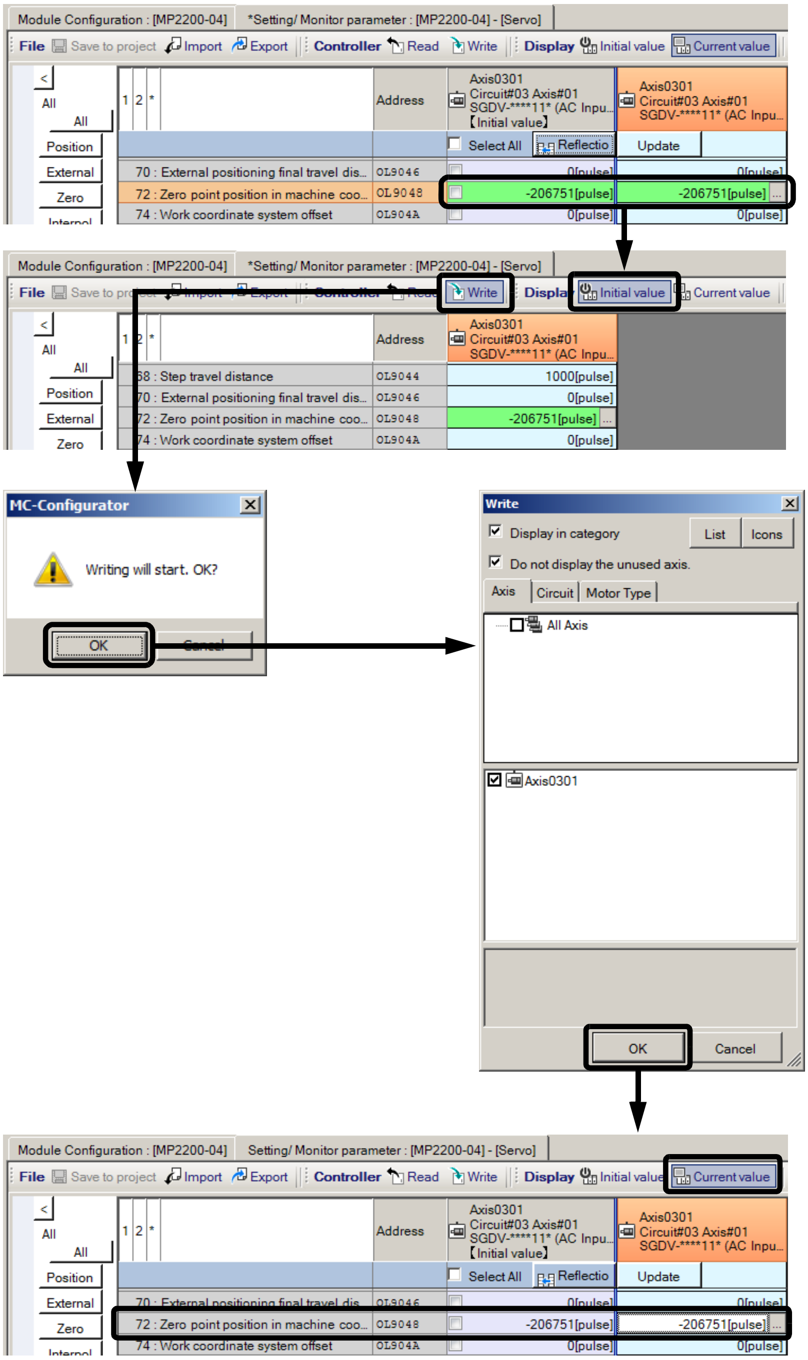
1. Check the value in IL□□10 in the Monitor Parameter Tab Page.



2. Check the current value in OL□□48 in the Setting Parameter Tab Page. Subtract the Calculated Position (IL□□10) from the Zero Point Position in Machine Coordinate System Offset (OL□□48) and save the result in OL□□48.



3. Check to see if the initial value and current value in OL□□48 are the same. If they are the same, click ***Write*** and save the setting to the Machine Controller.



4. Return to Module Configuration Definition Window and select ***Online - Save to Flash*** to save the setting in the flash memory.

5. Execute the setting with the ZSET command.

When the power is turned ON, the value that was saved will be stored automatically for Zero Point Position in Machine Coordinate System Offset (OL□□48).

■ Method 2: Saving in an M Register with a Ladder Program

Saves the value of the zero point offset for the machine coordinate system when the zero point is set in an M register backed up by a battery. When the power to the Machine controller is turned ON, saves the value of the M register in the Zero Point Position in the Machine Coordinate System Offset (OL☐☐48).

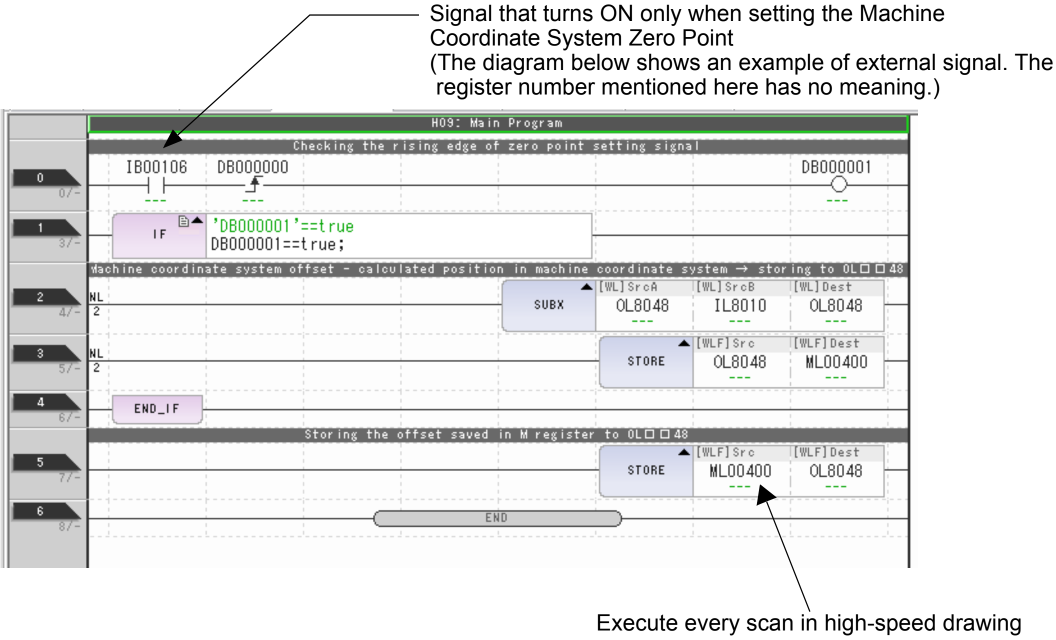
Create a ladder program that automatically executes the following sequence.

Program Example

The following diagram shows an example of a ladder program used to store the offset value of axis 1 of line number 1. In a ladder program for an actual application, select a register with a different address for each axis.

The ladder program shown here is used to carry out the following processing.

- Subtracts the Calculated Position in Machine Coordinate System (CPOS) (IL☐☐10) from the Zero Point Position in Machine Coordinate System Offset (OL☐☐48) and saves the result in OL☐☐48 after setting the zero point. This value is also saved in an M register at the same time.
- Saves the offset value saved in the M register and in OL☐☐48 after setting the zero point position.



- Save the value of OL☐☐48 (Zero Point Position Offset in Machine Coordinate System) to the M registers only when the value of OL☐☐48 is updated, such as when the origin is set. Processing that constantly saves the value of OL☐☐48 to the M registers may cause position variations.

Absolute Position Detection

9

9.3.3 Turning ON the Power after Setting the Zero Point of Machine Coordinate System

Bit 5 (Zero Point Return/Setting Completed) in the IW□□0C monitor parameter changes to 0 (Zero point return/setting not completed) when the power supply to the Machine Controller is turned OFF and ON again or communications are restarted by turning the power supply to the SERVOPACK OFF and ON again after the zero point has been set. The Zero Point Return (Setting) Completed bit must therefore be turned ON when the power supply is restored.
Use the following procedure.

1. Turn ON the power supply to the Machine Controller. Or, clear alarms to restart communication.

The offset saved in the M register is stored to OL□□48.

2. Check to see if communication has been synchronized.

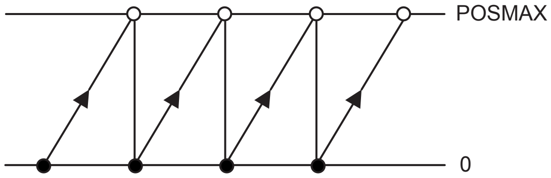
Check to make sure that bit 0 (Motion Operation Ready) in the IW□□00 monitor parameter is 0 (Motion operation not ready) at this time.

3. Set the OW□□08 setting parameter (Motion Commands) to 9 to execute the ZSET motion command.

- Use this procedure only to set bit 5 in IW□□0C to 1 (Zero point return/setting completed). It cannot be used to set the zero point of the machine coordinate system (OL□□48).

9.4 Absolute Position Detection for Infinite Length Axes

Infinite length axis positioning is a function that automatically resets the machine position, program position (absolute values in the program coordinate system), and current position at regular intervals **according to the Infinite Length Axis Reset Position (POSMAX)** (fixed parameter 10). This function can be used for repeated positioning in one direction.



9.4.1 Simple Absolute Infinite Length Position Control

(1) Overview

The Simple Absolute Infinite Length Position Control is a position control method that can be used for infinite length axes and has the following features.

- The coordinate system can be created simply by setting the machine coordinate system zero point position offset when the power is turned ON (when the communication is restarted).
- No ladder program for position control is required.

For the system that satisfies the conditions to enable the Simple Absolute Infinite Length Position Control (described in the following section), select the Simple Absolute Infinite Length Position Control.

(2) Conditions to Enable the Simple Absolute Infinite Axis Position Control

Set the Maximum Number of Absolute Encoder Turns Rotation (fixed parameter 38) to a value that satisfies the following equation to enable the Simple Absolute Infinite Axis Position Control.

$$\frac{\text{(No.38: Maximum Number of Absolute Encoder Turns Rotation +1)}}{\text{Reset number of turns}} = \text{An integer (remainder = 0)}$$

The reset number of turns will differ depending on whether the command unit is set to pulse or millimeters/degrees/inches as shown below.

When the Reference Unit is Pulses	When the Reference Unit is mm, deg, or inch
$\dfrac{\text{No. 10: Infinite Length Axis Reset Position (POSMAX)}}{\text{No.36: Number of Pulses per Motor Rotation}}$	$\dfrac{\text{No. 10: Infinite Length Axis Reset Position (POSMAX)} \times \text{No. 8: Servo Motor Gear Ratio}}{\text{No. 6: Travel Distance per Machine Rotation} \times \text{No. 9 Machine Gear Ratio}}$

The settings above can be used to enable Simple Absolute Infinite Axis Position Control with a Σ-II or Σ-III SERVOPACK.

- For SVB-01 Modules version 1.16 or earlier and built-in SVB Modules version 2.44 or earlier, the reset number of turns must be an integer (remainder = 0)
- Simple Absolute Infinite Length Position Control cannot be used by the Σ-I SERVOPACK.

■ System That Does Not Satisfy the Above Condition

The system that does not satisfy the above condition cannot use the Simple Absolute Infinite Length Position Control. Prepare the ladder program for position control. Refer to *9.4.5 Infinite Length Position Control without Simple Absolute Positions* for details.

■ System That Satisfies the Above Condition

The following example shows the system that can use the Simple Absolute Infinite Length Position Control function.

Fixed Parameter No.	Name	Setting Value
4	Reference Unit Selection	2 (deg)
6	Travel Distance per Machine Rotation	360000
8	Servo Motor Gear Ratio	6
9	Machine Gear Ratio	5
10	Infinite Length Axis Reset Position (POSMAX)	360000
36	Number of Pulses per Motor Rotation	16384
38	Maximum Number of Absolute Encoder Turns Rotation	59705

Reset number of turns = $(360000 \times 6) / (360000 \times 5) = 6/5$
Criterion to use Simple Absolute Infinite Length Position Control : $(59705 + 1) / (6/5) = 49755$
The Simple Absolute Infinite Length Position Control can be used since the result of the above equation is an integer (remainder 0).

9.4.2 Parameter Settings for Simple Absolute Infinite Length Position Control

Set the following parameters to use the Simple Absolute Infinite Length Position Control for an infinite length axis.

⚠ CAUTION

- The parameters for which ❗ precautions are provided must be set referring to *9.3.1 (3) Detailed Descriptions*. Set these parameters carefully. If they are not set correctly, the current position may not be correct after the power is turned ON. Machine damage may occur.

(1) Parameters Settings for Simple Absolute Infinite Length Position Control

Set the fixed parameters No.1 bit 0 and bit 9, and No. 30 as follows to set the Simple Absolute Infinite Length Position Control for an infinite length axis.

Parameter	Fixed Parameter No. 1, Bit 0 (Axis Selection)	Fixed Parameter No. 1, Bit 9 (Simple Rotary Pos. Mode)	Fixed Parameter No. 30 (Encoder Selection)
Setting	1: Infinite length axis	1: Enabled	1: Absolute encoder

(2) Machine Controller Fixed Parameters for Absolute Position Detection

Fixed Parameter No.	Name	Setting/Range	Units	Reference	Caution
No. 4	Reference Unit Selection	0: pulse 1: mm 2: deg 3: inch (Electric gear is disabled when pulse is selected.)	–	–	–
No. 6	Travel Distance per Motor Rotation	1 to $2^{31}-1$	1 = 1 reference unit	–	–
No. 8	Servo Motor Gear Ratio	1 to 65535	1 = 1 rotation	–	–
No. 9	Machine Gear Ratio	1 to 65535	1 = 1 rotation	–	–
No. 10	Infinite Length Axis Reset Position (POSMAX)	1 to $2^{31}-1$	Reference unit	–	–
No. 36	Number of Pulses per Motor Rotation	1 to $2^{31}-1$ (Set the value after multiplication. For example, set 2^{16} = 65536 when using a 16-bit encoder)	pulse	9.4.2 (4) [b]	❗
No. 38	Maximum Number of Absolute Encoder Turns Rotation	0 to $2^{31}-1$	1 = 1 rotation	9.4.2 (4) [c]	❗

(3) SERVOPACK Parameters for Absolute Position Detection

SERVOPACK Model	Parameter	Name	Setting Range	Units	Reference	Caution
Σ-III, Σ-V, and Σ-7 Series	Pn000.0	Direction Selection	0: Sets counterclockwise (CCW) rotation as forward direction. 1: Sets clockwise (CW) rotation as forward direction (reverse rotation mode).	–	–	–
	Pn205	Multiturn Limit Setting	0 to 65535	Rev	9.4.2 (4) [c]	
	Pn002.2	Absolute Encoder Usage	0: Uses absolute encoder as an absolute encoder. 1: Uses absolute encoder as an incremental encoder.	–	9.4.2 (4) [a]	
Σ-II Series	Pn000.0	Direction Selection	0: Sets counterclockwise (CCW) rotation as forward direction. 1: Sets clockwise (CW) rotation as forward direction (reverse rotation mode).	–	–	–
	Pn205	Multiturn Limit Setting	0 to 65535	Rev	9.4.2 (4) [c]	
	Pn002.2	Absolute Encoder Usage	0: Uses absolute encoder as an absolute encoder. 1: Uses absolute encoder as an incremental encoder.	–	9.4.2 (4) [a]	
Σ-I Series	Cn-0001, Bit E	Encoder Type	0: Incremental encoder 1: Absolute encoder	–	9.4.2 (4) [a]	
	Cn-0002, Bit 0	Rotation Direction Selection	0: Sets counterclockwise (CCW) rotation as forward rotation. 1: Sets clockwise (CW) rotation as forward rotation (reverse rotation mode).	–	–	–

(4) Detailed Descriptions

[a] Encoder Type/Absolute Encoder Usage

For an axis performing absolute position detection, set the parameters as shown in the table below.

Model	Parameter	Setting
Machine Controller	Fixed parameter 30: Encoder Selection	1: Absolute encoder
Σ-II, Σ-III, Σ-V, or Σ-7 Series	Parameter Pn002.2: Absolute Encoder Usage	0: Uses absolute encoder as an absolute encoder
Σ-I Series SERVOPACK	Parameter Cn-0001, Bit E: Encoder Type	1: Absolute encoder

- If the above settings are not used, correct motion control will not be performed. Set the parameters carefully.
- Be sure to set both the Machine Controller and SERVOPACK parameters.

[b] Encoder Resolution

Refer to the following table and set the fixed parameter 36 (Number of Pulses per Motor Rotation) according to the number of servomotor bits. The settings can be used for all SERVOPACK models.

Number of Bits	Fixed Parameter 36 (Number of Pulses per Motor Rotation)
12	4096
13	8192
15	32768
16	65536
17	131072
20	1048576

- If the above settings are not used, correct motion control will not be performed. Set the parameters carefully.

[c] Maximum Number of Absolute Encoder Turns Rotation/Multiturn Limit Setting

These parameters determine the maximum value of the number of encoder turns managed by the SERVOPACK and Machine Controller.

For an infinite length axis, set the parameters as shown in the table below.

Applicable SERVOPACK	Fixed Parameter 38 (Max. No. of Absolute Encoder Turns Rotation)	SERVOPACK Parameter Pn205 (Multiturn Limit Setting)
Σ-II, Σ-III, Σ-V, or Σ-7 Series	Set the same value as Pn205 *	65534 max. *
Σ-I Series	99999	–

* For details on the setting procedure, refer to *Appendix D Setting the Multiturn Limit*. If the Machine Controller fixed parameter 38 is set to 65535 when using a Σ-II, Σ-III, Σ-V, and Σ-7 series SERVOPACK for an infinite axis, a fixed parameter setting error will occur. When using a direct drive motor, set both the Machine Controller's fixed parameter 38 and the SERVOPACK's parameter Pn205 to 0.

- Set the parameters correctly as shown in the above table. Otherwise, correct motion control will not be performed resulting in position error.

9.4.3 Setting the Zero Point and Turning ON Power as Simple Absolute Positions

(1) Calculating the Zero Point of the Machine Coordinate System

If using the simple absolute infinite length position control, the Machine Controller calculates the axis position (i.e., current position for the machine coordinate system) as follows when the power is turned ON.

Current position for the machine coordinate system (monitoring parameter IL□□10[*1] or IL□□16[*1]) = Encoder position when servo power is turned ON[*2] + Zero Point Position in Machine Coordinate System Offset (setting parameter OL□□48)

To set the current position of the machine coordinate system as the zero position, set OL□□48 to the difference between OL□□48 and IL□□10 (or IL□□16).

* 1. Use the IL□□10 to make the machine coordinate reference position as a standard, and IL□□16 to make the machine coordinate current position as a standard.
* 2. The encoder position when the servo power is turned ON is the value that is calculated with the following equation and converted to reference unit: Multiturn data × Number of encoder pulses + initial increment pulses. Refer to your SERVOPACK manual for information on the initial increment pulses.

Example: IL□□10 = 10,000 and OL□□48 = 100

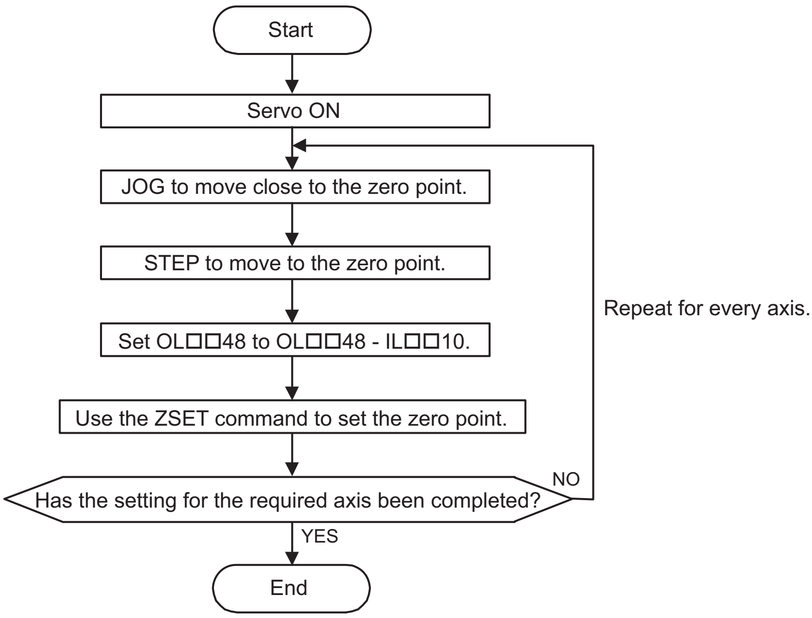
Set the encoder position when servo power is turned ON to a negative value as shown below.

OL□□48 − IL□□10 = 100 − 10000
= − 9900

Set OL□□48 to -9900 to assign the current position in the machine coordinate system as the zero point.

(2) Setting the Zero Point for Simple Absolute Infinite Axis Position Control

The procedure to set the zero point for a simple absolute infinite axis position control is shown below.



(3) Saving OL□□48 Values at Power OFF

After having set the zero point, save the value of OL□□48 before turning OFF the power of Machine Controller so that the value will be written in OL□□48 the next time the power is turned ON.

There are two ways to save the Zero Point Position in Machine Coordinate System Offset (OL□□48) value. It can be saved through a ladder program in an M register backed up by battery or from the MPE720 Parameter Window.

Refer to *9.3.2 (3)* ■ *Method 1: Saving the Zero Point Position in Machine Coordinate System Offset (OL□□48) from the MPE720 Parameter Window* and *9.3.2 (3)* ■ *Method 2: Saving in an M Register with a Ladder Program* for more details.

9.4.4 Turning ON the Power after Setting the Zero Point

Bit 5 (Zero Point Return/Setting Completed) in the IW□□0C monitor parameter changes to 0 (Zero point return/setting not completed) when the power supply to the Machine Controller is turned OFF and ON again or communications are restarted by turning the power supply to the SERVOPACK OFF and ON again after the zero point has been set. The Zero Point Return (Setting) Completed bit must therefore be turned back ON when the power supply is restored.
Use the following procedure.

1. Turn ON the power supply to the Machine Controller, or clear alarms to restart communication.

The offset saved in the M register is stored in OL□□48.

2. Check to see if communication has been synchronized.

Check to make sure that bit 0 (Motion Operation Ready) in the IW□□00 monitor parameter is 0 (Motion operation not ready) at this time.

3. Set the OW□□08 setting parameter (Motion Commands) to 9 to execute the ZSET motion command.

- Use this procedure only to set bit 5 in IW□□0C to 1 (Zero point return/setting completed). It cannot be used to set the zero point of the machine coordinate system (OL□□48).

9.4.5 Infinite Length Position Control without Simple Absolute Positions

(1) Parameter Settings for Infinite Length Position Control without Simple Absolute Positions

Set the infinite length position control without simple absolute positions by setting the fixed parameters No. 1 bit 0 and bit 9, and No. 30 as shown in the table below when the simple absolute infinite length position control function cannot be used.

Parameter	Fixed Parameter No.1, Bit 0 (Axis Selection)	Fixed Parameter No. 1, Bit 9 (Simple Rotary Pos. Mode)	Fixed Parameter No. 30 (Encoder Selection)
Setting	1: Infinite length axis	0: Disabled	1: Absolute encoder

(2) Infinite Length Axis Position Control without Simple Absolute Positions

The Machine Controller performs the following infinite length position control when the Simple Absolute Infinite Length Position Control Function is not used.
The pulse position and encoder position are always stored as paired information in backup memory. This information is used the next time power is turned ON as the pulse position and the encoder position at shutdown to find the relative encoder position in pulses.

- Pulse position = Pulse position at power OFF + (Encoder position - Encoder position at power OFF)*

  * The portion in parentheses ( ) represents the moving amount while the power is OFF.

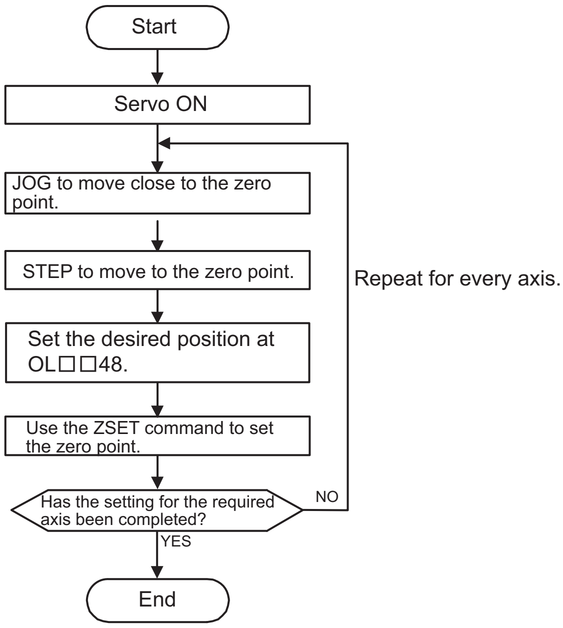
■ Terminology: Encoder position

Absolute encoder position information (Multiturn data × Number of encoder pulses + Initial increment pulses)

■ Terminology: Pulse Position

The position information from the Machine Controller converted to pulses

(3) Setting the Zero Point for an Infinite Length Axis without Simple Absolute Positions



Perform the procedure shown in the figure on the left to set the zero point for infinite length position control without simple absolute positions.
The OL□□48 value (zero point data) does not have to be stored in an M register with this method. Set a desired position in OL□□48 and execute the ZSET command to set the zero point. With this setting, the current position of the machine coordinate system will be set.
OL□□48 is valid only when executing a ZSET command.

Example:
To set the current position of the machine coordinate system to 0 when executing the ZSET command, set OL□□48 to 0.

(4) Ladder Program for Infinite Length Axis Position Control

If the Simple Absolute Infinite Length Position Control Function is not used, a special ladder program is needed for normal operation and for operation when system power is turned ON.

[a] Normal Operation

1. Check the status of the Zero Point Return (Setting) Completed bit.

Check to see if the Zero Point Return (Setting) Completed bit (monitoring parameter IW□□0C, bit 5) is ON. If it is, go to step 2.
If it is not, it means that the pulse position at power OFF, encoder position at power OFF and all position data was not settled. In that case, restart the system and set up the position data again or execute the ZSET (Set Zero Point) motion command to settle the position data all over from the start.

2. Save the modularized position at power OFF and absolute position at power OFF.

Use the ladder program to save the following monitoring parameters with high-speed scan timing at an M register backed up by battery.

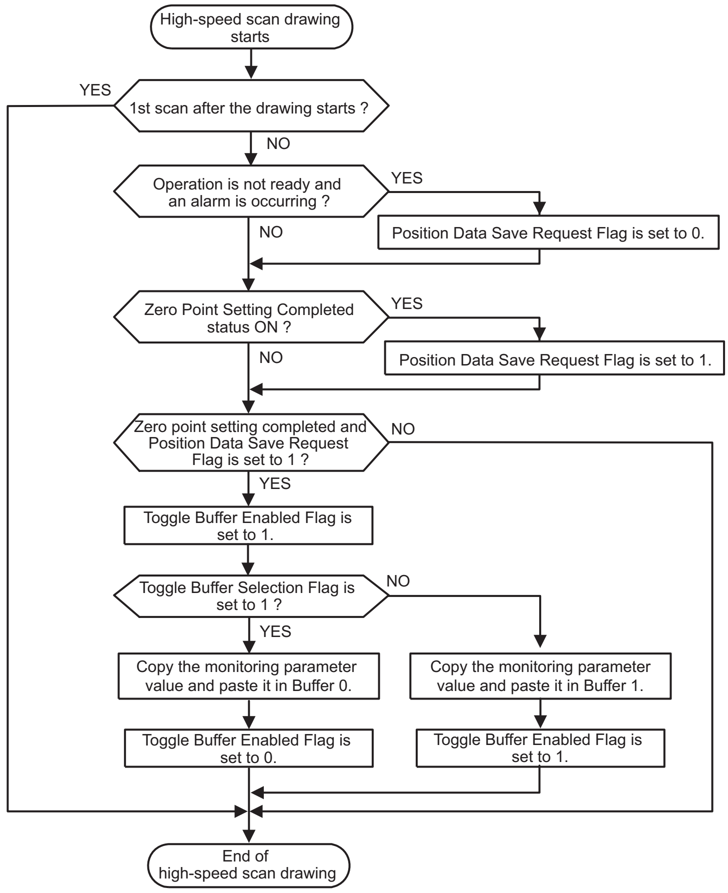
- Monitoring Parameter: Encoder Position when the Power is OFF (All four words at IL□□5E to IL□□60)
- Monitoring Parameter: Pulse Position when the Power is OFF (All four words at IL□□62 to IL□□64)

The M register that is used to save the above monitoring parameters is structured as shown below.

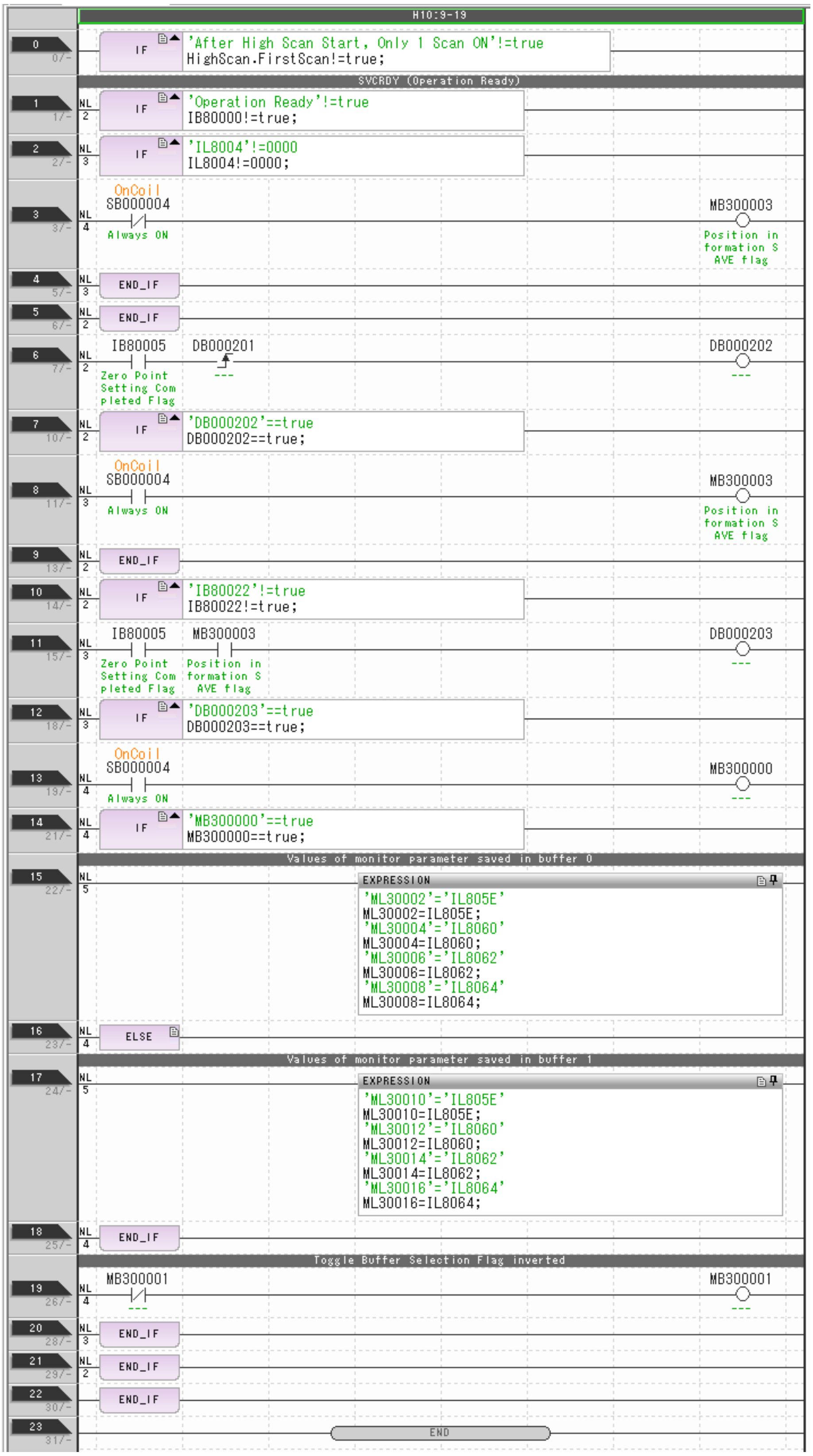
<table>
<tr><td rowspan="4">MW□□□□□</td><td>Bit 0</td><td colspan="2">Toggle Buffer Enabled Flag (0: Disabled, 1: Enabled)</td></tr>
<tr><td>Bit 1</td><td colspan="2">Toggle Buffer Selection Flag (0: Buffer 0, 1: Buffer 1)</td></tr>
<tr><td>Bit 2</td><td colspan="2">Position Data Re-setup Request Flag (0: Complete, 1: Request)</td></tr>
<tr><td>Bit 3</td><td colspan="2">Position Data Save Request Flag (0: Prohibited, 1: Request)</td></tr>
<tr><td>MW□□□□□ +1</td><td colspan="3">Not used</td></tr>
<tr><td rowspan="2">ML□□□□□ +2
ML□□□□□ +4</td><td rowspan="4">Buffer 0</td><td rowspan="2">Monitoring Parameter:
Encoder Position when the Power is OFF</td><td>Lower-place two words (IL□□5E)</td></tr>
<tr><td>Upper-place two words (IL□□60)</td></tr>
<tr><td rowspan="2">ML□□□□□ +6
ML□□□□□ +8</td><td rowspan="2">Monitoring Parameter:
Pulse Position when the power is OFF</td><td>Lower-place two words (IL□□62)</td></tr>
<tr><td>Upper-place two words (IL□□64)</td></tr>
<tr><td rowspan="2">ML□□□□□ +10
ML□□□□□ +12</td><td rowspan="4">Buffer 1</td><td rowspan="2">Monitoring Parameter:
Encoder Position when the Power is OFF</td><td>Lower-place two words (IL□□5E)</td></tr>
<tr><td>Upper-place two words (IL□□60)</td></tr>
<tr><td rowspan="2">ML□□□□□ +14
ML□□□□□ +16</td><td rowspan="2">Monitoring Parameter:
Pulse Position when the power is OFF</td><td>Lower-place two words (IL□□62)</td></tr>
<tr><td>Upper-place two words (IL□□64)</td></tr>
</table>

- Two buffers are needed to save the encoder position and the pulse position at power OFF because the program may be exited without settling position data at all four words if power is turned OFF during the high-speed scan.

Use the following flowchart to store values in buffers.



The following programming example (ladder program) is for the flowchart shown on the previous page. The axis used here is axis 1 of circuit number 1. Change the motion parameter register number if the circuit and axis numbers are different.



[b] Turning the System Back ON (Turning the Servo Back ON)

Set up position data again from the ladder program using high-speed scan timing as shown below. This is done when MP2300 power or power of the SERVOPACK is turned OFF and ON.

1. Store Pulse Position at Power OFF and Encoder Position at Power OFF to setting parameters.

Store the Pulse Position at Power OFF and Encoder Position at Power OFF values saved in M register to the following setting parameters.

- Setting parameter: Encoder Position when the Power is OFF (All four words, form OL□□5E to OL□□60.)
- Setting parameter: Pulse Position When the Power is OFF (All four words, from OL□□62 to OL□□64.)

Store the contents of the buffer selected by the Toggle Buffer Selection Flag.

2. Infinite Length Axis Position Information LOAD

Set bit 7 (Absolute Infinite-length Position Information Load Request) in the OW□□00 setting parameter to 0 (OFF), 1 (ON), and then 0 (OFF) again. This will allow all position data to be settled. Bit 5 (Zero Point Return/ Setting Completed) in the IW□□0C monitor parameter changes to 1 (Zero point return/setting completed) and the following monitor parameters are enabled.

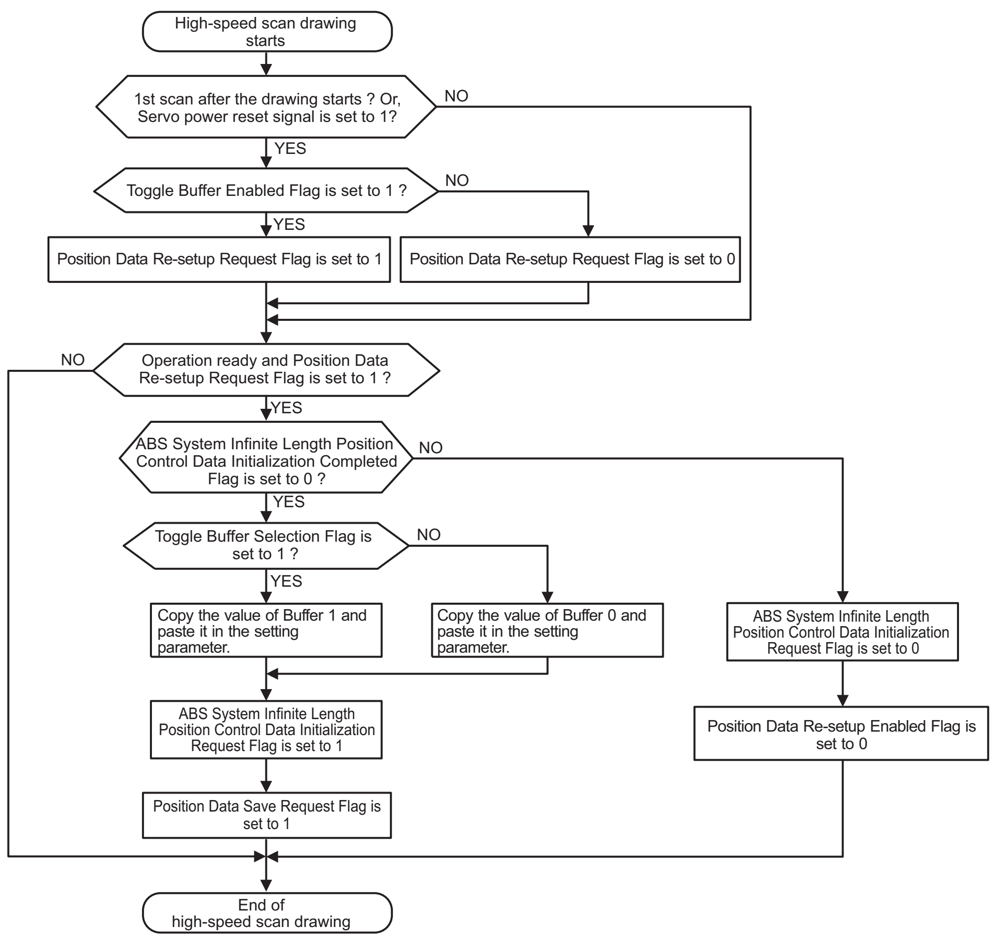
- Monitoring Parameter: Encoder Position when the Power is OFF (All four words, from IL□□5E to IL□□60.)
- Monitoring Parameter: Pulse Position When the Power is OFF (All four words, from IL□□62 to IL□□64.)

The system will create position data using the following equation when the Request ABS Rotary Pos. Load bit turns ON.

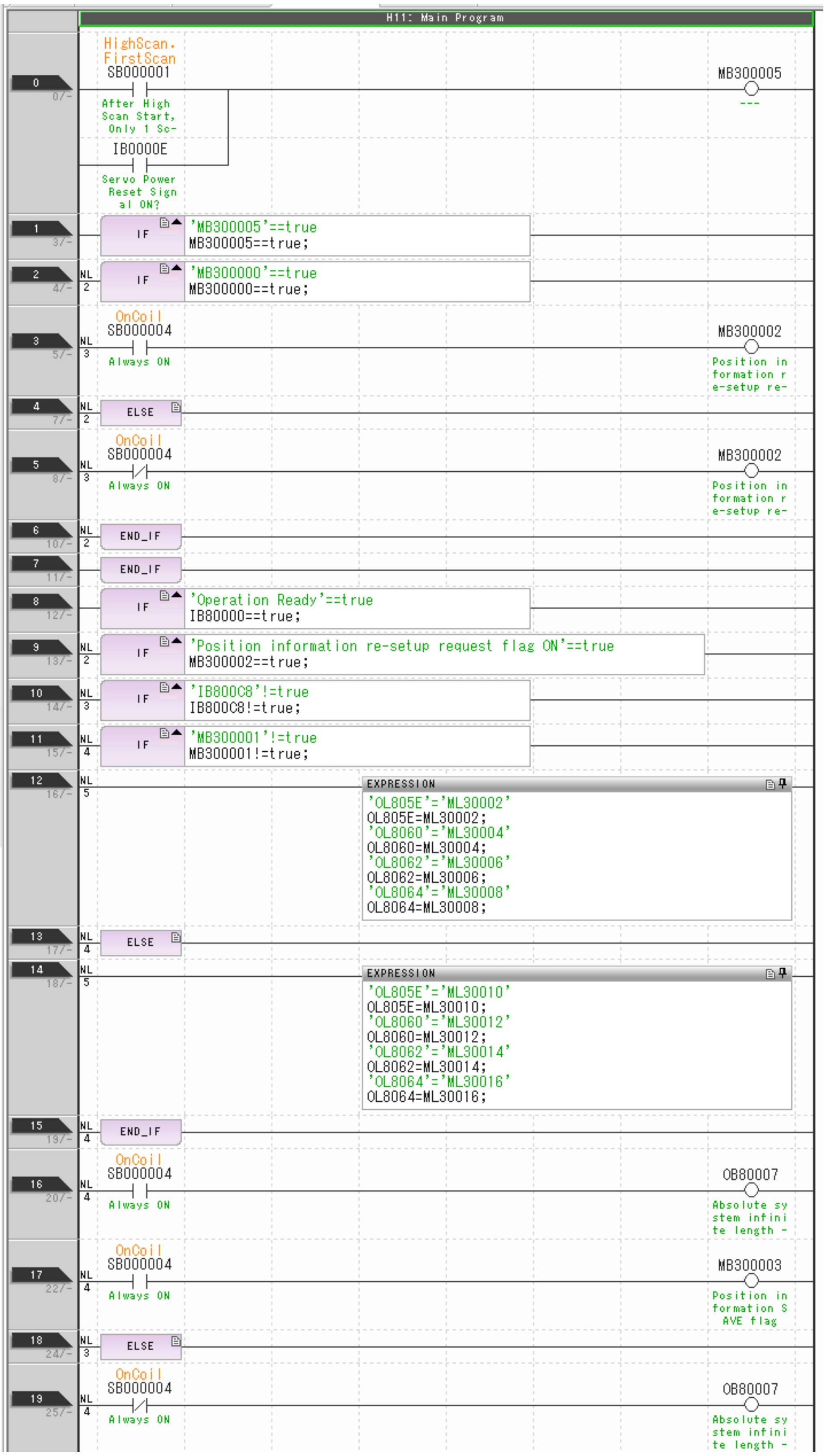
- Pulse position = Pulse position at power OFF + (Encoder position − Encoder position at power OFF)*

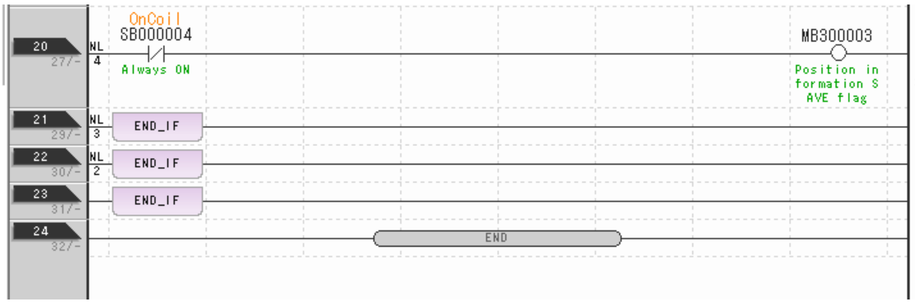
* The portion in parentheses ( ) represents the moving amount while power is OFF.

Use the following flowchart for storing the position data in the setting parameters and for requesting to load the infinite length axis position information.



The following programming example (ladder program) is for the flowchart shown above. The axis used here is axis 1 of circuit number 1. Change the motion parameter register number if the circuit and axis numbers are different.





- There are no restrictions in the executing order for ladder programs H10 and H11 when an absolute encoder is used for a finite length axis.

10

Inverter Operation

Motion control with an Inverter is possible using the SVB Module. This chapter describes the parameters and commands required for motion control with an Inverter.

10.1 Connection Specifications

The connection specifications when controlling an Inverter using MECHATROLINK-II communications from the Machine Controller are given in the following table.

Item		Description		
		MECHATROLINK-II (32-byte mode)	MECHATROLINK-II (17-byte mode)	MECHATROLINK-I
Supported Models	SVB Module	Built-in SVB: CPU version 2.20 or later SVB-01 Module: Version 1.10 or later		
	Engineering Tool	MPE720 version 5.12 or later		
	Inverter	A1000, using the SI-T3 Communications Option Card V1000, using the SI-T3/V Communications Option Unit Varispeed G7, using the SI-T Communications Option Card Varispeed F7, using the SI-T Communications Option Card VS mini V7, using the SI-T/V7 Communications Option Unit		
Number of Connectable Inverters		16 max. (at transmission cycle 2 ms) • Differs depending on whether messages are used and the number of retries to slaves. *1	15 max. • Differs depending on whether messages are used and the number of retries to slaves. *2	14 max.
Transmission Cycle		1 ms, 2 ms	1 ms	2 ms
Interface		Fixed parameters (To set application conditions) Setting parameters (To update references and output data) Monitor parameters (To update monitored or input data)		
Self-configuration Function		Available		
Others		Conforms to MECHATROLINK-I and II specifications		

* 1. The maximum number of connectable Inverters in MECHATROLINK-II 32-byte mode can be obtained by the following equation.
Transmission cycle 2 ms: 21 − C2 Message (with: 1, none: 0) − Number of retries to slaves
Transmission cycle 1 ms: 9 − C2 Message (with: 1, none: 0) − Number of retries to slaves
- Setting range of number of retry to slaves is 0 to 7.
- If the result of the above equation is 16 or greater, the maximum number of connectable Inverters is 16.

* 2. The maximum number of connectable Inverters in MECHATROLINK-II 17-byte mode can be obtained by the following equation.
Transmission cycle 1 ms: 15 − C2 Message (with: 1, none: 0) − Number of retries to slaves
- Setting range of number of retry to slaves is 0 to 7.

10.2 Parameters for Inverter Operation

This section describes the motion parameters required for Inverter operation.

10.2.1 Types of Motion Parameters

The motion parameters for operating an Inverter are fixed parameters, setting parameters, and monitor parameters.

Parameter	Description
Fixed Parameters	These parameters are used to configure basic system settings for Inverter operation.
Setting Parameters	These parameters are used to configure Inverter operation references and details of functions.
Monitor Parameters	These parameters are used to monitor detailed information, such as the operating status of the Inverter.

10.2.2 Motion Parameter Registers

Motion parameter registers are used to store setting parameters and monitor parameters.
Specific motion parameter register addresses are determined by the circuit number that is used for each motion control function and the axis number that is assigned. Motion parameter registers are the same as for SERVOPACKs. Refer to *4.1 Motion Parameters Register Numbers* for details on motion parameter registers.
However, the station address of the Inverter is used for motion parameter registers instead of the axis number on the SERVOPACK.

10.2.3 Motion Parameter List

This section provides tables of the motion parameters.
It also provides details of Inverter output data and input data when using MECHATROLINK-II-compatible Inverters.

(1) Fixed Parameter List

Fixed parameters are used to configure basic system settings for Inverter operation. The following table lists the fixed parameters.

<table>
<tr><th>No.</th><th colspan="2">Name and Contents</th><th>Setting Range</th><th>Default Setting</th></tr>
<tr><td rowspan="2">0</td><td colspan="2">Selection of Operation Mode</td><td>0 to 1</td><td>0</td></tr>
<tr><td colspan="4">Sets the run mode to send/receive commands to/from the Inverter through MECHATROLINK.
0: Normal Operation Mode (default)
Possible to send/receive commands.
1: Axis Unused
Impossible to send/receive commands.</td></tr>
<tr><td>1</td><td colspan="3">Reserved for system.</td><td>–</td></tr>
<tr><td rowspan="4">2</td><td colspan="2">Function Selection Flag 2</td><td>–</td><td>0</td></tr>
<tr><td>Bit 0</td><td colspan="3">Communication Abnormality Detection Mask
Specifies whether to mask an error to be reported to the monitor parameter when an error is detected in MECHATROLINK communications.
0: Disabled (default)
When a communication error occurs, the error will be reported in the Alarm or Warning monitor parameter.
1: Enabled
When a communication error occurs, the error will not be reported in the Alarm or Warning monitor parameter.</td></tr>
<tr><td>Bit 1</td><td colspan="3">WDT Abnormality Detection Mask (Applicable only for Inverters that support synchronous communications)
Specifies whether to mask an error to be reported to the monitor parameter when a synchronization management error is detected in MECHATROLINK communications.
0: Disabled (default)
Synchronized processing with the Inverter using the watchdog timer will be performed.
1: Enabled
Synchronized processing with the Inverter using the watchdog timer will not be performed.</td></tr>
<tr><td>Bit 2 to Bit F</td><td colspan="3">Reserved for system.</td></tr>
<tr><td rowspan="4">3</td><td colspan="2">Function Selection Flag 3</td><td>–</td><td>8000H</td></tr>
<tr><td>Bit 0</td><td colspan="3">Communication Selection Is Abnormal
Valid when Communication Abnormality Detection Mask bit (bit 0) of Function Selection Flag 2 is set to 0 (Disabled).
Specifies whether an Alarm or Warning is to be output when a communication error occurs.
0: Alarm (default)
Outputs Alarm at occurrence of communication error.
The alarm must be cleared to restart communication.
1: Warning
Outputs Warning at occurrence of communication error.
When communications is restored, the warning will be automatically cleared.</td></tr>
<tr><td>Bit 1 to Bit E</td><td colspan="3">Reserved for system.</td></tr>
<tr><td>Bit F</td><td colspan="3">Parameter Discrimination Flag
Reserved
1: Inverter parameter (always ON)</td></tr>
<tr><td>4 to 63</td><td colspan="3">Reserved for system.</td><td>–</td></tr>
</table>

(2) Setting Parameter List

Register No.	Name		Contents
OW□□00	RUN Command Setting	Bit 0 to C	Reserved for system.
		Bit D: Drive Permission	0: OFF/1: ON Enables (ON) or disables (OFF) the Inverter drive control. • This bit is captured at both rising and falling edges. • When set to 0 (OFF), the command Inverter Drive Control cannot be used. • When this bit turns ON from OFF, the request to prepare for Inverter control operation is sent. However, this request will not be accepted while the command Inverter Drive Control is being executed. To allow the Inverter to get ready to run, turn OFF this bit and then turn it ON again after setting a command other than Inverter Drive Control. • When this bit turns OFF from ON while the command Inverter Drive Control is being executed, bit 3 (Command Error Completed Status) of the monitoring parameter Command Status will turn ON. Also, when this bit turns OFF from ON while the Inverter is operating, the system will execute Forced OFF (OFF both for forward RUN and reverse RUN).
		Bit E: Communication Reset	0: OFF/1: ON Re-establishes the connection for MECHATROLINK communications with the Inverter, whether communications are stopped or in process. Also clears the Alarm monitor parameter. • This bit is captured at the rising edge. <Application Example> With the setting to continue communications after a communications error occurrence*1, the SVB Module will continue communications whether or not the Inverter stops communications because of the error. In this case, the connection for communications can be reestablished by execution of Communication Reset. * 1. When Communication Abnormality Detection Mask is enabled in the SVB Module fixed parameter Function Selection Flag 2, or when Communication Abnormality Detection Mask is disabled and Warning is selected for Communication Selection Is Abnormal of Function Selection Flag 3.
OW□□00	RUN Command Setting (Continued)	Bit F: Alarm Clear	0: OFF/1: ON Clears the Alarm monitor parameter. • This bit is captured at the rising edge. • If communications are stopped after the MECHATROLINK communication errors, clear the alarm bit and re-establish communications at the same time. • Alarm Clear is used to clear alarms in the SVB Module, but will not clear alarms and warnings in the Inverter. To clear alarms in the Inverter, use the Inverter Drive Control command and set the bit 9 (Fault Reset) of Input Command (OW□□10) to 1 (ON).
OW□□01 to OW□□07	–		Reserved for system.

(cont'd)

Register No.	Name		Contents
OW□□08	Main Command (Refer to *10.3.2 Main Command Details* for details.)		00: No Command 01: Inverter Drive Control 02: Read User Constant 03: Write User Constant 04: Alarm Monitor 05: Alarm History Monitor 06: User Constant RAM Writing 07: User Constant EEPROM Writing 08: Transmission Reference
OW□□09	–		Reserved for system.
OW□□0A	Sub Command (Refer to *10.3.3 Subcommand Details* for details.)		00: No Command 01: Inverter I/O Control 02: Read User Constant 03: Write User Constant 04: Alarm Monitor 05: Alarm History Monitor 08: Transmission Reference 09: Read Fixed Parameters
OW□□0B	–		Reserved for system.
OW□□0C	Output Data Option Selection	Bit 0: Torque Compensation	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Torque Compensation (OW□□13) will be enabled when the Inverter Drive Control command is executed.
		Bit 1: Multi-function Analog Output FM	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Output FM (OW□□14) will be enabled when the Inverter Drive Control command is executed.
		Bit 2: Multi-function Analog Output AM	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Output AM (OW□□15) will be enabled when the Inverter Drive Control command is executed.
		Bit 3: Multi-function Terminal Output	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Terminal Output (OW□□16) will be enabled when the Inverter Drive Control command is executed.
		Bit 4 to F	Reserved for system.
OW□□0D	Input Data Option Selection	Bit 0: Motor Speed	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Motor Speed (IW□□13) will be monitored when the Inverter Drive Control command is executed.
		Bit 1: Torque Reference (U1-09)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Torque Reference (IW□□14) will be monitored when the Inverter Drive Control command is executed.
		Bit 2: Encoder Count PG	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Encoder Count PG (IW□□15) will be monitored when the Inverter Drive Control command is executed.
		Bit 3: Frequency Reference (U1-01)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Frequency Reference (IW□□16) will be monitored when the Inverter Drive Control command is executed.
		Bit 4: Multi-function Analog Input A2	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Multi-function Analog Input A2 (IW□□17) will be monitored when the Inverter Drive Control command is executed.

(cont'd)

Register No.	Name		Contents
OW□□0D	Input Data Option Selection (Continued)	Bit 5: Main Bus Voltage	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Main Bus Voltage (IW□□18) will be monitored when the Inverter Drive Control command is executed.
		Bit 6: Alarm Code	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Alarm Code (IW□□19) will be monitored when the Inverter Drive Control command is executed.
		Bit 7: Warning Code	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Warning Code (IW□□1A) will be monitored when the Inverter Drive Control command is executed.
		Bit 8	Reserved for system.
		Bit 9: Multi-function Analog Input A3	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Multi-function Analog Input A3 (IW□□1C) will be monitored when the Inverter Drive Control command is executed.
		Bit A: Multi-function Terminal Input	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Multi-function Terminal Input (IW□□1D) will be monitored when the Inverter Drive Control command is executed.
		Bit B: Multi-function Analog Input A1	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Multi-function Analog Input A1 (IW□□1E) will be monitored when the Inverter Drive Control command is executed.
		Bit C: Encoder Counter (ch2)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Encoder Counter (ch2) (IW□□1F) will be monitored when the Inverter Drive Control command is executed.
		Bit D to F	Reserved for system.
OW□□0E	Auxiliary Output Data Option Selection	Bit 0: Torque Compensation	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Torque Compensation (OW□□13) will be enabled when the Inverter I/O Control subcommand is executed.
		Bit 1: Multi-function Analog Output FM	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Output FM (OW□□14) will be enabled when the Inverter I/O Control subcommand is executed.
		Bit 2: Multi-function Analog Output AM	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Output AM (OW□□15) will be enabled when the Inverter I/O Control subcommand is executed.
		Bit 3: Multi-function Terminal Output	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Terminal Output (OW□□16) will be enabled when the Inverter I/O Control subcommand is executed.
		Bit 4 to F	Reserved for system.

(cont'd)

Register No.	Name		Contents
OW□□0F	Auxiliary Input Data Option Selection	Bit 0: Motor Speed	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Motor Speed (IW□□13) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit 1: Torque Reference (U1-09)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Torque Reference (IW□□14) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit 2: Encoder Count PG	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Encoder Count PG (IW□□15) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit 3: Frequency Reference (U1-01)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Frequency Reference (IW□□16) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit 4: Multi-function Analog Input A2	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Multi-function Analog Input A2 (IW□□17) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit 5: Main Bus Voltage	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Main Bus Voltage (IW□□18) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit 6: Alarm Code	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Alarm Code (IW□□19) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit 7: Warning Code	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Warning Code (IW□□1A) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit 8	Reserved for system.
		Bit 9: Multi-function Analog Input A3	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Multi-function Analog Input A3 (IW□□1C) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit A: Multi-function Terminal Input	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Multi-function Terminal Input (IW□□1D) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit B: Multi-function Analog Input A1	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Multi-function Analog Input A1 (IW□□1E) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit C: Encoder Counter (ch2)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the input data option Encoder Counter (ch2) (IW□□1F) will be monitored when the Inverter I/O Control subcommand is executed.
		Bit D to F	Reserved for system.

