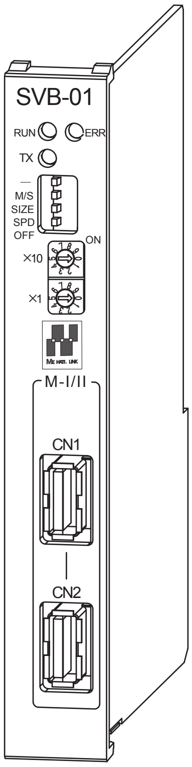
YASKAWA

Machine Controller MP2000 Series

Built-in SVB/SVB-01 Motion Module

USER'S MANUAL

Model: JAPMC-MC2100, JEPMC-MP2540-A□□ to C□□
JAPMC-MC2140, JEPMC-MP2500-D□□
JEPMC-MP2300, JEPMC-MP2540-D□□
JEPMC-MP2500-A□□ to C□□, JAPMC-MC2310



MANUAL NO. SIEP C880700 33E

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 \ Purpose		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	Settings for Connecting Inverters		✓		✓	
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 6.
For this reason, the screen captures and some descriptions may differ for MPE720 version 7.

■ 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 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 MP2500/MP2500M/ MP2500D/MP2500MD User's Manual	SIEP C880752 00	Describes how to use the MP2500, MP2500M, MP2500D, and MP2500MD Machine Controllers.
Machine Controller MP2000 Series Communication Module User's Manual	SIEP C880700 04	Provides the information on the Communication Module that can be connected to MP2000 series Machine Controller and the communication methods.
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 MP900/MP2000 Series User's Manual Motion Programming	SIEZ-C887-1.3	Describes the instructions used in MP900/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).
Σ Series SGM☐/SGDB User's Manual	SIEZ-S800-26.4	Describes the Σ-I Series SERVOPACK models, specifications, and capacity selection methods.
Σ-II Series SGM☐☐/SGDM User's Manual	SIEP S800000 15	Describes the installation, wiring, trial operation, function applications methods, maintenance, and inspection of the Σ-II Series SERVOPACKs.
Σ-III Series SGM☐☐/SGDS User's Manual	SIEP S800000 00	Describes the models, specifications, wiring, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ-III Series SERVOPACKs and Servomotors.
Σ-III Series SGM☐☐/SGDS User's Manual Rotational Motor/MECHATROLINK-II Communications Reference	SIEP S800000 11	Describes the models, specifications, wiring, trial operation, adjustment, function application methods, maintenance, inspection, and MECHATROLINK communication of the Σ-III Series SERVOPACKs and Servomotors.
Σ-III Series Operating Instructions Digital Operator	TOBP S800000 01	Describes the operating methods of the JUSP-OP05A Digital Operator.
Σ-V Series User's Manual Design and Maintenance Rotational Motor/Analog Voltage and Pulse Train Reference	SIEP S800000 45	Describes the models, specifications, wiring, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ-V Series SERVOPACKs and Servomotors.

Manual Name	Manual Number	Contents
Σ-V Series User's Manual Design and Maintenance Rotational Motor/MECHATROLINK-II Communications Reference	SIEP S800000 46	Describes the models, specifications, wiring, trial operation, adjustment, function application methods, maintenance, inspection, and MECHATROLINK communication of the Σ-V Series SERVOPACKs and Servomotors.
DC Power Input Σ-V Series USER'S MANUAL Design and Maintenance Rotational Motor/MECHATROLINK-II Communications Reference	SIEP S800000 82	Describes the models, specifications, wiring, trial operation, adjustment, function application methods, maintenance, and inspection of the DC power input Σ-V Series SERVOPACKs and Servomotors.
Σ-V Series USER'S MANUAL For Use with Large-Capacity Models Design and Maintenance Rotational Motor/MECHATROLINK-II Communications Reference	SIEP S800000 90	Describes the models, specifications, wiring, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ-V Series for use with large-capacity models SERVOPACKs and Servomotors.
Σ-V Series User's Manual Operation of Digital Operator	SIEP S800000 55	Describes the operating methods of the JUSP-OP05A-1-E Digital Operator.
Machine Controller MP900/MP2000 Series User's Manual For Linear Servomotors	SIEP C880700 06	Describes the connection methods, setting methods, and other information for Linear Servomotors.
Machine Controller MP900/MP2000 Series New Ladder Editor Programming Manual	SIEZ-C887-13.1	Describes the programming instructions of the New Ladder Editor, which assists MP900/MP2000 Series design and maintenance.
Machine Controller MP900/MP2000 Series New Ladder Editor User's Manual	SIEZ-C887-13.2	Describes the operating methods of the New Ladder Editor, which assists MP900/MP2000 Series design and maintenance.
Machine Controller MP900/MP2000 Series Distributed I/O Module User's Manual MECHATROLINK System	SIE-C887-5.1	Describes MECHATROLINK distributed I/O for MP900/MP2000 Series Machine Controllers.

■ Copyrights

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

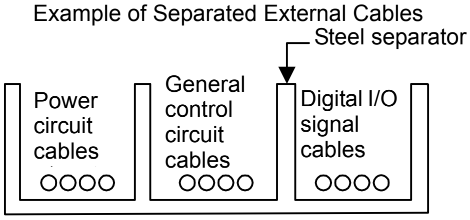
- Check the wiring to be sure it has been performed correctly.
  There is a risk of motor overrun, injury, or an accident.
- Always use a power supply of the specified voltage.
  There is a risk of burning.
- In places with poor power supply conditions, take all steps necessary to ensure that the input 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

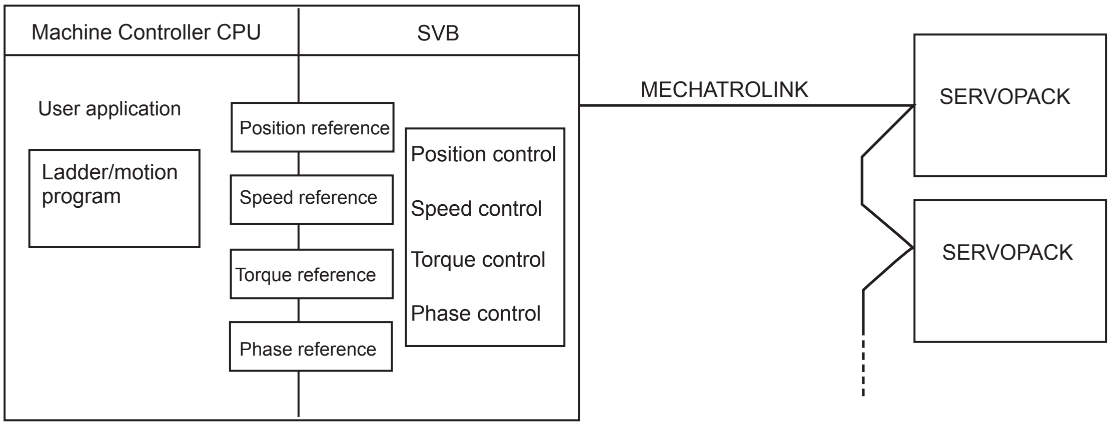
Overview

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

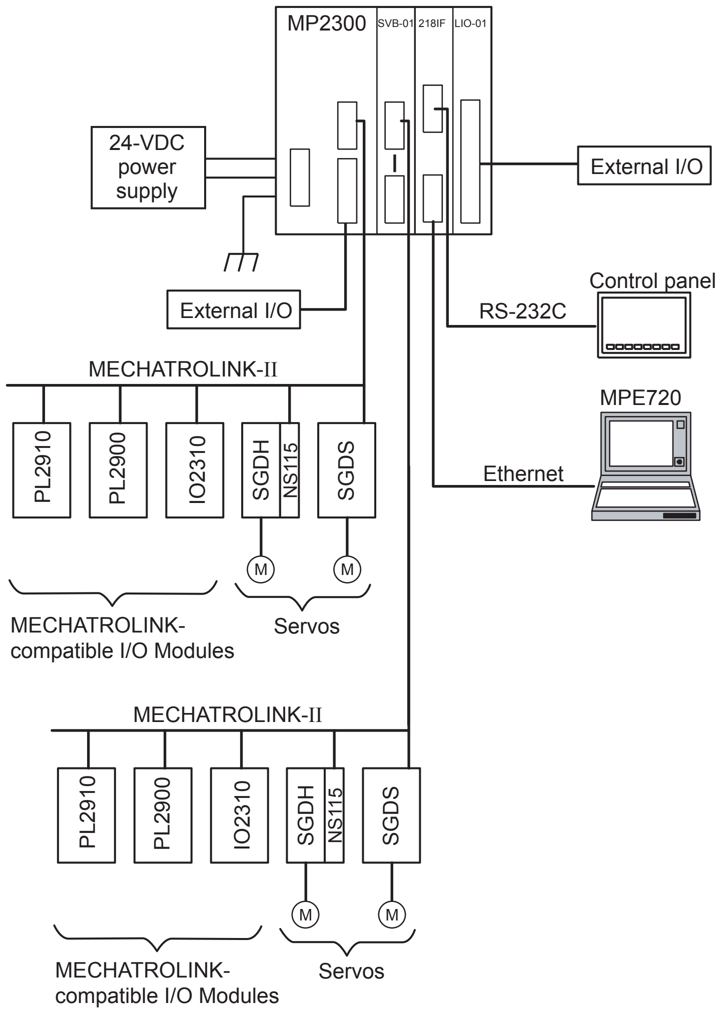
The SVB Modules are of two types: The built-in SVB (hereinafter referred to as Built-in SVB) and the slot-mounting optional SVB (hereinafter referred to as Optional SVB)
A built-in SVB Module is incorporated in the following MP2000-series Machine Controllers.
MP2100, MP2100M, MP2300, MP2500, MP2500M, MP2500D, and MP2500MD
The Optional SVB is one of the optional modules for the Machine Controller. The SVB-01 Module is an Optional SVB that can be mounted on Machine Controllers MP2200 and MP2300. An SVB-01 Module is mounted on Machine Controllers MP2100M, MP2500M, MP2500MD as a standard feature.

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).
  MP2300: Up to 2 SVB-01 Modules can be mounted in optional slots.
  The MP2300 incorporates a built-in SVB Module capable of controlling 16 axes and is able to control up to 48 axes.
  MP2200: Up to 16 SVB-01 Modules can be mounted in optional slots.
  If an extension rack is used, 256 axes can be controlled.
  MP2100M: Up to 14 SVB-01 Modules can be mounted in optional slots by connecting an extension rack.
  The MP2100M incorporates a built-in SVB Module capable of controlling 32 axes and is able to control up to 256 axes.
- 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 (3) 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 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.

1.1.5 Devices Connectable to MECHATROLINK

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

(1) SERVOPACKs and Inverters

The following table shows SERVOPACKs that are compatible with MECHATROLINK and can be connected to the SVB Module.

Type	Model Number	Details	MECHATROLINK-I	MECHATROLINK-II
SERVOPACKs	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 SERVOPACK	Yes	Yes
	SGDX-□□□12□	SGDX SERVOPACK	Yes	Yes
	SJDE-□□AN□	SJDE SERVOPACK	No	Yes
	SGDV-□□□□1□□	SGDV SERVOPACK	Yes	Yes
Inverters	CIMR-G7A□ SI-T	Varispeed G7 Inverter with MECHATROLINK interface	Yes	Yes
	CIMR-F7A□ SI-T	Varispeed F7 Inverter with MECHATROLINK interface	Yes	Yes
	CIMR-V7AA□ SI-T/V7	VSmini V7 Inverter with MECHATROLINK interface	Yes	Yes
	CIMR-A□ SI-T3	High Performance Vector Control Drive A1000 MECHATROLINK-II Option Card	Yes	Yes
	CIMR-V□ SI-T3/V	Compact Vector Control Drive V1000 MECHATROLINK-II Option Unit	Yes	Yes

(2) I/O Modules

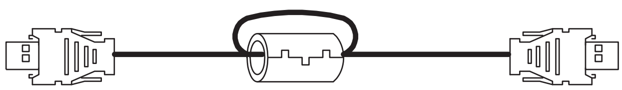
The following table shows Modules that are compatible with MECHATROLINK and can be connected to the SVB Module.

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	64-point I/O Module 24 VDC, 64 inputs, 64 outputs (sink)	Yes	Yes

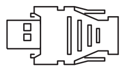
(cont'd)

Model Number	Details	MECHATROLINK-I	MECHATROLINK-II
JEPMC-IO2330	64-point I/O Module 24 VDC, 64 inputs, 64 outputs (source)	Yes	Yes
JEPMC-PL2900	Counter Module Reversible counter, 2 channels	Yes	Yes
JEPMC-PL2910	Pulse Output Module Pulse output, 2 channels	Yes	Yes
JEPMC-AN2900	A/D Module Analog inputs, -10 to 10 V, 4 channels	Yes	Yes
JEPMC-AN2910	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	SVB-01 Motion Module	Yes	Yes
JEVSA-YV250	MYVIS YV250 Machine Vision System	Yes	Yes
JEVSA-YV260	MYVIS YV260 Machine Vision System	Yes	Yes
JEPMC-REP2000	MECHATROLINK-II repeater	Yes	Yes
JEPMC-MC400	MP940 Machine Controller	Yes	No

(3) Cables

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

(cont'd)

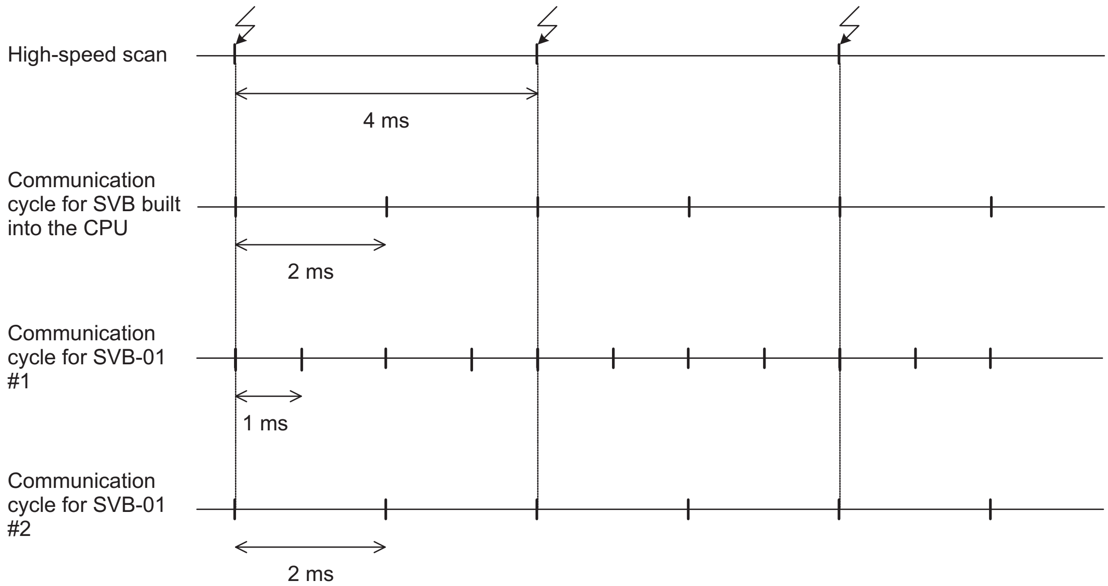
Name and Specification	Model Number	Length
MECHATROLINK Cable MECHATROLINK Connector – Loose Wire * 	JEPMC-W6011-A5	0.5m
	JEPMC-W6011-01	1 m
	JEPMC-W6011-03	3 m
	JEPMC-W6011-05	5 m
	JEPMC-W6011-10	10 m
	JEPMC-W6011-20	20 m
	JEPMC-W6011-30	30 m
	JEPMC-W6011-40	40 m
	JEPMC-W6011-50	50 m
Terminator 	JEPMC-W6022	–

* If making cables for the SGD-☐☐☐N and SGDB-☐☐AN SERVOPACKs, use cables with loose wires on one end. Do not use this cable for other SERVOPACKs.

1.1.6 Synchronization between Modules

(1) Overview

MP2200 and MP2300 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.

(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

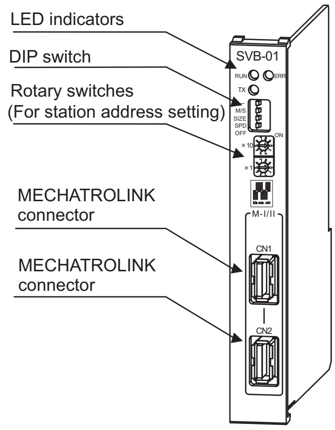
(7) Precaution

■ 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
Module Appearance		
Max. No. of Modules to be mounted		MP2300: 2, MP2200: 16
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 to 55°C
	Ambient Storage Temperature	-25 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 1 (conforming to JIS B 3501)
	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	Conforms to EN 61000-6-2 and EN 55011 (Group 1, Class A). Power supply noise (FT noise): 2 kV min., for one minute Radiation noise (FT noise): 1 kV min., for one minute

(cont'd)

Item		Specifications
Installation Requirements	Ground	Ground to 100 Ω max.
	Cooling Method	Natural cooling
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		One line	
	Number of Communication Ports (Connectors)		SVB-01, MP2100M, and MP2500M/MP2500MD	2 ports
			MP2100, MP2300, MP2500, and MP2500D	1 port
	Terminating Resistance		JEPMC-W6022 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*	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 MECHATROLINK-II Repeater is not used. Refer to *Chapter 8 MECHATROLINK-II Repeater* of the *Machine Controller MP900/MP2000 Series Distributed I/O Module User's Manual MECHATROLINK System* (Manual No. SIE-887-5.1) 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* 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 Repeater is used.
JEPMC-REP2000 Repeater must be used if 17 or more slave stations are connected when using MECHATROLINK-II communication.

1.3 SVR Virtual Motion Module

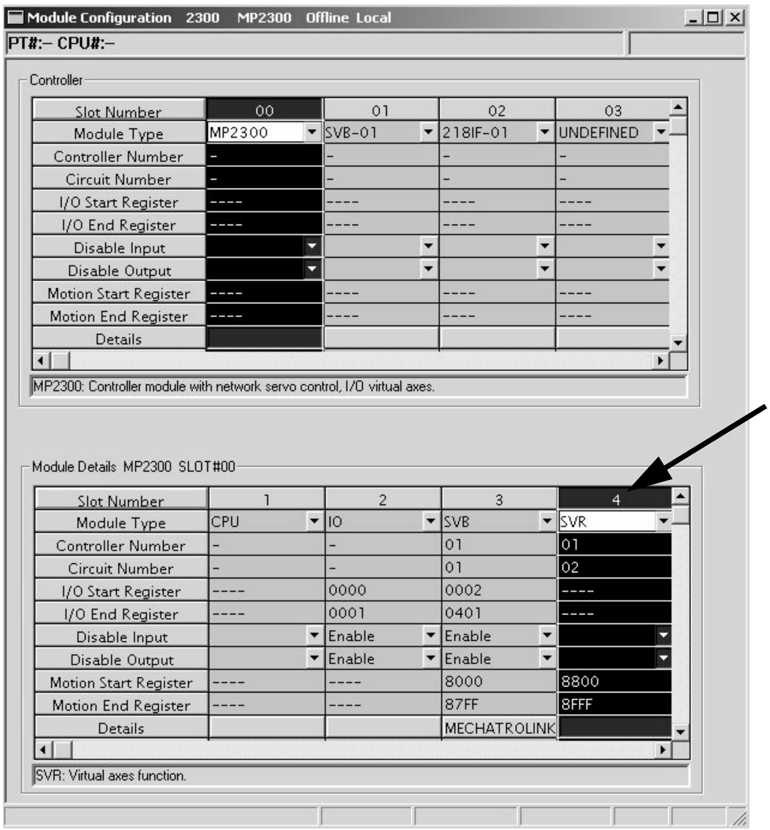
1.3.1 Overview

The Virtual Motion Module is a software module provided as a standard feature with the MP2000 series 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.

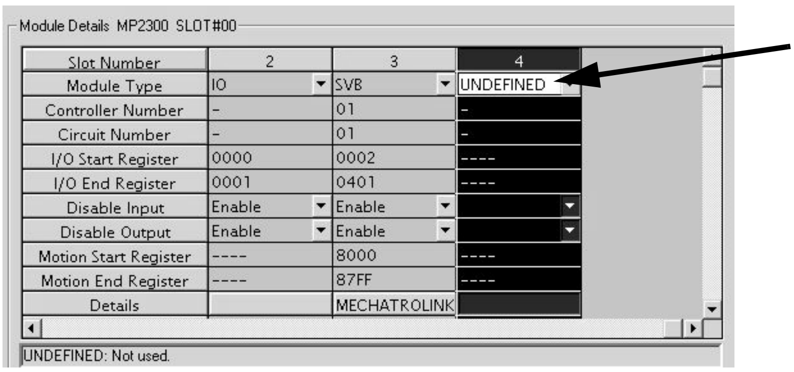
- Refer to items marked with R in *Chapter 4 Motion Parameters* for information on SVR motion parameters.
- Refer to *Chapter 6 Motion Commands* for information on how to use SVR motion commands.

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 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 Window.



Overview

1

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.

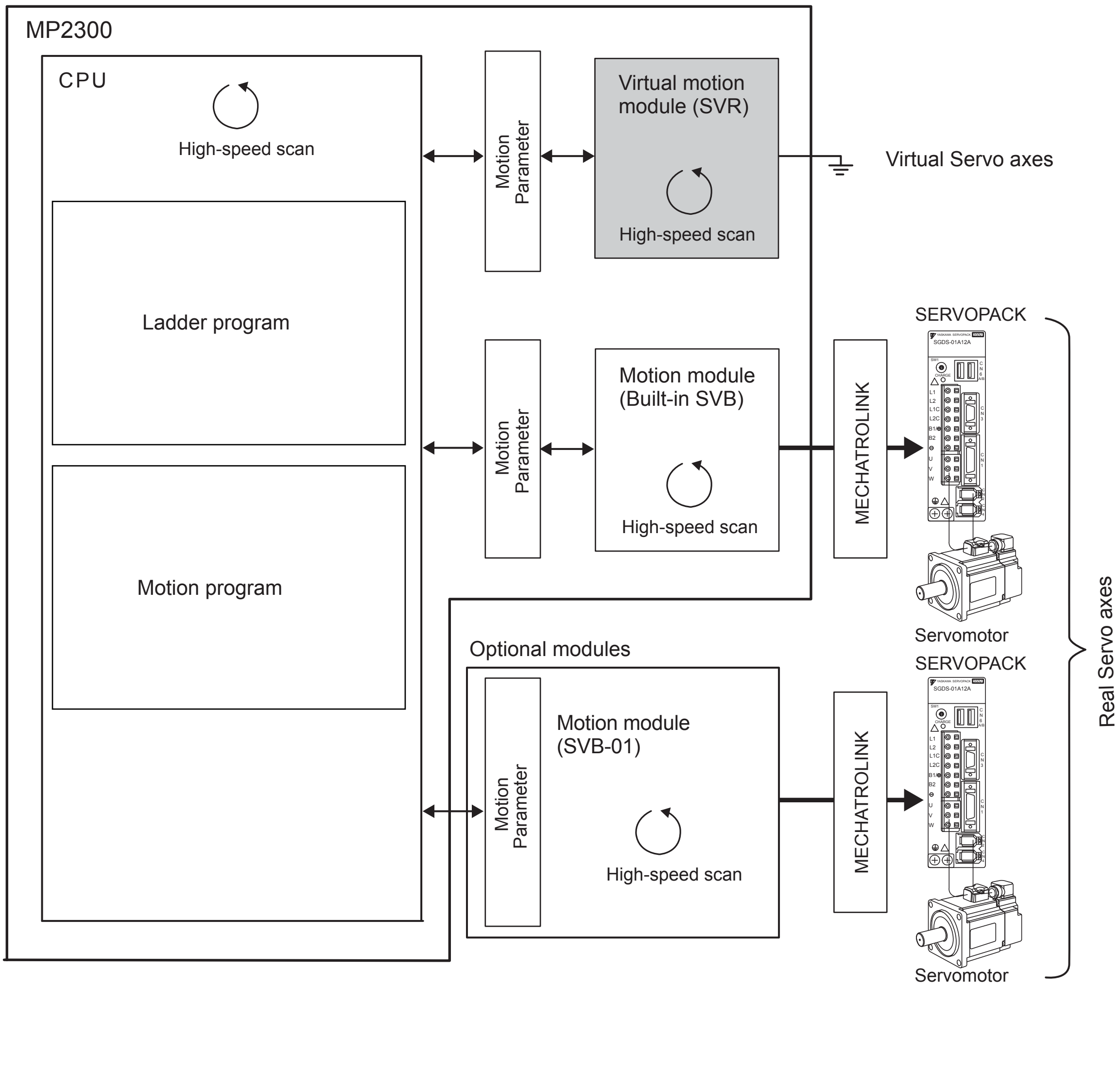
The following table lists application examples of the SVR.

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

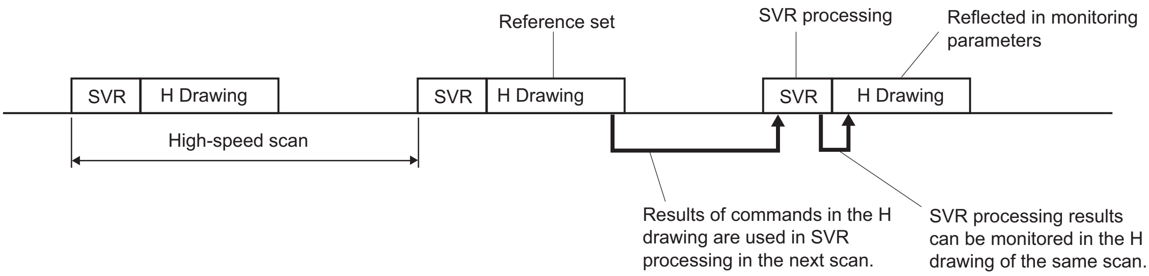
The following figure shows an example of system configuration using a Machine Controller MP2300 with a SVR Module mounted.



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.

Overview

1

2

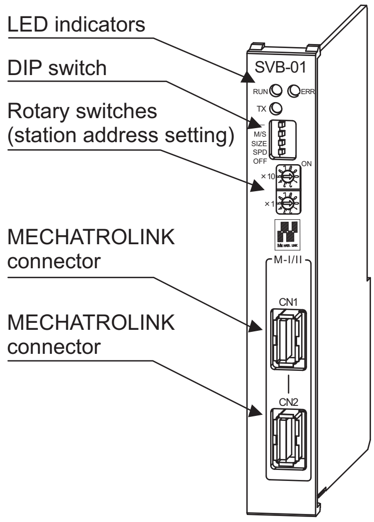
Settings and Installation

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 Window. Refer to *3.4 Self-configuration and Definition Files* and make the settings for MECHATROLINK transmission definition and SVB Module definition.
	●	○	●	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.

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.

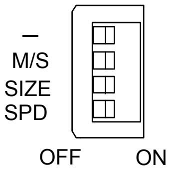
- ● : Lit
  ○ : Unlit
  ★ : Blinks
  \- : Not specified

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		

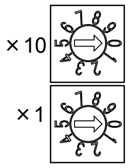
■ Setting Example

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.



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 MP2000-series Machine Controllers on which the SVB-01 Module can be mounted.

<table>
<tr><th colspan="2">Name</th><th>Model</th><th>Max. Number of SVB-01 Modules that Can Be Connected</th><th>Applicable CPU Version</th><th>Applicable MPE720 Version</th><th>Remarks</th></tr>
<tr><td colspan="2">MP2310</td><td>JEPMC-MP2310</td><td>3 modules</td><td rowspan="7">Ver. 2.44
or later</td><td rowspan="7">Ver. 5.33
Ver. 6.01
or later</td><td>–</td></tr>
<tr><td colspan="2">MP2300S</td><td>JEPMC-MP2300S</td><td>1 module</td><td>–</td></tr>
<tr><td colspan="2">MP2300</td><td>JEPMC-MP2300</td><td>2 modules</td><td>–</td></tr>
<tr><td rowspan="3">MP2200</td><td>100/200-VAC Input Base Unit[*1]</td><td>JEPMC-BU2200</td><td rowspan="3">16 modules</td><td rowspan="3">The max. number of optional modules is the total number that can be connected when using four racks (max. number of racks)[*2].</td></tr>
<tr><td rowspan="2">24-VDC Input Base Unit [*1]</td><td>JEPMC-BU2210</td></tr>
<tr><td>JEPMC-BU2220-E</td></tr>
<tr><td colspan="2">MP2100M</td><td>JAPMC-MC2140</td><td rowspan="4">14 modules</td><td rowspan="3">To install an optional module, use the following procedure.
1. Install an MP2100 MEX I/F board (Model: JAPMC-EX2100) in a personal computer.
2. Mount an optional module on an expansion rack (MP2200 base unit).
3. Mount an inter-rack connection module EXIOIF (Model: JAPMC-EX2200) on the expansion rack.
4. Connect the expansion rack to an MP2100M, and MP2101M or an MP2101TM.
5. Connect an MP2100M, MP2101M or MP2101TM to the personal computer.
• The maximum number of optional modules is the total number that can be used with three racks (maximum number of racks).</td></tr>
<tr><td colspan="2">MP2101M</td><td>JAPMC-MC2142-E</td><td rowspan="2">Ver. 2.74
or later</td><td rowspan="2">Ver. 5.54
Ver. 6.24
or later</td></tr>
<tr><td colspan="2">MP2101TM</td><td>JAPMC-MC2142T-E</td></tr>
<tr><td colspan="2">MP2500ME</td><td>JEPMC-MP254E</td><td>Ver. 2.44
or later</td><td>Ver. 6.10
or later</td><td>To install an optional module, use the following procedure.
1. Mount an optional module on an expansion rack (MP2200 base unit).
2. Mount an inter-rack connection module EXIOIF (Model: JAPMC-EX2200) on the expansion rack.
3. Connect the expansion rack to an MP2500ME controller.
• The maximum number of optional modules is the total number that can be used with three racks (maximum number of racks).</td></tr>
</table>

(cont'd)

Name	Model	Max. Number of SVB-01 Modules that Can Be Connected	Applicable CPU Version	Applicable MPE720 Version	Remarks
MP2500B-OP	JEPMC-MP250U	14 modules	Ver. 2.44 or later	Ver. 6.10 or later	To install an optional module, use the following procedure. The procedures differ if connecting one module or several modules. ■ For one module Mount an optional module on MP2500B-OP or an MP2500MB-OP controller directly. ■ For several modules 1. Mount an inter-rack connection module EXIOIF (Model: JAPMC-EX2200) on an MP2500B-OP or an MP2500MB-OP controller. 2. Mount an optional module on an expansion rack (MP2200 base unit). 3. Mount an inter-rack connection module EXIOIF (Model: JAPMC-EX2200) on the expansion rack. 4. Connect the expansion rack to the MP2500B-OP or the MP2500MB-OP controller. • The maximum number of optional modules is the total number that can be used with three racks (maximum number of racks).
MP2500MB-OP	JEPMC-MP254U				

* 1. One of the CPU modules indicated below is required.

Name	Model	Remarks
CPU-01	JAPMC-CP2200	–
CPU-02	JAPMC-CP2210	Equipped with one CF card slot and one USB port
CPU-03	JAPMC-CP2220-E	Equipped with one CF card slot and one Ethernet port.
CPU-04	JAPMC-CP2230-E	Equipped with one Ethernet port.

* 2. Inter-rack connection module EXIOIF (Model: JAPMC-EX2200) is required between racks.

- SVB-01 Modules cannot be mounted on the following MP2000-series Machine Controllers: MP2100, MP2400, MP2500, MP2500M, MP2500B, MP2500MB

2.3 Mounting/Removing SVB-01 Modules

This section describes how to mount and remove an SVB-01 Module.

2.3.1 Mounting an SVB-01 Module

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

- Remove the SVB-01 Module to be replaced, in advance of replacement, by referring to *2.3.2 Removing SVB-01 Modules for Replacement*.

(1) Preparation

1. Create a backup file of the programs.

Use the MPE720 to save the Machine Controller programs to a personal computer.

- MPE720 Ver 5.□□: Right-click the PLC folder and then select ***Transfer*** - ***All Files*** - ***From Controller to MPE720*** from the main menu.
  MPE720 Ver 6.□□: Open the project file and then select ***Online*** - ***Transfer*** - ***Read from Controller*** from the main menu.

2. Remove the Machine Controller and Expansion Racks.

Turn OFF the power supply, and then disconnect all cables from the Machine Controller and expansion racks (MP2200 base units). After disconnecting all the cables, remove the Machine Controller and expansion racks from the panel or mounting rack, and place them on a sufficiently wide and safe surface, such as working table.

(2) Removing an Optional Cover

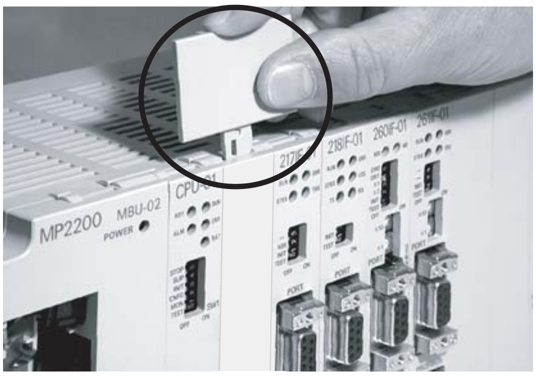
Use the following procedure if the slot has an optional cover installed.

1. Remove the battery cover.

Insert a coin in the notch on the side of the Machine Controller and pry the battery cover off.

2. Remove the cover of the SVB-01 Module.

Insert the tab of the battery cover into the slot on the top of the cover of the SVB-01 Module to release it, as shown in the diagram. Turn the front of the battery cover towards you for this operation.



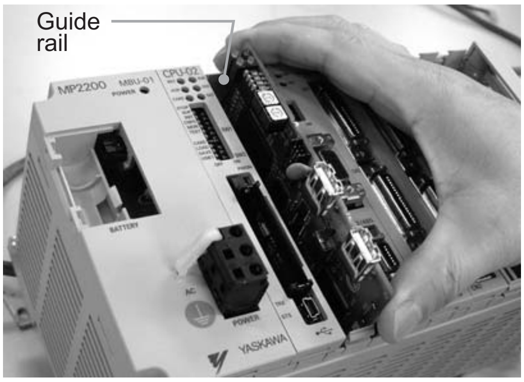
Release the bottom in the same way.

(3) Mounting SVB-01 Modules

1. Insert a SVB-01 Module.

Guide rails can be seen or are located at the top and bottom of the option slot, as shown in the following diagram. While holding both the top and bottom of the Module, line up the Module with the guide rails inside the option slot, make sure the Module is straight and insert it.

- If the Module is not lined up with the guide rails, the FG bar on the bottom inside the slot may become damaged.



2. Mount onto the mounting base.

After the SVB-01 Module has been completely inserted, firmly push the front of the Module into the mounting-base connectors. If the SVB-01 Module has been installed correctly, the front of the SVB-01 Module and the hook will be aligned.

3. Mount the panel of the SVB-01 Module.

Line up the notch on the bottom of the panel with the tab on the bottom of the Machine Controller.

This completes the installation procedure.

2.3.2 Removing SVB-01 Modules for Replacement

Use the following procedure to remove a SVB-01 Module.

(1) Preparation

1. Create a backup file of the programs

Use the MPE720 to save the programs of the Machine Controller to a personal computer.

- MPE720 Ver 5.□□: Right-click the PLC folder and then select ***Transfer*** - ***All Files*** - ***From Controller to MPE720*** from the main menu.
  MPE720 Ver 6.□□: Open the project file and then select ***Online*** - ***Transfer*** - ***Read from Controller*** from the main menu.

2. Remove the Machine Controller and Expansion Racks

Turn OFF the power supply, and then disconnect all cables from the Machine Controller and expansion racks (MP2200 base units). After disconnecting all the cables, remove the Machine Controller and expansion racks from the panel or mounting rack, and place them on a sufficiently wide and safe surface, such as work table.

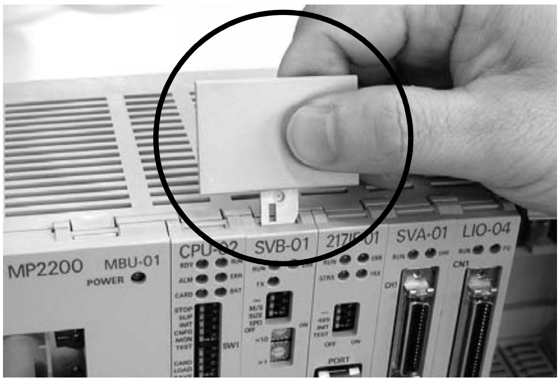
(2) Removing SVB-01 Modules

1. Remove the battery cover.

Insert a coin in the notch on the side of the Machine Controller and pry the battery cover off.

2. Remove the cover of the SVB-01 Module.

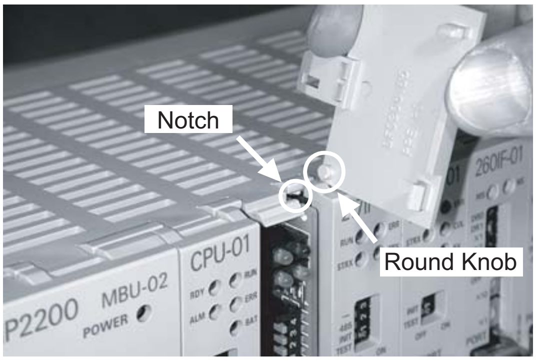
Insert the tab of the battery cover into the slot on the top of the panel of the SVB-01 Module to release it, as shown in the diagram. Turn the front of the battery cover towards you for this operation.



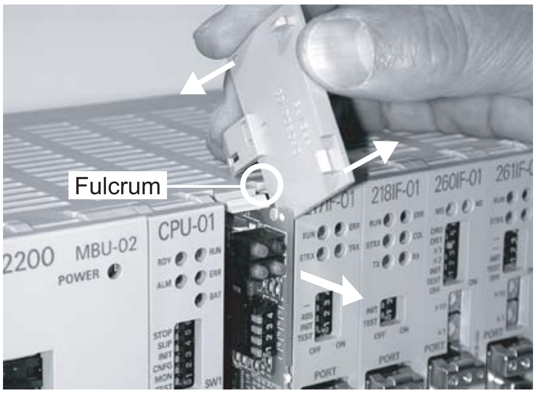
Release the bottom in the same way.

3. Remove the SVB-01 Module from the mounting base.

Pull the top of the panel of the SVB-01 Module towards you to remove it. A notch on the SVB-01 Module will be visible from the gap in the cover. Hook the round knob on the battery cover, shown in the diagram, into the notch in the SVB-01 Module.



While holding the battery cover as shown in the photograph, tilt the cover back with the knob as the pivot point to disconnect the Module. The Module should move forward out of the case.



4. Pull out the SVB-01 Module.

While holding both the top and bottom of the Module, pull the Module out straight towards you. Hold the Module by its edges and do not touch any components on the Module.

Place the Module in the bag provided with the initial shipment and store it in this bag.

- A optional cover (JEPMC-OP2300) must be installed on the empty slot.

3

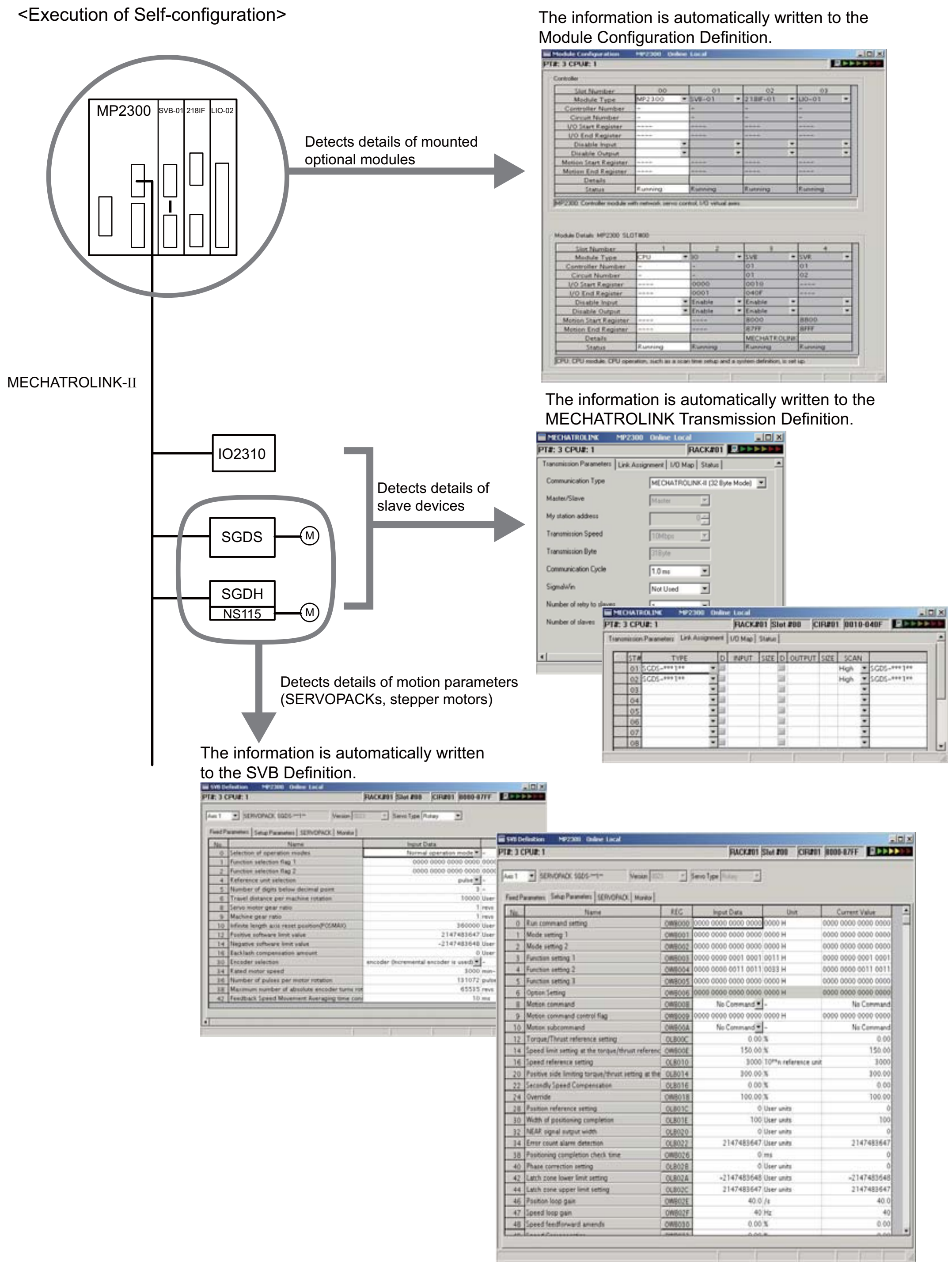
Self-configuration and Created Definition Files

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 the Module Configuration Definition, MECHATROLINK Transmission Definition, and SVB Definition files. The self-configuration function greatly reduces the system startup time.

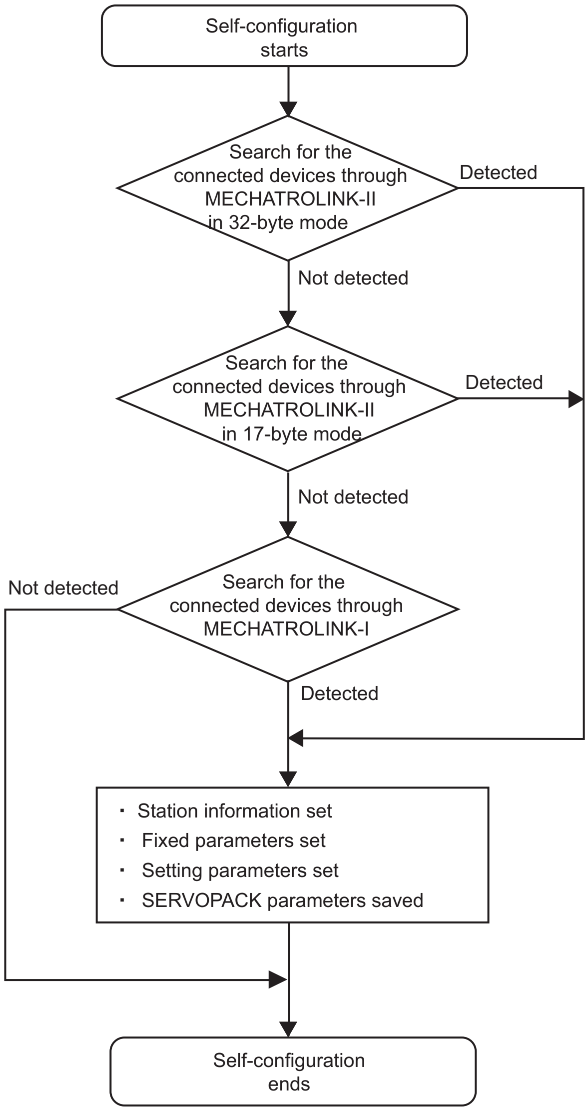
The following figure shows how the self-configuration function works.



- Refer to *3.4.1 Module Configuration Definition* for details on Module Configuration Definition, *3.4.2 MECHATROLINK Transmission Definition* for details on MECHATROLINK Transmission Definition, and *3.4.3 SVB Definition* for details on SVB Definition.

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 How to Execute 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 SVB Definition.
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. • The SVB definitions of 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, MP2500, MP2500M, MP2500D, and MP2500MD Machine Controllers, the DIP switch is not commonly used for self-configuration. Use an MPE720 as described below to execute self-configuration.

■ Using an MPE720

Start the Engineering Manager of MPE720 and open the Module Configuration Window. Select ***Order - Self Configure All Modules*** from the main menu of the Module Configuration Window, or select a module for which self-configuration is to be executed in the Module Configuration Window and then select ***Module Self-configuration***.

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

The results of configuration will be as follows.

INIT	Result
Self Configure 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. • The SVB definitions of the axes that have already been allocated to the MECHATROLINK Transmission Definition Window will not be updated.
Module Self-configuration (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. • The SVB definitions of the axes that have already been allocated to the MECHATROLINK Transmission Definition Window will not be updated.

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.

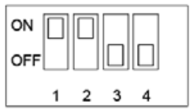
Correctly wire and connect all electronic devices to be used.

2. Make switch settings for MECHATROLINK slaves.

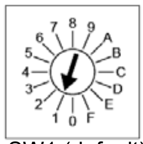
Set the MECHATROLINK communication specifications using the DIP switch and the station address on the rotary switch on each MECHATROLINK slaves.

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 the relevant Machine Controller manual.
- 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).

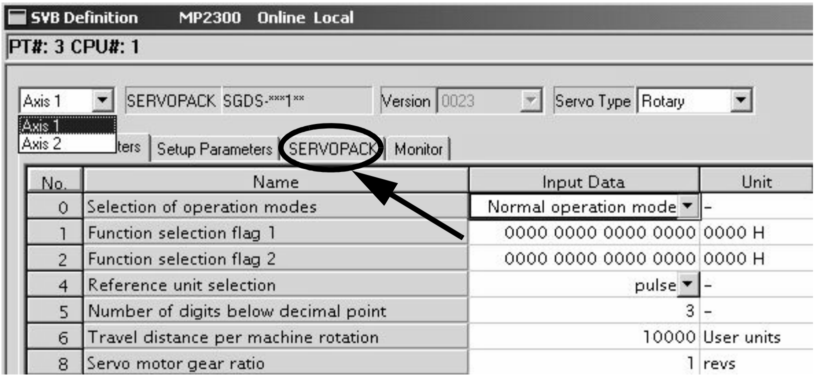
If the servo gain has not been adjusted in step 3, adjust the servo gain and make any other required adjustments.

* 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.

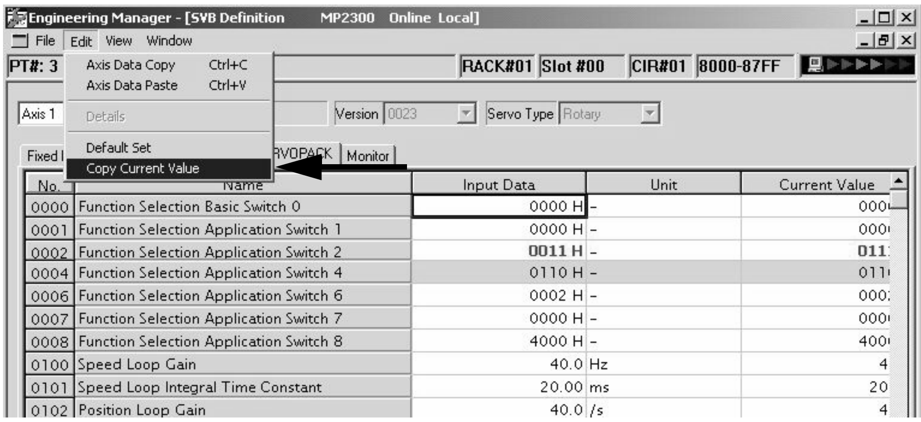
7. Save SERVOPACK parameters.

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

a) Select the axis in the SVB definition window (refer to *3.4.3 SVB Definition*), then click the **SERVOPACK** Tab to display the SERVOPACK Tab Page.



b) Select ***Edit - Copy Current Value***.



* The data in the *Input Data* column is the SERVOPACK data saved to the Machine Controller and the data in the *Current Value* column is the data set to the SERVOPACK.
* Refer to *3.4.4 Current Value and Setting Data in SVB* for information on the relationship between *Current Value* and *Input Data*.

c) Select ***File - Save*** to save the SERVOPACK settings for the axis to the Machine Controller.

8. Save Machine Controller data to flash memory.

Return to the MPE720 File Manager Window and save to flash memory.

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

<MP2100, MP2100M, MP2200, MP2300>
Transfer the ladder programs to the Machine Controller and save them in the flash memory. Then, set all DIP switches on the Machine Controller to OFF. Turn the power to the Machine Controller OFF and then ON again.
<MP2500, MP2500M, 2500D, MP2500MD>
Transfer the ladder programs to the motion board and save them in the flash memory. Then, turn the power to the Machine Controller OFF and then 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 (or the motion board for MP2500, MP2500M, MP2500D, and MP2500MD) 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 ***Transfer*** - ***All Files*** - ***From Controller to MPE720***.

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 ***Transfer - All Files - From Controller to MPE720*** to create a backup of the application.

2. Turn OFF the power to the Machine Controller.

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

3. Start the electronic device to be added.

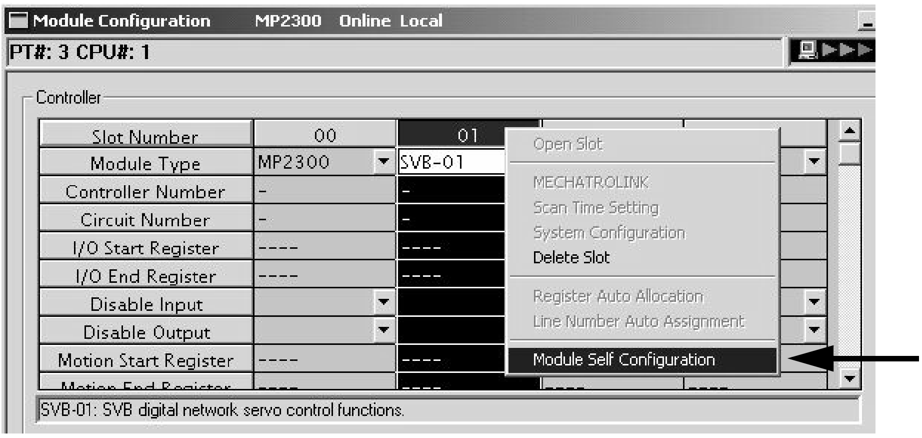
Make the DIP and rotary switch settings for the device to be added. For MECHATROLINK slaves, make the switch settings, and turn ON the power to the slave. Confirm that the device starts correctly and then turn OFF the power.

4. Connect the electronic device.

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

5. Execute Self-configuration.

Turn ON the power to the Machine controller, log on to the Machine Controller online using MPE720, then select ***Order - Module Self-configuration*** to execute self-configuration for the added Optional Module or the SERVOPACK connected to the SVB Module.



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

6. Make parameter settings to match machinery.

7. Save SERVOPACK parameters.

8. 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 ***Transfer - All Files - From Controller to MPE720*** to create a backup of the application.

2. Turn OFF the power to the Machine Controller.

Log off 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.

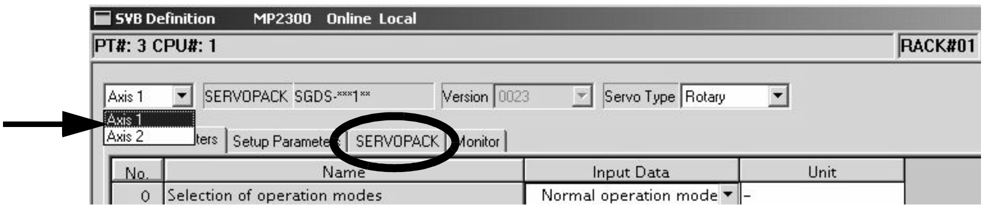
Remove the electronic device to be replaced, connect the new device to the Machine Controller, and turn ON the power to all MECHATROLINK slaves.

5. Turn ON the Machine Controller power.

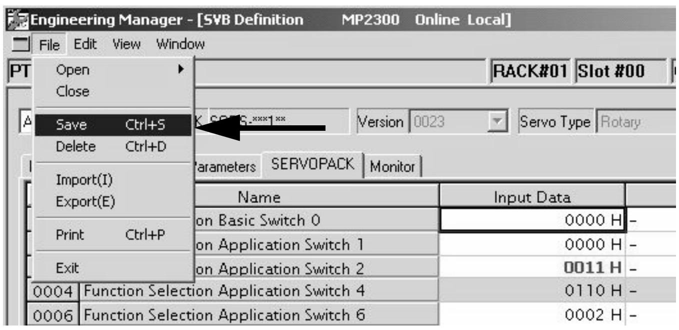
6. Save SERVOPACK Parameters.

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, then select the SERVOPACK Tab Page on the SVB Definition Window (refer to *3.4.3 SVB Definition*) to display the SERVOPACK Tab Page.



b) Click ***File - Save*** to write the SERVOPACK settings to the SERVOPACK.



- The Machine Controller SERVOPACK settings data is written to all SERVOPACKs when ***Save*** is executed, and the settings data is also written in the Machine Controller *Current Value* data column.

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 Definition Files

When executing self-configuration, the Machine Controller automatically recognizes all the connected optional modules, and the Module Configuration Definition, MECHATROLINK Transmission Definition, and SVB Definition files will accordingly be automatically created.
Each definition 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* for details.

■ MECHATROLINK Transmission Definition

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

■ SVB Definition

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 SVB Definition* for details.

This section describes the setting window for each definition file.

- Refer to *Chapter 10 Settings for Connecting Inverters* 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

(1) How to Open the Module Configuration Window

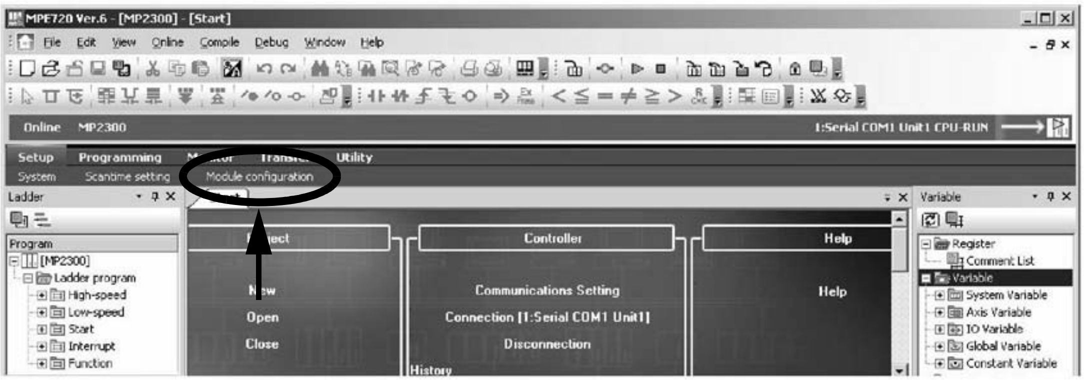
Open the Module Configuration Window by the following procedure.

■ Personal Computer with MPE720 Version 6 or 7 Installed

1. Start the MPE720 installed in a personal computer that is connected to a Machine Controller, and then open the target project file.

- For information on how to start the MPE720, refer to *Engineering Tool for MP2000 Series Machine Controller MPE720 Version 6 User's Manual* (manual number: SIEP C880700 30) or *Machine Controller MP2000/ MP3000 Series Engineering Tool MPE720 Version 7 User's Manual* (manual number: SIEP C880761 03).

2. Select ***Setup*** - ***Module Configuration Definition*** from the Launcher.



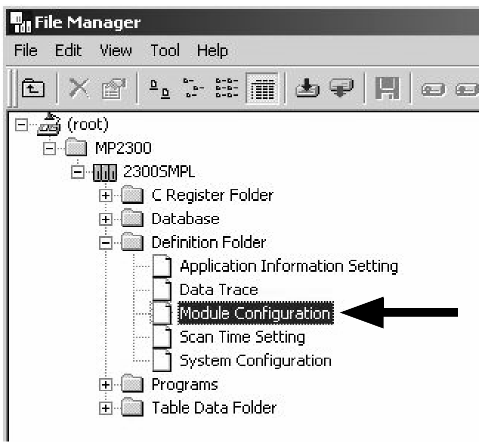
The Module Configuration Window (see the next page) will open.

■ Personal Computer with MPE720 Version 5 Installed

1. Start the MPE720 installed in a personal computer that is connected to a Machine Controller. Log on online to the application for the target Machine Controller in the File Manager Window.

- Refer to *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual* (manual number: SIEP C880700 05) for information on how to start the MPE720 and how to log on to the Machine Controller online.

2. Double-click ***Module Configuration*** in the ***Definition*** folder.

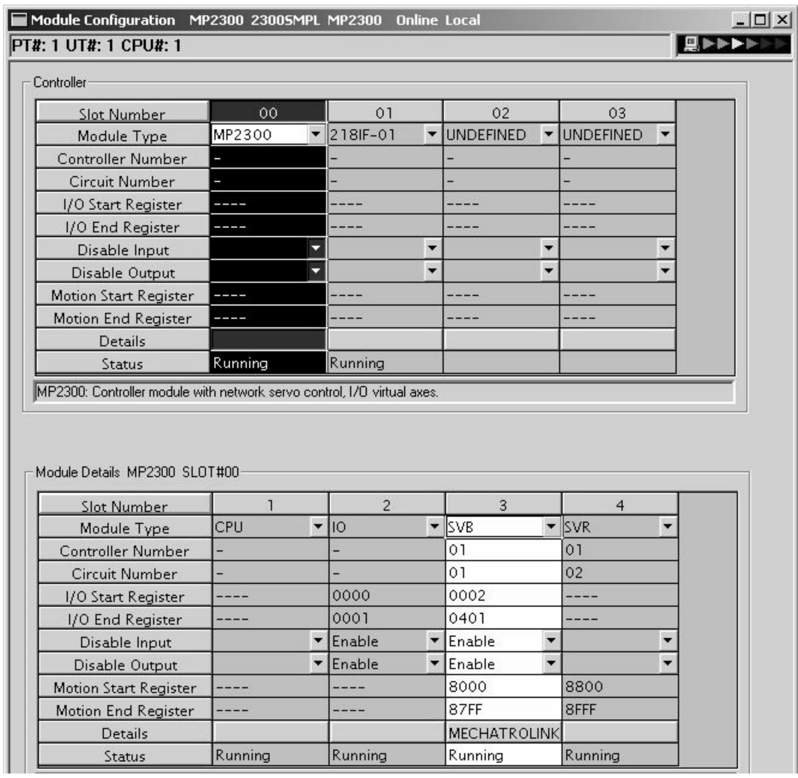


The Module Configuration Window will be open.

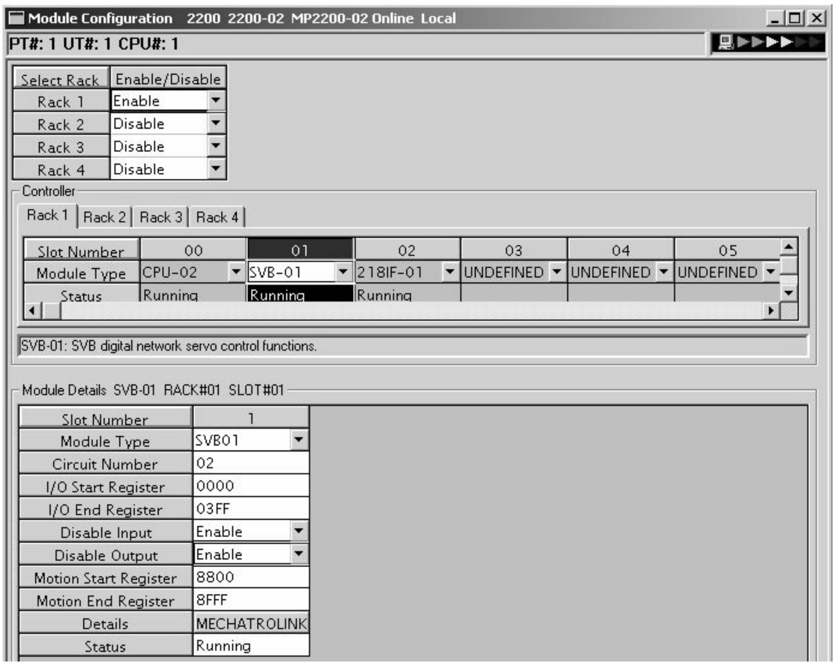
(2) Module Configuration Window

The Module Configuration Window will differ slightly depending on the Machine Controller model.

<MP2100, MP2300, MP2500, and MP2500D>



<MP2100M, MP2200, MP2500M, and MP2500MD>



After executing self-configuration, all the optional modules connected to the Machine Controller will be displayed in the ***Controller*** field. Click an optional module in the ***Controller*** field and its details will be displayed in the ***Module Details*** field.

The following table lists the items shown in the Module Configuration Window.

Item	Description	Modification
Select Rack (Only for MP2100M, MP2200, MP2500M, and MP2500MD)	Specifies whether the expansion rack (JEPMC-BU2200 and JEPMC-BU2210) is used or not. ◆ ***Rack 1* is reserved for the CPU Module and cannot be set to *Not Use*.**	Possible
Slot Number	Slot number	Not possible
Module Type	Module detected in the slot	Possible
Controller Number (Only for MP2100, MP2300, MP2500, and MP2500D)	Fixed to 01	Not possible
Circuit Number	Module circuit number	Possible
I/O Start Register	I/O start register number of the I/O Module to be connected to MECHA-TROLINK (Setting range: 0000 to 7FFFh, max. 400h words per SVB Module)	Possible
I/O End Register	I/O last register number of the I/O Module to be connected to MECHA-TROLINK (Setting range: 0000 to 7FFFh, max. 400h words per SVB Module)	Possible
Disable Input	Input enabled (Enable)/disabled (Disable)	Possible (Not possible if the cell is blank)
Disable Output	Output enabled (Enable)/disabled (Disable)	Possible (Not possible if the cell is blank)
Motion Start Register	Start register number of the motion parameters (Automatically sets according to the circuit number)	Not possible
Motion End Register	Last register number of the motion parameters (Automatically sets according to the circuit number)	Not possible
Details	Opens the MECHATROLINK Transmission Definition Window. (Double-click the ***MECHATROLINK*** cell to open the window.)	–
Status	Status of each module in online mode	Not possible

"Possible" in the Modification line in the above table means that it is possible to change the setting of the item. Always save the setting to the flash memory after having changed the setting.

- When changing the setting, be careful not to set the register numbers overlapped with another module.
- I/O Start Register and I/O End Register must be set even though the I/O Module is connected or not connected to MECHATROLINK.

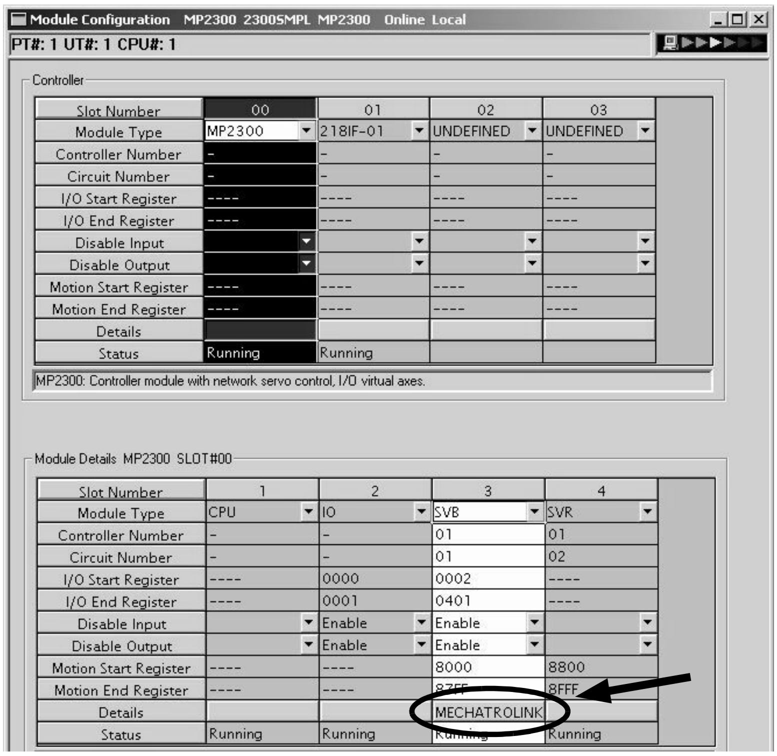
3.4.2 MECHATROLINK Transmission Definition

(1) How to Open the MECHATROLINK Transmission Definition Window

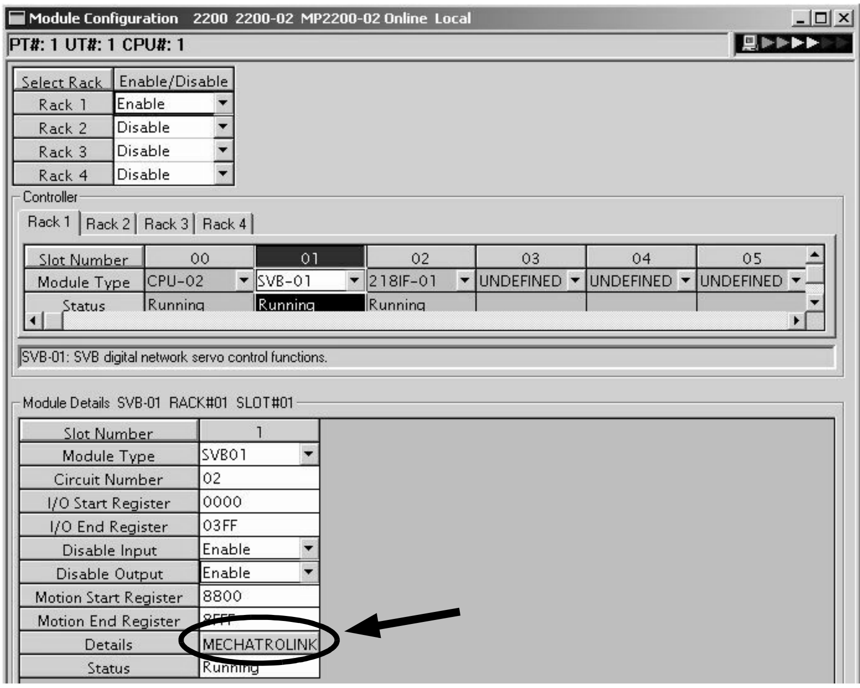
In the Module Configuration Window, select the ***SVB*** Module in the ***Controller*** field and double-click the ***MECHATROLINK*** cell in the ***Details*** field. The MECHATROLINK Transmission Definition Window will open.

- If several SVB Modules are mounted, select the SVB Module to be checked or set in the ***Controller*** field.
- To check or set the built-in SVB Module, select slot number ***00*** in the ***Controller*** field.

<MP2100, MP2300, MP2500, and MP2500D>



<MP2100M, MP2200, MP2500M, and MP2500MD>



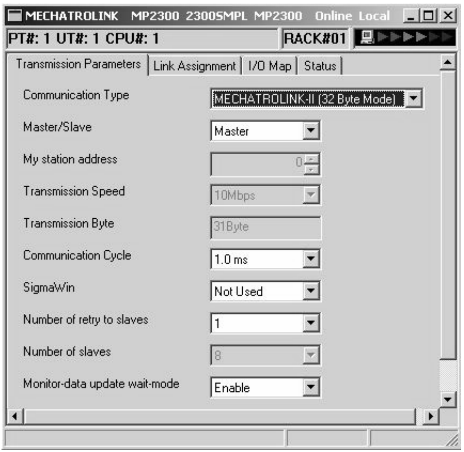
(2) MECHATROLINK Transmission Definition Window Details

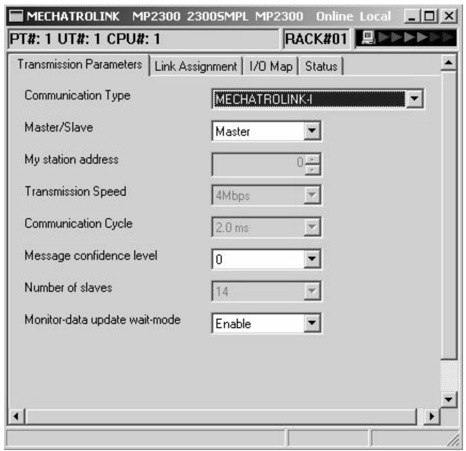
The MECHATROLINK Transmission Definition Window has four tabs: Transmission Parameters, Link Assignment, I/O Map, and Status. Click the tab to view each.

[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 (slot number 00) 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 MECHA-TROLINK-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.

■ 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.

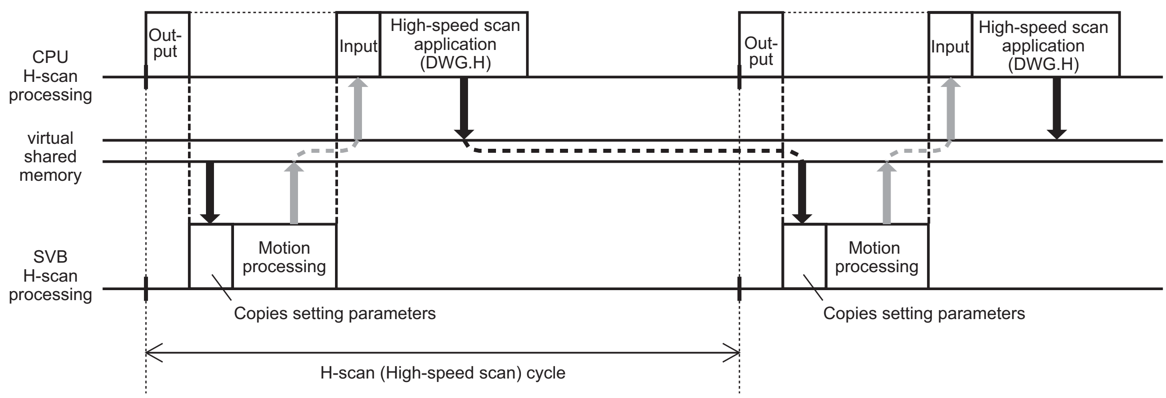
SVB Module Type	Built-in SVB		Optional SVB	
MECHATROLINK-II Communication Mode	32-byte mode	17-byte mode	32-byte mode	17-byte mode
Communication Cycle That Can be Set	1 ms, 1.5 ms, or 2 ms	Fixed to 1 ms	0.5 ms, 1 ms, 1.5 ms, or 2 ms	0.5 ms or 1 ms

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

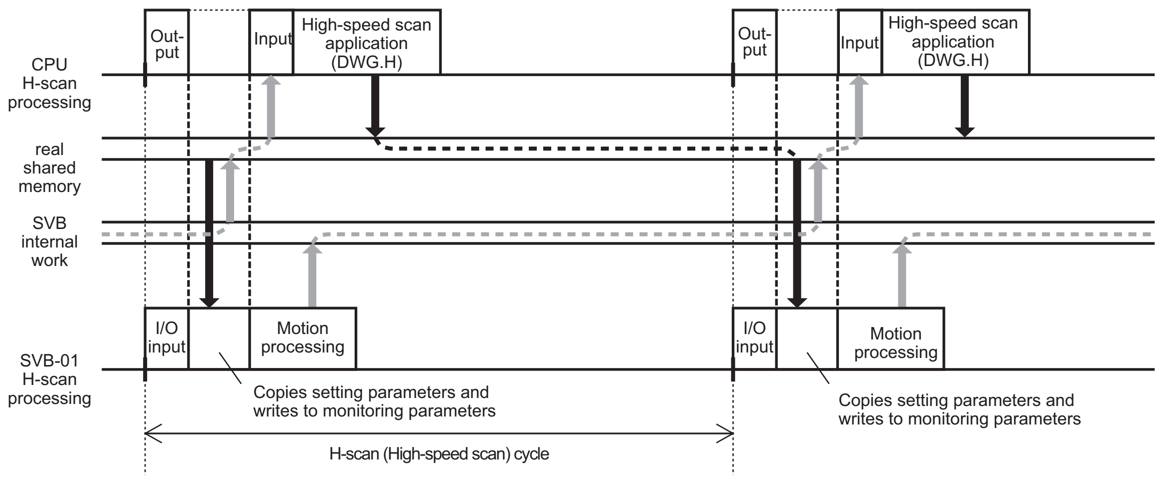
■ Wait for Monitor Data Update

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>



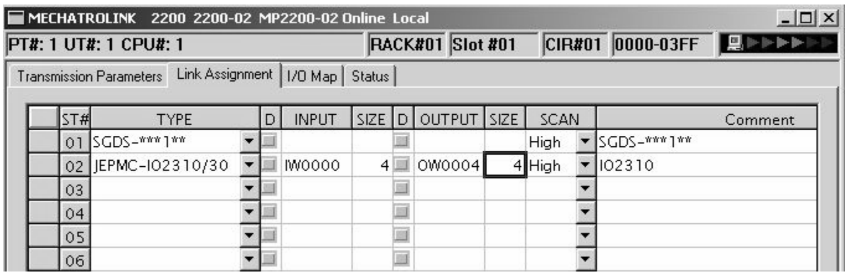
<Data Exchange Process with Optional SVB Module>



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] Link Assignment Tab Page

The data of the slave devices (MECHATROLINK connected devices such as SERVOPACK, inverter, and distributed I/O) are displayed on the Link Assignment Tab.



The items shown on the Link Assignment Tab are as follows. You can change the settings or delete the data station by station on this tab. Always save the settings to the flash memory after changing them.

Item	Description	Options and Precautions on Settings
ST #	Station number	The station number set here must be the same as the number set using rotary switches.
TYPE	Slave device connected at the station	Select the device type from the pull-down list.
D	I/O register's enable/disable status  : Enabled  : Disabled	Click the button to switch the status.
INPUT, SIZE	The leading input register number (***INPUT***) and the number of input registers in words (***SIZE***). The maximum number of input registers will be automatically set in ***SIZE***.	When setting, be careful not to overlap the register range among stations. The register numbers that can be set are in the range between the leading register number and the ending register number in the Module Configuration Definition Window.
OUTPUT, SIZE	The leading output register number (***OUTPUT***) and the number of input registers in words (***SIZE***). The maximum number of output registers will be automatically set in ***SIZE***.	When setting, be careful not to overlap the register range among stations. The register numbers that can be set are in the range between the leading register number and the ending register number in the Module Configuration Definition Window.
SCAN	Scan type used for synchronization with CPU. ***High***: High-speed scan ***Low***: Low-speed scan	Select either ***High*** or ***Low***. When ***TYPE*** is set to a SERVOPACK, fixed to ***High***.
Comment (Station name)	–	Enter a comment of up to 32 characters for each station.

■ Deleting a Station Assignment

Click any cell in the row of the station to be deleted, and select ***Edit - Assignment Delete*** from the main menu.

- Care must be taken when deleting a station assignment. The deletion is irreversible.

■ *****I/O and *****SERVO in Type

The following slave devices (I/O Modules) do not have model codes. Therefore, "********I/O***"(wild card I/O) will be displayed in ***TYPE*** for these devices after execution of self-configuration.

- JEPMC-IO350
- JAMSC-120DAI53330
- JAMSC-120DAI73330
- JAMSC-120DAO83330
- JAMSC-120DRA83030

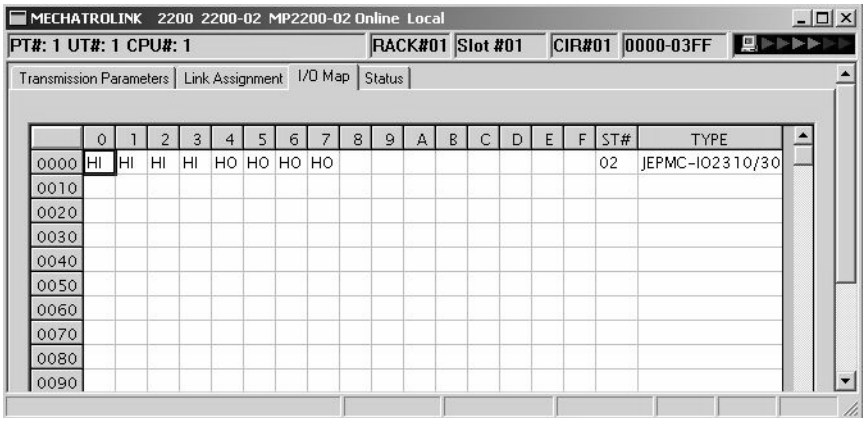
For a servo with customized specifications that could not be recognized by self-configuration, "********SERVO***" (wild card servo) will be displayed in ***TYPE***.
Select a correct device type in the Link Assignment Tab Page for the devices with ********I/O*** or ********SERVO*** displayed in ***TYPE***.

---

[c] I/O Map Tab

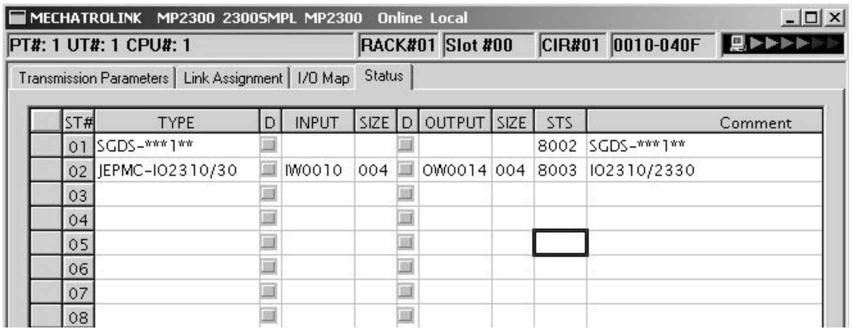
The status allocated to I/O registers is displayed.

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



[d] Status Tab Page

The MECHATROLINK transmission status is displayed. The displayed settings cannot be changed.



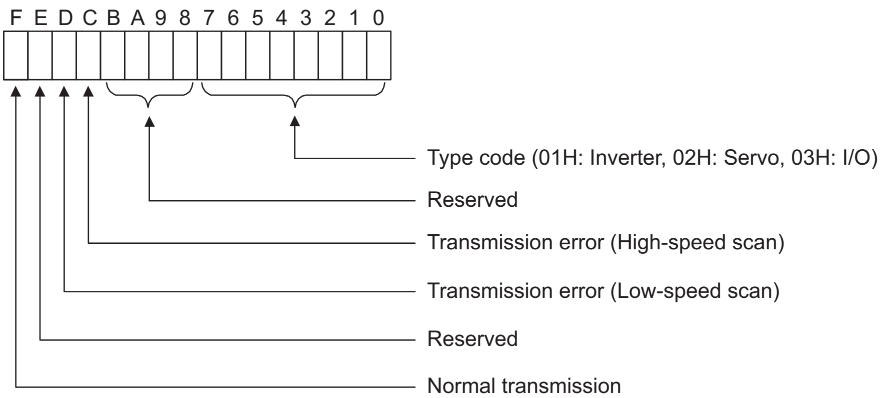
The items shown on the Status Tab are the same as those on the Link Assignment Tab except for STS.

■ 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 SVB Definition

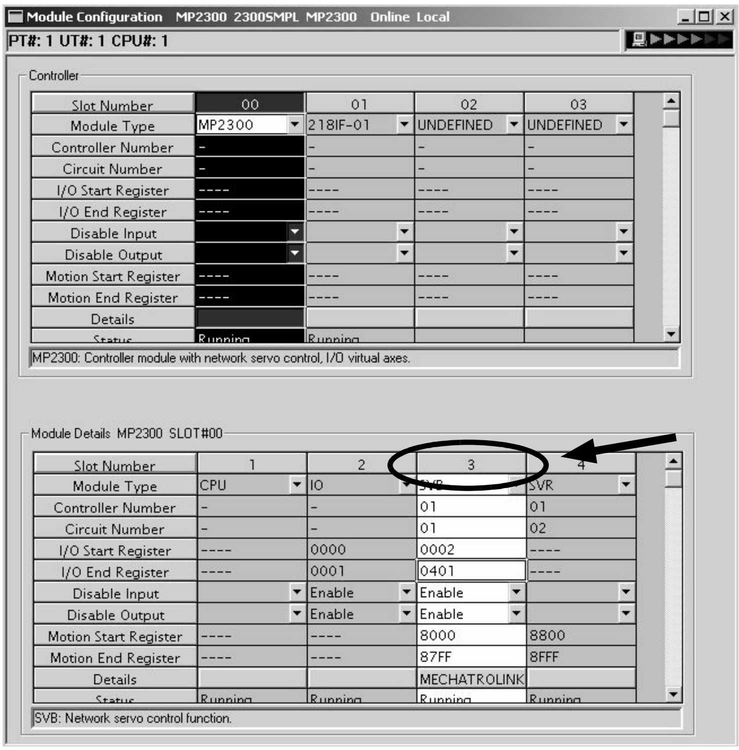
The SVB Definition file defines the motion parameters (motion fixed parameters, motion setting parameters, and motion monitoring parameters) to control motion axes such as the SERVOPACK, inverter, and stepper.

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

(1) Opening the SVB Definition Window

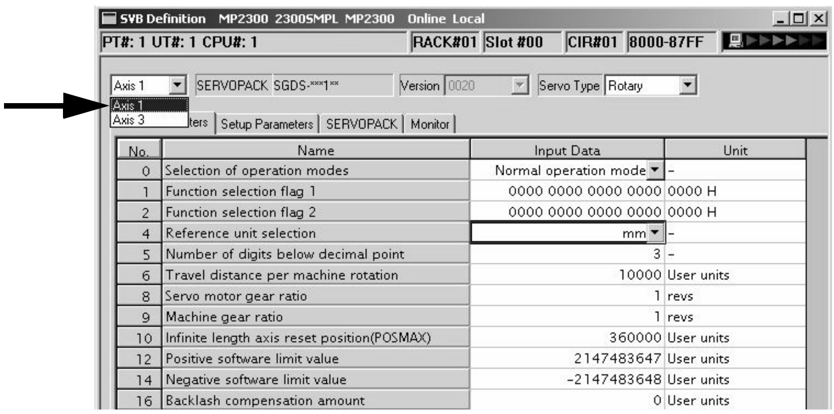
Open the SVB Definition Window by the following procedure.

1. Double-click the slot number cell of the SVB Module in the ***Module Details*** field in the Module Configuration Window (refer to *3.4.1 (1) How to Open the Module Configuration Window*).



The Create New Confirmation Dialog Box will open. Click **OK** to display the Fixed Parameters Tab of the SVB Definition Window.

2. Select the axis to be set or monitored from the ***Axis*** pull-down list.



- ***Axis*** corresponds to ***ST#*** (station number) in the Link Assignment Tab of the MECHATROLINK Transmission Definition Window.

3. Click the ***Fixed Parameters***, ***Set Up Parameters***, or ***Monitor*** tab to display the desired page.

- If the setting in ***Servo Type*** is switched from Rotary to Linear, or vice-versa, some of the displayed parameters will change. Refer to *4.2.2 Motor Type and Related Alarms* for details.

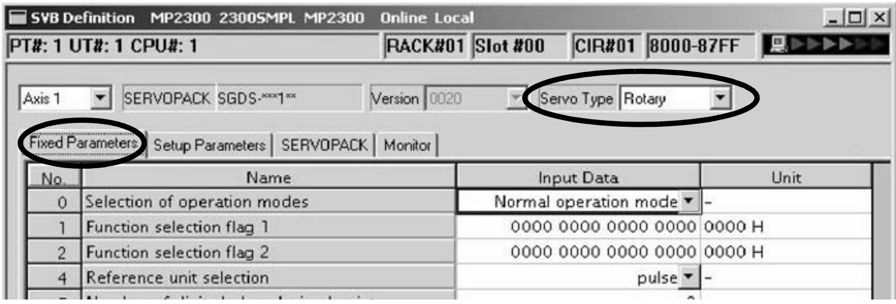


Fig. 3.1 Fixed Parameters Tab

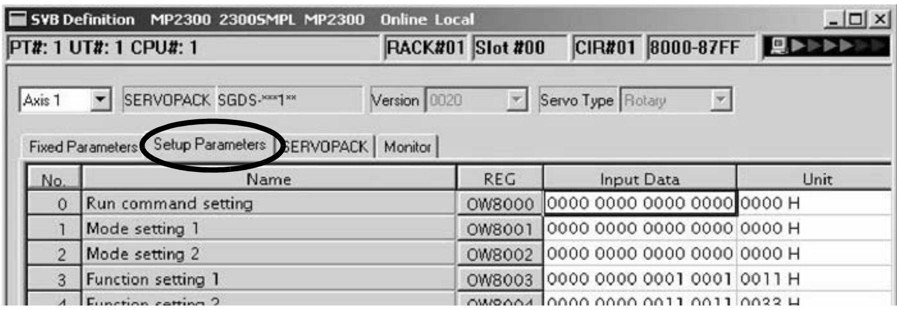


Fig. 3.2 Setup Parameters Tab

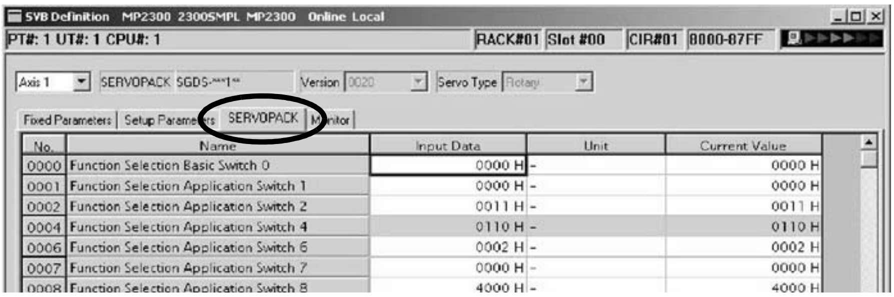


Fig. 3.3 SERVOPACK Parameters Tab

- Refer to the relevant SERVOPACK user's manual for information on SERVOPACK parameters.
- Refer *3.4.4 Current Value and Setting Data in SVB*.

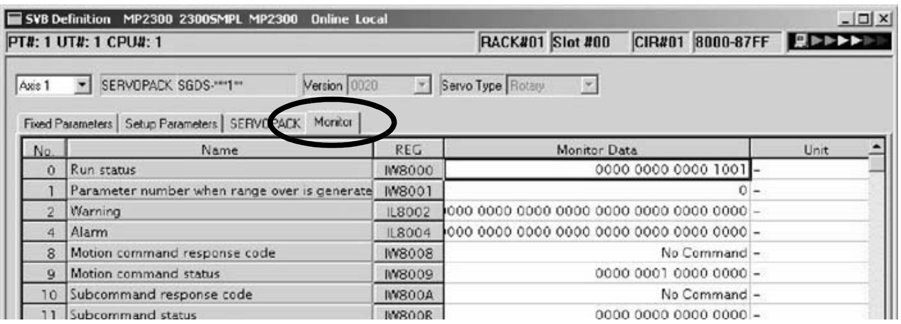


Fig. 3.4 Monitor Parameters Tab (read-only)

These parameter are written in the SVB Definition file when executing self-configuration.
For details on the parameters that are written in the definition file when executing self-configuration, refer to *11.6.5 Parameters Updated during Self-configuration*.

(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	JEPMC-MC2100 (-E)	Version 2.61 or later
MP2100M	JEPMC-MC2140 (-E)	Version 2.61 or later
MP2300	JEPMC-MC2300 (-E)	Version 2.61 or later
MP2300S	JEPMC-MC2300S-E	Version 2.61 or later
MP2310	JEPMC-MC2310-E	Version 2.61 or later
MP2400	JEPMC-MC2400-E	Version 2.61 or later
MP2000 series SVB-01	JEPMC-MC2310 (-E)	Version 1.22 or later

Engineering Tool	Model	Version
MPE720	CPMC-MPE720	Version 5.39 or later
MPE720 Version 6	CPMC-MPE770	Version 6.05 or later
MPE720 Version 7	CPMC-MPE780	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	JEPMC-MC2100 (-E)	Version 2.81 or later
MP2100M	JEPMC-MC2140 (-E)	Version 2.81 or later
MP2300	JEPMC-MC2300 (-E)	Version 2.81 or later
MP2300S	JEPMC-MC2300S-E	Version 2.81 or later
MP2310	JEPMC-MC2310-E	Version 2.81 or later
MP2400	JEPMC-MC2400-E	Version 2.81 or later
MP2000 series SVB-01	JEPMC-MC2310 (-E)	Version 1.30 or later

Engineering Tool	Model	Version
MPE720	CPMC-MPE720	Not supported.
MPE720 Version 6	CPMC-MPE770	Scheduled for version 6.33 or later.
MPE720 Version 7	CPMC-MPE780	Scheduled for 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	JEPMC-MC2100 (-E)	Version 2.81 or later
MP2100M	JEPMC-MC2140 (-E)	Version 2.81 or later
MP2300	JEPMC-MC2300 (-E)	Version 2.81 or later
MP2300S	JEPMC-MC2300S-E	Version 2.81 or later
MP2310	JEPMC-MC2310-E	Version 2.81 or later
MP2400	JEPMC-MC2400-E	Version 2.81 or later
MP2000 series SVB-01	JEPMC-MC2310 (-E)	Version 1.30 or later

Engineering Tool	Model	Version
MPE720	CPMC-MPE720	Not supported.
MPE720 Version 6	CPMC-MPE770	Version 6.32 or later
MPE720 Version 7	CPMC-MPE780	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	○	○	○

M-II (17 bytes)

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

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	○	○	○	○
SVB-01	○	○	○	○

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

■ Allocation

Use the following settings for the TYPE parameter of the station numbers on the Link Assignment Tab Page of the MECHATROLINK Detail Definition Window of the MPE720. The settings depend on the model of SERVOPACK that is connected and the version of the MPE720.
It is not necessary to set the other parameters on the Link Assignment Tab Page (i.e., INPUT, OUTPUT, SIZE, and SCAN).

Connected SERVOPACK Type	SERVOPACK Model	Version of MPE720	Displayed Setting of TYPE
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** (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. 7.14 or earlier	****SERVO
		Ver. 6.33 or Ver. 7.14 or later	SGDV-****1** (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-***E1** (DC)

- 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 correctly and processed 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 Link Assignment tab of MPE720.

■ 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 for the assigned TYPE parameter in the MECHATROLINK Transmission Definitions 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 TYPE
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-****1** (Over 22 kW)

(cont'd)

Connected SERVOPACK Type	SERVOPACK Model	Version of SVB-01 Module or Built-in SVB Module	Version of MPE720	Displayed Setting of TYPE
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-***E1**(DC)

[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)

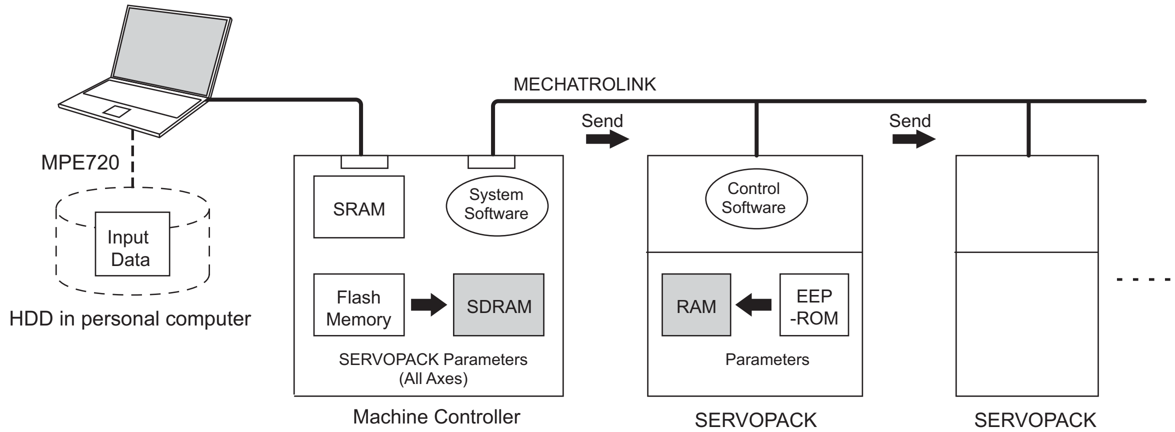
* 2. However, if you use an SGDV-****1** with software version 0023 or later, you can use the backlash compensation function in the SERVOPACK.

3.4.4 Current Value and Setting Data in SVB

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 flow of data for the SERVOPACK parameters under different conditions is described here.

(1) 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.

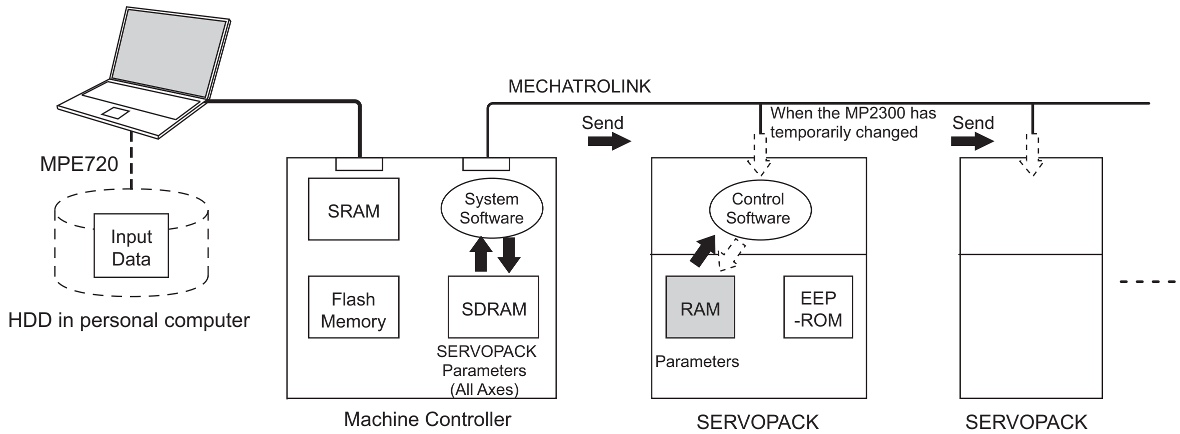


* 1. EEPROM, flash memory, and SRAM: Can store data even when the power is turned OFF.
* 2. RAM and SDRAM: Can lose data when the power is turned OFF.

- ▭ indicates data has been written.

(2) Normal Operation

- Control software of the SERVOPACK operates in accordance with on the parameter data held in the SERVOPACK'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.)

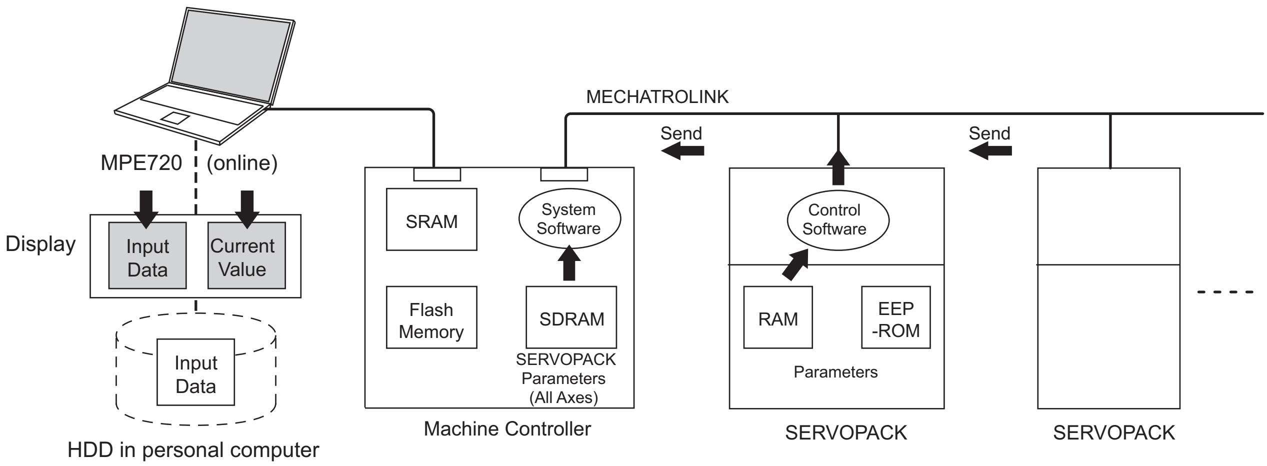


- Parameters held in the SERVOPACK's RAM are displayed on a Digital Operator connected to the SERVOPACK. Press the DATE/ENTER Key to write the parameters to the EEPROM.
- ▭ indicates data has been written.

(3) When the SERVOPACK Tab Page Is Open

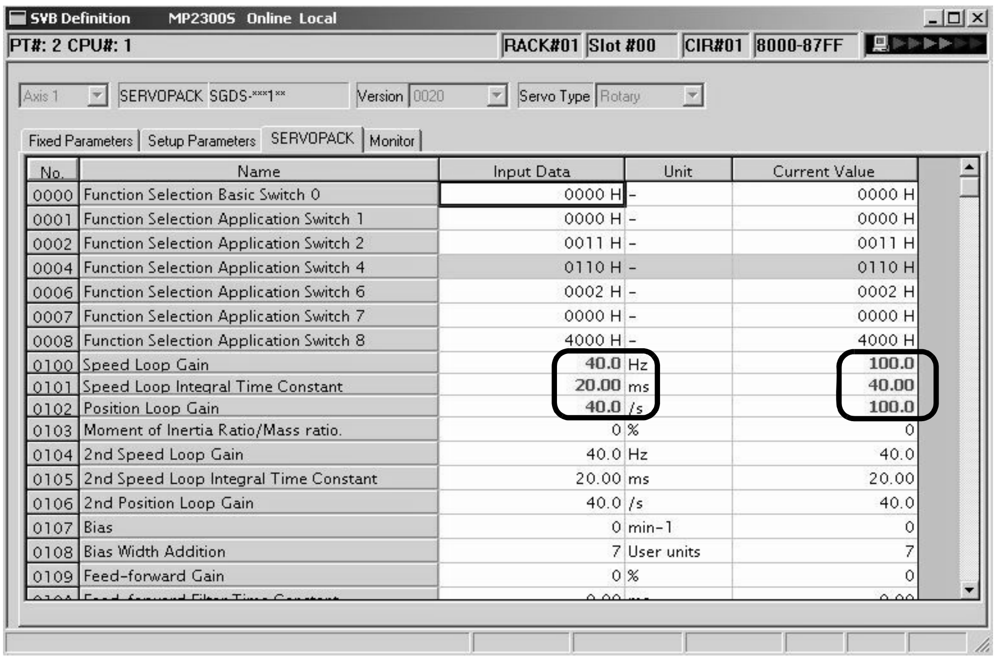
The data flow for SERVOPACK parameters is as follows when the SERVOPACK Tab Page is open in the SVB Definition Window on the MPE720 (refer to *3.4.3 SVB Definition* for details on how to open the SERVOPACK Tab Page.):

- The MPE720 reads and displays the parameters that are held in the SERVOPACK's RAM for the relevant axis to the ***Current*** in the SERVOPACK Tab Page.
  It also reads and displays the values that are held in the Machine Controller's SDRAM values to the ***Input Data*** in the SERVOPACK Tabbed page.



• ▭ indicates data has been written.

The following figure shows an example of the SERVOPACK Tab in the **SVB Definition** Window. The values in ***Current*** are different from the values in ***Input Data***.



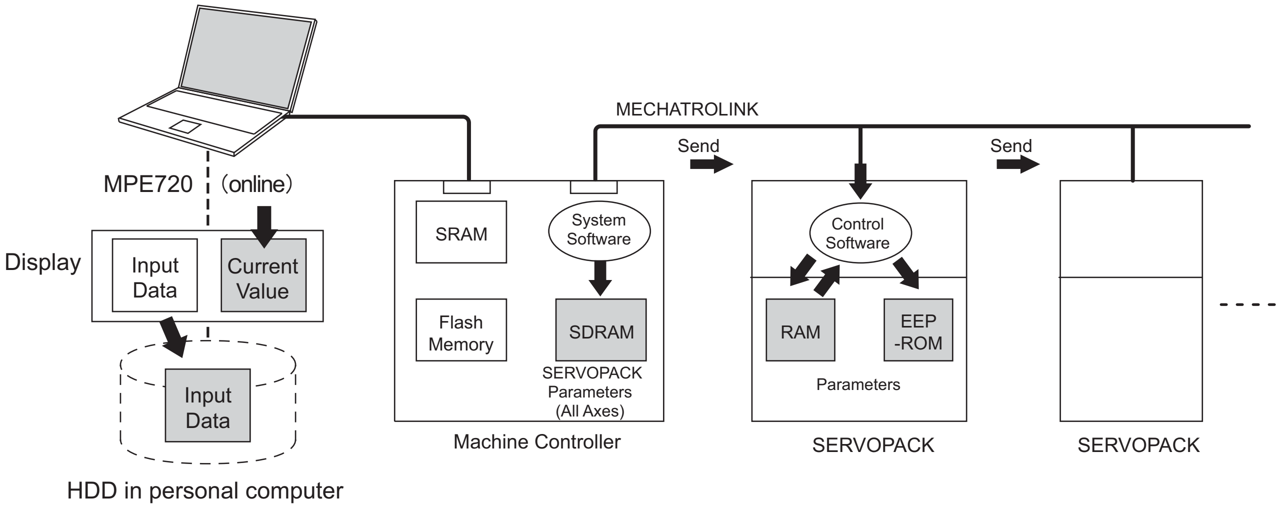
No.	Name	Input Data	Unit	Current Value
0000	Function Selection Basic Switch 0	0000 H	-	0000 H
0001	Function Selection Application Switch 1	0000 H	-	0000 H
0002	Function Selection Application Switch 2	0011 H	-	0011 H
0004	Function Selection Application Switch 4	0110 H	-	0110 H
0006	Function Selection Application Switch 6	0002 H	-	0002 H
0007	Function Selection Application Switch 7	0000 H	-	0000 H
0008	Function Selection Application Switch 8	4000 H	-	4000 H
0100	Speed Loop Gain	40.0	Hz	100.0
0101	Speed Loop Integral Time Constant	20.00	ms	40.00
0102	Position Loop Gain	40.0	/s	100.0
0103	Moment of Inertia Ratio/Mass ratio.	0	%	0
0104	2nd Speed Loop Gain	40.0	Hz	40.0
0105	2nd Speed Loop Integral Time Constant	20.00	ms	20.00
0106	2nd Position Loop Gain	40.0	/s	40.0
0107	Bias	0	min-1	0
0108	Bias Width Addition	7	User units	7
0109	Feed-forward Gain	0	%	0

Self-configuration and Created Definition Files
3

(4) SERVOPACK Parameters Saved in the MPE720

The data flow for SERVOPACK parameters is as follows when ***File - Save*** is selected from the SERVOPACK Tab Page:

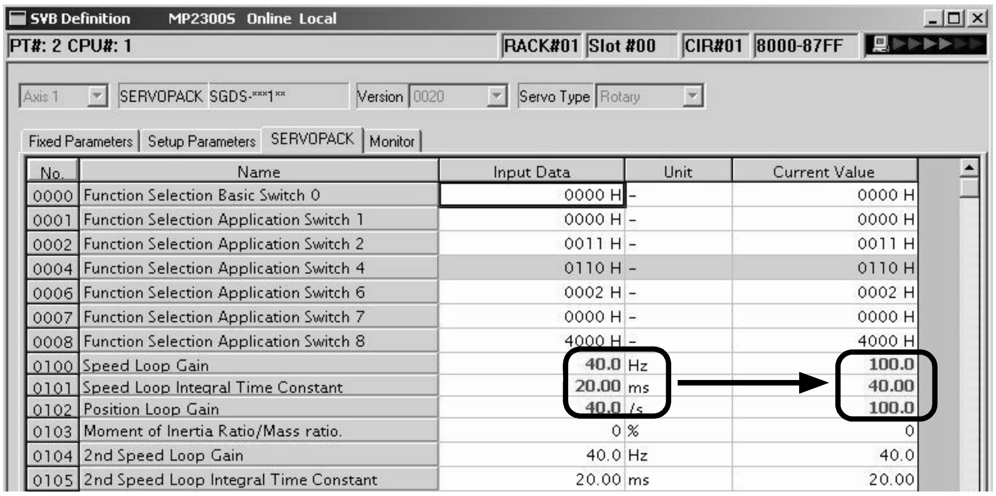
- The MPE720 writes all the parameters in ***Input Data*** currently displayed on SERVOPACK Tab Page of the relevant axis to the followings.
  - HDD (hard disk) of the personal computer
  - SDRAM of Machine Controller
  - RAM and EEPROM of the SERVOPACK
- After having completed writing the parameters, the MPE720 updates the values in ***Current*** on the SERVOPACK Tab Page with the SERVOPACK parameter values stored in the RAM.



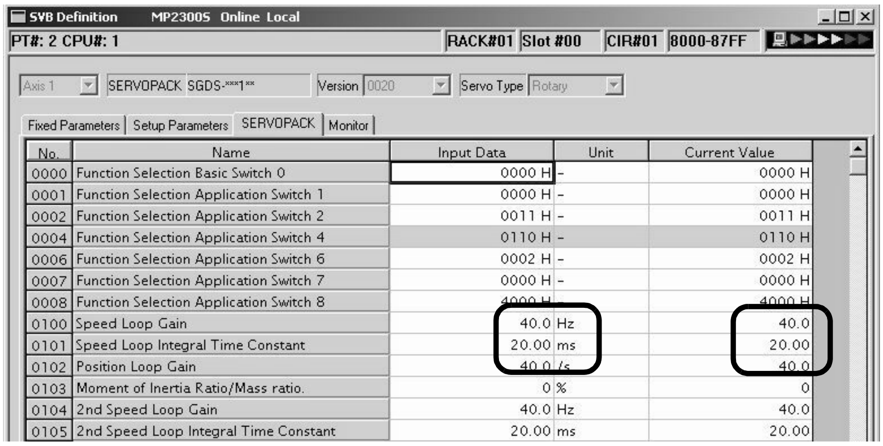
- ▒ indicates data has been written (same as below).

The following figure shows a display example after having executed save operation on the SERVOPACK Tab in the SVB Definition Window. After having saved the data, the values in ***Input Data*** of all the parameters become the same as the values in ***Current*** on the SERVOPACK Tab.

Before saving



After saving

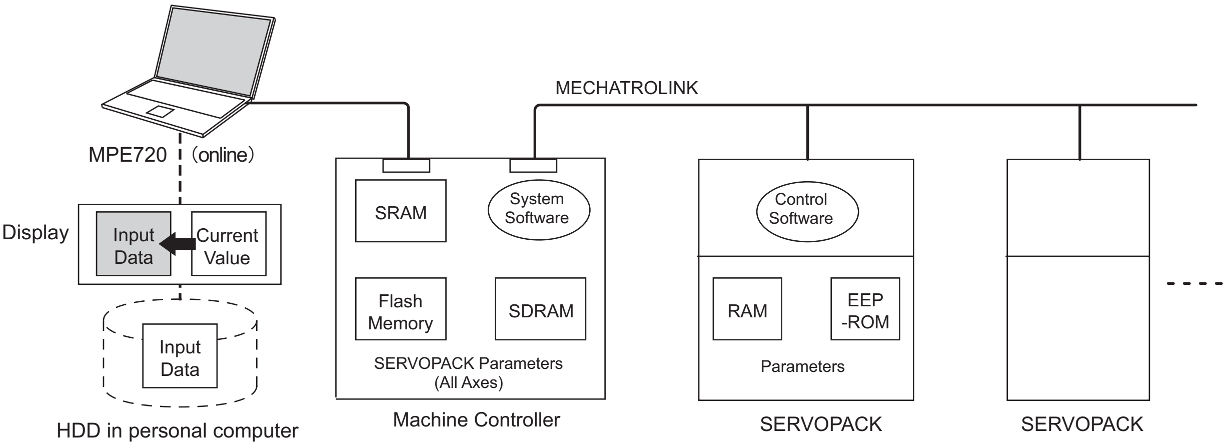


- The saving operation of SERVOPACK parameters can be used for writing data after SERVOPACK replacement because it writes all the parameters of the relevant axis.

(5) Copying Current Values to Set Values (Input Data) in the SERVOPACK Tab

The data flow for SERVOPACK parameters is as follows when selecting ***Edit - Copy Current Value*** from the SERVOPACK Tab in the SVB Definition Window on the MPE720:

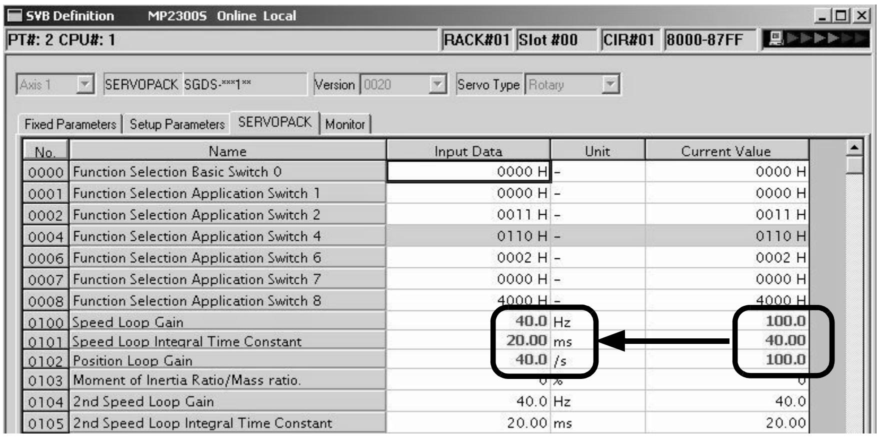
- The MPE720 copies the values currently displayed in ***Current*** to ***Input Data*** on the SERVOPACK Tab and displays.



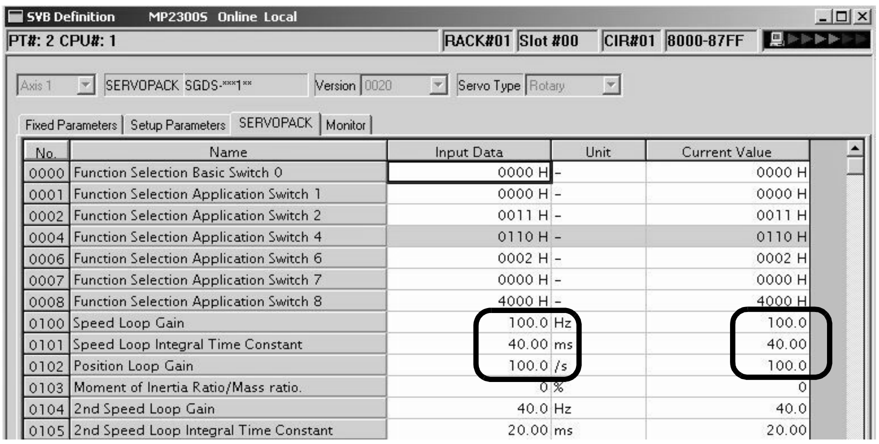
- ▭ indicates data has been written.

The following figure shows a display example after having selected ***Edit - Copy Current Value*** on the SERVOPACK Tab in the **SVB Definition** Window. The values in ***Current*** are copied to ***Input Data***.

Before copying



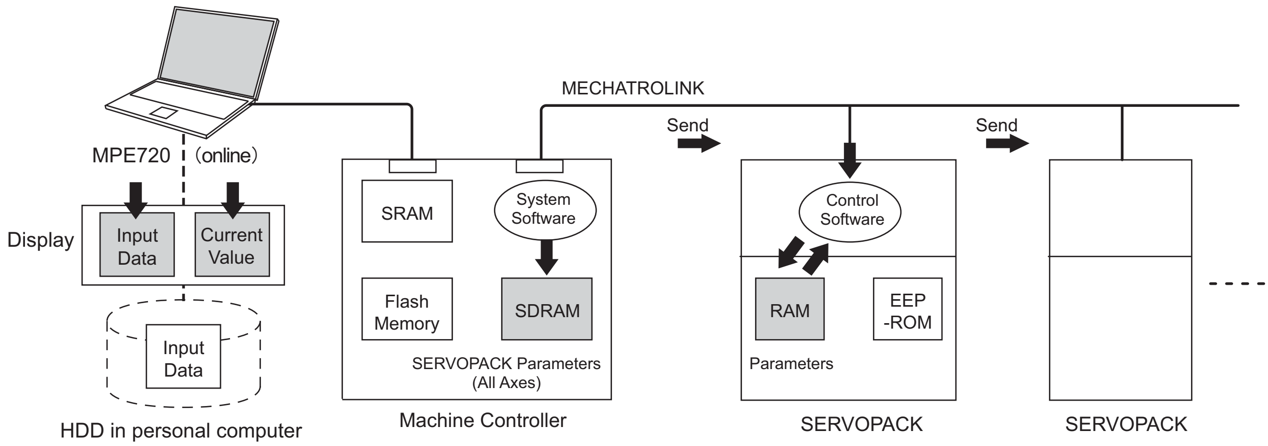
After copying



(6) Changing Parameters in the SERVOPACK Tab Page

The data flow for SERVOPACK parameters is as follows when parameters for the cursor position are changed from the SERVOPACK Tab Page in the SVB Definition Window for MPE720:

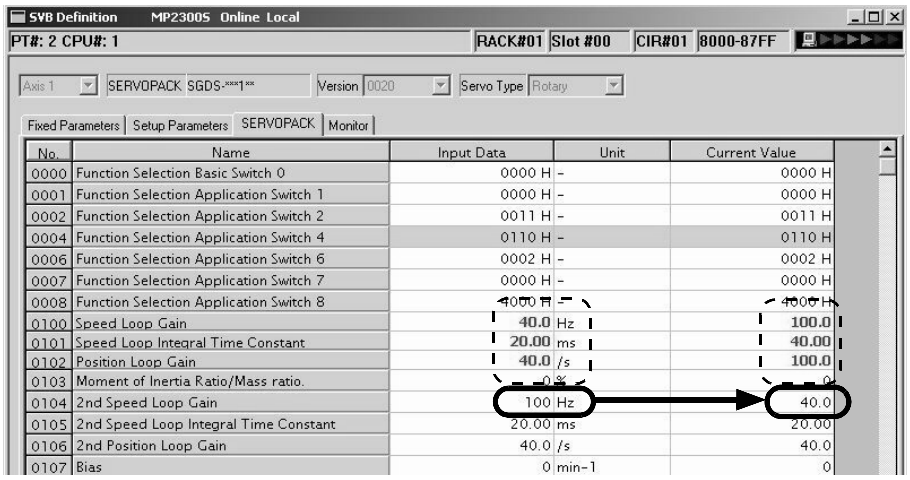
- The MPE720 writes parameters of the relevant axis to the followings when the ENTER Key is pressed on the computer. (The parameters other than those of the relevant axis will not be written.)
  - ***Input Data*** (set data) on the SERVOPACK Tab Page
  - SDRAM of the Machine Controller
  - RAM of the SERVOPACK
- After having completed writing, the MPE720 updates the values in ***Input Data*** on the SERVOPACK Tab Page with the parameter values stored in the RAM of the SERVOPACK.



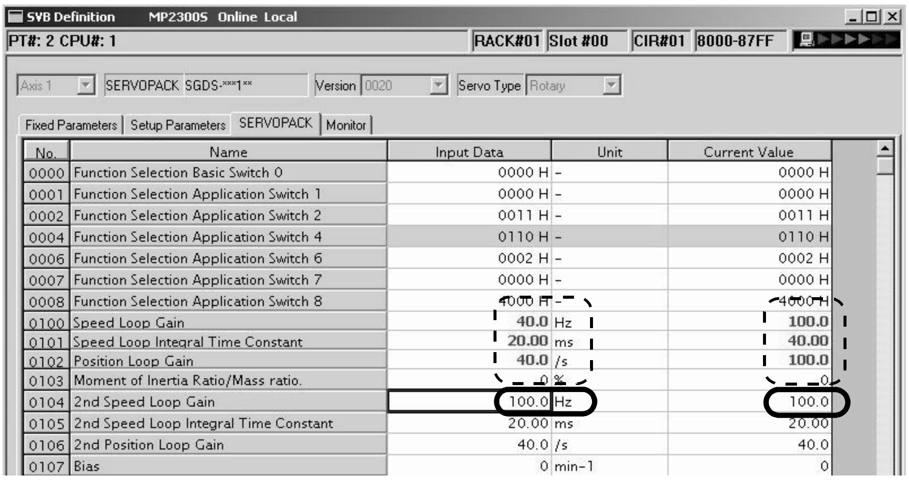
- ▭ indicates data has been written.

The following figure shows a display example after having changed the value (*2nd Speed Loop Gain*) in ***Input Data*** on the SERVOPACK Tab. After having pressed the ENTER Key, the values of ***Speed Loop Gain***, ***Speed Loop Integral Time Constant***, and ***Position Loop Gain*** (boxed in dotted line) in ***Input Data*** remain different from the values in ***Current*** since the parameters other than the one that has been changed are not written.

Before pressing ENTER Key



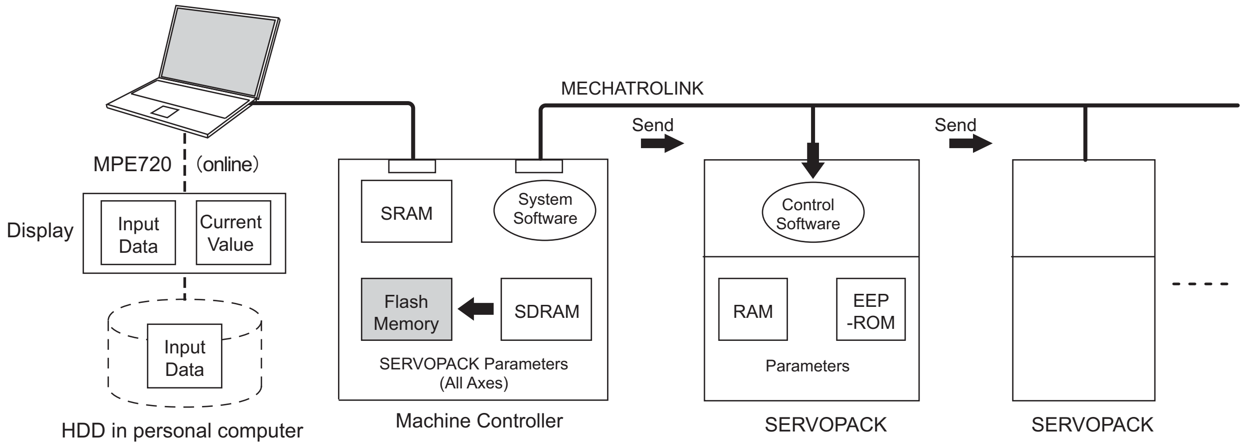
After having pressed ENTER Key



(7) Saving Data to Flash Memory

The data flow for SERVOPACK parameters is as follows when saving the parameters to flash memory on the MPE720:

- The Machine Controller writes the parameters data (*Input Data*) held in SDRAM to flash memory.



- Save to flash memory also after having changed set data of SERVOPACK parameter.
- [gray box] indicates data has been written.

3.4.5 Precautions When Saving SERVOPACK Parameters

Before executing saving operation in the SERVOPACK Tab Page in any cases excluding the SERVOPACK replacement, always select ***Edit - Copy Current Value*** to copy the values in **Current** to **Input Data**.

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, Set Up Parameters, and Monitor tabs of the SVB Definition Window.

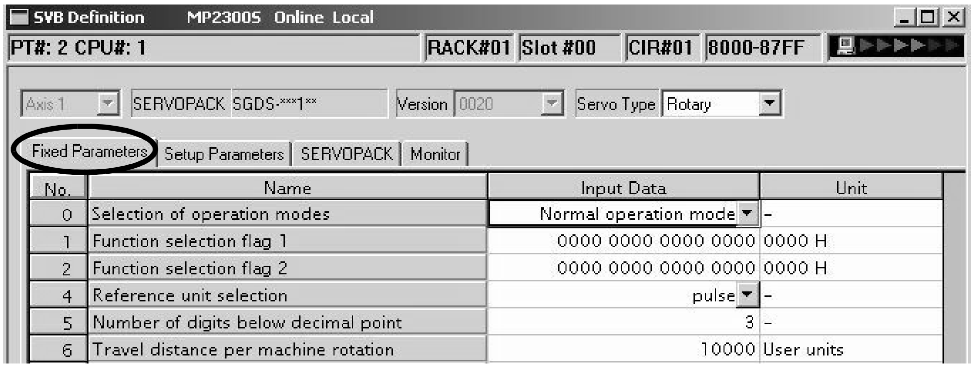


Fig. 4.1 Fixed Parameters Tab Page

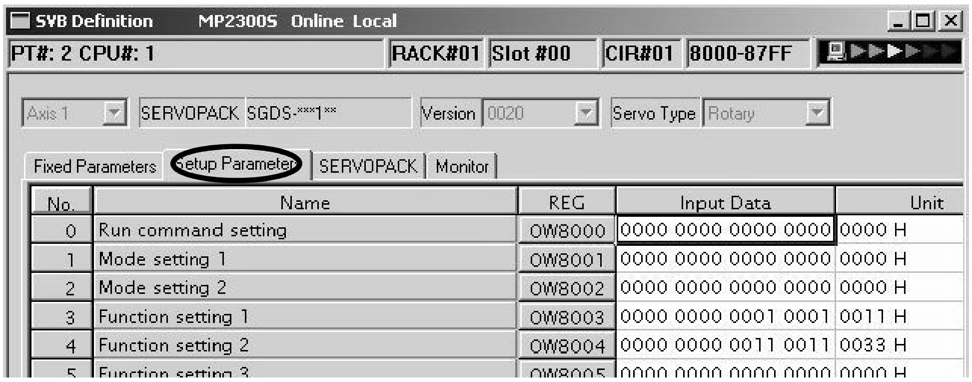


Fig. 4.2 Setup Parameters Tab Page

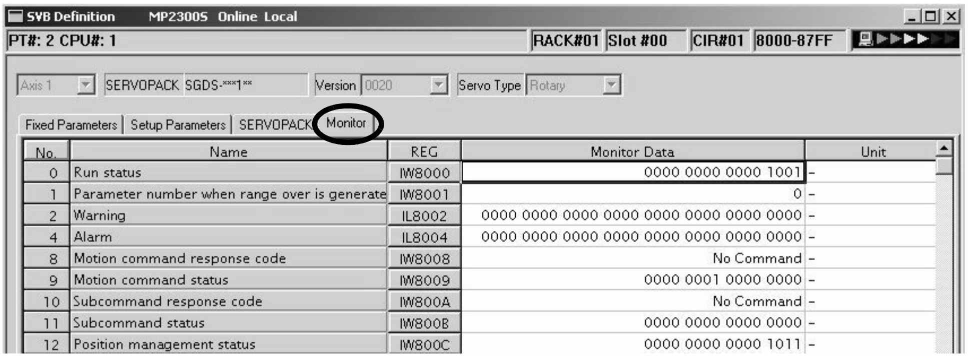


Fig. 4.3 Monitor Parameters Tab Page (Read-Only)

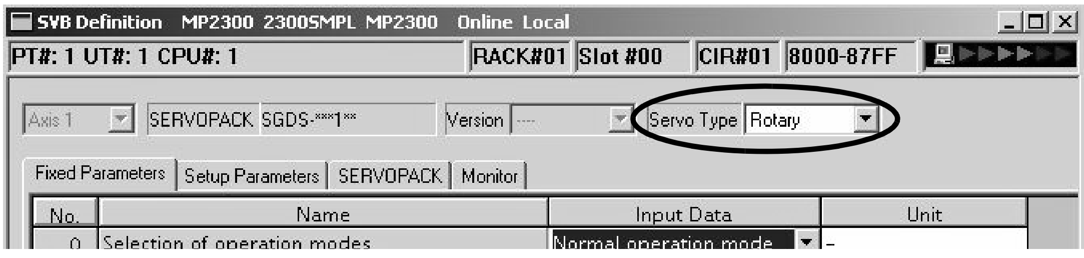
4.2.1 How to Open the Motion Parameter Setting Windows

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

4.2.2 Motor Type and Related Alarms

(1) Selecting a Motor Type

The motor type, rotary or linear, can be selected from the ***Servo Type*** pull-down list in the SVB Definition Window. Some of the fixed parameters will differ and some of the setting parameters will be disabled depending on the motor type selected.



■ Linear Type Selection for SVR (Virtual Motion Module)

The software versions with which Linear Type can be selected for the SVR Module are limited to:

- MP2000 series Machine Controller software version 2.50 or later
- MPE720 version 5.37 or later

(2) Alarm When Motor Type is Unmatched

If the following three settings do not match, an alarm*1 will activate.