(cont'd)

Register No.	Name	Contents
OW□□10	Input Command	These registers set references for the Inverter when the Inverter Drive Control command is executed. These registers depend the Inverter being used. Refer to *10.2.4 (1) Inverter Output Data Details* for details.
OW□□11	Speed Reference	
OW□□12	Torque Reference	
OW□□13	Torque Compensation (Option)	
OW□□14	Multi-function Analog Output FM (Option)	
OW□□15	Multi-function Analog Output AM (Option)	
OW□□16	Multi-function Terminal Output (Option)	
OW□□17 to OW□□31	–	Reserved for system.
OW□□32	Inverter Alarm Monitor Number	Setting range: Depends on the Inverter being used. Refer to *10.3.2 (6) Alarm History Monitor* for details. Set the alarm history number for the Alarm History Monitor command.
OW□□33	Auxiliary Inverter Alarm Monitor Number	Setting range: Depends on the Inverter being used. Refer to *10.3.3 (6) Alarm History Monitor* for details. Set the alarm history number for the Alarm History Monitor subcommand.
OW□□34 to OW□□3B	–	Reserved for system.
OW□□3C	Inverter User Constant Number	Setting range: 0 to FFFFH Set the leading number of the user constants to read by executing the Read User Constant command, or set the leading number of the user constants to write by executing the Write User Constant command. • Set the register number used for MEMOBUS communications.
OW□□3D	Inverter User Constant Number Size	Setting range: 1 to 4 (words) Set the size of the user constant to read by executing the Read User Constant command, or set the size of the user constant to write by executing the Write User Constant command, in words. Each inverter constant is composed of one word. Therefore, setting the Inverter User Constant Number Size enables the reading or writing of data of 1 to 4 consecutive words at once.
OW□□3E	Inverter User Constant Set Point 1	Setting range: 0 to 65535 (FFFFH) Set the data to write for the Write User Constant command. Enabled when Inverter User Constant Number Size = 1 to 4.
OW□□3F	Inverter User Constant Set Point 2	Setting range: 0 to 65535 (FFFFH) Set the data to write for the Write User Constant command. Enabled when Inverter User Constant Number Size = 2 to 4.
OW□□40	Inverter User Constant Set Point 3	Setting range: 0 to 65535 (FFFFH) Set the data to write for the Write User Constant command. Enabled when Inverter User Constant Number Size = 3 to 4.
OW□□41	Inverter User Constant Set Point 4	Setting range: 0 to 65535 (FFFFH) Set the data to write for the Write User Constant command. Enabled when Inverter User Constant Number Size = 4.

(cont'd)

Register No.	Name	Contents
OW□□42	Auxiliary Inverter User Constant Number	Setting range: 0 to FFFFH Set the leading number of user constants to read by executing the Read User Constant subcommand, or the leading number of user constants to write by executing the Write User Constant subcommand. • Set the register number used for MEMOBUS communications.
OW□□43	Auxiliary Inverter User Constant Number Size	Setting range: 1 to 4 (words) Set the size of the user constant to read by executing the Read User Constant subcommand, or set the size of the user constant to write by executing the Write User Constant subcommand, in words. Each inverter constant is composed of one word. Therefore, setting the Inverter User Constant Number Size enables the reading or writing of data of 1 to 4 consecutive words at once.
OW□□44	Auxiliary Inverter User Constant Set Point 1	Setting range: 0 to 65535 (FFFFH) Set the data to write for the Write User Constant subcommand. Enabled when Auxiliary Inverter User Constant Number Size = 1 to 4.
OW□□45	Auxiliary Inverter User Constant Set Point 2	Setting range: 0 to 65535 (FFFFH) Set the data to write for the Write User Constant subcommand. Enabled when Auxiliary Inverter User Constant Number Size = 2 to 4.
OW□□46	Auxiliary Inverter User Constant Set Point 3	Setting range: 0 to 65535 (FFFFH) Set the data to write for the Write User Constant subcommand. Enabled when Auxiliary Inverter User Constant Number Size = 3 to 4.
OW□□47	Auxiliary Inverter User Constant Set Point 4	Setting range: 0 to 65535 (FFFFH) Set the data to write for the Write User Constant subcommand. Enabled when Auxiliary Inverter User Constant Number Size = 4.
OW□□48	Fixed Parameter Number	Setting range: 0 to 65535 Set the fixed parameter number to read for the Read Fixed Parameters subcommand.
OW□□49 to OW□□6F	–	Reserved for system.
OW□□70	Transmission Reference Output Data 0	Setting range: 0 to FFFFH This data is sent as the 1st word in the command (main command bytes 0 and 1) when the Transmission Reference command is executed.
OW□□71	Transmission Reference Output Data 1	Setting range: 0 to FFFFH This data is sent as the 2nd word in the command (main command bytes 2 and 3) when the Transmission Reference command is executed.
OW□□72	Transmission Reference Output Data 2	Setting range: 0 to FFFFH This data is sent as the 3rd word in the command (main command bytes 4 and 5) when the Transmission Reference command is executed.
OW□□73	Transmission Reference Output Data 3	Setting range: 0 to FFFFH This data is sent as the 4th word in the command (main command bytes 6 and 7) when the Transmission Reference command is executed.

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Register No.	Name	Contents
OW□□74	Transmission Reference Output Data 4	Setting range: 0 to FFFFH This data is sent as the 5th word in the command (main command bytes 8 and 9) when the Transmission Reference command is executed.
OW□□75	Transmission Reference Output Data 5	Setting range: 0 to FFFFH This data is sent as the 6th word in the command (main command bytes 10 and 11) when the Transmission Reference command is executed.
OW□□76	Transmission Reference Output Data 6	Setting range: 0 to FFFFH This data is sent as the 7th word in the command (main command bytes 12 and 13) when the Transmission Reference command is executed.
OW□□77	Transmission Reference Output Data 7	Setting range: 0 to FFFFH This data is sent as the 8th word in the command (main command bytes 14 and 15) when the Transmission Reference command is executed.
OW□□78	Transmission Reference Output Data 8	Setting range: 0 to FFFFH This data is sent as the 1st word in the subcommand (subcommand bytes 0 and 1) when the Transmission Reference subcommand is executed.
OW□□79	Transmission Reference Output Data 9	Setting range: 0 to FFFFH This data is sent as the 2nd word in the subcommand (subcommand bytes 2 and 3) when the Transmission Reference subcommand is executed.
OW□□7A	Transmission Reference Output Data 10	Setting range: 0 to FFFFH This data is sent as the 3rd word in the subcommand (subcommand bytes 4 and 5) when the Transmission Reference subcommand is executed.
OW□□7B	Transmission Reference Output Data 11	Setting range: 0 to FFFFH This data is sent as the 4th word in the subcommand (subcommand bytes 6 and 7) when the Transmission Reference subcommand is executed.
OW□□7C	Transmission Reference Output Data 12	Setting range: 0 to FFFFH This data is sent as the 5th word in the subcommand (subcommand bytes 8 and 9) when the Transmission Reference subcommand is executed.
OW□□7D	Transmission Reference Output Data 13	Setting range: 0 to FFFFH This data is sent as the 6th word in the subcommand (subcommand bytes 10 and 11) when the Transmission Reference subcommand is executed.
OW□□7E	Transmission Reference Output Data 14	Setting range: 0 to FFFFH This data is sent as the 7th word in the subcommand (subcommand bytes 12 and 13) when the Transmission Reference subcommand is executed.
OW□□7F	Transmission Reference Output Data 15	Setting range: 0 to FFFFH This data is sent as the 8th word in the subcommand (subcommand bytes 14 and 15) when the Transmission Reference subcommand is executed.

(3) Monitor Parameter List

Monitor parameters are used to monitor detailed information, such as the operating status of the Inverter. The following table lists the monitor parameters.

Register No.	Name		Contents
IW□□00	Run Status	Bit 0: Operation Ready	0: Inverter drive control disabled 1: Inverter drive control enabled Turns ON when communications (synchronous communication) with the Inverter are established, the Drive Permission bit of Run Command Setting (OW□□00) is set to ON, and Inverter drive control is enabled. Turns OFF when a MECHATROLINK communications error occurs. • This bit provides different information from Inverter Operation Ready (READY) in the Inverter.
		Bit 1	Reserved for system.
		Bit 2: System BUSY	Not used.
		Bit 3: Inverter Ready	0: Inverter not ready 1: Inverter ready Turns ON when communications (synchronous communications) with the Inverter are established. Turns OFF when a MECHATROLINK communications error occurs. • This bit provides different information from Inverter Operation Ready (READY) in the Inverter.
		Bit 4 to F	Reserved for system.
IW□□01	Parameter Number when Range Over Is Generated		Setting parameters: 0 and higher Fixed parameters: 1000 and higher Displays the parameter number whose setting is incorrect (out of the setting range). The parameter number offset by 1000 is displayed.
IL□□02	Warning	Bit 0	Reserved for system.
		Bit 1: Setting Parameter Error	Turns ON when setting parameter error occurs. Correct the setting parameter to clear the warning. This warning can be cleared by executing Alarm Clear.
		Bit 2: Fixed Parameter Error	Turns ON when fixed parameter error occurs. Correct the fixed parameter to clear the warning. This warning cannot be cleared by executing Alarm Clear.
		Bit 3	Reserved for system.
		Bit 4: Command Set Warning	Turns ON when a command outside the allowable setting range is set. Correct the command to clear the warning.
		Bit 5 to 8	Reserved for system.
		Bit 9: Communication Warning	Turns ON when MECHATROLINK communications errors are detected individually. Enabled when: Communication Abnormality Detection Mask bit of the Function Selection Flag 2 fixed parameter is disabled, and Communication Selection is Abnormal bit of the Function Selection Flag 3 fixed parameter is set to Warning. This warning will be cleared when communications are restored.
		Bit A: Subcommand Set Warning	Turns ON when a subcommand outside the allowable setting range is set. Correct the subcommand to clear the warning.
		Bit B to 1F	Reserved for system.

(cont'd)

Register No.	Name		Contents
IL□□04	Alarm	Bit 0 to E	Reserved for system.
		Bit F: User Constant Error	Not used.
		Bit 10: Synchronization Communication Error	Turns ON when a MECHATROLINK communications watchdog timer timeout error is detected. Enabled when the WDT Abnormality Detection Mask bit of the Function Selection Flag 2 fixed parameter is set to Disabled. This alarm can be cleared by executing Alarm Clear.
		Bit 11: Communication Error	Turns ON when MECHATROLINK communications errors are detected continuously. Enabled when Communication Abnormality Detection Mask bit of the Function Selection Flag 2 fixed parameter is set to Disabled, and Alarm is selected for Communication Selection Abnormal of the Function Selection Flag 3 fixed parameter. This alarm can be cleared by executing Alarm Clear.
		Bit 12: Communication Timeout Error	Turns ON when a response from the Inverter for a command or subcommand is not detected within five seconds. This alarm can be cleared by executing Alarm Clear.
		Bit 13 to 1F	Reserved for system.
IW□□06	–		Reserved for system.
IW□□07	–		Reserved for system.
IW□□08	Command Response Code	00: No Command	No command is selected.
		01: Inverter Drive Control	Inverter Drive Control is executed.
		02: Read User Constant	Read User Constant is executed.
		03: Write User Constant	Write User Constant is executed.
		04: Alarm Monitor	Alarm Monitor is executed.
		05: Alarm History Monitor	Alarm History Monitor is executed.
		06: User Constant RAM Writing	User Constant RAM Writing is executed.
		07: User Constant EEPROM Writing	User Constant EEPROM Writing is executed.
		08: Transmission Reference	Transmission Reference is executed.
IW□□09	Command Status	Bit 0: Command Execution Flag	ON during command execution. Always ON when Transmission Reference command is selected.
		Bit 1 to 2	Reserved for system.
		Bit 3: Command Error Completed Status	Turns ON when command execution ends in an error.
		Bit 4 to 7	Reserved for system.
		Bit 8: Command Execution Completed	Turns ON when command execution is completed. With a Inverter Drive Control command, data input and output will continue after command execution is completed. Always ON when No Command is selected.
		Bit 9 to F	Reserved for system.
IW□□0A	Subcommand Response Code	00: No Command	No subcommand is selected.
		01: Inverter I/O Control	Inverter I/O Control is executed.
		02: Read User Constant	Read User Constant is executed.
		03: Write User Constant	Write User Constant is executed.
		04: Alarm Monitor	Alarm Monitor is executed.
		05: Alarm History Monitor	Alarm History Monitor is executed.
		08: Transmission Reference	Transmission Reference is executed.
		09: Read Fixed Parameters	Read Fixed Parameters is executed.

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Register No.	Name		Contents
IW□□0B	Subcommand Status	Bit 0: Command Execution Flag	ON during subcommand execution. Always ON when Inverter I/O Control or Transmission Reference command is executed.
		Bit 1 to 2	Reserved for system.
		Bit 3: Command Error Completed Status	Turns ON when command execution ends in an error.
		Bit 4 to 7	Reserved for system.
		Bit 8: Command Execution Completed	Turns ON when command execution is completed. Always ON when No Command is selected.
		Bit 9 to F	Reserved for system.
IW□□0C	–		Reserved for system.
IW□□0D	Input Data Option Selection Monitor	Bit 0: Motor Speed	ON when Motor Speed is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit 1: Torque Reference (U1-09)	ON when Torque Reference is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit 2: Encoder Count PG	ON when Encoder Count PG is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit 3: Frequency Reference (U0-01)	ON when Frequency Reference is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit 4: Multi-function Analog Input A2	ON when Multi-function Analog Input A2 is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit 5: Main Bus Voltage	ON when Main Bus Voltage is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit 6: Alarm Code	ON when Alarm Code is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit 7: Warning Code	ON when Warning Code is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit 8	Reserved for system.
		Bit 9: Multi-function Analog Input A3	ON when Multi-function Analog Input A3 is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit A: Multi-function Terminal Input	ON when Multi-function Terminal Input is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit B: Multi-function Analog Input A1	ON when Multi-function Analog Input A1 is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit C: Encoder Counter (ch2)	ON when Encoder Counter (ch2) is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported.
		Bit D: Monitor Data Set in F6-23	ON when Monitor Data Set in F6-23 is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported. • This bit is valid when using the A1000 or V1000 only.
		Bit E: Monitor Data Set in F6-24	ON when Monitor Data Set in F6-24 is selected for Input Data Option Selection (OW□□0D) and the data is being normally reported. • This bit is valid when using the A1000 or V1000 only.
		Bit F	Reserved for system.

(cont'd)

Register No.	Name		Contents
IW□□0E	–		Reserved for system.
IW□□0F	Auxiliary Input Data Option Selection Monitor	Bit 0: Motor Speed	ON when Motor Speed is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit 1: Torque Reference (U1-09)	ON when Torque Reference is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit 2: Encoder Count PG	ON when Encoder Count PG is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit 3: Frequency Reference (U1-01)	ON when Frequency Reference is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit 4: Multi-function Analog Input A2	ON when Multi-function Analog Input A2 is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit 5: Main Bus Voltage	ON when Main Bus Voltage is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit 6: Alarm Code	ON when Alarm Code is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit 7: Warning Code	ON when Warning Code is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit 8	Reserved for system.
		Bit 9: Multi-function Analog Input A3	ON when Multi-function Analog Input A3 is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit A: Multi-function Terminal Input	ON when Multi-function Terminal Input is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit B: Multi-function Analog Input A1	ON when Multi-function Analog Input A1 is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit C: Encoder Counter (ch2)	ON when Encoder Counter (ch2) is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally reported.
		Bit D to F	Reserved for system.

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Register No.	Name		Contents
IW□□10	Status		These registers display the status for the Inverter when the Inverter Drive Control command is executed. These registers depend the Inverter being used. Refer to *10.2.4 (2) Inverter Input Data Details* for details.
IW□□11	Output Frequency		
IW□□12	Output Current		
IW□□13	Motor Speed (Option)		
IW□□14	Torque Reference (U1-09) (Option)		
IW□□15	Encoder Count PG (Option)		
IW□□16	Frequency Reference (U1-01) (Option)		
IW□□17	Multi-function Analog Input A2 (Option)		
IW□□18	Main Bus Voltage (Option)		
IW□□19	Alarm Code (Option)		
IW□□1A	Warning Code (Option)		
IW□□1B	–		
IW□□1C	Multi-function Analog Input A3 (Option)		
IW□□1D	Multi-function Terminal Input (Option)		
IW□□1E	Multi-function Analog Input A1 (Option)		
IW□□1F	Encoder Counter (ch2) (Option)		
IW□□20	Monitor Data Set in F6-23 (Option)		
IW□□21	Monitor Data Set in F6-24 (Option)		
IW□□22 to IW□□2F	–		Reserved for system.
IW□□30	Response Alarm Code		Range: 0 to FFFFH Displays the alarm code returned in the response to the MECHATROLINK command. Refer to *10.5 Alarm and Warning Codes for Inverter* for details.
IW□□31	Subcommand Response Status	Bit 0: Subcommand Alarm	0: No alarm 1: Alarm occurred Displays the response status to the subcommand. Turns ON when a subcommand alarm occurs.
		Bit 1: Subcommand Warning	0: No warning 1: Warning occurred Turns ON when a subcommand warning occurs.
		Bit 2: Subcommand Ready	0: Busy 1: Ready Turns ON when subcommand execution is completed.
		Bit 3 to F	Reserved for system.
IW□□32	Inverter Alarm Code		Range: 0 to FFFFH Displays the alarm codes returned in the response to the Alarm Monitor or Alarm History Monitor command.
IW□□33	Auxiliary Inverter Alarm Code		Range: 0 to FFFFH Displays the alarm codes returned in the response to the Alarm Monitor or Alarm History Monitor subcommand.
IW□□34 to IW□□3B	–		Reserved for system.
IW□□3C	Inverter User Constant Number		Range: 0 to FFFFH Displays the inverter user constant number set for the Read User Constant or Write User Constant command.
IW□□3D	–		Reserved for system.
IW□□3E	User Constant Reading Data 1		Range: 0 to 65535 Displays the value read out by executing the Read User Constant command. Enabled when Inverter User Constant Number Size (OW□□3D) = 1 to 4.

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Register No.	Name	Contents
IW□□3F	User Constant Reading Data 2	Range: 0 to 65535 Displays the value read out by executing the Read User Constant command. Enabled when Inverter User Constant Number Size (OW□□3D) = 2 to 4.
IW□□40	User Constant Reading Data 3	Range: 0 to 65535 Displays the value read out by executing the Read User Constant command. Enabled when Inverter User Constant Number Size (OW□□3D) = 3 to 4.
IW□□41	User Constant Reading Data 4	Range: 0 to 65535 Displays the value read out by executing the Read User Constant command. Enabled when Inverter User Constant Number Size (OW□□3D) = 4.
IW□□42	Auxiliary Inverter User Constant Number	Range: 0 to 65535 Displays the auxiliary inverter user constant number set for the Read User Constant or Write User Constant subcommand.
IW□□43	–	Reserved for system.
IW□□44	Auxiliary User Constant Reading Data 1	Range: 0 to 65535 Displays the value read out by executing the Read User Constant subcommand. Enabled when Auxiliary Inverter User Constant Number Size (OW□□43) = 1 to 4.
IW□□45	Auxiliary User Constant Reading Data 2	Range: 0 to 65535 Displays the value read out by executing the Read User Constant subcommand. Enabled when Auxiliary Inverter User Constant Number Size (OW□□43) = 2 to 4.
IW□□46	Auxiliary User Constant Reading Data 3	Range: 0 to 65535 Displays the value read out by executing the Read User Constant subcommand. Enabled when Auxiliary Inverter User Constant Number Size (OW□□43) = 3 to 4.
IW□□47	Auxiliary User Constant Reading Data 4	Range: 0 to 65535 Displays the value read out by executing the Read User Constant subcommand. Enabled when Auxiliary Inverter User Constant Number Size (OW□□43) = 4.
IL□□48	Fixed Parameter Monitor	Displays the fixed parameter value read out by executing the Read Fixed Parameters subcommand.
IW□□4A to IW□□4F	–	Reserved for system.
IW□□50 to IW□□5F	Inverter/Type	Displays the model number of the connected Inverter.
IW□□60 to IW□□67	Inverter/Software Version (Option)	Displays the software version of the communications option board in the connected Inverter.
IW□□68 to IW□□6F	Inverter/Software Version (Main)	Displays the software version of the connected Inverter.
IW□□70	Transmission Reference Input Data 0	Displays the 1st word in the response data (main command bytes 0 and 1) when the Transmission Reference command is executed.
IW□□71	Transmission Reference Input Data 1	Displays the 2nd word in the response data (main command bytes 2 and 3) when the Transmission Reference command is executed.
IW□□72	Transmission Reference Input Data 2	Displays the 3rd word in the response data (main command bytes 4 and 5) when the Transmission Reference command is executed.

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Register No.	Name	Contents
IW☐☐73	Transmission Reference Input Data 3	Displays the 4th word in the response data (main command bytes 6 and 7) when the Transmission Reference command is executed.
IW☐☐74	Transmission Reference Input Data 4	Displays the 5th word in the response data (main command bytes 8 and 9) when the Transmission Reference command is executed.
IW☐☐75	Transmission Reference Input Data 5	Displays the 6th word in the response data (main command bytes 10 and 11) when the Transmission Reference command is executed.
IW☐☐76	Transmission Reference Input Data 6	Displays the 7th word in the response data (main command bytes 12 and 13) when the Transmission Reference command is executed.
IW☐☐77	Transmission Reference Input Data 7	Displays the 8th word in the response data (main command bytes 14 and 15) when the Transmission Reference command is executed.
IW☐☐78	Transmission Reference Input Data 8	Displays the 1st word in the subresponse data (subcommand bytes 0 and 1) when the Transmission Reference subcommand is executed.
IW☐☐79	Transmission Reference Input Data 9	Displays the 2nd word in the subresponse data (subcommand bytes 2 and 3) when the Transmission Reference subcommand is executed.
IW☐☐7A	Transmission Reference Input Data 10	Displays the 3rd word in the subresponse data (subcommand bytes 4 and 5) when the Transmission Reference subcommand is executed.
IW☐☐7B	Transmission Reference Input Data 11	Displays the 4th word in the subresponse data (subcommand bytes 6 and 7) when the Transmission Reference subcommand is executed.
IW☐☐7C	Transmission Reference Input Data 12	Displays the 5th word in the subresponse data (subcommand bytes 8 and 9) when the Transmission Reference subcommand is executed.
IW☐☐7D	Transmission Reference Input Data 13	Displays the 6th word in the subresponse data (subcommand bytes 10 and 11) when the Transmission Reference subcommand is executed.
IW☐☐7E	Transmission Reference Input Data 14	Displays the 7th word in the subresponse data (subcommand bytes 12 and 13) when the Transmission Reference subcommand is executed.
IW☐☐7F	Transmission Reference Input Data 15	Displays the 8th word in the subresponse data (subcommand bytes 14 and 15) when the Transmission Reference subcommand is executed.

10.2.4 Motion Parameter Details

(1) Inverter Output Data Details

[a] A1000 and V1000

<table>
<tr><th rowspan="2">Register No.</th><th rowspan="2" colspan="2">Name</th><th colspan="2">Description</th></tr>
<tr><th>A1000</th><th>V1000</th></tr>
<tr><td rowspan="16">OW□□10</td><td rowspan="16">Input Command</td><td>Bit 0</td><td colspan="2">Forward RUN
0: Stop, 1: Forward RUN</td></tr>
<tr><td>Bit 1</td><td colspan="2">Reverse RUN
0: Stop, 1: Reverse RUN</td></tr>
<tr><td>Bit 2</td><td colspan="2">Multi-function Input Terminal 3 (Initial value: External Fault)
0: Terminal S3 function OFF, 1: Terminal S3 function ON</td></tr>
<tr><td>Bit 3</td><td colspan="2">Multi-function Input Terminal 4 (Initial value: Fault reset)
0: Terminal S4 function OFF, 1: Terminal S4 function ON</td></tr>
<tr><td>Bit 4</td><td colspan="2">Multi-function Input Terminal 5 (Initial value: Multi-step Speed Reference 1)
0: Terminal S5 function OFF, 1: Terminal S5 function ON</td></tr>
<tr><td>Bit 5</td><td colspan="2">Multi-function Input Terminal 6 (Initial value: Multi-step Speed Reference 2)
0: Terminal S6 function OFF, 1: Terminal S6 function ON</td></tr>
<tr><td>Bit 6</td><td colspan="2">Multi-function Input Terminal 7 (Initial value: JOG Command)
0: Terminal S7 function OFF, 1: Terminal S7 function ON</td></tr>
<tr><td>Bit 7</td><td>Multi-function Input Terminal 8 (Initial value: External Base Block Command)
0: Terminal S8 function OFF,
1: Terminal S8 function ON</td><td>Reserved for system.</td></tr>
<tr><td>Bit 8</td><td colspan="2">External Fault Input (EF0)
0: Disabled, 1: External error input (EF0)</td></tr>
<tr><td>Bit 9</td><td colspan="2">Fault Reset
0: Disabled, 1: Fault reset</td></tr>
<tr><td>Bit A</td><td>Multi-function Input Terminal 9
0: Terminal S9 function OFF,
1: Terminal S9 function ON</td><td rowspan="4">Reserved for system.</td></tr>
<tr><td>Bit B</td><td>Multi-function Input Terminal 10
0: Terminal S10 function OFF,
1: Terminal S10 function ON</td></tr>
<tr><td>Bit C</td><td rowspan="2">Reserved for system.</td></tr>
<tr><td>Bit D</td></tr>
<tr><td>Bit E</td><td colspan="2">Fault Trace Clear
0: Disabled, 1: Error history cleared</td></tr>
<tr><td>Bit F</td><td colspan="2">External Base Block Command
0: Disabled, 1: External base block command ON</td></tr>
<tr><td>OW□□11</td><td colspan="2">Speed Reference</td><td colspan="2">Unit: Selectable with o1-03</td></tr>
<tr><td>OW□□12</td><td colspan="2">Torque Reference</td><td>Unit: 0.1%</td><td rowspan="2">Reserved for system.</td></tr>
<tr><td>OW□□13</td><td colspan="2">Torque Compensation</td><td>Unit: 0.1%</td></tr>
<tr><td>OW□□14</td><td colspan="2">Multi-function Analog Output FM</td><td colspan="2">10 [V]/4000H</td></tr>
<tr><td>OW□□15</td><td colspan="2">Multi-function Analog Output AM</td><td>10 [V]/4000H</td><td>Reserved for system.</td></tr>
</table>

(cont'd)

Register No.	Name		Description	
			A1000	V1000
OW□□16	Multi-function Terminal Output	Bit 0	Terminals M1-M2 0: OFF, 1: ON (Enabled when H2-01 = F)	Terminals MA-MC 0: OFF, 1: ON (Enabled when H2-01 = F)
		Bit 1	Terminals P1-PC 0: OFF, 1: ON (Enabled when H2-02 = F)	Terminal P1 0: OFF, 1: ON (Enabled when H2-02 = F)
		Bit 2	Terminals P2-PC 0: OFF, 1: ON (Enabled when H2-03 = F)	Terminal P2 0: OFF, 1: ON (Enabled when H2-03 = F)
		Bit 3 to F	Reserved for system.	

[b] Varispeed G7, Varispeed F7, and VS mini V7

Register No.	Name		Description		
			Varispeed G7	Varispeed F7	VS mini V7
OW□□10	Input Command	Bit 0	Forward RUN 0: Stop, 1: Forward RUN		
		Bit 1	Reverse RUN 0: Stop, 1: Reverse RUN		
		Bit 2	INV Multi-function Input Terminal 3 (Initial value: External Fault (EF3)) 0: Disabled, 1: External error input (EF3)		
		Bit 3	INV Multi-function Input Terminal 4 (Initial value: Fault reset) 0: Disabled, 1: Fault reset		
		Bit 4	INV Multi-function Input Terminal 5 (Initial value: Multi-step Speed Reference 1) 0: Disabled, 1: Multi-step speed reference 1		
		Bit 5	INV Multi-function Input Terminal 6 (Initial value: Multi-step Speed Reference 2) 0: Disabled, 1: Multi-step speed reference 2		
		Bit 6	INV Multi-function Input Terminal 7 (Initial value: JOG Command) 0: Disabled, 1: JOG command		
		Bit 7	INV Multi-function Input Terminal 8 (Initial value: External Base Block) 0: Disabled, 1: External base block	Reserved for system.	
		Bit 8	External Fault (EFO) 0: Disabled, 1: External fault (EFO)		
		Bit 9	Fault Reset 0: Disabled, 1: Fault reset		
		Bit A	INV Multi-function Input Terminal 9 (Initial value: Multi-step Speed Reference 3) 0: Disabled, 1: Multi-step speed reference 3	Reserved for system.	
		Bit B	INV Multi-function Input Terminal 10 (Initial value: Multi-step Speed Reference 4) 0: Disabled, 1: Multi-step speed reference 4	Reserved for system.	
		Bit C	INV Multi-function Input Terminal 11 (Initial value: Acceleration/Deceleration Time Selection 1) 0: Disabled, 1: Acceleration/deceleration time selection 1	Reserved for system.	
		Bit D	INV Multi-function Input Terminal 12 (Initial value: Emergency stop) 0: Disabled, 1: Emergency stop	Reserved for system.	
		Bit E	Fault Trace Clear		
		Bit F	External Base Block Command		
OW□□11	Speed Reference		Unit: Selectable with o1-03		Unit: Selectable with n035
OW□□12	Torque Reference		Polarity is common Unit: 0.1%		

(cont'd)

Register No.	Name		Description		
			Varispeed G7	Varispeed F7	VS mini V7
OW□□13	Torque Compensation		Unit: 0.1%		
OW□□14	Multi-function Analog Output FM		-11 V/-1540 to 11 V/1540		Reserved for system.
OW□□15	Multi-function Analog Output AM		-11 V/-1540 to 11 V/1540		
OW□□16	Multi-function Terminal Output	Bit 0	Terminals M1-M2 0: OFF, 1: ON (Enabled when H2-01 = F)		Terminals MA-MB 0: OFF, 1: ON (Enabled when n057 = 18)
		Bit 1	Terminal P1 0: OFF, 1: ON (Enabled when H2-02 = F)		Terminal P1 0: OFF, 1: ON (Enabled when n058 = 18)
		Bit 2	Terminal P2 0: OFF, 1: ON (Enabled when H2-03 = F)		Terminal P2 0: OFF, 1: ON (Enabled when n059 = 18)
		Bit 3 to F	Reserved for system.		

(2) Inverter Input Data Details

[a] A1000 and V1000

Register No.	Name		Description A1000	Description V1000
IW□□10	Status	Bit 0	ALM (Alarm) 0: None, 1: Alarm (error) occurred	
		Bit 1	WARNING (Warning) 0: None, 1: Warning occurred	
		Bit 2	CMDRDY (Command Ready (Command can be received)) 0: Busy, 1: Ready	
		Bit 3	BB OFF (Base Block Released (Inversion of output voltage from Inverter active and base block active)) 0: Base block active, 1: Base block released	
		Bit 4	PON (Power ON (Inversion of Uv active)) 0: Power OFF, 1: Power ON	
		Bit 5	RUNX (Driving) 1: Operating (driving)	
		Bit 6	0SP (Zero Speed) 1: Zero speed	
		Bit 7	REV (Reverse Operation) 0: Forward operation, 1: Reverse operation	
		Bit 8	RESET (During Reset) 1: During reset	
		Bit 9	AGREE (During Speed Coincident) 1: During speed coincident	
		Bit A	INV_READY (Inverter Ready) 1: Inverter ready	
		Bit B	OPE (OPE Error) 1: OPE Error	
		Bit C	UV_R (Momentary/Power Cut) 0: Recovery from power cut, 1: Recovery from momentary power interruption	
		Bit D	REMOTE (Remote Operation) 0: Local, 1: Remote (transmission)	
		Bit E	SEL_M (Motor Selection) 0: Motor 1 and Motor 3, 1: Motor 2	SEL_M (Motor Selection) 0: Motor 1, 1: Motor 2
		Bit F	0_SERVO (Set Zero Completed) 1: Set zero completed	Reserved for system.
IW□□11	Output Frequency		Unit: Determined by o1-03	
IW□□12	Output Current		Unit: 0.1 A or 0.01 A	
IW□□13	Motor Speed (U1-05)		Unit: Determined by o1-03 (Invalid in V/f with PG control mode)	
IW□□14	Torque Reference (U1-09)		Unit: 0.1% (Invalid in V/f with PG and V/f control mode)	
IW□□15	Encoder Count PG		Unit: 1 pulse (Invalid when an optional PG is not connected.)	Reserved for system.
IW□□16	Frequency Reference (U1-01)		Unit: Determined by o1-03	
IW□□17	Multi-function Analog Input A2 (U1-14)		10 V: 100% Unit: 0.1%	
IW□□18	Main Bus Voltage (U1-07)		10 V: 400 V Unit: 1 V	
IW□□19	Alarm Code		Inverter alarm	
IW□□1A	Warning Code		Inverter warning	

(cont'd)

<table>
<tr><th rowspan="2">Register No.</th><th rowspan="2" colspan="2">Name</th><th colspan="2">Description</th></tr>
<tr><th>A1000</th><th>V1000</th></tr>
<tr><td>IW□□1B</td><td colspan="2">Multi-Function Output Terminal Status (Option)</td><td colspan="2">Unit: 0.1%</td></tr>
<tr><td>IW□□1C</td><td colspan="2">Multi-function Analog Input A3</td><td>Unit: 0.1%</td><td>Reserved for system.</td></tr>
<tr><td rowspan="9">IW□□1D</td><td rowspan="9">Multi-function Input Terminals</td><td>Bit 0</td><td colspan="2">Terminal S1
0: OFF/1: ON</td></tr>
<tr><td>Bit 1</td><td colspan="2">Terminal S2
0: OFF/1: ON</td></tr>
<tr><td>Bit 2</td><td colspan="2">Terminal S3
0: OFF/1: ON</td></tr>
<tr><td>Bit 3</td><td colspan="2">Terminal S4
0: OFF/1: ON</td></tr>
<tr><td>Bit 4</td><td colspan="2">Terminal S5
0: OFF/1: ON</td></tr>
<tr><td>Bit 5</td><td colspan="2">Terminal S6
0: OFF/1: ON</td></tr>
<tr><td>Bit 6</td><td colspan="2">Terminal S7
0: OFF/1: ON</td></tr>
<tr><td>Bit 7</td><td colspan="2">Terminal S8
0: OFF/1: ON</td></tr>
<tr><td>Bit 8 to F</td><td colspan="2">Reserved for system.</td></tr>
<tr><td>IW□□1E</td><td colspan="2">Multi-function Analog Input A1</td><td colspan="2">Unit: 0.1%</td></tr>
<tr><td>IW□□1F</td><td colspan="2">Encoder Counter (ch2)</td><td>Unit: pulse
(Valid when a PG-Y2 is connected.)</td><td>Reserved for system.</td></tr>
<tr><td>IW□□20</td><td colspan="2">Monitor Data Set in F6-23 (Option)</td><td colspan="2">Reports the result of the monitoring set in F6-23.</td></tr>
<tr><td>IW□□21</td><td colspan="2">Monitor Data Set in F6-24 (Option)</td><td colspan="2">Reports the result of the monitoring set in F6-24.</td></tr>
</table>

[b] Varispeed G7, Varispeed F7, and VS mini V7

Register No.	Name		Description: Varispeed G7	Description: Varispeed F7	Description: VS mini V7
IW□□10	Status	Bit 0	ALM (Alarm) 0: None, 1: Alarm (error) occurred		
		Bit 1	WARNING (Warning) 0: None, 1: Warning occurred		
		Bit 2	CMDRDY (Command Ready (Command Can Be Received)) 0: Busy, 1: Ready		
		Bit 3	BB OFF (Base Block Released (Inversion of output voltage from Inverter active and base block active)) 0: Base block active, 1: Base block released		
		Bit 4	PON (Power ON (Inversion of UV active)) 0: Power OFF, 1: Power ON		
		Bit 5	RUNX (Driving) 1: Operating (driving)		
		Bit 6	0SP (Zero Speed) 1: Zero speed		
		Bit 7	REV (Reverse Operation) 0: Forward operation, 1: Reverse operation		
		Bit 8	RESET (During Reset) 1: During reset		
		Bit 9	AGREE (During Speed Coincident) 1: During speed coincident		
		Bit A	INV_READY (Inverter Ready) 1: Inverter ready		
		Bit B	OPE (OPE Error) 1: OPE Error		
		Bit C	UV_R (Momentary/Power Cut) 0: Recovery from power cut, 1: Recovery from momentary power interruption		
		Bit D	REMOTE (Remote Operation) 0: Local, 1: Remote (transmission)		
		Bit E and F	Reserved for system.		
IW□□11	Output Frequency		Unit: Determined by o1-03		Unit: Determined by n035
IW□□12	Output Current		Unit: 0.1 A or 0.01 A		
IW□□13	Motor Speed		Unit: Determined by o1-03 (Invalid in V/f with PG control mode)		Unit: Determined by n035 (Output frequency in V/f with PG control mode)
IW□□14	Torque Reference (U1-09)		Unit: 0.1% (Invalid in V/f with PG and V/f control mode)		Unit: 0.1% (Invalid in V/f with PG control mode)
IW□□15	Encoder Count PG		Unit: pulse (Invalid when an optional PG is not connected.)		Reserved for system.
IW□□16	Frequency Reference (U1-01)		Unit: Determined by o1-03		Unit: Determined by n035
IW□□17	Multi-function Analog Input A2		Unit: 0.1%		Unit: 0.1% (RP input)
IW□□18	Main Bus Voltage		Unit: 1 V		
IW□□19	Alarm Code		Inverter alarm		
IW□□1A	Warning Code		Inverter warning		
IW□□1B	Multi-Function Output Terminal Status (Option)		Reserved for system.		
IW□□1C	Multi-function Analog Input A3		Unit: 0.1%		Reserved for system.

(cont'd)

Register No.	Name		Description		
			Varispeed G7	Varispeed F7	VS mini V7
IW□□1D	Multi-function Input Terminals	Bit 0	Terminal S1 0: OFF/1: ON		
		Bit 1	Terminal S2 0: OFF/1: ON		
		Bit 2	Terminal S3 0: OFF/1: ON		
		Bit 3	Terminal S4 0: OFF/1: ON		
		Bit 4	Terminal S5 0: OFF/1: ON		
		Bit 5	Terminal S6 0: OFF/1: ON		
		Bit 6	Terminal S7 0: OFF/1: ON		
		Bit 7	Terminal S8 0: OFF/1: ON		
		Bit 8 to F	Reserved for system.		
IW□□1E	Multi-function Analog Input A1		Unit: 0.1%		Unit: 0.1% (FR input)
IW□□1F	Encoder Counter (ch2)		Unit: pulse (Valid when a PG-Y2 is connected.)	Reserved for system.	
IW□□20	Monitor Data Set in F6-23 (Option)		Reserved for system. • This system register is not used in this Inverter.		
IW□□21	Monitor Data Set in F6-24 (Option)				

10.3 Main Commands and Subcommands

This section describes the main commands and subcommands that can be used when connecting Inverters.

10.3.1 List of Commands

(1) List of Main Commands

Main commands are used for Inverter operation. They are used to write control programs for Inverter operation as ladder programs.

A distinct command code is assigned to each main command. Inverter operation is started by setting the OW☐☐08 setting parameter to the command code of the main command to be used.

The following table lists the main commands.

Main command compatibility is indicated with a check mark (✓).

Refer to the reference pages for details on individual commands.

Command Code	Name	Description	MECHATROLINK-II (32-byte)	MECHATROLINK-II (17-byte mode) / MECHATROLINK-I	Reference Page
0	No Command	Nothing is executed. If you change to this command during execution of another command, the current command process is canceled.	✓	✓	P.10-29
1	Inverter Drive Control	Sends commands to the Inverter and monitors the Inverter.	✓	✓	P.10-29
2	Read User Constant	Reads the specified user constant from the Inverter.	*	✓	P.10-31
3	Write User Constant	Writes the specified inverter user constant to a constant in the Inverter.	*	✓	P.10-32
4	Alarm Monitor	Reads the alarm that is occurring in the Inverter.	✓	✓	P.10-33
5	Alarm History Monitor	Reads the Inverter alarm history.	✓	✓	P.10-34
6	User Constant RAM Writing	Saves the parameter data written by executing Write User Constant in the Inverter volatile memory to enable the data.	✓	✓	P.10-35
7	User Constant EEPROM Writing	Saves the parameter data written by executing Write User Constant in the Inverter nonvolatile memory.	✓	✓	P.10-35
8	Transmission Reference	Enables the user to freely set a MECHATROLINK-II command and send it through the transmission line.	✓	✓	P.10-36

* The SVB Module sends commands, but they result in an error response in the Inverter.

(2) List of Subcommands

Subcommands assist the main commands. They can be executed at the same time as main commands.
A distinct command code exists for each subcommand. Subcommands are executed by setting the OW☐☐0A setting parameter to the command code of the subcommand to be used.
The following table lists the subcommands.
Subcommand compatibility is indicated with a check mark (✓).
Refer to the reference pages for details on individual subcommands.

Command Code	Name	Description	MECHATROLINK-II (32-byte)	MECHATROLINK-II (17-byte mode) / MECHATROLINK-I	Refer-ence Page
0	No Command	No command. When you do not want to execute a subcommand, set this command code.	✓	✓	P.10-37
1	Inverter I/O Control	Sends a command to the Inverter and monitors the Inverter.	✓	*1	P.10-37
2	Read User Constant	Reads the specified user constant from the Inverter.	✓	*1	P.10-39
3	Write User Constant	Writes the specified inverter user constant to a constant in the Inverter.	✓	*1	P.10-40
4	Alarm Monitor	Reads the alarm that is occurring in the Inverter.	✓	*1	P.10-41
5	Alarm History Monitor	Reads the Inverter alarm history.	✓	*1	P.10-41
8	Transmission Reference	Enables the user to freely set a MECHATROLINK-II command and send it through the transmission line.	✓	*1	P.10-42
9	Read Fixed Parameters*2	Reads the set data of the specified fixed parameter.	✓	✓	P.10-43

* 1. The SVB Module returns an error when this command is selected.
* 2. This is the subcommand to read out a fixed parameter in the SVB Module. This subcommand is not sent through the MECHATROLINK transmission line.

10.3.2 Main Command Details

Each command and its parameters are described below.

(1) No Command

■ Description

No command to be executed.

* If you change the command to No Command during operation, the motor will stop for a SERVOPACK but it will not stop for an Inverter.
Be aware that the operation for an Inverter is different from the operation for a SERVOPACK.

■ Related Parameters

• Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□08	Main Command	0 to 8	00: No Command

• Monitor Parameters

Register No.	Name	Setting Range	Remarks	
IW□□08	Command Response Code	0 to 8	00: No Command	
IW□□09	Command Status	Bit	Bit 0 (Command execution flag)	Always OFF
			Bit 3 (Command error completed status)	Always OFF
			Bit 8 (Command execution completed)	Always ON
IW□□10	Status	Bit	Status of the Inverter	
IW□□30	Response Alarm Code	0 to FFFFH	Alarm in the response to the MECHATROLINK command	

(2) Inverter Drive Control

■ Description

Sends a command to the Inverter and monitors the Inverter.

- If the Inverter Drive Control command is switched to another command during its execution, the Inverter retains the last data and continues operation. The MPE720 retains the last data for the monitor parameters because I/O between the SVB Module and Inverter are stopped. The Status monitor parameter, however, will be updated for any command being executed except Transmission Reference.

■ Related Parameters

• Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□08	Main Command	0 to 8	01: Inverter Drive Control
OW□□0C	Output Data Option Selection	Bit	–
OW□□0D	Input Data Option Selection	Bit	–
OW□□10	Input Command	Bit	–
OW□□11	Speed Reference	–	–
OW□□12	Torque Reference	–	–
OW□□13	Torque Compensation	–	Enabled when the Output Data Option Selection (OW□□0C), bit 0 is ON.
OW□□14	Multi-function Analog Output FM	–	Enabled when the Output Data Option Selection (OW□□0C), bit 1 is ON.
OW□□15	Multi-function Analog Output AM	–	Enabled when the Output Data Option Selection (OW□□0C), bit 2 is ON.
OW□□16	Multi-function Terminal Output	–	Enabled when the Output Data Option Selection (OW□□0C), bit 3 is ON.

• Monitor Parameters

Register No.	Name	Setting Range	Remarks	
IW□□02	Warning	Bit	–	–
IW□□04	Alarm	Bit	–	–
IW□□08	Command Response Code	0 to 8	01: Inverter Drive Control	
IW□□09	Command Status	Bit	Bit 0 (Command execution flag)	ON while the command is being executed
			Bit 3 (Command error completed status)	ON when an error occurs during command processing
			Bit 8 (Command execution completed)	OFF while the command is being executed ON when command execution completed
IW□□0D	Input Data Option Selection Monitor	Bit	–	
IW□□10	Status	Bit	Status of the Inverter	
IW□□11	Output Frequency	–	–	
IW□□12	Output Current	–	–	
IW□□13	Motor Speed	–	Enabled when Input Data Option Selection (OW□□0D), bit 0 is ON.	
IW□□14	Torque Reference	–	Enabled when Input Data Option Selection (OW□□0D), bit 1 is ON.	
IW□□15	Encoder Count PG	–	Enabled when Input Data Option Selection (OW□□0D), bit 2 is ON.	
IW□□16	Frequency Reference	–	Enabled when Input Data Option Selection (OW□□0D), bit 3 is ON.	
IW□□17	Multi-function Analog Input A2	–	Enabled when Input Data Option Selection (OW□□0D), bit 4 is ON.	
IW□□18	Main Bus Voltage	–	Enabled when Input Data Option Selection (OW□□0D), bit 5 is ON.	
IW□□19	Alarm Code	–	Enabled when Input Data Option Selection (OW□□0D), bit 6 is ON.	
IW□□1A	Warning Code	–	Enabled when Input Data Option Selection (OW□□0D), bit 7 is ON.	
IW□□1C	Multi-function Analog Input A3	–	Enabled when Input Data Option Selection (OW□□0D), bit 9 is ON.	
IW□□1D	Multi-function Input Terminals	–	Enabled when Input Data Option Selection (OW□□0D), bit A is ON.	
IW□□1E	Multi-function Analog Input A1	–	Enabled when Input Data Option Selection (OW□□0D), bit B is ON.	
IW□□1F	Encoder Counter	–	Enabled when Input Data Option Selection (OW□□0D), bit C is ON.	
IW□□20	Monitor Data Set in F6-23	–	Enabled when Input Data Option Selection (OW□□0D), bit D is ON.	
IW□□21	Monitor Data Set in F6-24	–	Enabled when Input Data Option Selection (OW□□0D), bit E is ON.	
IW□□30	Response Alarm Code	0 to FFFFH	Alarm in the response to the MECHATROLINK command	

(3) Read User Constant

■ Description

Reads the specified user constant from the Inverter.

- This command is valid when using MECHATROLINK-II (17-byte mode) and MECHATROLINK-I only.
  Use the subcommand when using MECHATROLINK-II (32-byte mode).

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□08	Main Command	0 to 8	02: Read User Constant
OW□□3C	Inverter User Constant Number	0 to FFFFH	–
OW□□3D	Inverter User Constant Number Size	1 to 4	–

- Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□02</td><td>Warning</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□04</td><td>Alarm</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□08</td><td>Command Response Code</td><td>0 to 8</td><td colspan="2">02: Read User Constant</td></tr>
<tr><td rowspan="3">IW□□09</td><td rowspan="3">Command Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IW□□10</td><td>Status</td><td>Bit</td><td colspan="2">Status of the Inverter</td></tr>
<tr><td>IW□□30</td><td>Response Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Alarm in the response to the MECHATROLINK command</td></tr>
<tr><td>IW□□3C</td><td>Inverter User Constant Number</td><td>0 to FFFFH</td><td colspan="2">–</td></tr>
<tr><td>IW□□3E</td><td>User Constant Reading Data 1</td><td>0 to 65535</td><td colspan="2">–</td></tr>
<tr><td>IW□□3F</td><td>User Constant Reading Data 2</td><td>0 to 65535</td><td colspan="2">–</td></tr>
<tr><td>IW□□40</td><td>User Constant Reading Data 3</td><td>0 to 65535</td><td colspan="2">–</td></tr>
<tr><td>IW□□41</td><td>User Constant Reading Data 4</td><td>0 to 65535</td><td colspan="2">–</td></tr>
</table>

(4) Write User Constant

■ Description

Writes the specified inverter user constant to a constant in the Inverter.

- This command is valid when using MECHATROLINK-II (17-byte mode) and MECHATROLINK-I only.
  Use the subcommand when using MECHATROLINK-II (32-byte mode).
- For the A1000, V1000, Varispeed G7, and Varispeed F7, you must execute the User Constant RAM Writing command to enable the data written by executing the Write User Constant command (refer to *10.3.2 (7) User Constant RAM Writing*).
  For the VS mini V7, the values written with the Write User Constant command become valid immediately.

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□08	Main Command	0 to 8	03: Write User Constant
OW□□3C	Inverter User Constant Number	0 to FFFFH	–
OW□□3D	Inverter User Constant Number Size	1 to 4	–
OW□□3E	Inverter User Constant Set Point 1	0 to 65535	–
OW□□3F	Inverter User Constant Set Point 2	0 to 65535	–
OW□□40	Inverter User Constant Set Point 3	0 to 65535	–
OW□□41	Inverter User Constant Set Point 4	0 to 65535	–

- Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□02</td><td>Warning</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□04</td><td>Alarm</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□08</td><td>Command Response Code</td><td>0 to 8</td><td colspan="2">03: Write User Constant</td></tr>
<tr><td rowspan="3">IW□□09</td><td rowspan="3">Command Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IW□□10</td><td>Status</td><td>Bit</td><td colspan="2">Status of the Inverter</td></tr>
<tr><td>IW□□30</td><td>Response Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Alarm in the response to the MECHATROLINK command</td></tr>
<tr><td>IW□□3C</td><td>Inverter User Constant Number</td><td>0 to FFFFH</td><td colspan="2">–</td></tr>
</table>

(5) Alarm Monitor

■ Description

Reads the alarm that is occurring in the Inverter.

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□08	Main Command	0 to 8	04: Alarm Monitor
OW□□32	Inverter Alarm Monitor Number	• A1000 and V1000: 0 to 9 • Varispeed G7 and Varispeed F7: 0 to 3 • VS mini V7: 0 to 1	Alarm monitor number Set the alarm monitor number to 0 normally. If multiple alarms are occurring, however, set the alarm monitor number in the setting range according to the number of alarms that are occurring.

- Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□02</td><td>Warning</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□04</td><td>Alarm</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□08</td><td>Command Response Code</td><td>0 to 8</td><td colspan="2">04: Alarm Monitor</td></tr>
<tr><td rowspan="3">IW□□09</td><td rowspan="3">Command Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IW□□10</td><td>Status</td><td>Bit</td><td colspan="2">Status of the Inverter</td></tr>
<tr><td>IW□□30</td><td>Response Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Alarm in the response to the MECHATROLINK command</td></tr>
<tr><td>IW□□32</td><td>Inverter Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Currently occurring alarm that was read</td></tr>
</table>

(6) Alarm History Monitor

■ Description

Reads the Inverter alarm history.

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□08	Main Command	0 to 8	05: Alarm History Monitor
OW□□32	Inverter Alarm Monitor Number	• A1000 and V1000: 0 to 9 • Varispeed G7 and Vari-speed F7: 0 to 3 • VS mini V7: 0 to 1	Alarm monitor number

- Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□02</td><td>Warning</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□04</td><td>Alarm</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□08</td><td>Command Response Code</td><td>0 to 8</td><td colspan="2">05: Alarm History Monitor</td></tr>
<tr><td rowspan="3">IW□□09</td><td rowspan="3">Command Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IW□□10</td><td>Status</td><td>Bit</td><td colspan="2">Status of the Inverter</td></tr>
<tr><td>IW□□30</td><td>Response Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Alarm in the response to the MECHATROLINK command</td></tr>
<tr><td>IW□□32</td><td>Inverter Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Alarm history that was read</td></tr>
</table>

(7) User Constant RAM Writing

■ Description

Saves the parameter data written by executing Write User Constant in the Inverter volatile memory to enable the data.

- For the VS mini V7, written data becomes valid without executing this command.

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW☐☐08	Main Command	0 to 8	06: User Constant RAM Writing

- Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW☐☐02</td><td>Warning</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW☐☐04</td><td>Alarm</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW☐☐08</td><td>Command Response Code</td><td>0 to 8</td><td colspan="2">06: User Constant RAM Writing</td></tr>
<tr><td rowspan="3">IW☐☐09</td><td rowspan="3">Command Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IW☐☐10</td><td>Status</td><td>Bit</td><td colspan="2">Status of the Inverter</td></tr>
<tr><td>IW☐☐30</td><td>Response Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Alarm in the response to the MECHATROLINK command</td></tr>
</table>

(8) User Constant EEPROM Writing

■ Description

Saves the parameter data written by executing Write User Constant in the Inverter nonvolatile memory.

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW☐☐08	Main Command	0 to 8	07: User Constant EEPROM Writing

- Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW☐☐02</td><td>Warning</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW☐☐04</td><td>Alarm</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW☐☐08</td><td>Command Response Code</td><td>0 to 8</td><td colspan="2">07: User Constant EEPROM Writing</td></tr>
<tr><td rowspan="3">IW☐☐09</td><td rowspan="3">Command Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IW☐☐10</td><td>Status</td><td>Bit</td><td colspan="2">Status of the Inverter</td></tr>
<tr><td>IW☐☐30</td><td>Response Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Alarm in the response to the MECHATROLINK command</td></tr>
</table>

(9) Transmission Reference

■ Description

Enables the user to freely set a command and send it through the transmission line.

■ Related Parameters

• Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□08	Main Command	0 to 8	08: Transmission Reference
OW□□70	Transmission Reference Output Data 0	0 to FFFFH	The lower bytes contain the command code.
to	to	–	–
OW□□77	Transmission Reference Output Data 7	0 to FFFFH	Watchdog timer counting is performed by the system.

• Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□08</td><td>Command Response Code</td><td>0 to 8</td><td colspan="2">08: Transmission Reference</td></tr>
<tr><td rowspan="3">IW□□09</td><td rowspan="3">Command Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>Always OFF</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>Always OFF</td></tr>
<tr><td>IW□□70</td><td>Transmission Reference Input Data 0</td><td>0 to FFFFH</td><td colspan="2">The lower bytes contain the command code and the upper bytes contain the alarm.</td></tr>
<tr><td>to</td><td>to</td><td>–</td><td colspan="2">–</td></tr>
<tr><td>IW□□77</td><td>Transmission Reference Input Data 7</td><td>0 to FFFFH</td><td colspan="2">Watchdog timer checking is performed by the system.</td></tr>
</table>

10.3.3 Subcommand Details

Each subcommand and the related parameters are described below.

(1) No Command

■ Description

No command to be executed.

■ Related Parameters

• Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□0A	Sub Command	0 to 9	00: No Command

• Monitor Parameters

Register No.	Name	Setting Range	Remarks	
IW□□0A	Subcommand Response Code	0 to 9	00: No Command	
IW□□0B	Subcommand Status	Bit	Bit 0 (Command execution flag)	Always OFF
			Bit 3 (Command error completed status)	Always OFF
			Bit 8 (Command execution completed)	Always OFF
IW□□31	Subcommand Response Status	Bit	Inverter subcommand processing status	
IW□□33	Auxiliary Inverter Alarm Code	0 to FFFFH	Inverter alarm code	

(2) Inverter I/O Control

■ Description

Sends a command to the Inverter and monitors the Inverter. This subcommand serves as an auxiliary function for the main command (OW□□08). Only the data selected in Auxiliary Output Data Option Selection (OW□□0E) can be output. Furthermore, only the data selected in the Auxiliary Input Data Option Selection (OW□□0F) can be monitored.

- This command is valid when using MECHATROLINK-II (32-byte mode).

■ Related Parameters

• Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□0A	Sub Command	0 to 9	01: Inverter I/O Control
OW□□0E	Auxiliary Output Data Option Selection	Bit	–
OW□□0F	Auxiliary Input Data Option Selection	Bit	–
OW□□13	Torque Compensation	–	Enabled when bit 0 of Auxiliary Output Data Option Selection (OW□□0E) is ON.
OW□□14	Multi-function Analog Output FM	–	Enabled when bit 1 of Auxiliary Output Data Option Selection (OW□□0E) is ON.
OW□□15	Multi-function Analog Output AM	–	Enabled when bit 2 of Auxiliary Output Data Option Selection (OW□□0E) is ON.
OW□□16	Multi-function Terminal Output	–	Enabled when bit 3 of Auxiliary Output Data Option Selection (OW□□0E) is ON.

Inverter Operation

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• Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□0A</td><td>Subcommand Response Code</td><td>0 to 9</td><td colspan="2">01: Inverter I/O Control</td></tr>
<tr><td rowspan="3">IW□□0B</td><td rowspan="3">Subcommand Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
Always ON after execution is completed</td></tr>
<tr><td>IW□□0F</td><td>Auxiliary Input Data Option Selection Monitor</td><td>Bit</td><td colspan="2">–</td></tr>
<tr><td>IW□□13</td><td>Motor Speed</td><td>–</td><td colspan="2">Enabled when bit 0 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□14</td><td>Torque Reference</td><td>–</td><td colspan="2">Enabled when bit 1 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□15</td><td>Encoder Count PG</td><td>–</td><td colspan="2">Enabled when bit 2 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□16</td><td>Frequency Reference</td><td>–</td><td colspan="2">Enabled when bit 3 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□17</td><td>Multi-function Analog Input A2</td><td>–</td><td colspan="2">Enabled when bit 4 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□18</td><td>Main Bus Voltage</td><td>–</td><td colspan="2">Enabled when bit 5 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□19</td><td>Alarm Code</td><td>–</td><td colspan="2">Enabled when bit 6 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□1A</td><td>Warning Code</td><td>–</td><td colspan="2">Enabled when bit 7 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□1C</td><td>Multi-function Analog Input A3</td><td>–</td><td colspan="2">Enabled when bit 9 of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□1D</td><td>Multi-function Input Terminals</td><td>–</td><td colspan="2">Enabled when bit A of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□1E</td><td>Multi-function Analog Input A1</td><td>–</td><td colspan="2">Enabled when bit B of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□1F</td><td>Encoder Counter (CH2)</td><td>–</td><td colspan="2">Enabled when bit C of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□20</td><td>Monitor Data Set in F6-23</td><td>–</td><td colspan="2">Enabled when bit D of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□21</td><td>Monitor Data Set in F6-24</td><td>–</td><td colspan="2">Enabled when bit E of Auxiliary Output Data Option Selection (OW□□0F) is ON.</td></tr>
<tr><td>IW□□31</td><td>Subcommand Response Status</td><td>Bit</td><td colspan="2">Inverter subcommand processing status</td></tr>
<tr><td>IW□□33</td><td>Auxiliary Inverter Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Inverter alarm code</td></tr>
</table>

(3) Read User Constant

■ Description

Reads the specified user constant from the Inverter.