- Servo Type in the SVB Definition Window
- SGDH SERVOPACK (SGDH+NS100 or SGDH+NS115) parameter Pn000.3 (rotary /linear startup selection), or SGDS SERVOPACK type
- Actually connected motor type *2

* 1. Two types of alarm: Monitoring parameter IL□□04, bit 30 (Motor Type Set Error) and bit 31 (Connected Encoder Type Error)

* 2. For SGDS SERVOPACKs, the SERVOPACK parameter Pn000.3 is automatically set as follows: Rotary for SGDS-□□□12□ and Linear for SGDS-□□□15□

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: Machine Controller (SVB Definition Window)	Setting Value: SERVOPACK/Pn000.3		Actually Connected Servomotor	Alarm That Can Occur	How to Clear Alarm
Rotary type	SGDH	Linear	Linear type	IL□□04, bit30 and IL□□04, bit31	Change the motor type setting for the Machine Controller (SVB Definition Window), and then save the change.
	SGDS	SGDS-□□□15□			
Linear type	SGDH	Rotary	Rotary type		
	SGDS	SGDS-□□□12□			
Rotary type	SGDH	Rotary	Linear type	IL□□04, bit31 (Connected Encoder Type Error)	Change both the motor type setting for Machine Controller (SVB Definition Window) and SGDH SERVOPACK parameter Pn000.3 setting, and then save the changes. (In case of an SGDS SERVOPACK, the SERVOPACK must be replaced with a correct model.) After saving the changes, restart the SERVOPACK and execute ***Alarm Clear***.
	SGDS	SGDS-□□□12□			
Linear type	SGDH	Linear	Rotary type		
	SGDS	SGDS-□□□15□			
Rotary type	SGDH	Linear	Rotary type	IL□□04, bit30 (Motor Type Set Error)	SGDH SERVOPACK: Change the SERVOPACK parameter Pn000.3 setting, and then save the change. SGDS SERVOPACK: Replace the SERVOPACK with a correct model. Then, restart the SERVOPACK and execute ***Alarm Clear***.
	SGDS	SGDS-□□□15□			
Linear type	SGDH	Rotary	Linear type		
	SGDS	SGDS-□□□12□			

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 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)
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)

(cont'd)

No.	Name	Contents	SVB	SVR	Reference
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 12 to 15 (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)

Motion Parameters

4

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 SERVOPACKs except 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 12 to 15 (Torque Unit Selection).	Yes	Yes	
IL□□44	Latch Completion Sequence Number	1 = 1 time	Yes	–	
IL□□45	Number of Continuous 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.

(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			

Motion Parameters

4

(cont'd)

<table>
<tr><td colspan="2" rowspan="2">No. 1
Function Selection Flag 1 (cont'd)</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 9</td><td colspan="3">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.</td></tr>
<tr><td>Bit A</td><td colspan="3">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.</td></tr>
</table>

(3) Function Selection Flag 2

<table>
<tr><td colspan="2" rowspan="2">No. 2
Function Selection Flag 2</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 0</td><td colspan="3">Communication Abnormality Detection Mask
Masks MECHATROLINK communication errors detected at the Machine Controller.
0: Disabled (default)
1: Enabled</td></tr>
<tr><td>Bit 1</td><td colspan="3">WDT Abnormality Detection Mask
Masks MECHATROLINK watchdog timeout errors detected at the Machine Controller.
0: Disabled (default)
1: Enabled</td></tr>
</table>

(4) Reference Unit Selection

<table>
<tr><td rowspan="2">No. 4 R
Reference Unit Selection</td><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 4</td><td>–</td><td>0</td></tr>
<tr><td>Description</td><td colspan="3">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.</td></tr>
</table>

No. 5 R Number of Digits Below Decimal Point	Setting Range	Setting Unit	Default Value
	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.		

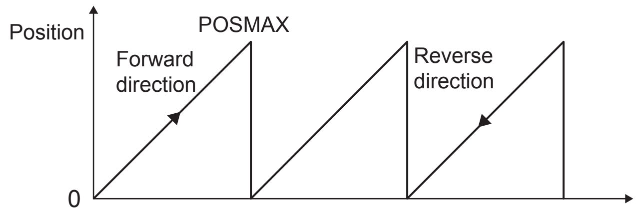
No. 6 (Rotary Motors) R Travel Distance per Machine Rotation	Setting Range	Setting Unit	Default Value
	1 to 2^{31}-1	User unit	10000
Description	Specify the amount of travel in the load as the number of reference units for each turn of the load shaft. ♦ Refer to *5.1.2 Electronic Gear* for details.		

No. 6 (Linear Motors) R Linear Scale Pitch	Setting Range	Setting Unit	Default Value
	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	Setting Range	Setting Unit	Default Value
	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.		

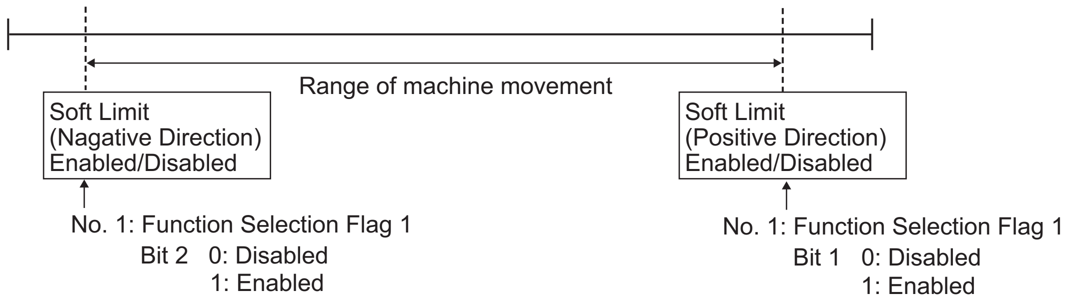


(6) Software Limits

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.

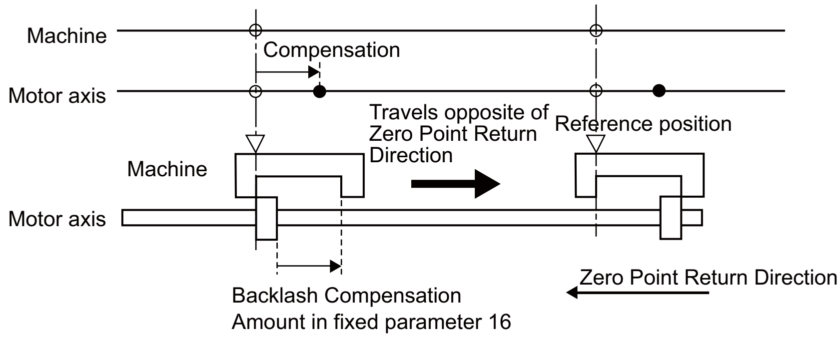
- SGDH + NS115
- SGDS
- SGDV-****1** with software version 0023 or later

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

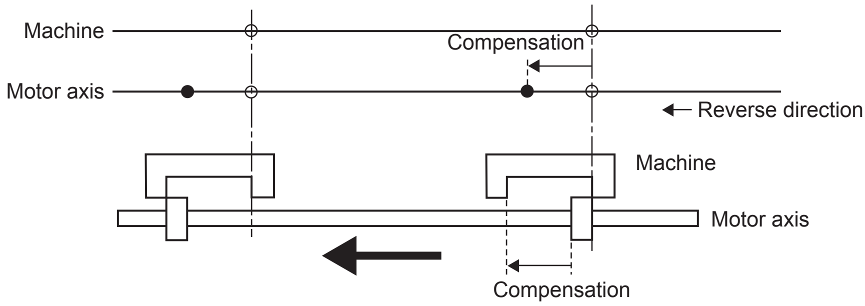
If you use the SGDH + NS115 or the SGDS, use this fixed parameter. The setting of this fixed parameter will be automatically written to the SERVOPACK parameter (SGDH + NS115: Pn81B, SGDS: Pn214) when communications are established with the SERVOPACK.

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

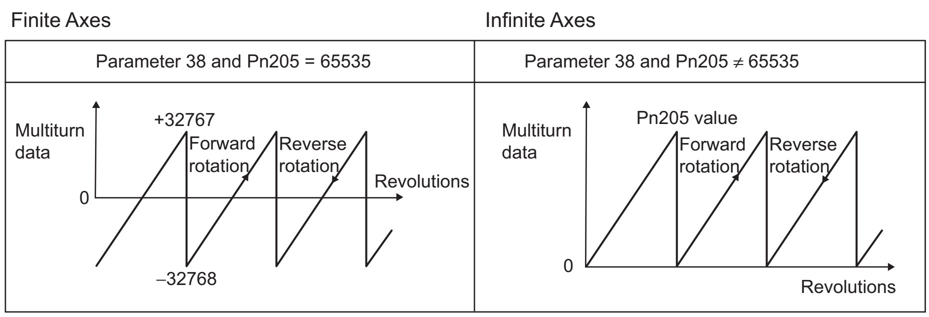
Set the maximum number of rotations for the absolute encoder to the highest number that the encoder can manage.

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

- Σ-I series: Set to 99999 (fixed).
- Σ-II, Σ-III, and Σ-V 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).



This parameter is used to manage position information when an absolute encoder is used and an infinite length axis has been set.

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.

4.4.2 Motion Setting Parameter Details

The following tables provide details of motion setting parameters.

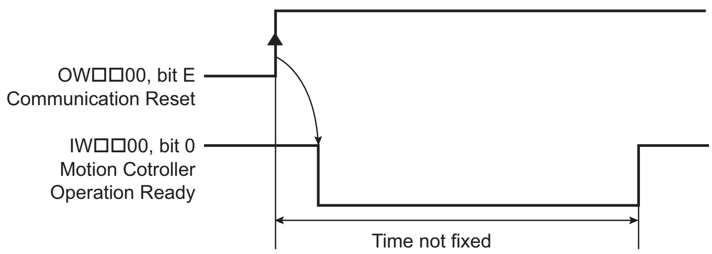
- Refer to *4.3.2 Setting Parameter List* for a list of the motion setting parameters.
- Register number “OW□□00” indicates the leading output register number + 00.Other register numbers listed below indicate output register numbers in the same way. Refer to *4.1.1 Motion Parameter Register Numbers for 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 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.

<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
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 SERVOPACKs.</td></tr>
</table>

<table>
<tr><td colspan="3" rowspan="2">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>–</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 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

<table>
<tr><td colspan="3" rowspan="2">OW□□01
Mode Setting 1
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="5">Description</td><td>Bit 0</td><td colspan="4">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)</td></tr>
<tr><td>Bit 3</td><td colspan="4">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</td></tr>
<tr><td>Bit 4</td><td colspan="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 SERVOPACKs are used and the tuning-less function is available, this setting is ignored.
0: Gain switch OFF (default)
1: Gain switch ON</td></tr>
<tr><td>Bit 5</td><td colspan="4">Gain Switch 2 (Valid with SVB-01 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 SERVOPACKs.)
In combination with bit 4, four types of gain switches can be set.</td></tr>
<tr><td>Bit6</td><td colspan="4">Latch Mode Selection
0: Usual latch
1: Continuous latch
Available only for SGDV SERVOPACKs.</td></tr>
</table>

[a] Continuous Latch Function of SGDV 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 SERVOPACKs, so the appropriate parameter settings must be made in the SGDV SERVOPACKs.

■ Related Parameters

- Motion setting parameters

<table>
<tr><th>Register No.</th><th>Name</th><th>Setting Range</th><th>Default Value</th><th>Meaning</th><th>Description</th></tr>
<tr><td rowspan="2">OW□□00</td><td rowspan="2">RUN Command Setting</td><td rowspan="2">Bit setting</td><td rowspan="2">0</td><td>Bit 4: Latch Detection Demand</td><td>0: OFF 1: ON</td></tr>
<tr><td>Bit 13: Latch Completion Status Clear Request</td><td>0: OFF 1: ON</td></tr>
<tr><td>OW□□01</td><td>Mode Setting 1</td><td>Bit setting</td><td>0</td><td>Bit 6: Latch Mode Selection</td><td>0: Usual latch
1: Continuous latch</td></tr>
<tr><td>OW□□04</td><td>Function Setting 2</td><td>2 to 5</td><td>3</td><td>Bits 0 to 3: Latch Detection Signal Selection</td><td>2: Phase-C pulse input signal
3: /EXT1
4: /EXT2
5: /EXT3</td></tr>
</table>

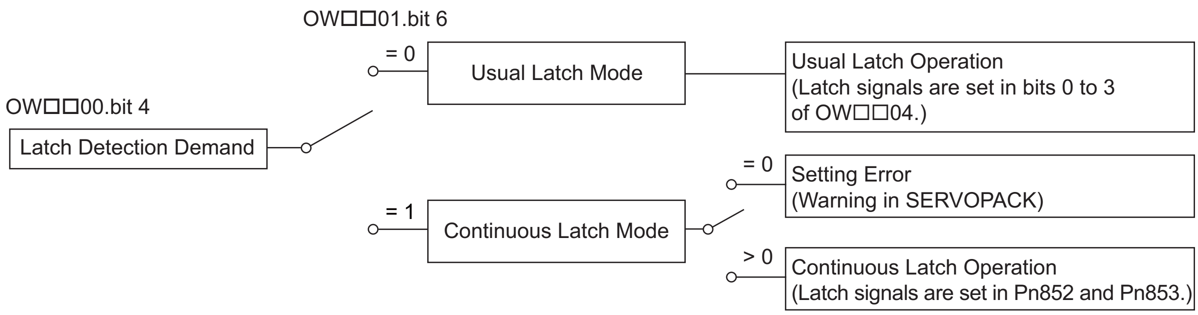
* Monitoring parameters

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 SERVOPACKs with MECHATROLINK-II communications (32 bytes)
IW□□45	Number of Continuous Latch Sequence Completion Cycles	0 to 32767	–	Available for SGDV 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>

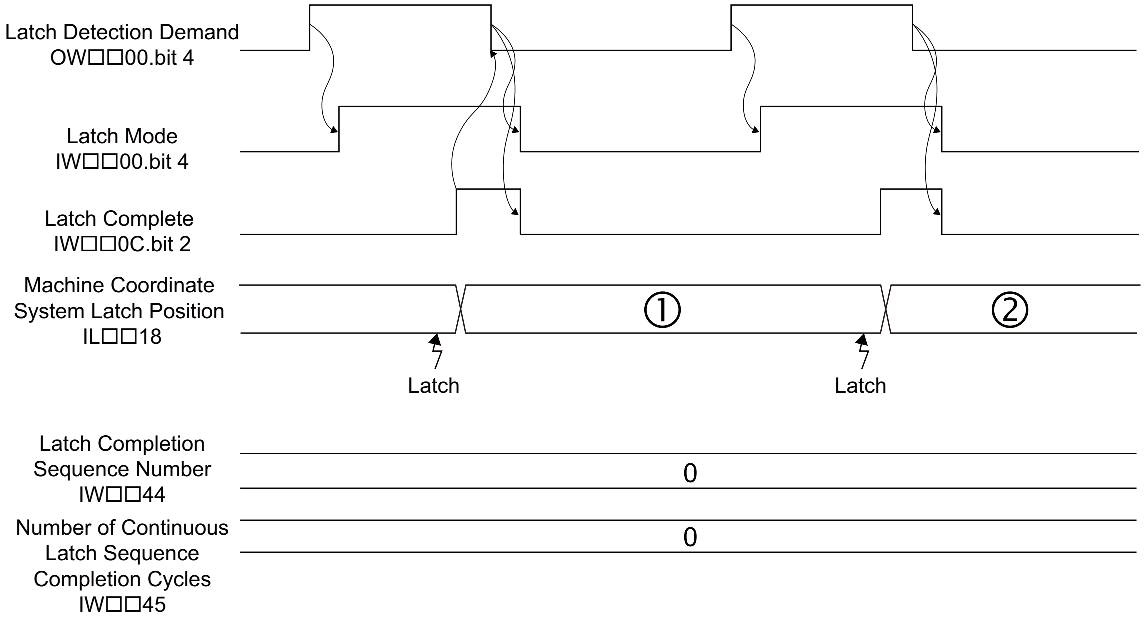
- Condition: Latch at phase-C pulse
- Settings:
  Motion setting parameters

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 0. 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.
- The same timing is required to change the bit settings: Change bit 10 of OW□□00 from 1 to 0 at the same moment as bit 2 of IW□□0C turns ON.

■ 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

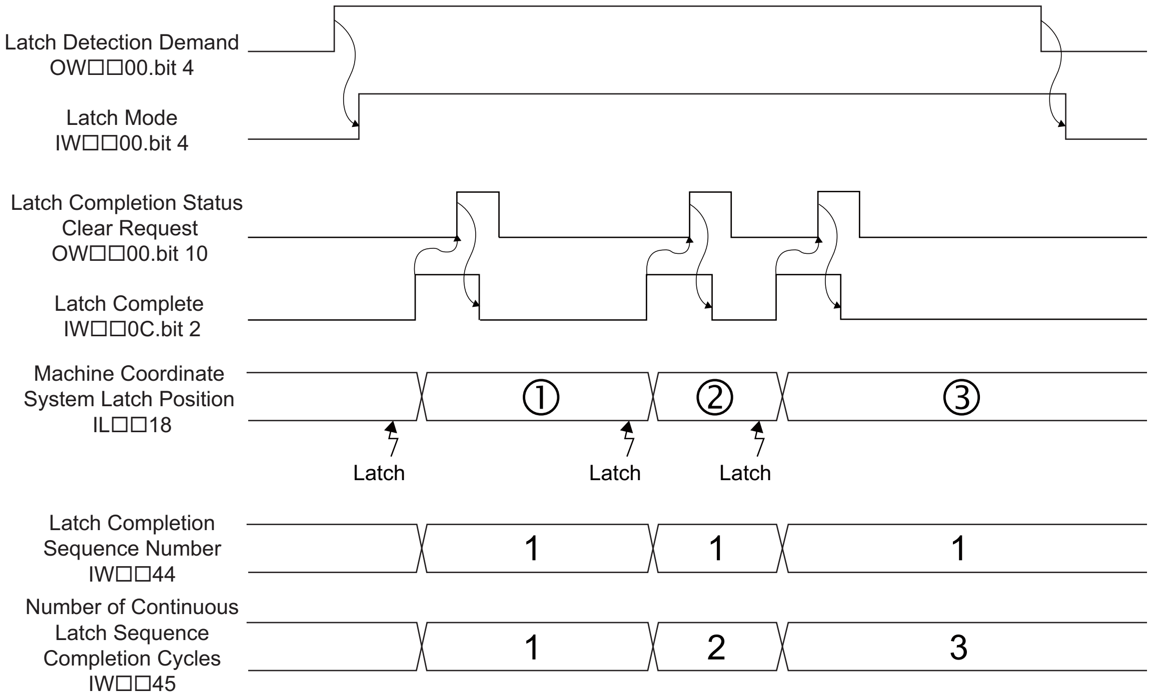
- A square (□) indicates an unspecified value.

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.



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

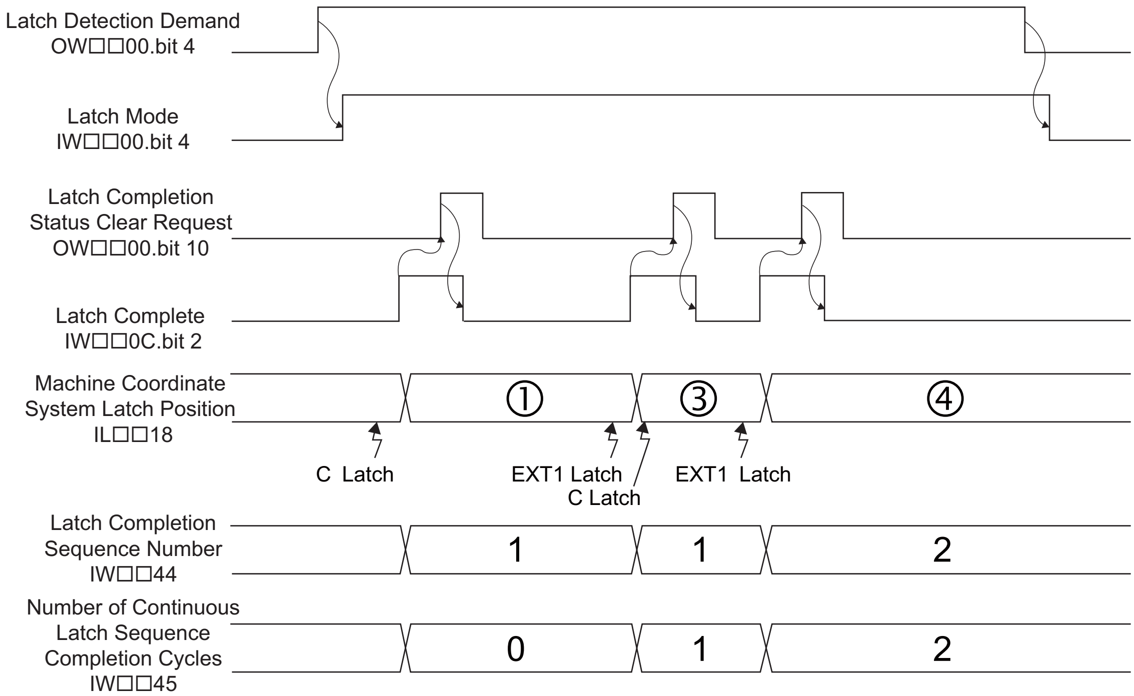
Parameter No.	Name	Setting value
Pn850	Latch Sequence Number	2
Pn851	Continuous Latch Count	0 (No limit)
Pn852	Latch Sequence Signal 1 to 4 Setting	□□10h
Pn853	Latch Sequence Signal 5 to 8 Setting	□□□□h

• A square (□) indicates an unspecified value.

• 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.

Motion Parameters

4

(3) Mode Setting 2

<table>
<tr><td colspan="2" rowspan="2">OW□□02
Mode 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>0000H</td></tr>
<tr><td rowspan="2">Description</td><td>Bit 0</td><td colspan="4">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.</td></tr>
<tr><td>Bit 8 to Bit F</td><td colspan="4">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*
* To use this setting, set Pn827 beforehand.</td></tr>
</table>

[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 (SERVOPACK Parameter: Pn827)	–
SGDS-□□□15□	○	○	○*1 (SERVOPACK Parameter: Pn827)	–
SGDX-□□□12□	○	○	○ (SERVOPACK Parameter: 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□	○	○	○ (Pn827)	–
SGDV-□□□□15□	○	○	○ (Pn827)	–
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.

- ○: 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.

<table>
<tr><th>Move Commands</th><th>When a command is interrupted.
(OW□□09 Bit 1=ON)</th><th>When a command is changed.</th><th>When an error occurs.</th></tr>
<tr><td>POSING (Positioning)</td><td rowspan="3">Stops according to the stop mode selected.</td><td rowspan="3">Stops according to the stop mode selected.</td><td rowspan="3">Stops according to the stop mode selected.</td></tr>
<tr><td>EX_POSING (External input positioning)</td></tr>
<tr><td>ZRET (Zero point return)</td></tr>
<tr><td>INTERPOLATE (Interpolation)</td><td rowspan="3">–</td><td rowspan="3">–</td><td rowspan="3">Stops according to the stop mode selected.</td></tr>
<tr><td>ENDOF_INTERPOLATE
(For system use)</td></tr>
<tr><td>LATCH (Latch)</td></tr>
<tr><td>FEED (JOG operation)</td><td rowspan="2">Stops according to the stop mode selected.</td><td rowspan="2">Stops according to the stop mode selected.</td><td rowspan="2">Stops according to the stop mode selected.</td></tr>
<tr><td>STEP (STEP operation)</td></tr>
<tr><td>VELO (Speed reference)</td><td>Stops according to the stop mode selected. Only available when the stop mode is set to 0 or 1.</td><td>Stops according to the stop mode selected. Only available when the stop mode is set to 0 or 1.</td><td>Stops according to the stop mode selected. Only available when the stop mode is set to 0 or 1.</td></tr>
<tr><td>TRQ (Torque/thrust reference)</td><td>Stops according to the stop mode selected.</td><td>Stops according to the stop mode selected.</td><td>Stops according to the stop mode selected.</td></tr>
<tr><td>PHASE (Phase reference)</td><td>–</td><td>–</td><td>Stops according to the stop mode selected.</td></tr>
</table>

(4) Function Setting 1

<table>
<tr><td colspan="3" rowspan="2">OW□□03
Function Setting 1
Position Phase Speed Torque</td><th>Setting Range</th><th>Setting Unit</th><th>Default Value</th></tr>
<tr><td>–</td><td>–</td><td>0011H</td></tr>
<tr><td rowspan="4">Description</td><td>Bit 0 to Bit 3</td><td colspan="4">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.</td></tr>
<tr><td>Bit 4 to Bit 7</td><td colspan="4">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)</td></tr>
<tr><td>Bit 8 to Bit B</td><td colspan="4">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).</td></tr>
<tr><td>Bit C to Bit F</td><td colspan="4">Torque Unit Selection R
Set the unit for torque references.
0: 0.01% (default)
1: 0.0001%</td></tr>
</table>

(5) Function Setting 2

<table>
<tr><td colspan="3">OW□□04
Function Setting 2   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>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="3">OW□□05
Function Setting 3   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 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

<table>
<tr><td colspan="3" rowspan="2">OW□□09
Motion Command Control Flag   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="6">Description</td><td>Bit 0</td><td colspan="4">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, or speed 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</td></tr>
<tr><td>Bit 1</td><td colspan="4">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</td></tr>
<tr><td>Bit 2</td><td colspan="4">Moving Direction (JOG/STEP) R
Set the movement direction for JOG or STEP.
0: Forward (default)
1: Reverse</td></tr>
<tr><td>Bit 3</td><td colspan="4">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</td></tr>
<tr><td>Bit 4</td><td colspan="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)</td></tr>
<tr><td>Bit 5</td><td colspan="4">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 set this parameter to Incremental Addition Mode when using motion programs or infinite axes. For details, refer to 5.1.4 Position Reference.
0: Incremental Value Add Method (default)
1: Absolute Value Set Method</td></tr>
</table>

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 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

	Setting Range	Setting Unit	Default Value
OL□□0C R Torque/Thrust Reference Setting /Torque Feed Forward Compensation 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).	0

Description

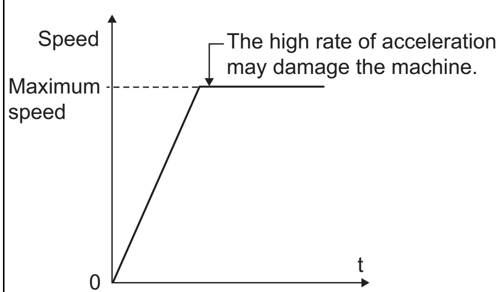
The meaning will depend on the command.
- Set the torque reference for torque reference commands.
  Refer to *6.2.23 Torque /Thrust Reference (TRQ)* for details.
- Set the torque feed forward gain* for interpolation commands.
  * Torque Feed Forward Gain Function
  Torque feed forward gain can be used when interpolation commands (INTERPOLATE, LATCH) are sent using SGDS 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.

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

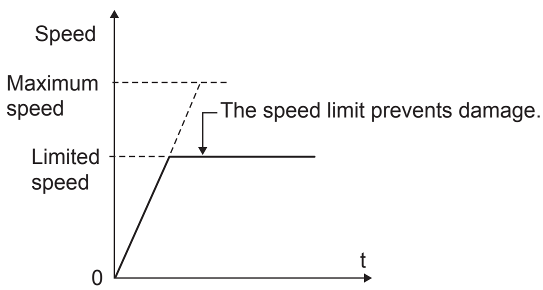
Description

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.

<No speed limit>



<Speed limit used>



■ Related Parameters
For SGDS, SGDH+NS115, SGDH+NS110 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 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 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.

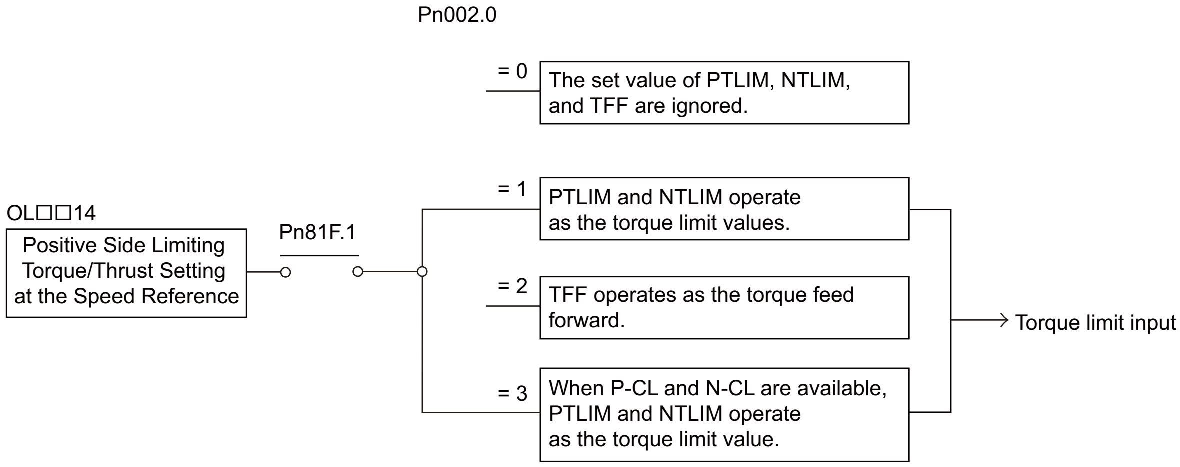
- Positioning (POSING)
- External input positioning (EX_POSING)
- Zero Point Return (ZRET)
- Interpolation (INTERPOLATE)
- Last Interpolation Segment (ENDOF_INTERPOLATE)
- Latch (LATCH)
- JOG operation (FEED)
- STEP operation (STEP)
- Speed control
- Position control

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.

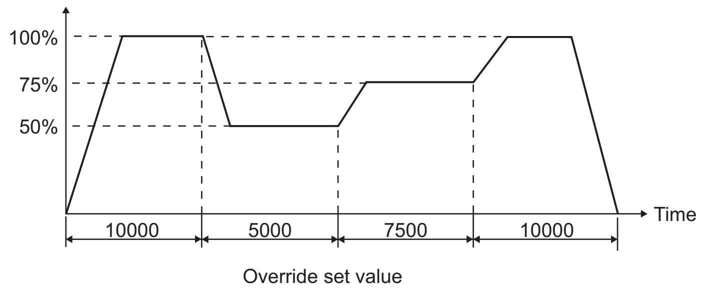
Pn002 Setting	Forward Torque Limit		Reverse Torque Limit	
	When OPTION.P_CL = 0	When OPTION.P_CL = 1	When OPTION.N_CL = 0	When OPTION.N_CL = 1
n.□□□0 or n.□□□2	Pn402 setting	Pn402 setting, Pn404 setting	Pn403 setting	Pn403 setting value, Pn405 setting value,
n.□□□1	Pn402 setting, PTLIM (TLIM)	Pn402 setting,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

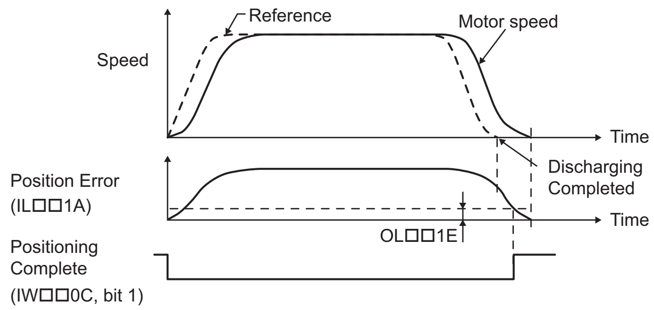
Description

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

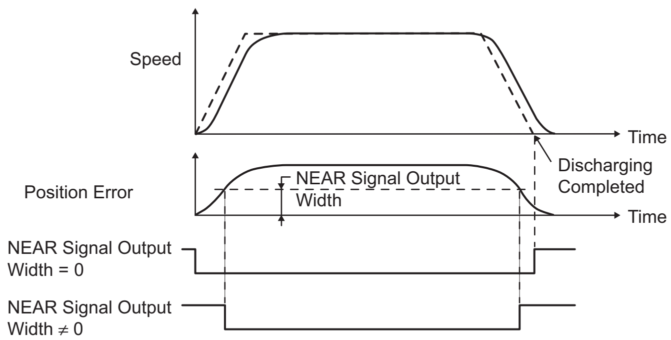
Description

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

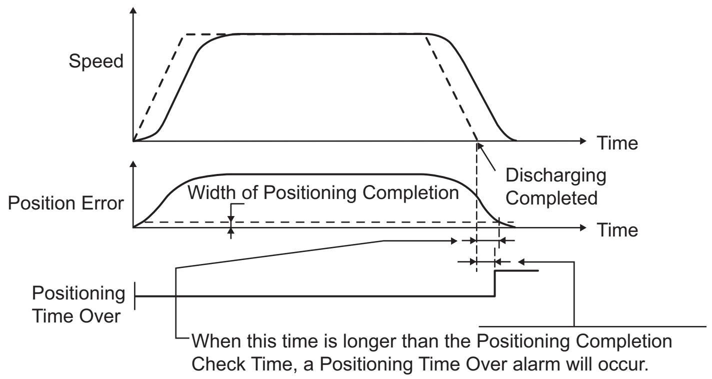
IW□□0C, bit 3: NEAR Position

(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 latch zone setting is supported for SGDS SERVOPACKs for MECHATROLINK-II communication only. 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.			

Motion Parameters

4

(22) Gain and Bias Settings

OW□□2E Position Loop Gain	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		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 SERVOPACKs are used and the tuning-less function is available, this setting is ignored.

OW□□2F Speed Loop Gain	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		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 SERVOPACKs are used and the tuning-less function is available, this setting is ignored.

OW□□30 Speed Feedforward Amends	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		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 SERVOPACKs are used and the tuning-less function is available, this setting is ignored.

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.

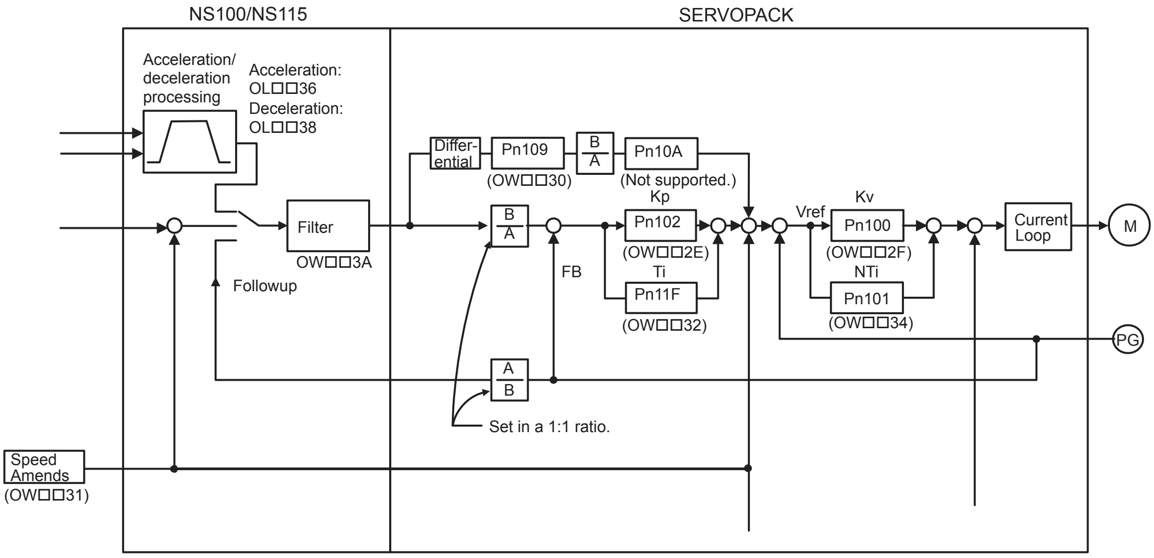
This function is achieved using the Servo command expansion area and can be executed when using the MECHATROLINK-II (32-byte Mode) communication method. The motion command KIS must be used to make changes to this parameter.

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 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 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.			
		Setting Range	Setting Unit	Default Value
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.			

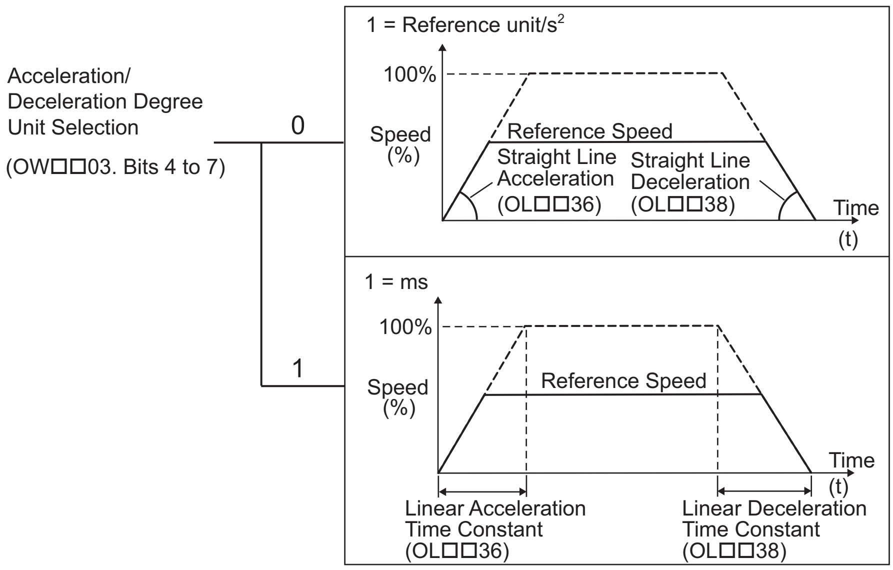
The following two methods can be used to specify the acceleration/deceleration speed.

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 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 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 = 3 ms

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, or SGDS 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

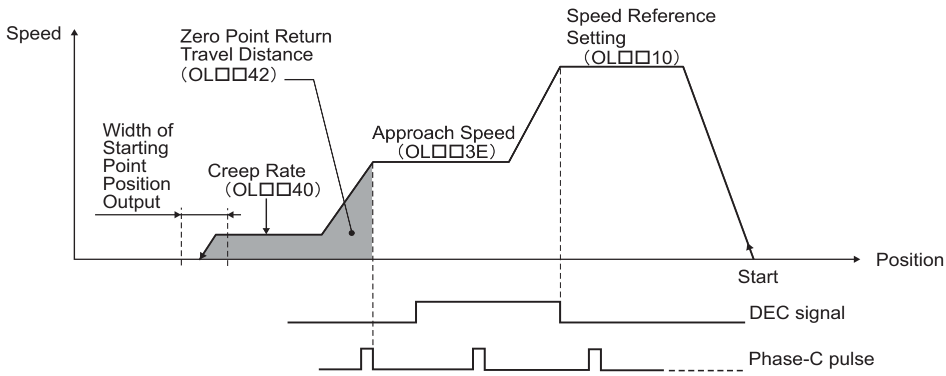
OW□□3C Zero Point Return Method	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 19	–	0
Description	Set the operation method when the Zero Point Return (ZRET) motion command is executed. With an incremental encoder, there are 13 different methods that can be performed for the 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.			

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.			

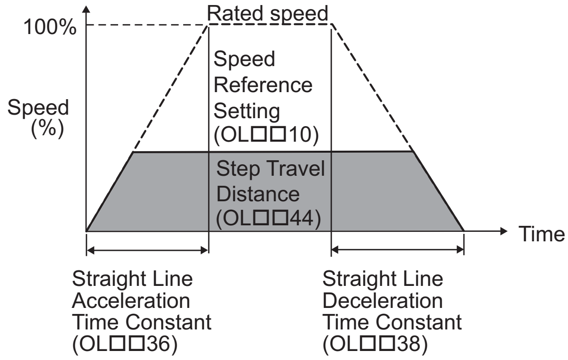
OL□□42 Zero Point Return Travel Distance	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-2^{31} to $2^{31}-1$	Reference unit	0
Description	Set the distance from where the signal is detected to the zero point position.			

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

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

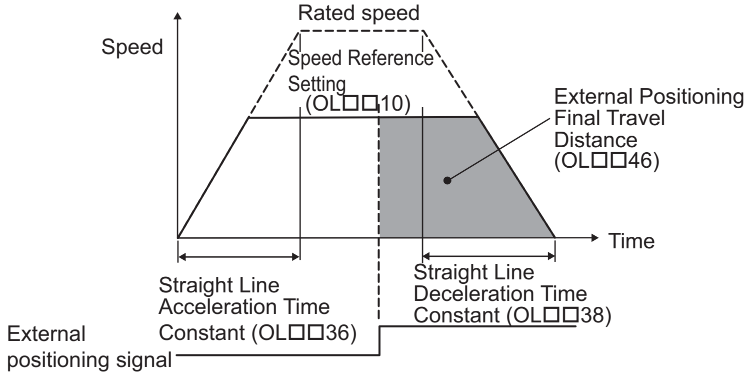


(26) Step Travel Distance

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

		Setting Range	Setting Unit	Default Value
OL□□46 External Positioning Final Travel Distance	Position Phase Speed Torque	-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

		Setting Range	Setting Unit	Default Value
OL□□48 R Zero Point Position in Machine Coordinate System Offset	Position Phase Speed Torque	-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	-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	-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

<table>
<tr><td colspan="2">OW□□4E
Servo User Monitor Setting</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>0E00H</td></tr>
<tr><td rowspan="2">Description</td><td>Bit 4 to Bit 7</td><td colspan="4">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)
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/40000000 hex)
9: Command speed (position/torque control: reference units/s, speed control: maximum speed/40000000 hex)
A: Target speed (position/torque control: reference units/s, speed control: maximum speed/40000000 hex)
B: Torque reference (position/speed control: reference units/s, torque control: maximum torque/40000000 hex)
C:
D:
E: Option Monitor 1 (default)
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.)</td></tr>
<tr><td>Bit C to Bit F</td><td colspan="4">Monitor 4
Monitor 4 is used only with the MECHATROLINK-II in 32-byte Mode.
0 to F: Same as for Monitor 2.</td></tr>
</table>

(30) SERVOPACK Commands

OW□□4F Servo Driver Alarm Monitor No.	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		0 to 10	–	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.			

OW□□50 Servo Driver User Constant No.	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		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.			

OW□□51 Servo Driver User Constant Size	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		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_WRmotion command. • Refer to *Chapter 6 Motion Commands* for details.			

OL□□52 Servo Driver User Constant Set Point	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-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.			

OW□□54 Servo Driver for Assistance User Constant No.	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		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.			

OW□□55 Servo Driver for Assistance User Constant Size	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		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.			

OL□□56 Servo Driver for Assistance User Constant Set Point	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		-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

OW□□5C R Fixed Parameter Number	Position Phase Speed Torque	Setting Range	Setting Unit	Default Value
		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			

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

IW☐☐00 Run Status		Range	Unit
		–	–
Description	Bit 0	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 (SVB Definitions Window) is being opened using the MPE720. • Configure an OR circuit with IW☐☐00, bit 2 when using as a Servo ON interlock.	
	Bit 1	Running (At Servo ON) R This bit is ON while the axis is in Servo ON status. 0: Stopped 1: Running (Servo ON)	
	Bit 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.	
	Bit 3	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.	
	Bit 4	Latch Mode (Valid with SVB-01 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.	

(2) Over Range Parameter Number

IW□□01 R Parameter Number When Range Over is Generated		Range	Unit
		0 to 65535	–
Description	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.		

(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*1 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*1 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 for SGDV*2 and SJDE SERVOPACKs when using a MECHATROLINK-II network.		

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

* 2. Does not include SGDV-□□□E1□□ SERVOPACKs.

- When the Σ-V series of SGDV SERVOPACKs is used, the SERVOPACK parameters use the following settings.
  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 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.	

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 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☐☐ 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 SVB 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 SVB Definition Window does not match the motor type set for the SERVOPACK parameter Pn000.3 "Rotary/Linear Start Selection." • Refer to *4.2.2 (2) Alarm When Motor Type is Unmatched* for corrective action when this alarm occurs.	

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 encoder type set in the SVB Definition Window does not match the connected encoder type. • Refer to *4.2.2 (2) Alarm When Motor Type is Unmatched* 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'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.		

Motion Parameters

4

IW□□0C Position Management Status (cont'd)		Range	Unit
		–	–
Description	Bit 4	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.	
	Bit 5	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.	
	Bit 6	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.	
	Bit 8	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	
	Bit 9	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	

(10) Position Information

IL□□0E R Target Position in Machine Coordinate System (TPOS)	Range	Unit
	-2^{31} to $2^{31}-1$	Reference unit
Description	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.	

IL□□10 R Calculated Position in Machine Coordinate System (CPOS)	Range	Unit
	-2^{31} to $2^{31}-1$	Reference unit
Description	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.	

IL□□12 R Machine Coordinate System Reference Position (MPOS)	Range: -2^{31} to $2^{31}-1$	Unit: 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	Range: -2^{31} to $2^{31}-1$	Unit: 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)	Range: -2^{31} to $2^{31}-1$	Unit: 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.	

IL□□18 Machine Coordinate System Latch Position (LPOS)	Range: -2^{31} to $2^{31}-1$	Unit: Reference unit
Description	Stores the latch position when the latch has been completed.	

IL□□1A Position Error (PERR)	Range: -2^{31} to $2^{31}-1$	Unit: 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	Range: -2^{31} to $2^{31}-1$	Unit: Reference unit
Description	Stores the number of pulses distributed each scan.	

IW□□1E R Number of POSMAX Turns	Range: -2^{31} to $2^{31}-1$	Unit: 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

IL□□20 Speed Reference Output Monitor	Range: -2^{31} to $2^{31}-1$	Unit: 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 BCD Example: The code for a communication error that occurs in an SGDS or SGDV 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. (3 digits for SGDS or SGDV 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 SERVOPACKs except 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

IL□□30 Servo Driver User Monitor 2	Range	Unit
	-2^{31} to $2^{31}-1$	–
Description	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).	
IL□□32 Servo Driver User Monitor 3	Range	Unit
	-2^{31} to $2^{31}-1$	–
Description	Used by the system.	
IL□□34 Servo Driver User Monitor 4	Range	Unit
	-2^{31} to $2^{31}-1$	–
Description	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).	
IW□□36 Servo Driver User Constant No.	Range	Unit
	0 to 65535	–
Description	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.	
IW□□37 Supplementary Servo Driver User Constant No.	Range	Unit
	0 to 65535	–
Description	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.	
IL□□38 Servo Driver User Constant Reading Data	Range	Unit
	-2^{31} to $2^{31}-1$	–
Description	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.	
IL□□3A Supplementary Servo Driver User Constant Reading Data	Range	Unit
	-2^{31} to $2^{31}-1$	–
Description	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.	
IW□□3F Motor Type	Range	Unit
	0, 1	–
Description	Stores the type of motor that is actually connected. 0: Rotation type motor 1: Linear motor	

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.		

IW□□44 Latch Completion Sequence Number		Range	Unit
		0 to 32767	1 = 1 time
Description	Available only for SGDV SERVOPACKs using the MECHATROLINK-II network (32 bytes).		

IW□□45 Latch Completion Sequence Number		Range	Unit
		0 to 32767	1 = 1 cycle
Description	Available only for SGDV SERVOPACKs using the MECHATROLINK-II network (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

IL□□5E Encoder Position When the Power is OFF (Lower 2 words)		Range	Unit
		-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)		Range	Unit
		-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)		Range	Unit
		-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)		Range	Unit
		-2^{31} to $2^{31}-1$	pulse
Description	Same as for IL□□62.		

(19) Servo Driver Transmission Reference Mode

IW□□70 to IW□□7E Response Buffer for Servo Driver Transmission Reference Mode		Range	Unit
		–	–
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:

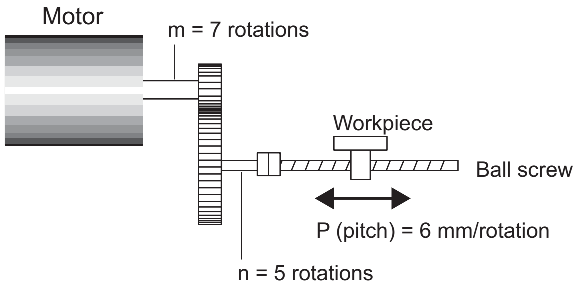
- Fixed Parameter 6: Travel Distance per Machine Rotation R
- Fixed Parameter 8: Servo Motor Gear Ratio R
- Fixed Parameter 9: Machine Gear Ratio R

- 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

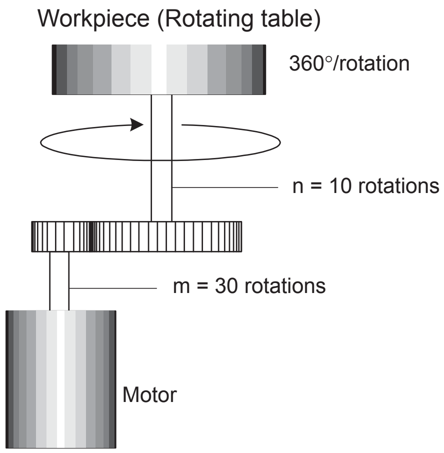


To move the workpiece 0.001 mm for 1 reference unit input under the conditions outlined above, i.e., for 1 reference unit = 1 output unit, make the following settings for fixed parameters 6, 8, and 9.

- 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.

(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.

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 set to 0 when using a motion program.	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

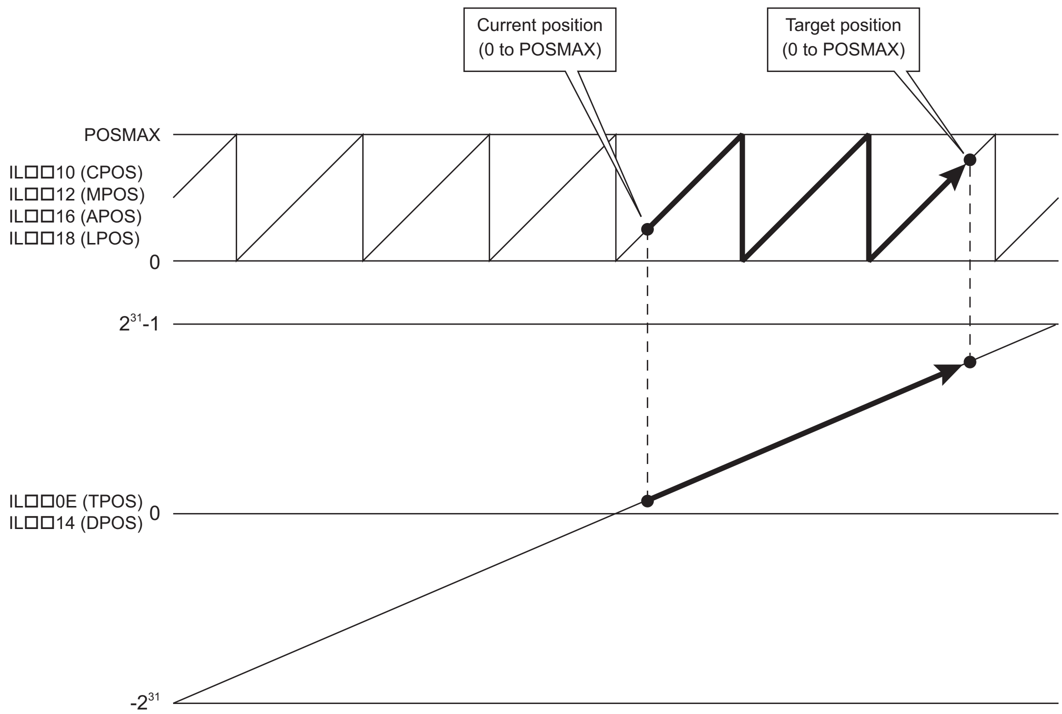
- n refers to the number of POSMAX complete turns needed to move from the current position (CPOS) to the target position. When the distance between the target position and the current position is within the first turn, n is 0.

■ 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

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- 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.

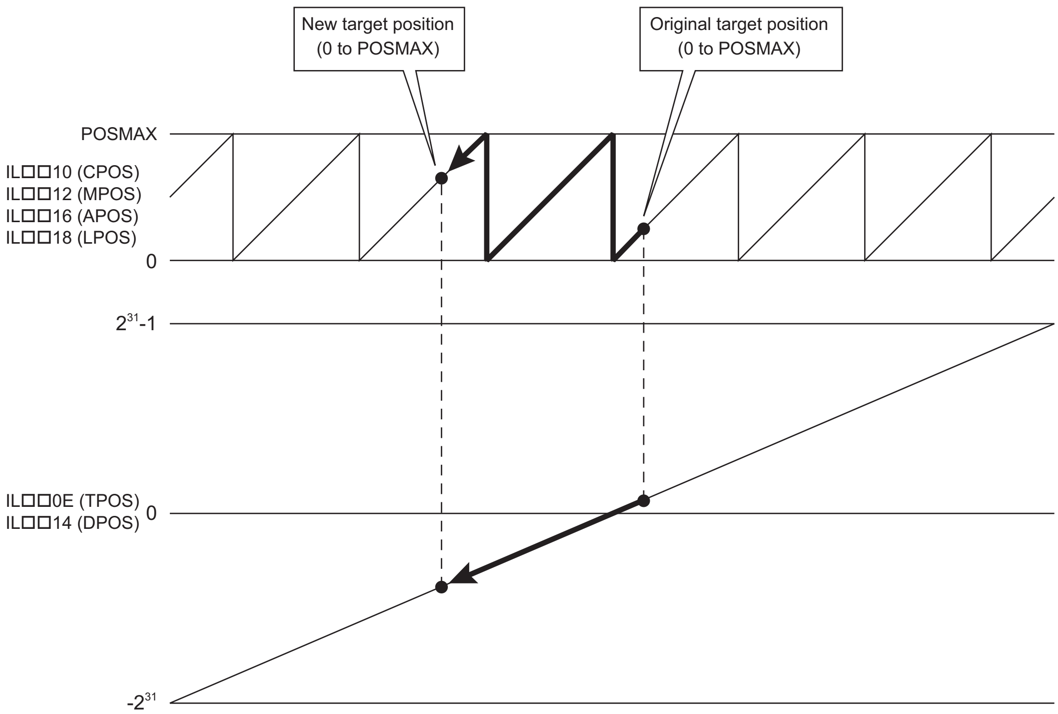
■ Absolute Mode (OW☐☐09, bit 5 = 1)

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/s • 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.

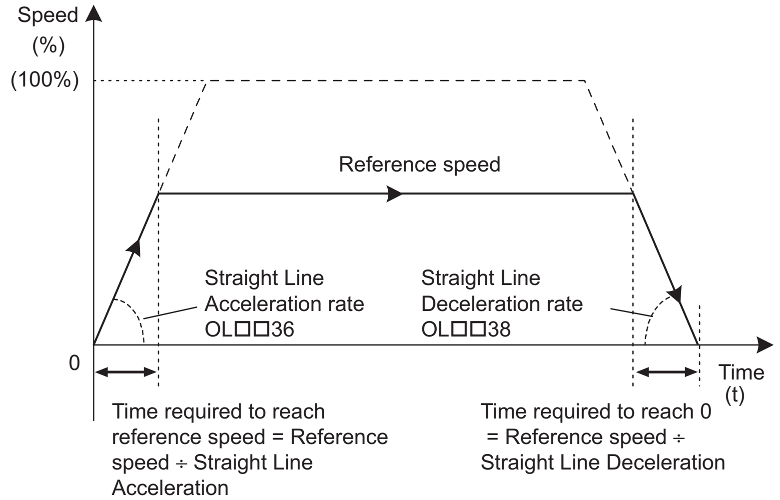
Parameter Type	Parameter No. (Register No.)	Name	Description	Default Value
Motion Fixed Parameters	No. 5 R	Number of Digits below Decimal Point	Set the number of digits below the decimal point in the input reference unit. The minimum reference unit is determined by this parameter and the Reference Unit 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.

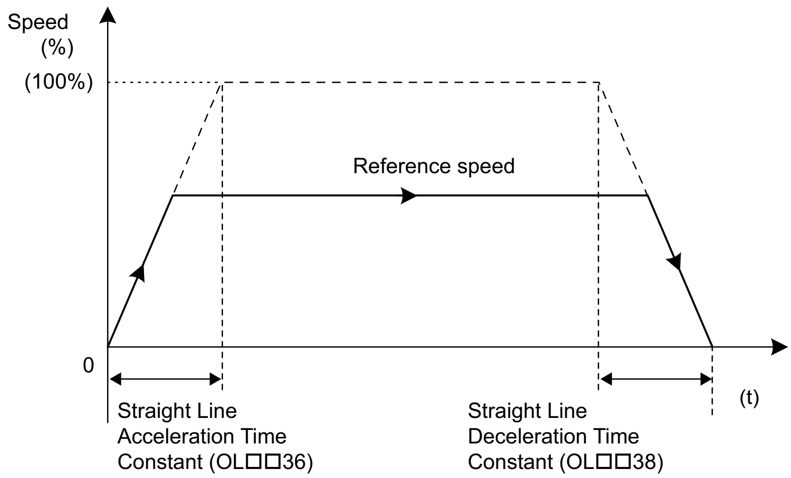
■ When the Acceleration/Deceleration Degree Unit Selection (OW□□03, Bits 4 to 7) Set to 0: Reference Unit/s^2

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.



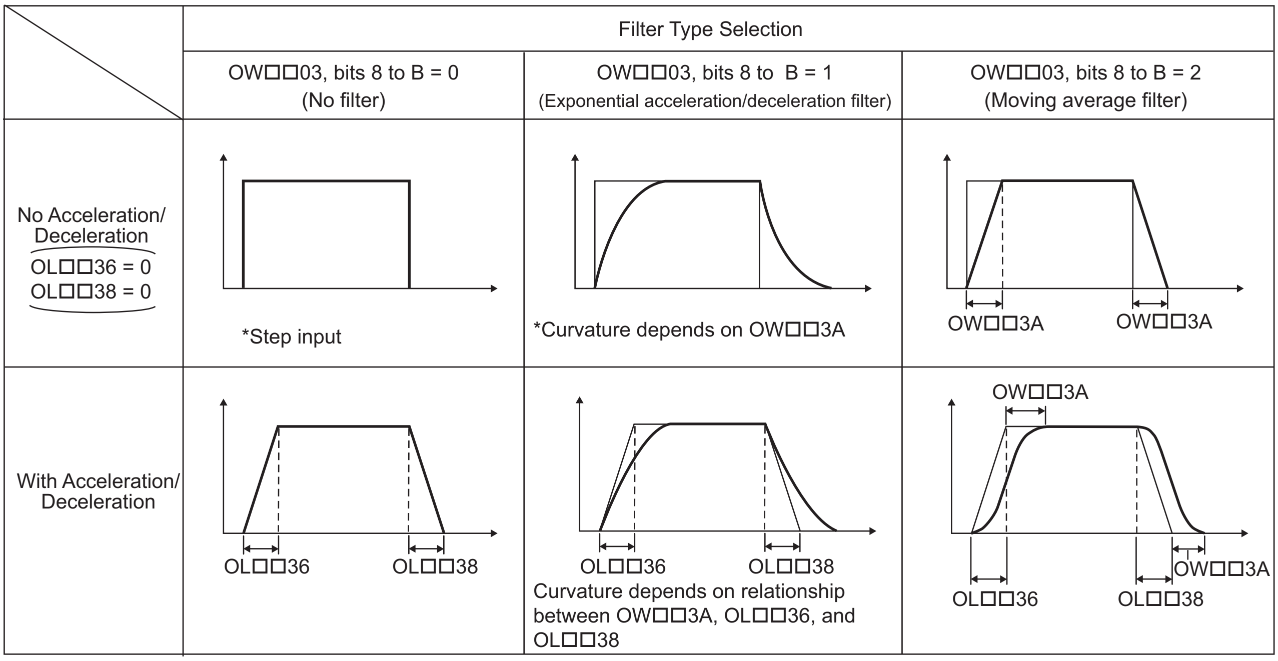
- For the following commands, acceleration/deceleration processing is carried out by the SERVOPACK.
  1: POSING
  2: EX_POSING
  3: ZRET
  7: FEED
  8: STEP
  The unit conversion is applied to the linear acceleration time constant and linear deceleration time constant specified in the setting parameters, 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□□		SGDX- □□□2□□	
					M-I	M-II	M-I	M-II	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	×	Δ	×	Δ
	PRM_WR	×	×	Δ	×	Δ	×	Δ	×	Δ
	SMON	×	×	Δ	×	Δ	×	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 SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV 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.

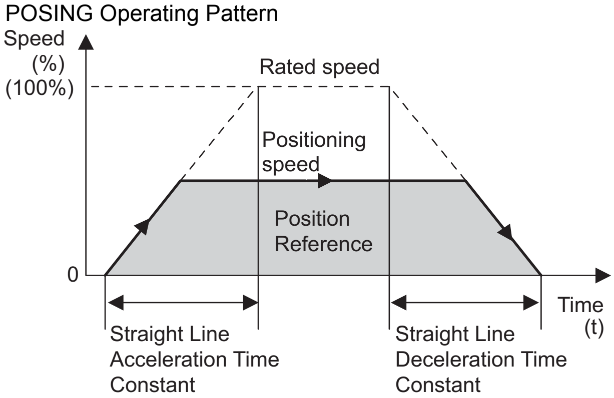
3. Set OW□□08 to 1 to execute the POSING motion command.

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.

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 travelled 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 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

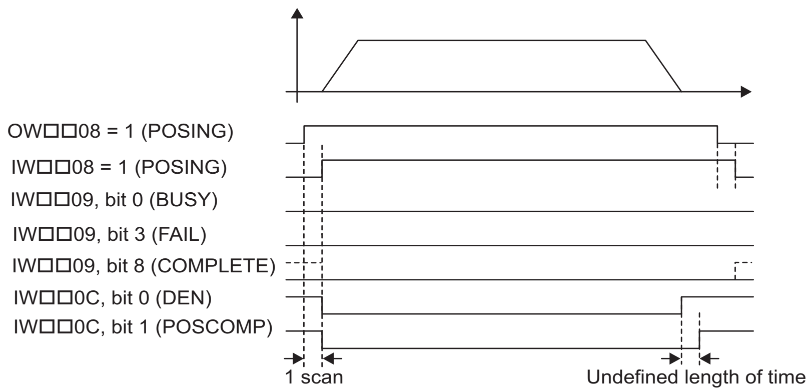
Pulse distribution transfers reference values from the Machine Controller registers to the SERVOPACK registers every scan. Used in describing motion command operation.