- This command is valid when using MECHATROLINK-II (32-byte mode).

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□0A	Sub Command	0 to 9	02: Read User Constant
OW□□42	Auxiliary Inverter User Constant Number	0 to FFFFH	–
OW□□43	Auxiliary Inverter User Constant Number Size	1 to 4	–

- Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□0A</td><td>Subcommand Response Code</td><td>0 to 9</td><td colspan="2">02: Read User Constant</td></tr>
<tr><td rowspan="3">IW□□0B</td><td rowspan="3">Subcommand Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IW□□31</td><td>Subcommand Response Status</td><td>Bit</td><td colspan="2">Inverter subcommand processing status</td></tr>
<tr><td>IW□□42</td><td>Auxiliary Inverter User Constant Number</td><td>0 to FFFFH</td><td colspan="2">–</td></tr>
<tr><td>IW□□44</td><td>Auxiliary User Constant Reading Data 1</td><td>0 to 65535</td><td colspan="2">–</td></tr>
<tr><td>IW□□45</td><td>Auxiliary User Constant Reading Data 2</td><td>0 to 65535</td><td colspan="2">–</td></tr>
<tr><td>IW□□46</td><td>Auxiliary User Constant Reading Data 3</td><td>0 to 65535</td><td colspan="2">–</td></tr>
<tr><td>IW□□47</td><td>Auxiliary User Constant Reading Data 4</td><td>0 to 65535</td><td colspan="2">–</td></tr>
</table>

(4) Write User Constant

■ Description

Writes the specified inverter user constant to a constant in the Inverter.

- This command is valid when using MECHATROLINK-II (32-byte mode).
- For the A1000, V1000, Varispeed G7, and Varispeed F7, you must execute the User Constant RAM Writing command to enable the data written by executing the Write User Constant command (refer to *10.3.2 (7) User Constant RAM Writing*).
  For the VS mini V7, the values written with the Write User Constant command become valid immediately.

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□0A	Sub Command	0 to 9	03: Write User Constant
OW□□42	Auxiliary Inverter User Constant Number	0 to FFFFH	–
OW□□43	Auxiliary Inverter User Constant Number Size	1 to 4	–
OW□□44	Auxiliary Inverter User Constant Set Point 1	0 to 65535	–
OW□□45	Auxiliary Inverter User Constant Set Point 2	0 to 65535	–
OW□□46	Auxiliary Inverter User Constant Set Point 3	0 to 65535	–
OW□□47	Auxiliary Inverter User Constant Set Point 4	0 to 65535	–

- Monitor Parameters

Register No.	Name	Setting Range	Remarks	
IW□□0A	Subcommand Response Code	0 to 9	03: Write User Constant	
IW□□0B	Subcommand Status	Bit	Bit 0 (Command execution flag)	ON while the command is being executed
			Bit 3 (Command error completed status)	ON when an error occurs during command processing
			Bit 8 (Command execution completed)	OFF while the command is being executed ON when command execution completed
IW□□30	Response Alarm Code	0 to FFFFH	Alarm in the response to the MECHATROLINK command	
IW□□31	Subcommand Response Status	Bit	Inverter subcommand processing status	
IW□□33	Auxiliary Inverter Alarm Code	0 to FFFFH	Inverter alarm code	
IW□□42	Auxiliary Inverter User Constant Number	0 to 65535	–	

(5) Alarm Monitor

■ Description

Reads the alarm that is occurring in the Inverter.

- This command is valid when using MECHATROLINK-II (32-byte mode).

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□0A	Sub Command	0 to 9	04: Alarm Monitor
OW□□33	Auxiliary Inverter Alarm Monitor Number	• A1000 and V1000: 0 to 9 • Varispeed G7 and Varispeed F7: 0 to 3 • VS mini V7: 0 to 1	Record number specification Set the alarm monitor number to 0 normally. If multiple alarms are occurring, however, set the alarm monitor number in the setting range according to the number of alarms that are occurring.

- Monitor Parameters

Register No.	Name	Setting Range	Remarks	
IW□□0A	Subcommand Response Code	0 to 9	04: Alarm Monitor	
IW□□0B	Subcommand Status	Bit	Bit 0 (Command execution flag)	ON while the command is being executed
			Bit 3 (Command error completed status)	ON when an error occurs during command processing
			Bit 8 (Command execution completed)	OFF while the command is being executed ON when command execution completed
IW□□31	Subcommand Response Status	Bit	Inverter subcommand processing status	
IW□□33	Auxiliary Inverter Alarm Code	0 to FFFFH	Currently occurring alarm that was read	

(6) Alarm History Monitor

■ Description

Reads the Inverter alarm history.

- This command is valid when using MECHATROLINK-II (32-byte mode).

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□0A	Sub Command	0 to 9	05: Alarm History Monitor
OW□□33	Auxiliary Inverter Alarm Monitor Number	• A1000 and V1000: 0 to 9 • Varispeed G7 and Varispeed F7: 0 to 3 • VS mini V7: 0 to 1	Record number specification

• Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□0A</td><td>Subcommand Response Code</td><td>0 to 9</td><td colspan="2">05: Alarm History Monitor</td></tr>
<tr><td rowspan="3">IW□□0B</td><td rowspan="3">Subcommand Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IW□□31</td><td>Subcommand Response Status</td><td>Bit</td><td colspan="2">Inverter subcommand processing status</td></tr>
<tr><td>IW□□33</td><td>Auxiliary Inverter Alarm Code</td><td>0 to FFFFH</td><td colspan="2">Alarm history that was read</td></tr>
</table>

(7) Transmission Reference

■ Description

Enables the user to freely set a command and send it through the transmission line.

- This command is valid when using MECHATROLINK-II (32-byte mode).

■ Related Parameters

• Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□0A	Sub Command	0 to 9	08: Transmission Reference
OW□□78	Transmission Reference Output Data 8	0 to FFFFH	The lower bytes contain the subcommand.
to	to	–	–
OW□□7F	Transmission Reference Output Data 15	0 to FFFFH	–

• Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□0A</td><td>Subcommand Response Code</td><td>0 to 9</td><td colspan="2">08: Transmission Reference</td></tr>
<tr><td rowspan="3">IW□□09</td><td rowspan="3">Subcommand Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>Always OFF</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>Always OFF</td></tr>
<tr><td>IW□□78</td><td>Transmission Reference Input Data 8</td><td>0 to FFFFH</td><td colspan="2">The lower bytes contain the subcommand code and the upper bytes contain the sub status.</td></tr>
<tr><td>to</td><td>to</td><td>–</td><td colspan="2">–</td></tr>
<tr><td>IW□□7F</td><td>Transmission Reference Input Data 15</td><td>0 to FFFFH</td><td colspan="2">–</td></tr>
</table>

(8) Read Fixed Parameters

■ Description

Reads the set data of the specified fixed parameter.

■ Related Parameters

- Setting Parameters

Register No.	Name	Setting Range	Remarks
OW□□0A	Sub Command	0 to 9	09: Read Fixed Parameters
OW□□48	Fixed Parameter Number	0 to 65535	Set the fixed parameter number.

- Monitor Parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>IW□□0A</td><td>Subcommand Response Code</td><td>0 to 9</td><td colspan="2">09: Read Fixed Parameters</td></tr>
<tr><td rowspan="3">IW□□0B</td><td rowspan="3">Subcommand Status</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON while the command is being executed</td></tr>
<tr><td>Bit 3 (Command error completed status)</td><td>ON when an error occurs during command processing</td></tr>
<tr><td>Bit 8 (Command execution completed)</td><td>OFF while the command is being executed
ON when command execution completed</td></tr>
<tr><td>IL□□48</td><td>Fixed Parameter Monitor</td><td>-2^{31} to $2^{31}-1$</td><td colspan="2">–</td></tr>
</table>

10.3.4 Applicable Combinations of Main Commands and Subcommands

The following table shows applicable combinations of commands and subcommands.

Subcommand / Main Command	No Command	Inverter I/O Control	Read User Constant	Write User Constant	Alarm Monitor	Alarm History Monitor	Transmission Reference	Read Fixed Parameter
00 No Command	○	○	○	○	○	○	○	○
01 Inverter Drive Control	○	○	○	○	○	○	○	○
02 Write User Constant	×*1	×*1	×*1	×*1	×*1	×*1	×*1	○
03 Read User Constant	×*1	×*1	×*1	×*1	×*1	×*1	×*1	○
04 Alarm Monitor	○	○	○	○	○	○	○	○
05 Alarm History Monitor	○	○	○	○	○	○	○	○
06 User Constant RAM Writing	○	○	○	○	○	○	○	○
07 User Constant EEPROM Writing	○	○	○	○	○	○	○	○
08 Transmission Reference	○*2	○*2	○*2	○*2	○*2	○*2	○*2	○

* 1. In MECHATROLINK-II 32-byte mode, the main commands Write User Constant and Read User Constant will activate alarms in the Inverter.

* 2. The Inverter determines whether the combination of command and subcommand is applicable based on the user settings for the command.

- There are no restrictions on the combination of commands and subcommands for the SVB Module.
- If the received main command and subcommand are incompatible, the Inverter will process the main command first.
- If a command that is incompatible with the command being processed is received, the command being processed will have priority.
- If the Inverter Drive Control main command is incompatible with the Inverter I/O Control subcommand, the main command processing will be overwritten by the subcommand processing.

10.3.5 Precautions for Inverter Operation

This section provides precautions for Inverter operation.

- Inverter operation in progress: Bit 5 (Driving) in the Status (IL□□10) monitor parameter is 1 (ON).
  Even if the motor is stopped, Inverter operation is considered to be in progress if this bit is 1 (ON).
- Inverter operation stopped: Bit 5 (Driving) in the Status (IL□□10) monitor parameter is 0 (OFF).

(1) Operation When the CPU Stops

If CPU STOP is executed from the Machine Controller while Inverter operation is in progress, the SVB Module will force the Inverter to stop operation.
Even if the Forward RUN or Reverse RUN bit was set to 1 (ON) by the application, the bit will be forced to 0 (OFF).
Bit 0 (Operation Ready) in IW□□00 (Run Status) will also change to 0 (OFF). To start the CPU when it has stopped, click the Setting Parameter Tab to change the tab page, set Main Command (OW□□08) to No Command and then change bit D (Drive Permission) of Run Command Setting (OW□□00) to 1 (ON).

(2) Timing of Changes to MECHATROLINK Allocations

Changes to settings made in the Module Configuration Tab Page cannot be saved while Inverter operation is in progress. Save the settings in the Module Configuration Tab Page while the Inverter is stopped.

(3) Timing of Changes to Fixed Parameters

The fixed parameters cannot be saved while Inverter operation is in progress. Save the fixed parameters while the Inverter is stopped.

(4) Switching between Motion Commands While the Command Control Inverter Drive Is Being Executed

If the Inverter Drive Control command in Main Command (OW□□08) is changed to another command while Inverter operation is in progress, the Inverter will maintain the last command status of the Inverter Drive Control command and motor operation will continue. Note that switching to the No Command command also will not stop the motor.
Refer to *10.3.5 (5) Motor Stopping and Restarting Methods* for the motor stopping methods.
Also, if you change the command, I/O between the SVB Module and Inverter will stop. When that occurs, the monitor parameter data on the MPE720 will no longer be the most recent data. If you change to any command other than the Transmission Reference command, the Run status monitor information will be valid.

(5) Motor Stopping and Restarting Methods

There are two ways to stop and restart the motor.

■ Method 1

To stop the motor, set bit 0 (Forward RUN) and bit 1 (Reserve RUN) of Input Command (OW□□10) to 0 (OFF) while the Inverter Drive Control command is being executed in Main Command (OW□□08).
To restart the motor, set bit 0 or bit 1 of OW□□10 to 1 (ON).

■ Method 2

To stop the motor, set bit D (Drive Permission) of Run Command Setting (OW□□00) to 0 (OFF).
To restart the motor, set parameters using the following procedure.

1. Change Main Command (OW□□08) to the No Command command.
2. Set bit D (Drive Permission) of Run command setting (OW□□00) to 1 (ON).
3. Change Main Command (OW□□08) to the Inverter Drive Control command.

This concludes the procedure to restart the motor.

(6) Saving Fixed Parameters

If you manually allocate the Inverter, always save the fixed parameters. If you do not save the fixed parameters, the current values of the setting parameters will be restored to the default values when you restart the Inverter.

10.4 Setup Procedure

This section describes how to set up Inverters using the MPE720.

10.4.1 Check Items before Setup

Confirm the following items before you set up an Inverter.

- For information on how to set Inverter user constants, Inverter constants, and Inverter parameters, refer to the relevant Inverter manual.

(1) A1000, V1000, Varispeed G7, and Varispeed F7

- The b1-01 Inverter parameter (Frequency Reference Selection 1) must be set to 3 (Option Card or Option Unit).
- The b1-02 Inverter parameter (Run Command Selection 1) must be set to 3 (Option Card or Option Unit).
- The other Inverter parameters must be correctly set.

(2) VS mini V7

- The n004 Inverter user constant (Frequency Reference Selection) must be set to 9 (Option Card).
- The n003 Inverter user constant (Run Command Selection) must be set to 3 (Option Card).
- The other Inverter parameters must be correctly set.

10.4.2 Inverter Settings

Use the following flowchart to make the Inverter settings.

STEP 1: Define the Module Configuration of the Inverter
↓
STEP 2: Set the Required Fixed Parameters
↓
STEP 3: Confirm That the Inverter Is Ready for Operation
↓
STEP 4: Execute the Inverter Drive Control Command
↓
STEP 5: Set the Required Setting Parameters

The procedures for STEP 1 to STEP 5 are given below.

(1) STEP 1: Define the Module Configuration of the Inverter

You can define the module configuration of the Inverter either automatically or manually.

[a] Automatic Definition Method

1. Execute self configuration on the Machine Controller.

When you execute self configuration, information on the Modules that are connected to the Machine Controller is detected and the Inverter I/O registers are assigned on the Module Configuration Tab Page. Refer to *3.2 Executing Self-configuration* for the procedure to execute self configuration.

2. Open the Module Configuration Tab Page.

- Refer to *3.4.1 (1) Opening the Module Configuration Definition Window* for how to open the Module Configuration Tab Page.

3. Confirm that communications have been established. Refer to steps 7. to 10. in *10.4.2 (1) [b] Manual Definition Method* on page 10-48 for the procedure.

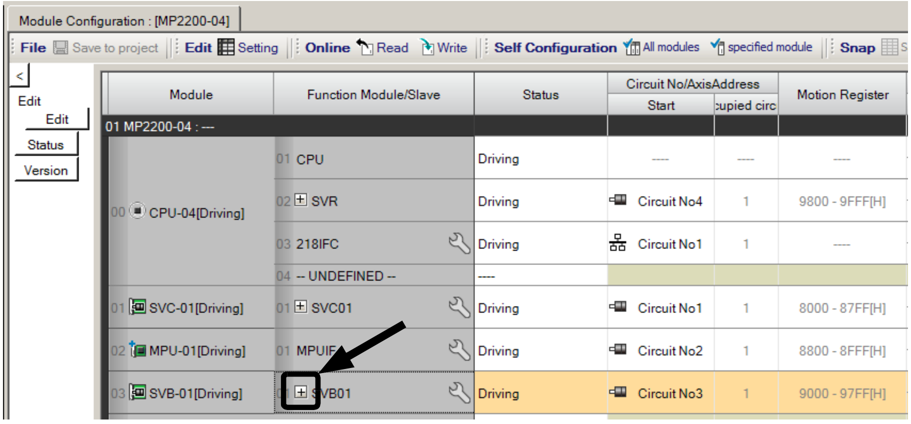
This concludes the procedure.

[b] Manual Definition Method

1. Start the MPE720 on a computer that is connected to the Machine Controller and open the Module Configuration Tab Page.

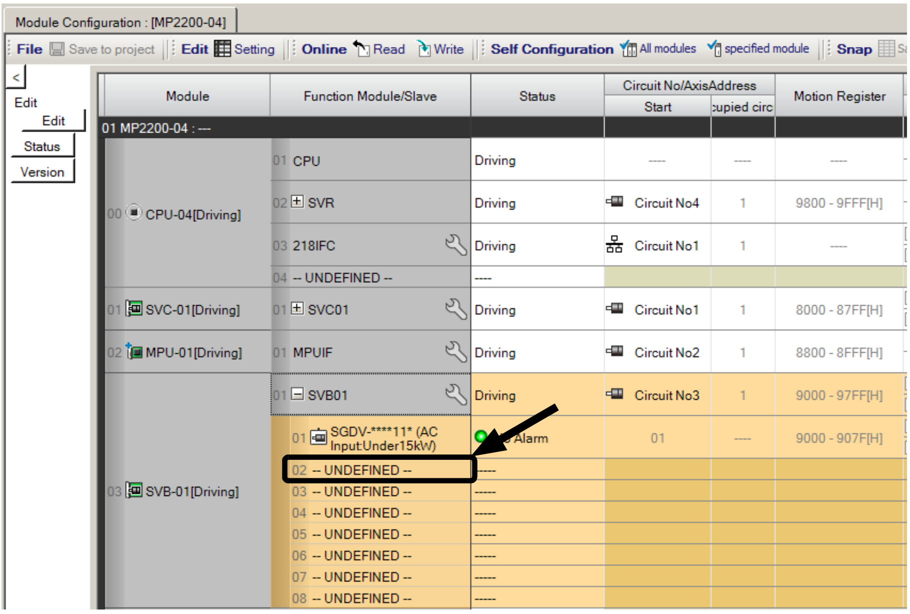
- Refer to *3.4.1 (1) Opening the Module Configuration Definition Window* for how to open the Module Configuration Tab Page.

2. Click the **Expand [+]** Button for the ***Function Module/Slave*** Cell labeled ***SVB*** or ***SVB01***.



The list of slaves connected to that Module will be displayed.

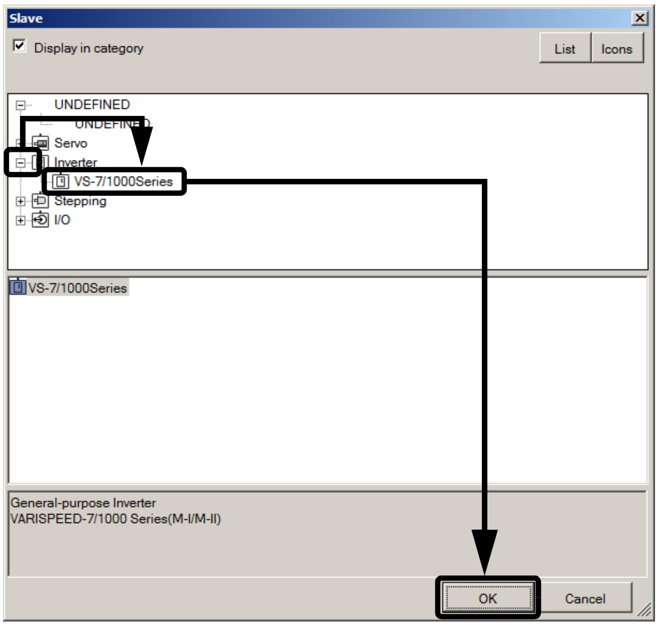
3. Double-click the cell at the location to allocate the Inverter.



The Slaves Dialog Box will be displayed.

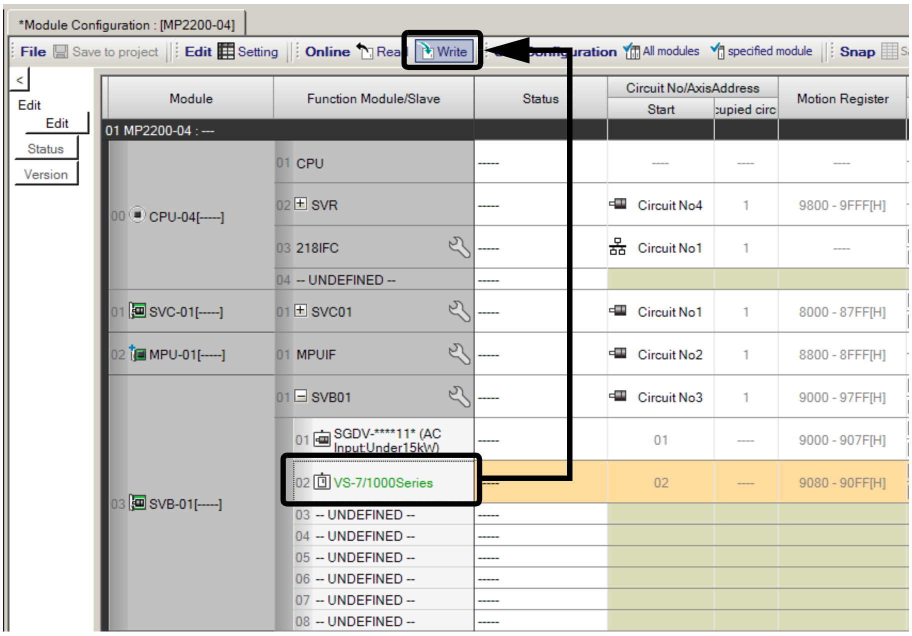
- The Function List Dialog Box may be displayed if the Inverter is already allocated. In this case, select the ***Device Select*** Icon.

4. Select ***Inverter - VS-7/1000Series*** and click **OK**.



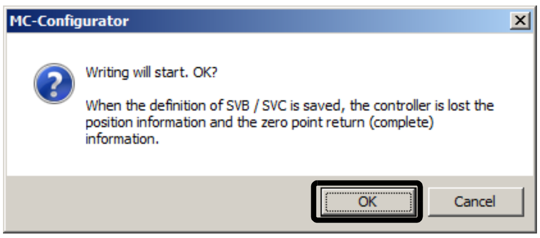
- Always select ***VS-7/1000Series*** regardless of the model of the Inverter.

5. Confirm that the Inverter was allocated, and then click **Write**.



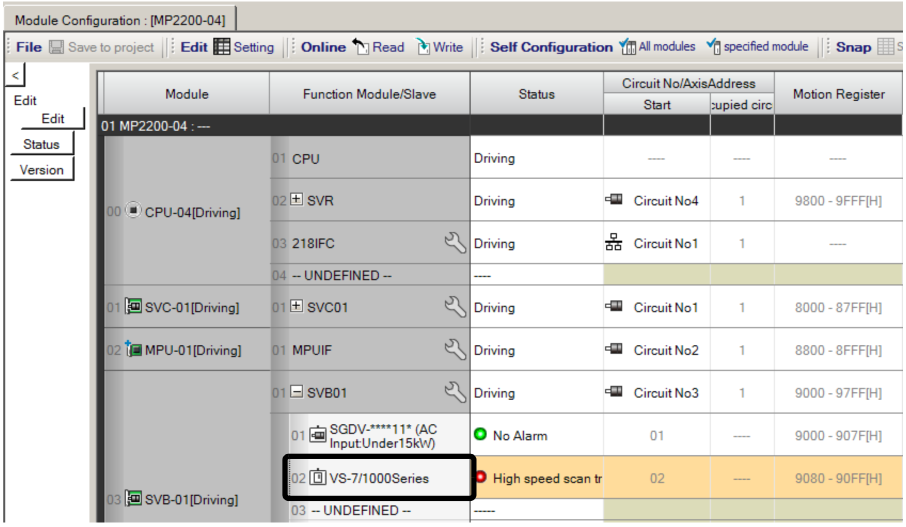
A message dialog box will be displayed.

6. Click **OK**.



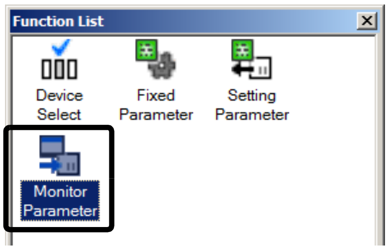
The manually allocated ***VS-7/1000Series*** device will be saved to the Machine Controller.

7. Double-click the ***VS-7/1000Series*** Cell.



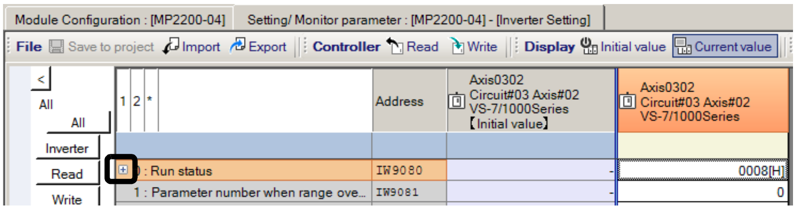
The Function List Dialog Box will be displayed.

8. Click the ***Monitor Parameter*** Icon.

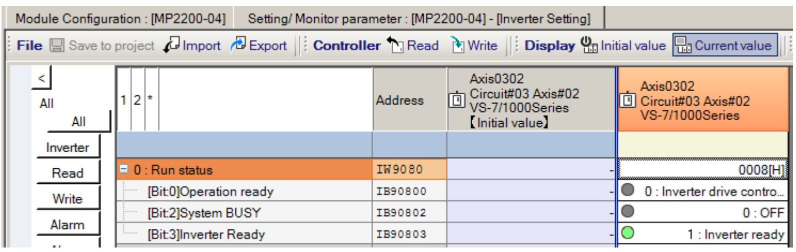


The Setting/Monitor Parameter Tab Page will be displayed.

9. Click the **Expand [+]** Button for Run Status (IW☐☐00).



10. Confirm that bit 3 (Inverter Ready) is 1 (ON).



If it is 1 (ON), the Inverter is ready and communications were established successfully.
If it is 0 (OFF), communications have not been established between the Machine Controller and Inverter. Check the connection of the MECHATROLINK cable, the setting status of the Inverter user constants, and the settings on the MECHATROLINK Communications Definition Tab Page.

- Refer to *3.4.2 MECHATROLINK Transmission Definition Window* for details on the MECHATROLINK Communications Definition Tab Page.

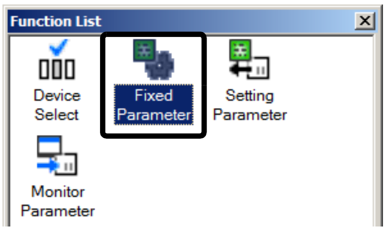
This concludes the procedure.

(2) STEP 2: Set the Required Fixed Parameters

1. Open the Function List Dialog Box.

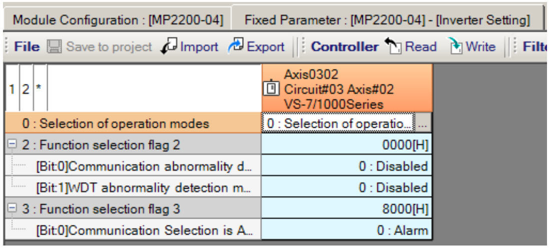
- Refer to step 7. in *10.4.2 (1) [b] Manual Definition Method* on page 10-48 for how to open the Function List Dialog Box.

2. Click the ***Fixed Parameter*** Icon.



The Fixed Parameter Tab Page will be displayed.

3. Set the fixed parameters as required.



- If you manually set the module configuration definitions for an Inverter, always save the fixed parameters. If you do not save the fixed parameters, the current values of the setting parameters will be restored to the default values when you restart the Inverter.

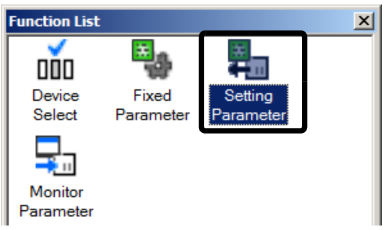
This concludes the procedure.

(3) STEP 3: Confirm That the Inverter Is Ready for Operation

1. Open the Function List Dialog Box.

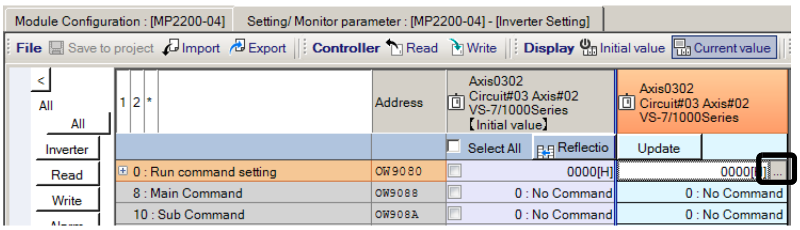
- Refer to step 7. in *10.4.2 (1) [b] Manual Definition Method* on page 10-48 for how to open the Function List Dialog Box.

2. Click the ***Setting Parameter*** Icon.



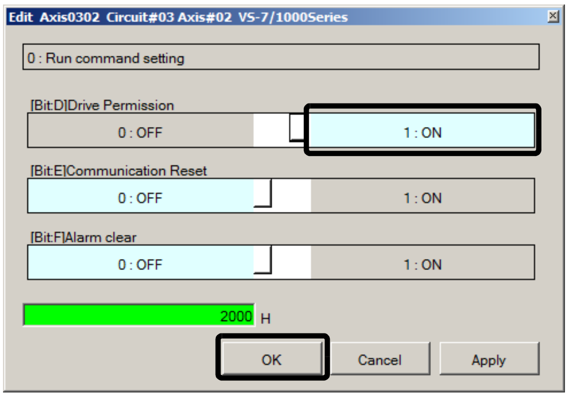
The Setting Parameter Tab Page will be displayed.

3. Double-click the [...] Cell for Run Command Setting (OW☐☐00).

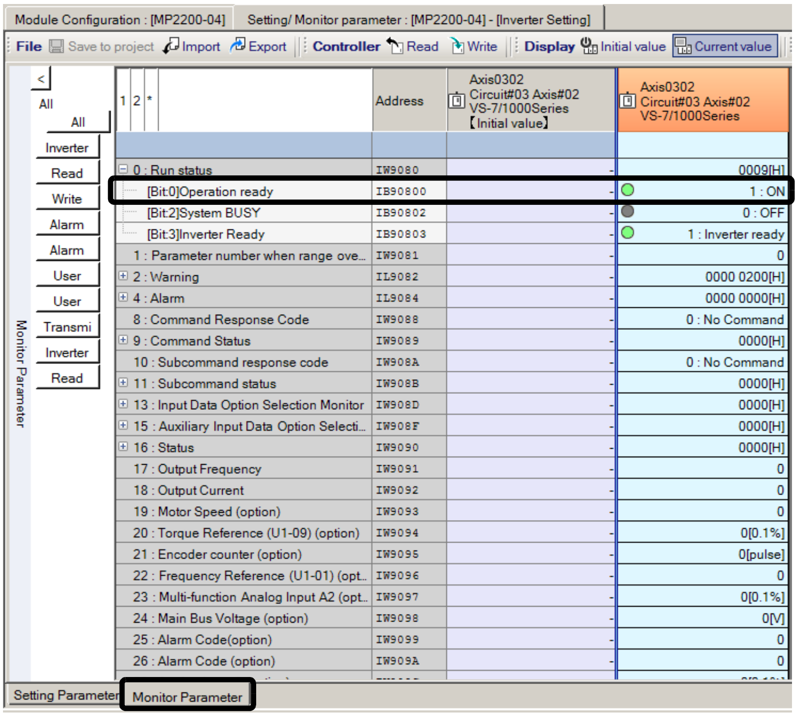


The Edit Dialog Box will be displayed.

4. Set bit D (Drive Permission) to 1 (ON), and then click **OK**.



5. Click the Monitor Parameter Tab, and confirm that bit 0 (Operation Ready) of Run Status (IW☐☐00) is 1 (ON).

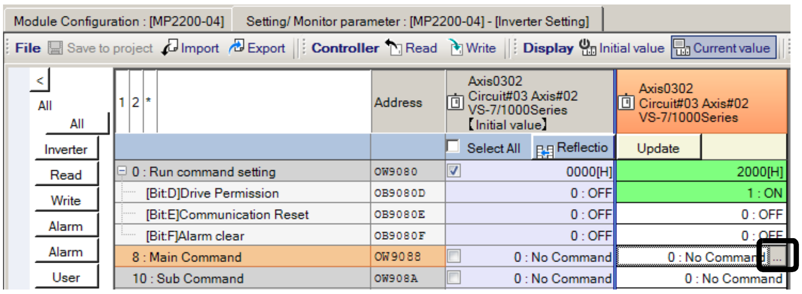


- If the status is 0 (OFF), click the Setting Parameter Tab, and confirm that a command is not being executed in the Main Command setting parameter (OW☐☐08).
  If the current command is Inverter Drive Control, first select another command and then set bit D (Drive Permission) in Run Command Setting (OW☐☐00) to 0 (OFF) and then change it back to 1 (ON).

This concludes the procedure.

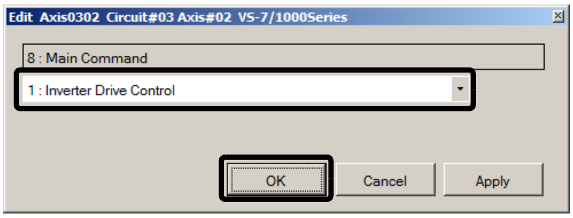
(4) STEP 4: Execute the Inverter Drive Control Command

1. Click the Setting Parameter Tab, and then double-click the [...] Cell for Main Command (OW☐☐08).



The Edit Dialog Box will be displayed.

2. Select ***1: Inverter Drive Control***, and click **OK**.



- Wait for at least one high-speed scan after you set bit D (Drive Permission) in Run Command Setting (OW☐☐00) to 1 (ON) in step 5. of *10.4.2 (3) STEP 3: Confirm That the Inverter Is Ready for Operation* before you make this setting.

The following parameters will be enabled when you execute the Inverter Drive Control command.

<Inverter Output> Setting Parameters Tab Page	<Inverter Input> Monitor Parameter Tab Page
Input Command (OW☐☐10)	Status (IW☐☐10)
Speed Reference (OW☐☐11)	Output Frequency (IW☐☐11)
Torque Reference (OW☐☐12)	Output Current (IW☐☐12)

Set the Output Data Option Selection (OW☐☐0C) and Input Data Option Selection (OW☐☐0D) to enable the output data from OW☐☐13 to OW☐☐16 and the input data from IW☐☐13 to IW☐☐1D as required.

- Refer to *10.4.3 I/O Options* for details on the Output Data Option Selection and Input Data Option Selection parameters.

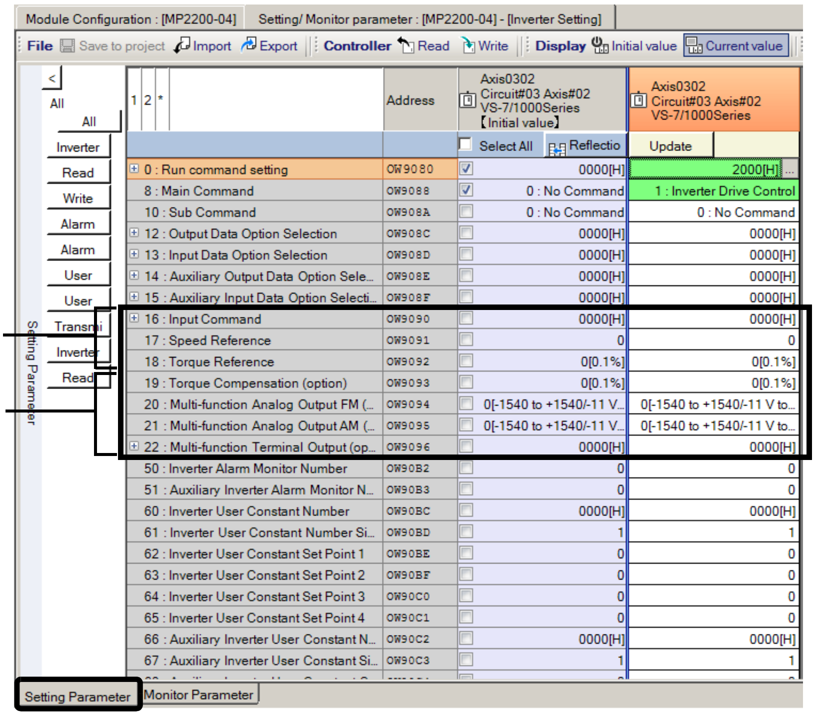
This concludes the procedure.

(5) STEP 5: Set the Required Setting Parameters

1. Set the required parameters in the setting column on the Setting Parameter Tab Page.

*1

*2

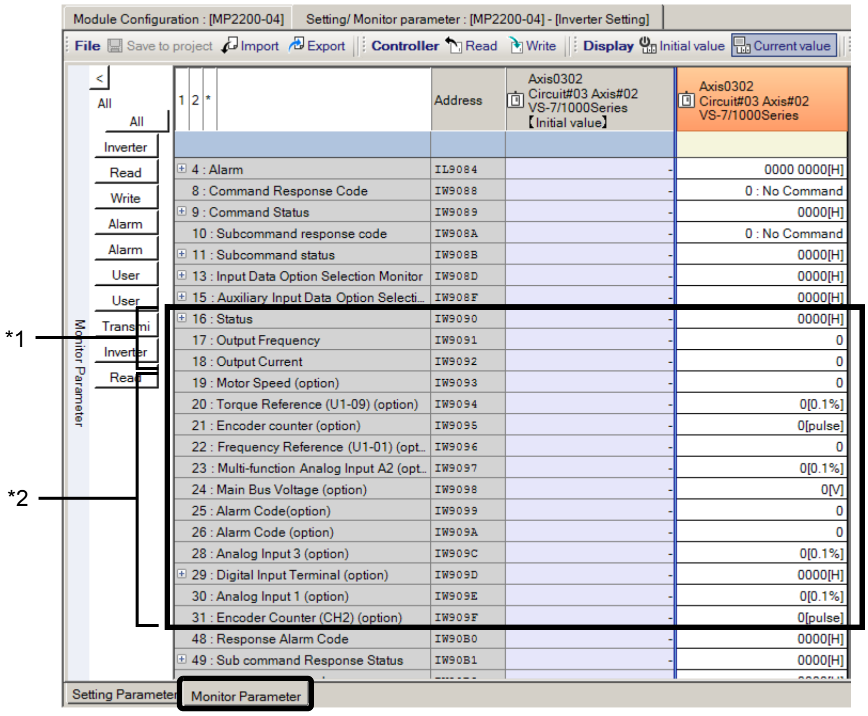


* 1. This is the data that is output continually during execution of the Inverter Drive Control command.

* 2. This data is enabled when the Inverter Drive Control command is being executed and the Output Data Option Selection parameter (OW☐☐0C) is set to 1 (enabled), or when the Inverter I/O Control subcommand is being executed and the Auxiliary Output Data Option Selection parameter (OW☐☐0E) is set to 1 (enabled).

- The Inverter I/O Control subcommand is valid for MECHATROLINK-II 32-byte mode only.
- If the Inverter Drive Control command is switched to another command during its execution, the Inverter retains the last data and continues operation. The MPE720 retains the last data for the monitor parameters because I/O between the SVB Module and Inverter are stopped. The Status monitor parameter, however, will be updated for any command being executed except Transmission Reference.

- The output data that can be used depends on the Inverter model. Refer to *10.2.4 (1) Inverter Output Data Details* for details.
- You can monitor a parameter by double-clicking the monitor data column cell to monitor on the Monitor Parameter Tab Page.



* 1. This is the data that is input continually during execution of the Inverter Drive Control command.
* 2. This data is enabled when the Inverter Drive Control command is being executed and the Input Data Option Selection parameter (OW□□0D) is set to 1 (enabled), or when the Inverter I/O Control subcommand is being executed and the Auxiliary Input Data Option Selection parameter (OW□□0F) is set to 1 (enabled).

- The Inverter I/O Control subcommand is valid for MECHATROLINK-II 32-byte mode only.
- The input data that can be used depends on the Inverter model. Refer to *10.2.4 (2) Inverter Input Data Details* for details.

This concludes the procedure.

10.4.3 I/O Options

(1) Output Data Options

The OW□□13 to OW□□16 parameters contain the output data options.
The output data options are valid when the following conditions are met.

- The Output Data Option Selection (OW□□0C) is set to 1 (enabled) during Inverter drive control.
- The Auxiliary Output Data Option Selection (OW□□0E) is set to 1 (enabled) during Inverter I/O control for a subcommand.

(2) Input Data Options

The IW□□13 to IW□□21 parameters contain the input data options.
The input data options are valid when the following conditions are met.

- The Input Data Option Selection (OW□□0D) is set to 1 (enabled) during Inverter drive control.
- The Auxiliary Input Data Option Selection (OW□□0F) is set to 1 (enabled) during Inverter I/O control for a subcommand.

Data of selected input options can be monitored by using the Input Data Option Selection Monitor (IW□□0D) and Auxiliary Input Data Option Selection Monitor (IW□□0F) of the monitor parameters.

(3) Response Speed of Selected Output and Input Data Options

The response speed for the data selected from Output Data Option Selection, Auxiliary Output Data Option Selection, Input Data Option Selection, and Auxiliary Input Data Option Selection depends on the amount of selected data. Normally, it will be six times slower than that for standard I/O data (always available I/O data).
The response speed differs depending on the number of selected options, shown in the following tables.

■ Number of Selected Output Data Options (OW□□0C) and Time Required for Response

Number of Selected Output Data Options	Time Required for Response (Standard output data = 1)
1	1
2	1
3	2
4	2

■ Number of Selected Auxiliary Output Data Options (OW□□0E) and Time Required for Response

Number of Selected Auxiliary Output Data Options	Time Required for Response (Standard output data = 1)
1	1
2	1
3	1
4	1

■ Number of Selected Input Data Options (OW□□0D) and Time Required for Response

Number of Selected Input Data Options	Time Required for Response (Standard input data = 1)
1	1
2	1
3	2
4	2
5	3
6	3
7	4
8	4
9	5
10	5
11	6
12	6

■ Number of Selected Auxiliary Input Data Options (OW□□0F) and Time Required for Response

Number of Selected Auxiliary Input Data Options	Time Required for Response (Standard input data = 1)
1	1
2	1
3	1
4	1
5	2
6	2
7	2
8	2
9	3
10	3
11	3
12	3

10.5 Alarm and Warning Codes for Inverter

There are the following four types of inverter alarms for different detection locations and error contents.

Error Type		Description	Place the Error Occurred
Alarm	Inverter alarm	Serious failure that can damage the inverter and machine	Inverter
	MECHATROLINK-II command error, MECHATROLINK-II communications error	MECHATROLINK communications failure	MECHATROLINK Option Card/Option Unit for Inverter
Warning	Inverter warning	Incorrect operation or minor failure that will not likely result in a serious situation.	Inverter
	MECHATROLINK-II command error, MECHATROLINK-II communications error	MECHATROLINK communications error warning	MECHATROLINK Option Card/Option Unit for Inverter

- If more than one error is detected at the same time, the MECHATROLINK Option Card/Option Unit for Inverter gives priority to the error with the lowest alarm code.
- When an error is detected while another is being detected, the alarm code will not be refreshed.
- If more than one warning is detected at the same time, the MECHATROLINK Option Card/Option Unit for Inverter gives priority to the warning with the lowest alarm code.

Inverter alarms and warnings are described below.

10.5.1 A1000

(1) Inverter Alarms

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description
	WARNG	ALM		
–	–	ON	CPF00 or CPF01	Control Circuit Error
–	–	ON	oFA03	Option Card Error Occurred at Option Port CN5-A
–	–	ON	oFA04	Option Card Error Occurred at Option Port CN5-A
–	–	ON	oFb03	Option Card Error Occurred at Option Port CN5-B
–	–	ON	oFb04	Option Card Error Occurred at Option Port CN5-B
–	–	ON	oFb07 to oFb09	Option Card Error Occurred at Option Port CN5-B
–	–	ON	oFC03	Option Card Error Occurred at Option Port CN5-C
–	–	ON	oFC04	Option Card Error Occurred at Option Port CN5-C
–	–	ON	oFC07 to oFC09	Option Card Error Occurred at Option Port CN5-C
0002H	–	ON	Uv1	DC Bus Undervoltage
0003H	–	ON	Uv2	Control Power Supply Voltage Fault
0004H	–	ON	Uv3	Soft Charge Circuit Fault
0005H	–	ON	SC	Output Short-Circuit or IGBT Fault
0006H	–	ON	GF	Ground Fault
0007H	–	ON	oC	Overcurrent
0008H	–	ON	ov	DC Bus Overvoltage
0009H	–	ON	oH	Heatsink Overheat
000AH	–	ON	oH1	
000BH	–	ON	oL1	Motor Overload
000CH	–	ON	oL2	Drive Overload
000DH	–	ON	oL3	Overtorque Detection 1
000EH	–	ON	oL4	Overtorque Detection 2
000FH	–	ON	rr	Dynamic Braking Transistor
0010H	–	ON	rH	Braking Resistor Overheat
0011H to 0016H	–	ON	EF3 to EF8	External Fault (input terminal 3 to 8)
0017H	–	ON	FAn	Internal Fan Fault

(cont'd)

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description
	WARNG	ALM		
0018H	–	ON	oS	Overspeed
0019H	–	ON	dEv	Speed Deviation (for Control Mode with PG and PM Open Loop Vector Control Mode without PG)
001AH	–	ON	PGo	PG Disconnect (for Control Mode with PG)
001BH	–	ON	PF	DC Bus Voltage Fault
001CH	–	ON	LF	Output Phase Loss
001DH	–	ON	oH3	Motor Overheat Alarm (PTC Input)
001EH	–	ON	oPr	Operator Connection Fault
001FH	–	ON	Err	EEPROM Write Error
0020H	–	ON	oH4	Motor Overheat Fault (PTC Input)
0021H	–	ON	CE	MEMOBUS/Modbus Communication Error
0022H	–	ON	bUS	Option Communication Error
0025H	–	ON	CF	Control Fault
0026H	–	ON	SvE	Zero Servo Fault
0027H	–	ON	EF0	Option Card External Fault
0028H	–	ON	FbL	PID Feedback Loss
0029H	–	ON	UL3	Undertorque Detection 1
002BH	–	ON	oL7	High Slip Braking oL
0030H	–	ON	UL4	Undertorque Detection 2
0032H	–	ON	dv1	Z Pulse Fault
0033H	–	ON	dv2	Z Pulse Noise Fault Detection
0034H	–	ON	dv3	Inversion Detection
0035H	–	ON	dv4	Inversion Prevention Detection
0036H	–	ON	LF2	Output Current Imbalance
0037H	–	ON	STo	Pull-Out Detection
0038H	–	ON	PGoH	PG Hardware Fault (when using PG-X3)
0039H	–	ON	E5	MECHATROLINK Watchdog Timer Error
003BH	–	ON	SEr	Too Many Speed Search Restarts
0041H	–	ON	FbH	Excessive PID Feedback
0042H	–	ON	EF1	External Fault (input terminal S1)
0043H	–	ON	EF2	External Fault (input terminal S2)
0044H	–	ON	oL5	Mechanical Weakening Detection 1
0045H	–	ON	UL5	Mechanical Weakening Detection 2
0046H	–	ON	CoF	Current Offset Fault
0049H	–	ON	dWFL	DriveWorksEZ Fault
004AH	–	ON	dWF1	EEPROM Memory DriveWorksEZ Data Error
004DH	–	ON	voF	Output Voltage Detection Fault
004EH	–	ON	rF	Braking Resistor Fault
004FH	–	ON	boL	Braking Transistor Overload Fault
0050H	–	ON	oH5	Motor Overheat (NTC Input)
0051H	–	ON	LSo	LSo Fault
0052H	–	ON	nSE	Node Setup Error
0053H	–	ON	THo	Thermistor Disconnect
005BH	–	ON	dv7	Polarity Judge Timeout
005FH	–	ON	LF3	Power Unit Output Phase Loss 3
0060H	–	ON	UnbC	Current Unbalance
0061H	–	ON	Uv4	Gate Drive Board Undervoltage
0083H	–	ON	CPF02	A/D Conversion Error
0084H	–	ON	CPF03	Control Board Connection Error
0087H	–	ON	CPF06	EEPROM Memory Data Error

(cont'd)

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description
	WARNG	ALM		
0088H, 0089H	–	ON	CPF07 or CPF08	Terminal Board Connection Error
008CH	–	ON	CPF11	RAM Fault
008DH	–	ON	CPF12	FLASH Memory Fault
008EH	–	ON	CPF13	Watchdog Circuit Exception
008FH	–	ON	CPF14	Control Circuit Fault
0091H	–	ON	CPF16	Clock Fault
0092H	–	ON	CPF17	Timing Fault
0093H	–	ON	CPF18	Control Circuit Fault
0094H	–	ON	CPF19	
0095H, 0096H	–	ON	CPF20 or CPF21	Control Circuit Error
0097H	–	ON	CPF22	Hybrid IC Error
0098H	–	ON	CPF23	Control Board Connection Error
0099H	–	ON	CPF24	Drive Unit Signal Fault
009AH	–	ON	CPF25	Terminal Board Not Connected
009BH to 00A4H	–	ON	CPF26 to CPF35	Control Circuit Error
00A9H to 00AEH	–	ON	CPF40 to CPF45	
00E5H*	–	ON	E5	MECHATROLINK-II WDT Error
00E6H*	–	ON	BUS	MECHATROLINK-II Communications Error
00ECH*	–	ON	–	Inverter WDC Error
00EDH*	–	ON	–	Inverter Access Permission Error
00EEH*	–	ON	–	Inverter Monitor Timer Exceeded
0101H	–	ON	oFA00	Unsupported Option Connection or Option Card Connection Error
0102H	–	ON	oFA01	Option Card Connection Error
0103H	–	ON	oFA02	Same Type of Option Error
0106H	–	ON	oFA05	Option Card Error Occurred at Option Port CN5-A
0107H	–	ON	oFA06	
0111H, 0112H	–	ON	oFA10 or oFA11	
0113H to 0118H	–	ON	oFA12 to oFA17	Option Card Connection Error (CN5-A)
0131H to 013EH	–	ON	oFA30 to oFA43	Comm. Option Card Connection Error (CN5-A)
0201H	–	ON	oFb00	Unsupported Option Connection
0202H	–	ON	oFb01	Option Card Connection Error
0203H	–	ON	oFb02	Same Type of Option Already Connected
0206H	–	ON	oFb05	Option Card Error Occurred at Option Port CN5-B
0207H	–	ON	oFb06	
0211H	–	ON	oFb10	
0212H	–	ON	oFb11	
0213H to 0218H	–	ON	oFb12 to oFb17	Option Card Connection Error (CN5-B)
0301H	–	ON	oFC00	Unsupported Option Connection
0302H	–	ON	oFC01	Option Card Connection Error
0303H	–	ON	oFC02	Same Type of Option Already Connected
0306H	–	ON	oFC05	Option Card Error Occurred at Option Port CN5-C
0307H	–	ON	oFC06	
0311H	–	ON	oFC10	
0312H	–	ON	oFC11	
0313H to 0318H	–	ON	oFC12 to oFC17	Option Card Connection Error (CN5-C)
0351H to 0356H	–	ON	oFC50 to oFC55	Option Card Error Occurred at Option Port CN5-C

– : Unchanged, ON: The corresponding bit turns ON.

* Error detected by the MECHATROLINK Option Card/Option Unit.

(2) Inverter Warnings

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description
	WARNG	ALM		
–	ON	–	PASS	MEMOBUS/Modbus Communication Test Mode Complete
–	ON	–	CrST	Cannot Reset
0001H	ON	–	Uv	DC Bus Undervoltage
0002H	ON	–	ov	DC Bus Overvoltage
0003H	ON	–	oH	Heatsink Overheat
0004H	ON	–	oH2	Drive Overheat Warning
0005H	ON	–	oL3	Overtorque 1
0006H	ON	–	oL4	Overtorque 2
0007H	ON	–	EF	Forward/Reverse Run Command Input Error
0008H	ON	–	bb	Drive Base Block
0009H to 000EH	ON	–	EF3 to EF8	External Fault (input terminal S3 to S8)
000FH	ON	–	FAn	Internal Fan Fault
0010H	ON	–	oS	Overspeed
0011H	ON	–	dEv	Speed Deviation (for Control Mode with PG and PM Open Loop Vector Control Mode without PG)
0012H	ON	–	PGo	PG Disconnect (for Control Mode with PG)
0014H	ON	–	CE	MEMOBUS/Modbus Communication Error
0015H	ON	–	bUS	Option Communication Error
001AH	ON	–	EF0	Option Card External Fault
001BH	ON	–	rUn	Motor Switch during Run
001DH	ON	–	CALL	Serial Communication Transmission Error
001EH	ON	–	UL3	Undertorque 1
001FH	ON	–	UL4	Undertorque 2
0020H	ON	–	SE	MEMOBUS/Modbus Communication Test Mode Error
0022H	ON	–	oH3	Motor Overheat
0027H	ON	–	FbL	PID Feedback Loss
0028H	ON	–	FbH	Excessive PID Feedback
002AH	ON	–	dnE	Drive Disabled
002BH	ON	–	PGoH	PG Hardware Fault (when using PG-X3)
0031H	ON	–	E5	MECHATROLINK Watchdog Timer Error
0032H	ON	–	AEr	Station Address Setting Error (MECHATROLINK)
0033H	ON	–	CyC	MECHATROLINK Trans. Cycle Setting Error
0034H	ON	–	HCA	Current Alarm
0035H	ON	–	LT-1	Cooling Fan Maintenance Time
0036H	ON	–	LT-2	Capacitor Maintenance Time
0039H	ON	–	EF1	External Fault (input terminal S1)
003AH	ON	–	EF2	External Fault (input terminal S2)
003BH	ON	–	HbbF	Safe Disable Signal Input
003CH	ON	–	Hbb	
003DH	ON	–	oL5	Mechanical Weakening Detection 1
003EH	ON	–	UL5	Mechanical Weakening Detection 2
0041H	ON	–	voF	Output Voltage Detection Fault
0042H	ON	–	TrPC	IGBT Maintenance Time (90%)
0043H	ON	–	LT-3	Soft Charge Bypass Relay Maintenance Time
0044H	ON	–	LT-4	IGBT Maintenance Time (50%)
0045H	ON	–	boL	Braking Transistor Overload
0048H	ON	–	oH5	Motor Overheat (NTC Input)
0049H	ON	–	dWAL	DriveWorksEZ Alarm

(cont'd)

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description
	WARNG	ALM		
004DH	ON	–	THo	Thermistor Disconnect
0094H*	ON	–	–	Data Setting Warning
0095H*	ON	–	–	Command Warning
0096H*	ON	–	–	MECHATROLINK-II Communications Error Warning

– : Unchanged, ON: The corresponding bit turns ON.

* Error detected by the MECHATROLINK Option Card/Option Unit.

10.5.2 V1000

(1) Inverter Alarms

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description
	WARNG	ALM		
0002H	–	ON	Uv1	DC Bus Undervoltage
0003H	–	ON	Uv2	Control Power Supply Voltage Fault
0004H	–	ON	Uv3	Soft Charge Circuit Fault
0005H	–	ON	SC	Output Short-Circuit or IGBT Fault
0006H	–	ON	GF	Ground Fault
0007H	–	ON	oC	Overcurrent
0008H	–	ON	ov	DC Bus Overvoltage
0009H	–	ON	oH	Heatsink Overheat
000AH	–	ON	oH1	
000BH	–	ON	oL1	Motor Overload
000CH	–	ON	oL2	Drive Overload
000DH	–	ON	oL3	Overtorque Detection 1
000EH	–	ON	oL4	Overtorque Detection 2
000FH	–	ON	rr	Dynamic Braking Transistor
0010H	–	ON	rH	Braking Resistor Overheat
0011H to 0015H	–	ON	EF3 to EF7	External Fault (input terminal S3 to S7)
0018H	–	ON	oS	Overspeed (for Simple V/f with PG)
0019H	–	ON	dEv	Excessive Speed Deviation (for Simple V/f with PG)
001AH	–	ON	PGo	PG Disconnect (for Simple V/f with PG)
001BH	–	ON	PF	DC Bus Voltage Fault
001CH	–	ON	LF	Output Phase Loss
001DH	–	ON	oH3	Motor Overheat Alarm (PTC Input)
001EH	–	ON	oPr	Operator Connection Fault
001FH	–	ON	Err	EEPROM Write Error
0020H	–	ON	oH4	Motor Overheat Fault (PTC Input)
0021H	–	ON	CE	MEMOBUS/Modbus Communication Error
0022H	–	ON	bUS	Option Communication Error
0025H	–	ON	CF	Control Fault
0027H	–	ON	EF0	Option Card External Fault
0028H	–	ON	FbL	PID Feedback Loss
0029H	–	ON	UL3	Undertorque Detection 1
002AH	–	ON	UL4	Undertorque Detection 2
002BH	–	ON	oL7	High Slip Braking oL
0036H	–	ON	LF2	Output Current Imbalance
0037H	–	ON	STo	Pull-Out Detection
0039H	–	ON	E5	MECHATROLINK Watchdog Timer Error

(cont'd)

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description
	WARNG	ALM		
003BH	–	ON	Ser	Too Many Speed Search Restarts
0041H	–	ON	FbH	Excessive PID Feedback
0042H	–	ON	EF1	External Fault (input terminal S1)
0043H	–	ON	EF2	External Fault (input terminal S2)
0044H	–	ON	oL5	Mechanical Weakening Detection 1
0045H	–	ON	UL5	Mechanical Weakening Detection 2
0046H	–	ON	CoF	Current Offset Fault
0049H	–	ON	dWFL	DriveWorksEZ Fault
0052H	–	ON	nSE	Node Setup Error
0083H	–	ON	CPF02	A/D Conversion Fault
0084H	–	ON	CPF03	PWM Data Error
0087H	–	ON	CPF06	EEPROM Data Error
0088H	–	ON	CPF07	Terminal Board Communication Fault
0089H	–	ON	CPF08	EEPROM Serial Communication Fault
008CH	–	ON	CPF11	RAM Fault
008DH	–	ON	CPF12	FLASH Memory Fault
008EH	–	ON	CPF13	Watchdog Circuit Exception
008FH	–	ON	CPF14	Control Circuit Fault
0091H	–	ON	CPF16	Clock Fault
0092H	–	ON	CPF17	Timing Fault
0093H	–	ON	CPF18	Control Circuit Fault
0094H	–	ON	CPF19	
0095H, 0096H	–	ON	CPF20 or CPF21	RAM Fault
				FLASH Memory Fault
				Watchdog Circuit Exception
				Clock Fault
0097H	–	ON	CPF22	A/D Conversion Fault
0098H	–	ON	CPF23	PWM Feedback Data Fault
0099H	–	ON	CPF24	Drive Capacity Signal Fault
009AH	–	ON	CPF25	Terminal Board Not Connected
00E5H*	–	ON	E5	MECHATROLINK-II WDT Error
00E6H*	–	ON	BUS	MECHATROLINK-II Communications Error
00ECH*	–	ON	–	Inverter WDC Error
00EDH*	–	ON	–	Inverter Access Permission Error
00EEH*	–	ON	–	Inverter Monitor Timer Exceeded
0101H	–	ON	oFA00	Unsupported Option Connection or Option Card Connection Error
0102H	–	ON	oFA01	Option Card Fault (Port A)
0104H	–	ON	oFA03	
0105H	–	ON	oFA04	
0131H to 013EH	–	ON	oFA30 to oFA43	Communication Option Card Fault (Port A)

– : Unchanged, ON: The corresponding bit turns ON.