[b] Monitoring Parameters

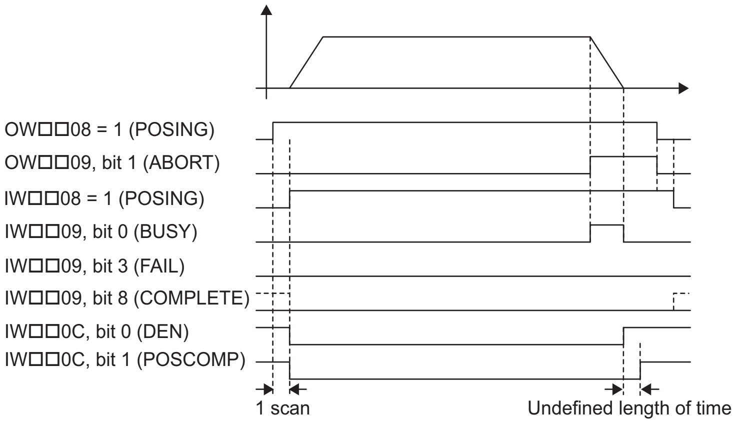
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	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

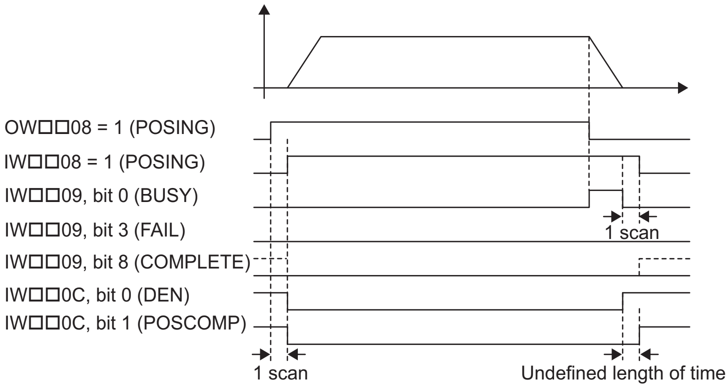
[a] Normal Execution



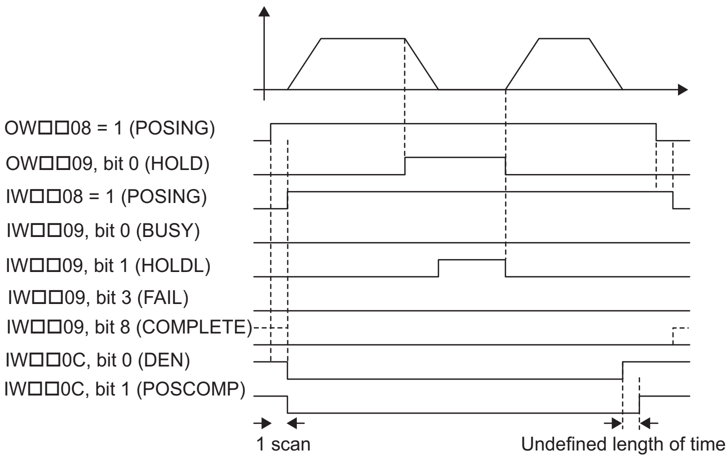
[b] Execution when Aborted



[c] Execution when Aborting by Changing the Command



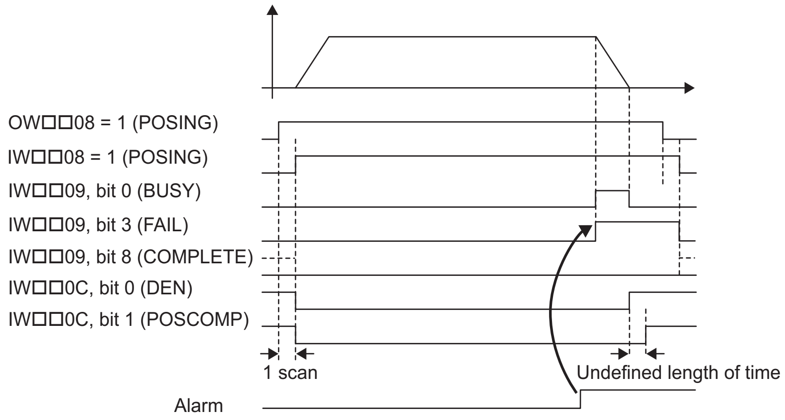
[d] Command Hold



Motion Commands

6

[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 SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV SERVOPACK Operations* of *4.4.2 (12)* and ■ *Precautions* of *6.2.1 (3)*. When using a DC Power Input Σ-V Series SERVOPACK (Model: SGDV-□□□E1□□), also 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 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

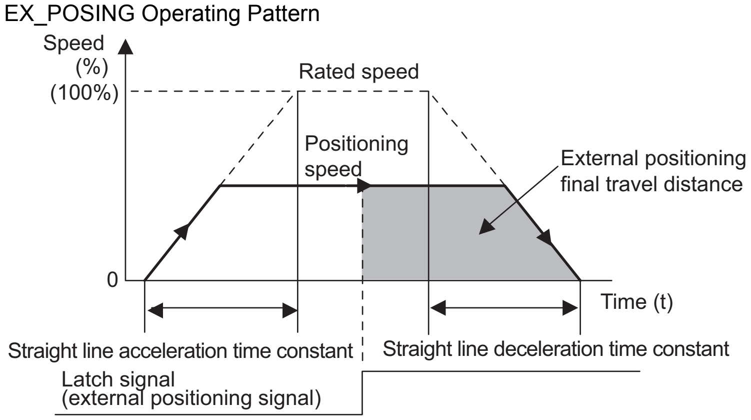
- The Speed Reference Setting can be changed during operation.
- An override of between 0% to 327.67% can be set for the speed reference.
- A latch zone can be set as long as it is supported by the SERVOPACK being used.

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.



(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

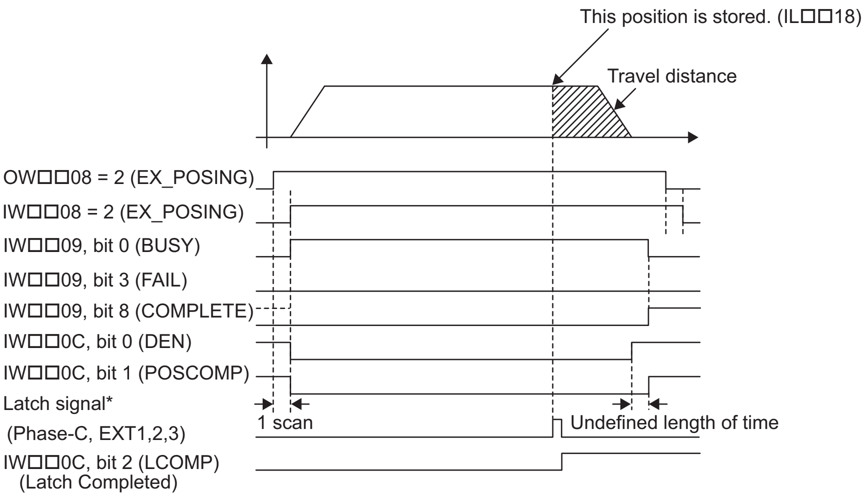
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	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.	–

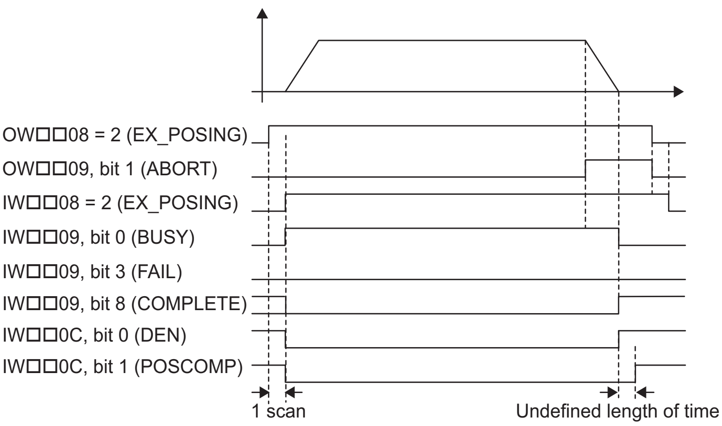
(5) Timing Charts

[a] Normal Execution

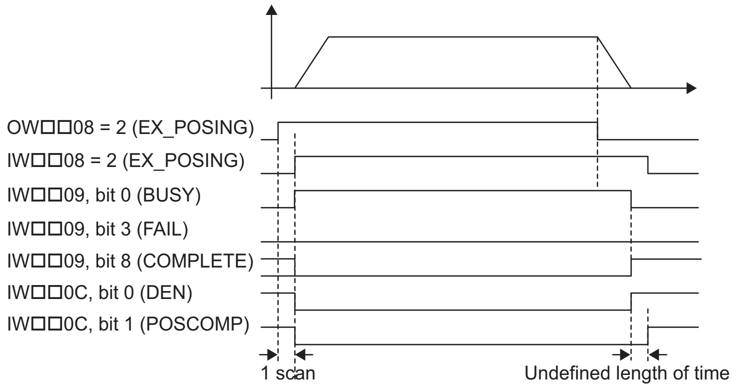


* Latch signal: Phase-C pulse, EXT1, EXT2, or EXT3 signal

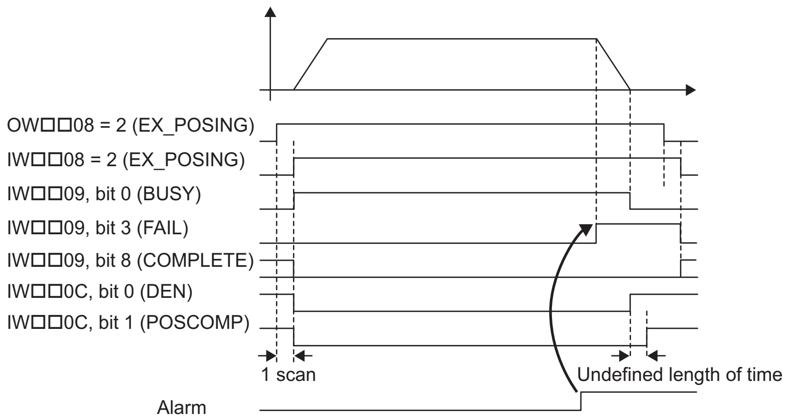
[b] Execution when Aborted



[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 SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV 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 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]
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]

(cont'd)

Setting Parameter OW□□3C	Name	Method	Signal Meaning	Reference
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

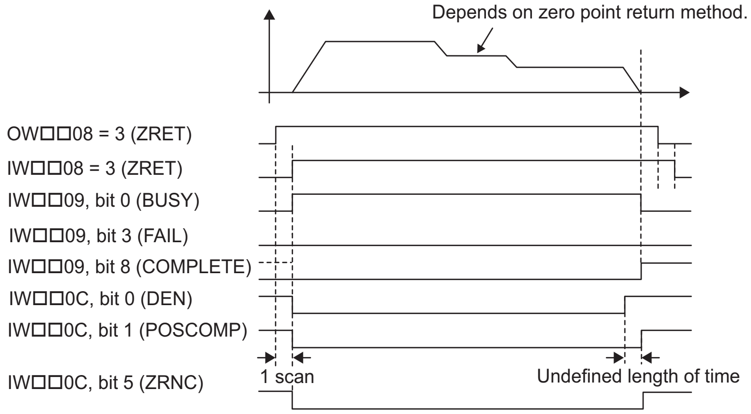
Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command (OW□□08) to 3.	R
OW□□01 Bit 3	Speed Loop P/PI Switch	Switches the SERVOPACK's speed loop between PI control 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

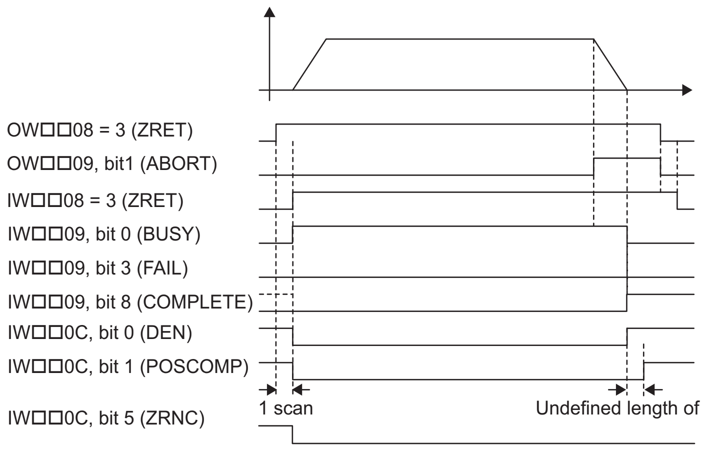
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	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

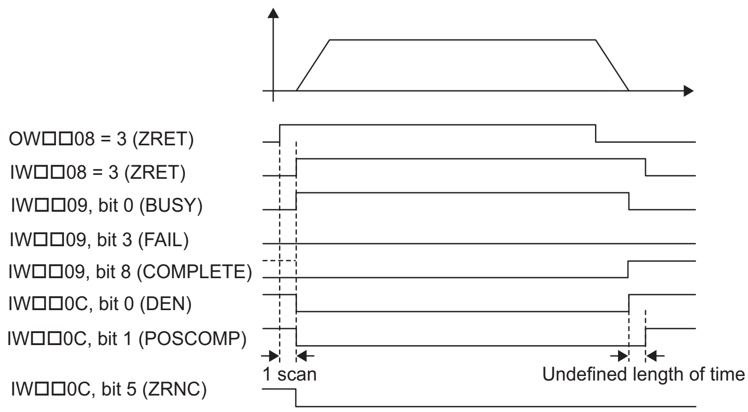
[a] Normal Execution



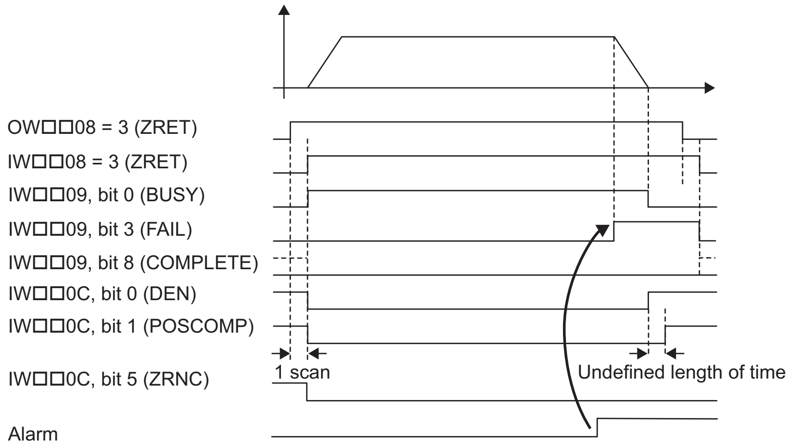
[b] Execution when Aborted



[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.

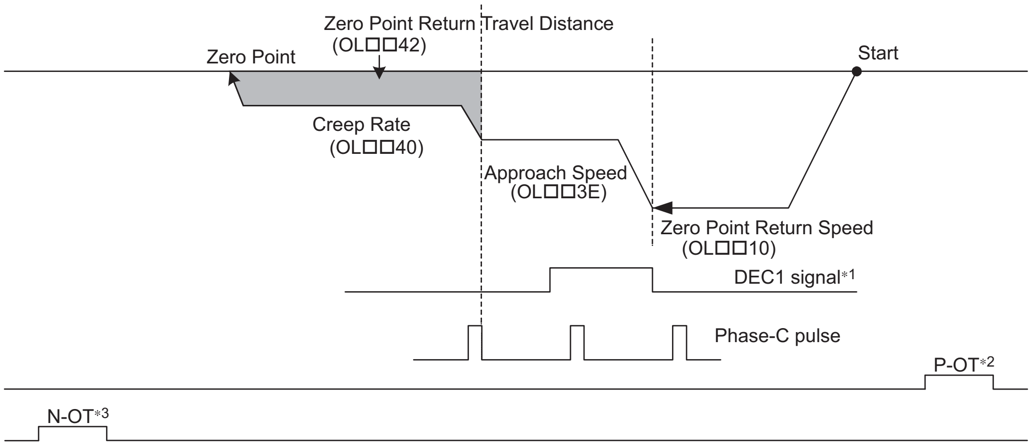
- None of the methods shown here are available with the SVR because it only supports absolute encoders.

[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

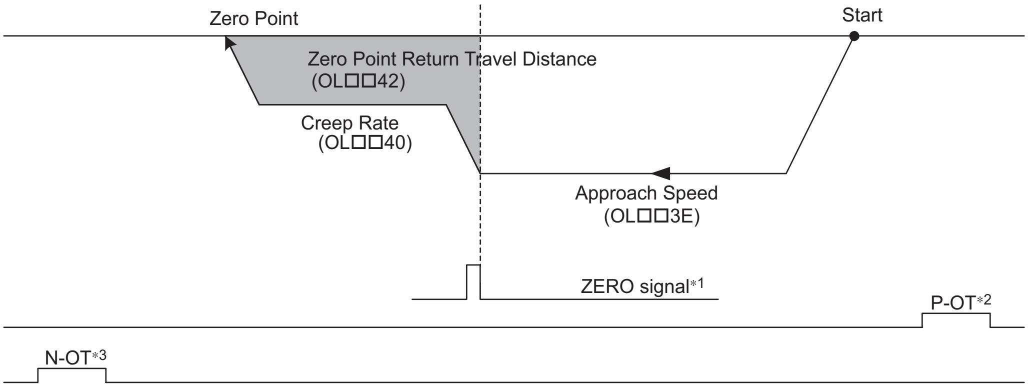
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	0: DEC1 + Phase-C
OW□□09, Bit 3	Zero Point Return Direction Selection	Set the zero point return direction.
OL□□10	Speed Reference Setting	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative value will 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

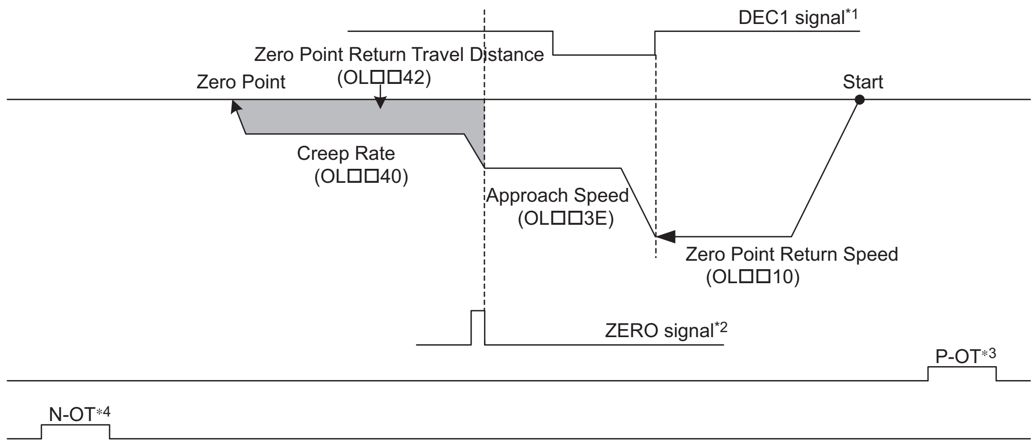
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	1: ZERO Signal Method
OW□□09, Bit 3	Zero Point Return Direction Selection	Set the zero point return direction.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative value will result 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

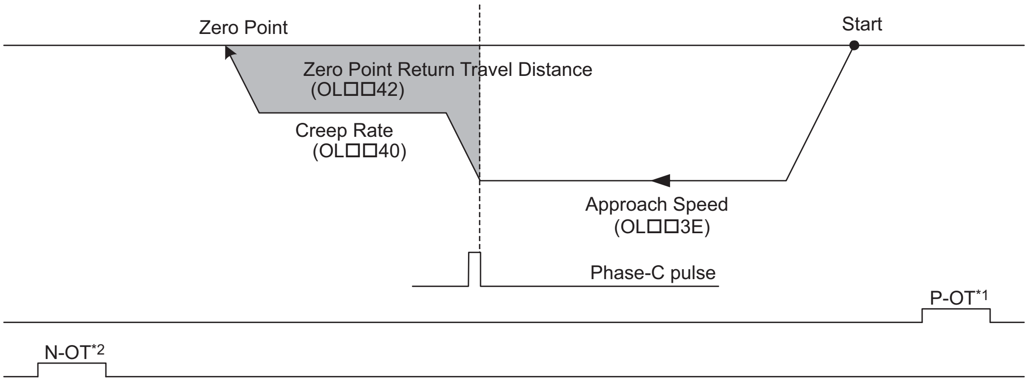
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	2: DEC1 + ZERO Signal Method
OW□□09, Bit 3	Zero Point Return Direction Selection	Set the zero point return direction.
OL□□10	Speed Reference Setting	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative 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

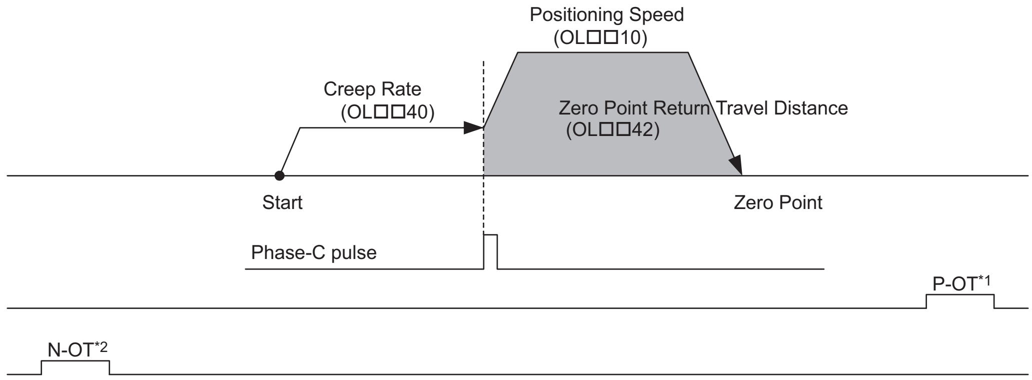
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	3: Phase-C Method
OW□□09, Bit 3	Zero Point Return Direction Selection	Set the zero point return direction.
OL□□3E	Approach Speed	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative value will result 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)

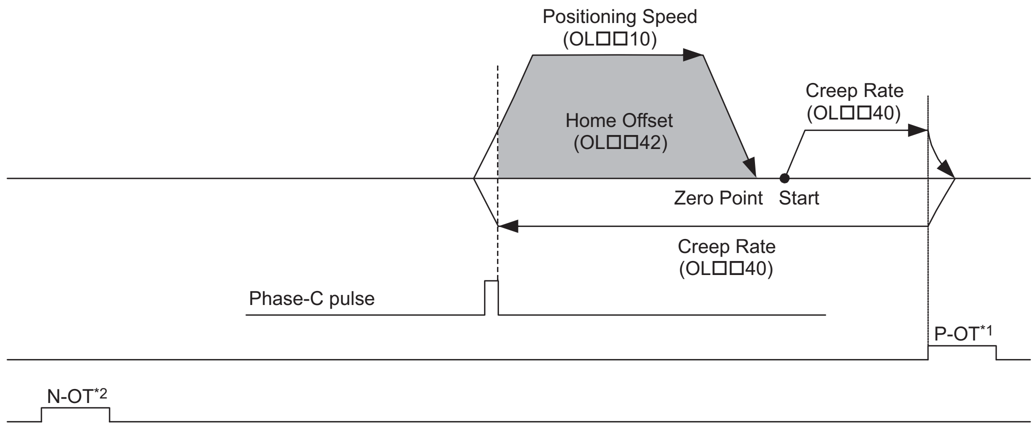
■ Operation after Zero Point Return Starts

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

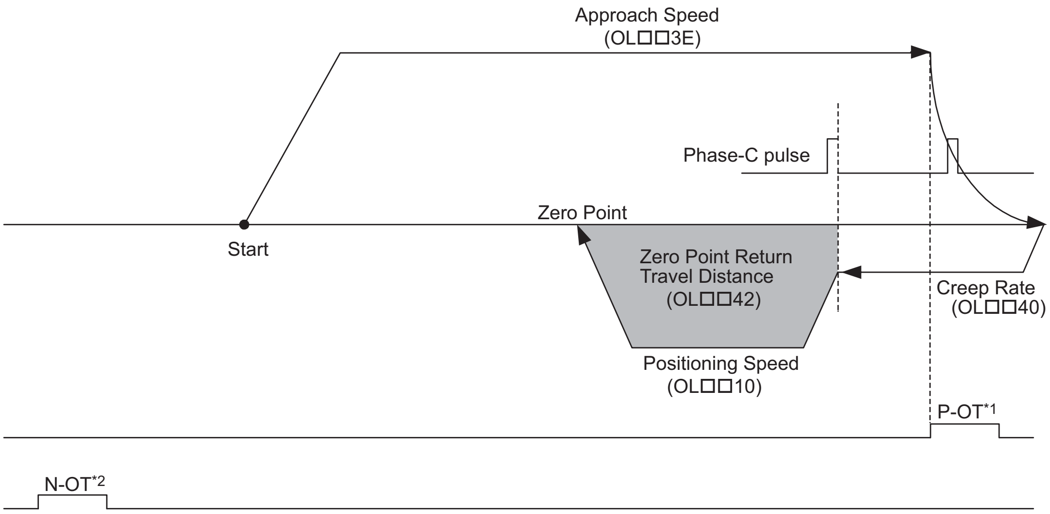
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	11: C Pulse Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction will depend on the sign of the Home Offset.
OL□□40	Creep Rate	Set the speed and travel 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

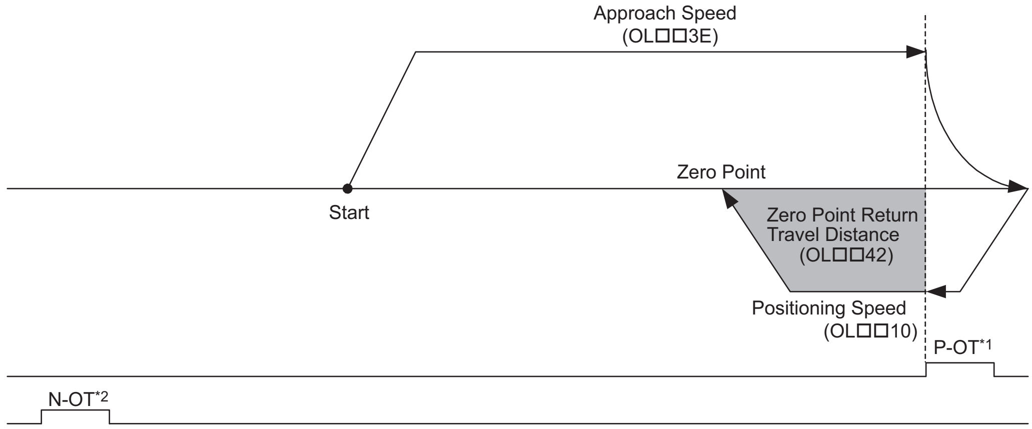
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	12: P-OT & C pulse method
OL□□10	Speed Reference Setting	Set the positioning to use after detecting the phase-C pulse. The sign is ignored. The zero point return direction will depend on the sign of the Home Offset.
OL□□3E	Approach Speed	Set the 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)

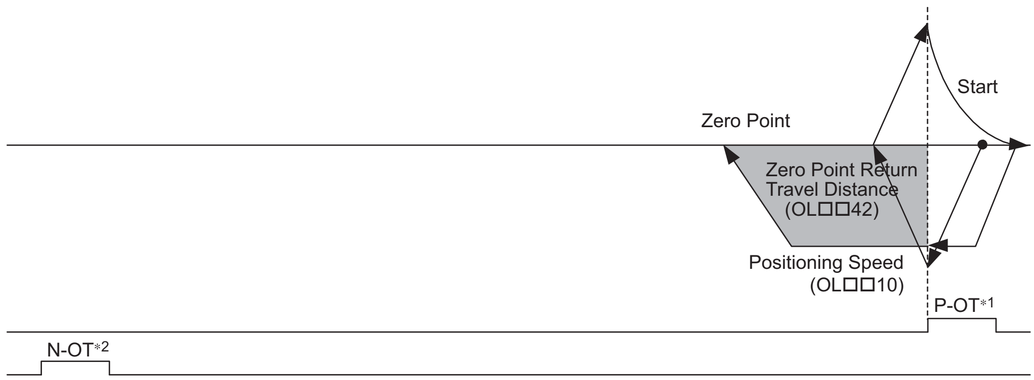
■ Operation after Zero Point Return Starts

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

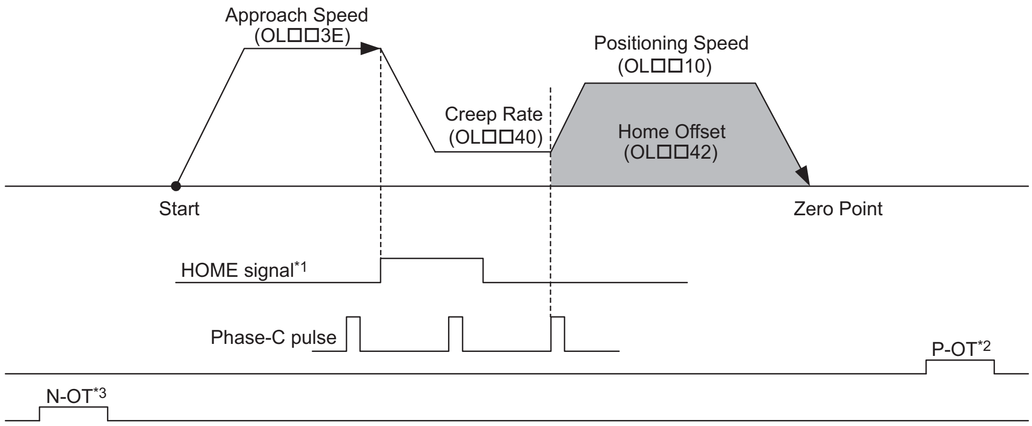
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	13: P-OT Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the P-OT signal. The sign is ignored. The travel direction will depend on the sign of the Zero Point Travel Distance.
OL□□3E	Approach Speed	Set the 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)

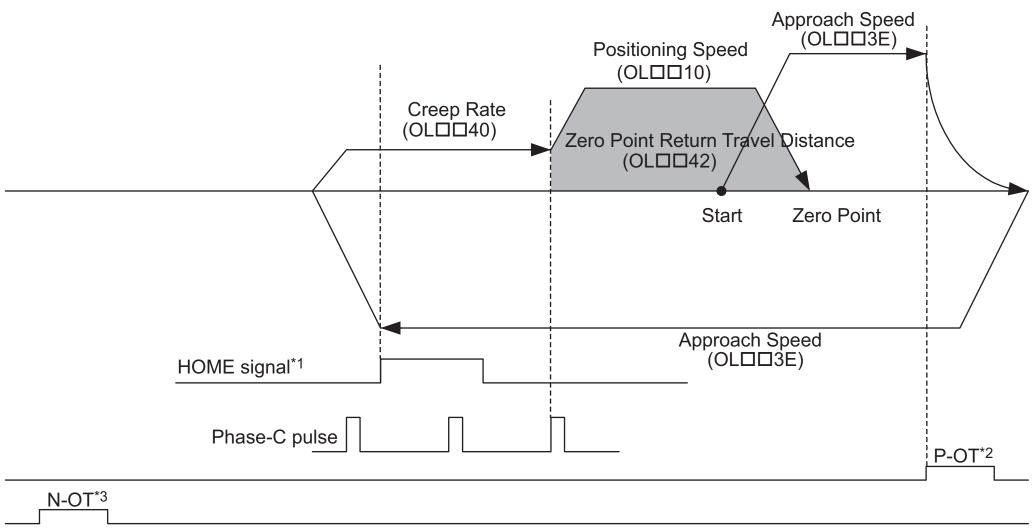
■ Operation after Zero Point Return Starts

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

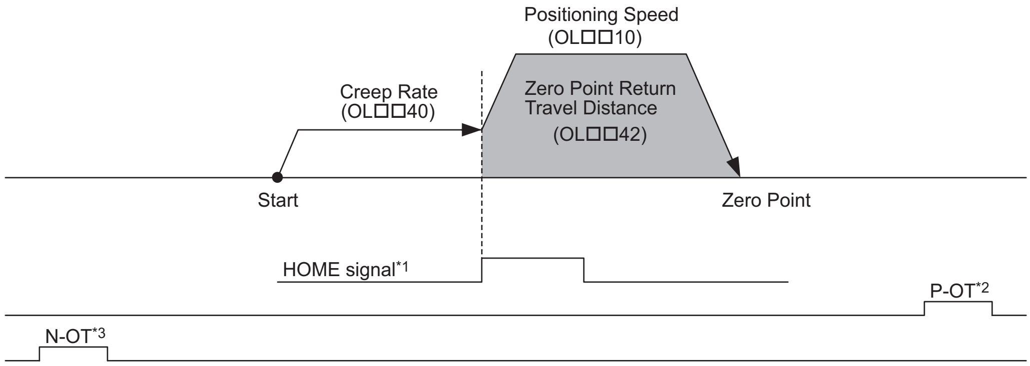
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	14: HOME LS & C pulse method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction depends on the sign of the Zero Point Return Travel Distance.
OL□□3E	Approach 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)

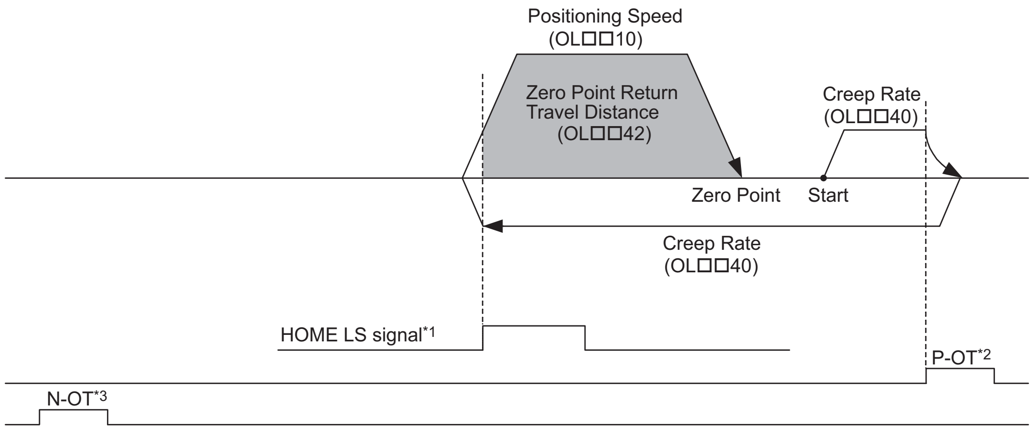
■ Operation after Zero Point Return Starts

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

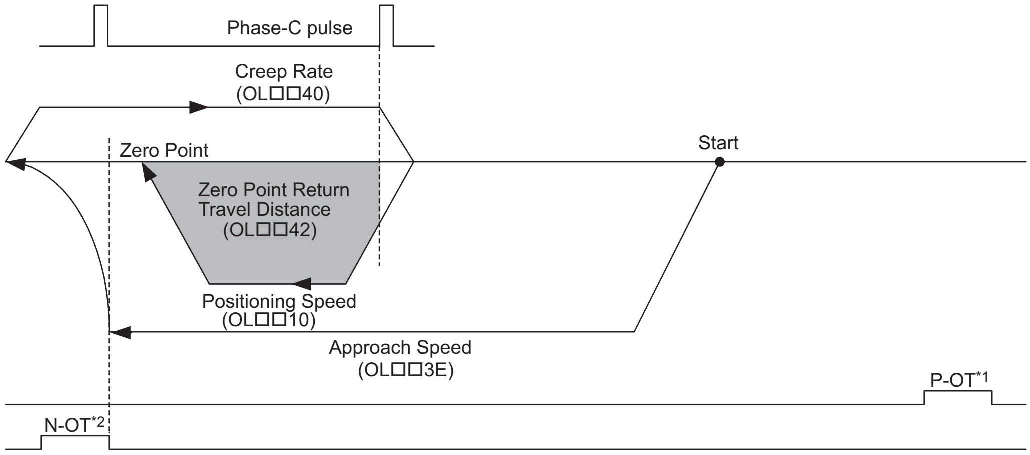
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	15: HOME LS Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the home signal. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance.
OL□□40	Creep Rate	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.

[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

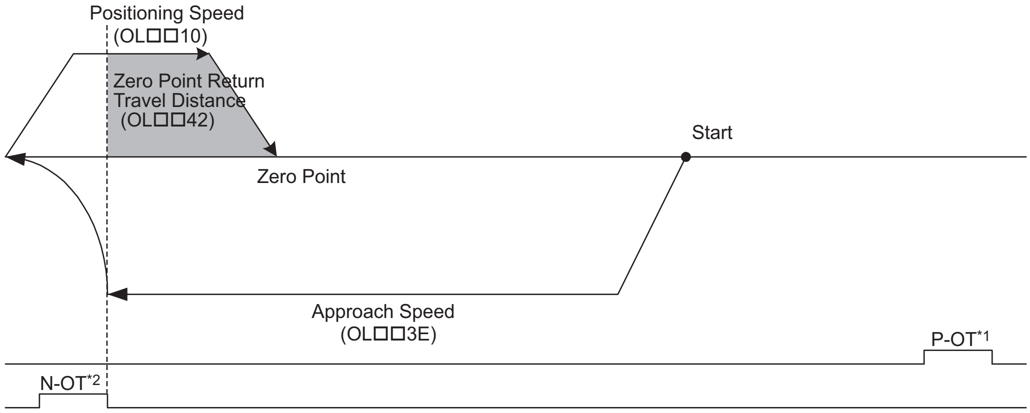
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	16: N-OT & C pulse Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance.
OL□□3E	Approach 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

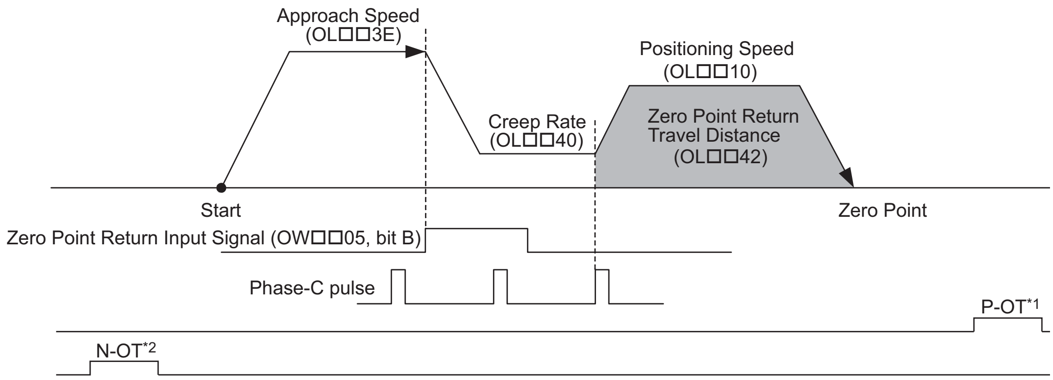
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	17: N-OT Only Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the N-OT signal. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance.
OL□□3E	Approach Speed	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)

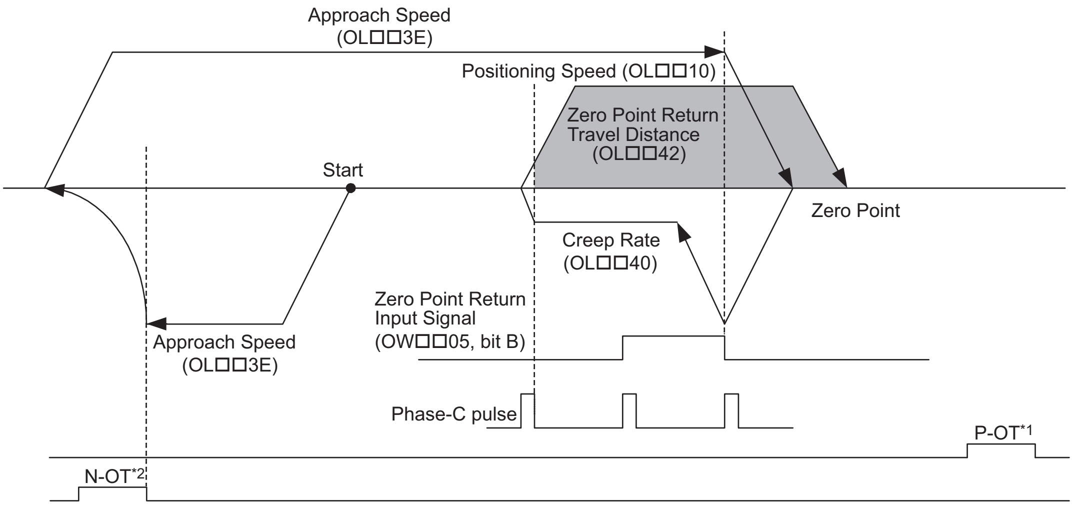
■ Operation after Zero Point Return Starts

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

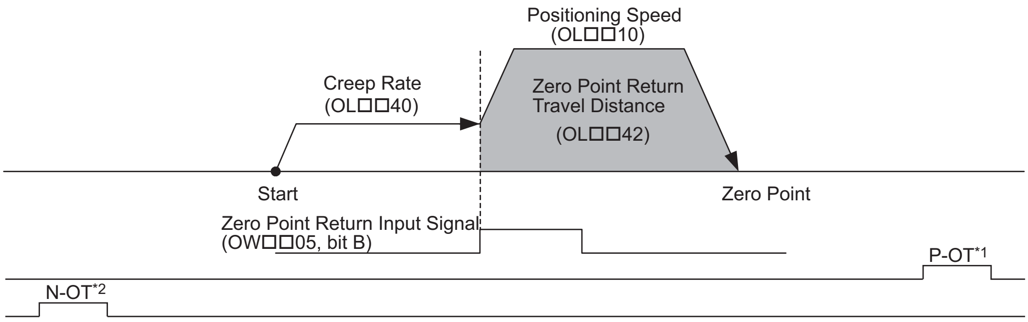
Parameter	Name	Setting
OW□□3C	Zero Point Return Method	18: INPUT & C pulse Method
OL□□10	Speed Reference Setting	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction will depend on the sign of the Zero Point Return Travel Distance
OL□□3E	Approach 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)

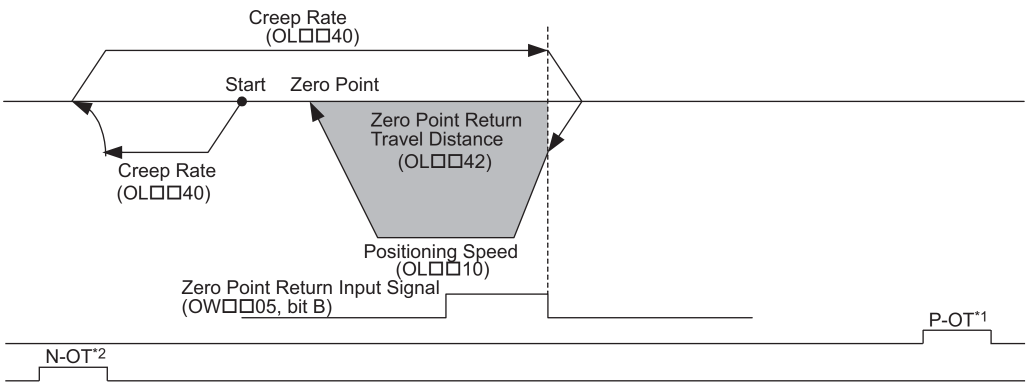
■ Operation after Zero Point Return Starts

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 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 SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV 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.

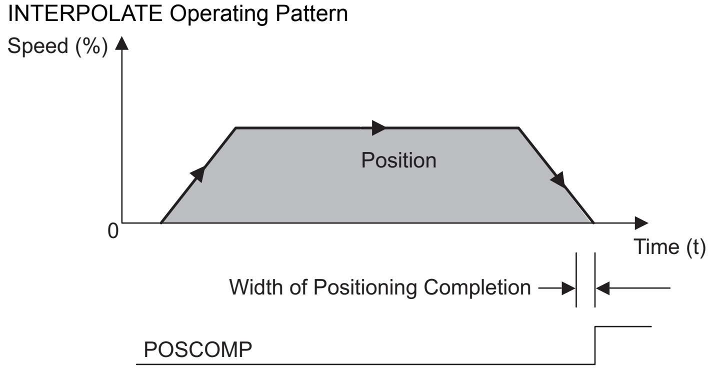
4. Refresh the value of OL□□1C (Position Reference Setting) at every high-speed scan.

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



(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

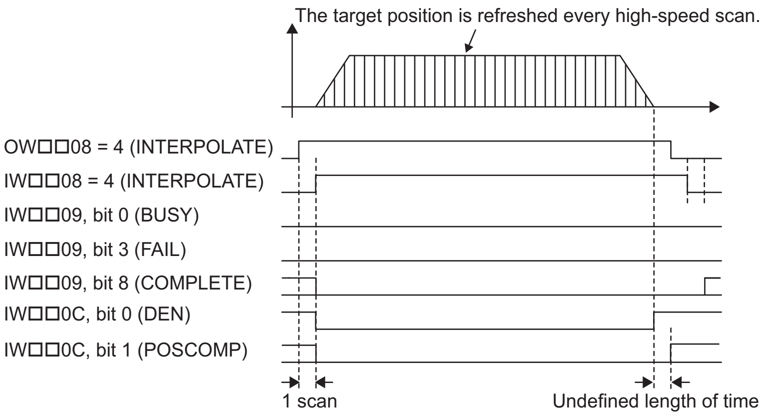
Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turns the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON this bit before setting the Motion Command (OW□□08) to 4.	R
OW□□03	Function Setting 1	Sets the speed unit, acceleration/deceleration units, and 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

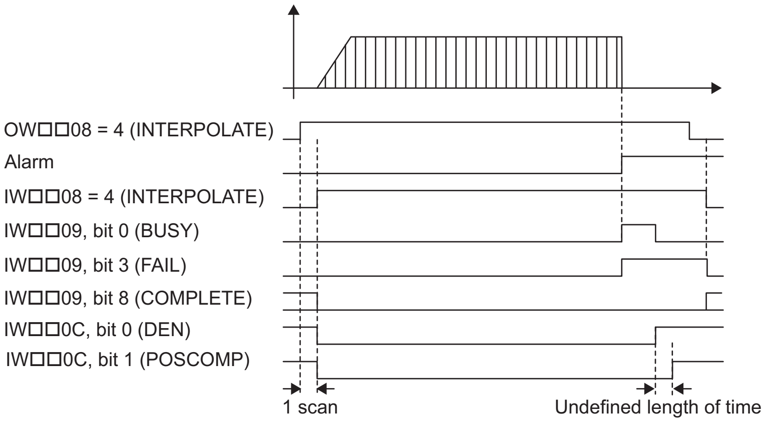
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	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

(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 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 SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV 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.

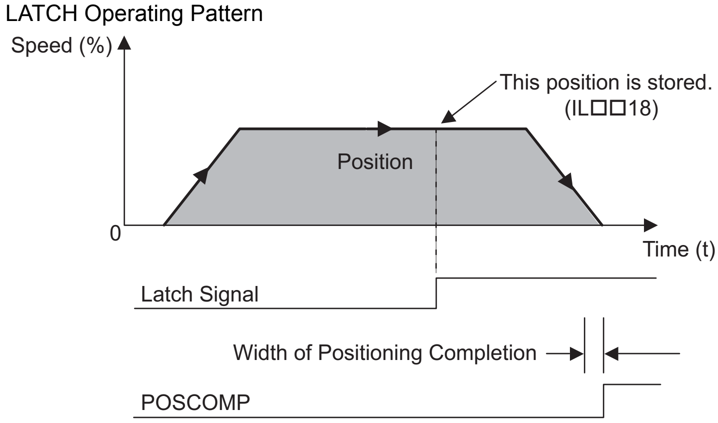
4. Refresh the value of OL□□1C "Position Reference Setting."

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

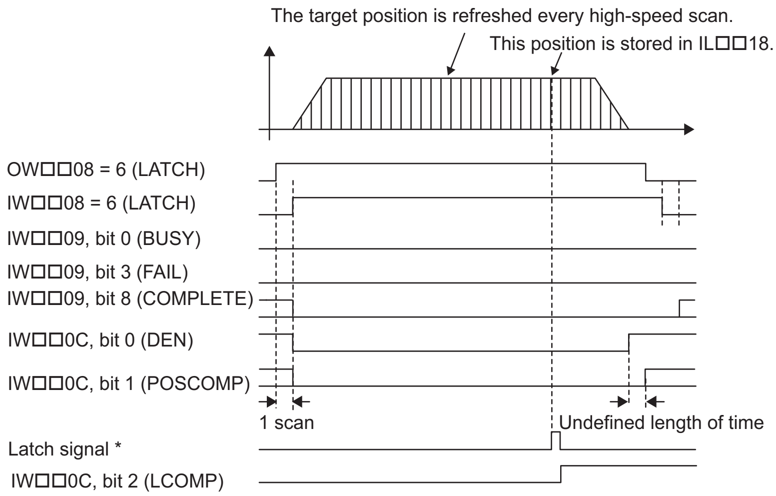
Parameter	Name	Setting	SVR
OW☐☐00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Set this bit to 1 before setting the Motion Command (OW☐☐08) to 6.	R
OW☐☐03	Function Setting 1	Sets the speed unit, acceleration/deceleration units, and 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 Decelera-tion/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.	–

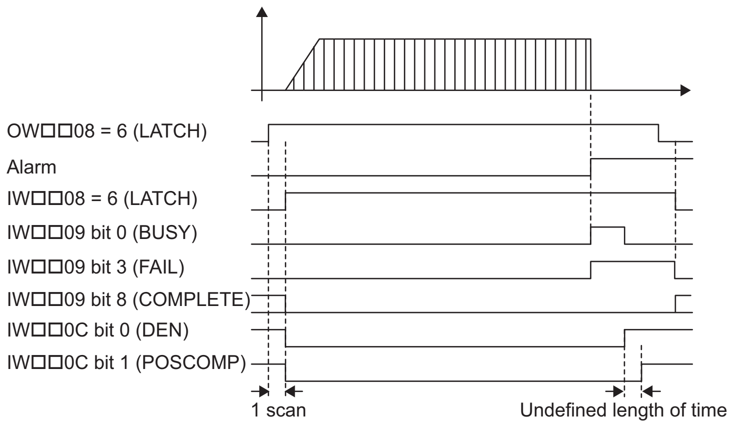
(4) Timing Charts

[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)

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 SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV 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 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.

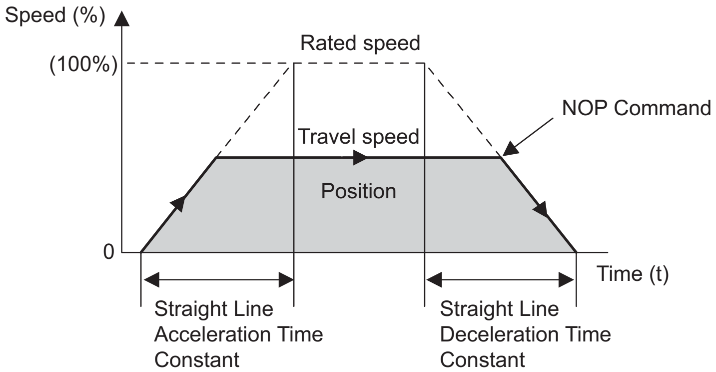
3. Set OW□□08 to 7 to execute the FEED motion command.

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

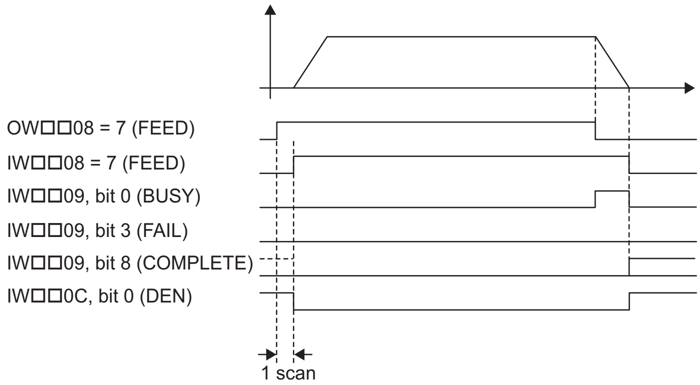
Motion Commands 6

[b] Monitoring Parameters

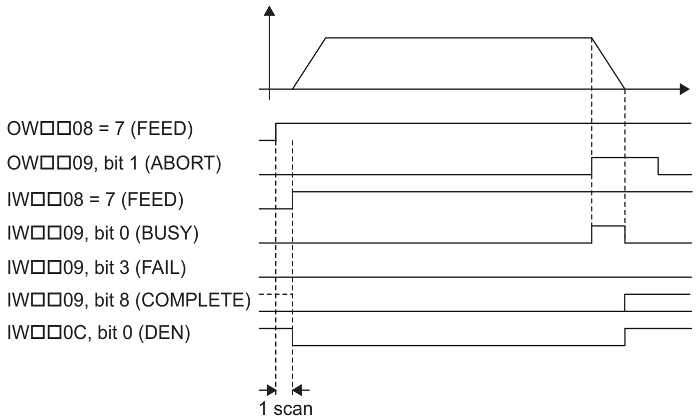
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code 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

(5) Timing Charts

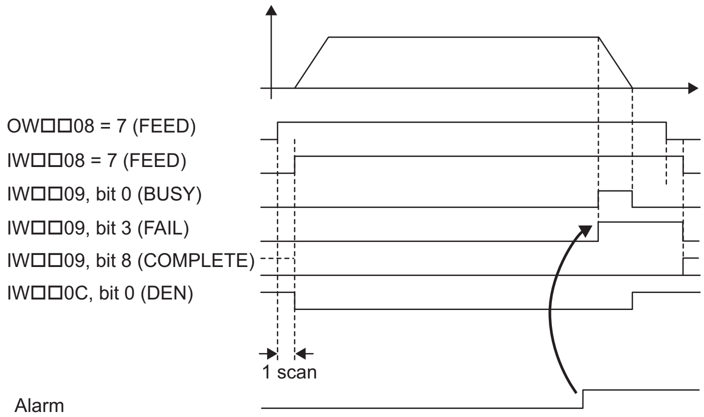
[a] Normal Execution



[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 SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV 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 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.

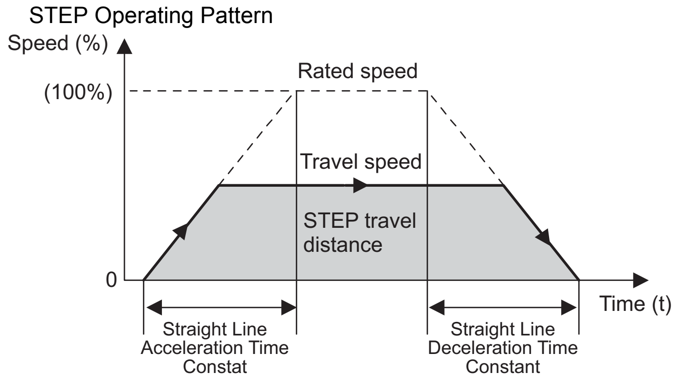
STEP Travel Distance: OL□□44
Moving Direction (JOG/STEP): OW□□09, bit 2
Speed Reference Setting: OL□□10
Filter Type Selection: OW□□03, bits 8 to B
Speed Loop P/PI Switch: OW□□01

- 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.



(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.

(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

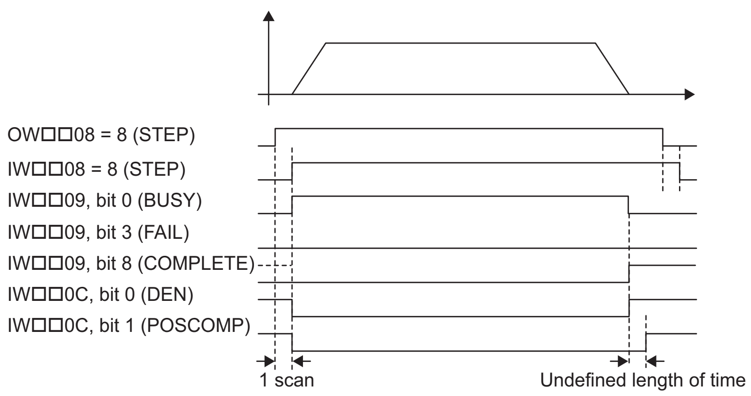
Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command (OW□□08) to 8.	R
OW□□01 Bit 3	Speed Loop P/PI Switch	Switch the speed control loop between PI control 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

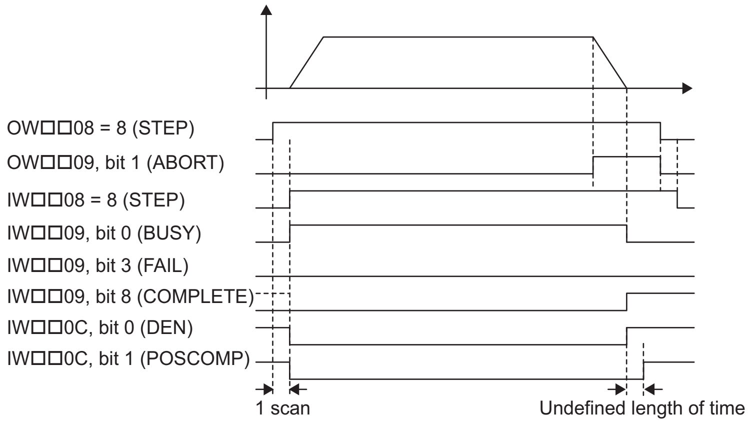
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	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

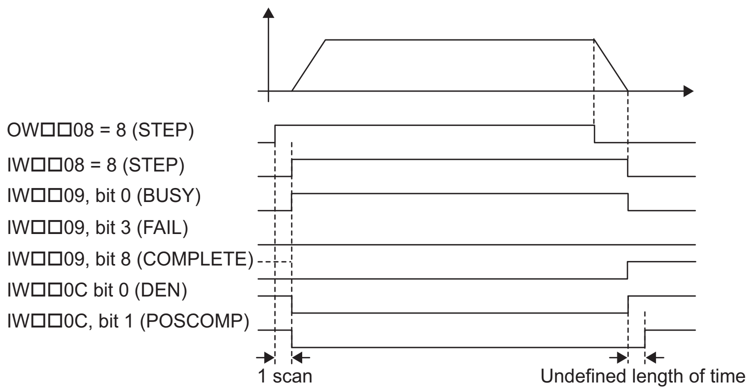
[a] Normal Execution



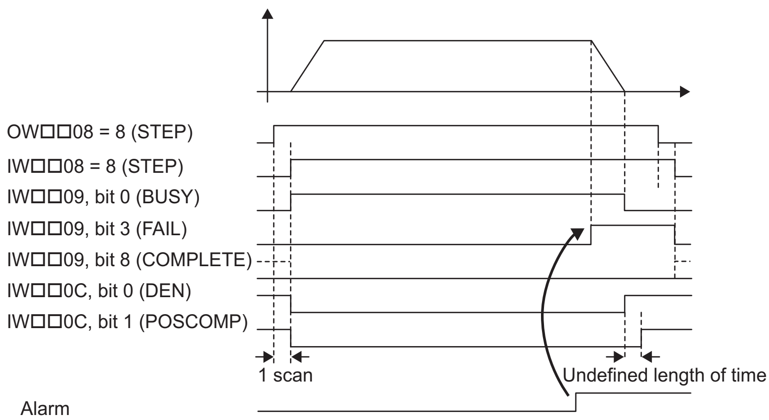
[b] Execution when Aborted



[c] Execution when Aborting by Changing the Command



[d] Execution when an Alarm Occurs



Motion Commands

6

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

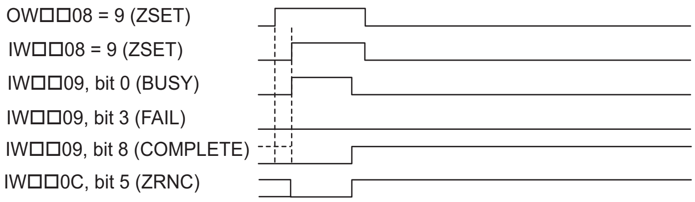
Parameter	Name	Setting	SVR
OW□□08	Motion Command	Set to 9 for ZSET command.	R
OW□□09 Bit 0	Command Pause	This parameter is ignored for ZSET command.	R
OW□□09 Bit 1	Holds a Command	This parameter is ignored for ZSET command.	R
OL□□48	Interrupt a Command	Sets the position offset from the zero point in the machine coordinate system after the setting of the zero point has been completed.	R

[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

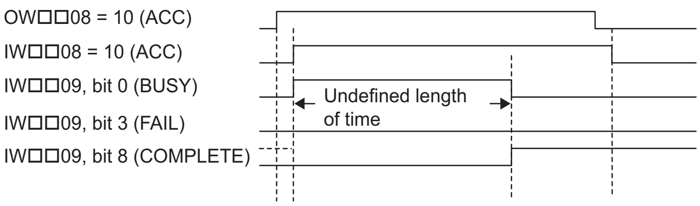
Parameter	Name	Setting
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.
OW□□08	Motion Command	The linear acceleration time constant is changed when this parameter is set to 10.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for ACC command.
OW□□09 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

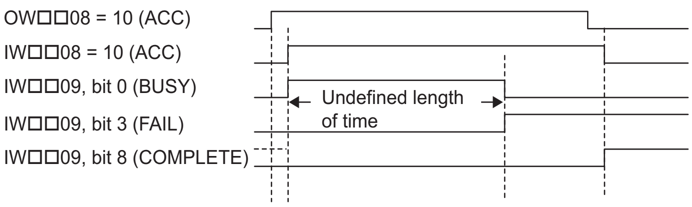
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 10 during ACC command execution.
IW□□09 Bit 0	Command Execution 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

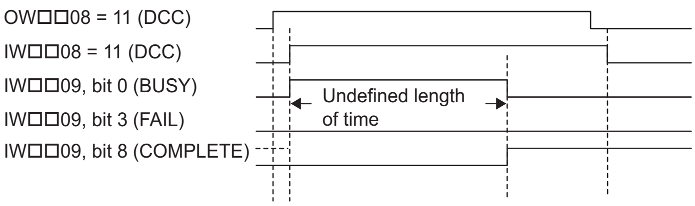
Parameter	Name	Setting
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.
OW□□08	Motion Command	The linear deceleration time constant is changed when this parameter is set to 11.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for DCC command.
OW□□09 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

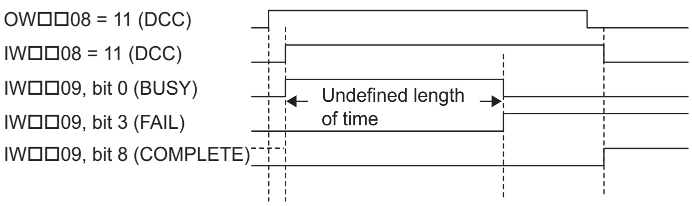
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 11 during DCC command execution.
IW□□09 Bit 0	Command Execution 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



Motion Commands

6

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

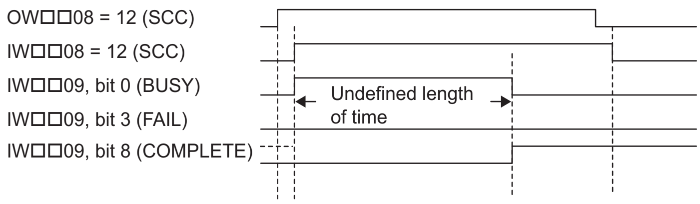
Parameter	Name	Setting
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.
OW□□08	Motion Command	The filter time constant is changed when this parameter is set to 12.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for SCC command.
OW□□09 Bit 1	Interrupt 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

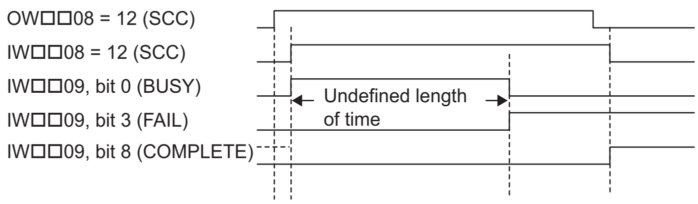
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 12 during SCC command execution.
IW□□09 Bit 0	Command Execution Flag	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

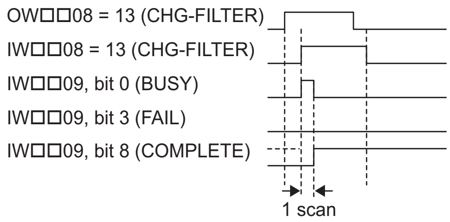
Parameter	Name	Setting
OW□□03	Function Setting 1	Set the speed unit, acceleration/deceleration units, and filter type.
OW□□08	Motion Command	The filter type is changed when this parameter is set to 13.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for CHG_FILTER command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for CHG_FILTER command.

[b] Monitoring Parameters

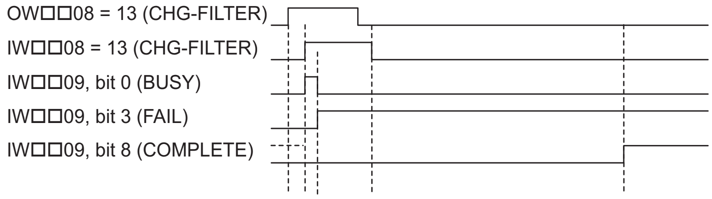
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 13 during CHG_FILTER command execution.
IW□□09 Bit 0	Command Execution 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 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

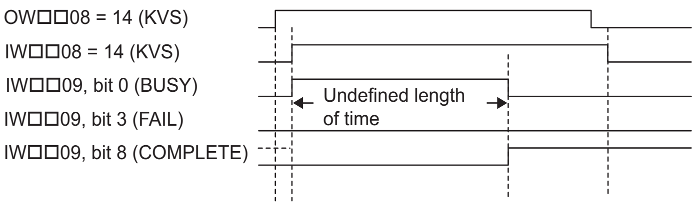
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 14 during KVS command execution.
IW□□09 Bit 0	Command Execution 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.

(cont'd)

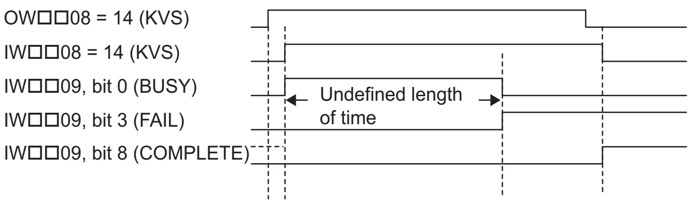
Parameter	Name	Monitor Contents
IW□□09 Bit 8	Command Execution Completed	Turns ON when KVS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



Motion Commands

6

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 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

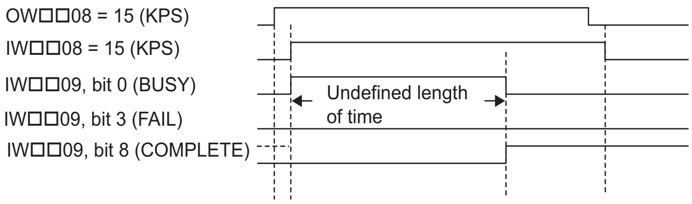
Parameter	Name	Setting
OW□□08	Motion Command	The position loop gain is changed when this parameter is set to 15.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for KPS command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for KPS command.
OW□□2E	Position Loop Gain	Set the gain for the SERVOPACK position control loop.

[b] Monitoring Parameters

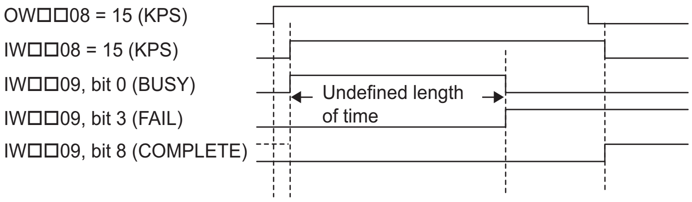
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code is 15 during KPS command execution.
IW□□09 Bit 0	Command Execution Flag	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 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

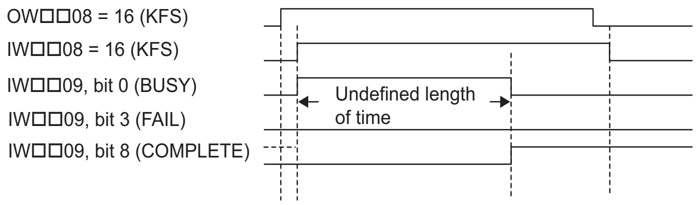
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 16 during KFS command execution.
IW□□09 Bit 0	Command Execution 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.

(cont'd)

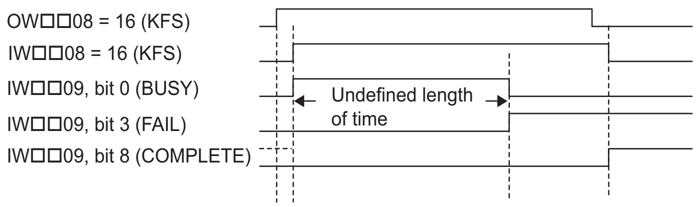
Parameter	Name	Monitor Contents
IW□□09 Bit 8	Command Execution Completed	Turns ON when KFS command execution has been completed.

(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

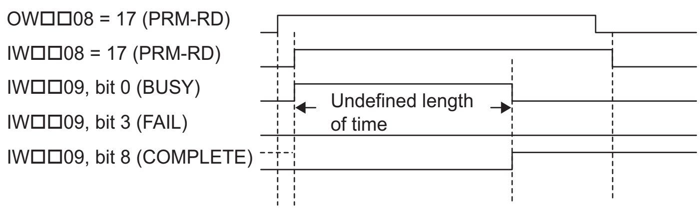
Parameter	Name	Setting
OW□□08	Motion Command	The SERVOPACK parameter is read when this parameter is set to 17.
OW□□09 Bit 0	Hold a Command	This parameter is ignored for PRM_RD command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for PRM_RD command.
OW□□50	Servo Driver User Constant No.	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

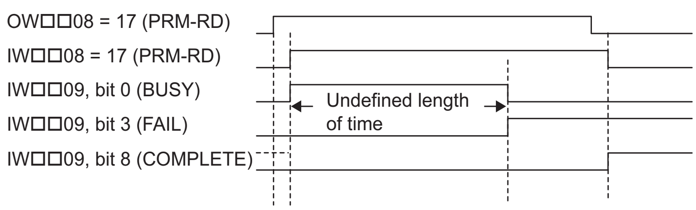
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 17 during PRM_RD command execution.
IW□□09 Bit 0	Command Execution 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

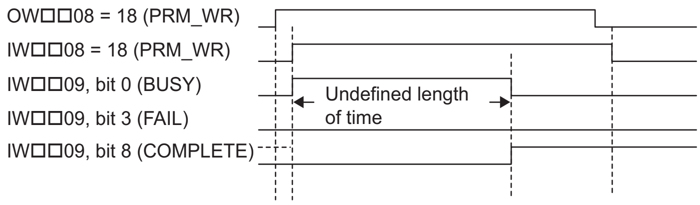
Parameter	Name	Setting
OW□□08	Motion Command	The SERVOPACK parameter is written when this parameter is set to 18.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for PRM_WR command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for PRM_WR command.
OW□□50	Servo Driver User Constant 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

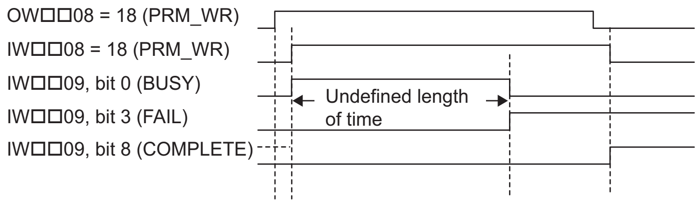
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 18 during PRM_WR command execution.
IW□□09 Bit 0	Command Execution 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



Motion Commands

6

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). 3-digit alarm codes, such as SGDS or SGDV 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

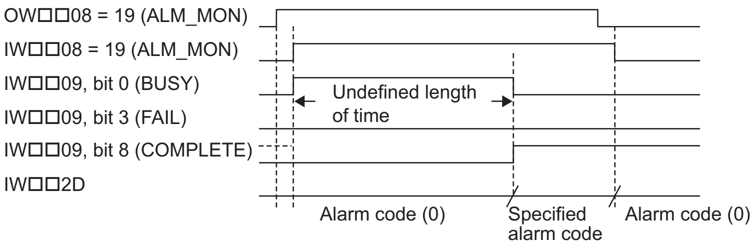
Parameter	Name	Setting
OW□□08	Motion Command	Alarms are monitored when this parameter is set to 19.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for ALM_MON command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for ALM_MON command.
OW□□4F	Servo Driver Alarm Monitor No.	When several alarms and warnings occur at the same time, set the number of the alarm or warning to be monitored.

[b] Monitoring Parameters

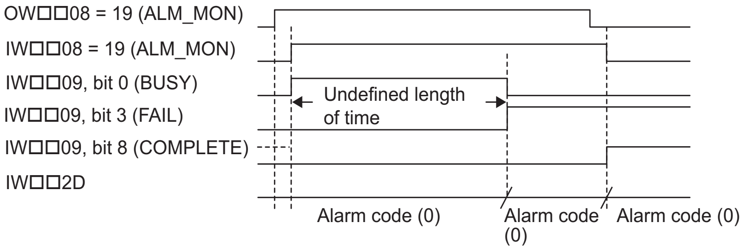
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 19 during ALM_MON command execution.
IW□□09 Bit 0	Command Execution 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 or warning history that is stored in the SERVOPACK and stores it in Servo Driver Alarm Code (monitoring 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

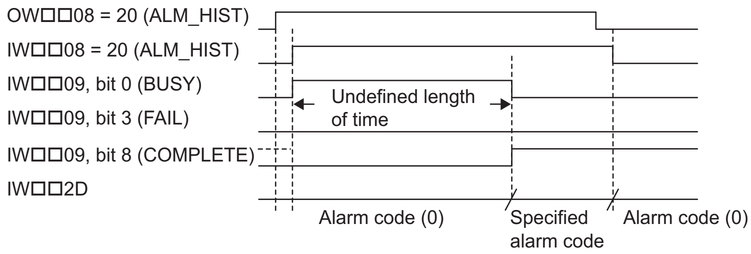
Parameter	Name	Setting
OW□□08	Motion Command	The alarm history is monitored when this parameter is set to 20.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for ALM_HIST command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for ALM_HIST command.
OW□□4F	Servo Driver Alarm Monitor No.	Set the alarm history number of a past SERVOPACK alarm or warning in the alarm history to be monitored. 0 to 9: Alarm history number of a past alarm or warning 10: Latest alarm or warning

[b] Monitoring Parameters

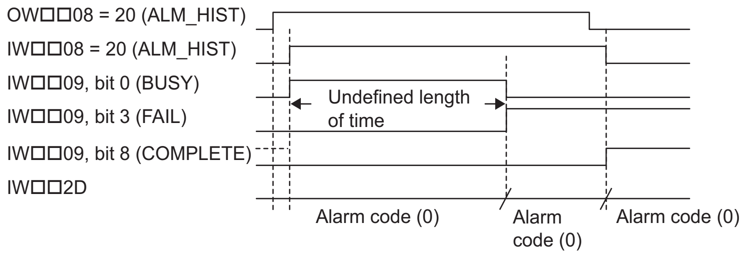
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 20 during ALM_HIST command execution.
IW□□09 Bit 0	Command Execution 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

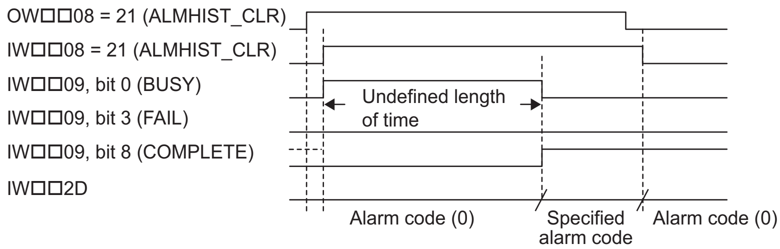
Parameter	Name	Setting
OW□□08	Motion Command	The alarm history is cleared when this parameter is set to 21.
OW□□09 Bit 0	Holds a Command	This parameter is ignored for ALMHIST_CLR command.
OW□□09 Bit 1	Interrupt a Command	This parameter is ignored for ALMHIST_CLR command.

[b] Monitoring Parameters

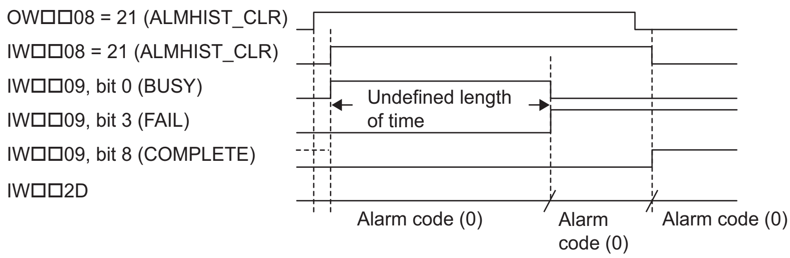
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 21 during ALMHIST_CLR command execution.
IW□□09 Bit 0	Command 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, and Σ-V Series SERVOPACKs with absolute encoder. 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 (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.

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 SGDH SERVOPACK, always turn OFF the power to the SERVOPACK and then turn it ON again after executing the ABS_RST command.
- 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 communication, and then execute the ZRET or ZSET command.
- If the ABS_RST command is executed while an A.81 alarm occurs, the alarm clear operation will have to be performed twice before communication can be synchronized again.

(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

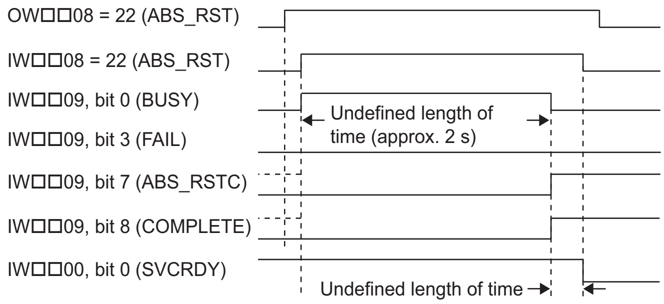
Parameter	Name	Setting
OW☐☐00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor; 0: Power OFF to Servomotor Turn OFF the power before setting the Motion Command (OW☐☐08) to 22.
OW☐☐08	Motion Command	Starts resetting the absolute encoder when this parameter is set to 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

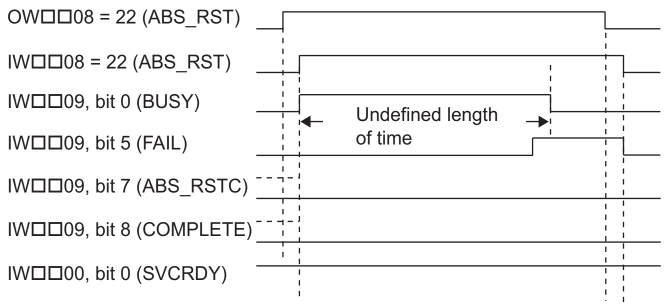
Parameter	Name	Monitor Contents
IW☐☐00 Bit 0	Motion Controller Operation Ready	Indicates the communication status between the Machine Controller and SERVOPACK. 1: Communication synchronized, 0: Communication disconnected
IW☐☐00 Bit 1	Servo ON	Indicates the Servo ON status. 1: Power supplied to Servomotor, 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 MECHA-TROLINK-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.

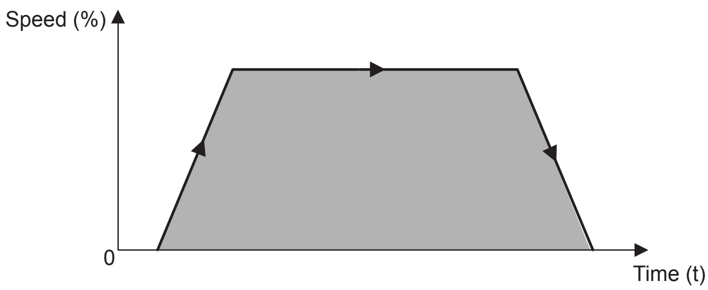
3. Set OW☐☐08 to 23 to execute the VELO motion command.

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 cancelled, and the axis will start moving again.

Motion Commands 6

(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

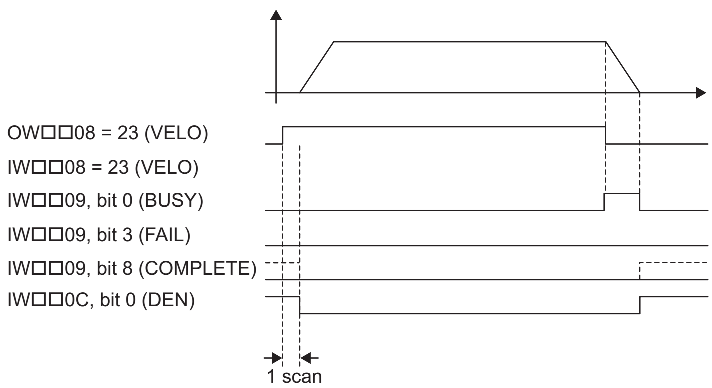
Parameter	Name	Setting	SVR
OW□□00 Bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Motor will start to rotate when this bit is set to 1 under the speed control data mode.	R
OW□□01 Bit 3	Speed Loop P/PI Switch	Switch the speed control loop 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

[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

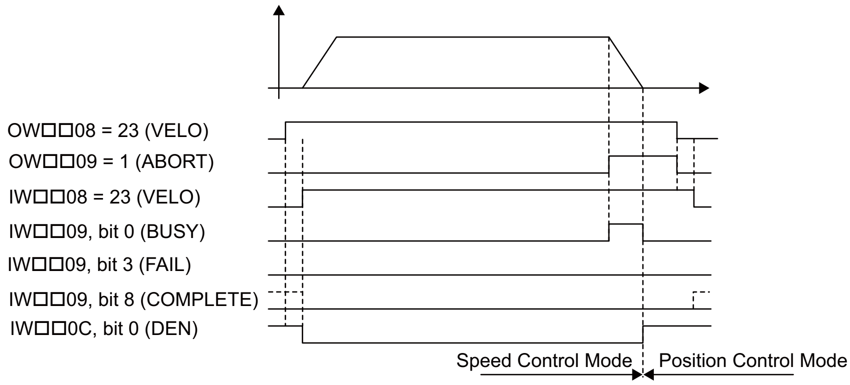
[a] Normal Execution



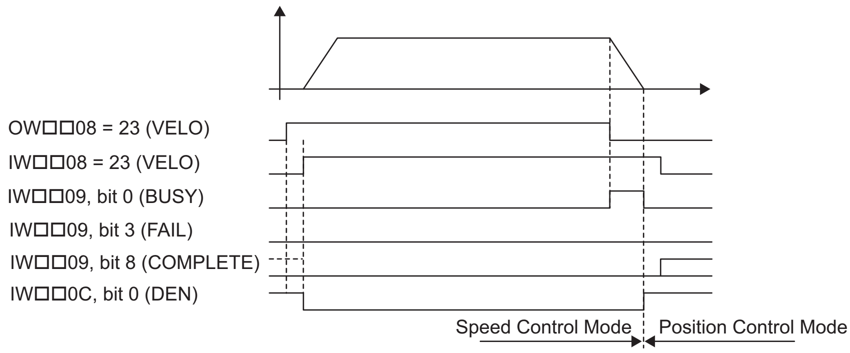
Motion Commands

6

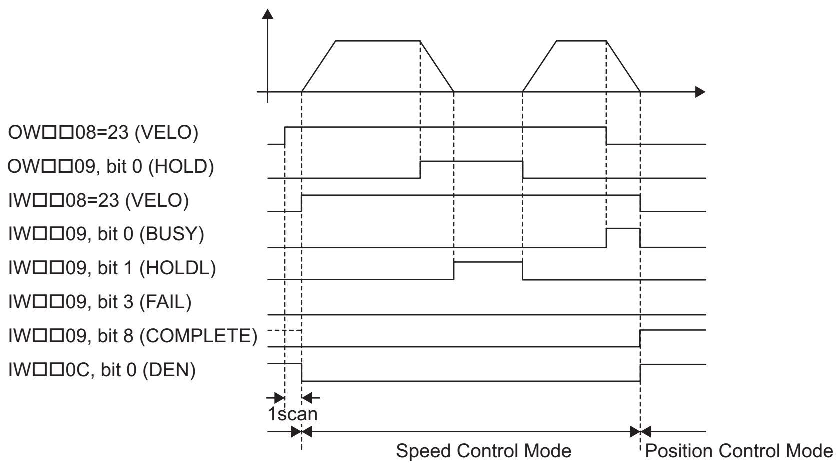
[b] Execution when Aborted



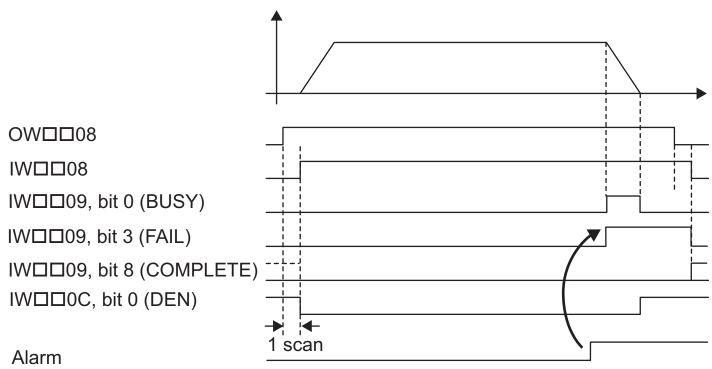
[c] Execution when Aborting by Changing the Command



[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 MECHA-TROLINK-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.

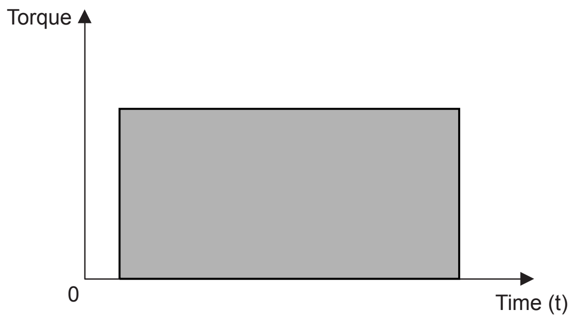
3. Set OW☐☐08 to 24 to execute the TRQ motion command.

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 cancelled, 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

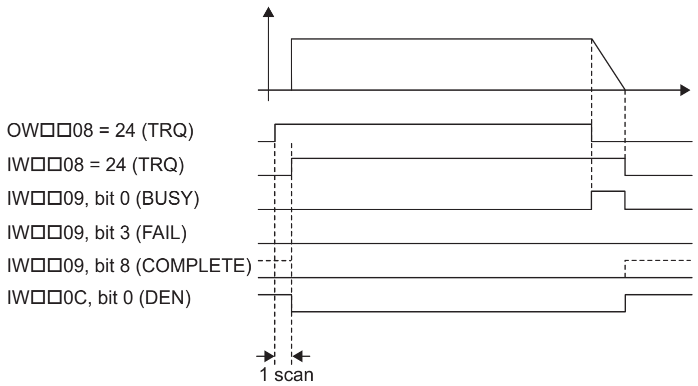
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response 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)

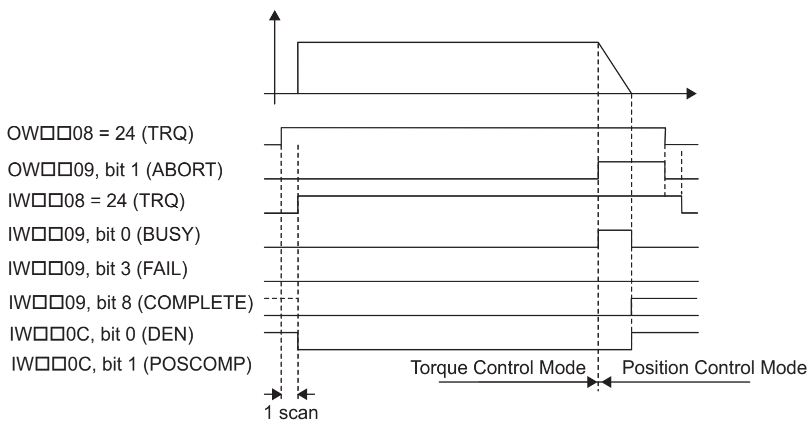
Parameter	Name	Monitor Contents	SVR
IW□□09 Bit 8	Command Execution Completed	Always OFF for TRQ command.	R
IW□□0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW□□0C Bit 1	Positioning Completed	Turns 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

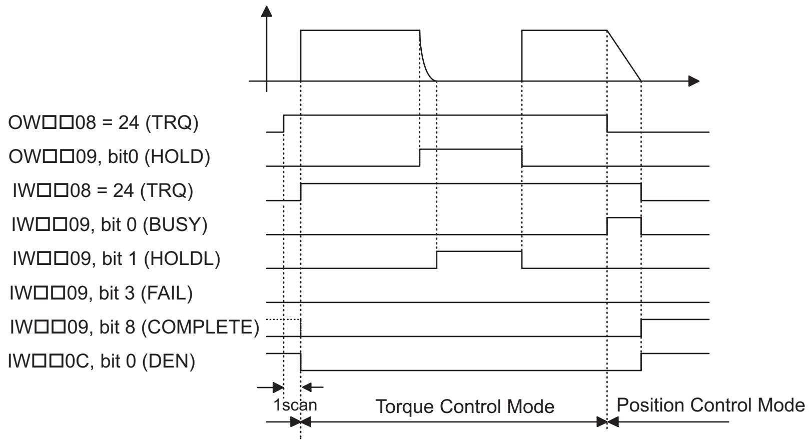
[a] Normal Execution



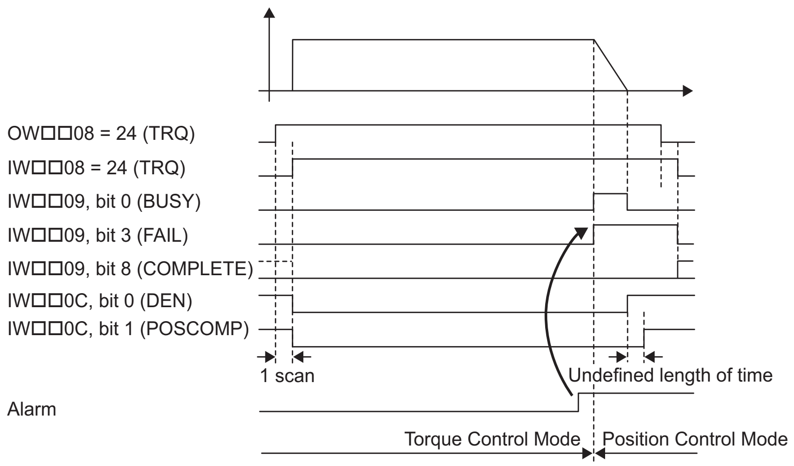
[b] Executed when Aborted



[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 SERVOPACK, the torque limit can be set and changed during SERVOPACK operation. For details, refer to ■ *Setting and Changing Torque Limit during SGDV 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 SGDV SERVOPACKs of Σ-V series

⚠ CAUTION

- If using the utility functions to adjust the Σ-V series of SERVOPACKs when the model-following control is enabled (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.

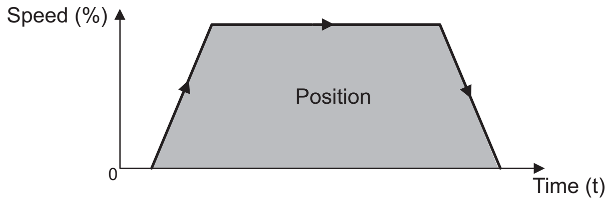
Speed Reference Setting: OL□□10
Filter Type Selection: OW□□03, bits 8 to B
Speed Loop P/PI Switch: OW□□01
Phase Correction Setting: OL□□28
Speed Compensation: OW□□31

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

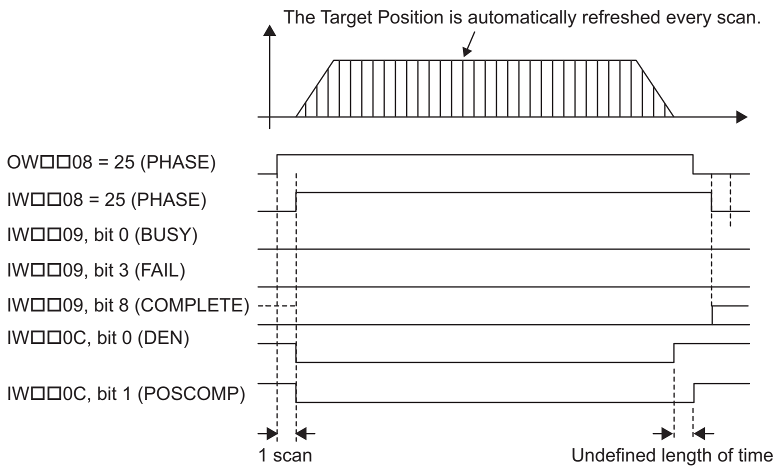
Parameter	Name	Monitor Contents	SVR
IW□□00 Bit 1	Running (At Servo ON)	Indicates the Servo ON status. 1: Power supplied to Servomotor, 0: Power not supplied to Servomotor	R
IL□□02	Warning	Stores the most current warning.	R
IL□□04	Alarm	Stores the most current alarm.	R
IW□□08	Motion Command Response Code	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

(cont'd)

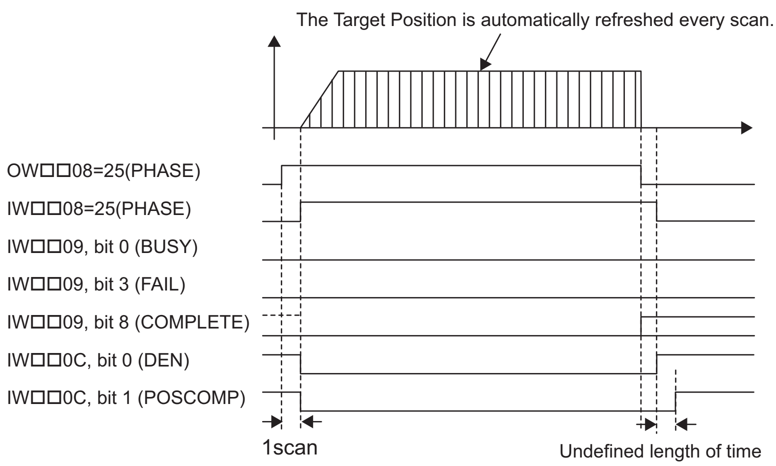
Parameter	Name	Monitor Contents	SVR
IW☐☐0C Bit 0	Discharging Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.	R
IW☐☐0C Bit 1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position 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



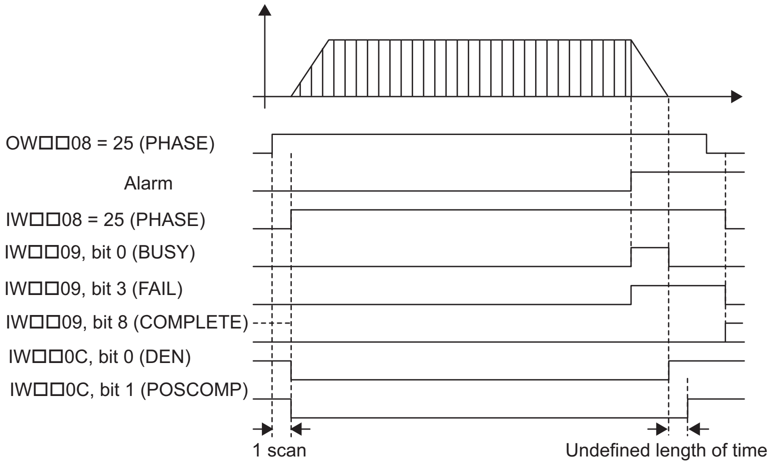
[b] Execution when Aborted



Motion Commands

6

[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 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

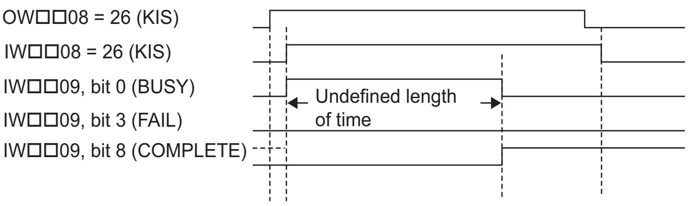
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Motion Command Response Cable	Indicates the motion command that is being executed. The response code will be 26 during KIS command execution.
IW□□09 Bit 0	Command Execution 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.

(cont'd)

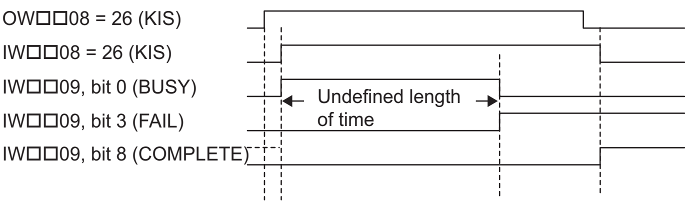
Parameter	Name	Monitor Contents
IW□□09 Bit 8	Command Execution Completed	Turns ON when KIS command execution has been completed.

(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

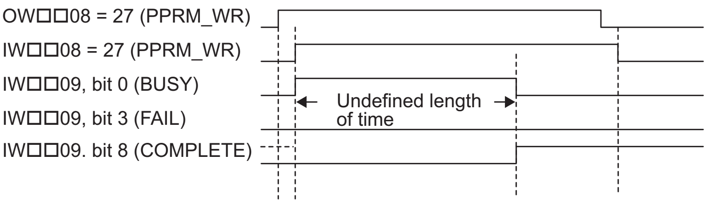
Parameter	Name	Setting
OW□□08	Motion Command	Set this parameter to 27 to write the parameter in the SERVOPACK's nonvolatile memory.
OW□□09 Bit 0	Holds a Command	This command is ignored by the PPRM_WR command.
OW□□09 Bit 1	Interrupt a Command	This command is ignored by the PPRM_WR command.
OW□□50	Servo 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

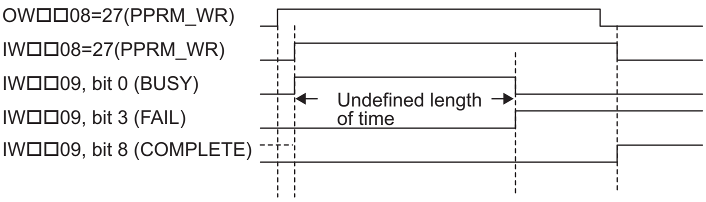
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the currently occurring warning.
IL□□04	Alarm	Stores the currently occurring alarm.
IW□□08	Motion Command Response Code	Indicates the motion command that is being executed. The response code will be 27 during execution of the PPRM_WR command.
IW□□09 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



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, and Σ-V Series SERVOPACKs with an absolute encoder. The command is completed in an error status if the MLTTRN_SET command is executed when an incremental encoder is being used (or even if an absolute encoder is being used in the incremental encoder mode) with Σ-II, Σ-III, and Σ-V Series SERVOPACKs.

* 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	CPMC-MPE720	Version 5.53 or later
MPE720 Version 6	CPMC-MPE770	Version 6.23 or later
MPE720 Version 7	CPMC-MPE780	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.

Motion Commands

6

(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
SGDX-□□□1□□	SGDX SERVOPACKs
SGDV-□□□□1□□	SGDV 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.

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 or SGDV 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

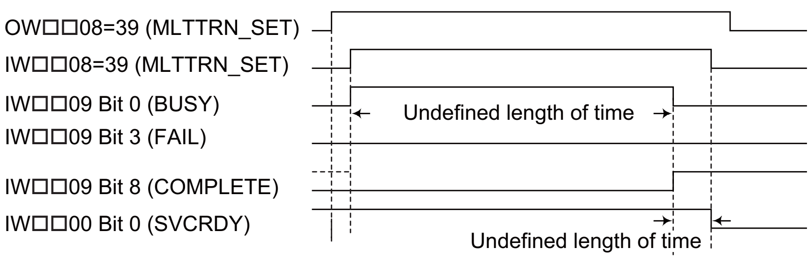
Parameter	Name	Setting
OW☐☐00, bit 0	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor; 0: Power OFF to Servomotor Turn OFF the power before setting the Motion Command (OW☐☐08) to 39.
OW☐☐08	Motion Command	Multiturn limit setting is started when this parameter is set to “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

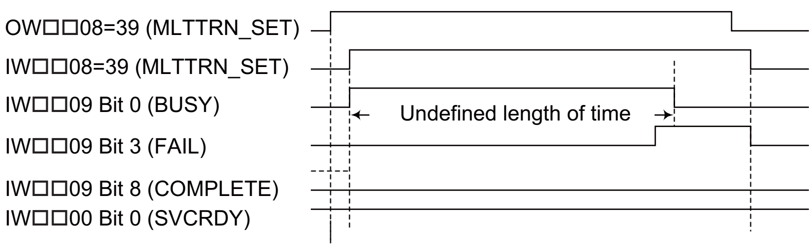
Parameter	Name	Monitor Contents
IW☐☐00, bit 0	Motion Controller Operation Ready	Indicates the communication status between the Machine Controller and SERVOPACK. 1: Communication synchronized, 0: Communication disconnected
IW☐☐00, bit 1	Servo ON	Indicates the Servo ON status. 1: Power supplied to Servomotor, 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

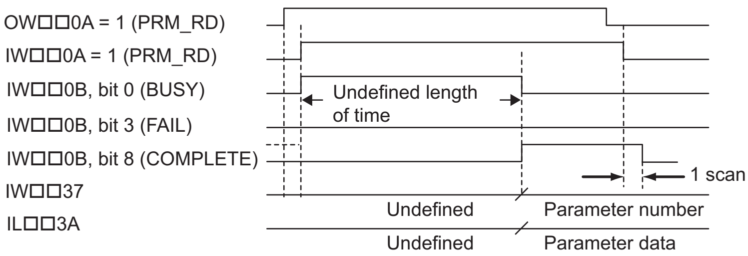
Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	The SERVOPACK parameter is read when this parameter is set to 1.
OW□□54	Servo Driver for Assistance User Constant No.	Set the parameter number of the SERVOPACK parameter to be read.
OW□□55	Servo Driver for Assistance User Constant Size	Set the 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

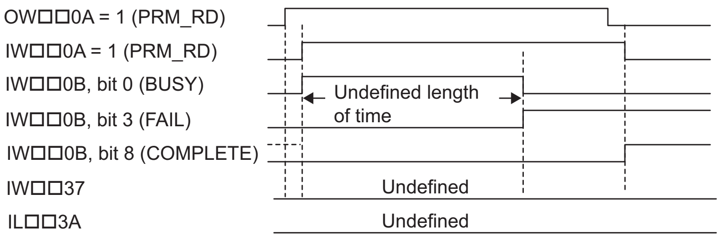
Parameter	Name	Monitoring Contents
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 1 during PRM_RD command execution.
IW□□0B Bit 0	Command Execution Flag	Turns ON during PRM_RD command execution and turns OFF when execution has been 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

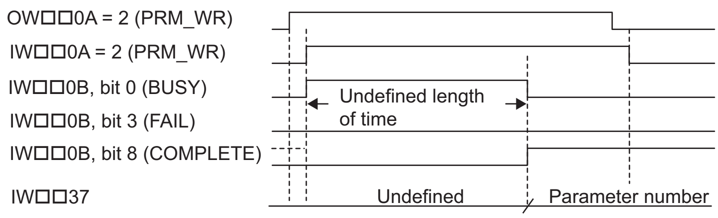
Parameter	Name	Setting Contents
OW☐☐0A	Motion Subcommand	The SERVOPACK parameter is written when this parameter is set to 2.
OW☐☐54	Servo Driver for Assistance User Constant No.	Set the number of the SERVOPACK parameter to be written.
OW☐☐55	Servo Driver for Assistance User Constant Size	Set the size 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

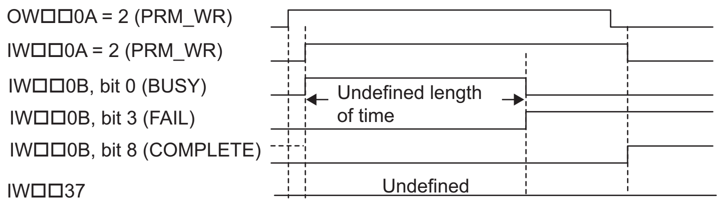
Parameter	Name	Monitoring Contents
IW☐☐0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 2 during PRM_WR command execution.
IW☐☐0B Bit 0	Command Execution Flag	Turns ON during PRM_WR command execution and turns OFF when execution has been 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

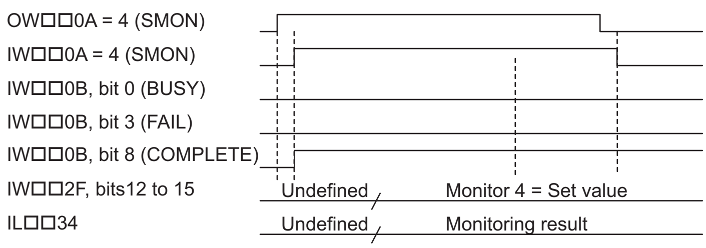
Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	The Monitor Status command is executed when this parameter is set to 4.
OW□□4E	Servo User Monitor Setting	Set the information managed by the Servo Driver to be monitored.

[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	Turns ON during SMON 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 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



Motion Commands

6

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

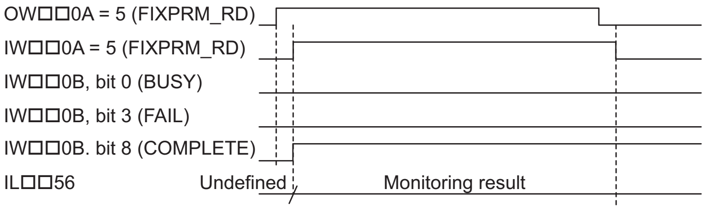
Parameter	Name	Setting Contents	SVR
OW□□0A	Motion Subcommand	The Read Fixed Parameter subcommand is executed when this parameter is set to 5.	R
OW□□5C	Fixed Parameter Number	Set the parameter number of the fixed parameter to be read.	R

[b] Monitoring Parameters

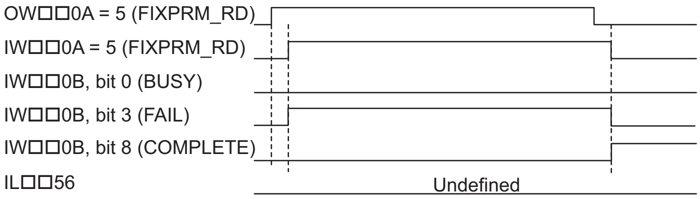
Parameter	Name	Monitoring Contents	SVR
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 5 during FIXPRM_RD command execution.	R
IW□□0B Bit 0	Command Execution Flag	Turns ON during FIXPRM_RD command execution and turns OFF when execution has been completed.	R
IW□□0B Bit 3	Command Error Completed Status	Turns ON if an error occurs during 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_INTERPOLATE	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○
6	LATCH	○	○	○	○	○	○	–	○	○	○	○	○	○	○	○	○
7	FEED	×	Δ	Δ	○	×	×	×	–	×	○	×	×	×	×	×	×
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	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_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	●	●	●	●	●	●	●	●	●	●	●	–	×	○
29	SV_ON	●	●	●	●	●	●	●	●	●	●	●	●	–	○
30	SV_OFF	●	●	●	●	●	●	●	●	●	●	●	●	×	–
31	ALM_CLR	●	●	●	●	●	●	●	●	●	●	●	●	×	○
39	MLTTRN_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.

Switching Commands during Execution

7

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

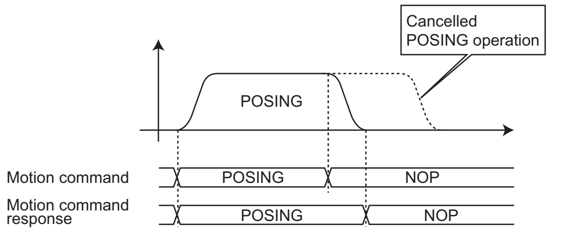
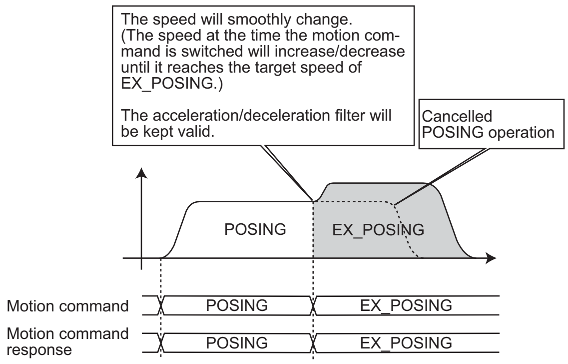
The details of motion changes enacted when the command in execution is switched to another command (listed in the following table) are described in *7.2.1 Switching from POSING*.

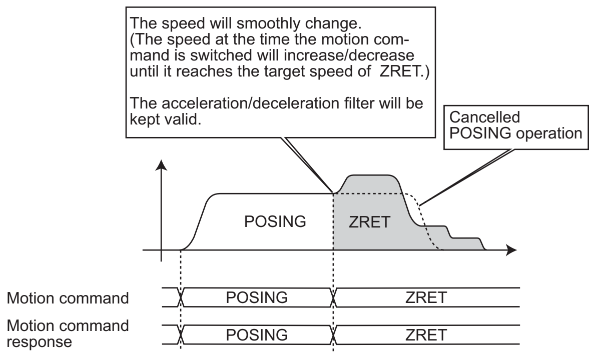
<Switching Between Commands>

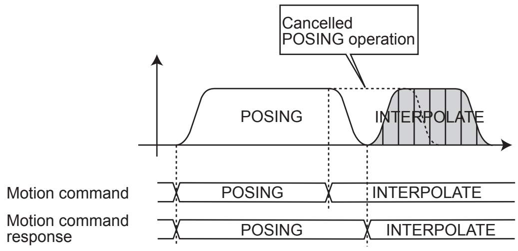
			Switched To (Newly Set Command)												
			0	1	2	3	4	5	6	7	8	9	23	24	25
			NOP	POS	EX_P	ZRET	INTE	ENDO	LAT	FEED	STEP	ZSET	VELO	TRQ	PHAS
Switched From (Command in Execution)	0	NOP	–	○	○	○	○	○	○	○	○	○	○	○	○
	1	POSING	×	–	○	○	×	×	×	○	×	○	○	○	○
	2	EX_POSING	×	○	–	○	×	×	×	○	×	○	○	○	○
	3	ZRET	×	×	×	–	×	×	×	×	×	×	×	×	×
	4	INTERPOLATE	○	○	○	○	–	○	○	○	○	○	○	○	○
	5	ENDOF_ INTERPOLATE	○	○	○	○	○	–	○	○	○	○	○	○	○
	6	LATCH	○	○	○	○	○	○	–	○	○	○	○	○	○
	7	FEED	×	○	○	○	×	×	×	–	×	○	○	○	○
	8	STEP	×	○	○	○	×	×	×	○	–	○	○	○	○
	9	ZSET	○	○	○	○	○	○	○	○	×	–	○	○	○
	23	VELO	×	○	○	×	×	×	×	○	○	×	–	○	○
	24	TRQ	×	○	○	×	×	×	×	○	○	×	○	–	○
	25	PHASE	○	○	○	○	○	○	○	○	○	○	○	○	–

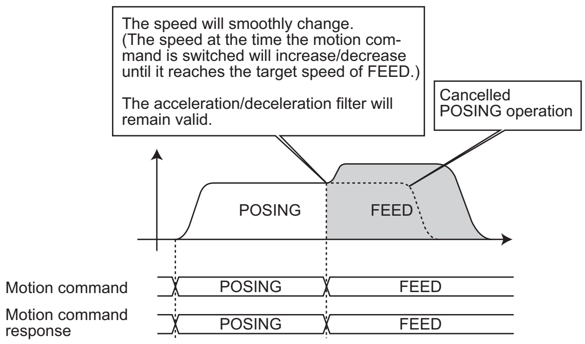
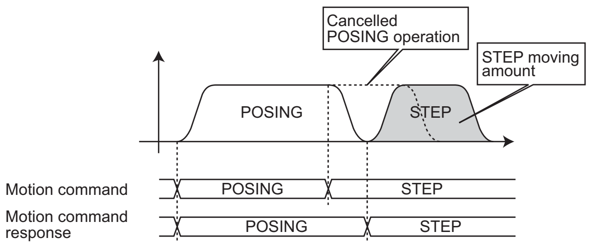
- ○: Available
  ×: The command in execution is aborted (the axis will be decelerated to a stop), and the newly set command will be executed.

7.2.1 Switching from POSING

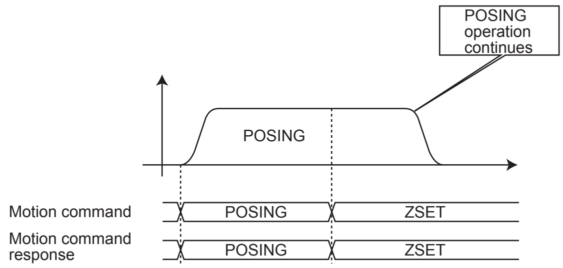
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="4">POSING</td><td>NOP</td><td>POSING will switch to NOP when the axis stops after deceleration.

</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>

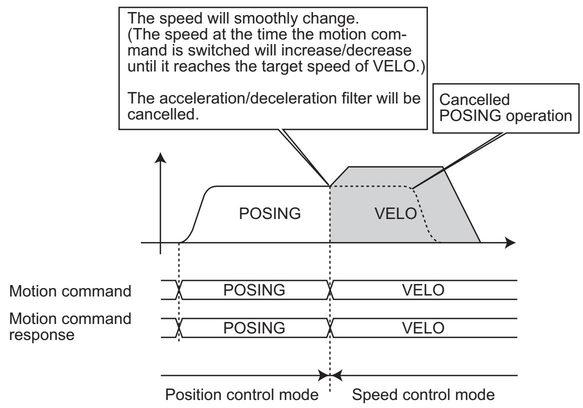
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="5">POSING</td><td>INTERPOLATE</td><td>POSING will switch to INTERPOLATE when the axis stops after deceleration.


<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>

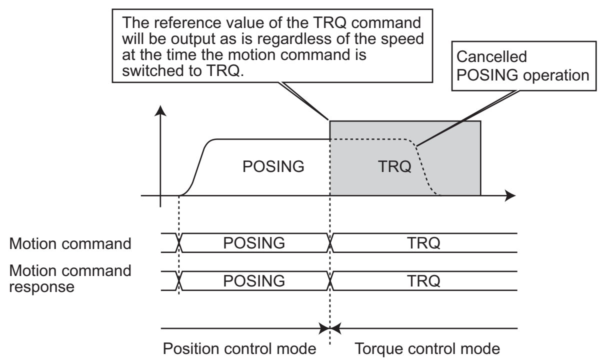
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">POSING</td><td>ZSET</td><td>
POSING will immediately switch to ZSET, and positioning will continue.



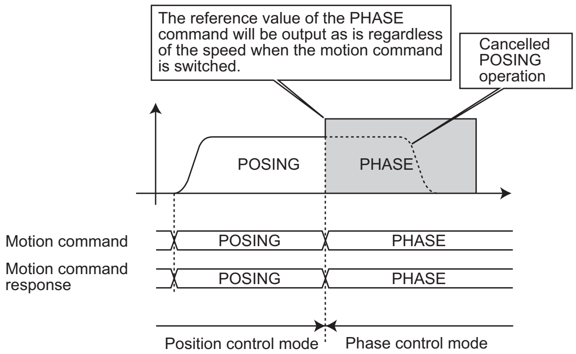
* In actual operation, set the zero point by executing ZSET in the positioning completed status.
</td></tr>
<tr><td>VELO</td><td>
POSING will immediately switch to VELO and the control mode will change from position control mode to speed control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.



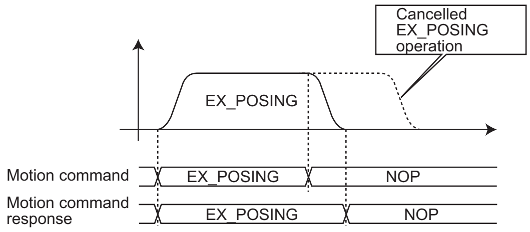
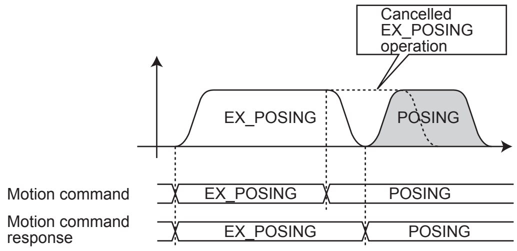
* After POSING has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the POSING operation by executing an NOP command, or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns 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.



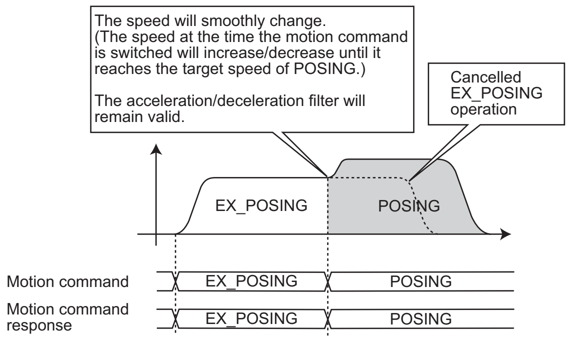
* After POSING has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.
</td></tr>
</table>

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. 

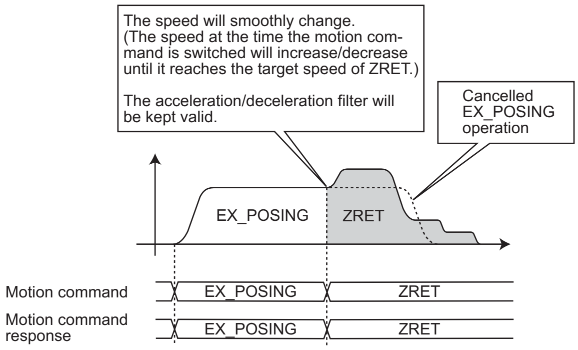
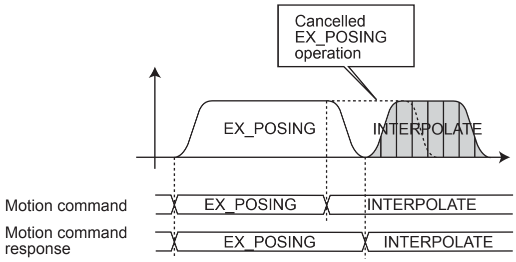
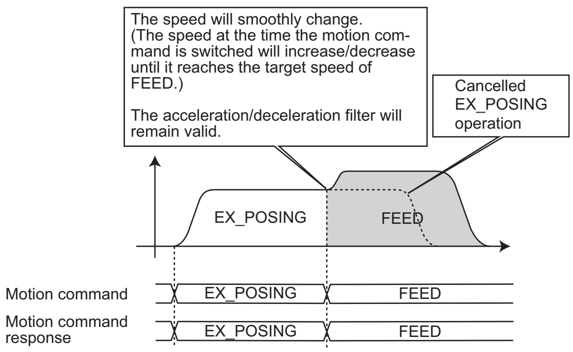
7.2.2 Switching from EX_POSING

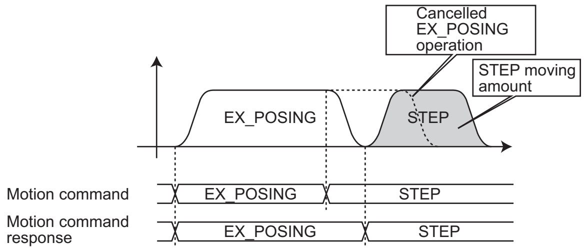
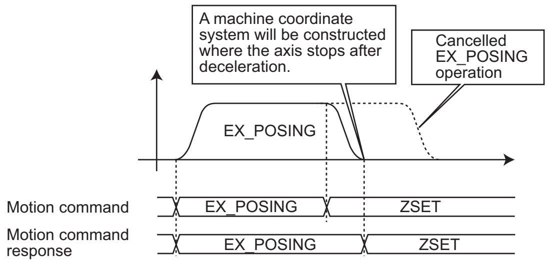
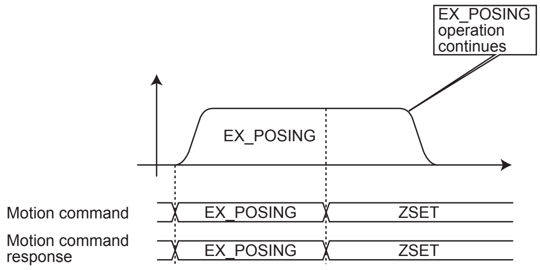
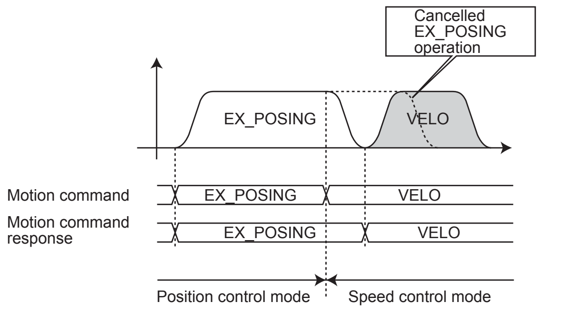
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">EX_POSING</td><td>NOP</td><td>EX_POSING will switch to NOP when the axis stops after deceleration.

</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.


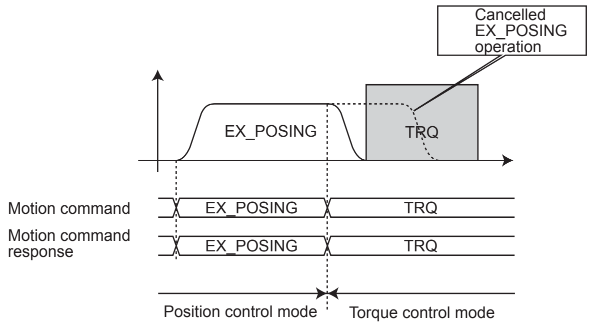
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C + Incremental value
• Any change in the Position Reference Setting (OL□□1C) during deceleration will be ignored.

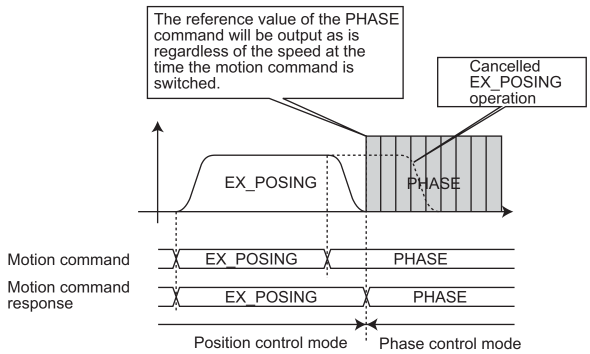
<In Absolute Mode (OW□□09, bit 5 = 1)>
EX_POSING will immediately switch to POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.


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>

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="5">EX_POSING</td><td>ZRET</td><td>EX_POSING will immediately switch to ZRET, and the moving amount stored in the acceleration/deceleration filter will be maintained.
</td></tr>
<tr><td>INTERPOLATE</td><td>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.</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>EX_POSING will be immediately switch to FEED, and the moving amount stored in the acceleration/deceleration filter will be maintained.
</td></tr>
</table>

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">EX_POSING</td><td>STEP</td><td>EX_POSING will switch to STEP when the axis stops after deceleration.
</td></tr>
<tr><td>ZSET</td><td><In Incremental Addition Mode (OW□□09, bit 5 = 0)>
EX_POSING will switch to ZSET when the axis stops after deceleration.

<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>

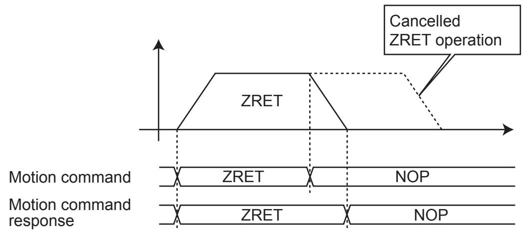
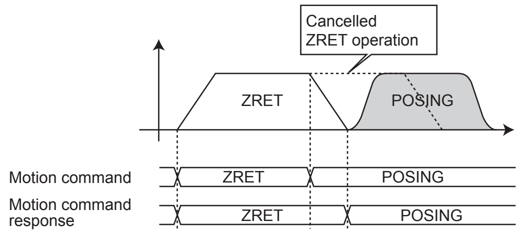
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">EX_POSING</td><td>TRQ</td><td>EX_POSING will switch to TRQ when the axis stops after deceleration, and the control mode will change from position control mode to torque control mode.


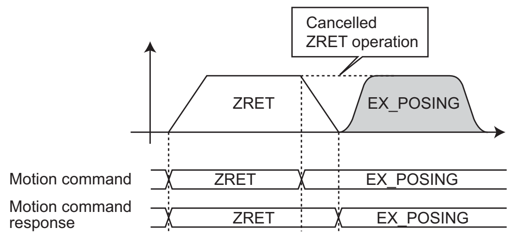
◆ After EX_POSING has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
<tr><td>PHASE</td><td>EX_POSING will switch to PHASE when the axis stops after deceleration, and the control mode will change from the position control mode to phase control mode.

</td></tr>
</table>

Switching Commands during Execution

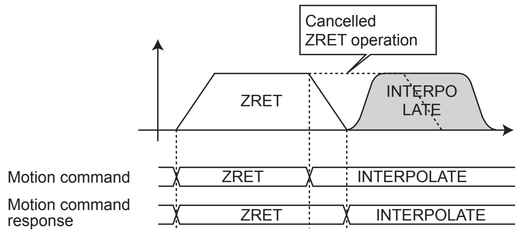
7

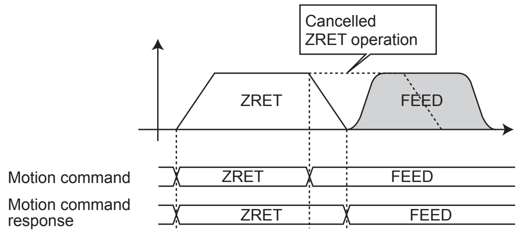
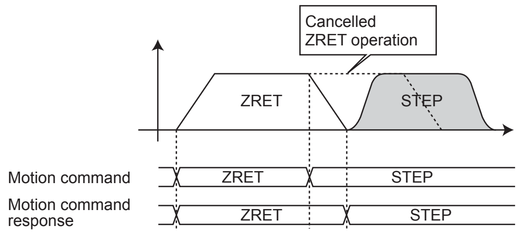
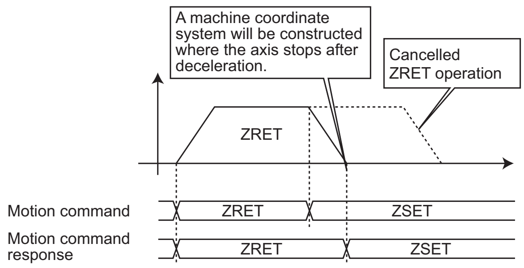
7.2.3 Switching from ZRET

<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.