* Error detected by the MECHATROLINK Option Card/Option Unit.

(2) Inverter Warnings

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description
	WARNG	ALM		
–	ON	–	CrST	Cannot Reset
–	ON	–	PASS	MEMOBUS/Modbus Communication Test Mode Complete
0001H	ON	–	Uv	DC Bus Undervoltage
0002H	ON	–	ov	DC Bus Overvoltage
0003H	ON	–	oH	Heatsink Overheat
0004H	ON	–	oH2	Drive Overheat Warning
0005H	ON	–	oL3	Overtorque 1
0006H	ON	–	oL4	Overtorque 2
0007H	ON	–	EF	Forward/Reverse Run Command Input Error
0008H	ON	–	bb	Drive Base Block
0009H to 000DH	ON	–	EF3 to EF7	External Fault (input terminal S3 to S7)
0010H	ON	–	oS	Overspeed (for Simple V/f with PG)
0011H	ON	–	dEv	Excessive Speed Deviation (for Simple V/f with PG)
0012H	ON	–	PGo	PG Disconnect (for Simple V/f with PG)
0014H	ON	–	CE	MEMOBUS/Modbus Communication Error
0015H	ON	–	bUS	Option Communication Error
001AH	ON	–	EF0	Option Card External Fault
001BH	ON	–	rUn	Motor Switch Command Input during Run
001DH	ON	–	CALL	Serial Communication Transmission Error
001EH	ON	–	UL3	Undertorque 1
001FH	ON	–	UL4	Undertorque 2
0020H	ON	–	SE	MEMOBUS/Modbus Communication Test Mode Error
0022H	ON	–	oH3	Motor Overheat
0027H	ON	–	FbL	PID Feedback Loss
0028H	ON	–	FbH	Excessive PID Feedback
002AH	ON	–	dnE	Drive Disabled
0031H	ON	–	E5	MECHATROLINK Watchdog Timer Error
0032H	ON	–	AEr	Station Address Setting Error (MECHATROLINK)
0033H	ON	–	CyC	MECHATROLINK Trans. Cycle Setting Error
0034H	ON	–	HCA	Current Alarm
0035H	ON	–	LT-1	Cooling Fan Maintenance Time
0036H	ON	–	LT-2	Capacitor Maintenance Time
0039H	ON	–	EF1	External Fault (input terminal S1)
003AH	ON	–	EF2	External Fault (input terminal S2)
003BH	ON	–	HbbF	Safe Disable Signal Input
003CH	ON	–	Hbb	
003DH	ON	–	oL5	Mechanical Weakening Detection 1
003EH	ON	–	UL5	Mechanical Weakening Detection 2
0042H	ON	–	TrPC	IGBT Maintenance Time (90%)
0043H	ON	–	LT-3	Soft Charge Bypass Relay Maintenance Time
0044H	ON	–	LT-4	IGBT Maintenance Time (50%)
0049H	ON	–	dWAL	DriveWorksEZ Alarm
0094H*	ON	–	–	Data Setting Warning
0095H*	ON	–	–	Command Warning
0096H*	ON	–	–	MECHATROLINK-II Communications Error Warning

– : Unchanged, ON: The corresponding bit turns ON.

* Error detected by the MECHATROLINK Option Card/Option Unit.

10.5.3 Varispeed G7, Varispeed F7, and VS mini V7

(1) Inverter Alarms

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description	Vari-speed G7	Vari-speed F7	VS mini V7
	WARNG	ALM					
01H	–	ON	PUF	Blown Fuse	○	○	×
02H	–	ON	UV1	DC Bus Undervoltage	○	○	○
03H	–	ON	UV2	Low Control Power Supply Voltage	○	○	○
04H	–	ON	UV3	MC Failure	○	○	×
06H	–	ON	GF	Ground Fault	○	○	○*1
07H	–	ON	OC	Overcurrent	○	○	○
08H	–	ON	OV	Overvoltage	○	○	○
09H	–	ON	OH	Drive Overheat	○	○	○
0AH	–	ON	OH1	Drive Overheat	○	○	×
0BH	–	ON	OL1	Motor Overload	○	○	○
0CH	–	ON	OL2	Drive Overload	○	○	○
0DH	–	ON	OL3	Overtorque 1	○	○	○
0EH	–	ON	OL4	Overtorque 2	○	○	×
0FH	–	ON	RR	Control Transistor Error	○	○	×
10H	–	ON	RH	Braking Resistor Overheat	○	○	○*1
11H	–	ON	EF3	External Fault 3	○	○	○
12H	–	ON	EF4	External Fault 4	○	○	○
13H	–	ON	EF5	External Fault 5	○	○	○
14H	–	ON	EF6	External Fault 6	○	○	○
15H	–	ON	EF7	External Fault 7	○	○	○
16H	–	ON	EF8	External Fault 8	○	○	×
18H	–	ON	OS	Acceleration	○	○	×
19H	–	ON	DEV	Speed Deviation	○	○	×
1AH	–	ON	PGO	PG Disconnection	○	○	×
1BH	–	ON	PF	Input Phase Loss	○	○	○
1CH	–	ON	LF	Output Phase Loss	○	○	○
1DH	–	ON	OH3	Motor Overheat 1	○	○	×
1EH	–	ON	OPR	Operator Disconnection	○	○	○
1FH	–	ON	ERR	EEPROM Write Error	○	○	×
20H	–	ON	OH4	Motor Overheat 2	○	○	×
21H	–	ON	CE	Memobus Transmission Error	○	○	○
25H	–	ON	CF	Control Fault	○	○	×
26H	–	ON	SVE	Zero Servo Fault	○	○	×
27H	–	ON	EFO	External Fault	○	○	○
28H	–	ON	FBL	PID Feedback Reference Loss	○	○	×
29H	–	ON	UL3	Undertorque Detection 1	○	○	○
2AH	–	ON	UL4	Undertorque Detection 2	○	○	×
2BH	–	ON	OL7	Overload during HSB	○	○	×
2CH	–	ON	EF9	External Fault 9	○	×	×
2DH	–	ON	EF10	External Fault 10	○	×	×
2EH	–	ON	EF11	External Fault 11	○	×	×
2FH	–	ON	EF12	External Fault 12	○	×	×
31H	–	ON	VCF	Neutral Point Error	○	×	×
50H	–	ON	STP	Emergency Stop	×	×	○
51H	–	ON	EF1	External Fault 1	×	×	○
52H	–	ON	EF2	External Fault 2	×	×	○

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(cont'd)

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description	Vari-speed G7	Vari-speed F7	VS mini V7
	WARNG	ALM					
83H	–	ON	CPF02	Base Block Circuit Error	○	○	×
84H	–	ON	CPF03	EEPROM Error	○	○	○*2
85H	–	ON	CPF04	CPU Internal A/D Error	○	○	○*3
86H	–	ON	CPF05	CPU External A/D Error	○	○	×
87H	–	ON	CPF06	Option Card Fault	○	○	○
88H	–	ON	CPF07	ASIC Internal RAM Error	○	○	×
89H	–	ON	CPF08	Watchdog Timer Failure	○	○	×
8AH	–	ON	CPF09	CPU-ASIC Compatibility Diagnosis Error	○	○	×
8BH	–	ON	CPF10	ASIC Version Failure	○	○	×
8CH			CPF07	Digital Operator Control Circuit Fault	×	×	○
91H	–	ON	CPF20	Comm. Option Card Error	○	○	×
92H	–	ON	CPF21	Communications Option Self-Diagnosis Failure	○	○	○
93H	–	ON	CPF22	Communications Option Model Code Error	○	○	○
94H	–	ON	CPF23	Communications Option Compatibility Diagnosis Error	○	○	○
E5H*4	–	ON	E5	MECHATROLINK-IIWDT Error	○	○	○
E6H*4	–	ON	BUS	MECHATROLINK-II Communications Error	○	○	○
ECH*4	–	ON		Inverter WDC Error	○	○	○
EDH*4	–	ON		Inverter Access Permission Error	○	○	○
EEH*4	–	ON		Inverter Monitor Timer Exceeded	○	○	○

○: Supported, ×: Not supported

* 1. VS mini V7 5.5-/7.5-kW only
* 2. Digital operator display for the VS mini V7: CPF04
* 3. Digital operator display for the VS mini V7: CPF05
* 4. Error detected by the MECHATROLINK Option Card/Option Unit.

(2) Inverter Warnings

Alarm Code (IW□□30)	Status (IW□□10)		Content Displayed on Digital Operator	Description	Vari-speed G7	Vari-speed F7	VS mini V7
	WARNG	ALM					
01H	ON	–	UV	DC Bus Undervoltage	○	○	○
02H	ON	–	OV	Overvoltage	○	○	○
03H	ON	–	OH	Drive Overheat	○	○	○
04H	ON	–	OH2	Drive Overheat	○	○	×
05H	ON	–	OL3	Overtorque 1	○	○	○
06H	ON	–	OL4	Overtorque 2	○	○	×
07H	ON	–	EF	External Fault	○	○	○
08H	ON	–	BB	Base Block Active	○	○	○
09H	ON	–	EF3	External Fault 3	○	○	×
0AH	ON	–	EF4	External Fault 4	○	○	×
0BH	ON	–	EF5	External Fault 5	○	○	×
0CH	ON	–	EF6	External Fault 6	○	○	×
0DH	ON	–	EF7	External Fault 7	○	○	×
0EH	ON	–	EF8	External Fault 8	○	○	×
0FH	ON	–	FAN	Cooling Fan Error	×	×	○
10H	ON	–	OS	Overspeed	○	○	×
11H	ON	–	DEV	Speed Deviation	○	○	×
12H	ON	–	PGO	PG Disconnection	○	○	×
13H	ON	–	OPR	Operator Disconnection	○	○	○
14H	ON	–	CE	Memobus Transmission Error	○	○	○
17H	ON	–	OL1	Motor Overload	○	○	×
18H	ON	–	OL2	Drive Overload	○	○	×
1AH	ON	–	EFO	External Fault	○	○	×
1BH	ON	–	RUN	Motor Operation in Progress	○	○	×
1CH	ON	–	FBL	PID Feedback Reference Loss	○	○	○
1DH	ON	–	CALL	Standby to Transfer Data	○	○	○
1EH	ON	–	UL3	Undertorque Detection 1	○	○	○
1FH	ON	–	UL4	Undertorque Detection 2	○	○	×
20H	ON	–	SER	PLC Input Error	×	×	○
22H	ON	–	OH3	Motor Overheat 1	○	○	×
23H	ON	–	EF9	External Fault 9	○	○	×
24H	ON	–	EF10	External Fault 10	○	○	×
25H	ON	–	EF11	External Fault 11	○	○	×
26H	ON	–	EF12	External Fault 12	○	○	×
40H	ON	–	STP	Emergency Stop	×	×	○
41H	ON	–	STP	Emergency Stop	×	×	○
94H*	ON	–		Data Setting Warning	○	○	○
95H*	ON	–		Command Warning	○	○	○
96H*	ON	–		MECHATROLINK-II Communications Error Warning	○	○	○

○: Supported, ×: Not supported

* Error detected by the MECHATROLINK Option Card/Option Unit.

Inverter Operation

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10.6 MECHATROLINK Option Card/Option Unit Settings

The following tables list the hardware settings for the MECHATROLINK Option Card/Option Unit for the Varispeed F7, Varispeed G7, and VS mini V7.

(1) S1: DIP Switches

Code	Switch Name	Status	Operation When Set
S1-1	BRS10/4	OFF	4 Mbps
		ON	10 Mbps
S1-2	BYTE16/31	OFF	17-byte transfer mode (MECHATROLINK-I and MECHATROLINK-II 17-byte mode only)
		ON	32-byte transfer mode (MECHATROLINK-II 32-byte mode only)
S1-3	SA16/32	OFF	Sets the second digit of the station address to 0 in hexadecimal. (For MECHATROLINK communications, sets it to 2.) Note: The station address 00 and 20 set with the S1-3 DIP switch and S2 rotary switch are invalid.
		ON	Sets the second digit of the station address to 1 in hexadecimal. (For MECHATROLINK communications, sets it to 3.) Note: The station address 1F and 3F set with the S1-3 DIP switch and S2 rotary switch are invalid.
S1-4	TEST	OFF	Normal mode
		ON	Diagnosis mode

(2) S2: Hexadecimal Rotary Switch

Code	Switch Name	Status	Operation When Set
S2	SA	0 to F	Sets the first digit of the station address in hexadecimal (□0 to □FH).

(3) Station Address List by DIP Switch (S1-3) and Hexadecimal Rotary Switch (S2) Settings

S1-3	S2	ST# (Station Address)		Station Address in Network Analyzer for MECHATROLINK Communications
		Decimal Number	Hexadecimal Number	
OFF	0	–*1	–*1	–*1
	1	1	01H	21H
	2	2	02H	22H
	3	3	03H	23H
	4	4	04H	24H
	5	5	05H	25H
	6	6	06H	26H
	7	7	07H	27H
	8	8	08H	28H
	9	9	09H	29H
	A	10	0AH	2AH
	B	11	0BH	2BH
	C	12	0CH	2CH
	D	13	0DH	2DH
	E	14	0EH	2EH
	F	15	0FH	2FH
ON	0	16	10H	30H
	1 to E	–*2	–*2	–*2
	F	–*1	–*1	–*1

* 1. Station address cannot be used because of the design of the Inverters.
* 2. Station address cannot be used because of the design of the SVB Module.

11

Utility Functions

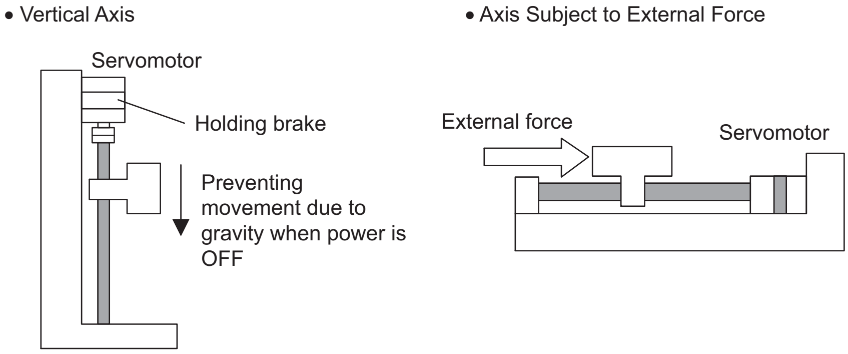
This chapter describes MP2000-series Machine Controller and SERVOPACK utility functions such as vertical axis control, overtravel, and software limits, modal latch, and bank switching. Also, the parameters automatically updated under the specified conditions are explained.

11.1 Controlling Vertical Axes

This section explains connection methods and parameter settings required to use the SERVOPACK to control a vertical axis.

11.1.1 Holding Brake Function of the SERVOPACK

When using a SERVOPACK to control a vertical axis or an axis to which an external force is being applied, a Servomotor with a brake must be used to prevent the axis from dropping or moving due to gravity or the external force when the system power is turned OFF.



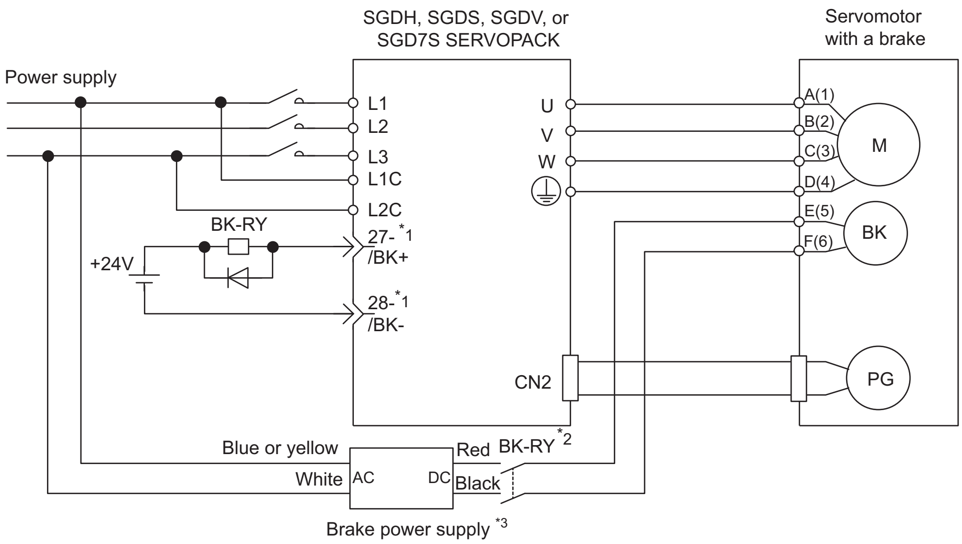
The holding brake of the Servomotor is controlled through the brake interlock output (/BK) signal from the SERVOPACK. The brake is not controlled from the Machine Controller.

- The brake built into a Servomotor with a brake uses non-excitation operation and is for use as a holding brake only. It cannot be used to control or stop axis movement. Use the holding brake only to hold the axis in a stopped state after the motor has stopped. The torque of the brake is 100% or higher of the rated torque of the motor.
- When using the servomotor on a vertical axis, hunting might occur. If so, set the SERVOPACK parameter Pn001.1 (Overtravel Stop Mode) to 1.

11.1.2 Connections to Σ-II Series SGDH SERVOPACKs, Σ-III Series SGDS SERVOPACKs, Σ-V Series SGDV SERVOPACKs, and Σ-7 Series SGD7S SERVOPACKs

(1) Example of a Brake ON and OFF Circuit

A circuit is configured to turn the brake ON and OFF using the /BK contact output signal from the SERVOPACK and a brake power supply. The following diagram shows a standard connection example. Refer to the manual for your SERVOPACK for details.



* 1. The output terminal is allocated using parameter Pn50F.2. Output terminal 1 (terminal numbers 1and 2) is selected in the example above.
* 2. Brake control relay contact
* 3. There are 200-V and 100-V brake power supplies.

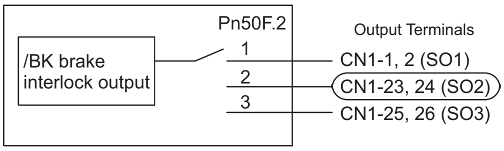
(2) Parameter Settings

The SERVOPACK parameters related to control the holding brake are described below.

Parameter	Name	Unit	Setting/Range	Default	Control Mode
Pn50F.2	Output Signal Selection 2	–	0: Brake not used 1: Terminal numbers 1 and 2 2: Terminal numbers 23 and 24 3: Terminal numbers 25 and 26	1	Speed, torque, position control

Details

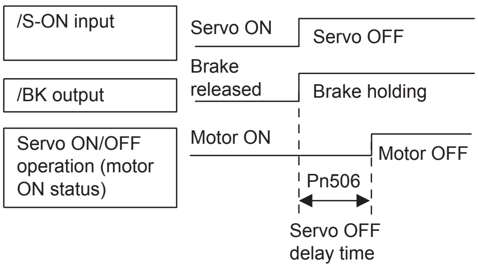
The following parameter determines which CN1 pin (0 to 3 above) will be used to output the /BK signal.



Parameter	Name	Unit	Setting/Range	Default	Control Mode
Pn506	Brake ON Timing after Motor Stops	10 ms	0 to 50	0	Speed, torque, position control

Details

This parameter adjusts the delay time from /BK Signal Output until Servo OFF (stopping Servomotor output), and it is used to be set when the machine moves slightly due to gravity or other factors after turning the brake ON.

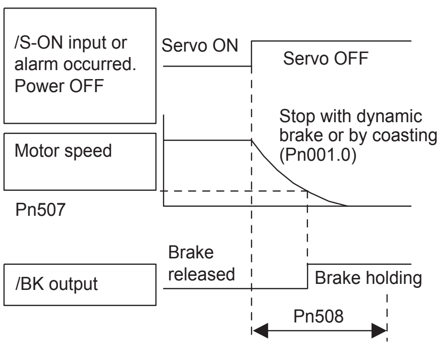


- This parameter is used to set the timing when the motor is stopped. Brake operation while the motor is running is set in Pn507 and Pn508.
- For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this time due to machine configuration or brake characteristics, turning OFF the Servo can be delayed to reduce the movement.

Parameter	Name	Unit	Setting/Range	Default	Control Mode
Pn507	Brake ON Timing when Motor Running	min^{-1}	0 to 10000	100	Speed, torque, position control
Pn508		10 ms	0 to 100	50	Speed, torque, position control

Details

Pn507: Speed Level for BK Signal Output when Motor Running
Pn508: Timing of BK Signal Output when Motor Running
These settings are used to set the timing for applying the brake when the Servo turns OFF due to an /S-ON input signal or alarm.

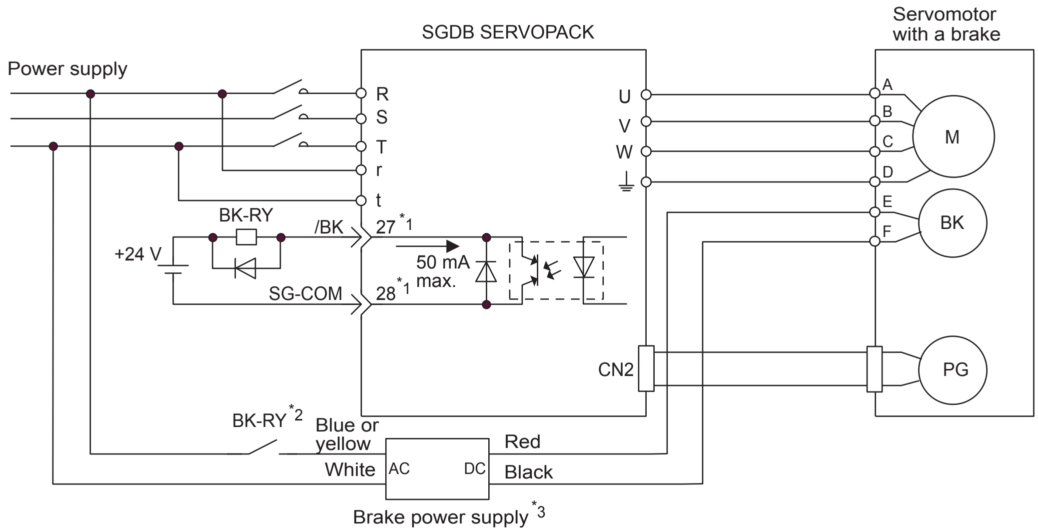


- The brake on the Servomotor is designed as a holding brake and it must be applied only after the motor has stopped. Adjust this parameter while observing machine operation.

11.1.3 Connections to Σ-I Series SGDB SERVOPACK

(1) Example of a Brake ON and OFF Circuit

A circuit is configured to turn the brake ON and OFF using the /BK contact output signal from the SERVOPACK and a brake power supply. The following diagram shows the standard connections.



* 1. The terminal is allocated using parameter Cn-2D. In the example above, /BK signal 4 is set in the 2nd digit.
* 2. Brake control relay contact
* 3. There are 200-V and 100-V brake power supplies.

(2) Parameter Settings

The SERVOPACK parameters related to control the holding brake are described below.

Parameter	Name	Unit	Setting/Range	Default	Control Mode
Cn-2D	OUTSEL Output Signal Selection	–	110 to 666	210	Speed, torque, position control

Details

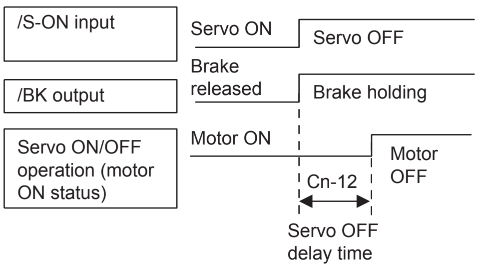
The following parameter determines which pin of the 1CN will be used to output the /BK signal (4 in the lower right column). In the figure above, 4 is allocated to the 2nd digit and the setting is □4□. So, the /BK signal is output to pins 27 and 28.

Allocation	Set Value and Function
1st digit: CN1-25, 26 (Factory setting: 0)	0: /COIN/ /V-CMP (Valid only at the 1st digit.)
2nd digit: CN1-27, 28 (Factory setting: 1)	1: /TGON
3rd digit: CN1-29, 30 (Factory setting: 2)	2: /S-RDY
	3: /CLT
	4: /BK
	5: OL warning
	6: OL alarm

Parameter	Name	Unit	Setting/Range	Default	Control Mode
Cn-12	Brake ON Timing after Motor Stops	10 ms	0 to 50	0	Speed, torque, position control

Details

This parameter adjusts the Delay Time from /BK Signal Output until Servo OFF (stopping Servomotor output), and it is used to be set when the machine moves slightly due to gravity or other factors after turning the brake ON.



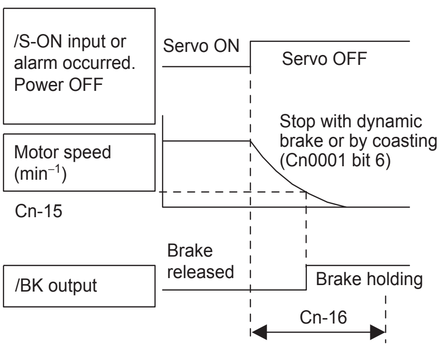
- This parameter is used to set the timing when the motor is stopped. Brake operation while the motor is running is set in Cn-15 and Cn-16.
- For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this time due to machine configuration or brake characteristics, turning OFF the Servo can be delayed to reduce the movement.

Parameter	Name	Unit	Setting/Range	Default	Control Mode
Cn-15	Brake ON Timing when Motor Running	min^{-1}	0 to max. speed	100	Speed, torque, position control
Cn-16		10 ms	0 to 100	50	Speed, torque, position control

Details

Cn-15: Speed Level for BK Signal Output when Motor Running
Cn-16: Timing of BK Signal Output when Motor Running

These settings are used to set the timing for applying the brake when the Servo turns OFF due to an /S-ON input signal or alarm.

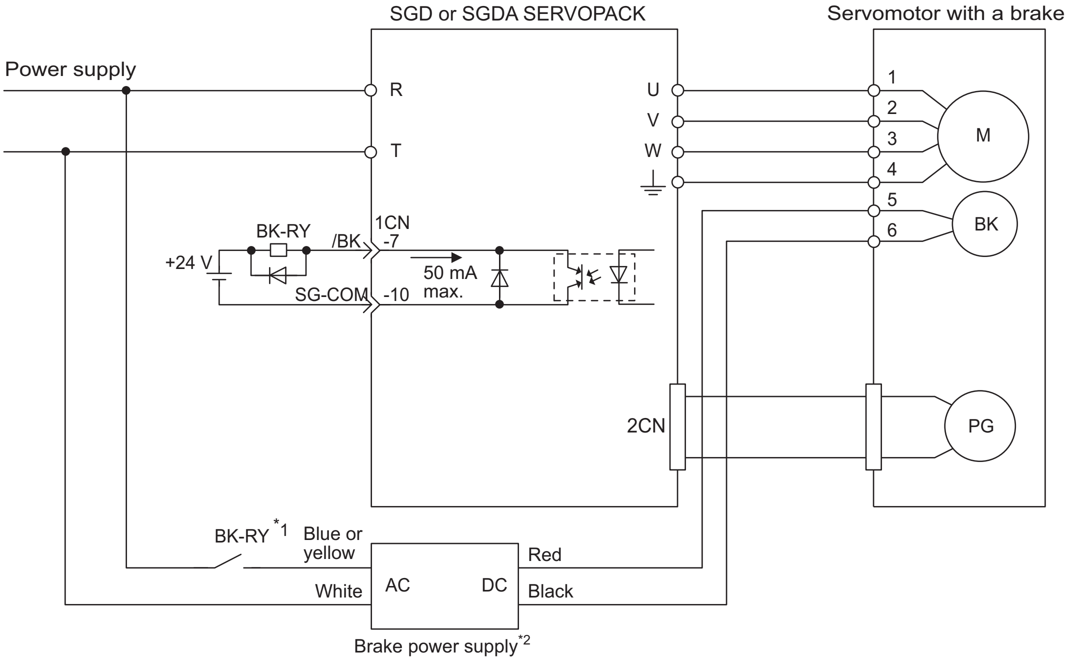


- The brake on the Servomotor is designed as a holding brake and it must be applied only after the motor has stopped. Adjust this parameter while observing machine operation.

11.1.4 Connections to Σ-I Series SGD SERVOPACK

(1) Brake ON and OFF Circuit Example

A circuit is configured to turn the brake ON and OFF using the /BK contact output signal from the SERVOPACK and a brake power supply. The standard connections are shown in the following diagram.



* 1. Brake control relay contact
* 2. There are 200-V and 100-V brake power supplies.

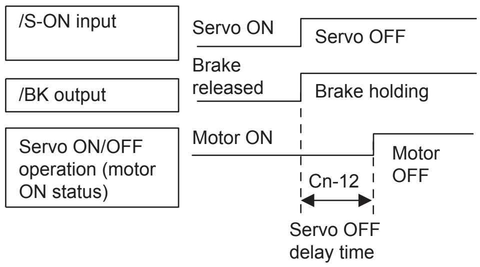
(2) Parameter Settings

The SERVOPACK parameters related to controlling the brake are described below.

Parameter	Name	Unit	Setting/Range	Default	Control Mode
Cn-12	Brake ON Timing after Motor Stops	10 ms	0 to 50	0	Speed, torque, position control

Details

This parameter adjusts the Delay Time from /BK Signal Output until Servo OFF (stopping Servomotor output), and it is used to be set when the machine moves slightly due to gravity or other factors after turning the brake ON.



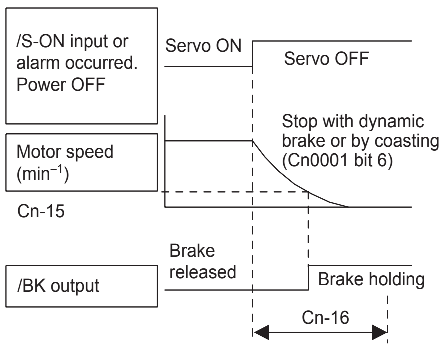
- This parameter is used to set the timing when the motor is stopped. Brake operation while the motor is running is set in Cn-15 and Cn-16.
- For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this time due to machine configuration or brake characteristics, turning OFF the Servo can be delayed to reduce the movement.

Parameter	Name	Unit	Setting/Range	Default	Control Mode
Cn-15	Brake ON Timing when Motor Running	min^{-1}	0 to max. speed	100	Speed, torque, position control
Cn-16		10 ms	0 to 100	50	Speed, torque, position control

Details

Cn-15: Speed Level for BK Signal Output when Motor Running
Cn-16: Timing of BK Signal Output when Motor Running

These settings are used to set the timing for applying the brake when the Servo turns OFF due to an /S-ON input signal or alarm.



- The brake on the Servomotor is designed as a holding brake and it must be applied only after the motor has stopped. Adjust this parameter while observing machine operation.

11.2 Overtravel Function

The overtravel function forces the machine to stop when the moving part of the machine exceeds the range of movement. With the MP2000-series Machine Controller, processing for stopping as a result of overtravel is achieved by using SERVOPACK functions.
The SERVOPACK connections and parameter setting depend on the model of SERVOPACK. The connections and parameter settings are described in the following sections.

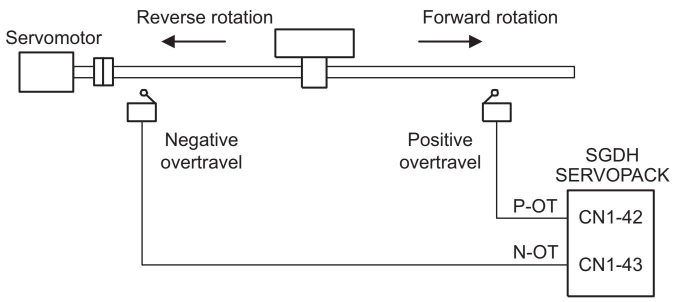
11.2.1 Connections to Σ-II Series SGDH SERVOPACKs, Σ-III Series SGDS SERVOPACKs, Σ-V Series SGDV SERVOPACKs, and Σ-7 Series SGD7S SERVOPACKs

Connections to Σ-II, Σ-III, Σ-V, or Σ-7 Series SGDH, SGDS, SGDV, and SGD7S SERVOPACKs
The following parameters must be set to ensure that the overtravel input signals are connected correctly for the overtravel function.

(1) Overtravel Input Signal Connections

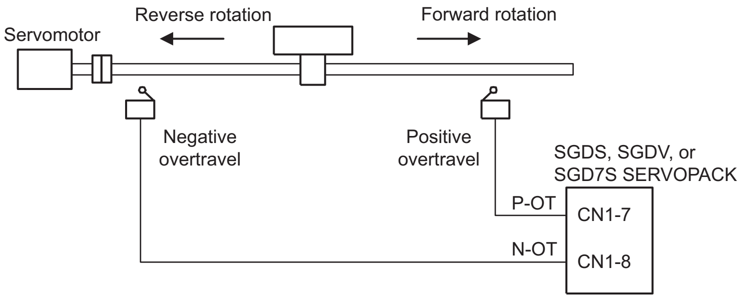
Correctly connect the input signals for the overtravel limit switches shown below to the corresponding pins on the SERVOPACK CN1 or 1CN connector.

■ Connections to Σ-II Series SERVOPACKs



P-OT	When ON CN1-42 is low.	Forward drive enabled. Normal operating condition
	When OFF CN1-42 is high.	Forward drive disabled. (Reverse movement possible.)
N-OT	When ON CN1-43 is low.	Reverse drive enabled. Normal operating condition
	When OFF CN1-43 is high.	Reverse drive disabled. (Forward movement possible.)

■ Connections to Σ-III, Σ-V, and Σ-7 Series SERVOPACKs



P-OT	When ON CN1-7 is low.	Forward drive enabled. Normal operating condition
	When OFF CN1-7 is high.	Forward drive disabled. (Reverse movement possible.)
N-OT	When ON CN1-8 is low.	Reverse drive enabled. Normal operating condition
	When OFF CN1-8 is high.	Reverse drive disabled. (Forward movement possible.)

(2) Parameter Settings

[a] Use/Not Use Overtravel Input Signals

The following parameters are used to enable and disable the overtravel input signals.

- These parameters are disabled by executing a self-configuration command.

- SGDH SERVOPACKs

Parameter	Name	Set Value	Item	Default
Pn50A.3	P-OT Signal Mapping	2 (Recom-mended)	Enables use of Positive Prohibit Input Signal (P-OT). Forward rotation prohibited when open, allowed for 0 V.	2
		8	Disables the P-OT signal.	
Pn50B.0	N-OT Signal Mapping	3 (Recom-mended)	Enables use of Negative Prohibit Input Signal (N-OT). Reverse rotation prohibited when open, allowed for 0 V.	3
		8	Disables the N-OT signal.	

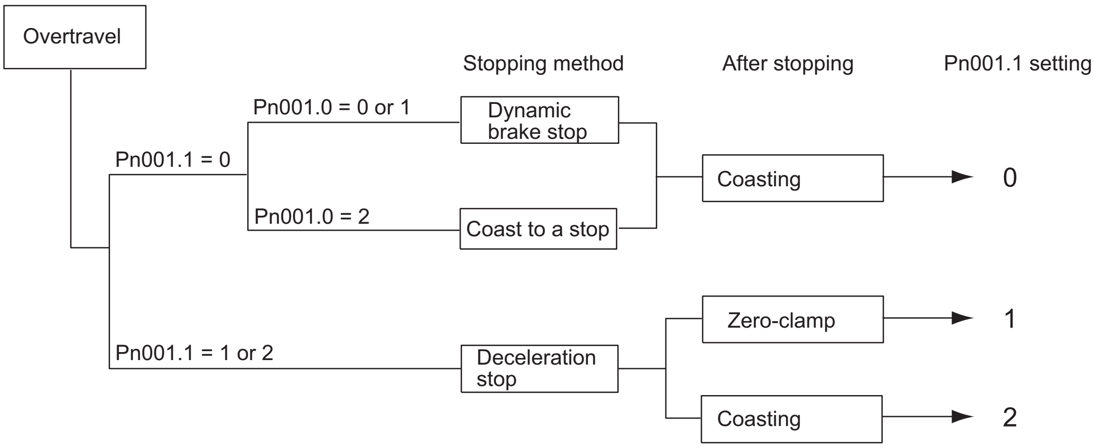
- SGDS, SGDV, or SGD7S SERVOPACKs

Parameter		Item
Pn50A	n.1□□□ (recommended)	Enables use of Positive Prohibit Input Signal (P-OT). Forward rotation prohibited when CN1-7 is open and allowed at 0 V. (Default setting)
	n.8□□□	Disables use of Positive Prohibit Input Signal (P-OT). Constant forward rotation allowed. Equivalent to short circuit between the CN1-7 and 0 V (Control power supply for sequence signal input).
Pn50B	n.□□□2 (recommended)	Enables use of Negative Prohibit Input Signal (N-OT). Reverse rotation prohibited when CN1-8 is open and allowed at 0 V. (Default setting)
	n.□□□8	Disables use of Negative Prohibit Input Signal (N-OT). Constant reverse rotation allowed. Equivalent to short circuit between the CN1-8 and 0 V (Control power supply for sequence signal input).

[b] Selecting Motor Stopping Methods for Overtravel

When using the overtravel function has been enabled, the following parameters are used to set the methods for stopping the motor. Select the methods for stopping when the P-OT or N-OT is input during motor running.

Parameter	Name	Set Value	Item	Default
Pn001.1	Overtravel Stop Mode	0 (Recom-mended)	Stops the motor according to Pn001.0 setting (dynamic brake or coasting) when overtravel is detected.	0
		1	Decelerates the motor to a stop by applying the torque specified in Pn406 (Emergency Stop Torque) when overtravel is detected, and then sets it to zero clamp (servolock) mode.	
		2	Decelerates the motor to a stop by applying the torque specified in Pn406 (Emergency Stop Torque) when overtravel is detected, and then sets it to coast (servo OFF) mode.	
Pn001.0	Servo OFF Stop Mode	0 (Recom-mended)	Stops the motor by applying dynamic brake (DB) and then holds the DB.	0
		1	Stops the motor by applying dynamic brake (DB) and then releases the DB.	
		2	Makes the motor coast to a stop. Current is not supplied to the motor and the machine stops due to friction.	



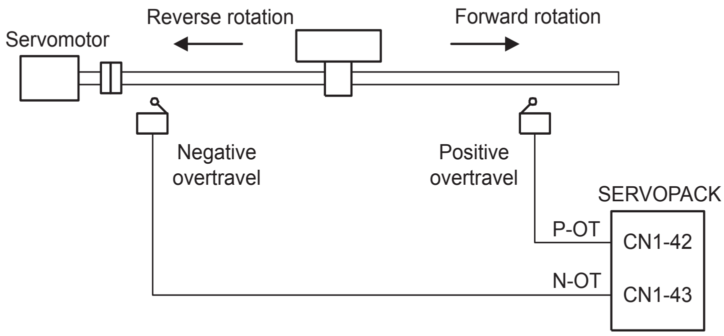
11.2.2 Connections to Σ-I Series SGDB or SGD SERVOPACK

The following parameters must be set to ensure the overtravel input signals are connected correctly for the overtravel function.

(1) Overtravel Input Signal Connections

Connect the input signals for the overtravel limit switches to the corresponding pins on the SERVOPACK CN1 or 1CN connector as shown below.

■ Connections to SGDB and SGD SERVOPACK



P-OT	When ON 1CN-7 is low.	Forward drive enabled. Normal operating condition
	When OFF 1CN-7 is high.	Forward drive disabled. (Reverse movement possible.)
N-OT	When ON 1CN-8 is low.	Reverse drive enabled. Normal operating condition
	When OFF 1CN-8 is high.	Reverse drive disabled. (Forward movement possible.)

(2) Parameter Settings

[a] Use/Not Use Overtravel Input Signals

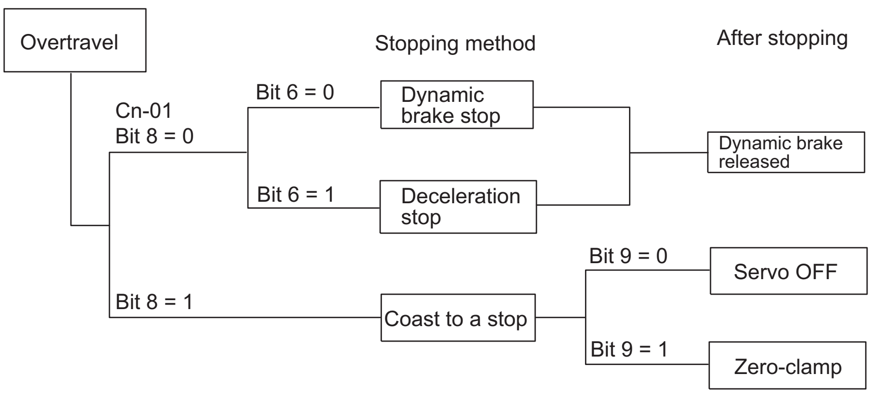
The following parameters are used to enable and disable the overtravel input signals.

Parameter	Name	Set Value	Item	Default
Cn-01 Bit 2	Use/Not Use P-OT Input Signal	0 (Recommended)	Enables use of Positive Prohibit Input Signal (P-OT). (Forward rotation prohibited when open, allowed for 0 V.)	0
		1	Disables use of Positive Prohibit Input Signal (P-OT). (Forward rotation always allowed.)	
Cn-01 Bit 3	Use/Not Use N-OT Input Signal	0 (Recommended)	Enables use of Negative Prohibit Input Signal (N-OT). (Reverse rotation prohibited when open, allowed for 0 V.)	0
		1	Disables use of Negative Prohibit Input Signal (N-OT). (Reverse rotation always allowed.)	

[b] Selecting Motor Stopping Methods for Overtravel

When using the overtravel function has been enabled, the following parameters are used to set the methods for stopping the motor. Select the methods for stopping when the P-OT or N-OT is input during motor running.

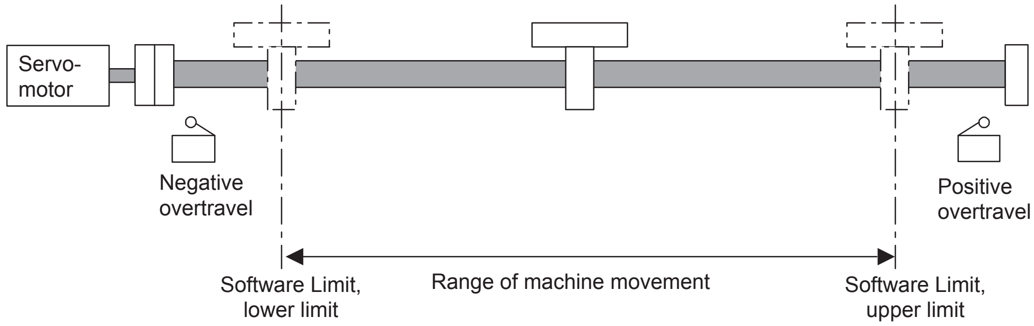
Parameter	Name	Set Value	Item	Default
Cn-01 Bit 8	Selection of stopping method for overtravel	0 (Recommended)	Uses the same stopping method as for Servo OFF. Stops the motor according to Cn-01 bit 6 setting (dynamic brake or coasting) when overtravel is detected.	0
		1	Decelerates the motor to a stop by applying the torque specified in Cn-06 (EMGTRQ Emergency Stop Torque) when overtravel is detected.	
Cn-01 Bit 9	Selection of processing after stopping for overtravel	0 (Recommended)	Decelerates the motor to a stop and then turns OFF the Servo.	0
		1	Decelerates the motor to a stop and then sets it in the zero-clamp mode.	
Cn-01 Bit 6	Selection of stopping method for motor when servo turns OFF	0	Stops the motor by applying dynamic brake (DB).	0
		1	Makes the motor coast to a stop. Current is not supplied to the motor and the machine stops due to friction.	
Cn-01 Bit 7	Selection of processing after stopping for overtravel	0	Stops the motor by applying dynamic brake (DB) and then releases the DB.	0
		1	Stops the motor by applying dynamic brake (DB) and then holds the DB.	



11.3 Software Limit Function

The software limit function is used to set upper and lower limits for the range of machine movement in fixed parameters so the Machine Controller can constantly monitor the operating range of the machine. The function can be used to help prevent machine runaway or damage due to incorrect operation as well as incorrect references in a motion program.
Disable the software limits in the SERVOPACK to use the Machine Controller for position control in the machine coordinate system.

- Refer to your SERVOPACK manual for the procedure on disabling software limits.



11.3.1 Fixed Parameter Settings

The following fixed parameters must be set in order to use the software limit function.

Fixed Parameter Number	Name	Unit	Setting/Range
1	Function Selection Flag 1 Bit 1: Soft Limit (Positive Direction) Enable/Disable Bit 2: Soft Limit (Negative Direction) Enable/Disable	–	0: Disable, 1: Enable 0: Disable, 1: Enable
12	Positive Software Limit Value	Reference unit	–2147483648 to 2147483647
14	Negative Software Limit Value	Reference unit	–2147483648 to 2147483647

- The software limit function is enabled only after completing a Zero Point Return or Zero Point Setting operation.
  If any fixed parameters are changed and saved or the power is turned ON, the Zero Point Return or Zero Point Setting operation must be performed again.

11.3.2 Effects of the Software Limit Function

If a position command that exceeds the positive and negative software limit is executed with the software limit function enabled, an alarm will occur and the Machine Controller will stop the axis. The type that the axis stops depends on the motion command as shown below.

Motion Command	Stop Operation
POSING EX_POSING FEED STEP	The axis will start decelerating before the software limit position and stop at the software limit position.
INTERPOLATE ENDOF_INTERPOLATE LATCH	The pulse distribution command will stop executing at the software limit position. The Servo will perform an emergency stop.
VELO TRQ PHASE	The axis will start decelerating the software limit position and stop beyond the software limit position.

- The software limit settings is disabled for ZRET operation.

11.3.3 Processing after an Alarm Occurs

(1) Monitoring Alarms

If a position command that moves to or exceeds the positive and negative software limit is received, the axis will be moved to the software limit position, and a Positive/Negative Direction Software Limit alarm will occur. This alarm can be monitored in the Alarm monitoring parameter (IL□□04).

Name	Register Number	Meaning	
Alarm	IL□□04	Bit 3:	Positive Direction Software Limit
		Bit 4:	Negative Direction Software Limit

(2) Clearing Software Limit Alarms

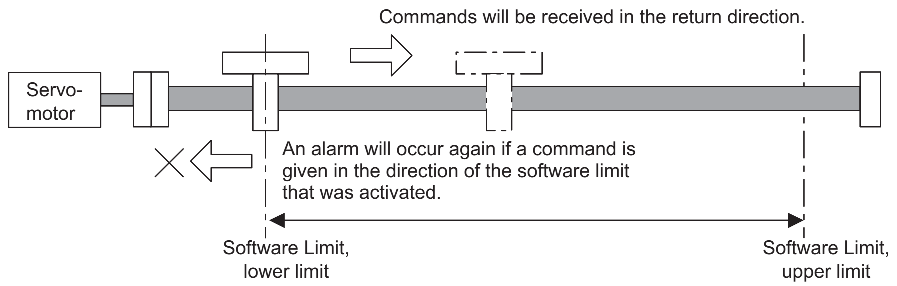
Clear software limit alarms using the procedure below.

1. Set the Alarm Clear bit to 1 in the RUN Command Setting (OW□□00 bit F) to clear the alarm.

The alarm (IL□□04) will be cleared.

Name	Register Number	Meaning	
RUN Command Setting	OW□□00	Bit F:	Alarm Clear

2. Use the FEED or STEP command to return past the software limit.



Utility Functions

11

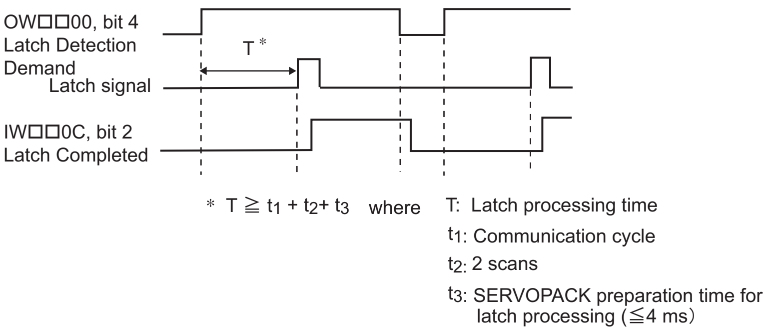
11.4 Modal Latch Function

The Modal Latch function can be executed to latch a position independently from the motion command being executed as long as the motion command being executed is not a motion command with latch function such as EX_POSING, ZRET, and LATCH.

- If a motion command with latch function, such as EX_POSING, ZRET, and LATCH, is executed while the modal latch function is being executed, the motion command has priority over the modal latch function, therefore, the motion command will be executed first.

■ Latch Request

A latch request is sent at the moment the Latch Detection Demand bit (setting parameter OW□□00, bit 4) turns ON from OFF.
When the latch is completed, the Latch Complete bit (monitoring parameter IW□□0C, bit 2) will turn ON.
The latched position will be written in the monitoring parameter IL□□18 Machine Coordinate System Latch Position (LPOS).



■ Canceling Latch Request

Set the Latch Detection Demand (setting parameter OW□□00, bit 4) to OFF to cancel the latch request.

■ Signals Used for Latch

The phase-C pulse, or /EXT1, /EXT2 or /EXT3 signals can be used as a latch signal. Use the setting parameter Latch Detection Signal Selection (OW□□04, bits 0 to 3) to select the signal to be used as a latch signal.

■ Parameters Related to Modal Latch Function

The following table shows the parameters related to the Modal Latch function.

Parameter Type	Parameter No.	Parameter Name	Description
Setting parameter	OW□□00, bit 4	Latch Detection Demand	Executed when the bit 4 turns ON from OFF. Canceled when the bit 4 turns OFF from ON.
	OW□□04, bits 0 to 3	Latch Detection Signal Selection	2: Phase-C pulse 3: /EXT1 4: /EXT2 5: /EXT3
Monitoring parameter	IW□□0C, bit 2	Latch Completed	–
	IL□□18	Machine Coordinate System Latch Position (LPOS)	1 = 1 reference unit

11.5 Bank Switching Function

Prior to use the Bank Switching function, register multiple types of SERVOPACK parameters (Bank Members) in one group as a Parameter Bank, and register multiple combinations of different set values of Bank Members. The Bank Switching function switches all the set values of Bank Members at once by selecting a combination of set values using the setting parameter Bank Selector (OW□□04, bits C to F).
To enable the MP2000-series SVB Module to use the Bank Switching function, the related SERVOPACK parameters must be set in advance so that the SERVOPACK can use the Bank Switching function.

- The Bank Switching function can be used with the following versions.
  - Built-in SVB: Version 2.46 or later
  - SVB-01 module: Version 1.18 or later
  - MPE720: Version 5.33B or later
  - SGDS-□□□1□□: MECHATROLINK communication interface version 0011 or later

11.5.1 Bank Switching Specifications

There is no motion parameter to select whether or not to use the Bank Switching function. When the communications between the SVB Module and SERVOPACK is established, the SVB Module reads the settings of model, version number, and related SERVOPACK parameter settings and automatically determines the availability of the Bank Switching function. When the Bank Switching function is available, the values of the setting parameter Bank Selector (OW□□04, bits C to F) will be sent to servo by executing the MECHATROLINK servo command. When it is not available, the set values of Bank Selector will be ignored.

- Refer to *4.4.2 (5) Function Setting 2* for details on the setting parameter Bank Selector.
- Refer to *11.5.4 Bank Member Setting* for information on the related parameters.

11.5.2 Bank Switching Function Unsupported Motion Commands

The parameter Bank Selector is reported using the MECHATROLINK servo command option field. While the following MECHATROLINK commands are executed, the MECHATROLINK servo commands that have no option fields are issued. Therefore the setting of Bank Selector will not be reflected.

NOP,	KVS,	ALM_HIST,
ZSET,	KPS,	ALMHIST_CLR,
ACC,	KFS,	ABS_RST,
DCC,	PRM_RD,	KIS,
SCC,	PRM_WR,	MLTTRN_SET
CHG_FILTER,	ALM_MON,	

11.5.3 SERVOPACK Parameter Settings for Bank Switching

Set the SERVOPACK parameters as shown in the following table and change the allocation of optional bits of MECHATROLINK servo commands to use the Bank Switching function. These settings will allocate BANK_SEL1 to bits 0 to 3 and ACCFIL to bits A and B. The SVB Module reads the allocations and determines the availability of Bank Switching function.

Parameter No.	Setting	
	When Using Bank Switching Function	When Not Using Bank Switching Function
Pn81F	0001H	0000H
Pn82A	181AH	1813H
Pn82B	1D1CH	1D1CH
Pn82C	1F1EH	1F1EH
Pn82D	0010H	0000H
Pn82E	0000H	0000H

- After changing the settings, turn OFF the power to the SERVOPACK and then turn ON again to validate the settings.
- Set the parameters exactly as shown in the above table. If not, the operation will not be guaranteed.

■ Information: Details on SERVOPACK Parameters Used for Bank Switching

The following table shows the details on SERVOPACK parameters used for bank switching.

Parameter No.	Digit	Name		Size	Lower Limit	Upper Limit	Unit	Factory Setting	Validation	Setting
Pn81F		Function Selection Application 8		2	0000H	0001H	–	0000H	Δ	0001H
	0	Optional Function Bit Allocation Function	0	Disabled				0	Δ	1
			1	Enabled						
	1	Reserved by the system	–	–				0	Δ	–
	2	Reserved by the system	–	–				0	Δ	–
	3	Reserved by the system	–	–				0	Δ	–
Pn82A		Optional Bit Allocation 1		2	000H	1E1EH	–	1813H	Δ	181AH
	0	ACCFIL Allocation Bit	0 to E	Set the bit of option field to allocate ACCFIL.				3	Δ	A
	1	With/Without ACCFIL Allocation	0	Not allocated in option field				1	Δ	1
			1	Allocated in option field						
	2	GSEL Allocation Bit	0 to E	Set the bit of option field to allocate GSEL.				8	Δ	8
	3	With/Without GSEL Allocation	0	Not allocated in option field				1	Δ	1
			1	Allocated in option field						
Pn82B		Optional Bit Allocation 2		2	000H	1F1FH	–	1D1CH	Δ	1D1CH
	0	V_PPI Allocation Bit	0 to F	Set the bit of option field to allocate V_PPI.				C	Δ	C
	1	With/Without V_PPI Allocation	0	Not allocated in option field				1	Δ	1
			1	Allocated in option field						
	2	P_PL_CLR Allocation Bit	0 to F	Set the bit of option field to allocate P_PL_CLR.				D	Δ	D
	3	With/Without P_PL_CLR Allocation	0	Not allocated in option field				1	Δ	1
			1	Allocated in option field						
Pn82C		Optional Bit Allocation 3		2	000H	1F1FH	–	1F1EH	Δ	1F1EH
	0	P_CL Allocation Bit	0 to F	Set the bit of option field to allocate P_CL.				E	Δ	E
	1	With/Without P_CL Allocation	0	Not allocated in option field				1	Δ	1
			1	Allocated in option field						
	2	N_CL Allocation Bit	0 to F	Set the bit of option field to allocate N_CL.				F	Δ	F
	3	With/Without N_CL Allocation	0	Not allocated in option field				1	Δ	1
			1	Allocated in option field						
Pn82D		Optional Bit Allocation 4		2	000H	001CH	–	0000H	Δ	0010H
	0	BANK_SEL1 Allocation Bit	0 to C	Set the bit of option field to allocate BANK_SEL1.				0	Δ	0
	1	With/Without BANK_SEL1 Allocation	0	Not allocated in option field				0	Δ	1
			1	Allocated in option field						
	2	Reserved	0	–				–	Δ	0
	3	Reserved	0	–				–	Δ	0
Pn82E		Optional Bit Allocation 5		2	000H	001CH	–	0000H	Δ	0000H
	0	R_MODE Allocation Bit	0 to C	Set the bit of option field to allocate R_MODE.				0	Δ	0
	1	With/Without R_MODE Allocation	0	Not allocated in option field				0	Δ	0
			1	Allocated in option field						
	2	Reserved	0	–				–	Δ	0
	3	Reserved	0	–				–	Δ	0

- Δ: Valid after restart the power supply.

11.5.4 Bank Member Setting

(1) SERVOPACK Parameters for Setting Bank Members

Set bank members using the following parameters.