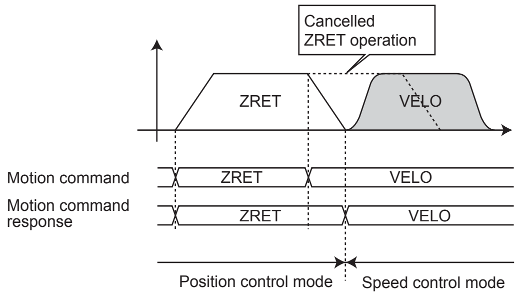
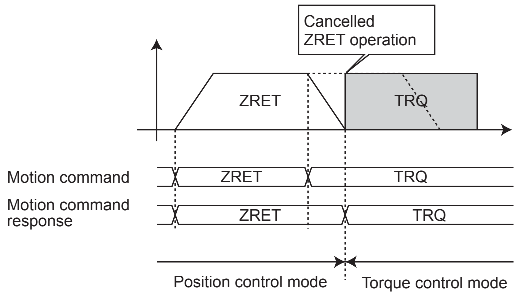
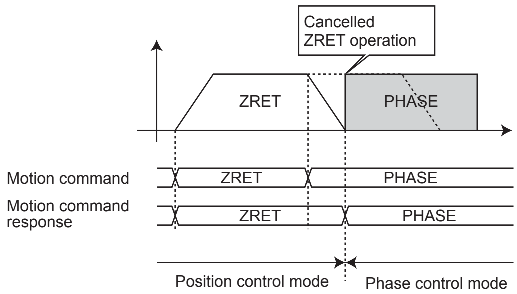
<Change in Position Reference Setting (OL□□1C) during Deceleration>
• In Incremental Addition Mode (OW□□09, bit 5 = 0)
Any change in the Position Reference Setting (OL□□1C) will be ignored.
• In Absolute Mode (OW□□09, bit 5 = 1)
The value of the Position Reference Setting (OL□□1C) when EX_POSING execution 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>

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="6">ZRET</td><td>INTERPOLATE</td><td>ZRET will switch to INTERPOLATE when the axis stops after deceleration.


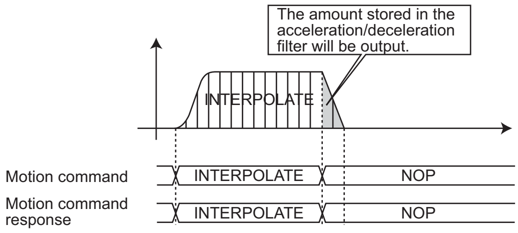
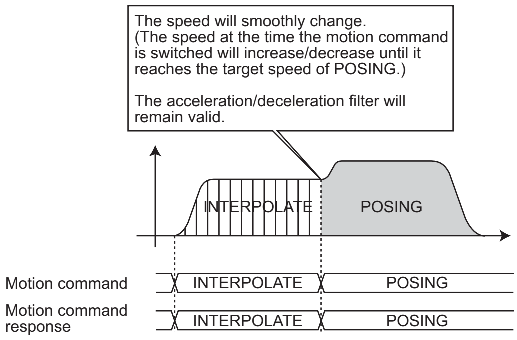
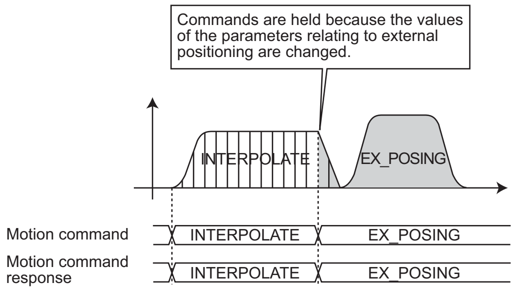
<Change in Position Reference Setting (OL□□1C) during Deceleration>
• In Incremental Addition Mode (OW□□09, bit 5 = 0)
Any change in the Position Reference Setting (OL□□1C) will be ignored.
• In Absolute Mode (OW□□09, bit 5 = 1)
The change in the Position Reference Setting (OL□□1C) will be output as 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.</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>ZRET will switch to FEED when the axis stops after deceleration.

</td></tr>
<tr><td>STEP</td><td>ZRET will switch to STEP when the axis stops after deceleration.

</td></tr>
<tr><td>ZSET</td><td>ZSET command will be executed when the axis stops after deceleration.

</td></tr>
</table>

Switching Commands during Execution

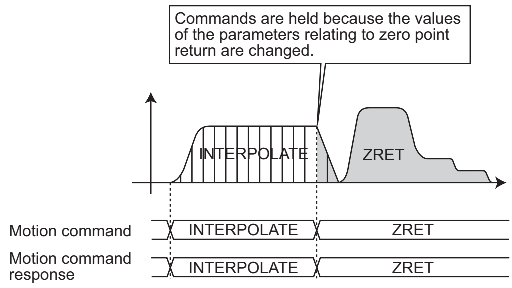
7

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. 

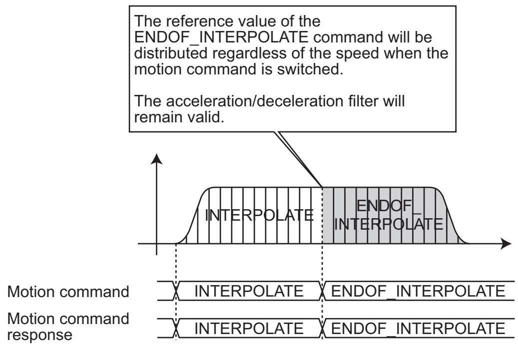
7.2.4 Switching from INTERPOLATE

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

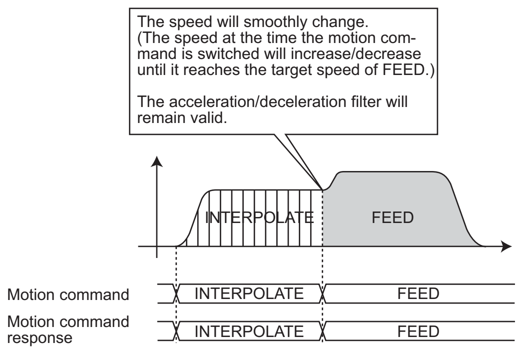
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="6">INTERPOLATE</td><td>ZRET</td><td>INTERPOLATE will immediately switch to ZRET, and the amount of motion stored in the acceleration/deceleration filter will be output.
When execution of ZRET is started, values are written to the related servo parameters and then the zero return operation starts.



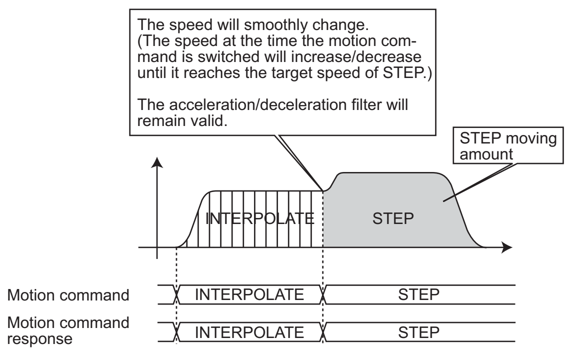
</td></tr>
<tr><td>INTERPOLATE</td><td>INTERPOLATE operation will continue.</td></tr>
<tr><td>ENDOF_INTER POLATE</td><td>INTERPOLATE will immediately switch to ENDOF_INTERPOLATE, and the moving amount stored in the acceleration/deceleration filter will be maintained.



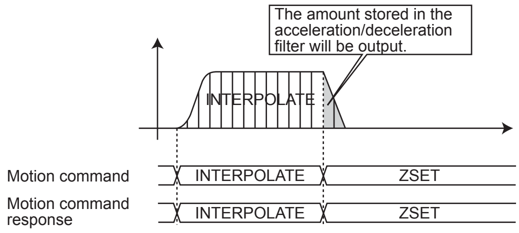
</td></tr>
<tr><td>LATCH</td><td>Same as ENDOF_INTERPOLATE</td></tr>
<tr><td>FEED</td><td>INTERPOLATE will immediately switch to FEED, and the moving amount stored in the acceleration/deceleration filter will be maintained.

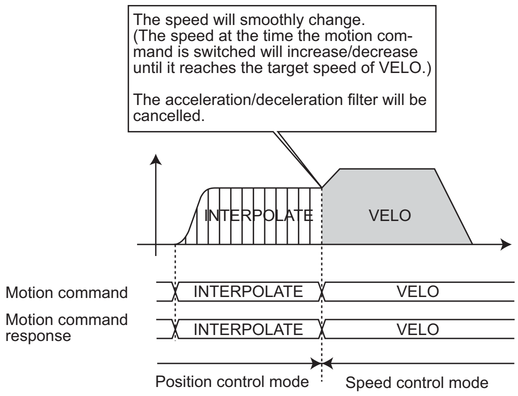


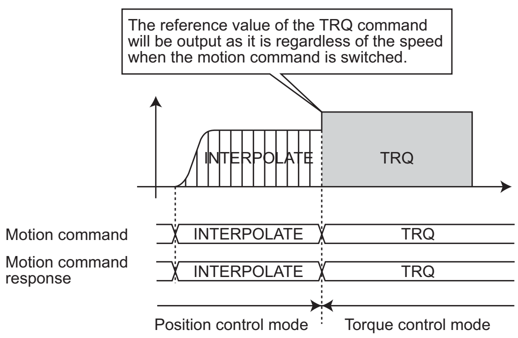
</td></tr>
<tr><td>STEP</td><td>INTERPOLATE will immediately switch to STEP, and the moving amount stored in the acceleration/deceleration filter will be maintained.



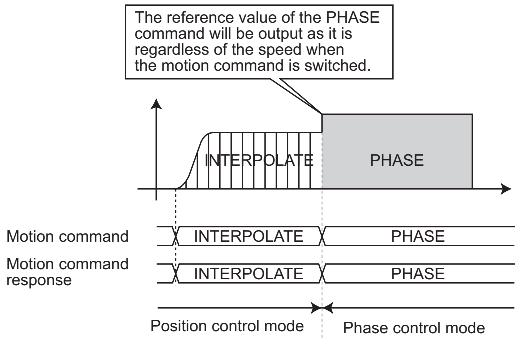
</td></tr>
</table>

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">INTERPOLATE</td><td>ZSET</td><td>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.</td></tr>
<tr><td>VELO</td><td>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.</td></tr>
<tr><td>TRQ</td><td>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.


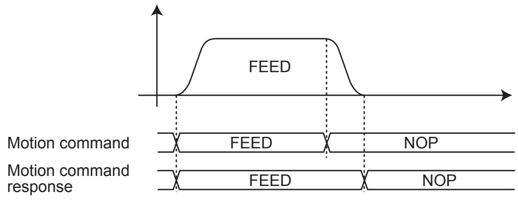
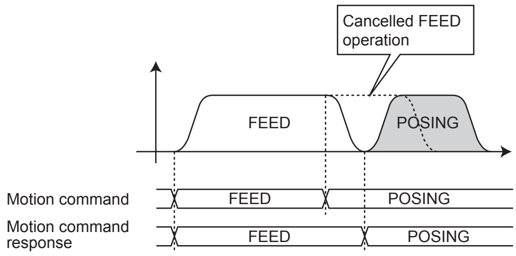
• After INTERPOLATE has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
</table>

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. 

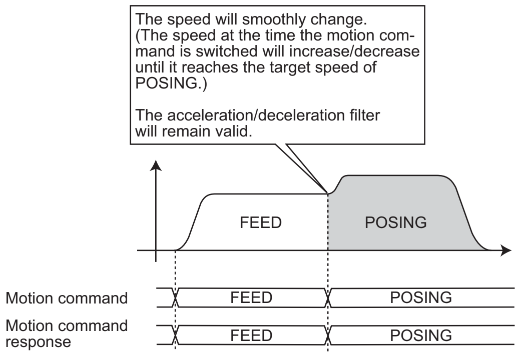
7.2.5 Switching from ENDOF_INTERPOLATE or LATCH

The operations are the same as are described in *7.2.4 Switching from INTERPOLATE*.

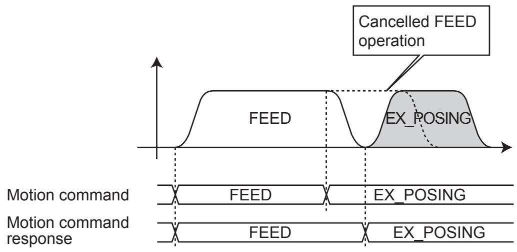
7.2.6 Switching from FEED

<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.


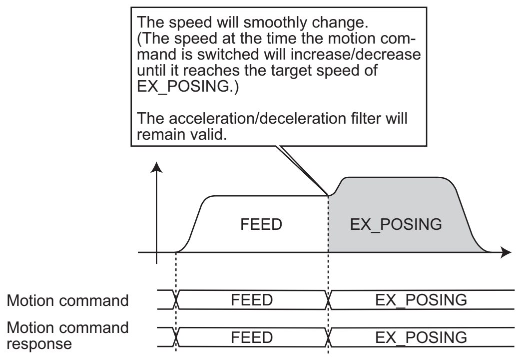
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C + Incremental value
• Any change in the Position Reference Setting (OL□□1C) during deceleration will be ignored.

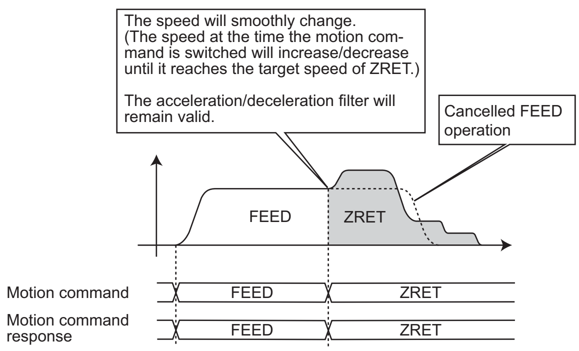
<In Absolute Mode (OW□□09, bit 5 = 1)>
FEED will immediately switch to POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.


The set value of Position Reference Setting (OL□□1C) will be:
OL□□1C = Target position</td></tr>
</table>

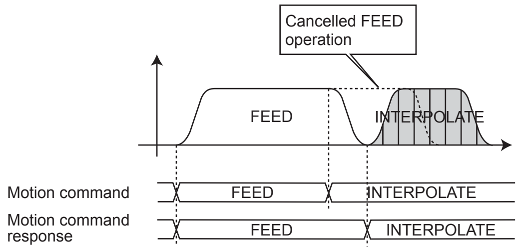
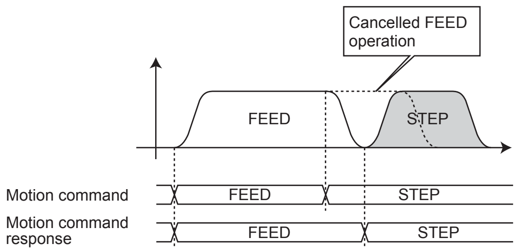
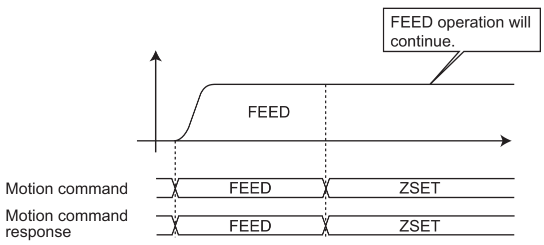
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">FEED</td><td>EX_POSING</td><td>
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
FEED will switch to EX_POSING when the axis stops after deceleration.
When execution of EX_POSING is started, values are written to the related servo parameters and then the positioning operation starts.


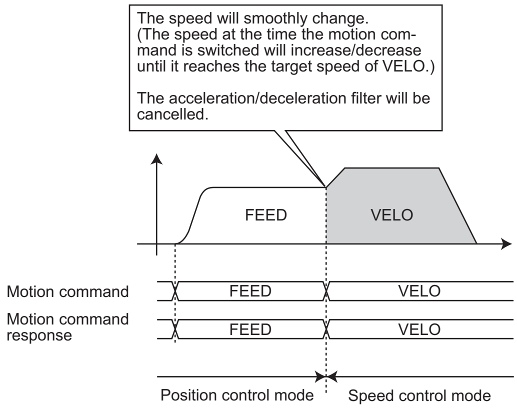
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C + Incremental value
• Any change in Position Reference Setting (OL□□1C) during deceleration will be ignored.

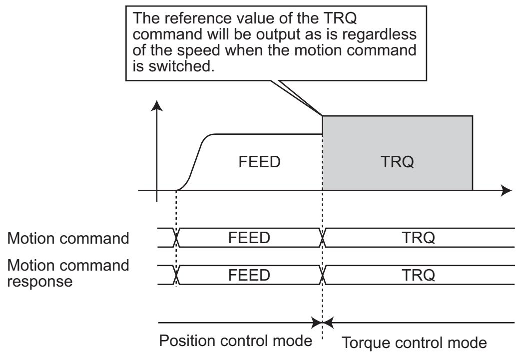
<In Absolute Mode (OW□□09, bit 5 = 1)>
FEED will immediately switch to EX_POSING, and the moving amount stored in the acceleration/deceleration filter will be maintained.


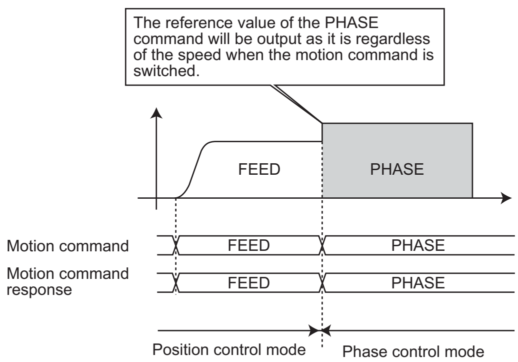
The set value of Position Reference Setting (OL□□1C) will be:
OL□□1C = Target position
</td></tr>
<tr><td>ZRET</td><td>
FEED will immediately switch to ZRET, and the moving amount stored in the acceleration/deceleration filter will be maintained.


</td></tr>
</table>

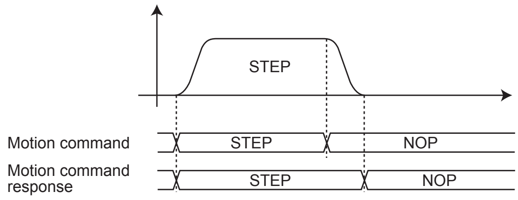
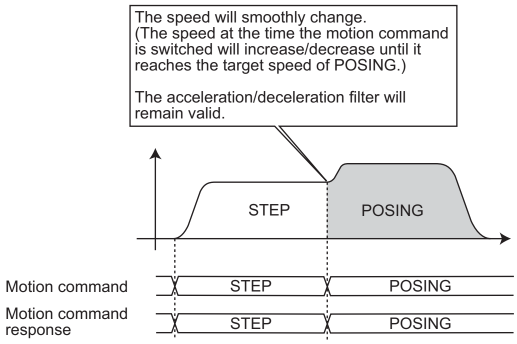
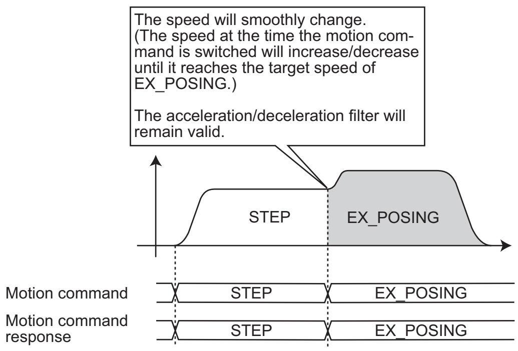
Switched From	Switched To	Operation
FEED	INTERPOLATE	FEED will switch to INTERPOLATE when the axis stops after deceleration.  <Change in Position Reference Setting (OL□□1C) during Deceleration> • In Incremental Addition Mode (OW□□09, bit 5 = 0) Any change in the Position Reference Setting (OL□□1C) will 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.

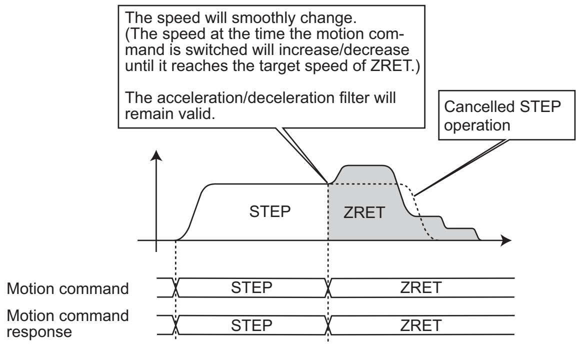
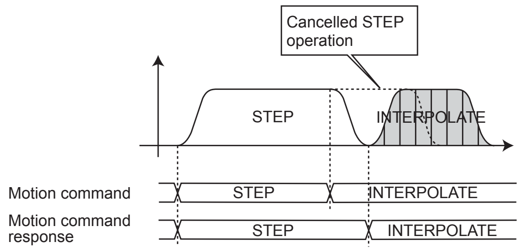
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">FEED</td><td>VELO</td><td>FEED will immediately switch to VELO, and the control mode will change from position control mode to speed control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.


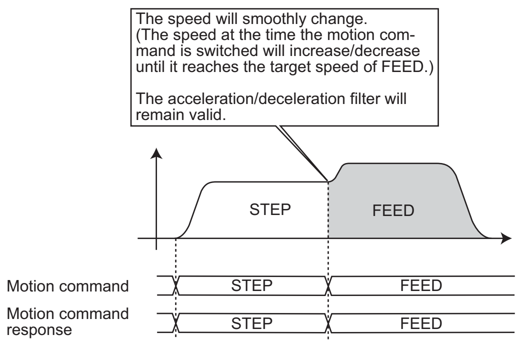
♦ After FEED has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the FEED operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, 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.


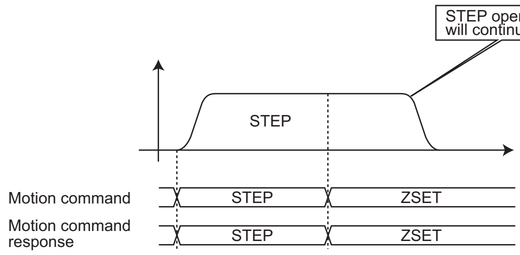
♦ After FEED has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
<tr><td>PHASE</td><td>FEED will immediately switch to PHASE, and the control mode will change from position control mode to phase control mode.

</td></tr>
</table>

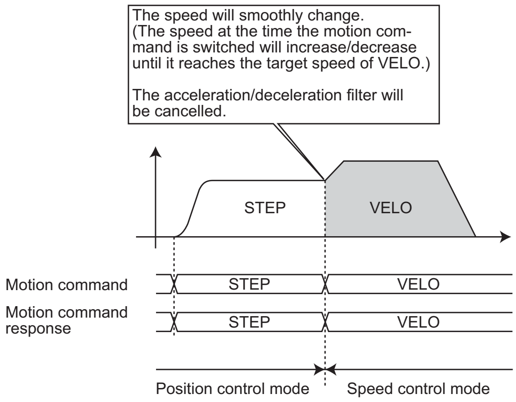
7.2.7 Switching from STEP

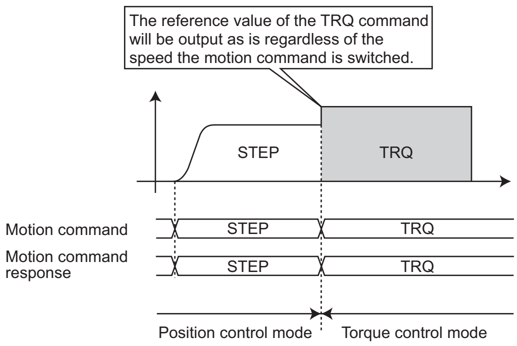
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="3">STEP</td><td>NOP</td><td>STEP will switch to NOP when the axis stops after deceleration.
</td></tr>
<tr><td>POSING</td><td>STEP will immediately switch to POSING, and the moving amount stored in the acceleration/deceleration 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>

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="6">STEP</td><td>ZRET</td><td>STEP will immediately switch to ZRET, and the moving amount stored in the acceleration/deceleration filter will be maintained.

</td></tr>
<tr><td>INTERPOLATE</td><td>STEP will switch to INTERPOLATE when the axis stops after deceleration.


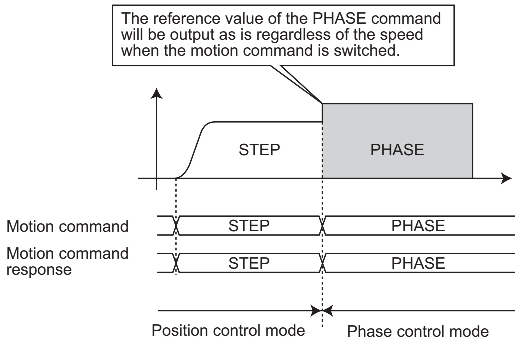
<Change in Position Reference Setting (OL□□1C) during Deceleration>
• In Incremental Addition Mode (OW□□09, bit 5 = 0)
Any change in the Position Reference Setting (OL□□1C) will be ignored.
• In Absolute Mode (OW□□09, bit 5 = 1)
The change in the Position Reference Setting (OL□□1C) will be output as 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.</td></tr>
<tr><td>ENDOF_INTERPOLATE</td><td>Same as INTERPOLATE</td></tr>
<tr><td>LATCH</td><td>Same as for INTERPOLATE</td></tr>
<tr><td>FEED</td><td>STEP 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>STEP operation will continue.</td></tr>
</table>

<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.


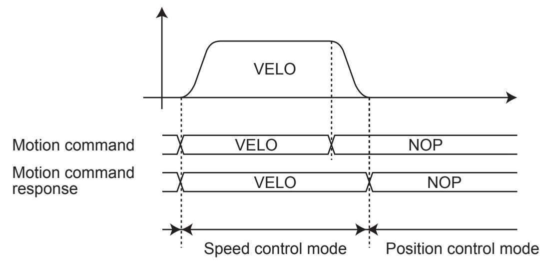
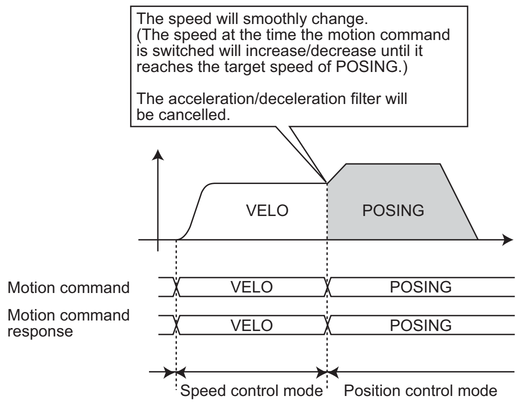
• After STEP has switched to TRQ, the TRQ command will be executed without the acceleration/deceleration filter. This is because TRQ is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
</table>

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

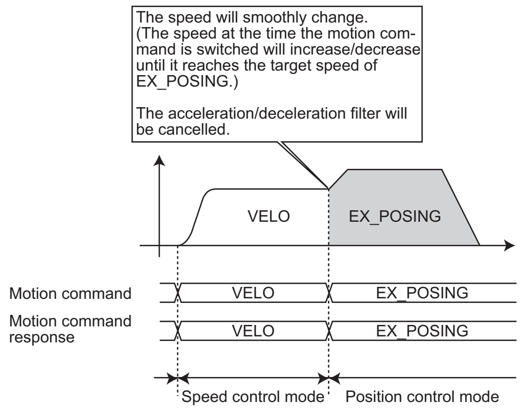
The execution of the ZSET command is completed in one scan if neither Absolute Mode nor infinite length axis are selected. So, a motion command that is set to run while the ZSET command is being carried out as soon as it is issued.

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.


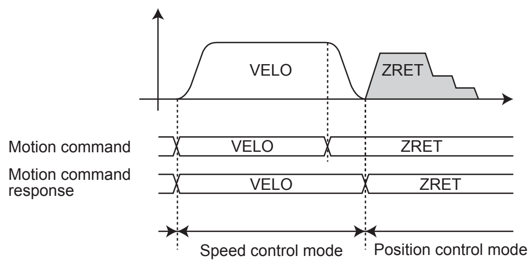
• After VELO has switched to POSING, the POSING command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the VELO operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns 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>

<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.

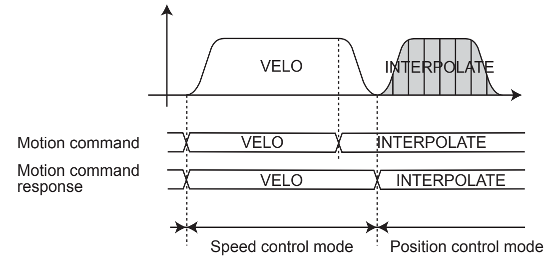
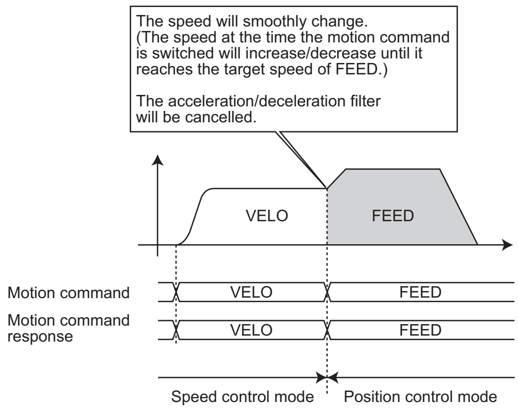


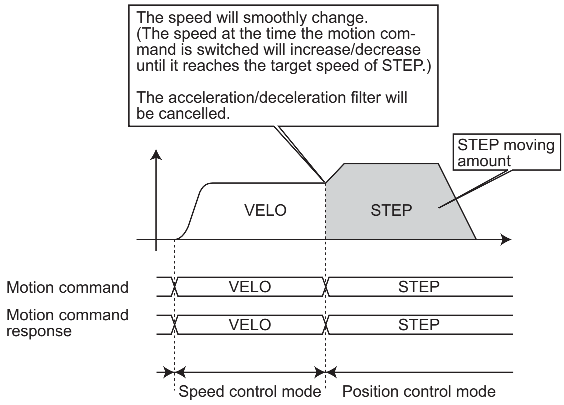
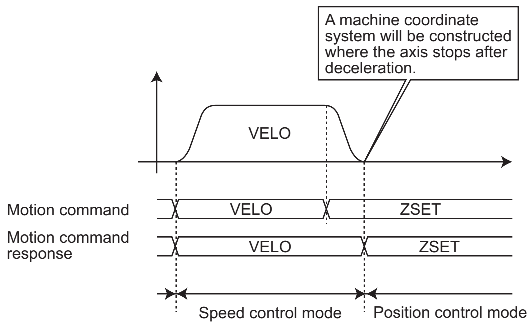
- After VELO has switched to EX_POSING, the EX_POSING command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the VELO operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW□□0C, bit 0) turns ON, execute an EX_POSING command.

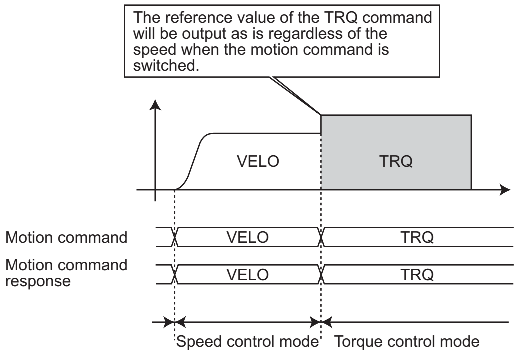
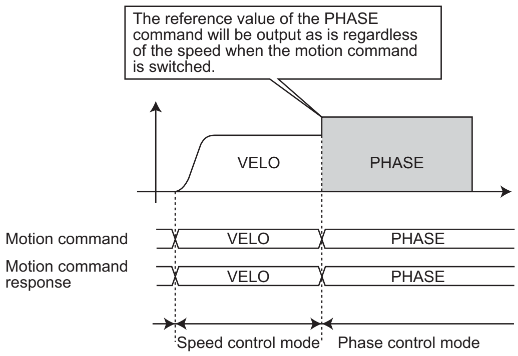
The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C+ Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target 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>

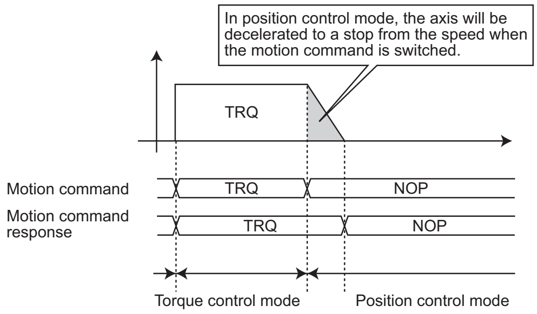
Switched From	Switched To	Operation
VELO	INTERPOLATE	VELO will switch to INTERPOLATE when the axis stops after deceleration, and the control mode will change from speed control mode to position control mode after the axis deceleration is completed.  <Change in Position Reference Setting (OL□□1C) during 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.
	ENDOF_INTERPOLATE	Same as INTERPOLATE
	LATCH	Same as INTERPOLATE
	FEED	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. 

<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>

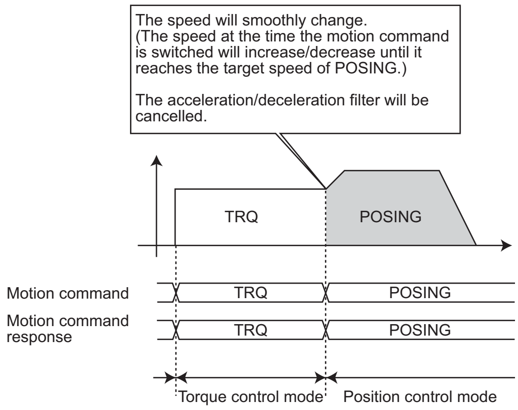
Switched From	Switched To	Operation
VELO	TRQ	VELO will immediately switch to TRQ, and the control mode will change from speed control mode to torque control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.  • After VELO has switched to TRQ, the TRQ command will 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

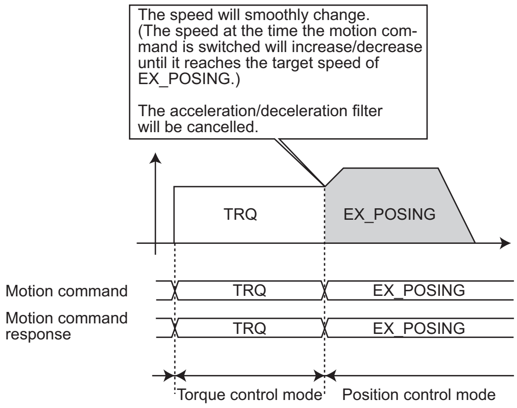
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">TRQ</td><td>NOP</td><td>
The axis will decelerate to a stop from the speed when the motion command is switched in position control mode.
TRQ will be switched to NOP when the axis stops after deceleration.

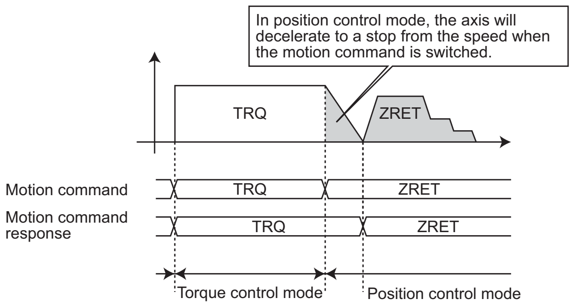


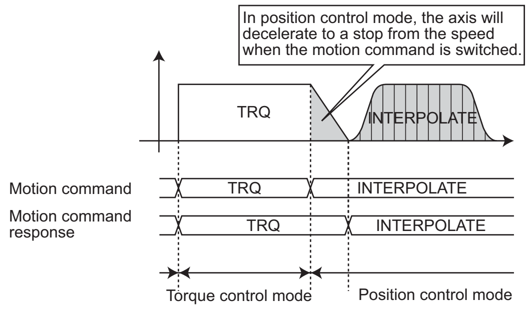
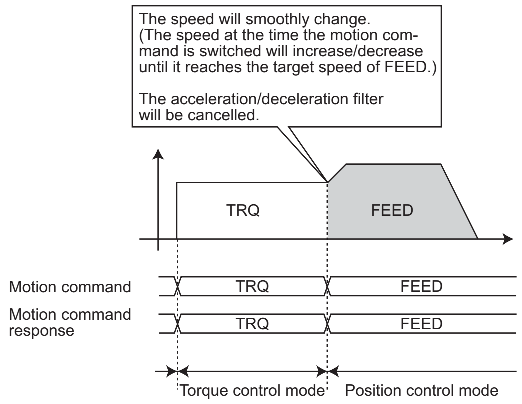
</td></tr>
<tr><td>POSING</td><td>
TRQ will immediately switch to POSING, and the control mode will change from torque control mode to position control mode.

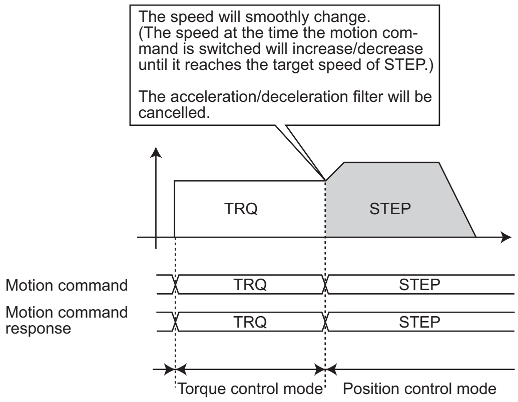
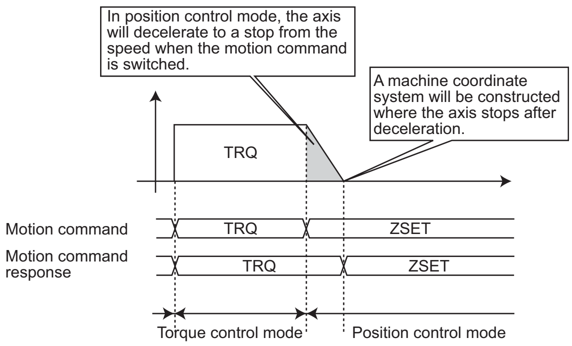


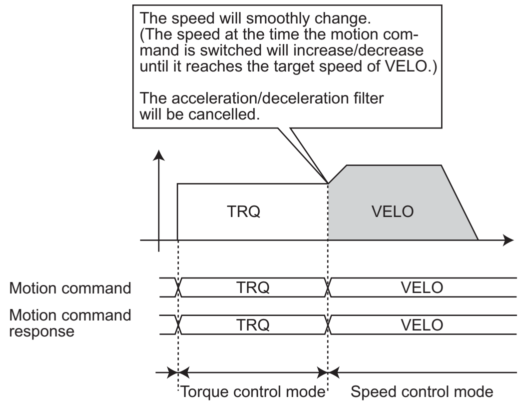
The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C+ Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target position
</td></tr>
</table>

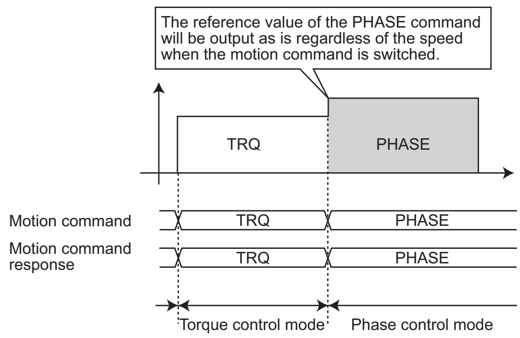
<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="2">TRQ</td><td>EX_POSING</td><td>TRQ will immediately switch to EX_POSING, and the control mode will change from torque control mode to position control mode.


• 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>

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.

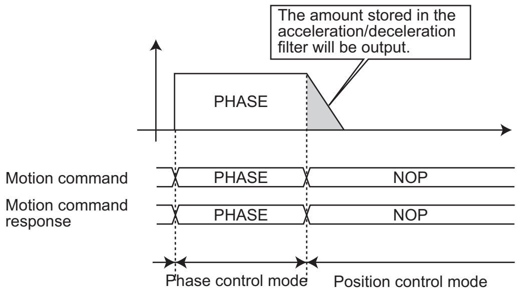
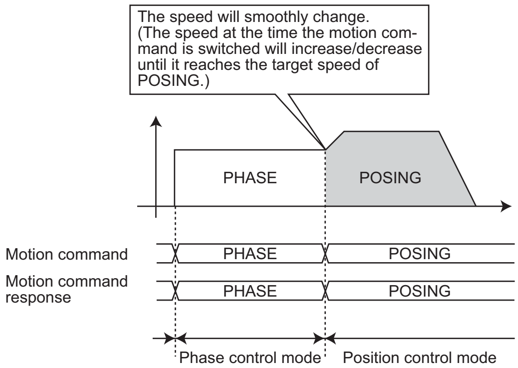
Switched From	Switched To	Operation
TRQ	STEP	TRQ will immediately switch to STEP, and the control mode will change from torque control mode to position control mode. The moving amount stored in the acceleration/deceleration filter will be reset to 0.  • After TRQ is switched to STEP, the STEP command 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.
	ZSET	The axis will decelerate to a stop in position control mode. When the axis stops, ZSET command execution will start. 

<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.


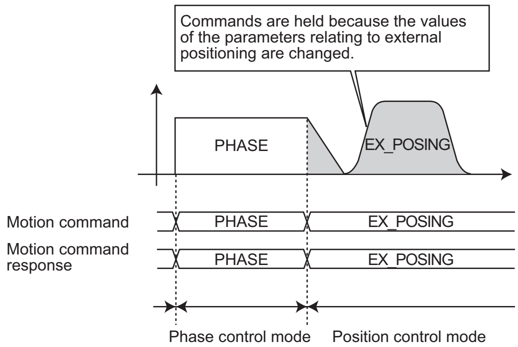
• After TRQ has switched to VELO, the VELO command will be executed without the acceleration/deceleration filter. To enable the acceleration/deceleration filter, hold the TRQ operation by executing an NOP command or other commands. Then, when the Discharging Completed bit (IW☐☐0C, bit 0) turns ON, execute 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.


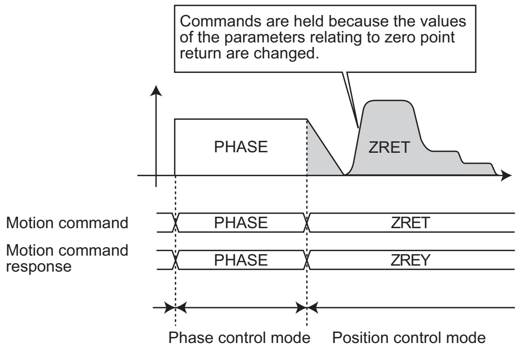
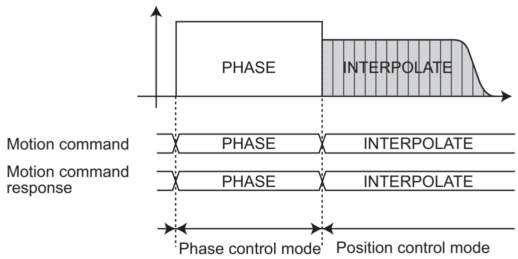
• After TRQ has switched to PHASE, the PHASE command will be executed without the acceleration/deceleration filter. This is because PHASE is a motion command for which the acceleration/deceleration filter is disabled.</td></tr>
</table>

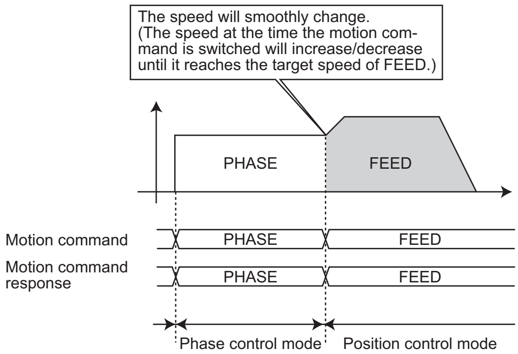
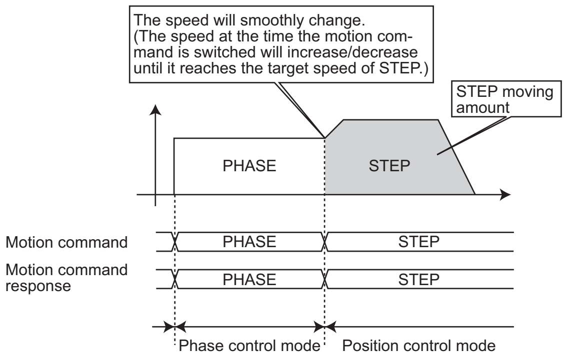
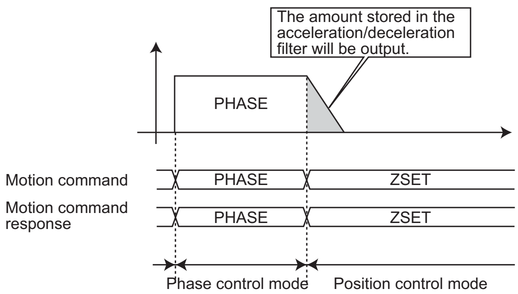
7.2.11 Switching from PHASE

<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.


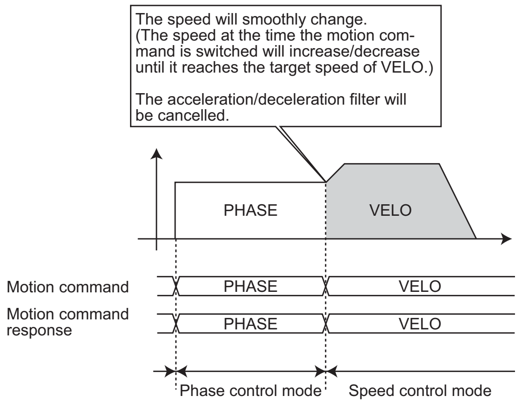
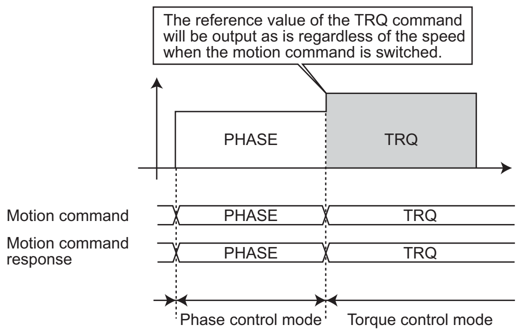
The value of the Position Reference Setting (OL□□1C) when the motion command is switched will be as follows.
<In Incremental Addition Mode (OW□□09, bit 5 = 0)>
Incremental value = Target position – IL□□14 (DPOS)
OL□□1C = OL□□1C+ Incremental value
<In Absolute Mode (OW□□09, bit 5 = 1)>
OL□□1C = Target position</td></tr>
</table>

<table>
<tr><th>Switched From</th><th>Switched To</th><th>Operation</th></tr>
<tr><td rowspan="5">PHASE</td><td>EX_POSING</td><td>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</td></tr>
<tr><td>ZRET</td><td>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.

</td></tr>
<tr><td>INTERPOLATE</td><td>PHASE will immediately switch to INTERPOLATE, and the control mode will change from phase control mode to position control mode.

</td></tr>
<tr><td>ENDOF_INTERPOLATE</td><td>Same as INTERPOLATE</td></tr>
<tr><td>LATCH</td><td>Same as INTERPOLATE</td></tr>
</table>

<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>

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

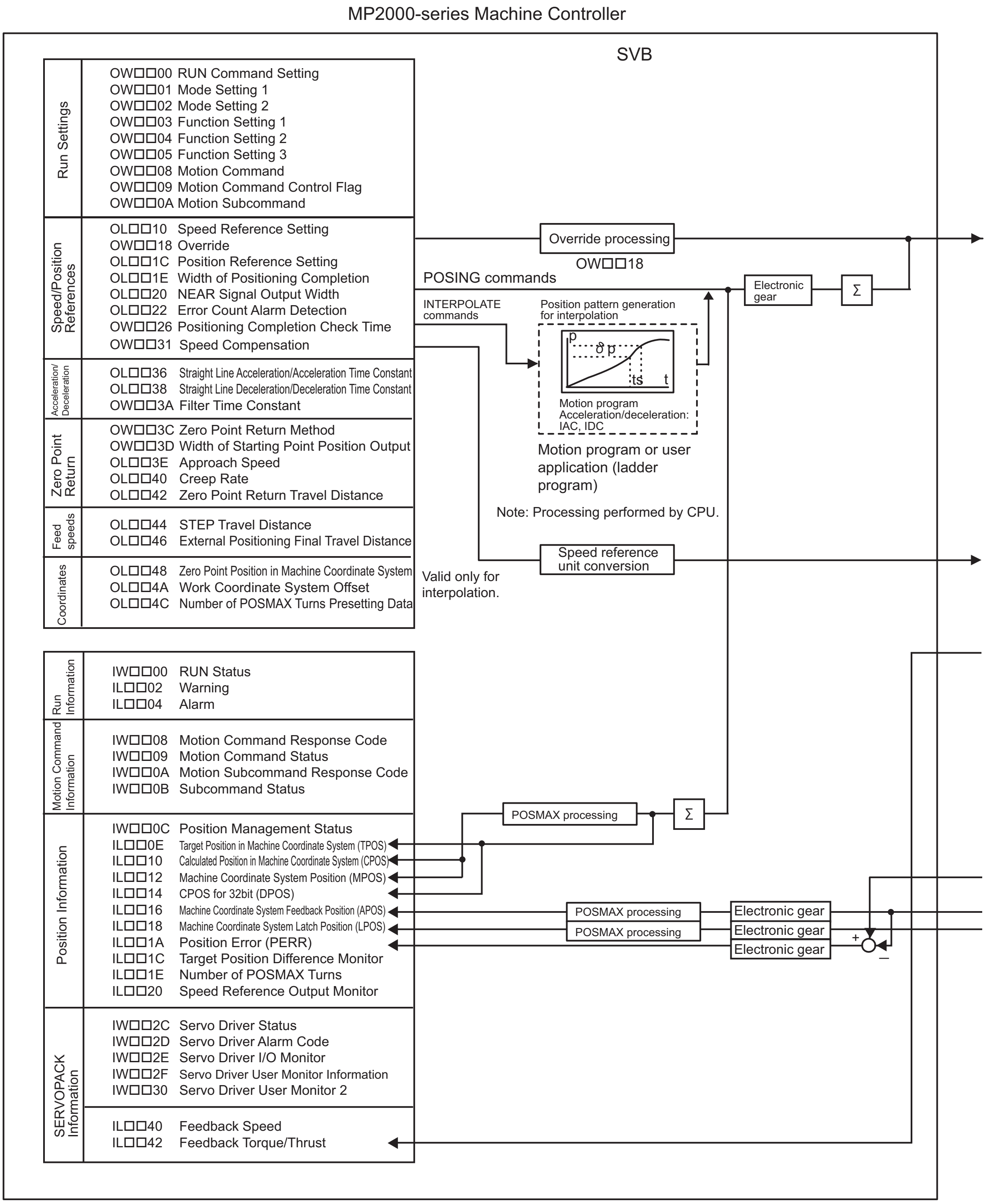
No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Command Setting	–	0000h	Bit setting
OW□□01	Mode Setting 1	–	0000h	Bit setting
OW□□02	Mode Setting 2	–	0000h	Bit setting
OW□□03	Function Setting 1	–	0011h	Bit setting
OW□□04	Function Setting 2	–	0033h	Bit setting
OW□□05	Function Setting 3	–	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 $2^{31}-1$

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 10
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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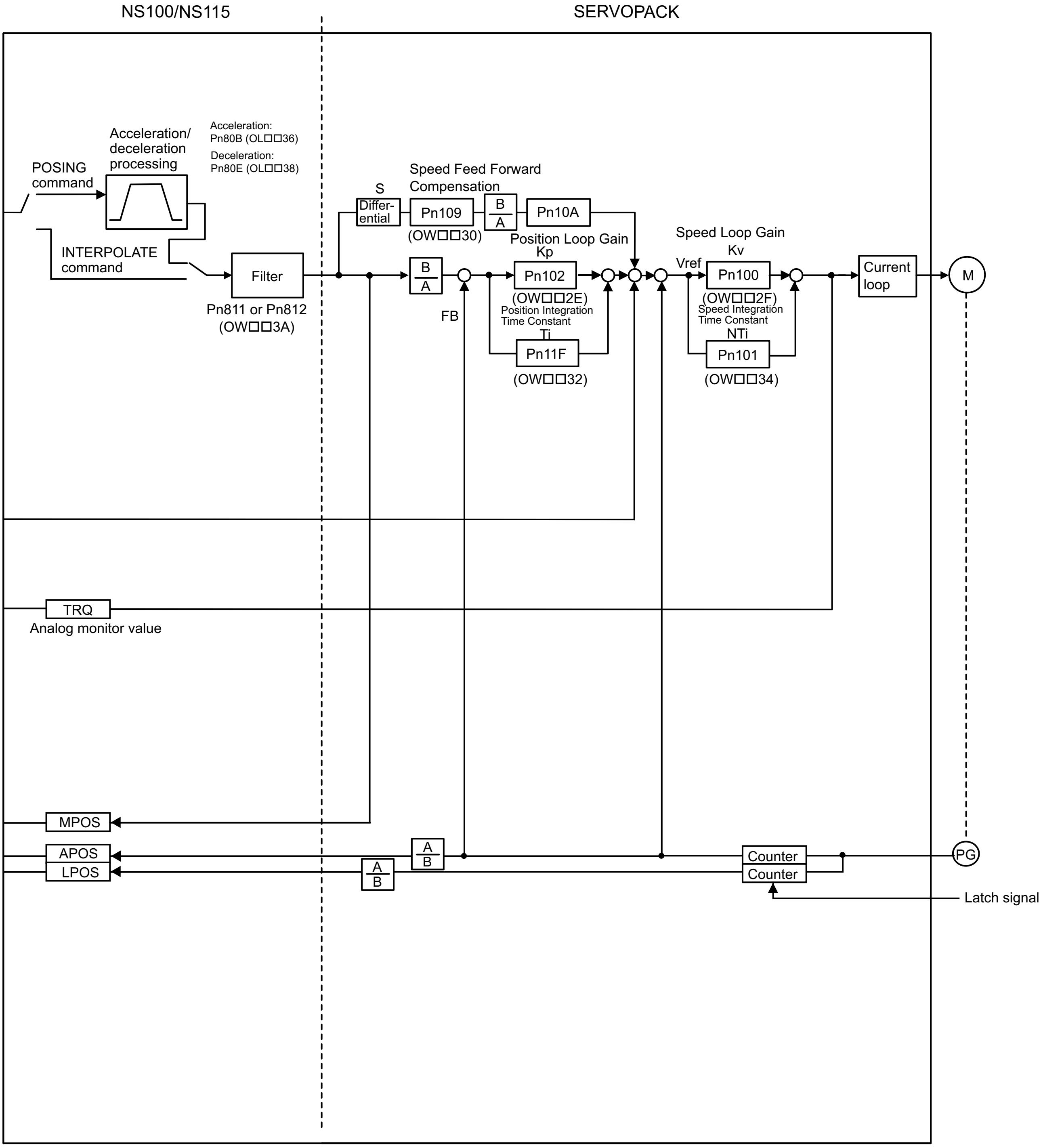

NS100/NS115
SERVOPACK
Acceleration/
deceleration
processing
Acceleration:
Pn80B (OL□□36)
Deceleration:
Pn80E (OL□□38)
POSING
command
INTERPOLATE
command
Filter
Pn811 or Pn812
(OW□□3A)
S
Differ-
ential
Speed Feed Forward
Compensation
Pn109
(OW□□30)
B
A
Pn10A
Position Loop Gain
Kp
Pn102
(OW□□2E)
Position 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 SGDV SERVOPACKs of Σ-V series

⚠ CAUTION

- If using the utility functions to adjust the Σ-V series of SERVOPACKs when the model-following control is enabled (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

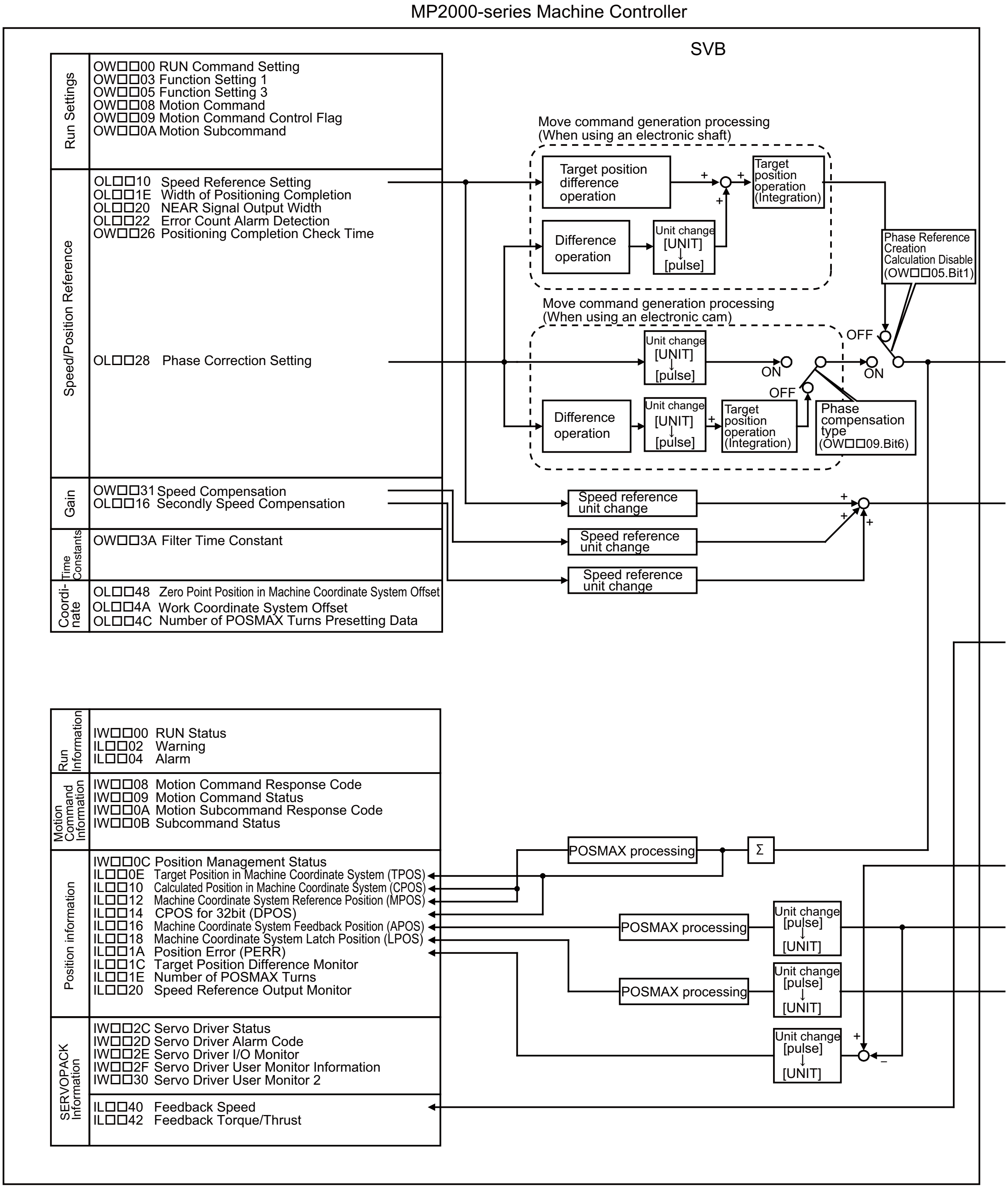
No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Command Setting	–	0000h	Bit setting
OW□□01	Mode Setting 1	–	0000h	Bit setting
OW□□02	Mode Setting 2	–	0000h	Bit setting
OW□□03	Function Setting 1	–	0011h	Bit setting
OW□□04	Function Setting 2	–	0033h	Bit setting
OW□□05	Function Setting 3	–	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 $2^{31}-1$

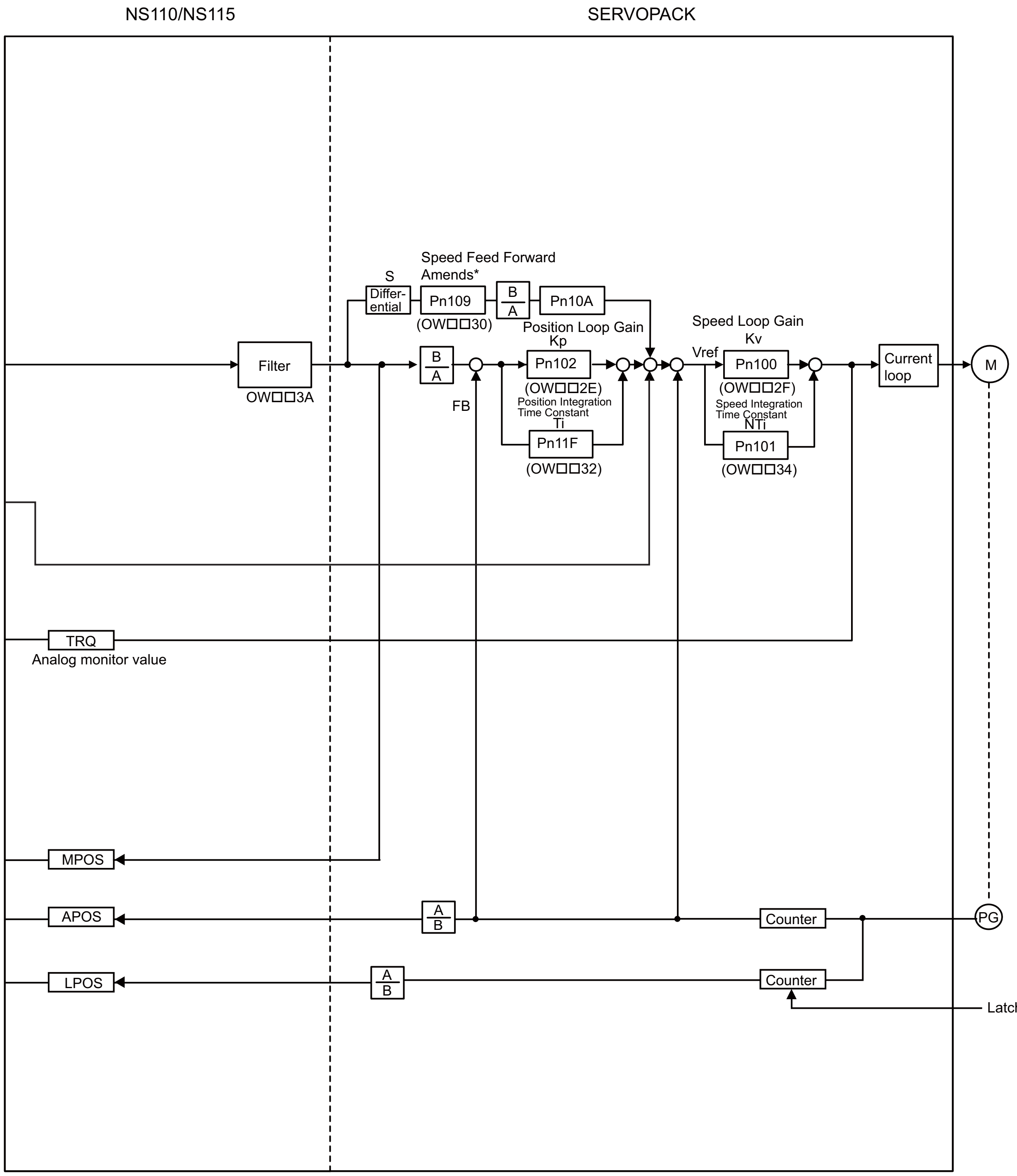
No.	Name	Setting Unit	Default Value	Setting Range
OL□□4C	Number of POSMAX Turns Presetting Data	Rev	0	-2^{31} to $2^{31}-1$
OW□□4E	Servo User Monitor Setting	–	0E00H	Bit setting
OW□□4F	Servo Driver Alarm Monitor No.	–	0	0 to 10
OW□□50	Servo Driver User Constant No.	–	0	0 to 65535
OW□□51	Servo Driver 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