Parameter No.	Name	Size	Setting Range Min.	Setting Range Max.	Unit	Factory Setting	Valida-tion	Setting
Pn900	Number of Parameter Banks	2	0	15	–	0	Δ	As required
Pn901	Number of Parameter Bank Members	2	0	15	–	0	Δ	As required
Pn902 to Pn910	Parameter Bank Member Definition	2	0	08FF	–	0	Δ	As required
Pn920 to Pn95F	Parameter Bank Data	2	Depends on member	Depends on member	Depends on member	0	✓	As required

- ✓: Immediately valid.
  Δ: Valid after restart the power supply.
- Refer to the related SERVOPACK manuals for the timing the Bank Switching function is validated.

(2) Applicable Parameters for Bank Member

The following parameters can be registered in Parameter Bank Member Definition.

Parameter No.	Name	Size	Setting Range Min.	Setting Range Max.	Unit	Factory Setting	Valida-tion	Setting
Pn80A	First Step Linear Acceleration Constant	2	1	65535	10000 reference units/s^2	0	Δ	As required
Pn80B	Second Step Linear Acceleration Constant	2	1	65535	10000 reference units/s^2	0	Δ	As required
Pn80C	Acceleration Constant Switching Speed	2	0	65535	100 reference units/s	0	Δ	As required
Pn80D	First Step Linear Deceleration Constant	2	1	65535	10000 reference units/s^2	0	✓	As required
Pn80E	Second Step Linear Deceleration Constant	2	1	65535	10000 reference units/s^2	0	✓	As required
Pn80F	Deceleration Constant Switching Speed	2	0	65535	100 reference units/s	0	✓	As required
Pn810	Exponential Acceleration/ Deceleration Bias	2	0	32767	reference unit/s	0	✓	As required
Pn811	Exponential Acceleration/ Deceleration Time Constant	2	0	5100	0.1 ms	0	✓	As required
Pn812	Average Moving Time	2	0	5100	0.1 ms	0	✓	As required

- ✓: Immediately valid.
  Δ: Valid after restart the power supply.

(3) Setting Procedure

1. Set the Number of Parameter Banks (Pn900) and Number of Parameter Bank Members (Pn901).

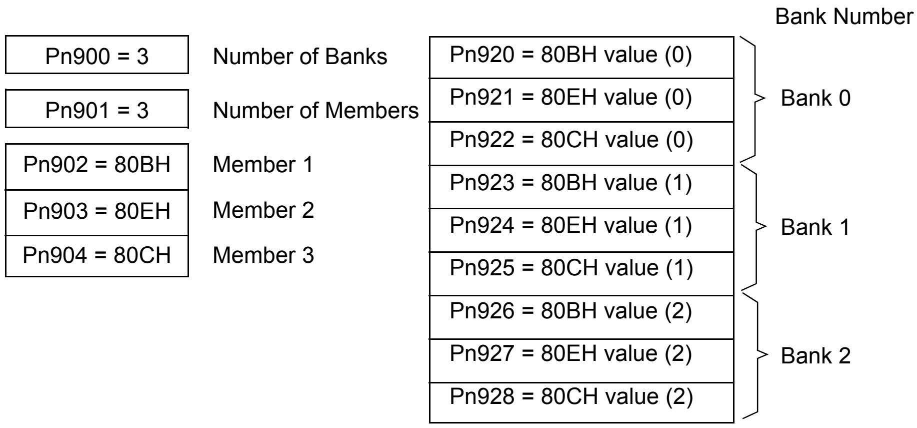
- Number of Parameter Banks and Number of Parameter Bank Members must satisfy the following equation.
  Number of Parameter Banks $\times$ Number of Parameter Bank members $\leq$ 64

2. Register the parameters to be Bank Members in the parameters Pn902 through Pn910.

3. Set each bank data in the parameter bank data area starting from Pn920. (See the following ■ *Setting Example*.)

4. Turn OFF the power to the SERVOPACK and then turn ON again.

■ Setting Example: Three Banks with Members Pn80B, Pn80E, and Pn80C



- The Bank Number starts from 0 (zero).
- Set above bank numbers in the Machine Controller's motion setting parameter Bank Selector (OW☐☐04, bits C to F).

(4) Precautions on Setting

- When the parameter Number of Banks (Pn900) or Number of Members (Pn901) is set to 0, the standard parameters will be used so that the Bank Switching function is invalid.
- When the members registered in Parameter Bank Member Definition (Pn902 to Pn910) are overlapped, the bank data of the member with the bigger Parameter Bank Member Definition number will be applied.
- The Number of Parameter Banks (Pn900), Number of Parameter Bank Members (Pn901), and Parameter Bank Member Definition (Pn902 to Pn910) are offline parameters and these settings will be validated after turning OFF the power and turning ON, or by executing CONFIG command.
- When the Machine Controller setting parameter Bank Selector (OW□□04, bits C to F) is set to 0 (BANK_SEL = 0), the bank data will be used. Set the Bank 0 to the default value.
- The Bank will be switched after pulse distribution is completed (DEN = 1). It will not be switched while pulse is being distributed (DEN = 0).
- If the Parameter Bank Data (Pn920 to Pn95F) of the selected bank is changed while pulse is being distributed (DEN = 0), the SERVOPACK will generate the warning A.95A and ignore the command.
- A.04A (Parameter Error) will occur after turning ON the power and then turning OFF, or after executing CONFIG command in the following cases.
  - A parameter that is not applicable for bank member has been set.
  - The bank data is out of the setting range.
  - The total number of bank data exceeds 64 (Pn900 × Pn901 > 64)
- When both the Bank Switching function and other torque feed forward compensation function are enabled at the same time, the 14th and 15th bytes are used for TFF field and the parameter bank designation cannot be changed. In this case, the latest bank settings will be maintained.
- If the BANK_SEL is allocated to the option field function bit, the BANK_SEL of the 14th byte will be invalid. Unless the 14th byte is used for interpolation torque feed forward compensation function, set it to 0.
- In the servo parameters, set the Bank Switching function for SGDV or SGD7S SERVOPACKs.
  The Parameter Bank data (Pn902 to Pn95F) is not saved in the nonvolatile memory. So, always set these parameters when using MECHATROLINK networks.

11.6 Parameters That Are Automatically Updated

Some of the parameters stored in SERVOPACK RAM may be overwritten automatically under certain conditions or as a result of self-configuration. This includes MP2000-series Machine Controller setting parameters and fixed parameters, as well as fixed value SERVOPACK parameters. Some SERVOPACK parameters are also written to setting parameters automatically during self-configuration. The parameters that are updated automatically under specific conditions are listed in the following tables.

- Refer to *Chapter 4 Motion Parameters* for details on Machine Controller parameters. Refer to your SERVOPACK manual for details on SERVOPACK parameters.

11.6.1 Parameters Updated when a MECHATROLINK Connection Is Established (1) (User Constants Self-writing Function Enabled)

The Machine Controller parameter settings in the left table below are automatically written to the SERVOPACK parameters given in the right table below when a connection is established between the Machine Controller and the SERVOPACK. This occurs after power is turned ON or alarms are cleared following a communication interruption. The parameters are written only when User Constants Self-writing Function is enabled when bit A of fixed parameter 1 in the Machine Controller is set to 0.

<table>
<tr><th colspan="3" rowspan="2">MP2000-Series Machine Controller</th><th rowspan="2"></th><th colspan="6">SERVOPACK Parameter</th><th colspan="2" rowspan="2">Remarks</th></tr>
<tr><th>SGD-N, SGDB-N</th><th>NS100</th><th>NS115</th><th>SGDS</th><th>SGDV</th><th>SGD7S</th></tr>
<tr><td rowspan="11">Setting parameters</td><td>Width of Positioning Completion</td><td>OL□□1E</td><td>→</td><td>–</td><td>–</td><td>Pn500 *1</td><td colspan="3">Pn522*1</td><td colspan="2" rowspan="6">* Settings are written only when using a MECHATROLINK-II operating at 10 Mbps in 32-byte mode.</td></tr>
<tr><td>Position Loop Gain</td><td>OW□□2E</td><td>→</td><td>–</td><td>–</td><td colspan="4">Pn102*1</td></tr>
<tr><td>Speed Loop Gain</td><td>OW□□2F</td><td>→</td><td>–</td><td>–</td><td colspan="4">Pn100*1</td></tr>
<tr><td>Speed Feed Forward Amends</td><td>OW□□30</td><td>→</td><td>–</td><td>–</td><td colspan="4">Pn109*1</td></tr>
<tr><td>Position Integration Time Constant</td><td>OW□□32</td><td>→</td><td>–</td><td>–</td><td colspan="4">Pn11F*1</td></tr>
<tr><td>Speed Integration Time Constant</td><td>OW□□34</td><td>→</td><td>–</td><td>–</td><td colspan="4">Pn101*1</td></tr>
<tr><td>Straight Line Acceleration/Acceleration Time Constant</td><td>OL□□36</td><td>→</td><td>Cn-0020</td><td colspan="3">Pn80B</td><td colspan="2">Pn80B/Pn836*2</td><td colspan="2" rowspan="2">Settings are written regardless of the communication method.</td></tr>
<tr><td>Straight Line Deceleration/Deceleration Time Constant</td><td>OL□□38</td><td>→</td><td>–</td><td colspan="3">Pn80E</td><td colspan="2">Pn80E/Pn83C *3</td></tr>
<tr><td rowspan="2">Filter Time Constant</td><td rowspan="2">OW□□3A</td><td>→</td><td>Cn-002E</td><td colspan="5">Pn811</td><td>When “Exponential Acceleration/ Deceleration Filter” is selected for filter type.</td><td rowspan="2">Settings are written regardless of the communication method.</td></tr>
<tr><td>→</td><td>Cn-0026</td><td colspan="5">Pn812</td><td>When either “Without filter” or “Moving Average Filter” is selected for filter type.</td></tr>
<tr><td>Filter Type Selection</td><td>OW□□03
Bits 8 to B</td><td>→</td><td colspan="8">Settings are automatically enabled.</td></tr>
</table>

* 1. Updated when using MECHATROLINK-II (10 Mbps, 32 bytes).
* 2. When Pn833.0 is set to 0, Pn80B will be updated. When Pn833.0 is set to 1, Pn836 will be updated.
* 3. When Pn833.0 is set to 0, Pn80E will be updated. When Pn833.0 is set to 1, Pn83C will be updated.

11.6.2 Parameters Updated when a MECHATROLINK Connection Is Established (2) (Regardless of the User Constants Self-writing Function)

The Machine Controller parameter settings in the left table below are automatically written to the SERVOPACK parameters given in the right table below when a connection is established between the Machine Controller and the SERVOPACK. The parameters are written regardless of whether User Constants Self-writing Function is enabled or disabled at bit A of fixed parameter 1 in the Machine Controller.

MP2000 Series Machine Controller			SERVOPACK Parameter						Remarks
			SGD-N, SGDB-N	NS100	NS115	SGDS	SGDV	SGD7S	
Fixed parameters	No.16: Backlash Compensation Amount		–	–	Pn81B	Pn214	–	Pn231	–
Fixed values	65535	→	Cn-001E	–					Position Error Overflow Range
	32767	→	–	Pn505		–			Overflow Level
	2^{30} -1	→	–	–		Pn520			Excessive Position Error Alarm Level
	100	→	–	Pn51E					Excessive Position Error Warning Level
	Pn820 and Pn822 are set to the same value.	→	–	–	Pn820 -> Pn822				Processing to disable the latch zone
	0010H	→	–	Pn813		–			Monitor Options 1 or 2
	0002H	→	–	Pn003		Pn824			Processing to monitor Torque/ Thrust Reference.

11.6.3 Parameters Updated when a Setting Parameter Is Changed (MECHATROLINK-II Operating at 10 Mbps in 32-byte Mode with User Constants Self-writing Function Enabled)

When User Constants Self-writing Function is enabled at bit A of fixed parameter 1 in the Machine Controller, the parameters shown in the right table below are automatically updated every time the Machine Controller setting parameters in the left table below are updated. Updating occurs on all SERVOPACKs connected to a MECHATROLINK-II operating at 10 Mbps in 32-byte mode.

MP2000 Series Machine Controller				SERVOPACK						Remarks
				SGD-N, SGDB-N	NS100	NS115	SGDS	SGDV	SGD7S	
Setting parameters	Width of Positioning Completion	OL□□1E	→	–	–	Pn500	Pn522			–
	Position Loop Gain	OW□□2E	→	–	–	Pn102				–
	Speed Loop Gain	OW□□2F	→	–	–	Pn100				–
	Speed Feed Forward Amends	OW□□30	→	–	–	Pn109				–
	Position Integration Time Constant	OW□□32	→	–	–	Pn11F				–
	Speed Integration Time Constant	OW□□34	→	–	–	Pn101				–
	Straight Line Acceleration/Acceleration Time Constant	OL□□36	→	–	–	Pn80B		Pn80B/Pn836*1		–
	Straight Line Deceleration/Deceleration Time Constant	OL□□38	→	–	–	Pn80E		Pn80E/Pn83C*2		

* 1. When Pn833.0 is set to 0, Pn80B will be updated. When Pn833.0 is set to 1, Pn836 will be updated.
* 2. When Pn833.0 is set to 0, Pn80E will be updated. When Pn833.0 is set to 1, Pn83C will be updated.

11.6.4 Parameters Updated when a Motion Command Is Executed

A special care must be taken for the parameters listed in the table below because the Machine Controller parameter settings in the left table below are automatically written to the SERVOPACK parameters given in the right table below when the Machine Controller starts executing a motion command.

MP2000 Series Machine Controller				SERVOPACK						Trigger Command
				SGD-N, SGDB-N	NS100	NS115	SGDS	SGDV	SGD7S	
Setting Parameters	Latch Zone Lower Limit Setting	OL□□2A	→	-	-	Pn822				EX_POSING
	Latch Zone Upper Limit Setting	OL□□2C	→	-	-	Pn820				EX_POSING
	Straight Line Acceleration/Acceleration Time Constant	OL□□36	→	Cn-0020	Pn80B*1			Pn80B/Pn836 *2		POSING, EX_POSING, ZRET, FEED, STEP • Only when DEN = ON (when pulse distribution has been completed)
	Straight Line Deceleration/Deceleration Time Constant	OL□□38	→	-	Pn80E*1			Pn80E/Pn83C*3		
	Filter Time Constant	OW□□3A		Cn-002E	Pn811*1					POSING, EX_POSING, ZRET, FEED, STEP • Only when DEN = ON (when pulse distribution has been completed) • When “None” or “Moving Average Filter” is selected for filter type.
			→	Cn-0026	Pn812*1					POSING, EX_POSING, ZRET, FEED, STEP • Only when DEN = ON (when pulse distribution has been completed.)
	Approach Speed	OL□□3E	→	Cn-0022	Pn817					ZRET
	Creep Rate	OL□□40	→	Cn-0023	Pn818					ZRET
	Zero Point Return Travel Distance	OL□□42	→	Cn-0028	Pn819					ZRET
	External Positioning Final Travel Distance	OL□□46	→	Cn-002B	Pn814					EX_POSING and ZRET
	Forward Outside Limiting Torque/ Thrust Input	OW□□00, Bit 8	→	The settings are enabled when the Servo is turned ON or a move command is sent.						
	Reverse Outside Limiting Torque/ Thrust Input	OW□□00, Bits9	→							

* 1. The parameters are written when User Constants Self-writing Function is enabled at bit A of fixed parameter 1 in the Machine Controller.
* 2. When Pn833.0 is set to 0, Pn80B will be updated. When Pn833.0 is set to 1, Pn836 will be updated.
* 3. When Pn833.0 is set to 0, Pn80E will be updated. When Pn833.0 is set to 1, Pn83C will be updated.

11.6.5 Parameters Updated during Self-configuration

(1) Motion Parameters

The motion parameters for each axis are set as shown below according to information from each SERVOPACK when self-configuration is executed. Some parameters are written to the SERVOPACK's RAM.

[a] Motion Fixed Parameters

■ SERVOPACK to Machine Controller

MP2000 Series Machine Controller Fixed Parameters				SERVOPACK			
No.		Name		SGD-N, SGDB-N	SGDH + NS100	SGDH+ NS115	SGDS, SGDV, or SGD7S
		Servomotor Type*	←	Depends on the specifications of the connected Servomotor.			
30		Encoder Selection	←				
Rotary	34	Rated Motor Speed	←				
	36	Number of Pulses per Motor Rotation	←				
	38	Maximum Number of Absolute Encoder Turns Rotation	←		Pn205		
Linear	6	Linear Scale Pitch	←	Depends on the connected servomotor.			
	34	Rated Motor Speed	←				
	36	Number of Pulse per Linear Scale Pitch	←				

- The above processing is not performed when the axis has been set.
- The default settings are used for all those parameters not listed above.

* The *Servomotor Type* is written in the Module Configuration Definition Window.

[b] Motion Setting Parameters

■ SERVOPACK to Machine Controller

MP2000 Series Machine Controller Setting Parameters			SERVOPACK			
Address	Name		SGD-N, SGDB-N	SGDH + NS100	SGDH + NS115	SGDS, SGDV, or SGD7S
OW□□2E	Position Loop Gain	←	Cn-001A	Pn102		
OW□□2F	Speed Loop Gain	←	Cn-0004	Pn100		
OW□□30	Speed Feed Forward Amends	←	Cn-001D	Pn109		
OW□□32	Position Integration Time Constant	←	–	Pn11F		
OW□□34	Speed Integration Time Constant	←	Cn-0005	Pn101		
OW□□3A	Filter Time Constant	←	Cn-0026	Pn812		

- The above processing is not performed when the axis has been set.
- The default settings are used for all those parameters not listed above.

(2) SERVOPACK Parameters

The SERVOPACK parameters are written to SERVOPACK EEPROM or RAM during self-configuration as shown below. Care must therefore be taken because the SERVOPACK parameters will be overwritten when self-configuration is executed.

- These settings, however, are not written to the set values for the SERVOPACK parameters saved in the Machine Controller.

[a] SERVOPACK Parameters (1)

MP2000 Series Machine Controller SERVOPACK Parameters: Name	Setting		SERVOPACK: SGD-N, SGDB-N	SGDH + NS100	SGDH + NS115	SGDS	SGDV	SGD7S
P-OT Signal Mapping	Disable	→	Cn-0001 Bit 2	Pn50A.3				
N-OT Signal Mapping	Disable	→	Cn-0001 Bit 3	Pn50B.0				
SERVOPACK Software Limit Function (Positive)	Disable	→	Cn-0014 Bit 2	Pn801.0				
SERVOPACK Software Limit Function (Negative)	Disable	→	Cn-0014 Bit 3					
SERVOPACK Electronic Gear Ratio (Numerator)	*1	→	Cn-0024	Pn202		Pn20E		
SERVOPACK Electronic Gear Ratio (Denominator)	1	→	Cn-0025	Pn203		Pn210		
Normal Autotuning Switches	Disable	→	–	Pn110		–		
/DEC Signal Mapping	*2	→	–	Pn511.0				
/EXT1 Signal Mapping	*2	→	–	Pn511.1				
/EXT2 Signal Mapping	*2	→	–	Pn511.2				
/EXT3 Signal Mapping	*2	→	–	Pn511.3				
Velocity Control Option	Use T-REF as the external torque limit input.	→	–	Pn002.0				
Torque Control Option	Use V-REF as the external speed limit input.	→	–	Pn002.1				
Forward Latching Allowable Area	Pn820 value	→	–		Pn822			
Command Data Allocation	1	→	–				Pn81F.1[*3]	
Linear Accel/Decel Constant Selection	1	→	–				Pn833.0[*4]	

* 1. The parameter setting differs with the model of SERVOPACK used as shown below.
  Rotary SGD7S: 16
  Other models: 1
* 2. The assigned SERVOPACK terminal differs with the model of SERVOPACK used as shown in the following table.

Signal Name	SERVOPACK Model	Setting
/DEC	SGDS	CN1-9
	SGDH	CN1-41
	SGDV-□□□J1□□	CN1-41
	SGDV-□□□E1□□	N/A
	SGD7S and other SGDV models	CN1-9
/EXT1	SGDS	CN1-10
	SGDH	CN1-44
	SGDV-□□□J1□□	CN1-44
	SGDV-□□□E1□□	N/A
	SGD7S and other SGDV models	CN1-10
/EXT2	SGDS	CN1-11
	SGDH	CN1-45
	SGDV-□□□J1□□	CN1-45
	SGDV-□□□E1□□	N/A
	SGD7S and other SGDV models	CN1-11
/EXT3	SGDS	CN1-12
	SGDH	CN1-46
	SGDV-□□□J1□□	CN1-46
	SGDV-□□□E1□□	N/A
	SGD7S and other SGDV models	CN1-12

* 3. Allocated for the TFF/TLIM function of the position control command.

* 4. Uses Pn834 to Pn83E.

- The above processing is not performed when the axis has been set.
- The above set values are written to the SERVOPACK's EEPROM.

[b] SERVOPACK Parameters (2)

MP2000 Series Machine Controller			SERVOPACK					
SERVOPACK Parameters			SGD-N, SGDB-N	SGDH + NS100	SGDH + NS115	SGDS	SGDV	SGD7S
Name	Setting							
Position Error Overflow Range	65535	→	Cn-001E	–				
Overflow Level	32767	→	–	Pn505		–		
Excessive Position Error Alarm Level	2^{30}-1	→	–			Pn520		
Excessive Position Error Warning Level	100	→	–	Pn51E				

- The above set values are written to the SERVOPACK's RAM.

11.7 Precautions When Using Σ-V-series SGDV SERVOPACKs

11.7.1 Software Limit Settings

Use the software limit setting of the Machine Controller, not that of the SGDV SERVOPACK.

11.7.2 When the Tuning-less Function is Enabled

In SGDV SERVOPACKs, Pn170.0 is set to 1 (default setting) and the tuning-less function is enabled. Any actions related to the settings of gain-related parameters are disabled.

(1) Gain Related Settings

The related servo parameters are changed when the User Constants Self-Writing Function of Function Selection Flag 1 (fixed parameter) is enabled and the following parameters are changed. The settings, however, do not affect actual operations.

Register no.	Name	Setting range	Default value	Meaning
OW□□2E	Position Loop Gain	0 to 32767	300	1 = 0.1/s
OW□□2F	Speed Loop Gain	1 to 2000	40	1 = 1 Hz
OW□□30	Speed Feed Forward Amends	0 to 32767	0	1 = 0.01%
OW□□32	Position Integration Time Constant	0 to 32767	0	1 = 1 ms
OW□□34	Speed Integration Time Constant	15 to 65535	0	1 = 0.01 ms

(2) Gain-related Motion Commands

The related servo parameters are changed in accordance with the results obtained by executing the following motion commands.
The settings, however, do not affect actual operations.

Register no.	Setting	Meaning
OW□□08	14	Change Speed Loop Gain (KVS)
	15	Change Position Loop Gain (KPS)
	16	Change Feed-forward (KFS)
	26	Change Position Loop Integral Time Constant (KIS)

(3) Gain Switching

Even if the setting for Mode Setting 1of the Gain Switch is changed, this setting does not affect actual operations.

Register no.	Name	Meaning	Remark
OW□□01	Mode Setting 1	Bit 4: Gain Switch	0: OFF, 1: ON

11.7.3 Saving the Parameter Bank Data

When using the Parameter Bank function, the Bank data (Pn920 to Pn95F) is not saved in the nonvolatile memory.
These parameters must always be reset if using a MECHATROLINK network between the Motion Controller and the SERVOPACK.
If these parameters are set to 0 and have not been changed, the Parameter Bank function operates in accordance with the minimum value of each parameter.

11.7.4 Motion Command Operation for External Latches with DC Power Input Σ-V-series SERVOPACKs

If you use an external latch signal (/EXT1) with a DC Power Input Σ-V-series SERVOPACK, always change the setting of the Input Signal Selection 5 in the Pn511 SERVOPACK parameter so that /EXT1 is used. This signal is disabled in the default settings.

If you attempt to execute a motion command[*2] using /EXT1[*1] when /EXT1 is disabled, a Set Parameter Error warning (Monitoring Parameter IL□□02, bit 1) will occur and execution of the motion command will end in an error.

* 1. Set bits 0 to 3 (Latch Detection Signal Selection) or bits 4 to 7 (External Positioning Signal Setting) of Setting Parameter OW□□04 to 3 (/EXT1) or set Setting Parameter OW□□3C (Zero Point Return Method) to 1 (ZERO), 2 (DEC1 + ZERO), 14 (Home LS & C Pulse), or 15 (Home Only).
* 2. Set Setting Parameter OW□□08 (Interpolation Mode with Latch Input) to 2 (EX_POSING (External Positioning)), 6 (LATCH), or 9 (ZSET) Set Zero Point)).

11.8 Precautions When Using Σ-7-series SGD7S SERVOPACKs with Rotary Servomotors

11.8.1 SGD7S Electronic Gear Ratio Settings

Set Pn20E (Electronic Gear Ratio (Numerator)) and Pn210 (Electronic Gear Ratio (Denominator)) for the SGD7S as shown in the following table.
These settings are made automatically if you execute self configuration.

Servo Parameter No.	Name	Setting	Default
Pn20E	Electronic Gear Ratio (Numerator)	16	64
Pn210	Electronic Gear Ratio (Denominator)	1	1

11.8.2 Assignment

Open the Module Configuration Tab Page in the MPE720, and set the model to ***SGD7S-****10**** or ***SGD7S-***10* (Linear)*** of the SERVOPACK that connects to the slave cell to assign to a ***Function Module/Slave*** Cell.
These settings are made automatically if you execute self configuration.

11.8.3 Number of Pulses per Motor Rotation

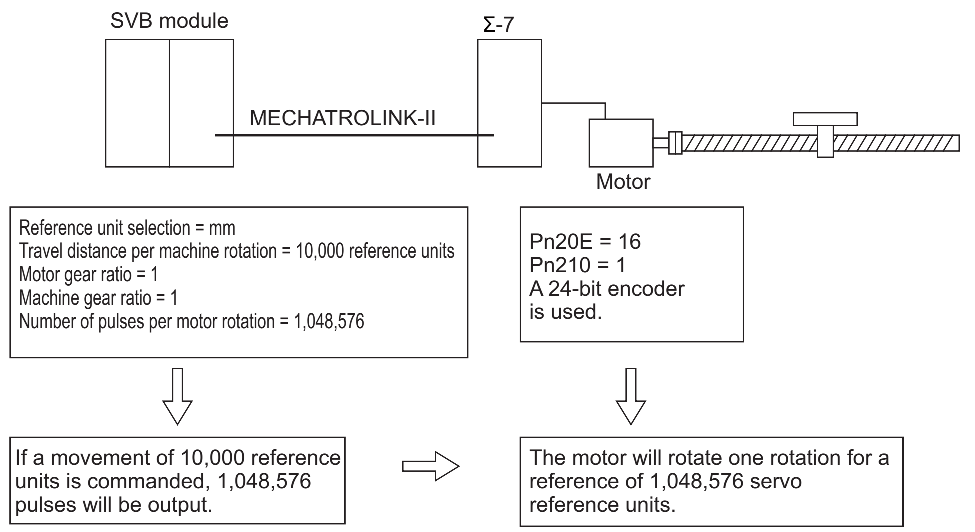
Set Fixed Parameter No. 36 Number of Pulses per Motor Rotation as shown in the following table.
These settings are made automatically if you execute self configuration.

Fixed Parameter No.	Name	Setting
36	Number of Pulses per Motor Rotation	1048576

- If you set fixed parameter No. 36 (Number of Pulses per Motor Rotation) to a value of 16777216 (24 bits) or higher, the monitoring parameters will be as follows:

IW☐☐00, Bit0	Motion Controller Operation Ready	OFF
IW☐☐01	Parameter Number When Range Over is Generated	1036
IL☐☐02, Bit2	Fixed Parameter Error	ON

11.8.4 Motion Image

Σ-7S Electronic Gear Ratio	Motion Image
16:1 (Pn20E = 16, Pn210 = 1)	

11.8.5 Software Limit Settings

Use the software limit setting of the Machine Controller, not that of the SGDV SERVOPACK.

11.8.6 When the Tuning-less Function is Enabled

The default servo parameter setting for the SGD7S is 1 (Tuning-less Function Selection is enabled) for Pn170.0 (Tuning-less Selection).
For functions that are disabled in this state, refer to *11.7.2 When the Tuning-less Function is Enabled*.

11.8.7 Saving the Parameter Bank Data

When using the Parameter Bank function, the Bank data (Pn920 to Pn95F) is not saved in the nonvolatile memory.
For details, refer to *11.7.3 Saving the Parameter Bank Data*.

12

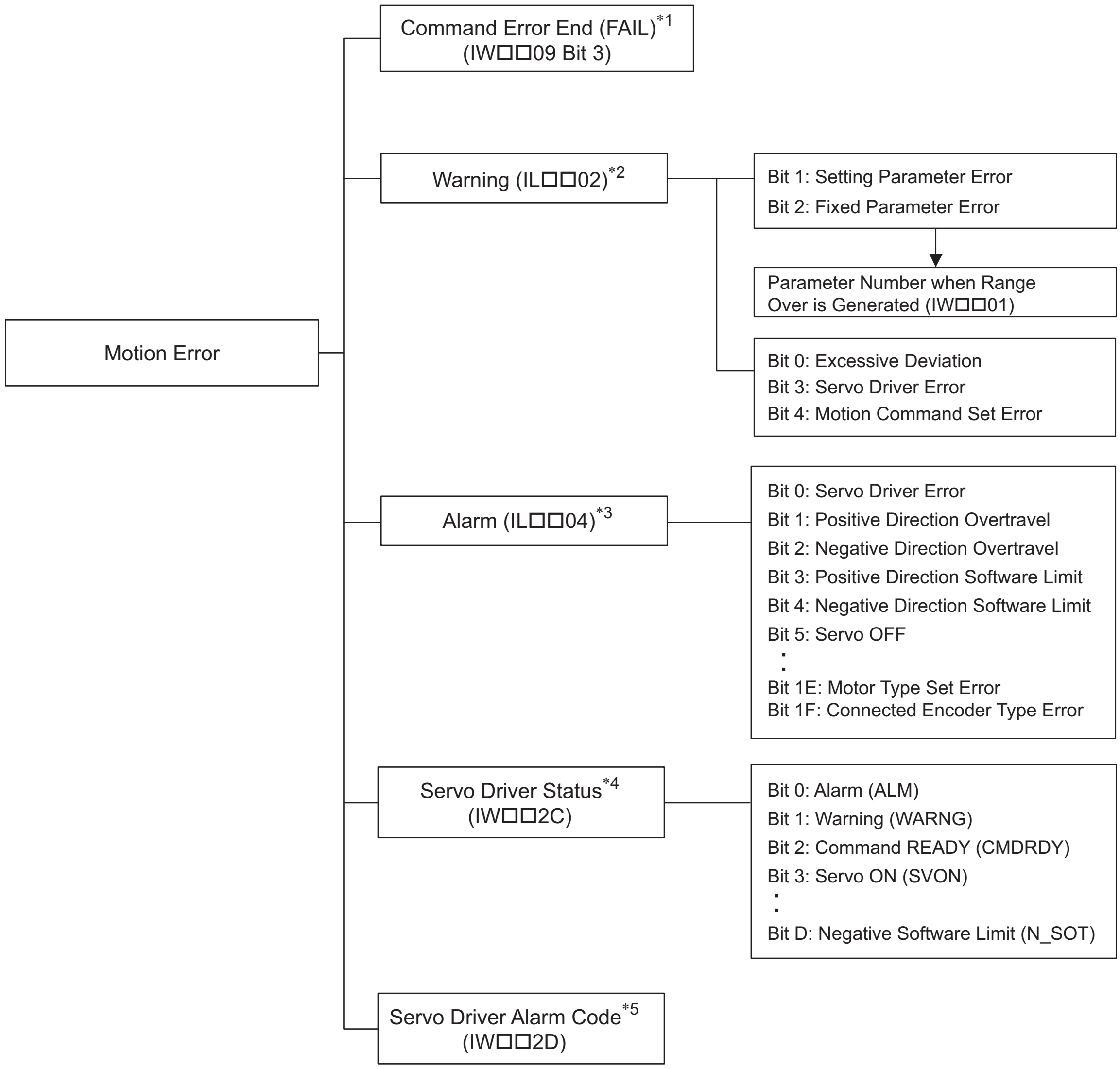
Troubleshooting

This chapter describes the system registers used for troubleshooting the SVB Module and trouble-shooting related to motion.

12.1 Troubleshooting Motion Errors

12.1.1 Overview of Motion Errors

Motion errors are errors that are detected in motion control.
You can check the details of motion errors with the system registers shown next.



* 1. Refer to *12.1.2 Causes of Command Error End Alarms (IW□□09 Bit 3)*.
* 2. Refer to *12.1.3 (1) Warnings in IL□□02*.
* 3. Refer to *12.1.3 (2) Alarms (IL□□04) Table and Corrections*.
* 4. Refer to *12.1.4 (1) SERVOPACK Status Monitor (IW□□2C) Table*.
* 5. Refer to *12.1.4 (2) SERVOPACK Alarm Code (IW□□2D) Tables*.

12.1.2 Causes of Command Error End Alarms (IW□□09 Bit 3)

Bit 3 (Command Error End) of the IW□□09 monitor parameter will turn ON when a motion command cannot be executed for some reason or if execution does not end normally. The reasons that cause this bit to turn ON depend on the motion command.
The following table gives the reasons that cause this bit to turn ON for each motion command.

Motion Command Code		Reason for Command Error End	Warnings (W) and Alarms (A) That Occur at the Same Time
1	POSING (Positioning)	The positioning travel distance exceeded the allowed value.	A: Excessive Positioning Travel Distance
		An absolute infinite-length axis is being used but the zero point is not set.	A: Zero Point Unset
		The power to the Servomotor is OFF.	A: Servo OFF
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
2	EX_POSING (External Positioning)	The positioning travel distance exceeded the allowed value.	A: Excessive Positioning Travel Distance
		An absolute infinite-length axis is being used but the zero point is not set.	A: Zero Point Unset
		The power to the Servomotor is OFF.	A: Servo OFF
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		Writing the SERVOPACK parameters was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		An A.94 or A.95 warning occurred in the SERVOPACK.	W: SERVOPACK Error
		An external signal selection is not within the setting range.	W: Setting Parameter Error
3	Zero Point Return (ZRET)	The machine is locked.	–
		The power to the Servomotor is OFF.	A: Servo OFF
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		Reading or writing the SERVOPACK parameters was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		An A.94 or A.95 warning occurred in the SERVOPACK.	W: SERVOPACK Error
		The zero point return method is not set within the setting range.	W: Setting Parameter Error
		The zero point return method is set to P-OT, but the approach speed is negative.	W: Setting Parameter Error
		The zero point return method is set to N-OT, but the approach speed is positive.	W: Setting Parameter Error
		The zero point return method is set to DEC1 + phase-C pulse, ZERO signal, DEC1 + ZERO signal, or Phase-C pulse, but the OT signal in the zero point return direction is ON.	OT alarm or OT warning in the zero point return direction
4 or 5	INTERPOLATE (Interpolation) ENDOF_INTERPOLATE (Last Interpolation Segment)	The travel distance for one scan exceeded the allowable segment for a SERVOPACK with MECHATROLINK Communications or the speed feedforward value exceeded the maximum speed.	A: Excessive Speed
		An absolute infinite-length axis is being used but the zero point is not set.	A: Zero Point Unset
		The power to the Servomotor is OFF.	A: Servo OFF
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error

(cont'd)

Motion Command Code		Reason for Command Error End	Warnings (W) and Alarms (A) That Occur at the Same Time
6	LATCH (Latch)	The travel distance for one scan exceeded the allowable segment for a SERVOPACK with MECHATROLINK Communications or the speed feedforward value exceeded the maximum speed.	A: Excessive Speed
		An absolute infinite-length axis is being used but the zero point is not set.	A: Zero Point Unset
		The power to the Servomotor is OFF.	A: Servo OFF
		An alarm has occurred.	–
		The latch signal is set outside of the setting range.	W: Setting Parameter Error
7	FEED (Jog)	The machine is locked.	–
		The power to the Servomotor is OFF.	A: Servo OFF
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
8	STEP (STEP Operation)	The positioning travel distance exceeded the allowed value.	A: Excessive Positioning Travel Distance
		The power to the Servomotor is OFF.	A: Servo OFF
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
9	ZSET (Set Zero Point)	An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
10 or 11	ACC (Change Linear Acceleration Time Constant) DCC (Change Linear Deceleration Time Constant)	An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		The command was executed when pulse distribution was not completed (i.e., when DEN was OFF).	–
		Writing the SERVOPACK parameters was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		An A.94 or A.95 warning occurred in the SERVOPACK.	W: SERVOPACK Error
12	SCC (Change Filter Time Constant)	An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		The command was executed when pulse distribution was not completed (i.e., when DEN was OFF).	A: Filter Time Constant Change Error
		Writing the SERVOPACK parameters was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		An A.94 or A.95 warning occurred in the SERVOPACK.	W: SERVOPACK Error
13	CHG_FILTER (Change Filter Type)	An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		The command was executed when pulse distribution was not completed (i.e., when DEN was OFF).	A: Filter Time Constant Change Error
		The filter type is set outside of the setting range.	W: Setting Parameter Error
14 or 15 or 16	KVS (Change Speed Loop Gain) KPS (Change Position Loop Gain) KFS (Change Feedforward)	An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		Writing the SERVOPACK parameters was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		An A.94 or A.95 warning occurred in the SERVOPACK.	W: SERVOPACK Error

(cont'd)

Motion Command Code		Reason for Command Error End	Warnings (W) and Alarms (A) That Occur at the Same Time
17 or 18	PRM_RD (Read SERVOPACK Parameter) PRM_WR (Write SERVOPACK Parameter)	An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		Reading the SERVOPACK parameter was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		An A.94 or A.95 warning occurred in the SERVOPACK.	W: SERVOPACK Error
		The SERVOPACK parameter number or parameter size is set outside of the setting range.	W: Setting Parameter Error
19 or 20	ALM_MON (Monitor Alarms) ALM_HIST (Alarm History Monitor)	The command to the SERVOPACK was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		The SERVOPACK alarm monitor number was set outside of the setting range.	W: Setting Parameter Error
21	ALMHIST_CLR (Clear Alarm History)	The command to the SERVOPACK was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
22	ABS_RST (Reset Absolute Encoder)	The command was issued to a Σ-I Type SERVOPACK.	–
		The command was issued when the power to the Servomotor was ON.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		The command to the SERVOPACK was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
23	VELO (Issue Speed Reference)	The command was issued for a MECHATROLINK-I connection.	–
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
24	TRQ (Issue Torque Reference)	The command was issued for a MECHATROLINK-I connection.	–
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
25	PHASE (Issue Phase Reference)	An absolute infinite-length axis is being used but the zero point is not set.	A: Zero Point Unset
		The power to the Servomotor is OFF.	A: Servo OFF
		An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
26	KIS (Change Position Loop Integral Time)	An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		Writing the SERVOPACK parameters was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		An A.94 or A.95 warning occurred in the SERVOPACK.	W: SERVOPACK Error
–	Others SERVOPACK parameter auto-write when movement commands are executed*	An alarm has occurred.	–
		Communications are not synchronized.	A: SERVOPACK Synchronized Communications Error
		Writing the SERVOPACK parameters was not completed within the specified time.	A: SERVOPACK Communications Timeout Error
		An A.94 or A.95 warning occurred in the SERVOPACK.	W: SERVOPACK Error
		Pulse distribution is not completed (i.e., DEN is OFF).	–

* This applies when No.1 Function Selection Flag 1 Bit A SERVOPACK Parameter Auto-Write fixed parameter is set to 0 (Enabled) and the set value of the OW□□3A Filter Time Constant, OL□□36 Linear Acceleration Rate/Acceleration Time Constant, or OL□□38 Deceleration Rate/Deceleration Time Constant setting parameter is changed at the same time as the movement command is set.

12.1.3 Motion Errors Details and Corrections

This section gives tables and details for the Axis Warnings (IL□□02) and Axis Alarms (IL□□04) parameters.

(1) Warnings in IL□□02

The following table lists the bits in the Warnings (IL□□02) parameter.

Register No.	Name	Contents
IL□□02	Warnings	Bit 0: Excessive Deviation
		Bit 1: Setting Parameter Error
		Bit 2: Fixed Parameter Error
		Bit 3: SERVOPACK Error
		Bit 4: Motion Command Setting Error
		Bit 5: Reserved for system.
		Bit 6: Positive Overtravel
		Bit 7: Negative Overtravel
		Bit 8: Servo ON Incomplete
		Bit 9: SERVOPACK Communications Warning
		Bit A: SERVOPACK Stop Signal Active
		Bits B to 1F: Reserved for system.

[a] Troubleshooting Warnings (IL□□02)

■ Bit 0: Excessive Deviation

Detection Timing	Anytime except during speed or torque control. This warning is detected only when bit 0 (Excessive Deviation Error Level Setting) in the OW□□01 setting parameter is set to 1 (Warning).
Processing When Warning Occurs	The current movement command is continued. Movement commands can be executed.
Details and Cause	The position deviation exceeded the OL□□22 setting parameter (Excessive Deviation Detection Value). Any of the following is possible. • Response was poor because the position loop or speed loop gain is not suitable. • The value of OL□□22 (Excessive Deviation Detection Value) is too small. • The capacity of the Servomotor is too small for the load. • SERVOPACK failure
Correction	Check the following and make suitable corrections where necessary. • Check the position loop or speed loop gain. • Check the OL□□22 (Excessive Deviation Detection Value) parameter. • Check the capacity of the Servomotor.

- The deviation is not checked if the OL□□22 (Excessive Deviation Detection Value) parameter is set to 0.

■ Bit 1: Setting Parameter Error

Detection Timing	At execution of a motion command.
Processing When Warning Occurs	The number of the setting parameter in which an error was detected is reported in the IW□□01 monitor parameter (Out-of-range Parameter Number).
Details and Cause	Any of the following is possible. • The set value of the setting parameter exceeds the setting range. • The value of the setting parameter that was specified when a motion command was executed was not correct.
Correction	Check the set value of the setting parameter that was reported in the IW□□01 monitor parameter (Out-of-range Parameter Number).

■ Bit 2: Fixed Parameter Error

Detection Timing	When saving the fixed parameters.
Processing When Warning Occurs	The number of the fixed parameter in which an error was detected is reported in the IW□□01 monitor parameter (Out-of-range Parameter Number). Bit 0 (Motion Operation Ready) in the IW□□01 monitor parameter changes to 0 (Motion operation not ready).
Details and Cause	A setting range error or operation error occurred in internal processing that used more than one fixed parameter.
Correction	Check the set value of the fixed parameter that was reported in the IW□□01 monitor parameter (Out-of-range Parameter Number).

- The following fixed parameters are related to a fixed parameter error for the electronic gear. Check the settings of these parameters.
  Bit 0 (Axis Selection) and bit 9 (Simple Absolute Infinite Axis Position Management) in the No.1 Function Selection Flags 1 parameter, and the No.4 Reference Unit Selection, No.6 Travel Distance per Machine Rotation, No.8 Servomotor Gear Ratio Term, No.9 Machine Gear Ratio Term, No.10 Infinite-length Axis Reset Position, No.30 Encoder Selection, No.36 Number of Pulses per Motor Rotation, and No.38 Maximum Number of Absolute Encoder Rotations parameters

■ Bit 3: SERVOPACK Error

Detection Timing	Anytime
Processing When Warning Occurs	The current movement command is continued. Movement commands can be executed.
Details and Cause	This warning indicates that a warning occurred in the SERVOPACK. Check the nature of the warning in IW□□2D monitor parameter (SERVOPACK Alarm Code). Refer to *12.1.4 (2) SERVOPACK Alarm Code (IW□□2D) Tables* for details.
Correction	Check the nature of the SERVOPACK warning and eliminate the cause.

■ Bit 4: Motion Command Setting Error

Detection Timing	At start of motion command execution.
Processing When Warning Occurs	The motion command is disabled.
Details and Cause	An unsupported motion command code was set.
Correction	Correct the motion command code.

■ Bit 6: Positive Overtravel and Bit 7: Negative Overtravel

Detection Timing	During execution of a movement motion command. Overtravel detection is enabled while the OT signal in travel direction is OFF.
Processing When Warning Occurs	• Stop processing is performed in the SERVOPACK. The stop method and the operation after stopping depend on the SERVOPACK parameter settings. • Controller Processing The current movement command is continued.
Details and Cause	Any of the following is possible. • A command was issued that caused a travel limit of the machine to be exceeded for one of the following: A command from a user program Manual operation that exceeds the travel limit • An error in the overtravel signal
Correction	• Check the following items: Check the overtravel signal. Check programmed and manual operation. • After completing the above checks, return the axis to eliminate the overtravel condition.

■ Bit 8: Servo ON Incomplete

Detection Timing	Anytime
Processing When Warning Occurs	Movement commands cannot be executed.
Details and Cause	The power to the Servomotor was not turned ON even though bit 0 (Servo ON) of the OW☐☐00 setting parameter was turned ON. Any of the following is possible. • The change in the Servo ON command from OFF to ON was not detected. • There is an alarm in the SERVOPACK. • The main circuit power supply to the SERVOPACK is OFF.
Correction	Turn ON the Servo ON command again. Check the SERVOPACK for alarms and check the power supply status and stop signal status.

■ Bit 9: SERVOPACK Communications Warning

Detection Timing	Anytime
Processing When Warning Occurs	The current movement command is continued. Movement commands can be executed.
Details and Cause	This bit shows individual errors in MECHATROLINK communications.
Correction	When the communications error stops, normal status is recovered automatically. If warnings occur frequently, reroute the MECHATROLINK cable, change the ground, or implement other noise countermeasures.

- If communications errors occur consecutively, an alarm will be shown in IL☐☐04 bit 11 (SERVOPACK Communications Error).

■ Bit A: SERVOPACK Stop Signal Active

Detection Timing	Anytime
Processing When Warning Occurs	The power supply to the Servomotor is turned OFF and movement commands are not executed.
Details and Cause	The stop signal (or an HWBB for Σ-V/Σ-7 SERVOPACKs) was received by the SERVOPACK.
Correction	Confirm safety, and then disable the stop signal.

(2) Alarms (IL☐☐04) Table and Corrections

This section describes the alarms that are given in IL☐☐04 and the corrections for them.

[a] Alarms in IL☐☐04

The following table lists the bits in the Alarms (IL☐☐04) parameter.

IL☐☐04	Alarm	IL☐☐04	Alarm
Bit 0	SERVOPACK Error	Bit 10	SERVOPACK Synchronized Communications Error
Bit 1	Positive Overtravel	Bit 11	SERVOPACK Communications Error
Bit 2	Negative Overtravel	Bit 12	SERVOPACK Communications Timeout Error
Bit 3	Positive Software Limit	Bit 13	Excessive Absolute Encoder Rotations
Bit 4	Negative Software Limit	Bit 14	Reserved for system.
Bit 5	Servo OFF	Bit 15	Reserved for system.
Bit 6	Positioning Time Exceeded	Bit 16	Not used.
Bit 7	Excessive Positioning Travel Distance	Bit 17	Not used.
Bit 8	Excessive Speed	Bit 18	Not used.
Bit 9	Excessive Deviation	Bit 19	Not used.
Bit A	Filter Type Change Error	Bit 1A	Not used.
Bit B	Filter Time Constant Change Error	Bit 1B	Not used.
Bit C	Not used.	Bit 1C	Not used.
Bit D	Zero Point Unset	Bit 1D	Detected SERVOPACK Model Error
Bit E	Not used.	Bit 1E	Motor Type Setting Error
Bit F	Not used.	Bit 1F	Connected Encoder Model Error

[b] Corrections for Alarms (IL□□04)

■ Bit 0: SERVOPACK Error

Detection Timing	SERVOPACK alarms are detected in the alarm control section (always).
Processing When Alarm Occurs	The current command is canceled. If a SERVOPACK Error alarm occurs during execution of a POSING command, the POSING operation is canceled and the axis decelerates to a stop. Bit 3 (Command Error End) in IW□□09 (Motion Command Status) turns ON.
Details and Cause	The cause depends on the specific alarm. The specific alarm is given in IW□□2D (SERVOPACK Alarm Code). Refer to *12.1.4 (2) SERVOPACK Alarm Code (IW□□2D) Tables* for details.
Correction	• Check the specific SERVOPACK alarm and eliminate the cause. • Reset the alarm.

- This bit changes to 1 when an alarm that is classified as a SERVOPACK alarm occurs in MECHATROLINK communications.

■ Bit 1: Positive Overtravel and Bit 2: Negative Overtravel

Detection Timing	These alarms are detected by the position control section during execution of a motion command (always). Overtravel detection is enabled while the OT signal in travel direction is OFF.
Processing When Alarm Occurs	• Stop processing is performed in the SERVOPACK. The stop method and the operation after stopping depend on the SERVOPACK parameter settings. Bit 3 (Command Error End) in IW□□09 (Motion Command Status) turns ON. • Controller Processing The command is canceled and the axis decelerates to a stop. Followup processing to align the command position with the current machine position is performed.
Details and Cause	Any of the following is possible. • A command was issued that caused a travel limit of the machine to be exceeded for one of the following: A command from a user program Manual operation that exceeds the travel limit • An error in the overtravel signal
Correction	• Check the following items: Check the overtravel signal. Check programmed and manual operation. • After checking the above item, clear the motion command code and reset the alarm. Then return the axis to eliminate the overtravel condition. (Commands in the overtravel direction will be disabled. If you attempt to execute one, the alarm will occur again.)

- For a vertical axis, we recommend that you make the following settings in the SERVOPACK to prevent falling or oscillation at the overtravel boundary.
  - Using an emergency stop to decelerate to a stop
  - Implementing a zero clamp after decelerating to a stop

■ Bit 3: Positive Software Limit and Bit 4: Negative Software Limit

Detection Timing	Detection is enabled when a motion command is used. These alarms are detected by the position control section. Detection is enabled after completion of a Zero Point Return or a Set Zero Point command.
Processing When Alarm Occurs	The axis decelerates to a stop at the software limit. Bit 3 (Command Error End) in IW□□09 (Motion Command Status) turns ON.
Details and Cause	A command was issued that caused a software limit to be exceeded for one of the following: A command from a user program that exceeds the travel limit Manual operation that exceeds the travel limit
Correction	• Check programmed and manual operation. • After checking the above items, clear the motion command code and reset the alarm. Then return the axis to within the software limit. (Commands in the direction of the software limit will be disabled. If you attempt to execute one, the alarm will occur again.)

■ Bit 5: Servo OFF

Detection Timing	This alarm is detected when a movement command is attempted when the power to the Servomotor is OFF.
Processing When Alarm Occurs	The movement command is not executed. Bit 3 (Command Error End) in IW□□09 (Motion Command Status) turns ON.
Details and Cause	A movement command (Positioning, External Positioning, Jog, or STEP Operation) was issued when the power to the Servomotor was OFF.
Correction	Clear the motion command code, reset the alarm, and then turn ON the power to the Servomotor.

■ Bit 6: Positioning Time Exceeded

Detection Timing	This alarm is detected when positioning was not completed within the time set in OW□□26 (Positioning Completion Check Time) after the completion of pulse distribution.
Processing When Alarm Occurs	The current command is aborted. Bit 3 (Command Error End) in IW□□09 (Motion Command Status) turns ON.
Details and Cause	Any of the following is possible. • Response was poor or oscillation occurred because the position loop or speed loop gain is not suitable. • The time in OW□□26 (Positioning Completion Check Time) is too short. • The capacity of the Servomotor is too small for the load. • The SERVOPACK and Servomotor are not connected correctly.
Correction	Check the following items: • Check the parameters that are related to the characteristics (gains) of the SERVOPACK. • Check the connection between the SERVOPACK and Servomotor. • See if the capacity of the Servomotor is sufficient. • Check the time in OW□□26 (Positioning Completion Check Time).

- The positioning time is not checked if the OW□□26 (Positioning Completion Check Time) parameter is set to 0.

■ Bit 7: Excessive Positioning Travel Distance

Detection Timing	This alarm is detected when a positioning command is executed.
Processing When Alarm Occurs	Movement commands are not executed. Bit 3 (Command Error End) in IW□□09 (Motion Command Status) turns ON.
Details and Cause	A movement command (Positioning, STEP Operation, or External Positioning) that exceeded the positioning travel limit was issued.
Correction	Check the axis travel distance specification in the positioning command.

The positioning travel limits depend on the setting of fixed parameter No. 4 (Reference Unit Selection) as given below.

Fixed Parameter No. 4 Setting	0	1	2	3	4
Reference unit	pulse	mm	deg	inch	μm
Positioning travel limit	2147483647	$2147483647 \times \dfrac{\text{No.6: Travel Distance per Machine Rotation} \times \text{No.9: Machine Gear Ratio}}{\text{No.36: Number of Pulses per Motor Rotation} \times \text{No.8: Servo Motor Gear Ratio}}$			

■ Bit 8: Excessive Speed

Detection Timing	This alarm is detected when a movement command is executed.
Processing When Alarm Occurs	Movement commands are not executed. Bit 3 (Command Error End) in IW☐☐09 (Motion Command Status) turns ON.
Details and Cause	The command speed (or, for interpolation, the distributed travel distance for one scan) that was sent to the SERVOPACK with MECHATROLINK communications exceeded the allowed upper limit.
Correction	Check the speed reference, travel distance per scan for the interpolation reference, and the speed compensation setting.

The speed limit that can be set depends on the connected SERVOPACK as shown next. However, the speed limit in simulation mode is 32,767,000 for all SERVOPACKs.

Model	Description	Speed Limit (pulse/s)
SGD-☐☐☐N SGDB-☐☐AN	MECHATROLINK-I-compatible AC SERVOPACK	16,384,000
SGDH-☐☐☐E JUSP-NS100	SGDH SERVOPACK NS100 MECHATROLINK-I Interface	131,068,000
SGDH-☐☐☐E JUSP-NS115	SGDH SERVOPACK NS115 MECHATROLINK-II Interface	32,767,000
SGDS-☐☐☐1☐☐	SGDS SERVOPACK	1,048,576,000
SGDV-☐☐☐☐1☐☐	SGDV SERVOPACK	2,097,152,000
SGD7S-☐☐☐☐10☐	SGD7S SERVOPACK	2,097,152,000
SJDE-☐☐AN☐	SJDE SERVOPACK	1,048,576,000

■ Bit 9: Excessive Deviation

Detection Timing	Anytime except during speed or torque control.
Processing When Alarm Occurs	Movement commands are not executed. Bit 3 (Command Error End) in IW☐☐09 (Motion Command Status) turns ON.
Details and Cause	Any of the following is possible. • Response was poor because the position loop or speed loop gain is not suitable. • The value of OL☐☐22 (Excessive Deviation Detection Value) is too small. • The capacity of the motor is too small for the load. • SERVOPACK failure
Correction	Check the following and make suitable corrections where necessary. If recovery is not possible, contact the maintenance division. • Check the position loop or speed loop gain. • Check the OL☐☐22 (Excessive Deviation Detection Value) parameter. • Check the capacity of the motor.

- The deviation is not checked if the OL☐☐22 (Excessive Deviation Detection Value) parameter is set to 0.

■ Bit A: Filter Type Change Error

Detection Timing	Always detected (This alarm is detected by the motion command processing section.)
Processing When Alarm Occurs	The Change Filter Type command is not executed. Bit 3 (Command Error End) in IW☐☐09 (Motion Command Status) turns ON.
Details and Cause	An error will occur if the Change Filter Type command is specified when pulse distribution has not been completed for a command (i.e., when bit 0 in IW☐☐0C is OFF).
Correction	Correct the program so that the Change Filter Type command is executed only after pulse distribution is completed (i.e., only when bit 0 in IW☐☐0C is ON).

- Note: The current command will not stop even if this error occurs. To stop the current command, program stop processing in a user program.

■ Bit B: Filter Time Constant Change Error

Detection Timing	Always detected (This alarm is detected by the motion command processing section.)
Processing When Alarm Occurs	Commands are not executed. Bit 3 (Command Error End) in IW□□09 (Motion Command Status) turns ON.
Details and Cause	An error will occur if the Change Filter Time Constant command is specified when pulse distribution has not been completed for a command (i.e., when bit 0 in IW□□0C is OFF).
Correction	Correct the program so that the Change Filter Time Constant command is executed only after pulse distribution is completed (i.e., only when bit 0 in IW□□0C is ON).

- The current command will not stop even if this error occurs. To stop the current command, program stop processing in a user program.

■ Bit D: Zero Point Unset

Detection Timing	Detection of this alarm is enabled only when an absolute encoder and an infinite-length axis are used. The alarm is detected when the following command is set in OW□□08 (Motion Commands). Commands: Positioning, External Positioning, Interpolation, Latch, or Issue Phase Reference
Processing When Alarm Occurs	The command that was set is not executed. Bit 3 (Command Error End) in IW□□09 (Motion Command Status) turns ON.
Details and Cause	A movement command was set when the zero point was not set (i.e., when bit 5 of IW□□0C was OFF).
Correction	Clear the motion command, reset the alarm, and then perform an operation to set the zero point.

■ Bit 10: SERVOPACK Synchronized Communications Error

Detection Timing	This alarm is detected by the communications control section when MECHATROLINK communications are synchronized between the Machine Controller and the SERVOPACK.
Processing When Alarm Occurs	The current command is canceled.
Details and Cause	Data was not updated properly on either the Machine Controller or the SERVOPACK.
Correction	Check the connection of the MECHATROLINK cable, and then reset the alarm.

■ Bit 11: SERVOPACK Communications Error

Detection Timing	This alarm is detected by the communications control section when MECHATROLINK communications is being performed between the Machine Controller and the SERVOPACK.
Processing When Alarm Occurs	• The current command is canceled. • The SERVOPACK turns OFF the power to the Servomotor.
Details and Cause	MECHATROLINK communications stopped because the cable was disconnected, there is an error in MECHATROLINK communications (e.g., noise entered the communications path), the power supply to the SERVOPACK was interrupted, etc.
Correction	• Check the connection of the MECHATROLINK cable, and then reset the alarm. • If communications error occur frequently, review the wiring and implement countermeasures for noise according to "MECHATROLINK-II Installation Guide" (Document No. MMATDEP011A) published by the MECHATROLINK Members Association. Download this document from the MECHATROLINK Members Association website.