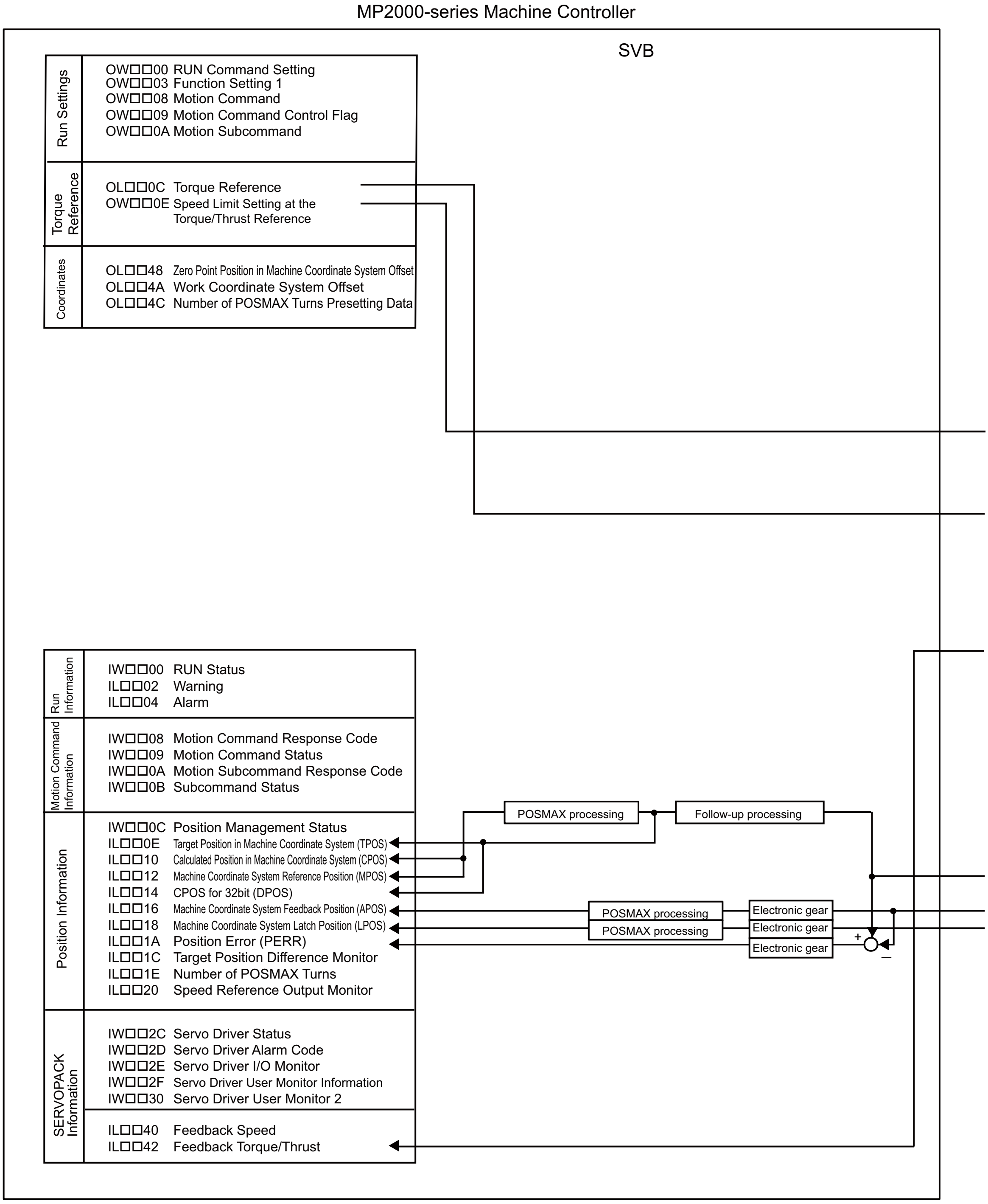
No.	Name	Setting Unit	Default Value	Setting Range
OW☐☐00	RUN Command Setting	–	0000h	Bit setting
OW☐☐01	Mode Setting 1	–	0000h	Bit setting
OW☐☐02	Mode Setting 2	–	0000h	Bit setting
OW☐☐03	Function Setting 1	–	0011h	Bit setting
OW☐☐04	Function Setting 2	–	0033h	Bit setting
OW☐☐05	Function Setting 3	–	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 $2^{31}-1$

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 10
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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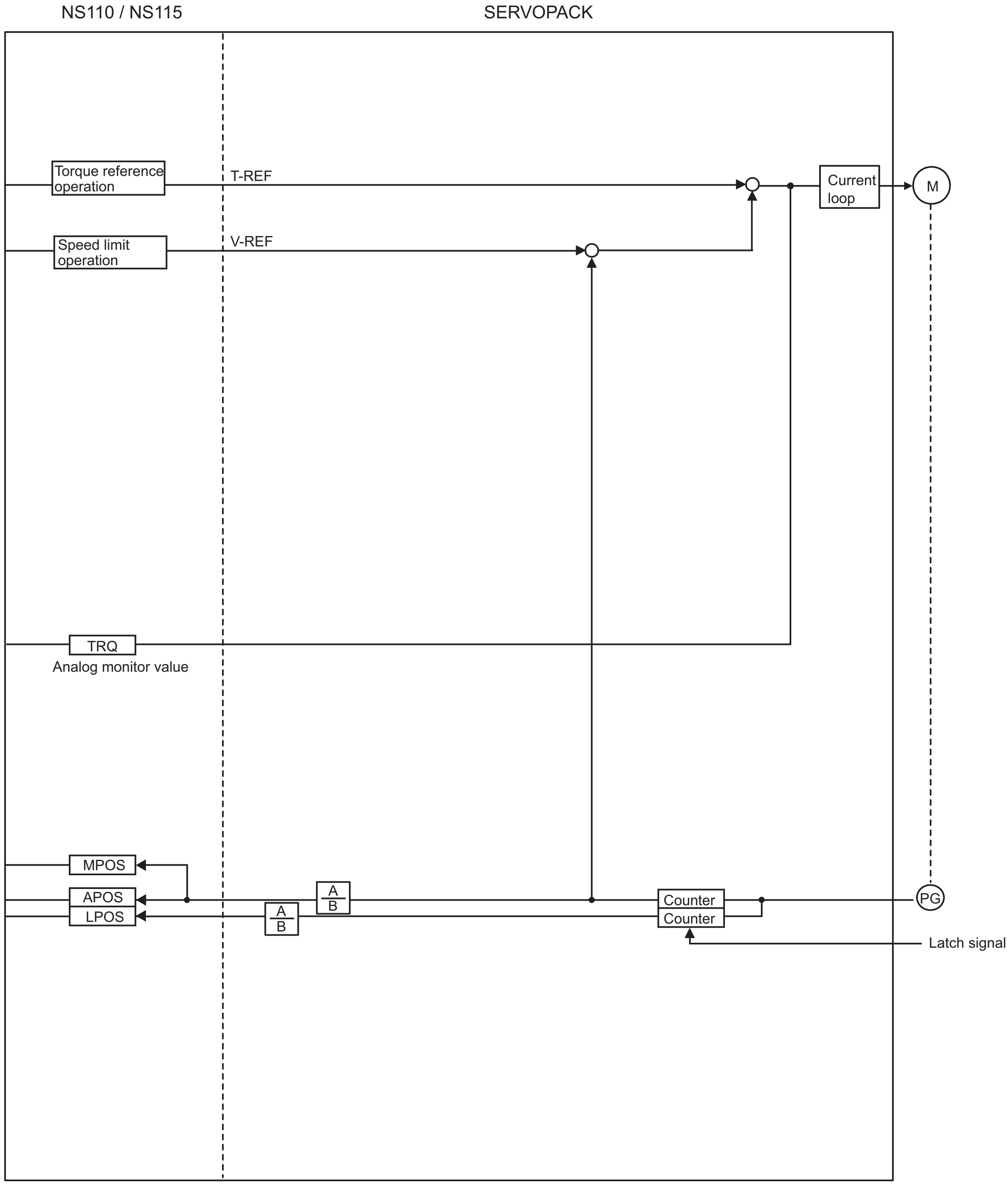

NS110 / NS115
SERVOPACK
Torque reference operation
T-REF
Speed limit operation
V-REF
Current loop
M
TRQ
Analog monitor value
MPOS
APOS
LPOS
A
B
A
B
Counter
Counter
PG
Latch signal

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

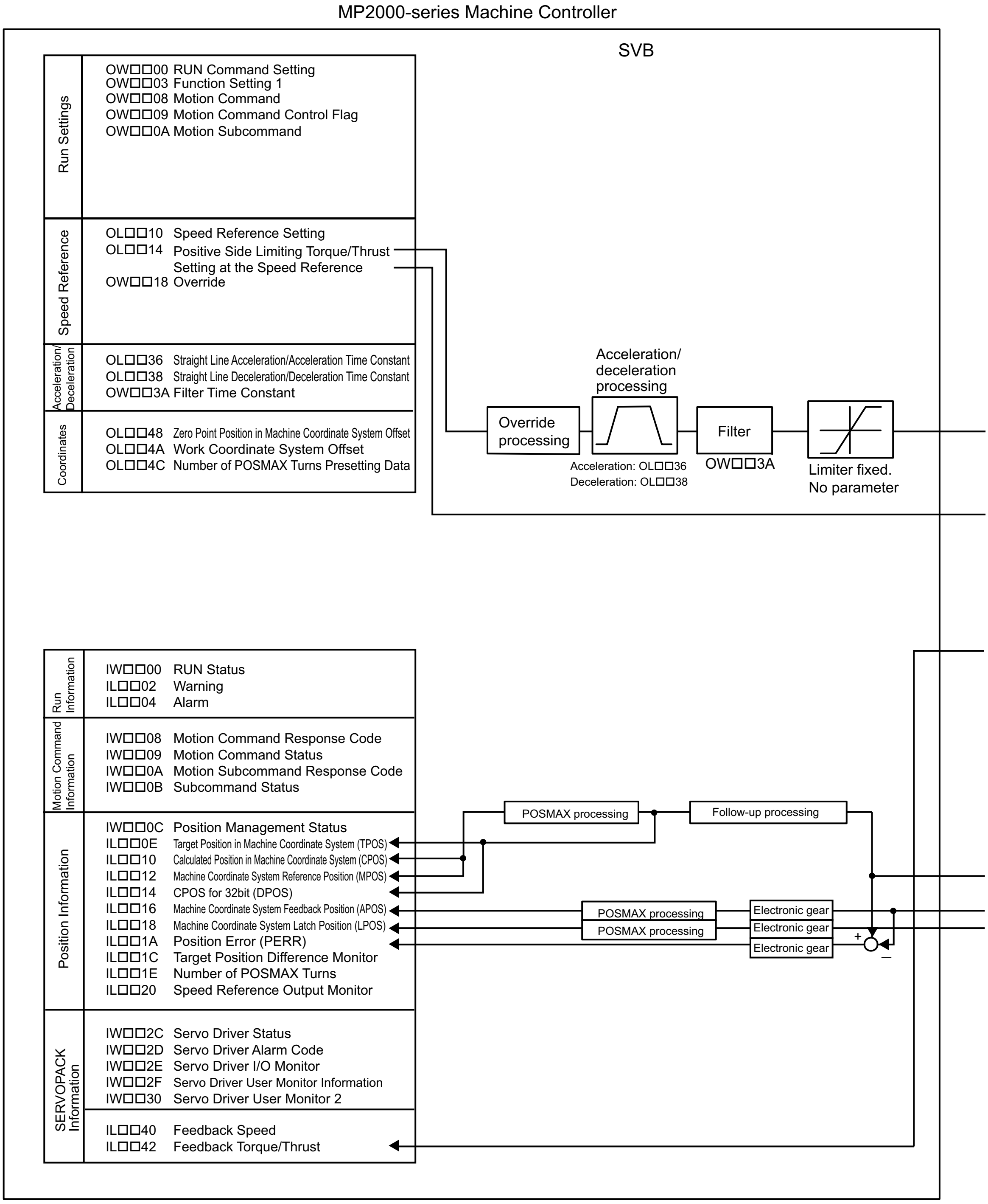
No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Command Setting	–	0000h	Bit setting
OW□□01	Mode Setting 1	–	0000h	Bit setting
OW□□02	Mode Setting 2	–	0000h	Bit setting
OW□□03	Function Setting 1	–	0011h	Bit setting
OW□□04	Function Setting 2	–	0033h	Bit setting
OW□□05	Function Setting 3	–	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 $2^{31}-1$

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 10
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 $2^{31}-1$

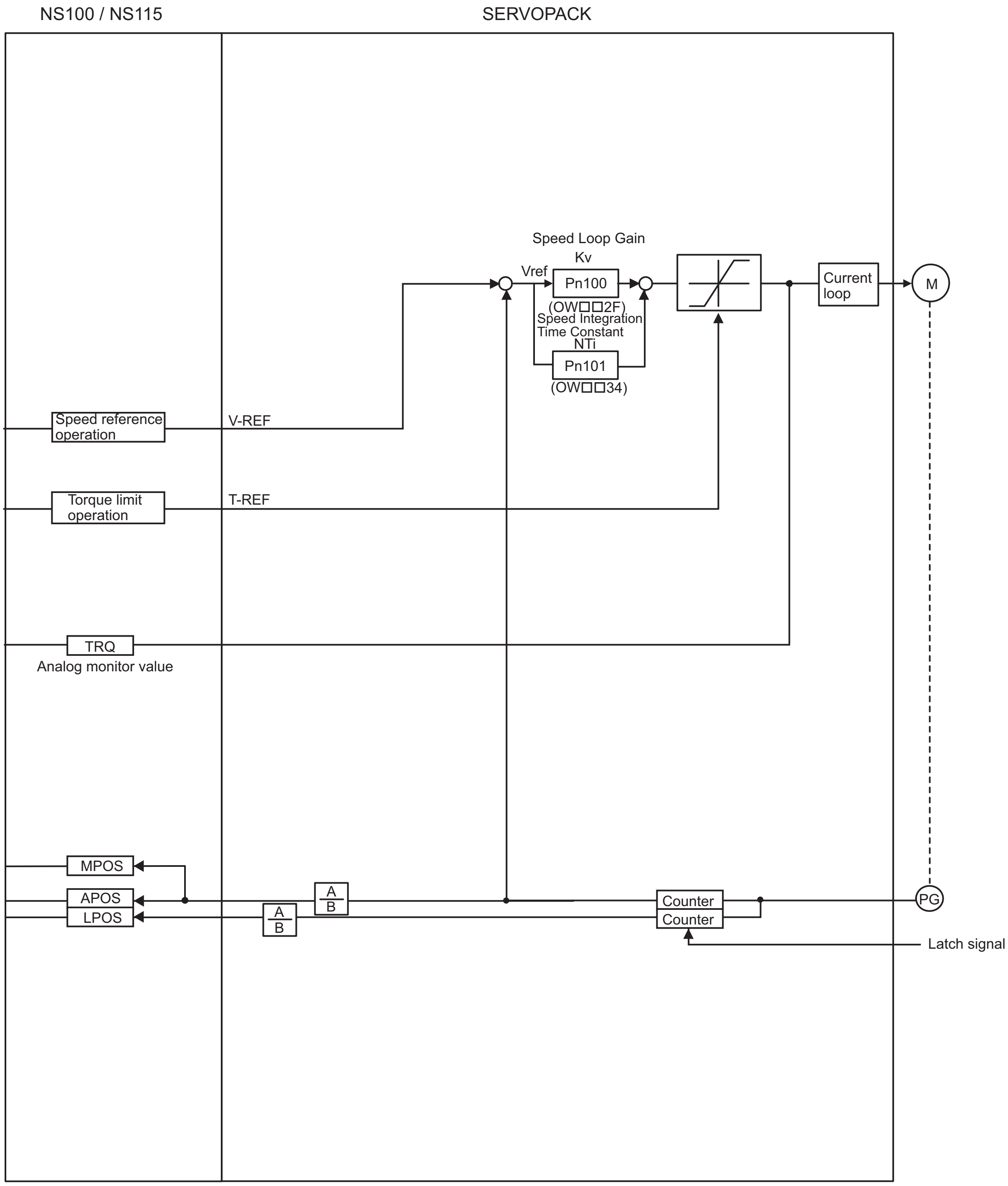
(3) Monitoring Parameters

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.

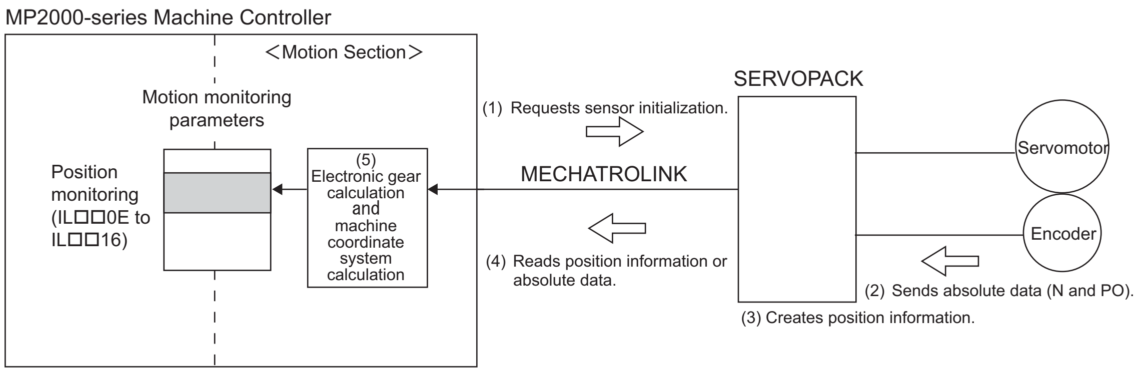
■ Terminology: Absolute Encoder

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.

<table>
<tr><td>1</td><td>Check Devices
Check to see if the SERVOPACK, Servomotor, and cables are the right products and models for the absolute encoder.</td></tr>
</table>

↓

<table>
<tr><td>2</td><td>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)</td></tr>
</table>

↓

<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 Encoder Turns Rotation	0 to 2^{31}–1	1 = 1 rotation	9.3.1 (3) [d]	

(2) SERVOPACK Parameters for Absolute Position Detection

SERVOPACK Model	Parameter	Name	Setting Range	Units	Reference	Caution
Σ-III and Σ-V Series (SGDS-□□□1□□, SGDV-□□□□)	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 (SGDH-□□□E + NS100, NS115)	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 (SGD-□□□N, SGDB-□□AN)	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 and Σ-V 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 and Σ-V 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

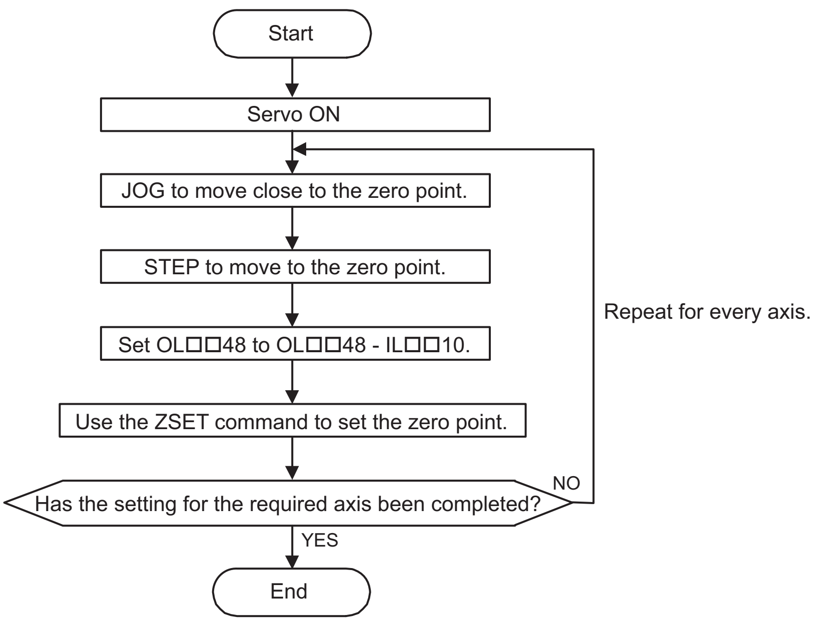
Set OL□□48 to -9900 to make the current position in the machine coordinate system the zero point.

(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 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 Tab Page.

Fixed Parameters | Setup Parameters | SERVOPACK | Monitor

No.	Name	REG	Monitor Data	Unit
12	Position management status	IW800C	0000 0000 0010 1011	-
14	Target position in machine coordinate system (T	IL800E	10000	User units
16	Calculated position in machine coordinate syster	IL8010	10000	User units
18	Machine coordinate system reference position (N	IL8012	10000	User units
20	System reservation (DPOS)	IL8014	10000	User units
22	Machine coordinate system feedback position (A	IL8016	10001	User units
24	Machine coordinate system latch position (LPOS)	IL8018	0	User units
26	Position error (PERR)	IL801A	-1	User units
30	Number of POSMAX turns	IL801E	0	Turn

2. Check the current value in OL□□48 in the Setup Parameters 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.

Fixed Parameters | Setup Parameters | SERVOPACK | Monitor

No.	Name	REG	Input Data	Unit	Current Value
70	External positioning final travel distance	OL8046	0	User units	0
72	Zero point position in machine coordinate syster	OL8048	-9900	User units	100
74	Work coordinate system offset	OL804A	0	User units	0
76	Number of POSMAX turns presetting data	OL804C	0	Turn	0
78	Servo driver user monitor setting	OW804E	0000 1110 0000 0000	0E00 H	0000 1110 0000 0000
79	Servo driver alarm monitor No.	OW804F	0	-	0
80	Servo driver user constant No.	OW8050	0	-	0
81	Servo driver user constant size	OW8051	1	-	1
82	Servo driver user constant set point	OL8052	0	-	0

3. Check to see if the setting and current value in OL□□48 are the same. If they are the same, select ***File - Save*** and save the setting to the Machine Controller.

4. Return to Module Configuration Window and select ***Save - 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.

Create a ladder program that automatically executes the following sequence.

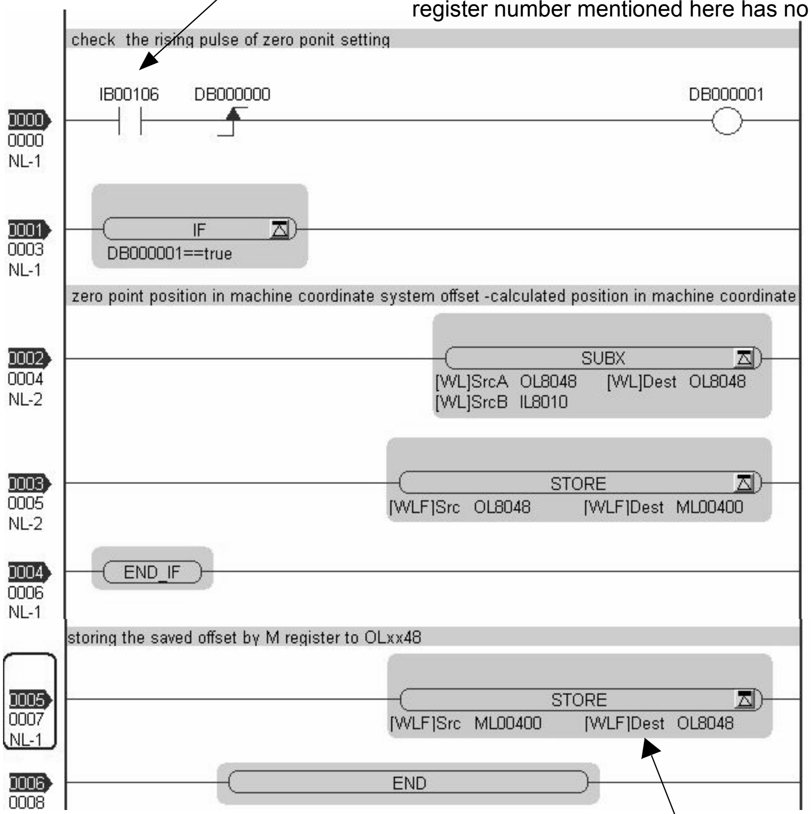
Program Example

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.

Signal that turns ON only when setting the Machine Coordinate System Zero Point
(The diagram below shows an example of external signal. The register number mentioned here has no meaning.)



Execute every scan in high-speed drawing

Absolute Position Detection

9

9.3.3 Turning ON the Power after Setting the Zero Point of Machine Coordinate System

The Zero Point Return (Setting) Completed bit (IW☐☐0C, bit 5) will turn OFF when the power supply to the Machine Controller is turned OFF and ON or the communication is interrupted by turning OFF and ON the power supply to the SERVOPACK 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.

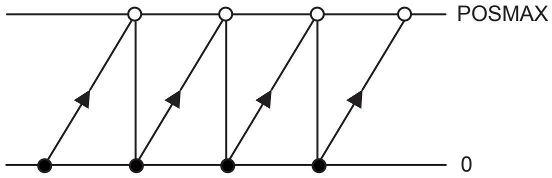
Check to see if the Motion Controller Operation Ready (SVCRDY) bit (IW☐☐00, bit 0) is ON.

3. Execute the Set Zero Point (ZSET) motion command by setting OW☐☐08 to 9.

- Use this procedure only to turn ON the Zero Point Return (Setting) Completed bit (IW☐☐0C, bit 5). 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
$\frac{\text{No. 10: Infinite Length Axis Reset Position (POSMAX)}}{\text{No.36: Number of Pulses per Motor Rotation}}$	$\frac{\text{No. 10: Infinite Length Axis Reset Position (POSMAX)} \times \text{No. 8: Servo Motor Gear Ratio}}{\text{No. 6: Travel Distance per Machine Rotation} \times \text{No. 9 Machine Gear Ratio}}$

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 × 6) / (360000 × 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 and Σ-V Series (SGDS-□□□1□□, SGDV-□□□□)	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 (SGDH-□□□E + NS100, NS115)	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 (SGD-□□□N, SGDB-□□AN)	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 and Σ-III Series SERVOPACK	Parameter Pn002.2: Absolute Encoder Usage	0: Uses absolute encoder as an absolute encoder
Σ-I Series SERVO-PACK	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, and Σ-V 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, and Σ-V 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

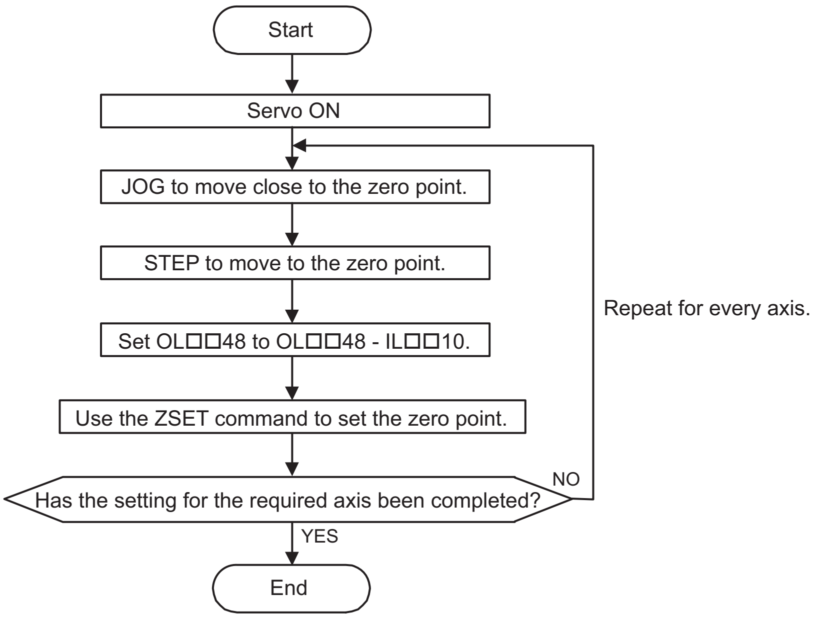
Set the encoder position when servo power is turned ON to a negative value as shown below.

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

The Zero Point Return (Setting) Completed bit (IW□□0C, bit 5) will turn OFF when the power supply to the Machine Controller is turned OFF and ON, the communication are interrupted by the power OFF to the SERVOPACK, or communication are interrupted in any other reason 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 see if the Motion Controller Operation Ready (SVCRDY) bit (IW□□00, bit 0) is ON.

3. Execute the Set Zero Point (ZSET) motion command by setting OW□□08 to 9.

- Use this procedure only to turn ON the Zero Point Return (Setting) Completed bit (IW□□0C, bit 5). 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

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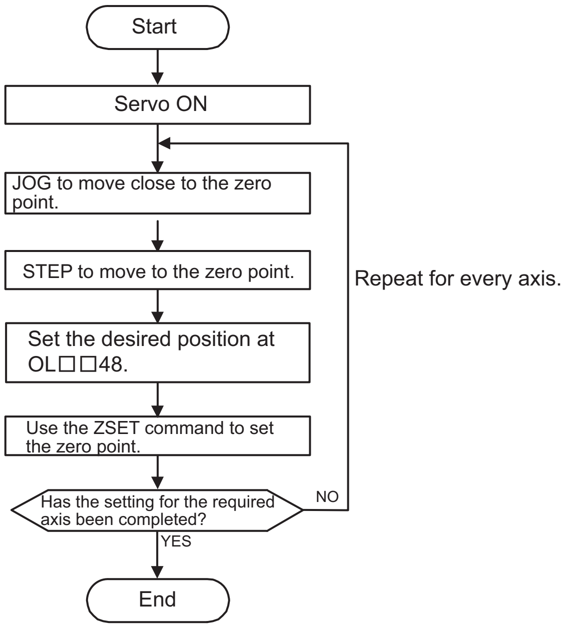
Absolute Position Detection

9

(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.

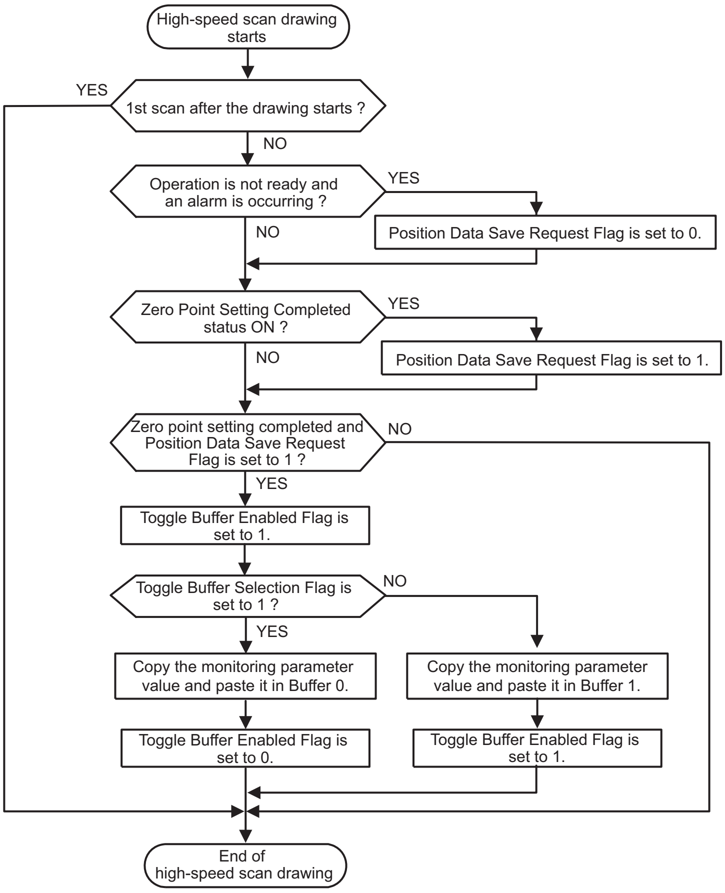
- Monitoring Parameter: Encoder Position when the Power is OFF (All four words at IL□□5E to IL□□60)
- Monitoring Parameter: Pulse Position when the Power is OFF (All four words at IL□□62 to IL□□64)

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>

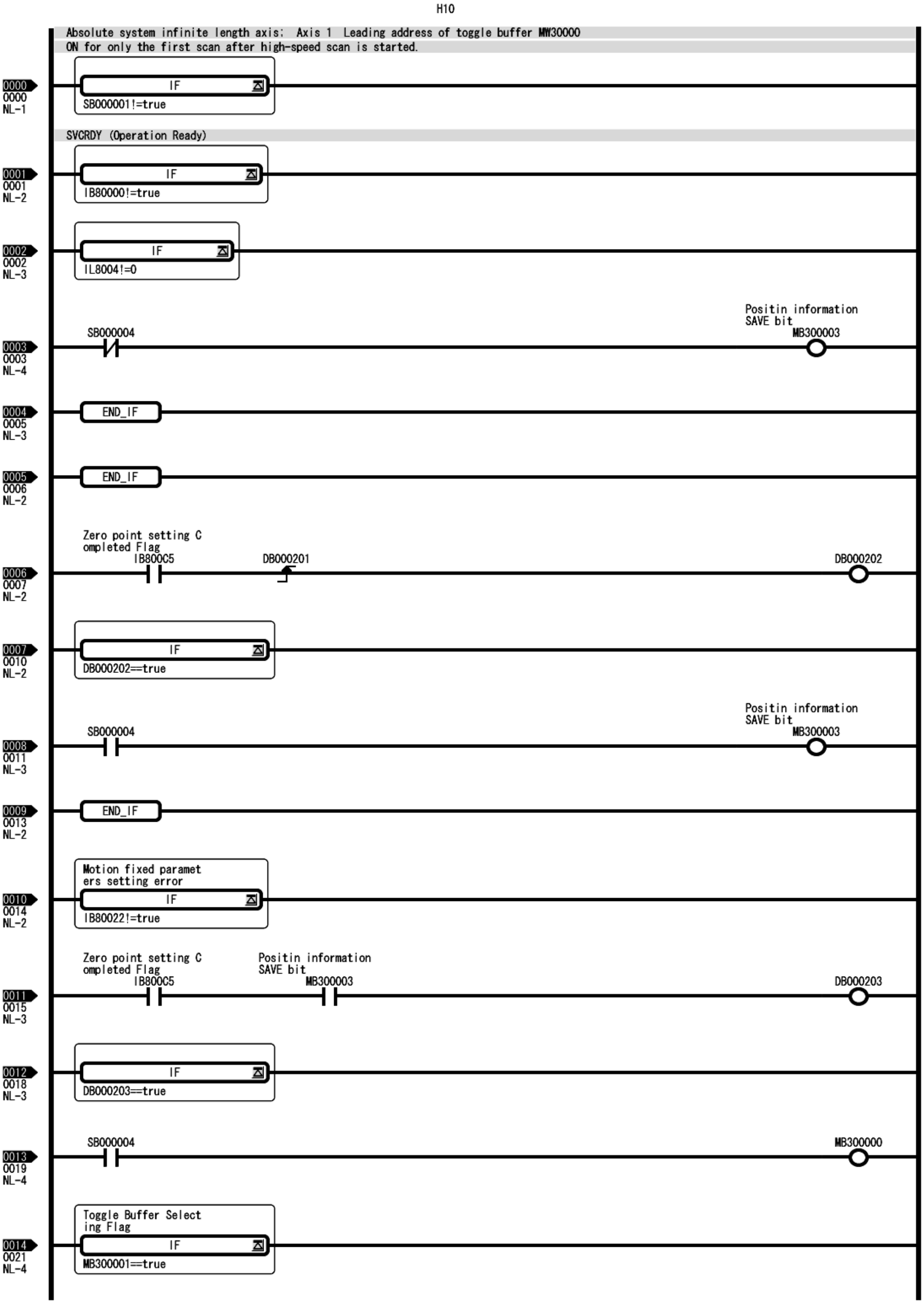
- Two buffers are needed to save the encoder position and the pulse position at power OFF because the program may be exited without settling position data at all four words if power is turned OFF during the high-speed scan.

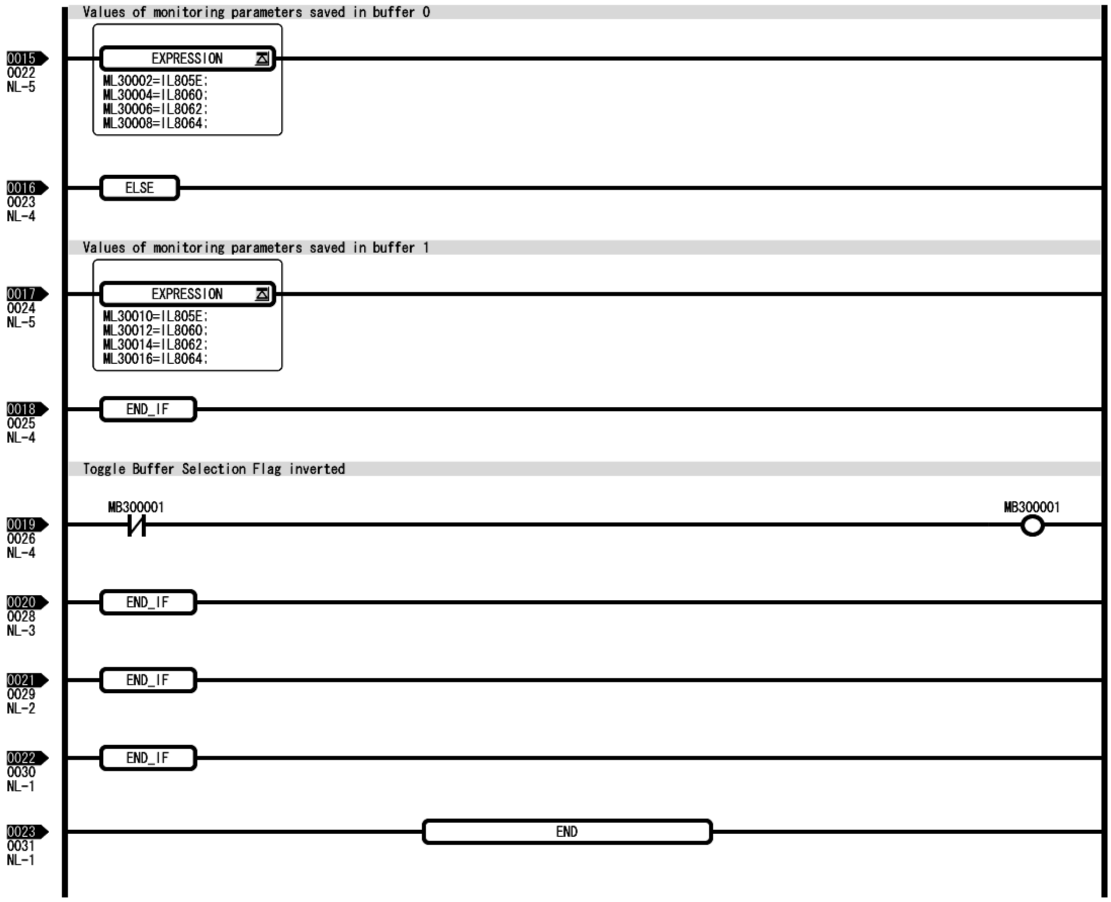
Use the following flowchart to store values in buffers.



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.

P00001 H10 Main Program





[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 servo power is turned 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

Reset the Request ABS Rotary Pos. Load bit (setting parameter OW□□00, bit 7) to 0, 1 and 0 again. This will allow all position data to be settled. The following monitoring parameters will then be enabled and the Zero Point Return (Setting) Completed bit (monitoring parameter IW□□0C, bit 5) will turn ON.

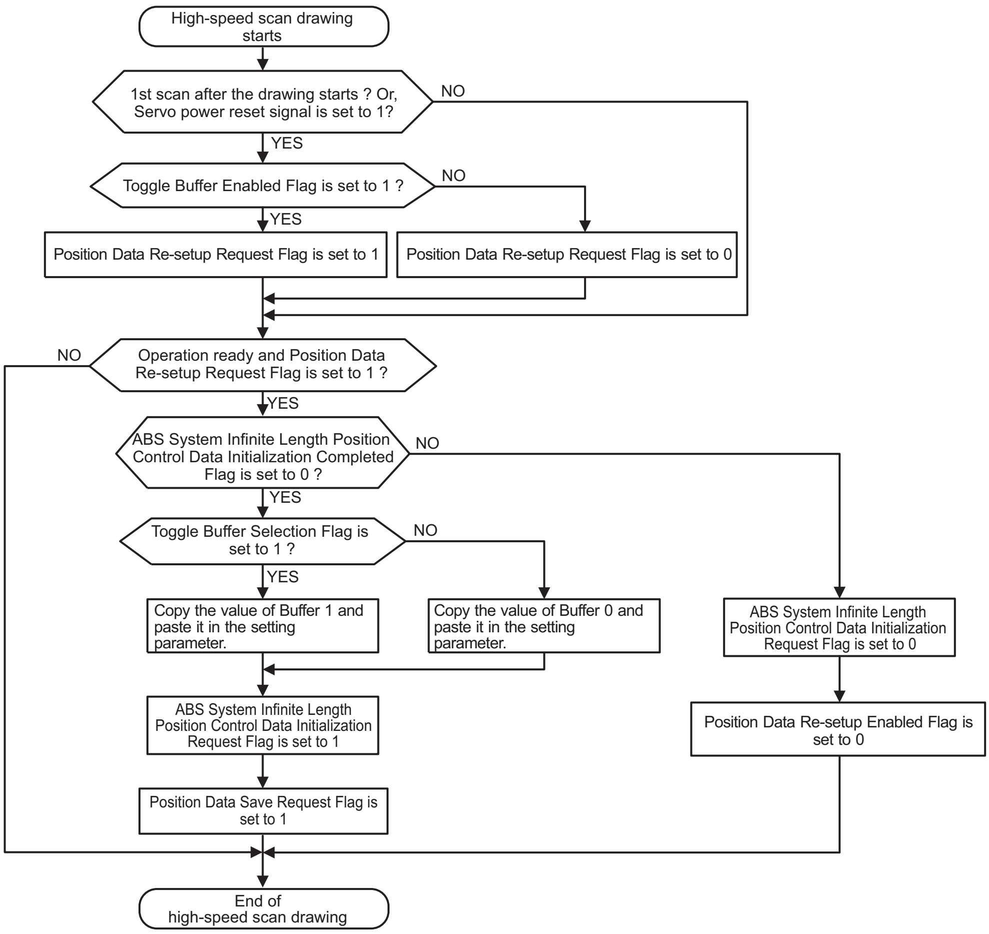
- Monitoring Parameter: Encoder Position when the Power is OFF (All four words, from IL□□5E to IL□□60.)
- Monitoring Parameter: Pulse Position When the Power is OFF (All four words, from IL□□62 to IL□□64.)

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)*

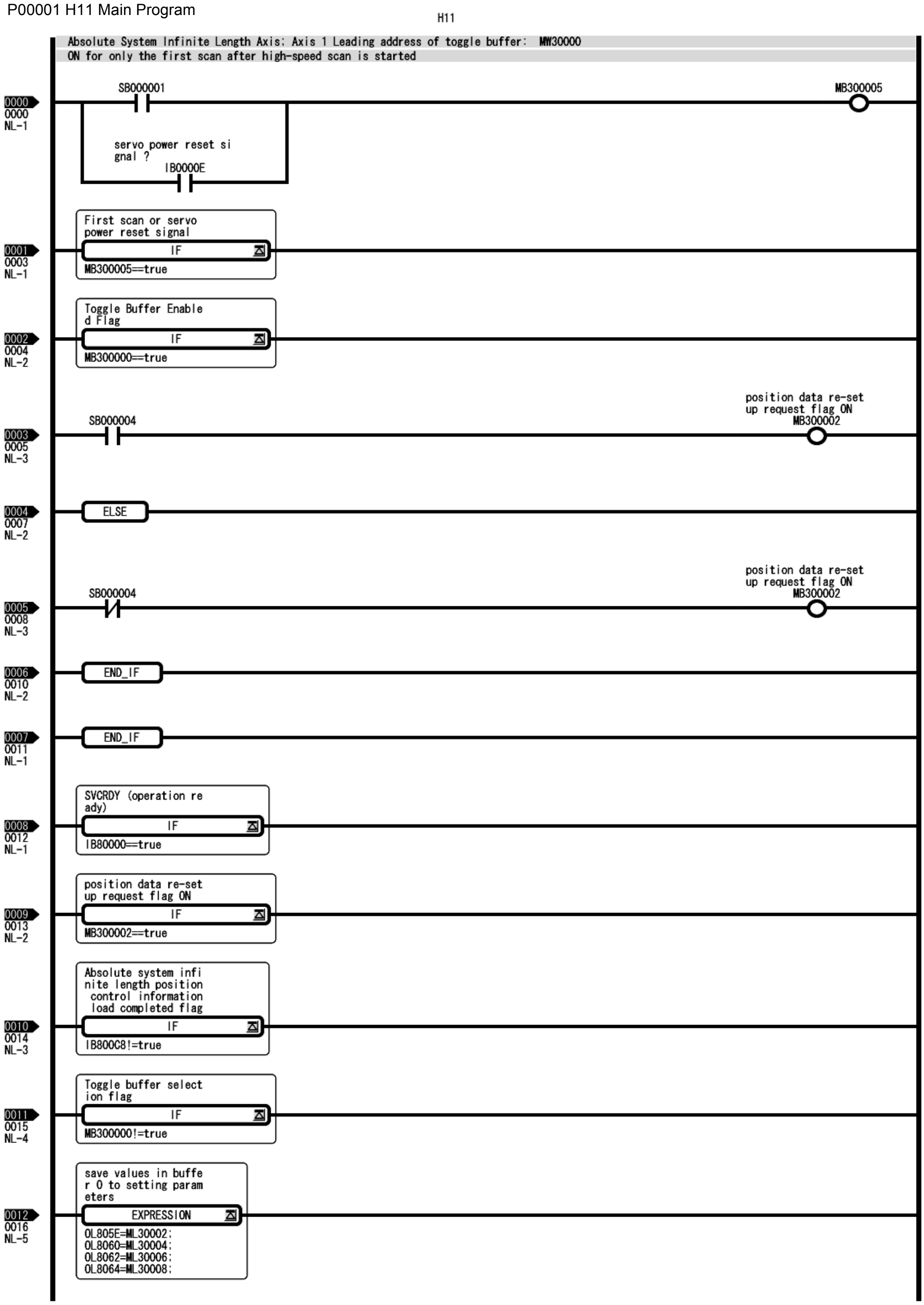
* The portion in parentheses ( ) represents the moving amount while power is OFF.

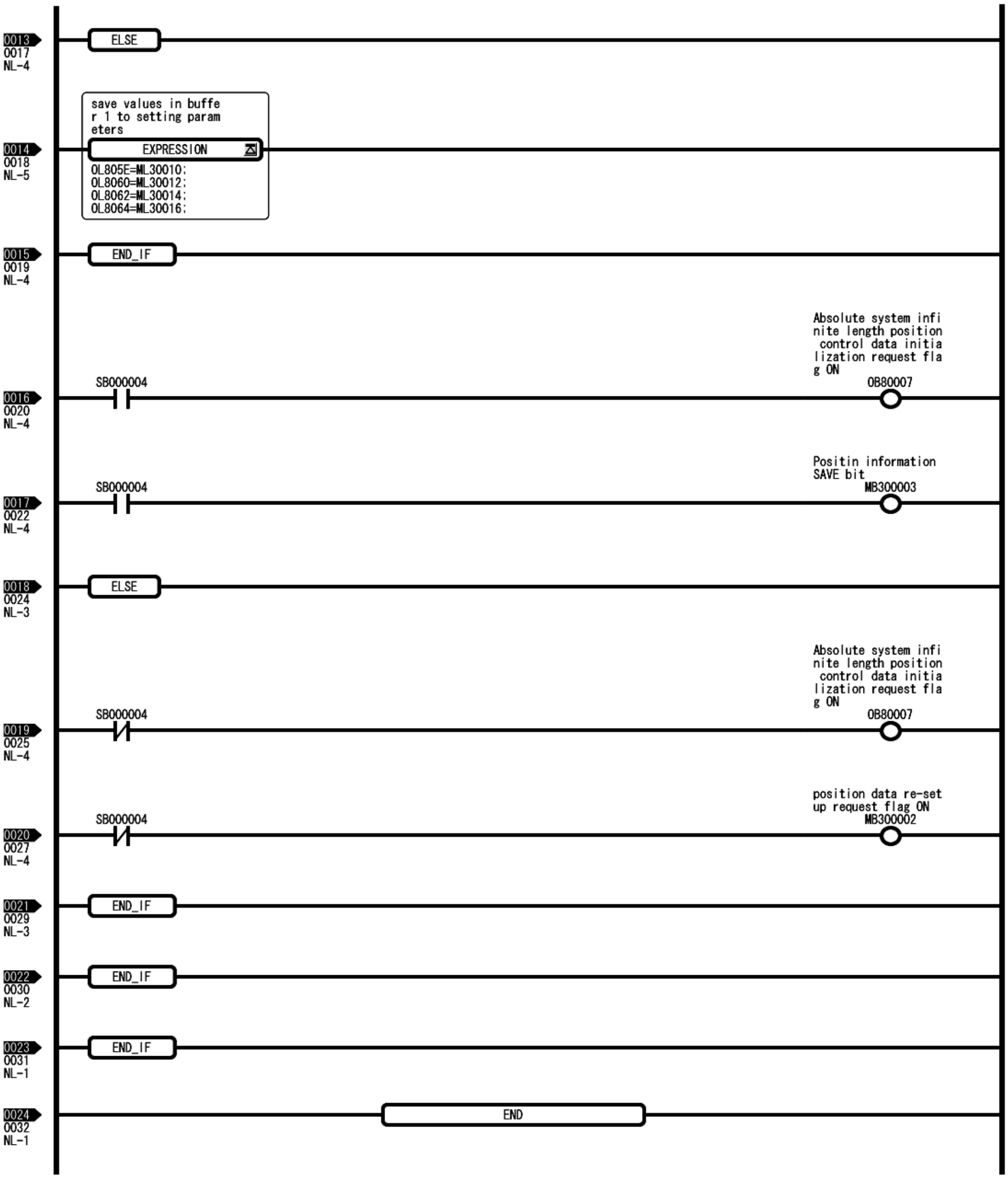
Use the following flowchart for storing the position data in the setting parameters and for requesting to load the infinite length axis position information.



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.

P00001 H11 Main Program





- 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

Settings for Connecting Inverters

This chapter describes the operations needed to connect inverters, and the settings for commands and parameters required when inverters are connected to a Machine Controller.

10.1 Specifications for Communications with Connected Inverters

The following table provides the specifications required when connecting inverters through MECHATROLINK.

Communication Specifications		MECHATROLINK-II (32-byte)	MECHATROLINK-II (17-byte)	MECHATROLINK-I
Supported Models	SVB Module	Built-in SVB: With CPU version 2.20 or later SVB-01: Version 1.10 or later		
	Engineering Tool	MPE720 version 5.12 or later		
	Inverter	VarispeedG7 VarispeedF7 VSminiV7 A1000 V1000		
Number of Connectable Inverters		16 max. (at transmission cycle 2 ms) • Differs depending on whether or not the message is used and the number of retries to slaves. *1	15 max. • Differs depending on whether or not the message is used and the number of retries to slaves. *2	14 max.
Transmission Cycle		1 ms or 2 ms	1 ms	2 ms
Interface		Fixed parameters (To set application conditions) Setting parameters (To update references and output data) Monitoring parameters (To update monitored or input data)		
Self-configuration Function		Available		
Others		Conforms with MECHATROLINK-I or -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 retries to slaves is 0 to 7.

10.2 Operating Inverters Using an MPE720

This section describes how to operate inverters using an MPE720 (version 5.12 or later).

10.2.1 Check Items before Operation

Confirm the following items before starting operation.

- For information on how to set inverter constants and user constants, refer to the relevant inverter manual.

(1) For VarispeedG7, F7, and A1000

- Inverter user constant b1-01 (Reference Selection) must be set to 3 (Option Board).
- Inverter user constant b1-02 (Operation Method Selection) must be set to 3 (Option Board).
- The inverter constants shown in the following table must be correctly set.

Inverter Constant No.	Name	Setting Range	Default Setting
F6-01	Operation selection after communications error	0 to 3	1: Coast to stop
F6-02	Input level of external fault from communications option board	0 or 1	0: Always detect 1: Detect during operation
F6-03	Stopping method for external fault from communications board	0 to 3	1: Coast to stop
F6-06	Torque reference/torque limit selection from optical option	0 or 1	1: Torque reference/torque limit from transmission enabled

(2) For VSminiV7

- Inverter user constant n004 (Reference Selection) must be set to 9 (Option Board).
- Inverter user constant n003 (Operation Method Selection) must be set to 3 (Option Board).

10.2.2 Operation Precautions

- The phrase “While the inverter is running” used in items (1) through (5) refers to bit 5 (During Running) of the monitoring parameter IW☐☐10 (Status) being ON. Whenever bit 5 of IW☐☐10 is ON, the inverter is considered to be running, even when the motor is stopped.
- The phrase “While the inverter is stopped” used in the items (1) through (5) refers to bit 5 of IW☐☐10 being OFF.

(1) Operation When the CPU is Stopped

When CPU STOP is executed from the Machine Controller while the inverter is running (IW☐☐10, bit 5 = ON), the SVB Module will forcibly stop the inverter, and the forward rotation or reverse rotation bit that is turned ON by the user application will be forcibly turned OFF.
When CPU STOP is reset to CPU RUN, the SVB Module will cancel the forced stop and the inverter will restart operation according to the user application.

(2) Change in MECHATROLINK Allocation While the Inverter is Running

While the inverter is running (IW☐☐10, bit 5 = ON), the MECHATROLINK definitions of SVB Definition Window cannot be saved. Save the MECHATROLINK definition while the inverter is stopped (IW☐☐10, bit 5 = OFF).

(3) Change in Fixed Parameter Setting While the Inverter is Running

The fixed parameters cannot be saved while the inverter is running (IW☐☐10, bit 5 = ON). Save the fixed parameters while the inverter is stopped (IW☐☐10, bit 5 = OFF).

(4) Switching between Motion Commands While the Command Control Inverter Drive is Being Executed

If the command Control Inverter Drive is switched to another command while the inverter is running (IW☐☐10, bit 5 = ON), the motor will continue running. Note that switching the command to NOP (No Command) also will not stop the motor.

(5) Motor Stopping Methods

■ Method 1

While the command Control Inverter Drive is being executed, set the bit 0 (Forward RUN) or bit 1 (Reserve RUN) of the Input Command (OW☐☐10) to OFF.
To restart the motor that has been stopped using this method, set the bit 0 or bit 1 of OW☐☐10 to ON.

■ Method 2

Set the Drive Permission bit of the Run Command Setting parameter (OW☐☐00, bit D) to OFF.
To restart a motor that has been stopped using this method, execute the following commands:

Switch the command to NOP (No Command)
↓
Set the bit D (Drive Permission) of the parameter Run Command Setting (OW☐☐00) to ON.
↓
Switch the command to Inverter Drive Control.

(6) Saving Fixed Parameters

Always save the fixed parameters after manually allocating inverters. If not saved, the current values setting parameters will be reset to their default values when restarting the Machine Controller.

10.2.3 Operation Procedure

Connect the inverter to the Machine Controller through MECHATROLINK-I or MECHATROLINK-II, and then carry out the following operations:

1. Execute the Machine Controller self-configuration.

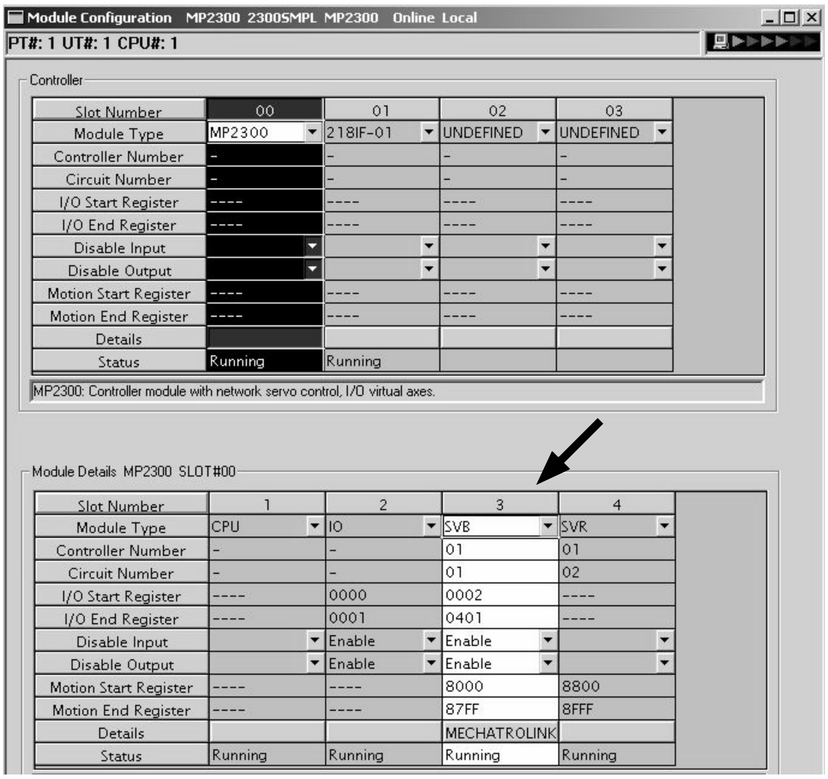
The inverter will be allocated to the Machine Controller's SVB Definition.

- The inverter can be also manually allocated. Refer to *10.2.4 Manually Allocating Inverters* for details.

2. Start the MPE720 (version 5.12 or later) in the personal computer connected to the Machine Controller, and open the Module Configuration Window.

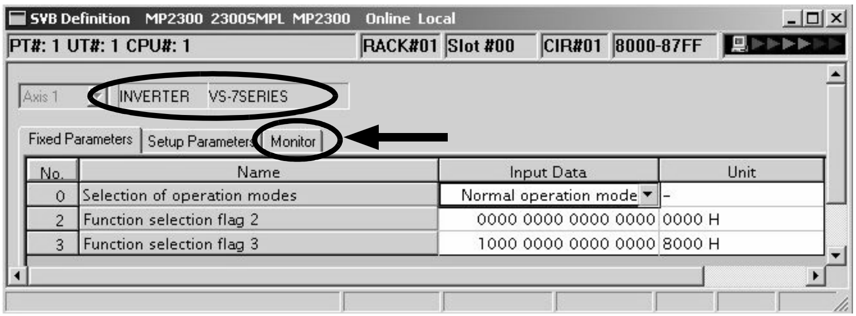
- Refer to *3.4.1 (1) How to Open the Module Configuration Window* for more information.

3. Double-click the ***Slot Number*** cell of the ***SVB*** column in the Module Details field.



The SVB Definition Window will open.

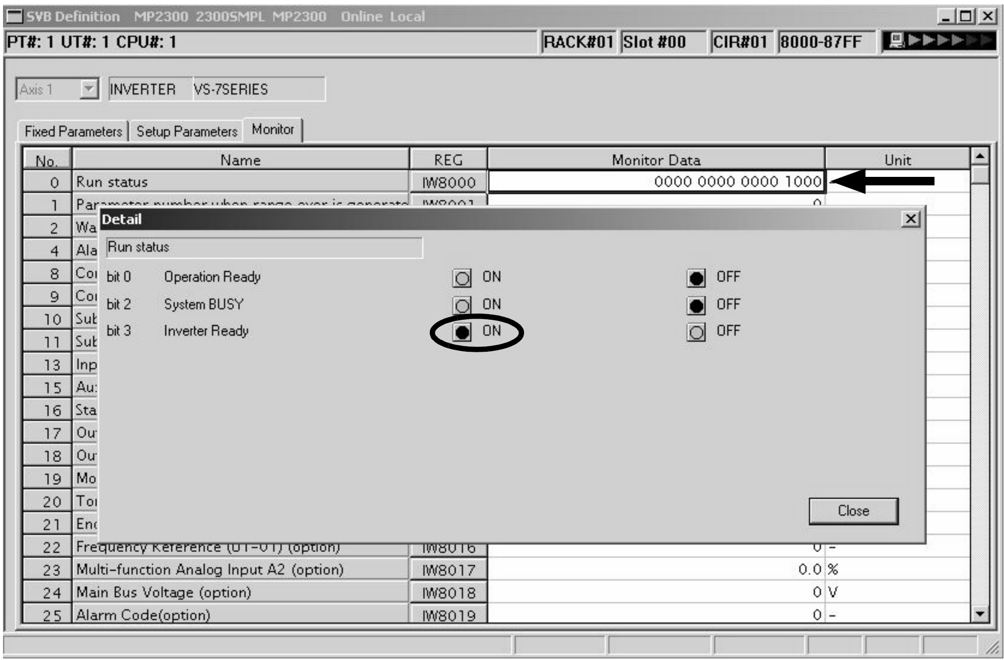
4. Confirm that ***INVERTER*** and ***VS-7SERIES*** are selected for the axis type, then click the **Monitor** Tab.



The Monitor Tab Page will open.

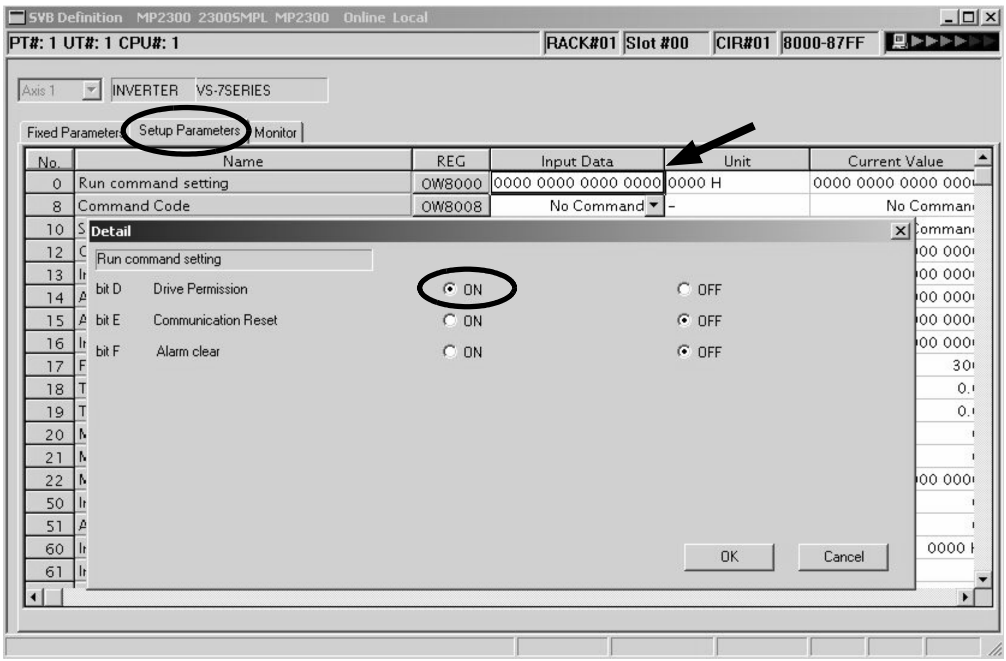
5. Confirm that bit 3 of the ***Run status*** (IW□□00) is set to 1 (ON).