■ Bit 12: SERVOPACK Communications Timeout Error

Detection Timing	This alarm is detected during execution of a motion command. This alarm is detected by the MECHATROLINK communications control section when the servo command/response check is performed in the processing sections.
Processing When Alarm Occurs	The current command is canceled.
Details and Cause	The servo command in MECHATROLINK communications was not completed within the specified time (5 seconds).
Correction	Check for alarms in the SERVOPACK with MECHATROLINK Communications.

- This alarm occurs in the SERVOPACK with MECHATROLINK Communications when module assignment is completed but the power supply to the SERVOPACK is not turned ON.

■ Bit 13: Excessive Absolute Encoder Rotations

Detection Timing	Detection of this alarm is enabled only when an absolute encoder, finite-length axis, and electronic gear are used. This alarm is detected by the position control section when the power supply is turned ON.
Processing When Alarm Occurs	The absolute position information that is read from the absolute encoder when the SEN signal turns ON is ignored.
Details and Cause	An operation error occurred when converting the absolute position information that was read from the absolute encoder when the power supply was turned ON from pulses to reference units.
Correction	Correct the settings of the gear ratio, encoder pulses, and other related fixed parameters.

■ Bit 1D: Detected SERVOPACK Model Error

Detection Timing	This alarm is detected when trying to establish MECHATROLINK communications with a SERVOPACK.
Processing When Alarm Occurs	Communications cannot be performed with the SERVOPACK where this error occurred.
Details and Cause	The SERVOPACK model assigned in the module configuration definitions does not match the actual SERVOPACK model that is connected.
Correction	• Change the model selected for the SERVOPACK to match the one that is actually connected. • If the model is not supported by the latest version of the MPE720, assign it as a wildcard SERVOPACK.

■ Bit 1E: Motor Type Setting Error

Detection Timing	This alarm is detected when communications is established with the SERVOPACK.
Processing When Alarm Occurs	No special processing is performed.
Details and Cause	The setting (rotary/linear) of the Motor Type fixed parameter does not agree with the setting in the SERVOPACK (Pn000.3 (Startup Selection Settings) for an SGDH SERVOPACK or Rotary/Linear for an SGDS/SGDV SERVOPACK).
Correction	Check the settings and model number of the SERVOPACK.

■ Bit 1F: Connected Encoder Model Error

Detection Timing	This alarm is detected when communications is established with the SERVOPACK.
Processing When Alarm Occurs	No special processing is performed.
Details and Cause	The setting (rotary/linear) of the Motor Type fixed parameter does not agree with the Servomotor that is connected to the SERVOPACK.
Correction	Check the Servomotor.

12.1.4 SERVOPACK Status/SERVOPACK Error Codes

(1) SERVOPACK Status Monitor (IW□□2C) Table

The status of the SERVOPACK with MECHATROLINK Communications can be monitored in the SERVOPACK Status Monitor parameter (IW□□2C).

Bit	Status	Meaning
Bit 0	Alarm (ALM)	0: No alarm occurred. 1: Alarm
Bit 1	Warning (WARNING)	0: No warning occurred. 1: Warning occurred.
Bit 2	Command Ready (CMDRDY)	0: Commands cannot be received. 1: Commands can be received.
Bit 3	Servo ON (SVON)	0: Servo OFF 1: Servo ON
Bit 4	Main Power supply ON (PON)	0: Main power OFF 1: Main power ON
Bit 5	Machine Lock (MLOCK)	0: Machine lock mode released. 1: Machine lock mode
Bit 6	Zero Position (ZPOINT)	0: Outside of the zero point position range 1: Inside the zero point position range
Bit 7	Positioning Completed (PSET)	0: Outside of the width of positioning completion 1: Inside width of positioning completion (for position control)
	Speed Coincidence (V-CMP)	0: Speed does not coincide. 1: Speed coincides (for speed control).
Bit 8	Distribution Completed (DEN)	0: Distributing pulses. 1: Distribution completed (for position control).
	Zero Speed (ZSPD)	0: Zero speed not detected. 1: Zero speed detected (during speed control).
Bit 9	Torque Restriction (T_LIM)	0: Torque limit is not being limited. 1: Torque limit is being limited.
Bit A	Latch Completed (L_CMP)	0: Latch not completed. 1: Latch completed.
Bit B	Near Position (NEAR)	0: Outside of NEAR signal output width 1: Inside NEAR signal output width
	Speed Limit (V_LIM)	0: Speed limit not detected. 1: Speed limit detected.
Bit C	Positive Software Limit (P_SOT)	0: Inside positive direction software limit range 1: Outside of positive direction software limit range
Bit D	Negative Software Limit (N_SOT)	0: Inside negative direction software limit range 1: Outside of negative direction software limit range

(2) SERVOPACK Alarm Code (IW☐☐2D) Tables

The alarm codes/warning codes of the SERVOPACK with MECHATROLINK Communications can be monitored in the SERVOPACK Alarm Code (IW☐☐2D).
The alarm codes are listed in the following tables. Refer to the relevant SERVOPACK manual for corrective measures.

[a] Σ-7-series SERVOPACKs

- The upper two digits of the alarm code are normally stored in the SERVOPACK Alarm Code (IW☐☐2D) (e.g., 71 is stored in IW☐☐2D when the alarm code is 710). Three-digit codes are stored when the ALM_MON motion command is used.

Code	Meaning	IL☐☐02 Bit 3 (Warning: SERVOPACK Error)	IL☐☐04 Bit 0 (Alarm: SERVOPACK Error)
000	Normal	OFF	OFF
900	Position Error Overflow	ON	OFF
901	Excessive Position Deviation for Servo ON	ON	OFF
910	Overload	ON	OFF
911	Vibration	ON	OFF
912	Internal Temperature Warning 1 (Control Board Temperature Error)	ON	OFF
913	Internal Temperature Warning 2 (Power Board Temperature Error)	ON	OFF
920	Regeneration Overload	ON	OFF
921	Dynamic Brake Overload	ON	OFF
923	Internal-in Fan in SERVOPACK Stopped	ON	OFF
930	Absolute Encoder Battery Error	ON	OFF
93B	Overheat Warnings	ON	OFF
942	Speed Ripple Compensation Information Disagreement	ON	OFF
94A	Data Setting Warning 1 (Parameter Number)	ON	OFF
94b	Data Setting Warning 2 (Data Out of Range)	ON	OFF
94C	Data Setting Warning 3 (Calculation Error)	ON	OFF
94d	Data Setting Warning 4 (Parameter Size)	ON	OFF
94E	Data Setting Warning 5 (Latch Mode Error)	ON	OFF
95A	Command Warning 1 (Command Conditions Not Met)	ON	OFF
95b	Command Warning 2 (Unsupported Command)	ON	OFF
95d	Command Warning 4 (Command Conflict)	ON	OFF
95E	Command Warning 5 (Subcommand Cannot Be Executed)	ON	OFF
95F	Command Warning 6 (Undefined Command)	ON	OFF
960	MECHATROLINK Communications Warning	ON	OFF
971	Undervoltage	ON	OFF
9A0	Overtravel	ON	OFF
9b0	Preventive Maintenance Warnings	ON	OFF
020	Parameter Checksum Error	OFF	ON
021	Parameter Format Error	OFF	ON
022	System Checksum Error	OFF	ON
024	System Alarm	OFF	ON
025	System Alarm	OFF	ON
030	Main Circuit Detector Error	OFF	ON
040	Parameter Setting Error	OFF	ON
041	Encoder Output Pulse Setting Error	OFF	ON
042	Parameter Combination Error	OFF	ON
044	Semi-closed/Fully-closed Loop Control Parameter Setting Error	OFF	ON
050	Combination Error	OFF	ON
051	Unsupported Device Alarm	OFF	ON

(cont'd)

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
070	Detected Motor Type Change	OFF	ON
080	Linear Encoder Scale Pitch Setting Error	OFF	ON
0B0	Canceled Servo ON Command Alarm	OFF	ON
100	Overcurrent Detected	OFF	ON
300	Regeneration Error	OFF	ON
320	Regeneration Overload	OFF	ON
330	Main Circuit Power Supply Wiring Error	OFF	ON
331	Power Monitor Input Signal Error	OFF	ON
400	Overvoltage	OFF	ON
410	Undervoltage	OFF	ON
450	Main Circuit Capacitor Overvoltage	OFF	ON
510	Overspeed	OFF	ON
511	Overspeed of Encoder Output Pulse Rate	OFF	ON
520	Vibration Alarm	OFF	ON
521	Autotuning Alarm	OFF	ON
550	Maximum Speed Setting Error	OFF	ON
710	Maximum Momentary Overload	OFF	ON
720	Maximum Continuous Overload	OFF	ON
730, 731	Dynamic Brake Overload	OFF	ON
740	Overload of Surge Current Limit Resistor	OFF	ON
7A1	Internal Temperature Error 1 (Control Board Temperature Error)	OFF	ON
7A2	Internal Temperature Error 2 (Power Board Temperature Error)	OFF	ON
7A3	Internal Temperature Detector Error	OFF	ON
7AB	Built-in Fan in SERVOPACK Stopped	OFF	ON
810	Encoder Backup Alarm	OFF	ON
820	Encoder Checksum Alarm	OFF	ON
830	Encoder Battery Alarm	OFF	ON
840	Encoder Data Alarm	OFF	ON
850	Encoder Overspeed	OFF	ON
860	Encoder Overheated	OFF	ON
861	Overheat	OFF	ON
890	Encoder Scale Error	OFF	ON
891	Encoder Module Error	OFF	ON
8A0	External Encoder Error	OFF	ON
8A1	External Encoder Module Error	OFF	ON
8A2	External Incremental Encoder Sensor Error	OFF	ON
8A3	External Absolute Encoder Position Error	OFF	ON
8A5	External Encoder Overspeed Error	OFF	ON
8A6	External Encoder Overheat Error	OFF	ON
B10	Speed Reference A/D Error	OFF	ON
B11	Speed Reference A/D Conversion Data Error	OFF	ON
B20	Torque Reference A/D Error	OFF	ON
B33	Current Detection Error 3	OFF	ON
BF0	System Alarm 0	OFF	ON
BF1	System Alarm 1	OFF	ON
BF2	System Alarm 2	OFF	ON
BF3	System Alarm 3	OFF	ON
BF4	System Alarm 4	OFF	ON
C10	Runaway Detected	OFF	ON

(cont'd)

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
C20	Phase Detection Error	OFF	ON
C21	Hole Sensor Error	OFF	ON
C22	Phase Information Disagreement	OFF	ON
C50	Magnetic Pole Detection Failed	OFF	ON
C51	Overtravel Detected during Magnetic Pole Detection	OFF	ON
C52	Magnetic Pole Detection Incomplete	OFF	ON
C53	Magnetic Pole Detection Variable Range Exceeded	OFF	ON
C54	Magnetic Pole Detection Failed 2	OFF	ON
C80	Absolute Encoder Clear Error and Multiturn Limit Setting Error	OFF	ON
C90	Encoder Communications Error	OFF	ON
C91	Encoder Communications Position Data Acceleration Rate Error	OFF	ON
C92	Encoder Communications Timer Error	OFF	ON
CA0	Encoder Parameter Error	OFF	ON
CB0	Encoder Echoback Error	OFF	ON
CC0	Multiturn Limit Disagreement	OFF	ON
CF1	Feedback Optional Module Communications Error, Reception Failed	OFF	ON
CF2	Feedback Optional Module Communications Error, Timer Stopped	OFF	ON
D00	Position Error Overflow	OFF	ON
D01	Position Error Overflow Alarm at Servo ON	OFF	ON
D02	Position Error Overflow Alarm by Speed Limit at Servo ON	OFF	ON
D10	Motor-load Position Error Overflow	OFF	ON
D30	Position Data Overflow	OFF	ON
E72	Feedback Optional Module Detection Failure Alarm	OFF	ON
EB1	Safety Function Signal Input Timing Error	OFF	ON
F10	Main Circuit Cable Open Phase	OFF	ON
F50	Motor Main Circuit Cable Disconnection	OFF	ON

[b] Σ-V-series SERVOPACKs

- The upper two digits of the alarm code are normally stored in the SERVOPACK Alarm Code (IW□□2D) (e.g., 71 is stored in IW□□2D when the alarm code is 710). Three-digit codes are stored when the ALM_MON motion command is used.

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
000	Normal	OFF	OFF
900	Position Error Overflow	ON	OFF
901	Excessive Position Deviation for Servo ON	ON	OFF
910	Overload	ON	OFF
911	Vibration	ON	OFF
920	Regeneration Overload	ON	OFF
921	Dynamic Brake Overload	ON	OFF
930	Absolute Encoder Battery Error	ON	OFF
94A	Data Setting Warning 1 (Parameter Number)	ON	OFF
94B	Data Setting Warning 2 (Data Out of Range)	ON	OFF
94C	Data Setting Warning 3 (Calculation Error)	ON	OFF
94D	Data Setting Warning 4 (Parameter Size)	ON	OFF
94E	Data Setting Warning 5 (Latch Mode Error)	ON	OFF

(cont'd)

Code	Meaning	IL☐☐02 Bit 3 (Warning: SERVOPACK Error)	IL☐☐04 Bit 0 (Alarm: SERVOPACK Error)
95A	Command Warning 1 (Command Conditions Not Met)	ON	OFF
95B	Command Warning 2 (Unsupported Command)	ON	OFF
95D	Command Warning 4 (Command Conflict)	ON	OFF
95E	Command Warning 5 (Subcommand Cannot Be Executed)	ON	OFF
95F	Command Warning 6 (Undefined Command)	ON	OFF
960	MECHATROLINK Communications Warning	ON	OFF
971	Undervoltage	ON	OFF
9A0	Overtravel	ON	OFF
020	Parameter Checksum Error	OFF	ON
021	Parameter Format Error	OFF	ON
022	System Checksum Error	OFF	ON
023	Parameter Password Error	OFF	ON
030	Main Circuit Detector Error	OFF	ON
040	Parameter Setting Error	OFF	ON
041	Encoder Output Pulse Setting Error	OFF	ON
042	Parameter Combination Error	OFF	ON
044	Semi-closed/Fully-closed Loop Control Parameter Setting Error	OFF	ON
050	Combination Error	OFF	ON
051	Unsupported Device Alarm	OFF	ON
0B0	Canceled Servo ON Command Alarm	OFF	ON
100	Overcurrent Detected	OFF	ON
300	Regeneration Error	OFF	ON
320	Regeneration Overload	OFF	ON
330	Main Circuit Power Supply Wiring Error	OFF	ON
400	Overvoltage	OFF	ON
410	Undervoltage	OFF	ON
510	Overspeed	OFF	ON
511	Overspeed of Encoder Output Pulse Rate	OFF	ON
520	Vibration Alarm	OFF	ON
521	Autotuning Alarm	OFF	ON
710	Maximum Momentary Overload	OFF	ON
720	Maximum Continuous Overload	OFF	ON
730, 731	Dynamic Brake Overload	OFF	ON
740	Overload of Surge Current Limit Resistor	OFF	ON
7A0	Heat Sink Overheated	OFF	ON
7AB	Built-in Fan in SERVOPACK Stopped	OFF	ON
810	Encoder Backup Alarm	OFF	ON
820	Encoder Checksum Alarm	OFF	ON
830	Encoder Battery Alarm	OFF	ON
840	Encoder Data Alarm	OFF	ON
850	Encoder Overspeed	OFF	ON
860	Encoder Overheated	OFF	ON
891	Encoder Module Error	OFF	ON
8A0	External Encoder Scaling Error	OFF	ON
8A1	External Encoder Module Error	OFF	ON
8A2	External Incremental Encoder Sensor Error	OFF	ON
8A3	External Absolute Encoder Position Error	OFF	ON
B10	Speed Reference A/D Error	OFF	ON
B11	Speed Reference A/D Conversion Data Error	OFF	ON

(cont'd)

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
B20	Torque Reference A/D Error	OFF	ON
B31	Current Detection Error 1	OFF	ON
B32	Current Detection Error 2	OFF	ON
B33	Current Detection Error 3	OFF	ON
BF0	System Alarm 0 (Scan C Error)	OFF	ON
BF1	System Alarm 1 (CPU Stack Memory Error)	OFF	ON
BF2	System Alarm 2 (Current Control Processing Section Program Error)	OFF	ON
BF3	System Alarm 3 (Scan A Error)	OFF	ON
BF4	System Alarm 4 (CPU WDT Error)	OFF	ON
C10	Runaway Prevention Detected	OFF	ON
C20	Phase Detection Error*1	OFF	ON
C21	Hall Sensor Error*1	OFF	ON
C22	Phase Information Disagreement*1	OFF	ON
C50	Magnetic Pole Detection Failed*1	OFF	ON
C51	Overtravel Detected during Magnetic Pole Detection*1	OFF	ON
C52	Magnetic Pole Detection Incomplete*1	OFF	ON
C53	Magnetic Pole Detection Variable Range Exceeded	OFF	ON
C54	Magnetic Pole Detection Failed 2	OFF	ON
C80	Absolute Encoder Clear Error and Multiturn Limit Setting Error	OFF	ON
C90	Encoder Communications Error	OFF	ON
C91	Encoder Communications Position Data Acceleration Rate Error	OFF	ON
C92	Encoder Communications Timer Error	OFF	ON
CA0	Encoder Parameter Error	OFF	ON
CB0	Encoder Echoback Error	OFF	ON
CC0	Multiturn Limit Disagreement	OFF	ON
CF1	Fully-closed Serial Conversion Unit Communications Error*1	OFF	ON
CF2	Fully-closed Serial Conversion Unit Communications Error*1	OFF	ON
D00	Position Error Overflow	OFF	ON
D01	Position Error Overflow Alarm at Servo ON	OFF	ON
D02	Position Error Overflow Alarm by Speed Limit at Servo ON	OFF	ON
D10	Motor-load Position Error Overflow	OFF	ON
EB0	Safety Function Drive Monitor Circuit Error*2	OFF	ON
EB1	Safety Function Signal Input Timing Error	OFF	ON
EB2	Safety Function Drive Internal Signal Error*2	OFF	ON
EB3	Safety Function Drive Communications Error 1*2	OFF	ON
EB4	Safety Function Drive Communications Error 2*2	OFF	ON
EB5	Safety Function Drive Communications Error 3*2	OFF	ON
EB6	Safety Function Drive Communications Data Error*2	OFF	ON
EC7	Safety Option Card Stop Command Error*2	OFF	ON
F10	Main Circuit Cable Open Phase	OFF	ON
CPF00	Digital Operator Transmission Error 1	OFF	ON
CPF01	Digital Operator Transmission Error 2	OFF	ON
- -	Not an error.	OFF	ON

* 1. These alarm codes are possible only when the feedback option is used.
* 2. These alarm codes are possible only when the safety function is used.

[c] Σ-III-series SERVOPACKs

- The upper two digits of the alarm code are normally stored in the SERVOPACK Alarm Code (IW☐☐2D) (e.g., 71 is stored in IW☐☐2D when the alarm code is 710). Three-digit codes are stored when the ALM_MON motion command is used.

Code	Meaning	IL☐☐02 Bit 3 (Warning: SERVOPACK Error)	IL☐☐04 Bit 0 (Alarm: SERVOPACK Error)
000	Normal	OFF	OFF
900	Position Error Overflow	ON	OFF
901	Excessive Position Deviation for Servo ON	ON	OFF
910	Overload	ON	OFF
911	Vibration	ON	OFF
920	Regeneration Overload	ON	OFF
930	Absolute Encoder Battery Error	ON	OFF
941	Parameter Changed That Requires Turning Power Supply OFF and ON	ON	OFF
94A	Data Setting Warning 1 (Parameter Number)	ON	OFF
94B	Data Setting Warning 2 (Data Out of Range)	ON	OFF
94C	Data Setting Warning 3 (Calculation Error)	ON	OFF
94D	Data Setting Warning 4 (Parameter Size)	ON	OFF
95A	Command Warning 1 (Command Conditions Not Met)	ON	OFF
95B	Command Warning 2 (Unsupported Command)	ON	OFF
95C	Command Warning 3	ON	OFF
95D	Command Warning 4	ON	OFF
95E	Command Warning 5	ON	OFF
960	MECHATROLINK Communications Warning	ON	OFF
020	Parameter Checksum Error 1	OFF	ON
021	Parameter Format Error 1	OFF	ON
022	System Parameter Checksum Error 1	OFF	ON
023	Parameter Password Error 1	OFF	ON
02A	Parameter Checksum Error 2	OFF	ON
02B	System Parameter Checksum Error 2	OFF	ON
030	Main Circuit Detector Error	OFF	ON
040	Parameter Setting Error 1	OFF	ON
04A	Parameter Setting Error 2	OFF	ON
041	Encoder Output Pulse Setting Error	OFF	ON
042	Parameter Combination Error	OFF	ON
050	Combination Error	OFF	ON
051	Unsupported Device Alarm	OFF	ON
0B0	Canceled Servo ON Command Alarm	OFF	ON
100	Overcurrent or Heat Sink Overheated	OFF	ON
300	Regeneration Error	OFF	ON
320	Regeneration Overload	OFF	ON
330	Main Circuit Wiring Error	OFF	ON
400	Overvoltage	OFF	ON
410	Undervoltage	OFF	ON
510	Overspeed	OFF	ON
511	Overspeed of Encoder Output Pulse Rate	OFF	ON
520	Vibration Alarm	OFF	ON
710	Maximum Momentary Overload	OFF	ON
720	Maximum Continuous Overload	OFF	ON

(cont'd)

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
730, 731	Dynamic Brake Overload	OFF	ON
740	Inrush Resistance Overload	OFF	ON
7A0	Heat Sink Overheated	OFF	ON
810	Encoder Backup Alarm	OFF	ON
820	Encoder Checksum Alarm	OFF	ON
830	Encoder Battery Alarm	OFF	ON
840	Encoder Data Alarm	OFF	ON
850	Encoder Overspeed	OFF	ON
860	Encoder Overheated	OFF	ON
870	Fully-closed Serial Encoder Checksum Alarm	OFF	ON
880	Fully-closed Serial Encoder Data Alarm	OFF	ON
8A0	Fully-closed Serial Encoder Scaling Error	OFF	ON
8A1	Fully-closed Serial Encoder Module Error	OFF	ON
8A2	Fully-closed Serial Encoder Sensor Error (Incremental Encoder)	OFF	ON
8A3	Fully-closed Serial Absolute Encoder Position Error	OFF	ON
B31	Current Detection Error 1	OFF	ON
B32	Current Detection Error 2	OFF	ON
B33	Current Detection Error 3	OFF	ON
B6A	MECHATROLINK Communications ASIC Error 1	OFF	ON
B6B	MECHATROLINK Communications ASIC Error 2	OFF	ON
BF0	System Alarm 0	OFF	ON
BF1	System Alarm 1	OFF	ON
BF2	System Alarm 2	OFF	ON
BF3	System Alarm 3	OFF	ON
BF4	System Alarm 4	OFF	ON
C10	Runaway Prevention Detected	OFF	ON
C80	Absolute Encoder Clear Error and Multiturn Limit Setting Error	OFF	ON
C90	Encoder Communications Error	OFF	ON
C91	Encoder Communications Position Data Acceleration Rate Error	OFF	ON
C92	Encoder Communications Timer Error	OFF	ON
CA0	Encoder Parameter Error	OFF	ON
CB0	Encoder Echoback Error	OFF	ON
CC0	Multiturn Limit Disagreement	OFF	ON
CF1	Fully-closed Serial Conversion Unit Communications Error, Reception Failure	OFF	ON
CF2	Fully-closed Serial Conversion Unit Communications Error, Timer Stopped	OFF	ON
D00	Position Error Overflow	OFF	ON
D01	Position Error Overflow Alarm at Servo ON	OFF	ON
D02	Position Error Overflow Alarm by Speed Limit at Servo ON	OFF	ON
D10	Motor-load Position Error Overflow	OFF	ON
E00	COM Alarm 0	OFF	ON
E01	COM Alarm 1	OFF	ON
E02	COM Alarm 2	OFF	ON
E07	COM Alarm 7	OFF	ON
E08	COM Alarm 8	OFF	ON
E09	COM Alarm 9	OFF	ON
E40	MECHATROLINK-II Communications Cycle Setting Error	OFF	ON
E50	MECHATROLINK-II Synchronization Error	OFF	ON

(cont'd)

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
E51	MECHATROLINK-II Synchronization Failed	OFF	ON
E60	MECHATROLINK-II Communications Error	OFF	ON
E61	MECHATROLINK-II Communications Cycle Error	OFF	ON
EA0	DRV Alarm 0	OFF	ON
EA1	DRV Alarm 1	OFF	ON
EA2	DRV Alarm 2	OFF	ON

[d] Σ-II-series SERVOPACKs

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
99	Normal	OFF	OFF
90	Position Error Overflow Warnings	ON	OFF
91	Overload Warning	ON	OFF
92	Regeneration Overload Warning	ON	OFF
93	Absolute Encoder Battery Error	ON	OFF
94	Data Setting Warning	ON	OFF
95	Command Warning	ON	OFF
96	Communications Warning	ON	OFF
02	Parameter Corruption	OFF	ON
03	Main Circuit Detector Error	OFF	ON
04	Parameter Setting Error	OFF	ON
05	Combination Error	OFF	ON
09	Frequency Division Setting Error	OFF	ON
0A	Encoder Type Unmatched	OFF	ON
10	Overcurrent or Heat Sink Overheated	OFF	ON
30	Regeneration Error	OFF	ON
32	Regeneration Overload	OFF	ON
33	Main Circuit Wiring Error	OFF	ON
40	Overvoltage	OFF	ON
41	Undervoltage	OFF	ON
51	Overspeed	OFF	ON
71	Maximum Momentary Overload	OFF	ON
72	Maximum Continuous Overload	OFF	ON
73	Dynamic Brake Overload	OFF	ON
74	Inrush Resistance Overload	OFF	ON
7A	Heat Sink Overheated	OFF	ON
81	Encoder Backup Alarm	OFF	ON
82	Encoder Checksum Alarm	OFF	ON
83	Encoder Battery Alarm	OFF	ON
84	Encoder Data Alarm	OFF	ON
85	Encoder Overspeed	OFF	ON
86	Encoder Overheated	OFF	ON
B1	Speed Reference A/D Error	OFF	ON
B2	Torque Reference A/D Error	OFF	ON
B3	Current Detection Error	OFF	ON
B6	Gate Array Error	OFF	ON
BF	System Alarm	OFF	ON
C1	Runaway Prevention Detected	OFF	ON

(cont'd)

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
C6	Fully-closed Loop Phase A/B Disconnection	OFF	ON
C7	Fully-closed Loop Phase C Disconnection	OFF	ON
C8	Absolute Encoder Clear Error and Multiturn Limit Setting Error	OFF	ON
C9	Encoder Communications Error	OFF	ON
CA	Encoder Parameter Error	OFF	ON
CB	Encoder Echoback Error	OFF	ON
CC	Multiturn Limit Disagreement	OFF	ON
D0	Position Error Overflow	OFF	ON
D1	Motor-load Position Error Overflow	OFF	ON
E0	No Option	OFF	ON
E1	Option Timeout	OFF	ON
E2	Option WDC Error	OFF	ON
E5	WDT error	OFF	ON
E6	Communications Error	OFF	ON
E7	Application Module Detection Failure	OFF	ON
E9	Bus OFF Error	OFF	ON
EA	SERVOPACK failure	OFF	ON
EB	SERVOPACK Initial Access Error	OFF	ON
EC	SERVOPACK WDC Error	OFF	ON
ED	Command Execution Incomplete	OFF	ON
EF	Application Module Alarm	OFF	ON
F1	Main Circuit Cable Open Phase	OFF	ON
F5	Motor Line Disconnection When Control Power Supply Turned ON	OFF	ON
F6	Motor Line Disconnection When Servo Turned ON	OFF	ON

[e] Σ-I-series SERVOPACKs

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
99	Normal	OFF	OFF
94	Parameter Setting Warning	ON	OFF
95	MECHATROLINK Command Warning	ON	OFF
96	MECHATROLINK Communications Error Warning	ON	OFF
00	Absolute Data Error	OFF	ON
02	Parameter Corruption	OFF	ON
10	Overcurrent	OFF	ON
11	Ground	OFF	ON
40	Overvoltage	OFF	ON
41	Undervoltage	OFF	ON
51	Overspeed	OFF	ON
71	Excessive Momentary Load	OFF	ON
72	Excessive Continuous Load	OFF	ON
7A	Heat Sink Overheated	OFF	ON
80	Absolute Encoder Error	OFF	ON
81	Absolute Encoder Backup Error	OFF	ON
82	Absolute Encoder Checksum Error	OFF	ON
83	Absolute Encoder Battery Error	OFF	ON
84	Absolute Encoder Data Error	OFF	ON
85	Absolute Encoder Overspeed	OFF	ON

(cont'd)

Code	Meaning	IL□□02 Bit 3 (Warning: SERVOPACK Error)	IL□□04 Bit 0 (Alarm: SERVOPACK Error)
B1	Gate Array 1 Error	OFF	ON
B2	Gate Array 2 Error	OFF	ON
B3	Current Feedback Phase U Error	OFF	ON
B4	Current Feedback Phase V Error	OFF	ON
B5	Watchdog Detector Error	OFF	ON
C1	Servo Runaway	OFF	ON
C2	Encoder Phase Detection Error	OFF	ON
C3	Encoder Phase A/B Disconnection	OFF	ON
C4	Encoder Phase C Disconnection	OFF	ON
C5	Incremental Encoder Initial Pulses Error	OFF	ON
D0	Excessive Position Deviation	OFF	ON
E5	MECHATROLINK Synchronization Error	OFF	ON
E6	MECHATROLINK Communications Error	OFF	ON
F1	Main Circuit Cable Open Phase	OFF	ON
F3	Momentary Power Failure	OFF	ON

12.2 Troubleshooting System Errors

This section describes how to troubleshoot system errors.

12.2.1 Overview of System Errors

The indicators on the Machine Controller show the operating status and error status of the Machine Controller.

- Refer to *MP2000 Series Troubleshooting Manual* (manual No.: SIEP C880700 40) for the flow of troubleshooting and details on the indicators.

You can use the system (S) registers to obtain more detailed information on errors. The contents of the system registers will allow you to isolate errors and implement corrections.
Details on the system registers are given in the following tables.

(1) Overall Configuration of the System Registers

The following table shows the overall configuration of the system registers. Refer to the sections that are given in the righthand column for details.

Register No.	Description	Details
SW00000 to SW00029	System Service Registers	*A.1 System Service Registers*
SW00030 to SW00049	System Status	*
SW00050 to SW00079	System Error Status	*
SW00080 to SW00089	User Operation Error Status	*
SW00090 to SW00103	System Service Execution Status	*
SW00104 to SW00109	Reserved for system.	–
SW00110 to SW00189	Detailed User Operation Error Status	*
SW00190 to SW00199	Reserved for system.	–
SW00200 to SW00503	System I/O Error Status	*12.2.2 (1) System I/O Error Status* *12.2.2 (2) Error Status for SVB-01 Module*
SW00504, SW00505	Reserved for system.	–
SW00506, SW00507	Security Status	*
SW00508 to SW00693	Reserved for system.	–
SW00694 to SW00697	Message Relaying Status	*
SW00698 to SW00789	Interrupt Status	*
SW00790 to SW00799	Reserved for system.	–
SW00800 to SW00815	CPU Unit Information	*12.2.2 (3) CPU Unit/CPU Module Information*
SW00816 to SW01095	Optional Module Information	*12.2.2 (4) Option Module Information*
SW01096 to SW01410	Reserved for system.	–
SW01411 to SW01442	MPU-01 Status	*
SW01443 to SW02687	Reserved for system.	–

(cont'd)

Register No.	Description	Details
SW02688 to SW03199	IOPS status for PROFINET controller (266IF-01)	*
SW03200 to SW05119	Motion Program Information	*12.2.2 (5) Motion Program Execution Information* *12.3 Motion Program Alarm*
SW05120 to SW05247	Reserved for system.	–
SW05248 to SW08191	Reserved for system.	–

* Refer to *MP2000 Series Troubleshooting Manual* (manual No.: SIEP C880700 40) for details.

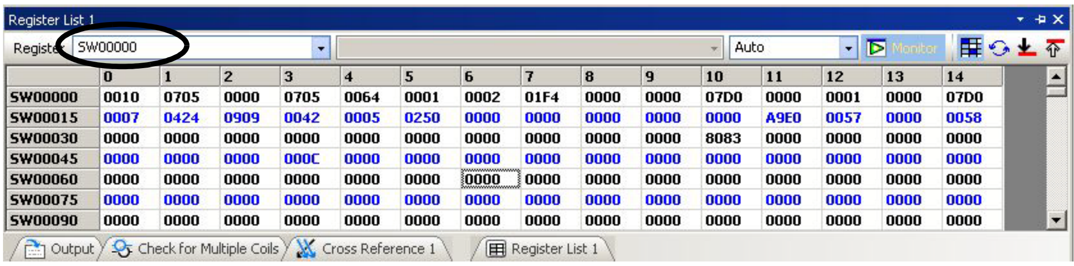
(2) Viewing the Contents of the System Registers

To view the contents of the system registers, start the MPE720 Engineering Tool and display a register list.
Use the following procedure to display the register list.

1. Display the Register List 1 Pane in the MPE720 tab page.

By default, there will be a Register List 1 Tab at the bottom of the Pane.

2. Enter the register address of the first system register to display in the Register Box in the form SW□□□□□. The contents of the system registers starting with the specified first register will be displayed.



- By default, the data type will be decimal. Right-click in the list and select Hexadecimal from the pop-up menu to display hexadecimal values (as shown above).

12.2.2 System Register Configuration and Error Status

(1) System I/O Error Status

The system I/O error status shows the I/O error status of the system. The data is stored in the following system registers.

<table>
<tr><th>Name</th><th>Register No.</th><th colspan="2">Remarks</th></tr>
<tr><td>I/O Error Count</td><td>SW00200</td><td colspan="2">Number of I/O error occurrences</td></tr>
<tr><td>Input Error Count</td><td>SW00201</td><td colspan="2">Number of input error occurrences</td></tr>
<tr><td>Input Error Address</td><td>SW00202</td><td colspan="2">Latest input error address (register address in IW□□□□)</td></tr>
<tr><td>Output Error Count</td><td>SW00203</td><td colspan="2">Number of output error occurrences</td></tr>
<tr><td>Output Error Address</td><td>SW00204</td><td colspan="2">Latest output error address (register address in OW□□□□)</td></tr>
<tr><td>Reserved for system</td><td>SW00205 to SW00207</td><td colspan="2">–</td></tr>
<tr><td rowspan="3">I/O Error Status</td><td>SW00208 to SW00215</td><td>CPU Board/Basic Module CPU/CPU Module error status
• The built-in SVB error status is stored in these system registers.
Refer to 12.2.2 (1) [b] CPU Board/ Basic Module CPU/CPU Module Error Status on page 12-30 for details on the error status.</td><td rowspan="3">The system registers that store I/O error status differ according to the Machine Controller type and configuration. Refer to 12.2.2 (1) [a] Configuration of I/O Error Status System Registers on page 12-28 for details.</td></tr>
<tr><td>SW00216 to SW00223</td><td>Reserved for system.</td></tr>
<tr><td>SW00224 to SW00503</td><td>Optional Modules/SVB Board/SVC Board error status*
• The SVB-01 Module error status is stored in these system registers.
Refer to 12.2.2 (2) Error Status for SVB-01 Module for details on the SVB-01 Module error status.</td></tr>
</table>

* The SVB Board is mounted on only MP2100M and MP2101M.

[a] Configuration of I/O Error Status System Registers

The configuration of I/O error status system registers differs as follows according to the Machine Controller type and configuration.

■ MP2100 to MP2101TM

Register Address	Machine Controller Type					
	MP2100	MP2101	MP2101T	MP2100M	MP2101M	MP2101TM
CPU Board Error Status SW00208 to SW00215	Error status for products					
Reserved for system SW00216 to SW00223	–	–	–	–	–	–
Error Status for Optional Modules/SVB Board/SVC Board SW00224 to SW00231	–	–	–	SVB Board error status		SVC Board error status
SW00232 to SW00239	–	–	–	–	–	–
SW00240 to SW00247	–	–	–	Rack 2, slot 1		
SW00248 to SW00255	–	–	–	Rack 2, slot 2		
SW00256 to SW00263	–	–	–	Rack 2, slot 3		
SW00264 to SW00271	–	–	–	Rack 2, slot 4		
SW00272 to SW00279	–	–	–	Rack 2, slot 5		
SW00280 to SW00287	–	–	–	Rack 2, slot 6		
SW00288 to SW00295	–	–	–	Rack 2, slot 7		
SW00296 to SW00303	–	–	–	Rack 2, slot 8		
SW00304 to SW00311	–	–	–	Rack 2, slot 9		
SW00312 to SW00319	–	–	–	Rack 3, slot 1		
SW00320 to SW00327	–	–	–	Rack 3, slot 2		
SW00328 to SW00335	–	–	–	Rack 3, slot 3		
SW00336 to SW00343	–	–	–	Rack 3, slot 4		
SW00344 to SW00351	–	–	–	Rack 3, slot 5		
SW00352 to SW00359	–	–	–	Rack 3, slot 6		
SW00360 to SW00367	–	–	–	Rack 3, slot 7		
SW00368 to SW00375	–	–	–	Rack 3, slot 8		
SW00376 to SW00383	–	–	–	Rack 3, slot 9		
SW00384 to SW00391	–	–	–	Rack 4, slot 1		
SW00392 to SW00399	–	–	–	Rack 4, slot 2		
SW00400 to SW00407	–	–	–	Rack 4, slot 3		
SW00408 to SW00415	–	–	–	Rack 4, slot 4		
SW00416 to SW00423	–	–	–	Rack 4, slot 5		
SW00424 to SW00431	–	–	–	Rack 4, slot 6		
SW00432 to SW00439	–	–	–	Rack 4, slot 7		
SW00440 to SW00447	–	–	–	Rack 4, slot 8		
SW00448 to SW00455	–	–	–	Rack 4, slot 9		
SW00456 to SW00463	–	–	–	–	–	–
SW00464 to SW00471	–	–	–	–	–	–
SW00472 to SW00479	–	–	–	–	–	–
SW00480 to SW00487	–	–	–	–	–	–
SW00488 to SW00495	–	–	–	–	–	–
SW00496 to SW00503	–	–	–	–	–	–

■ MP2200 to MP2400

Register Address	Machine Controller Type					
	MP2200		MP2300	MP2310	MP2300S	MP2400
	CPU-01, CPU-02	CPU-03, CPU-04				
Basic Module CPU Error Status SW00208 to SW00215	–	Error status for products				
Reserved for system SW00216 to SW00223	–	–	–	–	–	–
Optional Modules Error Status SW00224 to SW00231	Rack 1, slot 1		Slot 1			–
SW00232 to SW00239	Rack 1, slot 2		Slot 2		–	–
SW00240 to SW00247	Rack 1, slot 3		Slot 3		–	–
SW00248 to SW00255	Rack 1, slot 4		–	–	–	–
SW00256 to SW00263	Rack 1, slot 5		–	–	–	–
SW00264 to SW00271	Rack 1, slot 6		–	–	–	–
SW00272 to SW00279	Rack 1, slot 7		–	–	–	–
SW00280 to SW00287	Rack 1, slot 8		–	–	–	–
SW00288 to SW00295	Rack 2, slot 1		–	–	–	–
SW00296 to SW00303	Rack 2, slot 2		–	–	–	–
SW00304 to SW00311	Rack 2, slot 3		–	–	–	–
SW00312 to SW00319	Rack 2, slot 4		–	–	–	–
SW00320 to SW00327	Rack 2, slot 5		–	–	–	–
SW00328 to SW00335	Rack 2, slot 6		–	–	–	–
SW00336 to SW00343	Rack 2, slot 7		–	–	–	–
SW00344 to SW00351	Rack 2, slot 8		–	–	–	–
SW00352 to SW00359	Rack 2, slot 9		–	–	–	–
SW00360 to SW00367	Rack 3, slot 1		–	–	–	–
SW00368 to SW00375	Rack 3, slot 2		–	–	–	–
SW00376 to SW00383	Rack 3, slot 3		–	–	–	–
SW00384 to SW00391	Rack 3, slot 4		–	–	–	–
SW00392 to SW00399	Rack 3, slot 5		–	–	–	–
SW00400 to SW00407	Rack 3, slot 6		–	–	–	–
SW00408 to SW00415	Rack 3, slot 7		–	–	–	–
SW00416 to SW00423	Rack 3, slot 8		–	–	–	–
SW00424 to SW00431	Rack 3, slot 9		–	–	–	–
SW00432 to SW00439	Rack 4, slot 1		–	–	–	–
SW00440 to SW00447	Rack 4, slot 2		–	–	–	–
SW00448 to SW00455	Rack 4, slot 3		–	–	–	–
SW00456 to SW00463	Rack 4, slot 4		–	–	–	–
SW00464 to SW00471	Rack 4, slot 5		–	–	–	–
SW00472 to SW00479	Rack 4, slot 6		–	–	–	–
SW00480 to SW00487	Rack 4, slot 7		–	–	–	–
SW00488 to SW00495	Rack 4, slot 8		–	–	–	–
SW00496 to SW00503	Rack 4, slot 9		–	–	–	–

[b] CPU Board/Basic Module CPU/CPU Module Error Status

- The following models lack the SVB function so details about this error status are not listed in this manual.
  - MP2101T
  - MP2101TM
  - MP2200

■ MP2100/MP2100M/MP2101/MP2101M Error Status

<table>
<tr><td>(IO)</td><td colspan="8"></td></tr>
<tr><td>SW00208</td><td colspan="4">Bit 8 to Bit F
Not used.</td><td colspan="4">Bit 0 to Bit 7
Subslot (function) number (= 2)</td></tr>
<tr><td>(SVB)</td><td colspan="8"></td></tr>
<tr><td>SW00209</td><td colspan="4">Bit 8 to Bit F
Error code (station error = 1)</td><td colspan="4">Bit 0 to Bit 7
Subslot (function) number (= 3)</td></tr>
<tr><td>SW00210</td><td>Bit F
ST#15</td><td colspan="4">…………………………</td><td>Bit 2
ST#2</td><td>Bit 1
ST#1</td><td>Bit 0
Not used.</td></tr>
<tr><td>SW00211</td><td>Bit F
Not used.</td><td>Bit E
ST#30</td><td>Bit D
ST#29</td><td colspan="3">…………………………</td><td>Bit 1
ST#17</td><td>Bit 0
ST#16</td></tr>
<tr><td>SW00212</td><td colspan="8">Not used.</td></tr>
<tr><td>SW00213</td><td colspan="8">Not used.</td></tr>
<tr><td>(BUSIF)</td><td colspan="8"></td></tr>
<tr><td>SW00214</td><td colspan="4">Bit 8 to Bit F
Error code (I/O error = 2)</td><td colspan="4">Bit 0 to Bit 7
Subslot (function) number (= 7)</td></tr>
<tr><td>SW00215</td><td colspan="6">Bit F to Bit 2
Not used.</td><td>Bit 1
Output error</td><td>Bit 0
Input error</td></tr>
</table>

- SVB can be connected to a maximum of 21 stations (16 of which are servos totaling a maximum of 16 axes), including I/O.

- SVB Error Status Details

Item	Code	Remarks
Error Code	0	No error
	1	Station error
ST#n	0	Communications normal
	1	Communications error at station n

- BUSIF Error Status Details

Item	Code	Remarks
Error Code	0	Normal
	2	I/O error
Input Error	0	Communications normal
	1	Communications abnormal: Input timeout (2 ms)
Output Error	0	Communications normal
	1	Communications abnormal: Output timeout (2 ms)

■ MP2300 Error Status

Register								
(IO)								
SW00208	Bit 8 to Bit F Not used.				Bit 0 to Bit 7 Subslot (function) number (= 2)			
(SVB)								
SW00209	Bit 8 to Bit F Error code (station error = 1)				Bit 0 to Bit 7 Subslot (function) number (= 3)			
SW00210	Bit F ST#15	………………………				Bit 2 ST#2	Bit 1 ST#1	Bit 0 Not used.
SW00211	Bit F Not used.	Bit D ST#30	Bit D ST#29	………………………			Bit 1 ST#17	Bit 0 ST#16
SW00212 to SW00215	Not used.							

- SVB can be connected to a maximum of 21 stations (16 of which are servos totaling a maximum of 16 axes), including I/O.

• SVB Error Status Details

Item	Code	Remarks
Error Code	0	No error
	1	Station error
ST#n	0	Communications normal
	1	Communications error at station n

■ MP2300S/MP2310/MP2400 Error Status

Register								
(218IFA)								
SW00208	Bit 8 to Bit F Error code (station error = 1)				Bit 0 to Bit 7 Subslot (function) number (= 2)			
SW00209	Bit 2 to Bit F Not used.						Bit 1 Write	Bit 0 Read
SW00210	Bit C to Bit F Write transmission ST		Bit 8 to Bit B Reserved for system.		Bit 4 to Bit 7 Read transmission ST		Bit 0 to Bit 3 Reserved for system.	
SW00211 to SW00212	Not used.							
(SVB)								
SW00213	Bit 8 to Bit F Error code (station error = 1)				Bit 0 to Bit 7 Subslot (function) number (= 3)			
SW00214	Bit F ST#15	………………………				Bit 2 ST#2	Bit 1 ST#1	Bit 0 Not used.
SW00215	Bit F Not used.	Bit E ST#30	Bit D ST#29	………………………			Bit 1 ST#17	Bit 0 ST#16

• 218IFA Error Status Details

Item	Code	Remarks
Error Code	0	Normal
	1	Station error
Read/Write	0	Communications normal
	1	Communications error
Read/Write Transmission ST	0□0	No error
	0□4	Parameter formatting error
	0□5	Command sequence error
	0□6	Reset
	0□7	Data reception error
	0□8	Data sending error
	0□A	Connection error

• SVB Error Status Details

Item	Code	Remarks
Error Code	0	No error
	1	Station error
ST#n	0	Communications normal
	1	Communications error at station n

[c] SVB Board Error Status

- The SVB Board is mounted on only MP2100M and MP2101M.

SW00224	Bit 8 to Bit F Error code (station error = 1)				Bit 0 to Bit 7 Subslot (function) number (= 1)		
SW00225	Bit F ST#15	………………………			Bit 2 ST#2	Bit 1 ST#1	Bit 0 Not used.
SW00226	Bit F Not used.	Bit E ST#30	Bit D ST#29	………………………		Bit 1 ST#17	Bit 0 ST#16
SW00227 to SW00231	Not used.						

• SVB Board Error Status Details

Item	Code	Remarks
Error Code	0	No error
	1	Station error
ST#n	0	Communications normal
	1	Communications error at station n

(2) Error Status for SVB-01 Module

- System register addresses differ according to mounted rack and slot.
  For example, the first register address for rack 1, slot 1 (SW□□□□□ + 0) becomes SW00224.
  Refer to *12.2.2 (1) [a] Configuration of I/O Error Status System Registers* on page 12-28 for details on other first register addresses other than rack 1, slot 1.

SW□□□□□ + 0	Bit 8 to Bit F Error code (station error = 1)			Bit 0 to Bit 7 Subslot (function) number (= 1)		
SW□□□□□ + 1	Bit F ST#15	………………………		Bit 2 ST#2	Bit 1 ST#1	Bit 0 Not used.
SW□□□□□ + 2	Bit 6 to Bit F Not used.		Bit 5 ST#21	………	Bit 1 ST#17	Bit 0 ST#16
SW□□□□□ + 3	Not used.					
SW□□□□□ + 4	Not used.					
SW□□□□□ + 5	Not used.					
SW□□□□□ + 6	Not used.					
SW□□□□□ + 7	Not used.					

- Module can be connected to a maximum of 21 stations (16 of which are servos totaling a maximum of 16 stations), including I/O.

• Error Status Details

Item	Code	Remarks
Error Code	0	No error
	1	Station error
ST#n	0	Communications normal
	1	Communications error at station n

(3) CPU Unit/CPU Module Information

The data in these registers give information about the CPU Unit/CPU Module, and is stored in the following system registers.

[a] Configuration of System Registers

Register No.	Remarks
SW00800	CPU Module ID
SW00801	Hardware version (hex)
SW00802	Software version (BCD)
SW00803	Number of subslots (hex)
SW00804	Function Module 1 ID (hex)
SW00805	Function Module 1 Status
SW00806	Function Module 2 ID (hex)
SW00807	Function Module 2 Status
SW00808	Function Module 3 ID (hex)
SW00809	Function Module 3 Status
SW00810	Function Module 4 ID (hex)
SW00811	Function Module 4 Status
SW00812	Function Module 5 ID (hex)
SW00813	Function Module 5 Status
SW00814	Function Module 6 ID (hex)
SW00815	Function Module 6 Status

[b] Details

- The following models lack the SVB function so details about this information are not listed in this manual.
  - MP2101T
  - MP2101TM
  - MP2200

■ MP2100 to MP2101M

Register No.	Machine Controller Type			
	MP2100	MP2100M	MP2101	MP2101M
SW00800	MP2100ID (C180H)	MP2100M ID (C181H)	MP2101 ID (C182H)	MP2101M ID (C183H)
SW00801	Hardware version (hex)			
SW00802	Software version (BCD)			
SW00803	(0008H)	(0008H)	(0008H)	(0008H)
SW00804	CPU Function Module ID (C110H)			
SW00805	CPU Function Module Status			
SW00806	IO Function Module ID (8070H)			
SW00807	IO Function Module Status			
SW00808	SVB Function Module ID (9112H)			
SW00809	SVB Function Module Status			
SW00810	SVR Function Module ID (9210H)			
SW00811	SVR Function Module Status			
SW00812	–	–	–	–
SW00813	–	–	–	–
SW00814	–	–	–	–
SW00815	–	–	–	–

■ MP2300 to MP2400

Register No.	Machine Controller Type			
	MP2300	MP2310	MP2300S	MP2400
SW00800	MP2300 ID (C380H)	MP2310 ID (C382H)	MP2300S ID (C383H)	MP2400 ID (C480H)
SW00801	Hardware version (hex)			
SW00802	Software version (BCD)			
SW00803	(0004H)	(0005H)	(0005H)	(0005H)
SW00804	CPU Function Module ID (C310H)	CPU Function Module ID (C312H)	CPU Function Module ID (C313H)	CPU Function Module ID (C410H)
SW00805	CPU Function Module Status			
SW00806	IO Function Module ID (8070H)	218IFA Function Module ID (8623H)		
SW00807	IO Function Module Status	218IFA Function Module Status		
SW00808	SVB Function Module ID (9113H)	SVB Function Module ID (9116H)	SVB Function Module ID (9114H)	
SW00809	SVB Function Module Status			
SW00810	SVR Function Module ID (9210H)			
SW00811	SVR Function Module Status			
SW00812	–	M-EXECUTOR Function Module ID (8430H)		
SW00813	–	M-EXECUTOR Function Module Status		
SW00814	–	–	–	–
SW00815	–	–	–	–

(4) Option Module Information

Information on each Optional Module differs in system register depending on the rack, unit, and slot in which the Optional Module is installed.

[a] Configuration of the System Registers

■ MP2100 to MP2101TM

Register No.	Machine Controller Type					
	MP2100	MP2101	MP2101T	MP2100M	MP2101M	MP2101TM
SW00816 to SW00823	-	–	–	SVB Board information		SVC Board information
SW00824 to SW00831	–	–	–	–	–	–
SW00832 to SW00839	–	–	–	Rack 2, slot 1		
SW00840 to SW00847	–	–	–	Rack 2, slot 2		
SW00848 to SW00855	–	–	–	Rack 2, slot 3		
SW00856 to SW00863	–	–	–	Rack 2, slot 4		
SW00864 to SW00871	–	–	–	Rack 2, slot 5		
SW00872 to SW00889	–	–	–	Rack 2, slot 6		
SW00880 to SW00887	–	–	–	Rack 2, slot 7		
SW00888 to SW00895	–	–	–	Rack 2, slot 8		
SW00896 to SW00903	–	–	–	Rack 2, slot 9		
SW00904 to SW00911	–	–	–	Rack 3, slot 1		
SW00912 to SW00919	–	–	–	Rack 3, slot 2		
SW00920 to SW00927	–	–	–	Rack 3, slot 3		
SW00928 to SW00935	–	–	–	Rack 3, slot 4		
SW00936 to SW00943	–	–	–	Rack 3, slot 5		
SW00944 to SW00951	–	–	–	Rack 3, slot 6		
SW00952 to SW00959	–	–	–	Rack 3, slot 7		
SW00960 to SW00967	–	–	–	Rack 3, slot 8		
SW00968 to SW00975	–	–	–	Rack 3, slot 9		
SW00976 to SW00983	–	–	–	Rack 4, slot 1		
SW00984 to SW00991	–	–	–	Rack 4, slot 2		
SW00992 to SW00999	–	–	–	Rack 4, slot 3		
SW01000 to SW01007	–	–	–	Rack 4, slot 4		
SW01008 to SW01015	–	–	–	Rack 4, slot 5		
SW01016 to SW01023	–	–	–	Rack 4, slot 6		
SW01024 to SW01031	–	–	–	Rack 4, slot 7		
SW01032 to SW01039	–	–	–	Rack 4, slot 8		
SW01040 to SW01047	–	–	–	Rack 4, slot 9		
SW01048 to SW01055	–	–	–	–	–	–
SW01056 to SW01063	–	–	–	–	–	–
SW01064 to SW01071	–	–	–	–	–	–
SW01072 to SW01079	–	–	–	–	–	–
SW01080 to SW01087	–	–	–	–	–	–
SW01088 to SW01095	–	–	–	–	–	–

■ MP2200 to MP2400

Register No.	Machine Controller Type				
	MP2200	MP2300	MP2310	MP2300S	MP2400
SW00816 to SW00823	Rack 1, slot 1				–
SW00824 to SW00831	Rack 1, slot 2			–	–
SW00832 to SW00839	Rack 1, slot 3			–	–
SW00840 to SW00847	Rack 1, slot 4	–	–	–	–
SW00848 to SW00855	Rack 1, slot 5	–	–	–	–
SW00856 to SW00863	Rack 1, slot 6	–	–	–	–
SW00864 to SW00871	Rack 1, slot 7	–	–	–	–
SW00872 to SW00889	Rack 1, slot 8	–	–	–	–
SW00880 to SW00887	Rack 2, slot 1	–	–	–	–
SW00888 to SW00895	Rack 2, slot 2	–	–	–	–
SW00896 to SW00903	Rack 2, slot 3	–	–	–	–
SW00904 to SW00911	Rack 2, slot 4	–	–	–	–
SW00912 to SW00919	Rack 2, slot 5	–	–	–	–
SW00920 to SW00927	Rack 2, slot 6	–	–	–	–
SW00928 to SW00935	Rack 2, slot 7	–	–	–	–
SW00936 to SW00943	Rack 2, slot 8	–	–	–	–
SW00944 to SW00951	Rack 2, slot 9	–	–	–	–
SW00952 to SW00959	Rack 3, slot 1	–	–	–	–
SW00960 to SW00967	Rack 3, slot 2	–	–	–	–
SW00968 to SW00975	Rack 3, slot 3	–	–	–	–
SW00976 to SW00983	Rack 3, slot 4	–	–	–	–
SW00984 to SW00991	Rack 3, slot 5	–	–	–	–
SW00992 to SW00999	Rack 3, slot 6	–	–	–	–
SW01000 to SW01007	Rack 3, slot 7	–	–	–	–
SW01008 to SW01015	Rack 3, slot 8	–	–	–	–
SW01016 to SW01023	Rack 3, slot 9	–	–	–	–
SW01024 to SW01031	Rack 4, slot 1	–	–	–	–
SW01032 to SW01039	Rack 4, slot 2	–	–	–	–
SW01040 to SW01047	Rack 4, slot 3	–	–	–	–
SW01048 to SW01055	Rack 4, slot 4	–	–	–	–
SW01056 to SW01063	Rack 4, slot 5	–	–	–	–
SW01064 to SW01071	Rack 4, slot 6	–	–	–	–
SW01072 to SW01079	Rack 4, slot 7	–	–	–	–
SW01080 to SW01087	Rack 4, slot 8	–	–	–	–
SW01088 to SW01095	Rack 4, slot 9	–	–	–	–

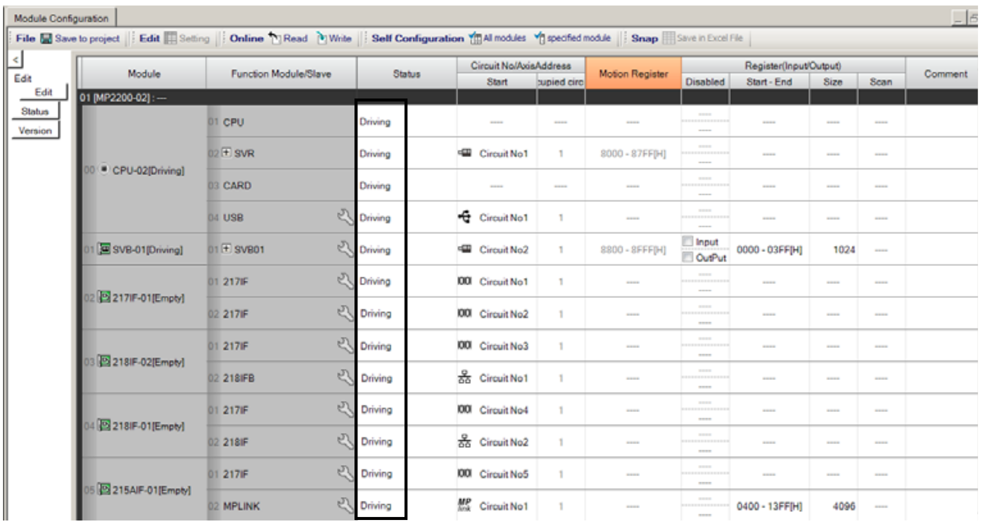
[b] Detailed Configuration of System Registers of Information on SVB-01 Module

Register No.	Remarks	Value
SW0□□□□ + 0	Optional Module ID	9195H
SW0□□□□ + 1	Hardware version (hex)	The value is displayed according to the actual product.
SW0□□□□ + 2	Software version (BCD)	
SW0□□□□ + 3	Number of subslots (hex)	0001H
SW0□□□□ + 4	Function Module 1 Function Module ID (hex)	9115H
SW0□□□□ + 5	Status of Function Module 1	Refer to ■ *Function Module Status Details*.
SW0□□□□ + 6	Function Module 2 Function Module ID (hex)	– (Nothing is displayed because the SVB-01 Module lacks Function Module 2.)
SW0□□□□ + 7	Status of Function Module 2	

■ Function Module Status Details

Value	Text Displayed in MPE720 Module Configuration Definition	Status
0	None	There is no module definition and the Module is not mounted.
1	Empty	There is a module definition, but the Module is not mounted.
2	Operating (Driving)	The Module is operating normally.
3	Standby (Reserved for system.)	The Module is on standby.
4	Failure	An error was detected in the Module.
5	Module name	The mounted Module does not match the definition.
6	Waiting for initialization	The Module is mounted, but there is no detailed function module definition.
7	Driving Stop	Local I/O is stopped.
8 or higher	—	Reserved for system.

- Details of Function Modules can be confirmed in the Module Configuration Tab Page of the MPE720.



(5) Motion Program Execution Information

This section gives the system register configuration of and details on the motion program execution information.

[a] Configuration of System Registers

The data in these registers give the execution status of the motion programs, and is stored in the following system registers.

Register No.	Name	Reference
SW03200	Number of Currently Executing Program for Work 1	–
SW03201	Number of Currently Executing Program for Work 2	–
SW03202	Number of Currently Executing Program for Work 3	–
SW03203	Number of Currently Executing Program for Work 4	–
SW03204	Number of Currently Executing Program for Work 5	–
SW03205	Number of Currently Executing Program for Work 6	–
SW03206	Number of Currently Executing Program for Work 7	–
SW03207	Number of Currently Executing Program for Work 8	–
SW03208	Number of Currently Executing Program for Work 9	–
SW03209	Number of Currently Executing Program for Work 10	–
SW03210	Number of Currently Executing Program for Work 11	–
SW03211	Number of Currently Executing Program for Work 12	–
SW03212	Number of Currently Executing Program for Work 13	–
SW03213	Number of Currently Executing Program for Work 14	–
SW03214	Number of Currently Executing Program for Work 15	–
SW03215	Number of Currently Executing Program for Work 16	–
SW03216 to SW03231	Reserved for system.	–
SW03232 to SW03263	Program Running Bits	*12.2.2 (5) [b] Details*
SW03264 to SW03321	Work 1 Program Information	■ *System Work Numbers 1 to 8*
SW03322 to SW03379	Work 2 Program Information	
SW03380 to SW03437	Work 3 Program Information	
SW03438 to SW03495	Work 4 Program Information	
SW03496 to SW03553	Work 5 Program Information	
SW03554 to SW03611	Work 6 Program Information	
SW03612 to SW03669	Work 7 Program Information	
SW03670 to SW03727	Work 8 Program Information	

Register No.	Name	Reference
SW03728 to SW03785	Work 9 Program Information	■ *System Work Numbers 9 to 16*
SW03786 to SW03843	Work 10 Program Information	
SW03844 to SW03901	Work 11 Program Information	
SW03902 to SW03959	Work 12 Program Information	
SW03960 to SW04017	Work 13 Program Information	
SW04018 to SW04075	Work 14 Program Information	
SW04076 to SW04133	Work 15 Program Information	
SW04134 to SW04191	Work 16 Program Information	
SW04192 to SW05119	Reserved for system.	–

[b] Details

The following table gives details on the Program Execution Bits from system register addresses SW03232 to SW03263.
The program is being executed when the corresponding bit is 1.

Register No.	Description
SW03232	MP□016 (Bit F) to MP□001 (Bit 0)
SW03233	MP□032 (Bit F) to MP□017 (Bit 0)
SW03234	MP□048 (Bit F) to MP□033 (Bit 0)
SW03235	MP□064 (Bit F) to MP□049 (Bit 0)
SW03236	MP□080 (Bit F) to MP□065 (Bit 0)
SW03237	MP□096 (Bit F) to MP□081 (Bit 0)
SW03238	MP□112 (Bit F) to MP□097 (Bit 0)
SW03239	MP□128 (Bit F) to MP□113 (Bit 0)
SW03240	MP□144 (Bit F) to MP□129 (Bit 0)
SW03241	MP□160 (Bit F) to MP□145 (Bit 0)
SW03242	MP□176 (Bit F) to MP□161 (Bit 0)
SW03243	MP□192 (Bit F) to MP□177 (Bit 0)
SW03244	MP□208 (Bit F) to MP□193 (Bit 0)
SW03245	MP□224 (Bit F) to MP□209 (Bit 0)
SW03246	MP□240 (Bit F) to MP□225 (Bit 0)
SW03247	MP□256 (Bit F) to MP□241 (Bit 0)
SW03248 to SW03263	Reserved for system.

[c] List of Used System Registers

The registers that are used are given in the following table.
Refer to *12.3.2 Motion Program Alarm Codes* for details on alarm codes.

■ System Work Numbers 1 to 8

System Work Numbers		Work 1	Work 2	Work 3	Work 4	Work 5	Work 6	Work 7	Work 8
Executing Main Program Number		SW03200	SW03201	SW03202	SW03203	SW03204	SW03205	SW03206	SW03207
Status		SW03264	SW03322	SW03380	SW03438	SW03496	SW03554	SW03612	SW03670
Control Signals		SW03265	SW03323	SW03381	SW03439	SW03497	SW03555	SW03613	SW03671
Fork 0	Program Number	SW03266	SW03324	SW03382	SW03440	SW03498	SW03556	SW03614	SW03672
	Block Number	SW03267	SW03325	SW03383	SW03441	SW03499	SW03557	SW03615	SW03673
	Alarm Code	SW03268	SW03326	SW03384	SW03442	SW03500	SW03558	SW03616	SW03674
Fork 1	Program Number	SW03269	SW03327	SW03385	SW03443	SW03501	SW03559	SW03617	SW03675
	Block Number	SW03270	SW03328	SW03386	SW03444	SW03502	SW03560	SW03618	SW03676
	Alarm Code	SW03271	SW03329	SW03387	SW03445	SW03503	SW03561	SW03619	SW03677
Fork 2	Program Number	SW03272	SW03330	SW03388	SW03446	SW03504	SW03562	SW03620	SW03678
	Block Number	SW03273	SW03331	SW03389	SW03447	SW03505	SW03563	SW03621	SW03679
	Alarm Code	SW03274	SW03332	SW03390	SW03448	SW03506	SW03564	SW03622	SW03680
Fork 3	Program Number	SW03275	SW03333	SW03391	SW03449	SW03507	SW03565	SW03623	SW03681
	Block Number	SW03276	SW03334	SW03392	SW03450	SW03508	SW03566	SW03624	SW03682
	Alarm Code	SW03277	SW03335	SW03393	SW03451	SW03509	SW03567	SW03625	SW03683
Fork 4	Program Number	SW03278	SW03336	SW03394	SW03452	SW03510	SW03568	SW03626	SW03684
	Block Number	SW03279	SW03337	SW03395	SW03453	SW03511	SW03569	SW03627	SW03685
	Alarm Code	SW03280	SW03338	SW03396	SW03454	SW03512	SW03570	SW03628	SW03686
Fork 5	Program Number	SW03281	SW03339	SW03397	SW03455	SW03513	SW03571	SW03629	SW03687
	Block Number	SW03282	SW03340	SW03398	SW03456	SW03514	SW03572	SW03630	SW03688
	Alarm Code	SW03283	SW03341	SW03399	SW03457	SW03515	SW03573	SW03631	SW03689
Fork 6	Program Number	SW03284	SW03342	SW03400	SW03458	SW03516	SW03574	SW03632	SW03690
	Block Number	SW03285	SW03343	SW03401	SW03459	SW03517	SW03575	SW03633	SW03691
	Alarm Code	SW03286	SW03344	SW03402	SW03460	SW03518	SW03576	SW03634	SW03692
Fork 7	Program Number	SW03287	SW03345	SW03403	SW03461	SW03519	SW03577	SW03635	SW03693
	Block Number	SW03288	SW03346	SW03404	SW03462	SW03520	SW03578	SW03636	SW03694
	Alarm Code	SW03289	SW03347	SW03405	SW03463	SW03521	SW03579	SW03637	SW03695
Logical Axis 1 Program Current Position		SL03290	SL03348	SL03406	SL03464	SL03522	SL03580	SL03638	SL03696
Logical Axis 2 Program Current Position		SL03292	SL03350	SL03408	SL03466	SL03524	SL03582	SL03640	SL03698
Logical Axis 3 Program Current Position		SL03294	SL03352	SL03410	SL03468	SL03526	SL03584	SL03642	SL03700
Logical Axis 4 Program Current Position		SL03296	SL03354	SL03412	SL03470	SL03528	SL03586	SL03644	SL03702
Logical Axis 5 Program Current Position		SL03298	SL03356	SL03414	SL03472	SL03530	SL03588	SL03646	SL03704
Logical Axis 6 Program Current Position		SL03300	SL03358	SL03416	SL03474	SL03532	SL03590	SL03648	SL03706
Logical Axis 7 Program Current Position		SL03302	SL03360	SL03418	SL03476	SL03534	SL03592	SL03650	SL03708

(cont'd)

System Work Numbers	Work 1	Work 2	Work 3	Work 4	Work 5	Work 6	Work 7	Work 8
Logical Axis 8 Program Current Position	SL03304	SL03362	SL03420	SL03478	SL03536	SL03594	SL03652	SL03710
Logical Axis 9 Program Current Position	SL03306	SL03364	SL03422	SL03480	SL03538	SL03596	SL03654	SL03712
Logical Axis 10 Program Current Position	SL03308	SL03366	SL03424	SL03482	SL03540	SL03598	SL03656	SL03714
Logical Axis 11 Program Current Position	SL03310	SL03368	SL03426	SL03484	SL03542	SL03600	SL03658	SL03716
Logical Axis 12 Program Current Position	SL03312	SL03370	SL03428	SL03486	SL03544	SL03602	SL03660	SL03718
Logical Axis 13 Program Current Position	SL03314	SL03372	SL03430	SL03488	SL03546	SL03604	SL03662	SL03720
Logical Axis 14 Program Current Position	SL03316	SL03374	SL03432	SL03490	SL03548	SL03606	SL03664	SL03722
Logical Axis 15 Program Current Position	SL03318	SL03376	SL03434	SL03492	SL03550	SL03608	SL03666	SL03724
Logical Axis 16 Program Current Position	SL03320	SL03378	SL03436	SL03494	SL03552	SL03610	SL03668	SL03726

■ System Work Numbers 9 to 16

System Work Numbers		Work 9	Work 10	Work 11	Work 12	Work 13	Work 14	Work 15	Work 16
Executing Main Program Number		SW03208	SW03209	SW03210	SW03211	SW03212	SW03213	SW03214	SW03215
Status		SW03728	SW03786	SW03844	SW03902	SW03960	SW04018	SW04076	SW04134
Control Signals		SW03729	SW03787	SW03845	SW03903	SW03961	SW04019	SW04077	SW04135
Fork 0	Program Number	SW03730	SW03788	SW03846	SW03904	SW03962	SW04020	SW04078	SW04136
	Block Number	SW03731	SW03789	SW03847	SW03905	SW03963	SW04021	SW04079	SW04137
	Alarm Code	SW03732	SW03790	SW03848	SW03906	SW03964	SW04022	SW04080	SW04138
Fork 1	Program Number	SW03733	SW03791	SW03849	SW03907	SW03965	SW04023	SW04081	SW04139
	Block Number	SW03734	SW03792	SW03850	SW03908	SW03966	SW04024	SW04082	SW04140
	Alarm Code	SW03735	SW03793	SW03851	SW03909	SW03967	SW04025	SW04083	SW04141
Fork 2	Program Number	SW03736	SW03794	SW03852	SW03910	SW03968	SW04026	SW04084	SW04142
	Block Number	SW03737	SW03795	SW03853	SW03911	SW03969	SW04027	SW04085	SW04143
	Alarm Code	SW03738	SW03796	SW03854	SW03912	SW03970	SW04028	SW04086	SW04144
Fork 3	Program Number	SW03739	SW03797	SW03855	SW03913	SW03971	SW04029	SW04087	SW04145
	Block Number	SW03740	SW03798	SW03856	SW03914	SW03972	SW04030	SW04088	SW04146
	Alarm Code	SW03741	SW03799	SW03857	SW03915	SW03973	SW04031	SW04089	SW04147
Fork 4	Program Number	SW03742	SW03800	SW03858	SW03916	SW03974	SW04032	SW04090	SW04148
	Block Number	SW03743	SW03801	SW03859	SW03917	SW03975	SW04033	SW04091	SW04149
	Alarm Code	SW03744	SW03802	SW03860	SW03918	SW03976	SW04034	SW04092	SW04150
Fork 5	Program Number	SW03745	SW03803	SW03861	SW03919	SW03977	SW04035	SW04093	SW04151
	Block Number	SW03746	SW03804	SW03862	SW03920	SW03978	SW04036	SW04094	SW04152
	Alarm Code	SW03747	SW03805	SW03863	SW03921	SW03979	SW04037	SW04095	SW04153

(cont'd)

System Work Numbers		Work 9	Work 10	Work 11	Work 12	Work 13	Work 14	Work 15	Work 16
Fork 6	Program Number	SW03748	SW03806	SW03864	SW03922	SW03980	SW04038	SW04096	SW04154
	Block Number	SW03749	SW03807	SW03865	SW03923	SW03981	SW04039	SW04097	SW04155
	Alarm Code	SW03750	SW03808	SW03866	SW03924	SW03982	SW04040	SW04098	SW04156
Fork 7	Program Number	SW03751	SW03809	SW03867	SW03925	SW03983	SW04041	SW04099	SW04157
	Block Number	SW03752	SW03810	SW03868	SW03926	SW03984	SW04042	SW04100	SW04158
	Alarm Code	SW03753	SW03811	SW03869	SW03927	SW03985	SW04043	SW04101	SW04159
Logical Axis 1 Program Current Position		SL03754	SL03812	SL03870	SL03928	SL03986	SL04044	SL04102	SL04160
Logical Axis 2 Program Current Position		SL03756	SL03814	SL03872	SL03930	SL03988	SL04046	SL04104	SL04162
Logical Axis 3 Program Current Position		SL03758	SL03816	SL03874	SL03932	SL03990	SL04048	SL04106	SL04164
Logical Axis 4 Program Current Position		SL03760	SL03818	SL03876	SL03934	SL03992	SL04050	SL04108	SL04166
Logical Axis 5 Program Current Position		SL03762	SL03820	SL03878	SL03936	SL03994	SL04052	SL04110	SL04168
Logical Axis 6 Program Current Position		SL03764	SL03822	SL03880	SL03938	SL03996	SL04054	SL04112	SL04170
Logical Axis 7 Program Current Position		SL03766	SL03824	SL03882	SL03940	SL03998	SL04056	SL04114	SL04172
Logical Axis 8 Program Current Position		SL03768	SL03826	SL03884	SL03942	SL04000	SL04058	SL04116	SL04174
Logical Axis 9 Program Current Position		SL03770	SL03828	SL03886	SL03944	SL04002	SL04060	SL04118	SL04176
Logical Axis 10 Program Current Position		SL03772	SL03830	SL03888	SL03946	SL04004	SL04062	SL04120	SL04178
Logical Axis 11 Program Current Position		SL03774	SL03832	SL03890	SL03948	SL04006	SL04064	SL04122	SL04180
Logical Axis 12 Program Current Position		SL03776	SL03834	SL03892	SL03950	SL04008	SL04066	SL04124	SL04182
Logical Axis 13 Program Current Position		SL03778	SL03836	SL03894	SL03952	SL04010	SL04068	SL04126	SL04184
Logical Axis 14 Program Current Position		SL03780	SL03838	SL03896	SL03954	SL04012	SL04070	SL04128	SL04186
Logical Axis 15 Program Current Position		SL03782	SL03840	SL03898	SL03956	SL04014	SL04072	SL04130	SL04188
Logical Axis 16 Program Current Position		SL03784	SL03842	SL03900	SL03958	SL04016	SL04074	SL04132	SL04190

12.3 Motion Program Alarm

If an alarm occurs in the motion program, use the alarm code to isolate the cause.

12.3.1 Structure of Motion Program Alarms

You can monitor for motion program alarms in the SW03268 to SW04159 system registers.
The structure of the motion program alarm data stored in the system registers is shown below.

Bit F – Bit D	Bit C – Bit 8	Bit 7 – Bit 0
Reserved for system	Alarm axis information (1 to 16)	Alarm code (Axis alarm when bit 7 turns ON.)

- The system register addresses depend on the system work number. Refer to *12.2.2 (5) [c] List of Used System Registers* for details.
- Alarm Indications

Alarm (Example)	Motion Program Alarm
Program Alarm	00□□H
Axis Alarm for Circuit 2 Axis 3	03□□H

12.3.2 Motion Program Alarm Codes

The following table lists the alarm codes for motion programs.

(1) Program Alarm

Alarm Code	Alarm Name	Alarm Contents	Correction
0002H	Division error	The data was divided by 0.	Correct the motion program.
0010H	Turn specified instead of radius	A number of turns (T) was specified instead of a radius for a circular or helical interpolation instruction.	• Convert the radius setting to a center point coordinate setting to execute the circular or helical interpolation instruction. • Do not specify a number of turns.
0011H	Interpolation feed speed over limit	The interpolation feed speed exceeded the setting range of the FMX instruction.	Correct the feed speed of the interpolation instruction.
0012H	No interpolation feed speed setting	The interpolation feed speed has never been set. (If you set it once, further settings can be omitted within the same program.)	Set the feed speed of the interpolation instruction.
0013H	Range exceeded after acceleration parameter conversion	The indirectly designated acceleration parameter exceeded the setting range.	Change the value of the register that is used for the indirect designation.
0014H	Circular arc length exceeded LONG_MAX	The circular arc length that was specified for a circular or helical interpolation instruction exceeded the setting range.	Correct the circular arc length setting for the circular or helical interpolation instruction.
0015H	No vertical axis set for the circular arc plane	The vertical axis was not set for a circular or helical interpolation instruction.	Set the vertical axis with the PLN instruction.
0016H	No horizontal axis set for the circular arc plane	The horizontal axis was not set for a circular or helical interpolation instruction.	Set the horizontal axis with the PLN instruction.
0017H	Number of axes over limit	The number of specified axes exceeds the limit of a circular interpolation instruction (2 axes max.) or a helical interpolation instruction (3 axes max.).	Correct the axis setting of the circular or helical interpolation instruction.
0018H	Number of turns over limit	The number of turns that was specified for a circular or helical interpolation instruction exceeded the setting range.	Correct the number of turns setting of the circular or helical interpolation instruction.
0019H	Radius exceeded LONG_MAX	The radius that was specified for a circular or helical interpolation instruction exceeded the setting range.	Correct the radius setting of the circular or helical interpolation instruction.

(cont'd)

Alarm Code	Alarm Name	Alarm Contents	Correction
001AH	Center point setting error	The correct center point was not set for a circular or helical interpolation instruction.	Correct the center point setting of the circular or helical interpolation instruction.
001BH	Emergency stop	The axis movement instruction was stopped due to a Request for Stop of Program.	Turn OFF the Request for Stop of Program motion program control signal, and turn ON the Alarm Reset Request.
001CH	Linear interpolation travel distance exceeded LONG_MAX	The travel distance that was specified for a linear interpolation instruction exceeded the setting range.	Correct the travel distance for the linear interpolation instruction.
001DH	FMX is not defined	There was no FMX instruction executed in a motion program that includes an interpolation instruction.	Execute an FMX instruction. An FMX instruction is required for each program that contains an interpolation instruction.
001EH	T address out of range	The address setting in an IAC/IDC/FMX instruction exceeds the setting range.	Correct the setting in the IAC/IDC/FMX instruction.
001FH	P address out of range	The address setting in an IFP instruction exceeds the setting range.	Correct the IFP instruction setting.
0021H	PFORK execution error	Motion instructions were executed at the same time in the second fork of the PFORK instruction in the calling motion program and the second fork of the PFORK instruction in the subprogram.	Correct the calling motion program or the subprogram.
0022H	Indirect designation register range error	The specified register address exceeds the range of the register size.	Correct the motion program.
0023H	Travel distance out of range	The decimal-format axis travel distance specified in an axis movement instruction exceeds the allowed range.	Correct the axis travel distance.

(2) Axis Alarm

- If an axis alarm occurs, the axis number is stored in bits 8 to C.

0080H	Logical axis use prohibited	More than one motion instruction was executed for the same axis.	Correct the motion program.
0081H	The infinite-length axis setting exceeded POSMAX	The travel distance setting for infinite-length axis exceeded the POSMAX setting.	• Correct the setting of fixed parameter No. 10 (Infinite-length Axis Reset Position). • Correct the motion program.
0082H	The axis travel distance exceeded LONG_MAX	The axis travel distance setting exceeded the allowed range.	Correct the motion program.
0084H	Duplicated motion command	More than one instruction was executed for the same axis.	Check for and remove simultaneous references for the same axis from other programs.
0085H	Motion command response error	A response for a different motion command was reported by the motion control function when a motion language instruction was executed.	• Remove the cause of the alarm at the target axis. • If the Servo is not ON, turn ON the Servo. • Check for and remove simultaneous references for the same axis from other programs.
0087H	VEL setting out of range	The setting in the VEL instruction exceeds the allowed range.	Correct the VEL instruction.
0088H	INP setting out of range	The setting in the INP instruction exceeds the allowed range.	Correct the INP instruction.
0089H	ACC/SCC/DCC setting out of range	The setting in the ACC/SCC/DCC instruction exceeds the allowed range.	Correct the ACC/SCC/DCC instruction.
008AH	No time setting in MVT instruction	The T setting in the MVT instruction is zero.	Correct the MVT instruction.

(cont'd)

008BH	Command cannot be executed	The specified motion instruction cannot be executed on the target motion control function.	Correct the motion program.
008CH	Distribution incomplete	A motion instruction was executed when the Motion Control Function Module had not completed distribution for a previous instruction.	Correct the motion program so that the motion instruction is executed when the Distribution Completed Bit is ON.
008DH	Motion command error termination	The Motion Control Function Module is in Command Error status.	• Clear the error at the target axis. • Correct the motion program.

Appendices

Appendices

App

Appendix A System Registers Lists

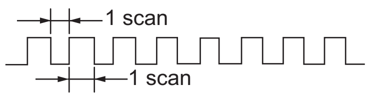
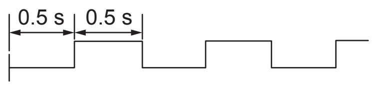
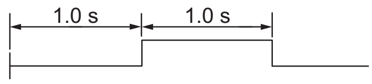
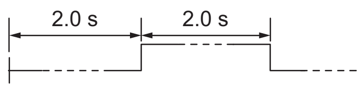
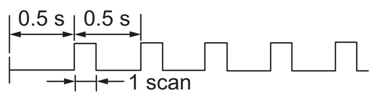
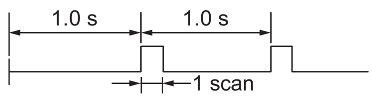
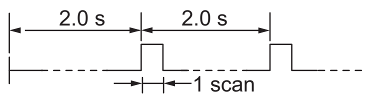
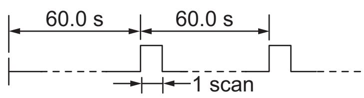
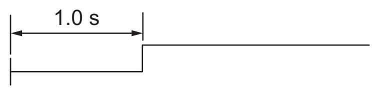
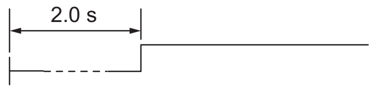
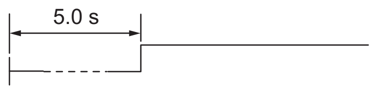
A.1 System Service Registers

(1) Shared by All Drawings

Name	Register No.	Remarks
Reserved (Reserved for the system)	SB000000	(Not used)
First High-speed Scan	SB000001	ON for only the first scan after high-speed scan is started.
First Low-speed Scan	SB000003	ON for only the first scan after low-speed scan is started.
Always ON	SB000004	Always ON (= 1)
Reserved (Reserved for the system)	SB000005 to SB00000F	(Not used)

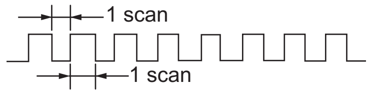
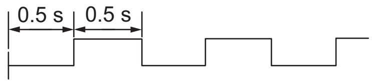
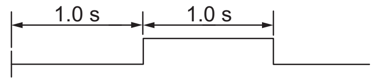
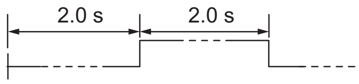
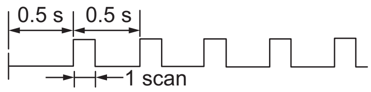
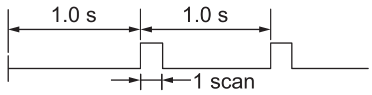
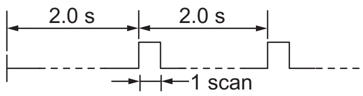
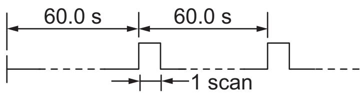
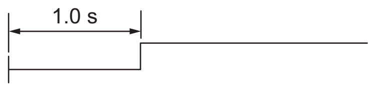
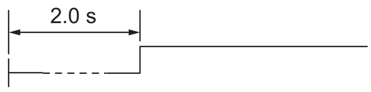
(2) DWG.H Only

Operation starts when high-speed scan starts.

Name	Register No.	Remarks
1-scan Flicker Relay	SB000010	
0.5-s Flicker Relay	SB000011	
1.0-s Flicker Relay	SB000012	
2.0-s Flicker Relay	SB000013	
0.5-s Sampling Relay	SB000014	
1.0-s Sampling Relay	SB000015	
2.0-s Sampling Relay	SB000016	
60.0-s Sampling Relay	SB000017	
1.0 s After Start of Scan Relay	SB000018	
2.0 s After Start of Scan Relay	SB000019	
5.0 s After Start of Scan Relay	SB00001A	

(3) DWG.L Only

Operation starts when low-speed scan starts.

Name	Register No.	Remarks
One-scan Flicker Relay	SB000030	
0.5-s Flicker Relay	SB000031	
1.0-s Flicker Relay	SB000032	
2.0-s Flicker Relay	SB000033	
0.5-s Sampling Relay	SB000034	
1.0-s Sampling Relay	SB000035	
2.0-s Sampling Relay	SB000036	
60.0-s Sampling Relay	SB000037	
1.0 s After Start of Scan Relay	SB000038	
2.0 s After Start of Scan Relay	SB000039	
5.0 s After Start of Scan Relay	SB00003A	

A.2 Scan Execution Status and Calendar

Name	Register No.	Remarks
High-speed Scan Set Value	SW00004	High-speed Scan Set Value (0.1 ms)
High-speed Scan Current Value	SW00005	High-speed Scan Current Value (0.1 ms)
High-speed Scan Maximum Value	SW00006	High-speed Scan Maximum Value (0.1 ms)
Reserved by the system	SW00007 to SW00009	(Not used)
Low-speed Scan Set Value	SW00010	Low-speed Scan Set Value (0.1 ms)
Low-speed Scan Current Value	SW00011	Low-speed Scan Current Value (0.1 ms)
Low-speed Scan Maximum Value	SW00012	Low-speed Scan Maximum Value (0.1 ms)
Reserved by the system.	SW00013	(Not used)
Executing Scan Current Value	SW00014	Executing Scan Current Value (0.1 ms)
Calendar: Year	SW00015	1999: 0099 (BCD) (Last two digits only)
Calendar: Month Day	SW00016	December 31: 1231 (BCD)
Calendar: Hours Minutes	SW00017	23 hours 59 minutes: 2359 (BCD)
Calendar: Seconds	SW00018	59 s: 59 (BCD)
Calendar: Day of Week	SW00019	0 to 6: Sun., Mon. to Sat.
H Scan Time Over Counter	SW00044	H Scan Time Over Counter
L Scan Time Over Counter	SW00046	L Scan Time Over Counter

A.3 Program Software Numbers and Remaining Program Memory Capacity Name

Name	Register No.	Remarks
System Program Software Number	SW00020	S□□□□ (□□□□ is stored as BCD)
System Number	SW00021 to SW00025	(Not used)
Remaining Program Memory Capacity	SL00026	Unit: Bytes
Total Memory Capacity	SL00028	Unit: Bytes

Appendix B Settings When Connecting MECHATROLINK Compatible I/O Modules, MYVIS, and MP940

When connecting MECHATROLINK compatible Distributed I/O Module, MYVIS, and MP940 as slave stations, set as described below in the Module Configuration Definition Window.

- Refer to *3.4.2 (1) Opening the MECHATROLINK Transmission Definition Window* for further information.

B.1 Settings in the Module Configuration Definition Window

After setting the required items in the Module Configuration Definition Window, and save the settings.

		Model	Setting			
			TYPE	SIZE		SCAN
				INPUT	OUTPUT	
Supported Communication Method	MECHATROLINK-I only	JEPMC-IO350		4	4	Can be set
		MP940		8	8	Can be set
		JAMSC-120DRA83030		0	1	Can be set
		JAMSC-120DAI53330		1	0	Can be set
		JAMSC-120DAI73330		1	0	Can be set
		JAMSC-120DDI34330		1	0	Can be set
		JAMSC-120DDO34340		0	1	Can be set
		JAMSC-120AVI02030		7	2	Can be set
		JAMSC-120AVO01030		2	4	Can be set
		JAMSC-120EHC21140		7	8	Can be set
		JAMSC-120MMB20230		8	8	Can be set
		JAMSC-120DAO83330		0	1	Can be set
	MECHATROLINK-I and MECHATROLINK-II	JEPMC-IO2310/30(-E)		4	4	Can be set
		JEPMC-PL2900(-E)		7	8	Can be set
		JEPMC-PL2910(-E)		8	8	Can be set
		JEPMC-AN2900(-E)		7	2	Can be set
		JEPMC-AN2910(-E)		2	4	Can be set
		JEPMC-IO2320		8	8	Can be set
		JAPMC-IO2900-E		1	0	Can be set
		JAPMC-IO2910-E		0	1	Can be set
		JAPMC-IO2920-E		1	1	Can be set
		JAPMC-IO2950-E		0	1	Can be set
		SVB-01		8 (15)	8 (15)	Can be set
		MYVIS YV250 and YV260		8 (16)	8 (16)	Can be set

- The values in parentheses are the sizes in MECHATROLINK-II 32-byte mode.

■ Slave Devices That Are Not Detected by Self-configuration

The following slave devices (I/O Modules) have no model code. Therefore, "*****I/O" (wild card I/O) will be displayed in the ***TYPE*** column after allocation by self-configuration.

- JEPMC-IO350
- JAMSC-120DAI53330
- JAMSC-120DAI73330
- JAMSC-120DAO83330
- JAMSC-120DRA83030

For the slave devices with the "*****I/O" display, set the correct device type in the Module Configuration Definition Window.

B.2 I/O Register Configuration

This section describes the I/O register configuration of each MECHATROLINK compatible Module.

(1) 120DRA83030, 120DAO83330, and JAPMC-IO2950-E (8-point Output)

	Command Data			Response Data	
OW□□□□		High-speed/ Low-speed control data (1 word)		None	

(2) 120DAI53330 and 120DAI73330 (8-point Input)

	Command Data			Response Data	
	None		IW□□□□		High-speed/ Low-speed control data (1 word)

(3) 120DDI34330 and JAPMC-IO2900-E (16-point Input)

	Command Data			Response Data	
	None		IW□□□□		High-speed/ Low-speed control data (1 word)

(4) 120DDO34340 and JAPMC-IO2910-E (16-point Output)

	Response Data			Response Data	
OW□□□□		High-speed/ Low-speed control data (1 word)		None	

(5) JAPMC-IO2920-E (16-point I/O)

	Response Data			Response Data	
OW□□□□		High-speed/ Low-speed control data (1 word)	IW□□□□		High-speed/ Low-speed control data (1 word)

(6) JEPMC-IO350, JEPMC-IO2310 (-E), and JEPMC-IO2330 (-E) (64-point I/O)

	Command Data			Response Data	
OW□□□□		High-speed/ Low-speed control data (4 words)	IW□□□□		High-speed/ Low-speed control data (4 words)
OW□□□□+1			IW□□□□+1		
OW□□□□+2			IW□□□□+2		
OW□□□□+3			IW□□□□+3		

(7) JEPMC-IO2320 (128-point I/O)

Register	Command Data
OW□□□□	
OW□□□□+1	
OW□□□□+2	
OW□□□□+3	
OW□□□□+4	
OW□□□□+5	
OW□□□□+6	
OW□□□□+7	

High-speed/ Low-speed control data (8 words)

Register	Response Data
IW□□□□	
IW□□□□+1	
IW□□□□+2	
IW□□□□+3	
IW□□□□+4	
IW□□□□+5	
IW□□□□+6	
IW□□□□+7	

High-speed/ Low-speed control data (8 words)

(8) 120AVI02030 and JEPMC-AN2900 (-E) (Analog Input)

Register	Command Data
OW□□□□	(Reserved by the system)
OW□□□□+1	Not used

High-speed/ Low-speed control data (2 words)

Register	Response Data
IW□□□□	
IW□□□□+1	
IW□□□□+2	CH1 Analog input value
IW□□□□+3	CH2 Analog input value
IW□□□□+4	CH3 Analog input value
IW□□□□+5	CH4 Analog input value
IW□□□□+6	Status

High-speed/ Low-speed control data (7 words)

(9) 120AVO01030 and JEPMC-AN2910 (-E) (Analog Output)

Register	Command Data
OW□□□□	(Reserved by the system)
OW□□□□+1	Not used
OW□□□□+2	CH1 Analog output value
OW□□□□+3	CH2 Analog output value

High-speed/ Low-speed control data (4 words)

Register	Response Data
IW□□□□	
IW□□□□+1	

High-speed/ Low-speed control data (2 words)

(10) 120EHC21140 and JEPMC-PL2900 (-E) (Counter with Preset Function)

Register	Command Data	
OW□□□□		Scan counter
OW□□□□+1	Not used	
OW□□□□+2	Output coil	
OW□□□□+3	Output coil	
OW□□□□+4	Output register	
OW□□□□+5	Output register	
OW□□□□+6	Output register	
OW□□□□+7	Output register	

High-speed/ Low-speed control data (8 words)

Register	Response Data
IW□□□□	
IW□□□□+1	
IW□□□□+2	Input relay
IW□□□□+3	Input register
IW□□□□+4	Input register
IW□□□□+5	Input register
IW□□□□+6	Input register

High-speed/ Low-speed control data (7 words)

- For counters with the preset function, the first two words are reserved by the system, and various settings are required for outputs. Refer to *Machine Controller MP2000/MP3000 Series Distributed I/O Module User's Manual for MECHATROLINK-II* (manual number SIEP C880732 13) for details.

(11) 120MMB20230 and JEPMC-PL2910 (-E) (Pulse MC)

Register	Command Data	
OW□□□□		Scan counter
OW□□□□+1	Not used	
OW□□□□+2	Output coil	
OW□□□□+3	Output coil	
OW□□□□+4	Output register	
OW□□□□+5	Output register	
OW□□□□+6	Output register	
OW□□□□+7	Output register	

High-speed/ Low-speed control data (8 words)

Register	Response Data
IW□□□□	
IW□□□□+1	
IW□□□□+2	Input relay
IW□□□□+3	Input register
IW□□□□+4	Input register
IW□□□□+5	Input register
IW□□□□+6	Input register
IW□□□□+7	Input register

High-speed/ Low-speed control data (8 words)

- For pulse output modules, the first two words are reserved by the system, and various settings are required for outputs. Refer to *Machine Controller MP2000/MP3000 Series Distributed I/O Module User's Manual for MECHATROLINK-II* (manual number SIEP C880732 13) for details.

(12) MP940 (Machine Controller)

Register	Command Data
OW□□□□	
OW□□□□+1	
OW□□□□+2	
OW□□□□+3	
OW□□□□+4	
OW□□□□+5	
OW□□□□+6	
OW□□□□+7	

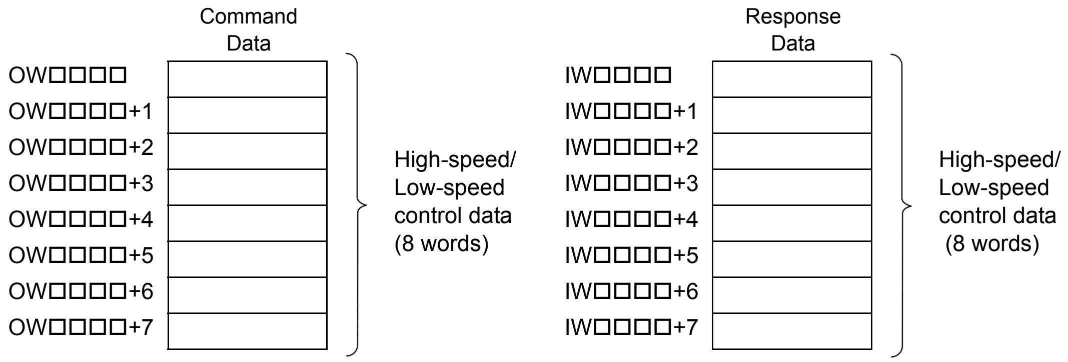
High-speed/ Low-speed control data (8 words)

Register	Response Data
IW□□□□	
IW□□□□+1	
IW□□□□+2	
IW□□□□+3	
IW□□□□+4	
IW□□□□+5	
IW□□□□+6	
IW□□□□+7	

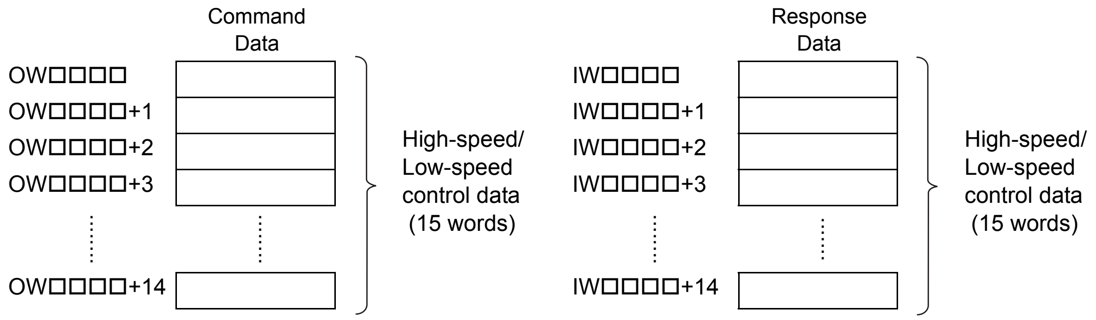
High-speed/ Low-speed control data (8 words)

(13) SVB-01 (Motion Module)

<In 17-byte mode>

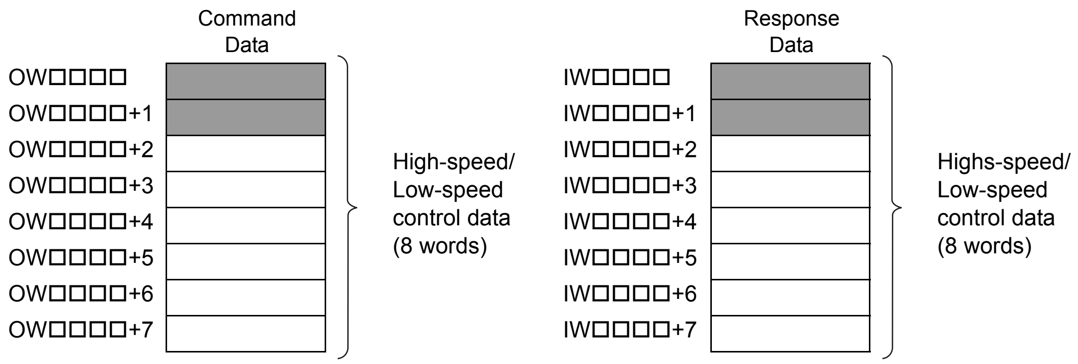


<In 32-byte mode>

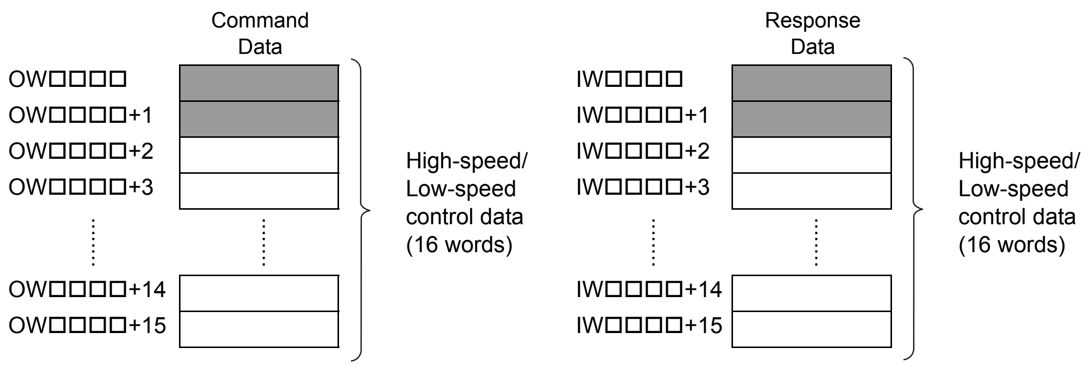


(14) MYVIS YV250 and MYVIS YV260 (Machine Vision System)

<In 17-byte mode>



<In 32-byte mode>



- The shaded area ( ) indicates areas for system use.

I/O registers are allocated in word units. However, the following precautions must be observed when handling 1-byte module data.

<Output module>

The most significant bytes will be valid, and the least significant bytes will not be specified.

F 8	7 0
Most significant bytes	Least significant bytes

OB□□□8 to OB□□□F are valid.

<Input module>

The least significant bytes will be valid, and the most significant bytes will not be specified.

F 8	7 0
Most significant bytes	Least significant bytes

IB□□□0 to IB□□□7 are valid.

Appendix C Initializing the Absolute Encoder

The procedures for initializing absolute encoders for Σ-I, Σ-II, Σ-III, Σ-V, and Σ-7 SERVOPACKs are given below.

- Refer to *9.2.1 System Startup Flowchart* for the procedure for absolute-position detection.

C.1 Σ-III, Σ-V, and Σ-7 Series SERVOPACKs

- For details on the Σ-III, Σ-V, and Σ-7 series SERVOPACKs, refer to the following manuals.

SERVOPACK Series	Manual Name	Manual Number
Σ-III	SGM☐☐/SGDS User's Manual	SIEP S800000 00
	SGM☐☐/SGDS USER'S MANUAL, Rotational Motor MECHATROLINK-II Communications Reference	SIEP S800000 11
	SGM☐S/SGDS Digital Operator Operating Instructions	TOBP S800000 01
Σ-V	User's Manual Design and Maintenance, Rotational Motor MECHATROLINK-II Communications Reference	SIEP S800000 46
	User's Manual Design and Maintenance, Linear Motor MECHATROLINK-II Communications Reference	SIEP S800000 48
	User's Manual Operation of Digital Operator	SIEP S800000 55
Σ-7	Σ-7S SERVOPACKs with MECHATROLINK-II Communications References Product Manual	SIEP S800001 27
	Digital Operator Operating Manual	SIEP S800001 33

Follow the setup procedure below using a Digital Operator.

1. Press the MODE/SET Key to display the Utility Function Mode main menu. Use the UP Key or DOWN Key to select Fn008.

```
BB          －FUNCTION－
Fn007
Fn008
Fn009
Fn00A
```

2. Press the DATA Key.

The display is switched to the execution display of Fn008 (Absolute encoder multi-turn reset and encoder alarm reset).

```
BB

 Multiturn Clear

      PGCL1
```

- If the display is not switched and "NO_OP" is displayed in the status display, the Write Prohibited setting (Fn010 = 0001) is set. Check the status and reset. Then clear the Write Prohibited setting.

3. Keep pressing the [∧] Key until "PGCL1" is changed to "PGCL5."

```
BB
 Multiturn Clear
      PGCL5
```

4. Press the [DATA] Key.

"BB" in the status display changes to "Done."

```
Done
 Multiturn Clear
      PGCL5
```

5. Press the [MODE/SET] Key. The display returns to the Utility Function Mode main menu.

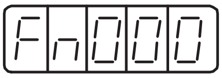
This completes setting up the absolute encoder. Turn the power supply OFF and then back ON to reset the SERVOPACK.

C.2 Σ-II SERVOPACK

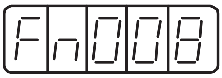
- Refer to the following manuals for information on Σ-II SERVOPACKs.
  AC Servo Drives Σ-II Series SGM□□/SGDH User's Manual Rotational Motor/Analog Voltage and Pulse Train Reference (Manual No. SIEP S8000000 05)
  AC Servo Drives Σ-II Series SGM□□/SGDM User's Manual Rotational Motor/Analog Voltage and Pulse Train Reference (Manual No. SIEP S800000 15)

(1) Initialization Using a Hand-held Digital Operator

1. Press the DSPL/SET Key to select the Auxiliary Function Mode.

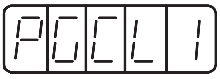


2. Select parameter Fn008 by pressing the LEFT (<) and RIGHT (>) Keys to select the digit to be changed and then using the UP (∧) and DOWN (∨) Keys to change the value of the digit.



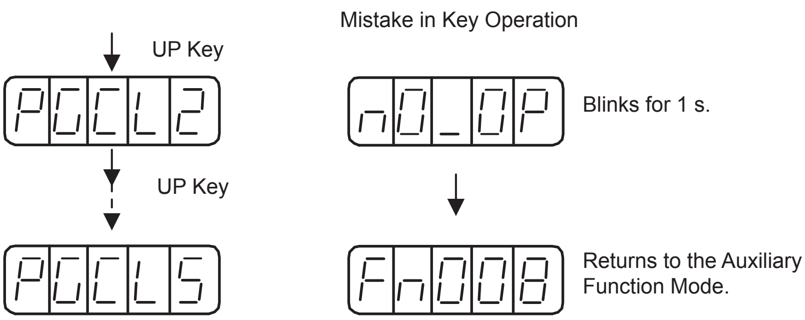
3. Press the DATA/ENTER Key.

The following display will appear.



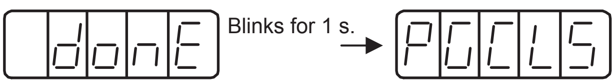
4. The rightmost digit will be incremented each time the UP (∧) Key is pressed. Press the UP (∧) Key several times until "PGCL5" is displayed.

If a mistake is made in the key operation, "nO_OP" will blink on the display for 1 second and then the display will return to the Auxiliary Function Mode. If this happens, return to step 3, above, and repeat the operation.



5. Press the DSPL/SET Key.

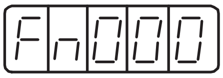
The display will change as shown below and the clear operation will be performed for multiturn data for the absolute encoder.



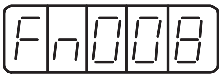
This completes initializing the absolute encoder. Reset the SERVOPACK to turn the power supply OFF and then back ON.

(2) Initialization Using the Built-in Panel Operator

1. Press the MODE/SET Key to select the Auxiliary Function Mode.

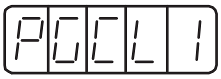


2. Press the UP (▲) and DOWN (▼) Keys to select parameter Fn008.



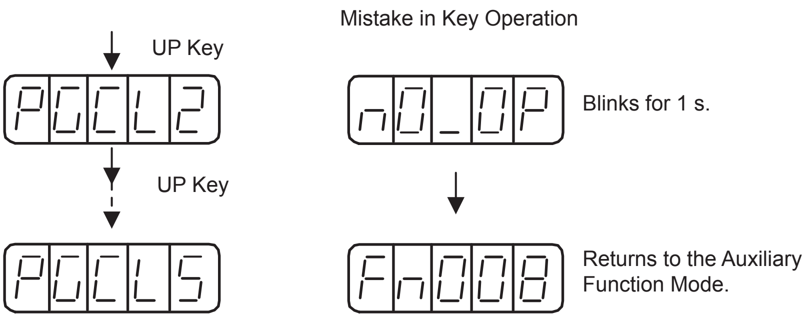
3. Press the DATA/ < Key for more than one second.

The following display will appear.



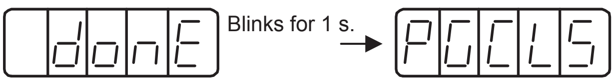
4. The rightmost digit will be incremented each time the UP (▲) Key is pressed. Press the UP (▲) Key several time until “PGCL5” is displayed.

If a mistake is made in the key operation, “nO_OP” will blink on the display for 1 second and then the display will return to the Auxiliary Function Mode. If this happens, return to step 3, above, and repeat the operation.



5. Press the MODE/SET Key.

The display will change as shown below and the clear operation will be performed for multiturn data for the absolute encoder.



This completes initializing the absolute encoder. Reset the SERVOPACK to turn the power supply OFF and then back ON.

C.3 Σ-I SERVOPACK

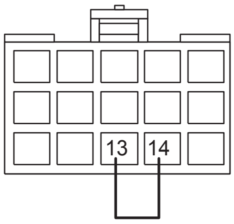
- Refer to the following manuals for information on Σ-I SERVOPACKS.
  Σ Series SGM□/SGD User's Manual High-speed Field Network MECHATROLINK-compatible AC Servo Driver (Manual No. SIE-S800-26.3)
  Σ Series SGM□/SGDB User's Manual High-speed Field Network MECHATROLINK-compatible AC Servo Driver (Manual No. SIE-S800-26.4)

(1) Initializing a 12-bit Absolute Encoder

Use the following procedure to initialize a 12-bit absolute encoder.

1. Properly connect the SERVOPACK, Servomotor, and Machine Controller.

2. Disconnect the connector on the encoder end and short-circuit pins 13 and 14 on the encoder end connector for 2 seconds or more.



3. Remove the short piece and insert the connector securely in its original position.

4. Connect the cables using normal wiring and make sure the encoder battery is connected.

5. Turn ON the system.

Repeat the procedure starting from step 1 if an Absolute Encoder Alarm occurs, so the system has been successfully initialized.

(2) Initializing a 15-bit Absolute Encoder

Use the following procedure to initialize a 15-bit absolute encoder.

1. Turn OFF the SERVOPACK and Machine Controller.

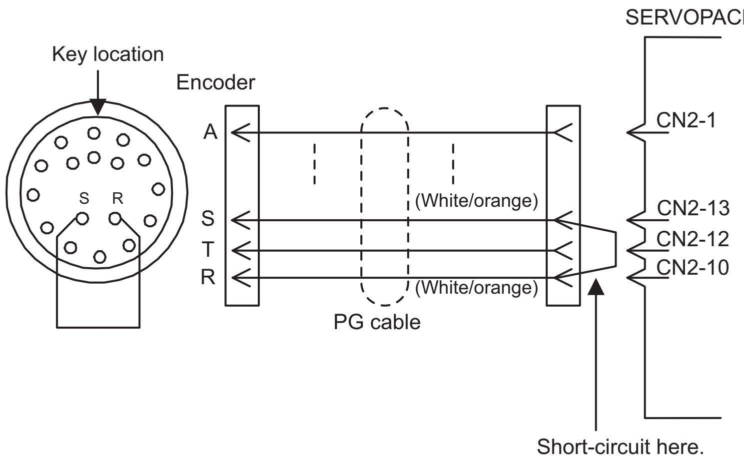
2. Discharge the large-capacity capacitor in the encoder using one of the following methods.

■ At the SERVOPACK End Connector

a) Disconnect the connector on the SERVOPACK end.
b) Use a short piece to short-circuit together connector pins 10 and 13 on the encoder end and leave the pins short-circuited for at least 2 minutes.
c) Remove the short piece and insert the connector securely in its original position.

■ At the Encoder End Connector

a) Disconnect the connector on the encoder end.
b) Use a short piece to short-circuit together connector pins R and S on the encoder end and leave the pins short-circuited for at least 2 minutes.
c) Remove the short piece and insert the connector securely in its original position.



3. Connect the cables using normal wiring and make sure the encoder battery is connected.

4. Turn ON the system.

Repeat the procedure starting from step 1 if an Absolute Encoder Alarm occurs, so the system has been successfully initialized.

Appendix D Setting the Multiturn Limit

D.1 Overview

When using the absolute encoder of a Σ-II, Σ-III, Σ-V, or Σ-7 series SERVOPACK for an infinite axis, satisfy the following conditions.
If these conditions are not satisfied, a “fixed parameter setting error” or “multiturn limit mismatch error” will occur.

- Fixed parameter No. 38 = 65534 or less
- Value set for fixed parameter No. 38 = value set for SERVOPACK user parameter Pn205

D.2 Setting Method

The procedure for using SigmaWin+ is explained here.
When using the digital operator or panel operator, refer to the user’s manual for the SERVOPACK being used.

1. Change the multiturn reset value of Pn205.

After setting a value not exceeding 65534 for Pn205 on the [Edit Parameters] screen, click [Write to SERVOPACK].

2. Turn the power to the SERVOPACK OFF and back ON.

A “multiturn limit mismatch error (A.CC0)” will be displayed.

3. Click [Setup] – [Absolute encoder setting] – [Multiturn limit setting].

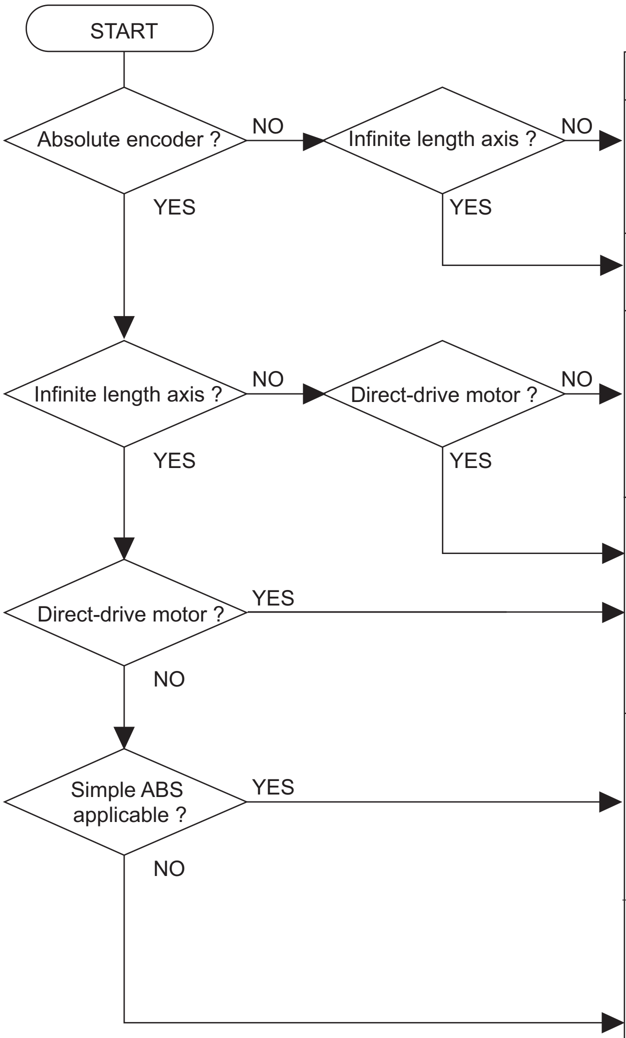
4. Click [Continue].

5. After setting the same value as was set for Pn205 for [Multiturn limit value], click [Write to SERVOPACK].

6. Turn the power to the SERVOPACK OFF and back ON.

Appendix E Fixed Parameter Setting According to Encoder Type and Axis Type

The method of setting or changing the coordinate zero point differs depending on the encoder type, motor type, and axis type (infinite length axis or finite length axis) to be used. Use the flowchart below to correctly set the fixed parameter according to your application.



Encoder Type	Motor Type	Fixed Parameter Setting
Incremental encoder	Any type	No.1, bit 0 = 0 (Finite length axis)
Incremental encoder	Any type	No.1, bit 0 = 1 (Infinite length axis)
Absolute encoder	Any type other than direct-drive motor	No.1, bit 0 = 0 (Finite length axis)
Absolute encoder	Direct-drive motor	No.1, bit 0 = 1 (Infinite length axis) + No.1, bit 9 = 1 (Simple ABS enabled)
Absolute encoder	Any type other than direct-drive motor	No.1, bit 0 = 1 (Infinite length axis) + No.1, bit 9 = 1 (Simple ABS enabled)
Absolute encoder	Any type other than direct-drive motor	No.1, bit 0 = 1 (Infinite length axis) + No.1, bit 9 = 0 (Simple ABS disabled)

Coordinate Zero Point is Determined By	Precautions When Turning the Power Back ON	Setting Mode	How to Change the Coordinate Zero Point
Zero point return method and zero point position offset (OL□□48). The way the axis returns to zero point depends on the motion pattern. (See the relevant SERVOPACK manual.)	Requires zero point return operation after turning ON the power. When zero point return operation is not performed, the position when the power is turned ON becomes the coordinate zero point. In this case, if ZSET (Set Zero Point) command is not executed, the software limit function will not be valid.	Either Absolute mode or in Incremental Addition mode (relative value). Depends on the setting of OW□□09, bit 5. Setting range: -2^{31} to $2^{31}-1$ In Incremental Addition mode (relative value)	The coordinate zero point offset is always calculated. The coordinate zero point will be changed whenever the OL□□48 is changed. When setting the current position as the zero point, set OL□□48 to the result of OL□□48 - IL□□10.
Encoder zero-point position (incremental pulses) and Machine Controller coordinate zero point offset (OL□□48). Encoder zero-point position is set by encoder initialization.	Requires no special processing since the encoder retains the position data while the power to the Machine Controller is OFF. However, the ZSET (Set Zero Point) command must be executed to validate the software limit function	Either Absolute mode or in Incremental Addition mode (relative value). Depends on the setting of OW□□09, bit 5. Setting range: -2^{31} to $2^{31}-1$	
Encoder zero-point position (incremental pulses) and Machine Controller coordinate zero point offset (OL□□48). Encoder zero-point position is set by encoder initialization.	While the power to the Machine Controller is OFF, the encoder retains the position data within one turn (incremental pulses), however, it does not retain multiturn data. Requires to execution of the ZSET (Set Zero Point) command after turning ON the power.	Incremental Addition mode (relative value)	
Encoder zero-point position (incremental pulses) and Machine Controller coordinate zero point offset (OL□□48). Encoder zero-point position is set by encoder initialization.	Requires no special processing since the encoder retains the position data while the power to the Machine Controller is OFF. However, the ZSET (Set Zero Point) command must be executed after turning ON the power. (If not an alarm will occur.)	Incremental Addition mode (relative value)	
Encoder zero-point position (incremental pulses) and by executing ZSET (Set Zero Point) command.	Requires processing to request coordinate setup (set bit 7 of OW□□00 to ON.) The current position coordinate must be backed up even during normal operation. Both processes can be implemented by using a ladder program. For details, refer to *9.4.5 (4) Ladder Program for Infinite Length Axis Position Control.*	Incremental Addition mode (relative value)	Executing ZSET (Set Zero Point) command will re-set the coordinate system. Set OL□□48 to the coordinate value to be set, and then execute ZSET command.

Appendix F SVB Module Throughput

The maximum time for data to be received via the SVB Module is described below.

F.1 For Servos and Inverters

(1) Time Required to Transmit a Command from an Application to a Servo

<When the high-speed scan setting = Communication cycle × n (n = an integer)>

Required time for command = High-speed scan set time × 2 + Communication cycle × 1

<When the high-speed scan setting = Communication cycle × n (n = a non-integer)>

Required time for command = High-speed scan set time × 2 + Communication cycle × 2

- The time from the moment the servo receives a command until it outputs the command is not included.
- This also applies to built-in and optional SVB Modules

(2) Time Required to Transmit a Response from a Servo to an Application

■ Built-in SVB Modules

<When the high-speed scan setting = Communication cycle × n (n = an integer)>

Required time for response = High-speed scan set time × 1 + Communication cycle × 1

<When the high-speed scan setting = Communication cycle × n (n = a non-integer)>

Required time for response = High-speed scan set time × 1 + Communication cycle × 2

- The time required for the response from the servo to be written in MECHATROLINK input data is not included.

■ Optional SVB Modules

<When the high-speed scan setting = Communication cycle × n (n = an integer)>

Required time for response = High-speed scan set time × 2 + Communication cycle × 1

<When the high-speed scan setting = Communication cycle × n (n = a non-integer)>

Required time for response = High-speed scan set time × 2 + Communication cycle × 2

- When Wait For Monitor Data Update mode is used, the required time will be same as for built-in SVB Modules.

F.2 For I/Os

(1) Time Required to Transmit an output from the Application to an I/O Module

<When the high-speed scan setting = Communication cycle × n (n = an integer)>

Required time for command = High-speed scan set time × 2 + Communication cycle × 1

<When the high-speed scan setting = Communication cycle × n (n = a non-integer)>

Required time for command = High-speed scan set time × 2 + Communication cycle × 2

- The time from the moment the output module receives a command until it outputs a signal is not included.
- This also applies to built-in and optional SVB Modules

(2) Time Required to Transmit an I/O Module Input Data to an Application

<When the high-speed scan setting = Communication cycle × n (n = an integer)>

Required time for response = High-speed scan set time × 1 + Communication cycle × 1

<When the high-speed scan setting = Communication cycle × n (n = a non-integer)>

Required time for response = High-speed scan set time × 1 + Communication cycle × 2

- The time required for the response from the input module to be written in MECHATROLINK input data is not included.
- This also applies to built-in and optional SVB Modules

Appendix G Settings when Connecting MECHATROLINK-II Compatible Stepping Motor Drivers

G.1 Required Firmware and Engineering Tool Versions

The following table shows the firmware and engineering tool versions required to control MECHATROLINK-II stepping motor drivers (hereinafter referred to as M-II Stepper) using the MP2000-series SVB Module.

Type	Model	Model Number	Version Number
Machine Controller	MP2100	JAPMC-MC2100 (-E)	Version 2.46 or later
	MP2100M	JAPMC-MC2140 (-E)	Version 2.46 or later
	MP2300	JEPMC-MP2300 (-E)	Version 2.46 or later
	MP2300S	JEPMC-MP2300S-E	Version 2.60 or later
	MP2310	JEPMC-MP2310-E	Version 2.60 or later
	MP2400	JEPMC-MP2400-E	Version 2.60 or later
Optional SVB Module	SVB-01	JAPMC-MC2310 (-E)	Version 1.18 or later
Engineering Tool	MPE720 Version 5	CPMC-MPE720	Version 5.34 or later
	MPE720 Version 6	CPMC-MPE770 (D)	Version 6.00 or later
	MPE720 Version 7	CPMC-MPE780 (D)	Version 7.10 or later

G.2 Applicable Communication Methods and Cycles

		Communication Method and Cycle						
		M-I	M-II in 17-byte mode		M-II in 32-byte mode			
			0.5 ms	1.0 ms	0.5 ms	1.0 ms	1.5 ms	2.0 ms
Model	MP2100	✓	–	✓	–	✓	✓	✓
	MP2100M (with built-in SVB)	✓	–	✓	–	✓	✓	✓
	MP2100M (with SVB board)	✓	✓	✓	✓	✓	✓	✓
	MP2300	✓	–	✓	–	✓	✓	✓
	MP2300S	✓	✓	✓	✓	✓	✓	✓
	MP2310	✓	✓	✓	✓	✓	✓	✓
	MP2400	✓	✓	✓	✓	✓	✓	✓
	SVB-01 Module	✓	✓	✓	✓	✓	✓	✓

- ✓ : Applicable, –: Not applicable
- SVB-01 Module operates with the setting Communication Cycle = Transmission Cycle
- Always confirm the specifications of the M-II Stepper to be used, since the applicable communication settings differ depending on the model.

G.3 Module Configuration Definition

To use a M-II Stepper, open the Module Configuration Tab Page in the MPE720, and set ***SteppingMotorDRV(M-I/M-II)*** to the slave cell to assign to a ***Function Module/Slave*** Cell.

- Refer to *3.4.2 (1) Opening the MECHATROLINK Transmission Definition Window* for information on how to open the Module Configuration Definition Window.

G.4 Restrictions on the Use of Motion Parameters

When using an M-II Stepper, the specifications of some motion parameters are different from when using servos.

(1) Invalid Parameters When Using an M-II Stepper

■ Fixed Parameters

No.	Name	Setting Range	Default	Description
16	Backlash Compensation Amount	-2^{31} to $2^{31}-1$	0	1 = 1 reference unit

■ Setting Parameters

Register	Name	Setting Range	Default	Description
OW□□00	Run Command Setting	Bit setting	0	Bit 4: Latch Detection Demand Bit 8: Forward Outside Limiting Torque/Thrust Input Bit 9: Reverse Outside Limiting Torque/Thrust Input Bit B: Integration Reset
OW□□01	Mode Setting 1	Bit setting	0	Bit 3: Speed Loop P/PI Switch Bit 4: Gain Switch
OW□□03	Function Setting 1	0 to 2	0	Bits 8 to B: Filter Type Selection
		0 or 1	0	Bits C to F: Torque Unit Selection
OW□□05	Function Setting 3	Bit setting	0	Bit 1: Phase Reference Creation Calculation Disable Bit B: Zero Point Return Input Signal
OW□□09	Motion Command Control Flag	Bit setting	0	Bit 4: Latch Zone Effective Selection Bit 6: Phase Compensation Type
OL□□0C	Torque/Thrust Reference Setting	-2^{31} to $2^{31}-1$	0	1 = 0.01% or 0.0001%
OW□□0E	Speed Limit Setting at the Torque/Thrust Reference	-32768 to 32767	15000	1 = 0.01%
OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	-2^{31} to $2^{31}-1$	30000	1 = 0.01%
OL□□1E	Width of Positioning Completion	0 to 65535	100	1 = 1 reference unit
OL□□28	Phase Correction Setting	-2^{31} to $2^{31}-1$	0	1 = 1 reference unit
OL□□2A	Latch Zone Lower Limit Setting	-2^{31} to $2^{31}-1$	-2^{31}	1 = 1 reference unit
OL□□2C	Latch Zone Upper Limit Setting	-2^{31} to $2^{31}-1$	$2^{31}-1$	1 = 1 reference unit
OW□□2E	Position Loop Gain	0 to 32767	300	1 = 0.1/s
OW□□2F	Speed Loop Gain	1 to 2000	40	1 = 1 Hz
OW□□30	Speed Feed Forward Amends	0 to 32767	0	1 = 0.01%
OW□□32	Position Integration Time Constant	0 to 32767	0	1 = 1 ms
OW□□34	Speed Integration Time Constant	15 to 65536	2000	1 = 0.01 ms
OW□□3A	Filter Time Constant	0 to 65535	0	1 = 0.1 ms
OW□□3C	Zero Point Return Method	0 to 19	0	–

■ Monitoring Parameter

Register	Name	Range	Description
IL□□42	Feedback Torque/Thrust	-2^{31} to $2^{31}-1$	1 = 0.01% or 0.0001%

(2) Parameters Valid Only When Using an M-II Stepper

■ Setting Parameters

Register	Name	Setting Range	Default	Description
OW□□06	Option Setting	Bit setting	0	Bits 0 to F: Copied in the option field of MECHATROLINK stepper command
OW□□4E	Servo User Monitor Setting	Bit setting	0E00H	Bits 8 to B: Monitor 3

(3) Stepper Parameters

For the axis for which “SteppingMotorDRV(M-I/M-II)” is allocated on the Module Configuration Definition Window, the stepper parameter can be set on the Motion Parameter Window.

- Refer to *3.4.3 (1) Opening the Motion Parameter Window* for information on how to open the Motion Parameter Window.

G.5 Availability When Using M-II Steppers

(1) Limitation in Motion Command Application

For M-II Steppers, the applications of some motion commands are limited as follows.

Motion Command		Application	Description
0	No command (NOP)	○	–
1	Position Mode (POSING) (Positioning)	○	–
2	Latch Target Positioning (EX_POSING) (External positioning)	○	The axis motion depends on the setting of the Parameter Switch.
3	Zero Point Return (ZRET)	Δ	Zero Point Return Method (zero point return method selection) is invalid. The axis motion depends on the setting of the Parameter Switch.
4	Interpolation (INTERPOLATE)	○	–
5	Last Interpolation Segment (ENDOF_INTERPOLATE)	○	–
6	Interpolation Mode with Latch Input (LATCH)	○	–
7	Jog Mode (FEED)	○	–
8	Relative Position Mode (STEP) (Step mode)	○	–
9	Set Zero Point (ZSET)	○	–
10	Change Acceleration Time (ACC)	○	The axis motion depends on the setting of the Parameter Switch.
11	Change Deceleration Time (DCC)	○	The axis motion depends on the setting of the Parameter Switch.
12	Change Filter Time Constant (SCC)	×	Invalid. If executed, a normal completion response will be returned although no processing has been implemented.
13	Change Filter Type (CHG_FILTER)	×	Invalid. If executed, a normal completion response will be returned although no processing has been implemented. Use the Option Setting parameter OW□□06 to select a filter type.
14	Change Speed Loop Gain (KVS)	×	Invalid. If executed, a normal completion response will be returned although no processing has been implemented.
15	Change Position Loop Gain (KPS)	×	
16	Change Feed Forward (KFS)	×	
17	Read User Constant (PRM_RD)	○	–
18	Write User Constant (PRM_WR)	○	–
19	Alarm Monitor (ALM_MON)	○	–
20	Alarm History Monitor (ALM_HIST)	○	–
21	Clear Alarm History (ALMHIST_CLR)	○	–
22	Absolute Encoder Reset (ABS_RST)	×	Use is prohibited. If executed, the Command Error Completed Status bit will turn ON.
23	Speed Reference (VELO)	×	
24	Torque/Thrust Reference (TRQ)	×	
25	Phase Reference (PHASE)	×	
26	Change Position Loop Integral Time Constant (KIS)	×	Invalid. If executed, a normal completion response will be returned although no processing has been implemented.
27	Stored Parameter Write (PPRM_WR)	○	–
39	Multiturn Limit Setting (MLTTRN_SET)	×	Use is prohibited. If executed, the Command Error Completed Status bit will turn ON.

- ○: Applicable, ×: Not applicable, Δ: Limited application
- Refer to *G.6 Motion Command Details* for details.

(2) Absolute Encoder Infinite Length Axis Setting

For M-II Steppers, absolute encoder infinite length axis setting is not supported.

(3) Absolute Encoder Finite Length Axis Setting

For M-II Steppers, absolute encoder finite length axis setting is possible. However, the allowable stroke range will be determined by the M-II Stepper specifications.
Check the absolute position data range that the M-II Stepper can store, and determine whether the absolute encoder finite length axis can be used or not.

(4) Instructions That Cannot be Used in Motion Programs

The following instructions cannot be used.

Instruction	Description
VCS	Speed reference
VCR	Cancel speed reference
TCS	Torque reference
TCR	Cancel torque reference

G.6 Motion Command Details

(1) Latch Torque Positioning (EX_POSING) (External Positioning)

The axis motion depends on the setting of the External Positioning Move Distance Parameter Options (bit 9) of the stepper parameter Parameter Switch (0000h).

Parameter Switch (0000h), bit 9: External Positioning Move Distance Parameter Options	Operation
0: Standard Parameter	The external positioning will be carried out using the value set in the setting parameter External Positioning Final Travel Distance (OL□□46) as the move amount after the external signal input.
1: Unique Parameter	The external positioning will be carried out using the stepper parameter of the stepper model as the move amount after the external signal input.

(2) Zero Point Return (ZRET)

The setting parameter Zero Point Return Method (OW□□3C) is invalid and will be ignored.
Select the latch signal for zero point return motion by using Latch Detection Signal Selection bits 0 to 3 of the setting parameter Function Setting 2.
The axis motion depends on the setting of Zero Point Return Speed Parameter Options (bit A) and Home Offset Parameter Options (bit B) of the stepper parameter Parameter Switch (0000h).

Parameter Switch (0000h)	Operation
0: Standard Parameter	The zero point return will be carried out according to the following parameter settings: OW□□09 Motion Command Control Flag, bit 3: Zero Point Return Direction Selection OL□□3E: Approach Speed OL□□40: Creep Rate OL□□42: Zero Point Return Travel Distance
1: Unique Parameter	The zero point return will be carried out according to the parameter of the stepper model.

(3) Change Acceleration Time (ACC)

Parameter Switch (0000h), bit 8: Acceleration/Deceleration Rate Parameter Options	Operation
0: Standard Parameter	The values determined by the following setting parameters will be written into stepper parameters: OW□□03 Function setting 1, bits 4 to 7: Acceleration/Deceleration Degree Unit Selection OL□□36: Straight Line Acceleration/Acceleration Time Constant
1: Unique Parameter	The values determined by the setting parameters will not be written into the stepper parameters. The execution will be normally completed.

(4) Change Deceleration Time (DCC)

Parameter Switch (0000h), bit 8: Acceleration/Deceleration Rate Parameter Options	Operation
0: Standard Parameter	The value determined by the following setting parameter will be written to the stepper parameter. OW□□03 Function Setting 1, bits 4 to 7: Acceleration/Deceleration Degree Unit Selection OL□□38: Straight Line Deceleration/Deceleration Time Constant
1: Unique Parameter	Writing to the stepper parameter will not be implemented. The execution will be normally completed.

G.7 Automatic Parameter Updating Function

(1) Parameters Updated when a MECHATROLINK Connection Is Established (Machine Controller to Stepper)

■ When communication is in MECHATROLINK-II 32-byte mode and the User Constants Self-writing Function bit (fixed parameter No. 1, bit A) is set to 0 (enabled)

Machine Controller/Setting Parameter			M-II Stepper/Parameter	
Straight Line Acceleration/ Acceleration Time Constant	OL□□36	→	No.15	
Straight Line Deceleration/Deceleration Time Constant	OL□□38	→	No.16	

- Only when using standard parameters.

(2) Parameters Updated when a Setting Parameter is Changed (Machine Controller to Stepper)

■ When communication is in MECHATROLINK-II 32-byte mode and the User Constants Self-writing Function bit (fixed parameter No. 1, bit A) is set to 0 (enabled)

Machine Controller/Setting Parameter			M-II Stepper/Parameters	
Straight Line Acceleration/ Acceleration Time Constant	OL□□36	→	No.15	
Straight Line Deceleration/Deceleration Time Constant	OL□□38	→	No.16	

- The above parameters will also be automatically updated when Acceleration/Deceleration Degree Unit Selection bits (OW□□03, bits 4 to 7) is changed.
- Only when using standard parameters

(3) Parameters Updated When Execution of Motion Command Starts (Machine Controller to Stepper)

■ In any communication mode when the User Constants Self-writing Function bit (fixed parameter No. 1, bit A) is set to 0 (enabled)

Machine Controller/Setting Parameter			M-II Stepper/Parameter	
Straight Line Acceleration/ Acceleration Time Constant	OL□□36	→	No.15	Updated when execution of POSING, EX_POSING, ZRET, FEED, or STEP starts
Straight Line Deceleration/Deceleration Time Constant	OL□□38	→	No.16	Updated when execution of POSING, EX_POSING, ZRET, FEED, or STEP starts

- Only when using standard parameters

■ In any communication mode, regardless of the setting of fixed parameter No. 1, bit A

Machine Controller/Setting Parameter			M-II Stepper/Parameter	
Approach Speed	OL□□3E	→	No.18	Updated when execution of ZRET starts
Creep Rate	OL□□40	→	No.19	Updated when execution of ZRET starts
Zero Point Return Travel Distance	OL□□42	→	No.20	Updated when execution of ZRET starts
External Positioning Final Travel Distance	OL□□46	→	No.17	Updated when execution of EX_POSING starts

- Only when using standard parameters

(4) Parameters Updated During Self-configuration (Machine Controller to Stepper)

■ In any communication mode, regardless of the setting of fixed parameter No. 1, bit A

Machine Controller/Setting Parameter			M-II Stepper/Parameter	
P-OT	Invalid	→	No.1, bit 2	
N-OT	Invalid	→	No.1, bit 3	
Software Limit by Stepper (Positive)	Invalid	→	No.2, bit 6	
Software Limit by Stepper (Negative)	Invalid	→	No.2, bit 7	
Electronic Gear (Numerator)	1	→	No.5	
Electronic Gear (Denominator)	1	→	No.6	

- The above processing will not be implemented for an axis that has been already defined.

G.8 Writing and Changing Parameters During Self-configuration

When a M-II Stepper is recognized as a slave, the data will be written into the Machine Controller fixed parameters, and the settings of the stepper parameters will be changed accordingly as described below.

(1) Fixed Parameters

The setting of the Basic Resolution Parameter Options bit of the stepper parameter Parameter Switch (0000h, bit 1) will be read out. When set to Use Standard Parameter, the value of the stepper parameter Basic Resolution (0007h) will be written into the Machine Controller fixed parameter No. 36: Encoder Resolution.

Stepper/Parameter			Machine Controller/Fixed Parameter		Remarks
No.7	Basic Resolution	→	No.36	Number of Pulses per Motor Rotation	Unit conversion not required

Additionally, the setting of the User Constants Self-writing Function bit of the fixed parameter Function Selection Flag 1 (No.1, bit A) will be changed to 1 (disabled).

	Machine Controller/Fixed Parameter		Details	Value
→	No.1	Function Selection Flag 1	Bit A: User Constant Self-writing Function	1 (disabled)

(2) Stepper Parameters

The settings of the following parameters will be changed. Where the definition has already been made, it will stay unchanged.

No.	Name	Setting
1	Memory Switch 1	
	Bit 2: P-OT Mask	1: P-OT signal disabled
	Bit 3: N-OT Mask	1: N-OT signal disabled
2	Memory Switch 2	
	Bit 6: Positive Software Limit Check	0: No check
	Bit 7: Negative Software Limit Check	0: No check
3	Electronic Gear (Numerator)	1
4	Electronic Gear (Denominator)	1

G.9 M-II Stepper Parameters

(1) Standard Parameters

No.	Name	Size (Byte)	Unit
0	Parameter Switch	2	Bit
1	Memory Switch 1	2	Bit
2	Memory Switch 2	2	Bit
3	Memory Switch 3	2	Bit
4	Memory Switch 4	2	Bit
5	Electronic Gear (Numerator)	2	Bit
6	Electronic Gear (Denominator)	2	Bit
7	Basic Resolution	2	pulse/rev
8	Zero Point Position Range	2	Reference unit
9	Home Offset (For Absolute Encoder)	4	Reference unit
10	Positioning Completed Width	2	Reference unit
11	Positioning Completed Width 2 (NEAR)	2	Reference unit
12	Forward Software Limit	4	Reference unit
13	Reserve Software Limit	4	Reference unit
14	Start Speed	2	100 reference units
15	Linear Acceleration Constant (Acceleration Rate)	2	10000 reference units
16	Linear Deceleration Constant (Deceleration Rate)	2	10000 reference units
17	External Positioning Move Distance	4	Reference unit
18	Zero Point Return Approach Speed	2	100 reference units/s
19	Zero Point Return Creep Speed	2	100 reference units/s
20	Home Offset (Home Offset)	4	Reference unit
21	Current at Run	2	%
22	Current at Stop	2	%

Details on the parameters No. 0 (Parameter Switch) to 4 (Memory Switch 4) are described in the following pages.

(2) No. 0: Parameter Switch

Bit	Name	Setting	
0	Electronic Gear Parameter Options (Numerator and Denominator)	0	Use standard parameter
		1	Use unique parameter
1	Definition of Basic Resolution Parameter Options	0	Use standard parameter
		1	Use unique parameter
2	Zero Point Position Range Parameter Options	0	Use standard parameter
		1	Use unique parameter
3	Home Offset Parameter Options	0	Use standard parameter
		1	Use unique parameter
4	Positioning Completed Width Parameter Options	0	Use standard parameter
		1	Use unique parameter
5	Positioning Completed Width 2 (NEAR) Parameter Options	0	Use standard parameter
		1	Use unique parameter
6	Software Limit Parameter Options	0	Use standard parameter
		1	Use unique parameter
7	Start Speed Parameter Options	0	Use standard parameter
		1	Use unique parameter
8	Acceleration/Deceleration Rate Parameter Options	0	Use standard parameter
		1	Use unique parameter
9	External Positioning Move Distance Parameter Options	0	Use standard parameter
		1	Use unique parameter
A	Zero Point Return Speed (Approach Speed and Creep Speed) Parameter Options	0	Use standard parameter
		1	Use unique parameter
B	Home Offset (Zero Point Return Final Travel Distance) Parameter Options	0	Use standard parameter
		1	Use unique parameter
C	Current at Run Parameter Options	0	Use standard parameter
		1	Use unique parameter
D	Current at Stop Parameter Options	0	Use standard parameter
		1	Use unique parameter
E	Undefined		
F	Use of Unique Non-standard Parameters	0	Use only standard parameters
		1	Use standard parameters and unique non-standard parameters

(3) No. 1: Memory Switch 1

Bit	Name	Setting	
0 and 1	Undefined		
2	P-OT Mask	0	P-OT signal enabled
		1	P-OT signal disabled
3	N-OT Mask	0	N-OT signal enabled
		1	N-OT signal disabled
4 to 7	Undefined		
8	Stopping Method at OT	0	Decelerate to a stop
		1	Stop immediately (Emergency stop)
9 to E	Undefined		
F	Encoder Type (Optional)	0	Incremental encoder
		1	Absolute encoder

(4) No. 2: Memory Switch 2

Bit	Name	Setting	
0	Reverse Rotation Mode (Rotation Direction)	0	CCW as forward rotation
		1	CW as forward rotation
1 to 5	Undefined		
6	Positive Software Limit Check	0	No check
		1	Check
7	Negative Software Limit Check	0	No check
		1	Check
8 to F	Undefined		

(5) No. 3: Memory Switch 3

Bit	Name	Setting	
0 to 9	Undefined		
A	MECHATROLINK Communication Check (For Debugging)	0	With communication check
		1	Without communication check Ignores the command errors 01, 02, and 03.
B	WDT Check (For Debugging)	0	With WDT check
		1	Without WDT check Ignores error 04.
C D E F	Communication Error Count	0 to F	Communication error processing will be implemented when received errors (timeout and CRC error) occur continuously a set number of times. • Processing to a safe stop, such as power disconnection and excitation OFF. • 0: Select a value from the options specified for the system. • Valid only for transmission in a single direction.

(6) No. 4: Memory Switch 4

Bit	Name	Setting	
0	Undefined		
1	Home Direction	0	Forward direction
		1	Reverse direction
2 to 8	Undefined		
9	Brake ON/OFF (Optional)	0	Use BRK_ON and BRK_OFF commands.
		1	BRK_ON/BRK_OFF command disabled.
A	P-OT Signal Logic	0	Positive logic
		1	Negative logic
B	N-OT Signal Logic	0	Positive logic
		1	Negative logic
C	DEC Signal Logic	0	Positive logic
		1	Negative logic
D to F	Undefined		

Appendix H Wild Card Servos

Wild Card Servos refer to general-purpose servo drivers.
A MECHATROLINK servo driver that is not compatible with the MP2000-series SVB Module can be connected to a SVB Module by allocating the servo driver as a general-purpose servo driver, and can be operated using an user application.

- Wild Card Servos cannot use all the functions of the SVB Module since it is a general-purpose servo driver. Also, the functions of some servo driver models may be limited by the product specifications.

H.1 Required Firmware and Engineering Tool Versions

The following firmware and engineering tool versions numbers are required to use wild card servos with the MP2000-series SVB Module.

Type	Model	Model Number	Version Number
Machine Controller	MP2100	JAPMC-MC2100 (-E)	Version 2.48 or later
	MP2100M	JAPMC-MC2140 (-E)	Version 2.48 or later
	MP2300	JEPMC-MP2300 (-E)	Version 2.48 or later
	MP2300S	JEPMC-MP2300S-E	Version 2.60 or later
	MP2310	JEPMC-MP2310-E	Version 2.60 or later
	MP2400	JEPMC-MP2400-E	Version 2.60 or later
Optional SVB Module	SVB-01	JAPMC-MC2310 (-E)	Version 1.19 or later
Engineering Tool	MPE720 Version 5	CPMC-MPE720	Version 5.36 or later
	MPE720 Version 6	CPMC-MPE770 (D)	Version 6.00 or later
	MPE720 Version 7	CPMC-MPE780 (D)	Version 7.10 or later

H.2 Applicable Communication Methods and Cycles

The communication method and cycle that can be set for each SVB Module is shown in the table below.

		Communication Method/Communication Cycle						
		M-I	M-II (17-byte mode)		M-II (32-byte mode)			
			0.5ms	1.0 ms	0.5 ms	1.0 ms	1.5 ms	2.0 ms
Model	MP2100	✓	–	✓	–	✓	✓	✓
	MP2100M (Built-in SVB)	✓	–	✓	–	✓	✓	✓
	MP2100M (SVB board)	✓	✓	✓	✓	✓	✓	✓
	MP2300	✓	–	✓	–	✓	✓	✓
	MP2300S	✓	✓	✓	✓	✓	✓	✓
	MP2310	✓	✓	✓	✓	✓	✓	✓
	MP2400	✓	✓	✓	✓	✓	✓	✓
	SVB-01 Module	✓	✓	✓	✓	✓	✓	✓

✓: Applicable, –: Not applicable

- SVB-01 Module operates with the setting of Communication cycle = Transmission cycle.
- Check the specifications of the slave device, because the communication setting depends on the product specifications.

H.3 Link Assignment

Open the Module Configuration Tab Page in the MPE720, and set ***Wild Card Servo*** or ***Wild Card Servo(Linear)*** to the slave cell to assign to a ***Function Module/Slave*** Cell.

- Refer to *3.4.3 (1) Opening the Motion Parameter Window* for information on how to open the Module Configuration Definition Window.
- SVB Module operates as though the actual object is true, despite the setting. If ***Wild Card Servo*** or ***Wild Card Servo(Linear)*** is set in place of ***SGDS-***1***** for example, the SVB Module recognizes it as SGDS and operates accordingly.

H.4 Invalid Motion Parameters When Using Wild Card Servos

The following motion parameters are invalid when using wild card servos.

■ Fixed Parameters

No.	Name	Setting Range	Default	Description
16	Backlash Compensation Amount	-2^{31} to 2^{31}-1	0	1 = 1 reference unit
29	Motor Type Selection	0: Rotation type motor, 1: Linear motor	0: Rotation type motor	

■ Setting Parameters

Register	Name	Setting Range	Default	Description
OW□□03	Function Setting 1	0 or 1	0	Bits 4 to 7: Acceleration/Deceleration Degree Unit Selection
OW□□04	Function Setting 2	0 to 14	0	Bits C to F: Bank Selector
OW□□06	Option Setting	Bit setting	0	Bits A to F: Options for Stepper
OW□□09	Motion Command Control Flag	Bit setting	0	Bit 3: Zero Point Return Direction Selection Bit 4: Latch Zone Effective Selection
OL□□1E	Width of Positioning Completion	0 to 65535	100	1 = 1 reference unit
OL□□2A	Latch Zone Lower Limit Setting	-2^{31} to 2^{31}-1	0-2^{31}	1 = 1 reference unit
OL□□2C	Latch Zone Upper Limit Setting	-2^{31} to 2^{31}-1	2^{31}-1	1 = 1 reference unit
OW□□2E	Position Loop Gain	0 to 32767	300	1 = 1.0/s
OW□□2F	Speed Loop Gain	1 to 2000	40	1 = 1 Hz
OW□□30	Speed Feedforward Amends	0 to 32767	0	1 = 0.01%
OW□□32	Position Integration Time Constant	0 to 32767	0	1 = 1 ms
OW□□34	Speed Integration Time Constant	15 to 65535	2000	1 = 0.01 ms
OW□□36	Straight Line Acceleration/Acceleration Time Constant*	0 to 2^{31}-1	0	1 = 1 reference unit/s^2, 1 = 1 ms
OW□□38	Straight Line Deceleration/Deceleration Time Constant*	0 to 2^{31}-1	0	1 = 1 reference unit/s^2, 1 = 1 ms
OW□□3A	Filter Time Constant *	0 to 65535	0	1 = 0.1 ms
OL□□42	Zero Point Return Travel Distance	-2^{31} to 2^{31}-1	0	1 = 1 reference unit
OL□□46	External Positioning Final Travel Distance	-2^{31} to 2^{31}-1	0	1 = 1 reference unit

* Valid only for VELO (Speed Reference) command.

■ Monitoring Parameters

Register	Name	Setting Range	Description
IL□□42	Feedback Torque/Thrust	-2^{31} to 2^{31}-1	1 = 0.01% or 0.0001%

H.5 Availability When Using Wild Card Servos

(1) Limitation in Application of Motion Commands

- ○: Applicable, ×: Not applicable, Δ: Limited Application

Motion Command		Application	Remarks
0	No command (NOP)	○	–
1	Position Mode (POSING) (Positioning)	○	–
2	Latch Target Positioning (EX_POSING) (External positioning)	Δ	The setting parameter Zero Point Return Travel Distance is invalid. The axis moves according to the settings of servo driver parameter.
3	Zero Point Return (ZRET)	Δ	The following limitation will be applied for each home return type. DEC + C-Phase Pulse The following setting parameters are invalid: Zero Point Return Direction Selection, Approach Speed, Creep Rate, and Zero Point Travel Distance ZERO (ZERO Signal) The following setting parameters are invalid: Zero Point Return Direction Selection and Zero Point Return Travel Distance DEC1 + ZERO (DEC1 and ZERO Signal): The following setting parameters are invalid: Zero Point Return Direction Selection, Approach Speed, Creep Rate, and Zero Point Return Travel Distance C-Phase Pulse The following setting parameters are invalid: Zero Point Return Direction Selection and Zero Point Return Travel Distance C pulse only, POT & C pulse, HOME LS & C pulse, HOME only, NOT & C pulse, and INPUT & C pulse: The setting parameter Zero Point Return Travel Distance is invalid. • The servo driver parameters are used for the above invalid parameters. • Applicable home return types will differ depending on the servo being used.
4	Interpolation (INTERPOLATE)	○	–
5	Last Interpolation Segment (ENDOF_INTERPOLATE)	○	–
6	Interpolation Mode with Latch Input (LATCH)	○	–
7	JOG Mode (FEED)	○	–
8	Relative Position Mode (STEP) (Step mode)	○	–
9	Set Zero Point (ZSET)	○	–
10	Change Acceleration Time (ACC)	×	Invalid
11	Change Deceleration Time (DCC)	×	Invalid
12	Change Filter Time Constant (SCC)	×	Invalid
13	Change Filter Type (CHG_FILTER)	×	Invalid
14	Change Speed Loop Gain (KVS)	×	Invalid

(cont'd)

Motion Command		Application	Remarks
15	Change Position Loop Gain (KPS)	×	Invalid
16	Change Feed Forward (KFS)	×	Invalid
17	Read User Constant (PRM_RD)	○	–
18	Write User Constant (PRM_WR)	○	–
19	Alarm Monitor (ALM_MON)	○	–
20	Alarm History Monitor (ALM_HIST)	○	–
21	Clear Alarm History (ALMHIST_CLR)	○	–
22	Absolute Encoder Reset (ABS_RST)	×	Executing this command will cause Command Error Completed Status (FAIL).
23	Speed Reference (VELO)	×	Operation is possible. The internal processing will be implemented while assuming the maximum speed to be 4500min^{-1}, however, some servos may operate adversely at a speed significantly different from the target speed.
24	Torque/Thrust Reference (TRQ)	×	Operation is possible. The internal processing will be implemented while assuming the maximum torque to be 300%, however, some servos may operate adversely with a torque significantly different from the target torque.
25	Phase Reference (PHASE)	×	Operation is possible. However, execution of this command may not result as intended for some servos.
26	Change Position Loop Integral Time Constant (KIS)	×	Invalid
27	Stored Parameter Write (PPRM_WR)	○	–
39	Multiturn Limit Setting (MLTTRN_SET)	×	Executing this command will cause Command Error Completed Status (FAIL).

(2) Absolute Encoder Infinite Length Axis

Wild card servos do not support the absolute encoder infinite length axis.

(3) Absolute Encoder Finite Length Axis

The absolute encoder finite length axis is supported for wild card servos, but the allowable stroke is determined by the specifications of the servo driver being used.
Check the absolute position data range that the servo driver can handle to know whether the absolute encoder finite length axis can be used or not.

(4) User Constants Self-writing Function

The automatic updating of the parameters function is invalid for wild card servos.

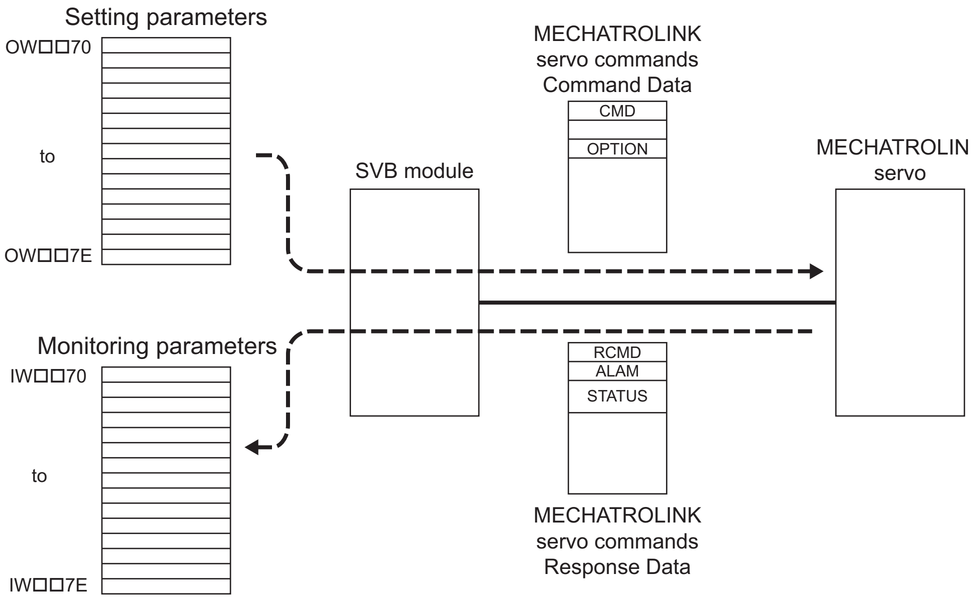
(5) Self-configuration

When the Machine Controller recognizes the slave station as an unsupported servo, the servo is allocated as "****SERVO" type and the fixed parameters will be set by default.

Appendix I   Servo Driver Transmission Reference Mode

I.1   What is Servo Driver Transmission Reference Mode?

Users can directly send MECHATROLINK servo commands in Servo Driver Transmission Reference Mode.
Set the fixed parameter No. 0 (Selection of Operation Modes) of the corresponding axis to 3 (Servo Driver Transmission Reference Mode) to enable the mode.
MECHATROLINK servo command data can be sent using the motion setting parameters OW□□70 to OW□□7E in 32-byte mode or OW□□70 to OW□□77 in 17-byte mode, and the response data can be received using the motion monitoring parameters IW□□70 to IW□□7E in 32-byte mode or IW□□70 to IW□□77 in 17-byte mode.



- Refer to the relevant SERVOPACK user's manual for details on MECHATROLINK commands.

I.2   MECHATROLINK Communication Management by the System

(1) Connection Management

When the power to the system is turned ON, the system will automatically execute the processing to shift the operation to MECHATROLINK communication phase 3 (synchronous communication status) by establishing a connection and synchronous communications.
When an alarm is cleared, the system automatically clears the alarms of MECHATROLINK connected servos. At the same time, the system will execute processing to restore MECHATROLINK communication phase 3 (synchronous communication status.)

(2) Watchdog Timer Processing

The WDT field of the 16th byte (both command and response) of the MECHATROLINK servo command is used by the system to automatically prepare transmission data and detect errors.
When an error is detected, the MECHATROLINK communication phase is shifted to phase 2 (asynchronous communication status) and then to phase 4 (communication stop status). As a result, the Motion Controller Operation Ready bit (bit 0 of the motion monitoring parameter Drive Status) will be set to 0: Operation Not Ready.

(3) Interpolation Segment Distribution

When the Interpolation Segment Distribution Processing bit (fixed parameter No. 1 Function Selection Flag 1, bit 8) is set to 0 (enabled) and interpolation segment distribution per high-speed scan is constant, processing to control interpolation segment distribution per MECHATROLINK communication cycle to be constant is implemented.

I.3 Motion Parameters That Can be Used in Servo Driver Transmission Reference Mode

The motion parameters that can be used in transparent command mode are limited to those listed below. Motion Commands other than those listed below cannot be used.

■ Motion Fixed Parameters

No.	Name	Setting Range	Default Setting	Description
1	Function Selection Flag 1	Bit setting	0	Bit 8: Interpolation Segment distribution Processing
2	Function Selection Flag 2	Bit setting	0	Bit 0: Communication Abnormality Detection Mask Bit 1: WDT Abnormality Detection Mask

■ Motion Setting Parameters

Register	Name	Setting Range	Default Setting	Description
OW□□00	Run Command Setting	Bit setting	0	Bit E: Communication Reset * Bit F: Clear Alarm
0W□□70 to OW□□7E	Command Buffer for Servo Driver Transmission Reference Mode		0	

* For SVB-01 Module version 1.20 or later or built-in SVB Module version 2.50 or later

■ Motion Monitoring Parameters

Register	Name	Setting Range	Description
IW□□00	RUN Status	Bit setting	Bit 0: Motion Controller Operation Ready
IW□□01	Parameter Number When Range Over is Generated	0 to 65535	
IL□□02	Warning	Bit setting	Bit 2: Fixed Parameter Error
IL□□04	Alarm	Bit setting	Bit 10: Servo Driver Synchronization Communication Error Bit 11: Servo Driver Communication Error
IL□□18	Machine Coordinate System Latch Position (LPOS)	-2^{31} to $2^{31}-1$	
IW□□70 to IW□□7E	Response Buffer for Servo Driver Transmission Reference Mode		

I.4 MECHATROLINK Commands That Cannot Be Used

Do not use the following MECHATROLINK commands unless it is absolutely necessary, since connection management is carried out by the system.

- Connection request command (CONNECT)
- Disconnection request command (DISCONNECT)
- Synchronization request command (SYNC_SET)
- Device setup request command (CONFIG)
- Sensor ON command (SENS_ON)
- Sensor OFF command (SENS_OFF)

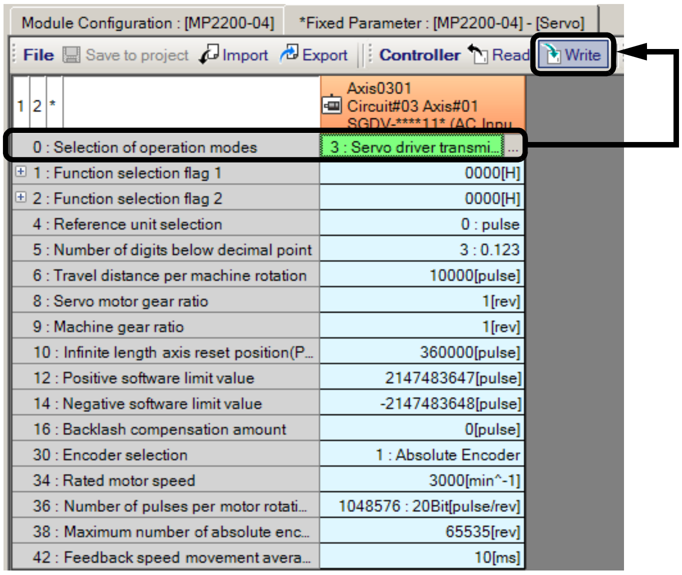
I.5 Operation Procedure in Servo Driver Transmission Reference Mode

Use the following procedure to send commands in Servo Driver Transmission Reference Mode mode using the **Register List** Window of MPE720.

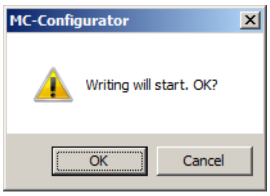
1. Start the MPE720 to open the **Fixed Parameter** Tab Page in the **Module Configuration Definition** Window.

- Refer to *3.4.3 (1) Opening the Motion Parameter Window* for information on how to open the Fixed Parameter Tab Page.

2. In the Fixed Parameters of the corresponding axis, select ***Servo Driver Transmission Reference Mode)*** for fixed parameter No. ***0: Selection of Operation Mode***, and click **Write**.



3. Click **OK**.



4. Display the registers OW□□70 to OW□□7E in the Register List.

- Refer to *12.2.1 (2) Viewing the Contents of the System Registers* formation on how to display the register list.

5. Enter MECHATROLINK application layer commands for the registers OW□□70 to OW□□7E in the Register List.

Set commands in OW□□70 to OW□□77, and subcommands in OW□□78 to OW□□7E.

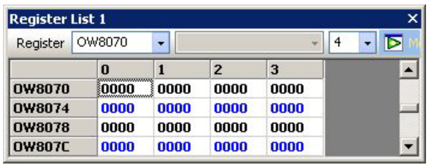
Appendices

App

■ <Setting Example> Sending the main command PPRM_WR

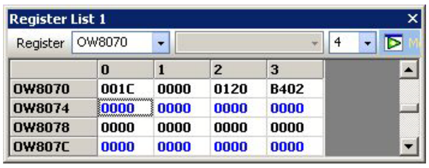
In the MECHATROLINK application layer command setting example given below, the main command PPRM_WR is sent.

1. Enter 0 for all registers from OW□□70 to OW□□77 in the **Register List** Window of MPE720.



This results in No Command (NOP) status.

2. First, enter the data for registers from OW□□71 to OW□□77. Then, set 001CH (PPRM_WR command) for OW□□70 at the end.



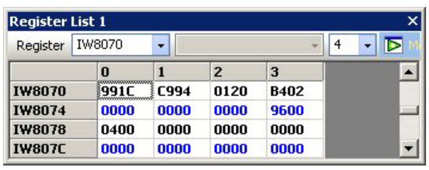
- Use the little-endian format to set the data.

<Setting Example to Write 180 (00B4H) in Pn-102>

MECHATROLINK Command				Settings in Register List	
Byte	Command	Set Value		Register	Set Value (HEX)
1	PPRM_WR	1CH	→	OW□□70	001CH (Enter at the end.)
2		0	→		
3		0	→	OW□□71	0
4		0	→		
5	NO	02H	→	OW□□72	0120H
6		01H	→		
7	SIZE (byte)	2	→	OW□□73	B402H
8	PARAMETER	B4H	→		
9		0	→	OW□□74	0
10		0	→		
11		0	→	OW□□75	0
12		0	→		
13		0	→	OW□□76	0
14		0	→		
15		0	→	OW□□77	0
16	WDT	0	→		

3. Display registers IW□□70 to IW□□77 in the Register List.

The response to the PPRM_WR command can be confirmed in registers IW□□70 to IW□□77 as shown below.



I.6 Precautions When Using Servo Driver Transmission Reference Mode

- Note that the response to a MECHATROLINK servo command will be delayed because of the delay in the MECHATROLINK communications.
  For example, when sending a move command such as POSING for the axis being stopped, it will take some time for the Commanded Profile Complete bit to turn OFF. Wait the following number of scans to monitor the response data to the MECHATROLINK servo command.
  When High-speed scan set time < MECHATROLINK communication cycle × 3
  Number of scans (rounded up to the nearest integer) =
  MECHATROLINK communication cycle × 7 ÷ High-speed scan set time
  When MECHATROLINK communication cycle × 3 ≤ High-speed scan set time ≤ MECHATROLINK communication cycle × 6
  Number of scans (rounded up to the nearest integer) =
  MECHATROLINK communication cycle × 6 ÷ High-speed scan set time + 1
  When High-speed scan set time > MECHATROLINK communication cycle × 6
  Number of scans = 1
- Always set the Interpolation Segment Distribution Processing bit (fixed parameter No. 1 Function Selection Flag 1, bit 8) to 0 (enabled) when using an interpolation MECHATROLINK servo command, INTERPOLATE or LATCH.
  If this bit is set to 1 (disabled), interpolation segment distribution per MECHATROLINK communication cycle will not be constant, though that per high-speed scan will be constant. As a result, the speed waveform will be disordered.
- Precaution on operation of MPE720 parameter windows of MECHATROLINK compatible servos
  Current value reading, writing, and saving operations are allowed only when the MECHATROLINK servo command NOP is set. The operations in parameter windows are disabled while any command other than NOP is being executed.

Appendix J Terminology

■ Phase-C Pulse

The encoders mounted on Yaskawa's servomotors output three types of pulse data, phase-A, -B, and -C. Phase-C pulse is a signal that reverses once per motor rotation and is called Zero-point Pulse.

■ POSMAX

Reset position of infinite length axis
Refer to *4.4.1 Motion Fixed Parameter Details* for details.

■ Override

The original meaning of Override is annulling. In descriptions on Machine Controllers, override means overwriting the setting.

■ Machine Coordinate System

The basic coordinate system set by executing the motion command ZRET (Zero Point Return) or ZSET (Set Zero Point). The Machine Controller manages positions using the Machine Coordinate System.
With a system using an incremental encoder, or absolute encoder as the incremental encoder, the Machine Coordinate System is automatically set by the first zero point return operation after the power turns ON.
With the system using an absolute encoder, it is automatically set after the power turns ON.

■ Deceleration LS

Limit switch for deceleration.
For SERVOPACKs, deceleration LS for zero point return is connected to the Zero Point Return Deceleration signal DEC.

■ Absolute Mode

One of target position (CPOS) coordinate data setting methods for position control. Target position (CPOS) coordinate data is directly set in Absolute Mode.
Refer to *5.1.4 Position Reference* for details.

■ Incremental Addition Mode

One of the target position (CPOS) coordinate data setting methods for position control. Target position (CPOS) coordinate data is set by adding the movement amount to the previous position reference value in Incremental Addition Mode.
Refer to *5.1.4 Position Reference* for details.

■ Infinite Length Axis

An axis that employs the infinite length position control method, which resets the position data after one motor rotation.
Refer to *5.1.3 Axis Type Selection* for details.

■ Infinite Length Position Control

This control method is used to perform position control without limiting the movement range for movements such as rotation in one direction.
Refer to *5.1.3 Axis Type Selection* for details.

■ Finite Length Axis

An axis that employs the finite length position control method or infinite length position control that does not reset the position data after one motor rotation to move in one direction.
Refer to *5.1.3 Axis Type Selection* for details.

■ Finite Length Position Control

This control method is used to perform position control within a specified section for movements such as go-and-return motions.
Refer to *5.1.3 Axis Type Selection* for details.

■ Work Coordinate System

The coordinate system used in motion programs. It is called the Work Coordinate System to distinguish it from the Machine Coordinate System. The work coordinate system can be set by executing the Change Current Value (POS) instruction of the motion program.
Refer to *Machine Controller MP2000 Series User's Manual Motion Programming* (manual number: SIEP C880700 38) for details.

Appendix K Functions Added to Σ-V-series SERVOPACKs

The functions that were added to Σ-V-series SERVOPACKs are listed in the following table.

No.	Function	Description	Reference
1	Setting and Changing Torque Limit during SGDV SERVOPACK Operations	The torque limit can be set or changed during SERVOPACK operations if the following parameter settings have been made. • Pn81F.1 = 1 (Position Control Command TFF/TLIM Function Allocation is enabled.) • Pn002.0 = 1 (PTLIM and NTLIM operate as the torque limit values.) Or • Pn81F.1 = 1 (Position Control Command TFF/TLIM Function Allocation is enabled.) • Pn002.0 = 3 (When P-CL and N-CL are available, PTLIM and NTLIM operate as the torque limit value.)	4.4.2 (12) Positive Side Limiting Torque/Thrust Setting at the Speed Reference
2	Changing the Maximum Value of Acceleration and Deceleration	When the SERVOPACK parameter Pn833.0 is set to 1 (Accel/Decel Constant Selection = Uses Pn834 to Pn840), a wilder range of speed for acceleration and deceleration can be obtained by raising the upper limit of acceleration and deceleration for the following motion commands. • Positioning (POSING) • External input positioning (EX_POSING) • Zero Point Return (ZRET) • JOG operation (FEED) • STEP operation (STEP)	4.4.2(23) Acceleration/Deceleration Settings
3	Continuous Latch	By selecting Latch Detection Demand in the parameter RUN Command Setting (OW□□00, bit 4), the Continuous Latch Function is enabled. This function is for SGDV SERVOPACKs, so the appropriate parameter settings must be made in the SGDV SERVOPACKs.	4.4.2 (2) Mode Setting 1
4	Stop Signal Input Warning	When an HWBB signal (stop signal) is input, bit A of IL□□02 is turned ON, and a warning is issued. The warning (Servo Driver Stop Signal Input) indicates that the SERVOPACK is being stopped forcibly. This warning is cleared automatically when the HWBB signal turns OFF. The status of the HWBB signal can be checked with the stop signal (HWBB) of Servo Driver I/O Monitor (IW□□2E, bit A).	4.4.3 (3) Warning
5	Gain Switch	Two different gain switching are available. When the tuning-less function is available, the setting is ignored.	4.4.2 (2) Mode Setting 1
6	Bank Switching Functions	In the servo parameters, set the Bank Switching function for SGDV SERVOPACKs. The Parameter Bank data (Pn902 to Pn95F) is not saved in the nonvolatile memory. So, always set these parameters when using MECHATROLINK networks.	11.5.4 (4) Precautions on Setting

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Revision History

The date of publication, revision number, and web revision number are given at the bottom right of the back cover. Refer to the following example.

MANUAL NO. SIEP C880700 33A <1>-1
Web revision number
Revision number
Published in Japan August 2009
Date of publication

Date of Publication	Rev. No.	Web Rev. No.	Section	Revised Contents
April 2020	<14>	1	1.1.5, 1.2.2	Partly revised.
December 2019		0	All chapters	Completely revised
			Back cover	Revision: Address
March 2019	<13>	1	1.2.1	Revision: Vibration Resistance, Noise Resistance
November 2018		0	Back cover	Revision: Address
June 2018	<12>	0	4.3.1, 4.4.1 (3)	Addition: Bit 5 of No.2 Function Selection Flag 2
			4.4.2 (10)	Revision: Description of OL□□0C Torque/Thrust Reference Setting/Torque Feed Forward Compensation
				Revision: Description of OW□□0E Speed Limit Setting at the Torque/Thrust Reference
			4.4.2 (21)	Revision: Description of OL□□2A Latch Zone Lower Limit Setting
			4.4.2 (24)	Revision: Description of OW□□3A Filter Time Constant
			6.1.2	Addition: SGDV-□□□□□1□□, SGD7S-□□□10□
			6.2.4, 6.2.5	Revision: Notes of Interpolation (INTERPOLATE)
			6.4.2 (3) [b], 6.4.3 (3), 6.4.4 (3) [a], 6.4.5 (3)	Revision: Timing charts
February 2018	<11>	0	1.2.1	Revision: Pollution Level, Vibration Resistance
			2.2	Revision: Applicable machine controllers for the SVB-01 modules
			All chapter	Partly revised
August 2017	<10>	0	–	Printed version of the manual that is available on the web (web version: SIEP C880700 33G<9>-1)
			Back cover	Revision: Address
October 2016	<9>	1	3.4.3 (3) [a]	Revision: Compatible versions under (3) Environmental Requirements of SGD7S SERVOPACKs
July 2016		0	–	Printed version of the user's manual that is available on the web (web version: SIEP C880700 33G<8>-2)
June 2016	<8>	2	3.4.3 (2) [a], (3) [a], 6.2.27 (1), Appendix G.1, Appendix H.1	Revision: Controller model numbers and version of MPE720
December 2015		1	4.4.3 (16)	Addition: Information on servo parameter set value for IL□□42
			8.4.2	Deletion: Filter Time Constant (OW□□3A)
October 2015		0	Front cover, spine	Revision: Format
			Preface, 1.1.5 (1), 3.4.3 (3), Chapter 4, 6.2, 8.2, Chapter 9, Chapter 11, 12.5.2 (8)	Addition: Information on Σ-7-series SERVOPACKs
			6.2.2 (5)	Addition: Precautions on EX_POSING
			–	Based on Japanese user's manual, SIJP C880700 33J<19>-1, published in June 2014.
			Back cover	Revision: Address and format
July 2015	<7>	0	Front cover	Revision: Format
			Back cover	Revision: Address and format
September 2013	<6>	0	–	SIEP C880700 33E<5>-1, available on the web.
			8.2.2	Revision: Diagram of move command generation processing (When using an electronic shaft)
			Back cover	Revision: Address

Date of Publication	Rev. No.	Web Rev. No.	Section	Revised Contents
January 2013	<5>	1	4.4.2 (30), 6.2.18 (3), 6.2.19	Revision: Description of OW□□4F
			4.4.3 (9)	Revision: Description of IW□□0C Bit 1
			Back cover	Revision: Address
December 2012		0	–	Printed version of the user's manual that is available on the web (web version: SIEP C880700 33C<4>-4)
			–	Based on Japanese user's manual, SIEP C880700 33I<18>-1, published in October 2012.
			Back cover	Revision: Address
May 2012	<4>	4	12.5.2 (14)	Revision: Name of reference manual described in *Correction*
January 2012		3	8.1.1 (2)	Revision: OL□□0C (disable→enable)
			Back cover	Revision: Address
December 2011		2	2.2	Revision: Description of applicable machine controllers for SVB-01 modules
October 2011		1	6.4.4	Revision: Setting value of "OW□□0A" (3 → 4) Setting value of "IW□□0A" (3 → 4) "IW□□2D" → "IW□□2F"
September 2011		0	–	Based on Japanese user's manual, SIJP C880700 33F<15>-3, available on the Web in September 2011.
May 2011	<3>	0	–	SIEP C880700 33B<2>-4, available on the Web.
April 2011	<2>	4	8.3.1 (2)	Revision: Availability of "OL□□38" and "OW□□3A" (Available→Unavailable)
			1.1.5 (1), 10.1, 10.4.3	Addition: Description of A1000 and V1000
October 2010		3	Front cover, back cover	Revision: Format
			10.3.3 (2), 10.3.4 (2)	Addition: Setting range of IW□□15
September 2010		2	5.1.4	Revision: Description of OW□□09, bit 5
			Back cover	Revision: Address
June 2010		1	6.2.1 (4) [a], 6.2.2 (4) [a], 6.2.6 (4) [a], 6.2.7 (4) [a]	Revision: Setting of OL□□10
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			All chapters	Completely revised
			12.5.3 (2) [d]	Revision: Servo driver alarm code
			Back cover	Revision: Address
December 2009	<1>	5	12.5.3 (2) [c]	Deletion: Alarm code 941 for Σ-III series SERVOPACK of Servo Driver Alarm Code (monitoring parameter IW□□2D)
November 2009		4	5.1.4	Revision: Description of disadvantages for using absolute mode
			6.4.2	Addition: Step1 in (1) Executing/Operating Procedure
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September 2009		2	Preface	Addition: Warranty
			Back cover	Revision: Address
August 2009		1	4.4.2 (10)	Deletion: Related parameters Pn407, Pn408.1, and Pn300
			4.4.2 (18)	Slightly revised
			4.4.3 (4)	Revision: Description of Bit8
			4.4.3 (9)	Revision: "IL□□12" → "IL□□16" in description of Bit4
			4.4.3 (13)	Addition: Explanation of the alarm code in Simulation Mode
			8.3.1 (2)	Revision: "OL□□38" and "OW□□3A" unshaded in table
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Machine Controller MP2000 Series

Built-in SVB/SVB-01 Motion Module

USER'S MANUAL

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