- Double-clicking the ***Monitor Data*** column will open the **Details** Window to check the status of each bit.

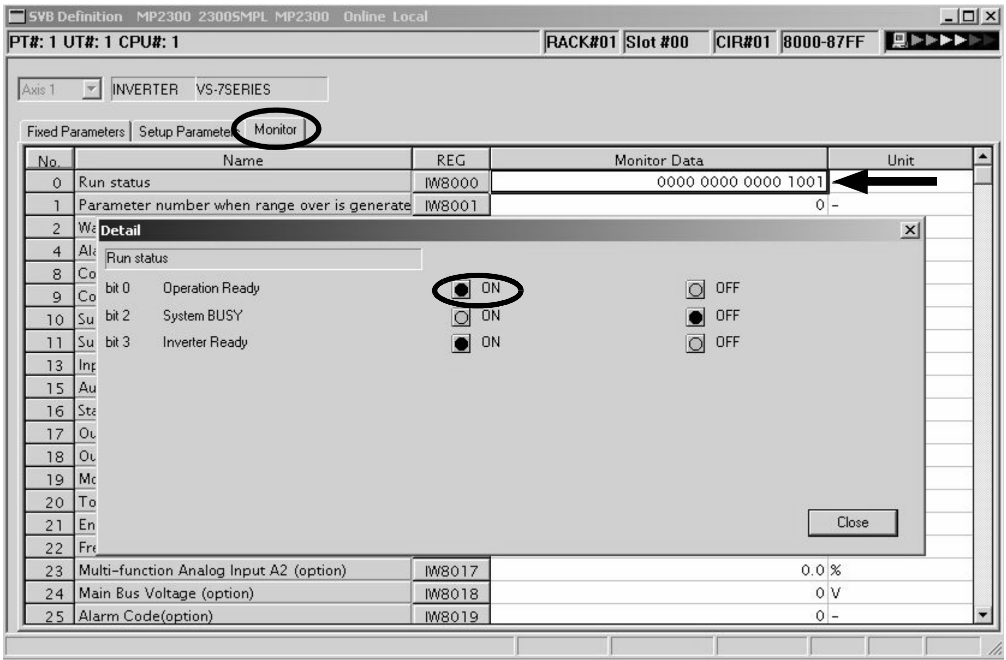


When bit 3 is set to 1 (ON), the inverter is ready to run and the connection has been established.
When it is set to 0 (OFF), check the MECHATROLINK cable connection, settings for inverter user constants, and link assignment of the SVB module.

6. Click the **Setup Parameters** Tab to switch the tab page, then set bit D (Drive Permission) of Run Command Setting parameter (OW□□00) to 1 (ON).



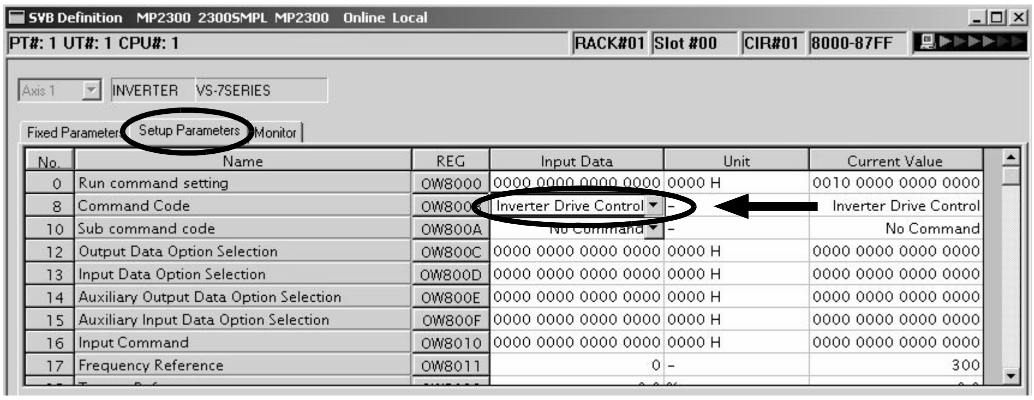
7. Click the **Monitor** Tab again to return to the **Monitor** Tab page, then confirm that bit 0 of the Run status (IW□□00) is set to 1 (ON).



If bit 0 is still set to 0 (OFF), return to the **Setup Parameters** Tab Page to see if the Command Code (OW□□08) is set to a command other than Inverter Drive Control. If it is set to Inverter Drive Control, change it to a command other than Inverter Drive Control, and set bit D (Drive Permission) of Run Command Setting parameter (OW□□00) to 0 (OFF) then to 1 (ON) again.

8. Click the **Setup Parameters** Tab. Set the setting parameter Command Code (OW□□08) to Inverter Drive Control in the **Setup Parameters** Tab Page.

- After setting bit D (Drive Permission) of Run Command Setting parameter (OW□□00) in step 6, wait at least the time equivalent to one high-speed scan to set the setting parameter Command Code.



The above settings will enable the following inverter outputs and inputs.

<Inverter Output> (Setup Parameters Tab Page)
Input Command (OW□□10)
Frequency Reference (OW□□11)
Torque Reference (OW□□12)

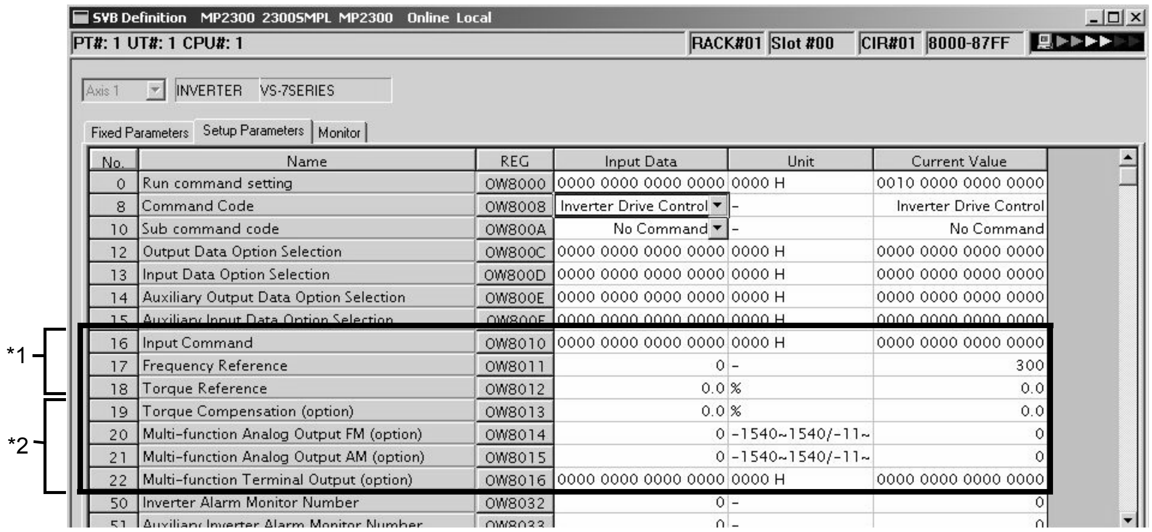
<Inverter Input> (Monitor Tab Page)
Status (IW□□10)
Output Frequency (IW□□11)
Output Current (IW□□12)

If required, set the Output Data Option Selection (OW□□0C) and Input Data Option Selection (OW□□0D) to enable the data outputs of OW□□13 to OW□□16 and data inputs of IW□□13 to IW□□1D.

- Refer to *10.2.5 I/O Options* for details on Output Data Option Selection and Input Data Option Selection.

The output and input data that can be set during inverter operation are described below.

■ Output Data for Inverter Drive Control (Setup Parameters Tab Page)



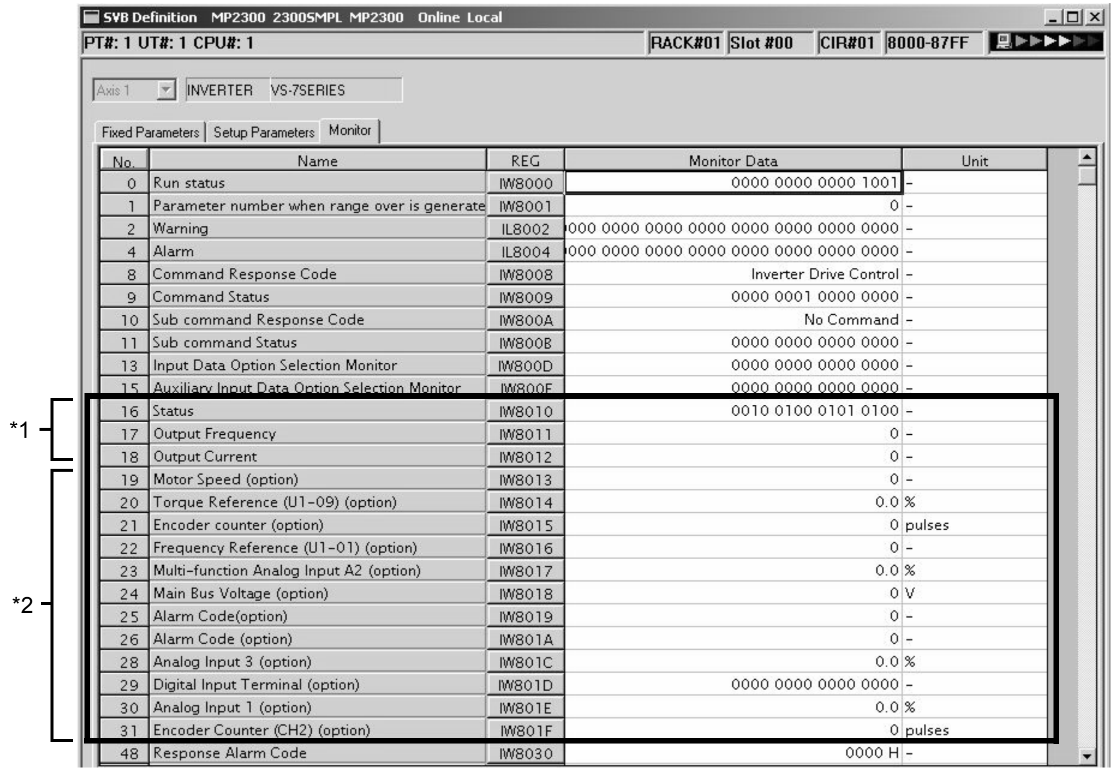
No.	Name	REG	Input Data	Unit	Current Value
0	Run command setting	OW8000	0000 0000 0000 0000	0000 H	0010 0000 0000 0000
8	Command Code	OW8008	Inverter Drive Control	-	Inverter Drive Control
10	Sub command code	OW800A	No Command	-	No Command
12	Output Data Option Selection	OW800C	0000 0000 0000 0000	0000 H	0000 0000 0000 0000
13	Input Data Option Selection	OW800D	0000 0000 0000 0000	0000 H	0000 0000 0000 0000
14	Auxiliary Output Data Option Selection	OW800E	0000 0000 0000 0000	0000 H	0000 0000 0000 0000
15	Auxiliary Input Data Option Selection	OW800F	0000 0000 0000 0000	0000 H	0000 0000 0000 0000
16	Input Command	OW8010	0000 0000 0000 0000	0000 H	0000 0000 0000 0000
17	Frequency Reference	OW8011	0	-	300
18	Torque Reference	OW8012	0.0	%	0.0
19	Torque Compensation (option)	OW8013	0.0	%	0.0
20	Multi-function Analog Output FM (option)	OW8014	0	-1540~1540/-11~	0
21	Multi-function Analog Output AM (option)	OW8015	0	-1540~1540/-11~	0
22	Multi-function Terminal Output (option)	OW8016	0000 0000 0000 0000	0000 H	0000 0000 0000 0000
50	Inverter Alarm Monitor Number	OW8032	0	-	0
51	Auxiliary Inverter Alarm Monitor Number	OW8033	0	-	0

* 1. Output data that is always available during inverter control operation

* 2. Data that is available when Output Data Option Selection (OW□□0C) is selected while the command Inverter Drive Control is being executed, or when Auxiliary Output Data Option Selection (OW□□0E) is selected while the subcommand Inverter I/O Control is being executed.

- The subcommand Inverter I/O Control is valid only in MECHATROLINK-II 32-byte mode.
- If the command Inverter Drive Control is switched to another command during its execution, the Inverter retains the last data and continues operation. The MPE720 retains the last data of the monitoring parameters since inputs and outputs between SVB Module and Inverter are stopped. The monitoring parameter Status, 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 *10.4.4 Inverter Output Data Details* for details.

■ Input Data for Inverter Drive Control (Monitoring Tab Page)



No.	Name	REG	Monitor Data	Unit
0	Run status	IW8000	0000 0000 0000 1001	-
1	Parameter number when range over is generate	IW8001	0	-
2	Warning	IL8002	000 0000 0000 0000 0000 0000 0000 0000	-
4	Alarm	IL8004	000 0000 0000 0000 0000 0000 0000 0000	-
8	Command Response Code	IW8008	Inverter Drive Control	-
9	Command Status	IW8009	0000 0001 0000 0000	-
10	Sub command Response Code	IW800A	No Command	-
11	Sub command Status	IW800B	0000 0000 0000 0000	-
13	Input Data Option Selection Monitor	IW800D	0000 0000 0000 0000	-
15	Auxiliary Input Data Option Selection Monitor	IW800F	0000 0000 0000 0000	-
16	Status	IW8010	0010 0100 0101 0100	-
17	Output Frequency	IW8011	0	-
18	Output Current	IW8012	0	-
19	Motor Speed (option)	IW8013	0	-
20	Torque Reference (U1-09) (option)	IW8014	0.0	%
21	Encoder counter (option)	IW8015	0	pulses
22	Frequency Reference (U1-01) (option)	IW8016	0	-
23	Multi-function Analog Input A2 (option)	IW8017	0.0	%
24	Main Bus Voltage (option)	IW8018	0	V
25	Alarm Code(option)	IW8019	0	-
26	Alarm Code (option)	IW801A	0	-
28	Analog Input 3 (option)	IW801C	0.0	%
29	Digital Input Terminal (option)	IW801D	0000 0000 0000 0000	-
30	Analog Input 1 (option)	IW801E	0.0	%
31	Encoder Counter (CH2) (option)	IW801F	0	pulses
48	Response Alarm Code	IW8030	0000 H	-

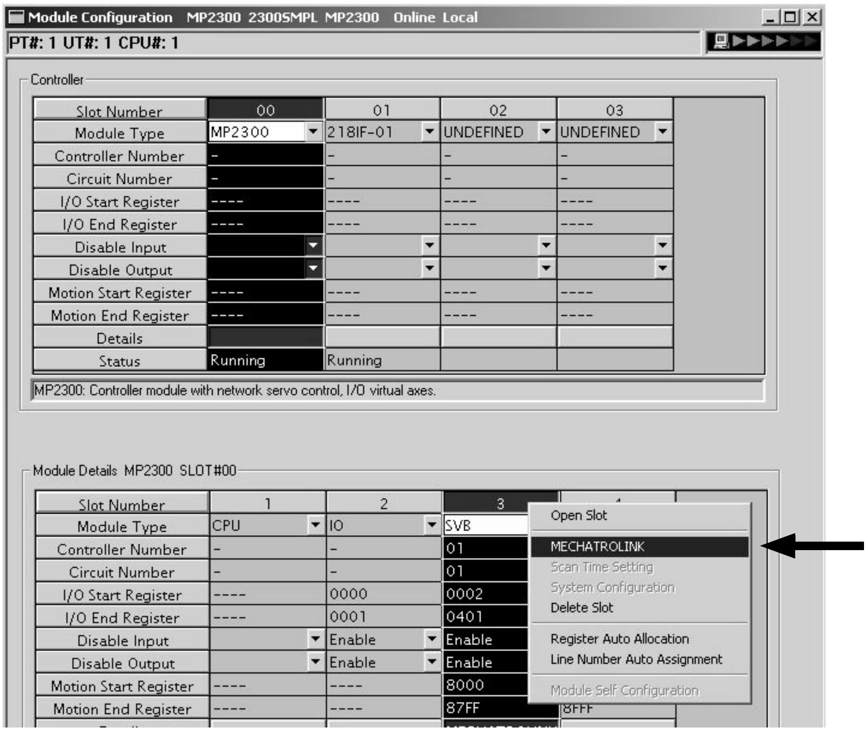
* 1. Input data that is always available during inverter control operation
* 2. Data that are available when Input Data Option Selection (OW☐☐0D) is selected while the command Inverter Drive Control is being executed, or when Auxiliary Input Data Option Selection (OW☐☐0F) is selected while the subcommand Inverter I/O Control is being executed.

- The subcommand Inverter I/O Control is valid only in MECHATROLINK-II 32-byte mode.
- The input data that can be used depends on the Inverter model. Refer to *10.4.5 Inverter Input Data Details* for details.

10.2.4 Manually Allocating Inverters

1. Start the MPE720 (version 5.12 or later) installed in the personal computer connected to the Machine Controller, and open the **Module Configuration** Window.

2. Right-click the SVB column in the Module Details field, and select ***MECHATROLINK*** from the pop-up menu.

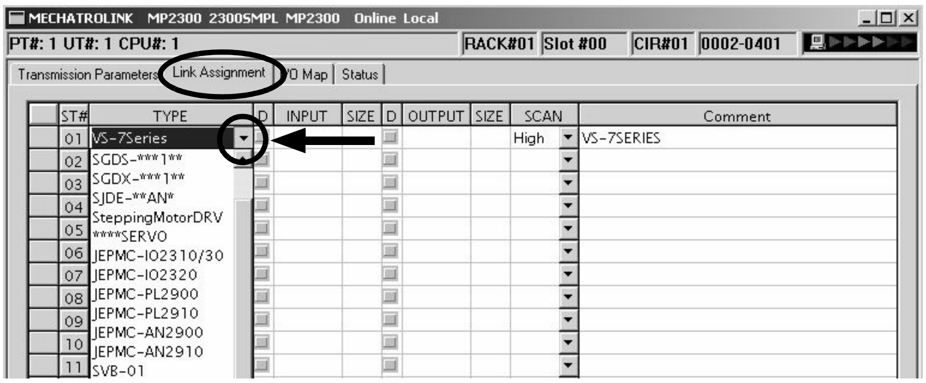


The MECHATROLINK Definition Window for parameter setting will open.

3. Click **Link Assignment** Tab to display the tab page.

4. Click the ▼ Button in the ***TYPE*** column, and select ***VS-7Series*** (Inverter) from the list.

- Always select ***VS-7Series*** regardless of the actual inverter model.



5. Select ***File*** - ***Save*** from the main menu to save the setting.

6. Click the close button **X** to close the MECHATROLINK Definition Window and return to the **Module Configuration** Window.

10.2.5 I/O Options

(1) Output Data Options

The parameters OW☐☐13 to OW☐☐16 are for output data options.
These output data options will be available when:

- The Output Data Option Selection (OW☐☐0C) is selected while the command Inverter Drive Control is being executed.
- The Auxiliary Output Data Option Selection (OW☐☐0E) is selected while the subcommand Inverter I/O Control is being executed.

(2) Input Data Options

The parameters IW☐☐13 to IW☐☐1F are for input data options.
These input data options will be available when:

- The Input Data Option Selection (OW☐☐0D) is selected while the command Inverter Drive Control is being executed.
- The Auxiliary Input Data Option Selection (OW☐☐0F) is selected while the subcommand Inverter I/O Control is being executed.

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 monitoring 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 Select, 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.

■ 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 (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

10.3 Main Commands and Subcommands

This section describes the main commands and subcommands that can be used when connecting Inverters.

10.3.1 List of Main Commands and Subcommands

The following table lists the main commands and subcommands that are available for each communication protocol.

	Name	MECHATROLINK-II (32-byte mode)	MECHATROLINK-II (17-byte mode)	MECHATROLINK-I
Main Commands (OW☐☐08)	00: No Command	Applicable	Applicable	Applicable
	01: Inverter Drive Control	Applicable	Applicable	Applicable
	02: Read User Constant	*1	Applicable	Applicable
	03: Write User Constant	*1	Applicable	Applicable
	04: Alarm Monitor	Applicable	Applicable	Applicable
	05: Alarm History Monitor	Applicable	Applicable	Applicable
	06: User Constant RAM Writing	Applicable	Applicable	Applicable
	07: User Constant EEPROM Writing	Applicable	Applicable	Applicable
	08: Transmission Reference	Applicable	Applicable	Applicable
Subcommands (OW☐☐0A)	0: No Command	Applicable	Applicable	Applicable
	01: Inverter I/O Control	Applicable	*2	*2
	02: Read User Constant	Applicable	*2	*2
	03: Write User Constant	Applicable	*2	*2
	04: Alarm Monitor	Applicable	*2	*2
	05: Alarm History Monitor	Applicable	*2	*2
	08: Transmission Reference	Applicable	*2	*2
	09: Read Fixed Parameter *3	Applicable	Applicable	Applicable

* 1. The SVB Module sends a command, but an error response will be returned from the Inverter.
* 2. When a command is selected, the SVB Module will return an error.
* 3. Subcommand to read out a fixed parameter in the SVB Module. This subcommand will not be sent through the MECHATROLINK transmission line.

10.3.2 Applicable Combinations of Commands and Subcommands

The following table shows applicable combinations of commands and subcommands.

Command \ Subcommand	No Command	Inverter I/O Control	Read User Constant	Write User Constant	Monitor Current Alarm	Monitor Alarm History	Transmission Reference	Read Fixed Parameter
00: No Command	✓	✓	✓	✓	✓	✓	✓	✓
01: Inverter Drive Control	✓	✓	✓	✓	✓	✓	✓	✓
02: Read User Constant	–*1	–*1	–*1	–*1	–*1	–*1	–*1	✓
03: White 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	✓

✓: Applicable, –: Not applicable

* 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 is no restriction 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 command Inverter Drive Control is incompatible with the subcommand Inverter I/O Control, the main command processing will be overwritten by the subcommand processing.

10.3.3 Command Details

Each command and its parameters are described below.

(1) No Command

■ Description

No command to be executed

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	00: No Command

■ Monitoring Parameters

<table>
<tr><th>Name</th><th>Register No.</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>Command Response Code</td><td>IW□□08</td><td>0 to 8</td><td colspan="2">00: No Command</td></tr>
<tr><td rowspan="3">Command Status</td><td rowspan="3">IW□□09</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>Always OFF</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 status)</td><td>ON when command execution is completed.</td></tr>
<tr><td>Status</td><td>IW□□10</td><td>Bit</td><td colspan="2">Inverter status</td></tr>
<tr><td>Response Alarm Code</td><td>IW□□30</td><td>0 to FFFFH</td><td colspan="2">Inverter alarm code</td></tr>
</table>

(2) Inverter Drive Control

■ Description

Sends commands to the Inverter and monitors the Inverter.

- If the command Inverter Drive Control is switched to another command during its execution, the Inverter retains the last data and continues operation. The MPE720 retains the last data of the monitoring parameters since inputs and outputs between SVB Module and Inverter are stopped. The monitoring parameter Status, however, will be updated for any command being executed except Transmission Reference.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	01: Inverter Drive Control
Output Data Option Selection	OW□□0C	Bit 0 to 3	
Input Data Option Selection	OW□□0D	Bit 0 to C	
Input Command	OW□□10	Bit	
Frequency Reference	OW□□11		
Torque Reference	OW□□12		
Torque Compensation	OW□□13		Valid when the Output Data Option Selection (OW□□0C), bit 0 is ON.
Multi-function Analog Output FM (Option)	OW□□14		Valid when the Output Data Option Selection (OW□□0C), bit 1 is ON.
Multi-function Analog Output AM (Option)	OW□□15		Valid when the Output Data Option Selection (OW□□0C), bit 2 is ON.
Multi-function Terminal Output	OW□□16		Valid when the Output Data Option Selection (OW□□0C), bit 3 is ON.

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Command Response Code	IW□□08	0 to 8	01: Inverter Drive Control	
Command Status	IW□□09	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)	ON when command execution is completed.
Input Data Option Selection Monitor	IW□□0D	Bit	Displays optional input data.	
Status	IW□□10	Bit	Inverter status	
Output Frequency	IW□□11			
Output Current	IW□□12			
Motor Speed (Option)	IW□□13		Valid when Input Data Option Selection (OW□□0D) bit 0 is ON.	
Torque Reference	IW□□14		Valid when Input Data Option Selection (OW□□0D) bit 1 is ON.	
Encoder Counter (Option)	IW□□15	0 to 65535	Valid when Input Data Option Selection (OW□□0D) bit 2 is ON.	
Frequency Reference	IW□□16		Valid when Input Data Option Selection (OW□□0D) bit 3 is ON.	
Multi-function Analog Input A2 (Option)	IW□□17		Valid when Input Data Option Selection (OW□□0D) bit 4 is ON.	
Main Bus Voltage (Option)	IW□□18		Valid when Input Data Option Selection (OW□□0D) bit 5 is ON.	
Alarm Code (Option)	IW□□19		Valid when Input Data Option Selection (OW□□0D) bit 6 is ON.	
Alarm Code (Option)	IW□□1A		Valid when Input Data Option Selection (OW□□0D) bit 7 is ON.	
Multi-function Analog Input A3 (Option)	IW□□1C		Valid when Input Data Option Selection (OW□□0D) bit 9 is ON.	
Digital Input Terminal (Option)	IW□□1D		Valid when Input Data Option Selection (OW□□0D) bit A is ON.	
Multi-function Analog Input A1 (Option)	IW□□1E		Valid when Input Data Option Selection (OW□□0D) bit B is ON.	
Encoder Counter (CH2) (Option)	IW□□1F		Valid when Input Data Option Selection (OW□□0D) bit C is ON.	
Response Alarm Code	IW□□30	0 to FFFF	Inverter alarm code	

(3) Read User Constant

■ Description

Reads the specified user constant from the Inverter.

- Valid only when using MECHATROLINK-II 17-byte mode or MECHATROLINK-I.
  Use a subcommand when using MECHATROLINK-II 32-byte mode.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	02: Read User Constant
Inverter User Constant Number	OW□□3C	0 to FFFFH	
Inverter User Constant Number Size	OW□□3D	1 to 4	Data type: Word (Enter the size of the user constant read out from the leading user constant number of the inverter.)

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Command Response Code	IW□□08	0 to 8	02: Read User Constant	
Command Status	IW□□09	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	ON when an error occurs during command processing
			Bit 8 (Command execution completed)	ON when command execution is completed.
Status	IW□□10	Bit	Inverter status	
Response Alarm Code	IW□□30	0 to FFFFH	Inverter alarm code	
Inverter User Constant Number	IW□□3C	0 to FFFFH		
User Constant Reading Data 1	IW□□3E	0 to 65535		
User Constant Reading Data 2	IW□□3F	0 to 65535		
User Constant Reading Data 3	IW□□40	0 to 65535		
User Constant Reading Data 4	IW□□41	0 to 65535		

(4) Write User Constant

■ Description

Writes the specified inverter user constant to a constant in the Inverter.

- Valid when using MECHATROLINK-II 17-byte mode and MECHATROLINK-I.
  Use the subcommand when using MECHATROLINK-II 32-byte mode.
- With Varispeed G7and F7, it is necessary to execute the command User Constant RAM Writing (see *(7) User Constant RAM Writing*) to validate the data written by executing Write User Constant.
  With VSminiV7, the data written by executing Write User Constant will be immediately validated.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	03: Write User Constant
Inverter User Constant Number	OW□□3C	0 to FFFFH	
Inverter User Constant Number Size	OW□□3D	1 to 4	Data type: Word (Enter the size of the user constant read out from the leading user constant number of the inverter.)
Inverter User Constant Set Point 1	OW□□3E	0 to 65535	
Inverter User Constant Set Point 2	OW□□3F	0 to 65535	
Inverter User Constant Set Point 3	OW□□40	0 to 65535	
Inverter User Constant Set Point 4	OW□□41	0 to 65535	

■ Monitoring Parameters

<table>
<tr><th>Name</th><th>Register No.</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>Command Response Code</td><td>IW□□08</td><td>0 to 8</td><td colspan="2">03: Write User Constant</td></tr>
<tr><td rowspan="3">Command Status</td><td rowspan="3">IW□□09</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON during execution</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>ON when command execution is completed.</td></tr>
<tr><td>Status</td><td>IW□□10</td><td>Bit</td><td colspan="2">Inverter status</td></tr>
<tr><td>Response Alarm Code</td><td>IW□□30</td><td>0 to FFFFH</td><td colspan="2">Inverter alarm code</td></tr>
<tr><td>Inverter User Constant Number</td><td>IW□□3C</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.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	04: Alarm Monitor

■ Monitoring Parameters

<table>
<tr><th>Name</th><th>Register No.</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>Command Response Code</td><td>IW□□08</td><td>0 to 8</td><td colspan="2">04: Alarm Monitor</td></tr>
<tr><td rowspan="3">Command Status</td><td rowspan="3">IW□□09</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON during execution</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 status)</td><td>ON when command execution is completed.</td></tr>
<tr><td>Status</td><td>IW□□10</td><td>Bit</td><td colspan="2">Inverter status</td></tr>
<tr><td>Response Alarm Code</td><td>IW□□30</td><td>0 to FFFFH</td><td colspan="2">Inverter alarm code</td></tr>
<tr><td>Inverter Alarm Code</td><td>IW□□32</td><td>0 to FFFFH</td><td colspan="2">The currently occurring alarm is read out</td></tr>
</table>

(6) Alarm History Monitor

■ Description

Reads the Inverter alarm history.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	05: Alarm History Monitor
Inverter Alarm Monitor Number	OW□□32	0 to 3	Alarm monitor number (0 to 3 for Varispeed G7 and F7, 0 or 1 for VSminiV7)

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Command Response Code	IW□□08	0 to 8	05: Alarm History Monitor	
Command Status	IW□□09	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	ON when an error occurs during command processing
			Bit 8 (Command execution completed)	ON when command execution is completed.
Status	IW□□10	Bit	Inverter status	
Response Alarm Code	IW□□30	0 to FFFFH	Inverter alarm code	
Inverter Alarm Code	IW□□32	0 to FFFFH	The alarm history is read out	

(7) User Constant RAM Writing

■ Description

Saves the parameter data written by executing Write User Constant in the Inverter volatile memory to validate the data.

- With VSminiV7, the data written by executing Write User Constant will be validated without executing this command.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	06: User Constant RAM Writing

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Command Response Code	IW□□08	0 to 8	06: User Constant RAM Writing	
Command Status	IW□□09	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	ON when an error occurs during command processing
			Bit 8 (Command execution completed)	ON when command execution is completed.
Status	IW□□10	Bit	Inverter status	
Response Alarm Code	IW□□30	0 to FFFFH	Inverter alarm code	

(8) User Constant EEPROM Writing

■ Description

Saves the parameter data written by executing Write User Constant in the Inverter nonvolatile memory.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	07: User Constant EEPROM Writing

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Command Response Code	IW□□08	0 to 8	07: User Constant EEPROM Writing	
Command Status	IW□□09	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	ON when an error occurs during command processing
			Bit 8 (Command execution completed)	ON when command execution is completed.
Status	IW□□10	Bit	Inverter status	
Response Alarm Code	IW□□30	0 to FFFFH	Inverter alarm code	

(9) Transmission Reference

■ Description

Enables the user to freely set a command and send it through the transmission line.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Command Code	OW□□08	0 to 8	08: Transmission Reference
Transmission Reference Output Data 0	OW□□70	0 to FFFFH	Command code on Lo (lower) bytes
⋮	⋮	0 to FFFFH	
Transmission Reference Output Data 7	OW□□77	0 to FFFFH	The system implements watchdog timeout timer.

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Command Response Code	IW□□08	0 to 8	08: Transmission Reference	
Command Status	IW□□09	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	Always OFF
			Bit 8 (Command execution completed)	Always OFF
Transmission Reference Input Data 0	IW□□70	0 to FFFFH	Command code on Lo (lower) bytes, Alarm on Hi (upper) bytes	
⋮	⋮	0 to FFFFH		
Transmission Reference Input Data 7	IW□□77	0 to FFFFH	The system implements watchdog timeout timer.	

10.3.4 Subcommand Details

Each subcommand and the related parameters are described below.

(1) No Command

■ Description

No command to be executed.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Subcommand Code	OW□□0A	0 to 9	00: No Command

■ Monitoring Parameters

<table>
<tr><th>Name</th><th>Register No.</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>Subcommand Response Code</td><td>IW□□0A</td><td>0 to 9</td><td colspan="2">00: No Command</td></tr>
<tr><td rowspan="3">Subcommand Status</td><td rowspan="3">IW□□0B</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>Always OFF</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>Subcommand Response Status</td><td>IW□□31</td><td>Bit</td><td colspan="2">Inverter status</td></tr>
</table>

(2) Inverter I/O Control

■ Description

Sends a command to the Inverter and monitors the Inverter. This subcommand has 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.

- Valid only in MECHATROLINK-II 32-byte mode.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Subcommand Code	OW□□0A	0 to 9	01: Inverter I/O Control
Auxiliary Output Data Option Selection	OW□□0E	Bit 0 to 3 options	
Auxiliary Input Data Option Selection	OW□□0F	Bit 0 to C options	
Torque Compensation	OW□□13		Valid when bit 0 of Auxiliary Output Data Option Selection (OW□□0E) is ON.
Multi-function Analog Output FM (Option)	OW□□14		Valid when bit 1 of Auxiliary Output Data Option Selection (OW□□0E) is ON.
Multi-function Analog Output AM (Option)	OW□□15		Valid when bit 2 of Auxiliary Output Data Option Selection (OW□□0E) is ON.
Multi-function Terminal Output (Option)	OW□□16		Valid when bit 3 of Auxiliary Output Data Option Selection (OW□□0E) is ON.

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Subcommand Response Code	IW□□0A	0 to 9	01: Inverter I/O Control	
Subcommand Status	IW□□0B	Bit	Bit 0 (Command execution flag)	ON from the first execution until execution is completed. Stays OFF after the first execution is completed.
			Bit 3 (Command error completed status)	ON when an error occurs during the command processing.
			Bit 8 (Command execution completed)	Always ON after execution is completed.
Auxiliary Input Data Option Selection Monitor	IW□□0F	Bit	Displays the optional data that have been entered.	
Motor Speed (Option)	IW□□13		Valid when bit 0 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Torque Reference (U1-09) (Option)	IW□□14		Valid when bit 1 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Encoder Counter (Option)	IW□□15	0 to 65535	Valid when bit 2 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Frequency Reference (U1-01) (Option)	IW□□16		Valid when bit 3 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Multi-function Analog Input A2 (Option)	IW□□17		Valid when bit 4 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Main Bus Voltage (Option)	IW□□18		Valid when bit 5 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Alarm Code (Option)	IW□□19		Valid when bit 6 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Alarm Code (Option)	IW□□1A		Valid when bit 7 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Multi-function Analog Input A3 (Option)	IW□□1C		Valid when bit 9 of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Digital Input Terminal (Option)	IW□□1D		Valid when bit A of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Multi-function Analog Input A1 (Option)	IW□□1E		Valid when bit B of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Encoder Counter (CH2) (Option)	IW□□1F		Valid when bit C of Auxiliary Input Data Option Selection (OW□□0F) is ON.	
Subcommand Response Status	IW□□31	Bit	Refer to Subcommand Response Status of *10.4.3 Monitoring Parameter List*.	

(3) Read User Constant

■ Description

Reads the specified inverter user constant from the Inverter.

- Valid only in MECHATROLINK-II 32-byte mode.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Subcommand Code	OW☐☐0A	0 to 9	02: Read User Constant
Auxiliary Inverter Constant Number	OW☐☐42	0 to FFFFH	
Auxiliary Inverter Constant Number Size	OW☐☐43	1 to 4	Data type: Word (Enter the size of user constant that read out from the leading user constant number of the auxiliary inverter.)

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Subcommand Response Code	IW☐☐0A	0 to 9	02: Read User Constant	
Subcommand Status	IW☐☐0B	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	ON when an error occurs during command processing.
			Bit 8 (Command execution completed)	ON when command execution is completed.
Subcommand Response Status	IW☐☐31	Bit	Refer to Subcommand Response Status of *10.4.3 Monitoring Parameter List*.	
Auxiliary Inverter User Constant Number	IW☐☐42	0 to FFFFH		
Auxiliary User Constant Reading Data 1	IW☐☐44	0 to 65535		
Auxiliary User Constant Reading Data 2	IW☐☐45	0 to 65535		
Auxiliary User Constant Reading Data 3	IW☐☐46	0 to 65535		
Auxiliary User Constant Reading Data 4	IW☐☐47	0 to 65535		

(4) Write User Constant

■ Description

Writes the specified inverter user constant in the Inverter internal constant.

- Valid only in MECHATROLINK-II 32-byte mode.
- With Varispeed G7 and F7, it is necessary to execute the command User Constant RAM Writing (see *10.3.3 (7) User Constant RAM Writing*) to validate the data written by executing Write User Constant.
  With VSminiV7, the data written by executing Write User Constant will be immediately validated.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Subcommand Code	OW□□0A	0 to 9	03: Write User Constant
Auxiliary Inverter Constant Number	OW□□42	0 to FFFFh	
Auxiliary Inverter Constant Number Size	OW□□43	1 to 4	Data type: Word (Enter the size of user constant that read out from the leading user constant number of the auxiliary inverter.)
Auxiliary Inverter User Constant Set Point 1	OW□□44	0 to 65535	
Auxiliary Inverter User Constant Set Point 2	OW□□45	0 to 65535	
Auxiliary Inverter User Constant Set Point 3	OW□□46	0 to 65535	
Auxiliary Inverter User Constant Set Point 4	OW□□47	0 to 65535	

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Subcommand Response Code	IW□□0A	0 to 9	03: Write User Constant	
Subcommand Status	IW□□0B	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	ON when an error occurs during command processing.
			Bit 8 (Command execution completed)	ON when the command execution is completed.
Subcommand Response Status	IW□□31	Bit	Refer to Subcommand Response Status of *10.4.3 Monitoring Parameter List*.	
Response Alarm Code	IW□□30	0 to FFFFH	Inverter alarm code	
Inverter User Constant No.	IW□□3C	0 to FFFFH		

(5) Alarm Monitor

■ Description

Reads out the alarm that is occurring in the Inverter.

- Valid only in MECHATROLINK-II 32-byte mode.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Subcommand Code	OW□□0A	0 to 9	04: Alarm Monitor

■ Monitoring Parameters

<table>
<tr><th>Name</th><th>Register No.</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>Subcommand Response Code</td><td>IW□□0A</td><td>0 to 9</td><td colspan="2">04: Alarm Monitor</td></tr>
<tr><td rowspan="3">Subcommand Status</td><td rowspan="3">IW□□0B</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON during execution</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>ON when command execution is completed.</td></tr>
<tr><td>Subcommand Response Status</td><td>IW□□31</td><td>Bit</td><td colspan="2">Refer to Subcommand Response Status of 10.4.3 Monitoring Parameter List.</td></tr>
<tr><td>Auxiliary Inverter Alarm Code</td><td>IW□□33</td><td>0 to FFFFH</td><td colspan="2">The currently occurring alarm that is read out.</td></tr>
</table>

(6) Alarm History Monitor

■ Description

Reads out the Inverter alarm history.

- Valid only in MECHATROLINK-II 32-byte mode

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Subcommand Code	OW□□0A	0 to 9	05: Alarm History Monitor
Auxiliary Inverter Alarm Monitor Number	OW□□33	0 to 3	History monitor number

■ Monitoring Parameters

<table>
<tr><th>Name</th><th>Register No.</th><th>Setting Range</th><th colspan="2">Remarks</th></tr>
<tr><td>Subcommand Response Code</td><td>IW□□0A</td><td>0 to 9</td><td colspan="2">05: Alarm History Monitor</td></tr>
<tr><td rowspan="3">Subcommand Status</td><td rowspan="3">IW□□0B</td><td rowspan="3">Bit</td><td>Bit 0 (Command execution flag)</td><td>ON during execution</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>ON when command execution is completed.</td></tr>
<tr><td>Subcommand Response Status</td><td>IW□□31</td><td>Bit</td><td colspan="2">Refer to Subcommand response Status of 10.4.3 Monitoring Parameter List.</td></tr>
<tr><td>Auxiliary Inverter Alarm Code</td><td>IW□□33</td><td>0 to FFFFH</td><td colspan="2">The alarm history that is read out.</td></tr>
</table>

(7) Transmission Reference

■ Description

Enables the user to freely set a command and send it through the transmission line.

- Valid only in MECHATROLINK-II 32-byte mode.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Subcommand Code	OW□□0A	0 to 9	08: Transmission Reference
Transmission Reference Output Data 8	OW□□78	0 to FFFFH	Subcommand on Lo (lower) bytes
:	:	0 to FFFFH	
Transmission Reference Output Data 15	OW□□7F	0 to FFFFH	

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Subcommand Response Code	IW□□0A	0 to 9	08: Transmission Reference	
Subcommand Status	IW□□09	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	Always OFF
			Bit 8 (Command execution completed)	Always OFF
Transmission Reference Input Data 8	IW□□78	0 to FFFFH	Subcommand on Lo (lower) bytes, and substatus on Hi (upper) bytes	
:	:	0 to FFFFH		
Transmission Reference Input Data 15	IW□□7F	0 to FFFFH		

(8) Read Fixed Parameters

■ Description

Reads out the set data of the specified fixed parameter.

■ Setting Parameters

Name	Register No.	Setting Range	Remarks
Subcommand Code	OW□□0A	0 to 9	09: Read Fixed Parameters
Fixed Parameter Number	OW□□48	0 to 3	

■ Monitoring Parameters

Name	Register No.	Setting Range	Remarks	
Subcommand Response Code	IW□□0A	0 to 9	09: Read Fixed Parameters	
Subcommand Status	IW□□0B	Bit	Bit 0 (Command execution flag)	ON during execution
			Bit 3 (Command error completed status)	ON when an error occurs during command processing.
			Bit 8 (Command execution completed)	ON when command execution is completed.
Fixed Parameter Monitor	IL□□48	-2^{31} to $2^{31}-1$		

10.4 Motion Parameter Details

This section describes the fixed parameters, setup parameters, and monitoring parameters that can be set in the SVB Definition Window for the connected inverters.

10.4.1 Fixed Parameter List

<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 or 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 by the 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 monitoring parameter.
0: Disabled (default)
When a communication error occurs, the error will be written in the monitoring parameter Alarm or Warning.
1: Enabled
When a communication error occurs, the error will not be written in the monitoring parameter Alarm or Warning.</td></tr>
<tr><td>Bit 1</td><td colspan="3">WDT Abnormality Detection Mask (Applicable only for synchronous communications supported inverters)
Specifies whether or not to mask synchronized processing with the Inverter.
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 by the 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 errors occurs.
0: Alarm (default)
Outputs Alarm at occurrence of communication error.
The alarm must be cleared to restart communications.
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 by the system</td></tr>
<tr><td>Bit F</td><td colspan="3">Used by the system
Always ON</td></tr>
<tr><td>4 to 63</td><td colspan="3">Reserved by the system</td><td>–</td></tr>
</table>

10.4.2 Setting Parameter List

<table>
<tr><th>Register No.</th><th colspan="2">Name</th><th>Contents</th></tr>
<tr><td rowspan="4">OW□□00</td><td rowspan="4">RUN Command Setting</td><td>Bit 0 to C</td><td>Reserved by the system</td></tr>
<tr><td>Bit D: Drive Permission</td><td>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).</td></tr>
<tr><td>Bit E: Communication Reset</td><td>0: OFF, 1: ON
Re-establishes the connection for communications with the Inverter, whether the communications is stopped or in process. Also clears the monitoring parameter Alarm.
• This bit is captured at the rising edge.
<Application Example>
With the setting to continue communications after a communication error occurrence *1, the SVB Module will continue communications whether or not the Inverter stops communication because of the error occurrence. In this case, the connection for communications can be re-established 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.</td></tr>
<tr><td>Bit F: Alarm Clear</td><td>0: OFF, 1: ON
Clears the monitoring parameter Alarm.
• Detected at the rising edge of this bit.
• If communications is stopped after occurrence of the communication error, clear the alarm bit and re-establish the connection by setting this bit to 1 (ON).
• 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 command Inverter Drive Control and set the bit 8 (Fault Reset) of Input Command (OW□□10) to ON.</td></tr>
<tr><td>OW□□01
to
OW□□07</td><td colspan="2">–</td><td>Reserved by the system</td></tr>
</table>

Register No.	Name		Contents
OW□□08	Motion Commands (Refer to *10.3.3 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 by the system
OW□□0A	Subcommands (Refer to *10.3.4 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 by the 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 validated when the command Inverter Drive Control 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 validated when the command Inverter Drive Control 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 validated when the command Inverter Drive Control 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 validated when the command Inverter Drive Control is executed.
		Bits 4 to F	Reserved by the system

Register No.	Name		Contents
OW□□0D	Input Data Option Selection	Bit 0: Motor Speed	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Motor Speed (IW□□13) will be monitored when the command Inverter Drive Control is executed.
		Bit 1: Torque Reference (U1-09)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Torque Reference (IW□□14) will be monitored when the command Inverter Drive Control is executed.
		Bit 2: Encoder Count	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Encoder Count (IW□□15) will be monitored when the command Inverter Drive Control is executed.
		Bit 3: Frequency Reference (U1-01)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Frequency Reference (IW□□16) will be monitored when the command Control Inverter Drive is executed.
		Bit 4: Multi-function Analog Input A2	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Input A2 (IW□□17) will be monitored when the command Inverter Drive Control is executed.
		Bit 5: Main Bus Voltage	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Main Bus Voltage (IW□□18) will be monitored when the command Inverter Drive Control is executed.
		Bit 6: Alarm Code	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Alarm Code (IW□□19) will be monitored when the command Inverter Drive Control is executed.
		Bit 7: Warning Code	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Alarm Code (IW□□1A) will be monitored when the command Inverter Drive Control is executed.
		Bit 8	Reserved by the system
		Bit 9: Multi-function Analog Input A3	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Input A3 (IW□□1C) will be monitored when the command Inverter Drive Control is executed.
		Bit A: Multi-function Input Terminal	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Digital Input Terminal (IW□□1D) will be monitored when the command Inverter Drive Control is executed.
		Bit B: Multi-function Analog Input A1	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Input A1 (IW□□1E) will be monitored when the command Inverter Drive Control is executed.
		Bit C: Encoder Counter (ch2)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Encoder Counter (ch2) (IW□□1F) will be monitored when the command Inverter Drive Control is executed.
		Bits D to F	Reserved by the system

Register No.	Name		Contents
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 validated when the subcommand Inverter I/O Control 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 validated when the subcommand Inverter I/O Control 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 validated when the subcommand Inverter I/O Control 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 validated when the subcommand Inverter I/O Control is executed.
		Bits 4 to F	Reserved by the system
OW□□0F	Auxiliary Input Data Option Selection	Bit 0: Motor Speed	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Motor Speed (IW□□13) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit 1: Torque Reference (U1-09)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Torque Reference (IW□□14) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit 2: Encoder Count	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Encoder Count (IW□□15) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit 3 Frequency Reference (U1-01)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Frequency Reference (IW□□16) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit 4: Multi-function Analog Input A2	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Input A2 (IW□□17) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit 5: Main Bus Voltage	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Main Bus Voltage (IW□□18) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit 6: Alarm Code	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Alarm Code (IW□□19) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit 7: Warning Code	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Alarm Code (IW□□1A) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit 8	Reserved by the system

Register No.	Name		Contents
OW☐☐0F	Auxiliary Input Data Option Selection (continued)	Bit 9: Multi-function Analog Input A3	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Input A3 (IW☐☐1C) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit A: Multi-function Input Terminal	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Digital Input Terminal (IW☐☐1D) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit B: Multi-function Analog Input A1	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Multi-function Analog Input A1 (IW☐☐1E) will be monitored when the subcommand Inverter I/O Control is executed.
		Bit C: Encoder Counter (ch2)	0: Disabled, 1: Enabled When this bit is set to 1 (enabled), the output data option Encoder Counter (ch2) (IW☐☐1F) will be monitored when the subcommand Inverter I/O Control is executed.
		Bits D to F	Reserved by the system
OW☐☐10	Input Command	Bit 0: Forward RUN	0: OFF, 1: ON Forward run when ON
		Bit 1: Reverse RUN	0: OFF, 1: ON Reverse run when ON
		Bit 2: Multi-function Input Command S3	0: OFF, 1: ON (Initial value: External fault (EF3))
		Bit 3: Multi-function Input Command S4	0: OFF, 1: ON (Initial value: Error reset)
		Bit 4: Multi-function Input Command S5	0: OFF, 1: ON (Initial value: Multi-step reference 1)
		Bit 5: Multi-function Input Command S6	0: OFF, 1: ON (Initial value: Multi-step reference 2)
		Bit 6: Multi-function Input Command S7	0: OFF, 1: ON (Initial value: JOG command)
		Bit 7: Multi-function Input Command S8	0: OFF, 1: ON (Initial value: External baseblock)
		Bit 8: External Fault Input (EFO)	0: OFF, 1: ON
		Bit 9: Fault Reset	0: OFF, 1: ON Clears alarm or warning in the Inverter when ON
		Bit A: Multi-function Input Command S9	0: OFF, 1: ON (Initial value: Multi-step reference 3)
		Bit B: Multi-function Input Command S10	0: OFF, 1: ON (Initial value: Multi-step reference 4)
		Bit C: Multi-function Input Command S11	0: OFF, 1: ON (Initial value: Acceleration/deceleration time switch 1)
		Bit D: Multi-function Input Command S12	0: OFF, 1: ON (Initial value: Emergency stop)
		Bit E: Fault Trace Clear	0: OFF, 1: ON Clears error history trace when ON.
		Bit F: External Base Block Command	0: OFF, 1: ON
OW☐☐11	Frequency Reference		Units: According to n035 for VSminiV7, and 01-03 for Varispeed G7 and F7
OW☐☐12	Torque Reference		Units: 0.1%
OW☐☐13	Torque Compensation (Option)		Units: 0.1%
OW☐☐14	Multi-function Analog Output FM (Option)		Units: -1540 to +1540/-11 V to +11 V (Varispeed G7 and F7)
OW☐☐15	Multi-function Analog Output AM (Option)		Units: -1540 to +1540/-11 V to +11 V (Varispeed G7 and F7)

Register No.	Name		Contents
OW☐☐16	Multi-function Terminal Output (Optional)	Bit 0: Contact Output (MZ-M2) (MA-MB)	0: OFF, 1: ON Outputs to terminals M1-M2 for Varispeed G7 and F7, Outputs to terminals MA-MB for VSminiV7
		Bit 1: PHC1 Output (Contact P1-PC)	0: OFF, 1: ON Outputs to terminals P1-PC for Varispeed G7 and F7, and VSminiV7.
		Bit 2: PHC2 Output (Contact P2-PC)	0: OFF, 1: ON Outputs to terminals P2-PC for Varispeed G7 and F7, and VSminiV7.
		Bit 3: PHC3 Output (Contact P3-C4)	0: OFF. 1: ON Outputs to terminals P3-C3 for Varispeed G7
		Bit 4: PHC4 Output (Contact P4-C4)	0: OFF, 1: ON Outputs to terminals P4-C4 for Varispeed G7
		Bits 5 to F	Reserved by the system
OW☐☐17 to OW☐☐31	–		Reserved by the system
OW☐☐32	Inverter Alarm Monitor Number		Setting range: 0 to 3 for Varispeed G7 and F7, 0 or 1 for VSminiV7 Set the alarm history number for the command Alarm History Monitor.
OW☐☐33	Auxiliary Inverter Alarm Monitor Number		Setting range: 0 to 3 for Varispeed G7 and F7, 0 or 1 for VSminiV7 Set the alarm history number for the subcommand Alarm History Monitor.
OW☐☐34 to OW☐☐3B	–		Reserved by the system
OW☐☐3C	Inverter User Constant Number		Setting range: 0 to FFFFH Sets the leading number of the user constants to read by executing the command Read User Constant, or set the leading number of the user constants to write by executing the command Write User Constant. • Set the register number used for MEMOBUS communications.
OW☐☐3D	Inverter User Constant Number Size		Setting range: 1 to 4 (word) Sets the size of the user constant to read by executing the command Read User Constant, or set the size of the user constant to be write by executing the command Write User Constant, in words. Each inverter user 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 Sets the data to write for the command Write User Constant. Valid when Inverter User Constant Number Size = 1 to 4
OW☐☐3F	Inverter User Constant Set Point 2		Setting range: 0 to 65535 Sets the data to write for the command Write User Constant. Valid when Inverter User Constant Number Size = 2 to 4.
OW☐☐40	Inverter User Constant Set Point 3		Setting range: 0 to 65535 Sets the data to write for the command Write User Constant. Valid when Inverter User Constant Number Size = 3 or 4.
OW☐☐41	Inverter User Constant Set Point 4		Setting range: 0 to 65535 Sets the data to write for the command Write User Constant. Valid when Inverter User Constant Number Size = 4.

Register No.	Name	Contents
OW□□42	Auxiliary Inverter User Constant Number	Setting range: 0 to FFFFH Sets the leading number of user constants to read by executing the subcommand Read User Constant, or the leading number of user constants to write by executing the subcommand Write User Constant. • Set the register numbers to be set or read for MEMOBUS transmission.
OW□□43	Auxiliary Inverter User Constant Number Size	Setting range: 1 to 4 Sets the size of user constants to read for the subcommand Read User Constant, or the size of user constants to write for the subcommand Write User Constant. All inverter constants are 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 Sets the data to write for the subcommand Write User Constant. Valid when Auxiliary Inverter User Constant Number Size = 1 to 4.
OW□□45	Auxiliary Inverter User Constant Set Point 2	Setting range: 0 to 65535 Sets the data to write for the subcommand Write User Constant. Valid when Auxiliary Inverter User Constant Number Size = 2 to 4.
OW□□46	Auxiliary Inverter User Constant Set Point 3	Setting range: 0 to 65535 Sets the data to write for the subcommand Write User Constant. Valid when Auxiliary Inverter User Constant Number Size = 3 or 4.
OW□□47	Auxiliary Inverter User Constant Set Point 4	Setting range: 0 to 65535 Sets the data to write for the subcommand Write User Constant. Valid when Auxiliary Inverter User Constant Number Size = 4.
OW□□48	Fixed Parameter Number	Setting range: 0 to 65535 Sets the fixed parameter number to read for the subcommand Read Fixed Parameters.
OW□□49 to OW□□6F	–	Reserved by the system
OW□□70	Transmission Reference Output Data 0	Setting range: 0 to FFFFH This will be sent as the 1st word of the command Transmission Reference.
OW□□71	Transmission Reference Output Data 1	Setting range: 0 to FFFFH This will be sent as the 2nd word of the command Transmission Reference.
OW□□72	Transmission Reference Output Data 2	Setting range: 0 to FFFFH This will be sent as the 3rd word of the command Transmission Reference.
OW□□73	Transmission Reference Output Data 3	Setting range: 0 to FFFFH This will be sent as the 4th word of the command Transmission Reference.
OW□□74	Transmission Reference Output Data 4	Setting range: 0 to FFFFH This will be sent as the 5th word of the command Transmission Reference.
OW□□75	Transmission Reference Output Data 5	Setting range: 0 to FFFFH This will be sent as the 6th word of the command Transmission Reference.

Register No.	Name	Contents
OW□□76	Transmission Reference Output Data 6	Setting range: 0 to FFFFH This will be sent as the 7th word of the command Transmission Reference.
OW□□77	Transmission Reference Output Data 7	Setting range: 0 to FFFFH This will be sent as the 8th word of the command Transmission Reference.
OW□□78	Transmission Reference Output Data 8	Setting range: 0 to FFFFH This will be sent as the 1st word of the subcommand Transmission Reference.
OW□□79	Transmission Reference Output Data 9	Setting range: 0 to FFFFH This will be sent as the 2nd word of the subcommand Transmission Reference.
OW□□7A	Transmission Reference Output Data 10	Setting range: 0 to FFFFH This will be sent as the 3rd word of the subcommand Transmission Reference.
OW□□7B	Transmission Reference Output Data 11	Setting range: 0 to FFFFH This will be sent as the 4th word of the subcommand Transmission Reference.
OW□□7C	Transmission Reference Output Data 12	Setting range: 0 to FFFFH This will be sent as the 5th word of the sub command Transmission Reference.
OW□□7D	Transmission Reference Output Data 13	Setting range: 0 to FFFFH This will be sent as the 6th word of the subcommand Transmission Reference.
OW□□7E	Transmission Reference Output Data 14	Setting range: 0 to FFFFH This will be sent as the 7th word of the subcommand Transmission Reference.
OW□□7F	Transmission Reference Output Data 15	Setting range: 0 to FFFFH This will be sent as the 8th word of the subcommand Transmission Reference.

10.4.3 Monitoring Parameter List

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: Connection (synchronous communication) with the Inverter is established, Drive permission bit of Run Command Setting (OW□□00) is set to ON, and Inverter drive control is enabled. Turns OFF when a synchronous communications error other communication error occurs.
		Bit 1	Reserved by the system
		Bit 2: System BUSY	Not used
		Bit 3: Inverter READY	0: Inverter not ready 1: Inverter ready Turns ON when the connection (synchronous communication) with the Inverter is established. Turns OFF when a synchronous communications error or other communication error occurs.
		Bits 4 to F	Reserved by the system
IW□□01	Parameter Number when Range Over is Generated		Setting parameters: 0 or more Fixed parameters: 1000 or more 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 by the system
		Bit 1: Set Parameter Error	Turns ON when setting parameter error occurs. Correct the setting parameter to clear the warning. • This warning can also 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 by the system
		Bit 4: Command Set Error	Turns ON when a command outside the allowable range is set. Correct the command to clear the warning.
		Bits 5 to 8	Reserved by the system
		Bit 9: Communication Warning	Turns ON when a communication error occurs. Valid when: Communication Abnormality Detection Mask bit of the fixed parameter Function Selection Flag 2 is disabled, and Communication Selection is Abnormal bit of the fixed parameter Function Selection Flag 3 is set to Warning. This warning will be cleared when communications are restored.
		Bit A: Subcommand Set Error	Turns ON when a subcommand outside the allowable range is set. Correct the subcommand to clear the warning.
		Bits B to 1F	Reserved by the system

Register No.	Name		Contents
IL□□04	Alarm	Bits 0 to E	Reserved by the system
		Bit F: User Constant Error	Not used
		Bit 10: Synchronization Communication Error	Turns ON when SVB Module watchdog timer timeout error is detected. Valid when the WDT Abnormality Detection Mask bit of the fixed parameter Function Selection Flag 2 is set to Disabled. This alarm can be cleared by executing Alarm Clear.
		Bit 11: Communication Warning	Turns ON when communication error occurs. Valid when: Communication Abnormality Detection Mask bit of the fixed parameter Function Selection Flag 2 is set to Disabled, and Alarm is selected for Communication Selection is Abnormal of the fixed parameter Function Selection Flag 3. This alarm can be cleared by executing Alarm Clear.
		Bit 12: Communication Timeout Error	Turns ON when no response to the sent command or subcommand has been returned from the Inverter for five seconds. This alarm can be cleared by executing Alarm Clear.
		Bits 13 to 1F	Reserved by the system
IW□□06	–		Reserved by the system
IW□□07	–		Reserved by the system
IW□□08	Command Response Code	00: No Command	No command is selected.
		01: Inverter Drive Control	Control Inverter Drive is selected.
		02: Read User Constant	Read User Constant is selected.
		03: Write User Constant	Write User Constant is selected.
		04: Alarm Monitor	Alarm Monitor is selected.
		05: Alarm History Monitor	Alarm History Monitor is selected.
		06: User Constant RAM Writing	User Constant RAM Writing is selected.
		07: User Constant EEPROM Writing	User Constant EEPROM Writing is selected.
		08: Transmission Reference	Transmission Reference is selected
IW□□09	Command Status	Bit 0: Command Execution Flag	ON during command execution Always ON when Transmission Reference command is selected.
		Bits 1and 2	Reserved by the system
		Bit 3: Command Error Completed Status	Turns ON when the command execution ends with an error.
		Bits 4 to 7	Reserved by the 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.
		Bits 9 to F	Reserved by the system
IW□□0A	Subcommand Response Code	00: No Command	No subcommand is selected.
		01: Inverter I/O Control	Inverter I/O Control is selected.
		02: Read User Constant	Read User Constant is selected.
		03: Write User Constant	Write User Constant is selected.
		04: Alarm Monitor	Alarm Monitor is selected.
		05: Alarm History Monitor	Alarm History Monitor is selected.
		08: Transmission Reference	Transmission Reference is selected.
		09: Read Fixed Parameters	Read Fixed Parameters is selected.

Register No.	Name		Contents
IW☐☐0B	Subcommand Status	Bit 0: Command Execution Flag	ON during subcommand execution Always ON when Control Inverter I/O or Transmission Reference command is selected.
		Bits 1 and 2	Reserved by the system
		Bit 3: Command Error Completed Status	Turns ON when the command execution ended with an error.
		Bits 4 to 7	Reserved by the system
		Bit 8: Command Execution Completed	Turns ON when command execution is completed. Always ON when No Command is selected.
		Bits 9 to F	Reserved by the system
IW☐☐0C	–		Reserved by the system
IW☐☐0D	Input Data Option Selection Monitor	Bit 0: Motor Speed	ON when Motor Speed monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit 1: Torque Reference (U1-09)	ON when Torque Reference Monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit 2: Encoder Count	ON when Encoder Count monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit 3: Frequency Reference (U0-01)	ON when Frequency Reference monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit 4: Multi-function Analog Input A2	ON when Multi-function Analog Input 2 monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit 5: Main Bus Voltage	ON when Main Bus Voltage monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit 6: Alarm Code	ON when Alarm Code monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit 7: Warning Code	ON when Warning Code monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit 8	Reserved by the system
		Bit 9: Multi-function Analog Input A3	ON when Multi-function Analog Input A3 monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit A: Multi-function Input Terminal	ON when Multi-function Input Terminal monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit B: Multi-function Analog Input A1	ON when Multi-function Analog Input A1 monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bit C: Encoder Counter (ch2)	ON when Encoder Counter (ch2) monitor is selected for Input Data Option Selection (OW☐☐0D) and the data is being normally updated.
		Bits D to F	Reserved by the system
IW☐☐0E	–		Reserved by the system

Register No.	Name		Contents
IW□□0F	Auxiliary Input Data Option Selection Monitor	Bit 0: Motor Speed	ON when Motor Speed monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit 1: Torque Reference (U1-09)	ON when Torque Reference Monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit 2: Encoder Count	ON when Encoder Count monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit 3: Frequency Reference (U1-01)	ON when Frequency Reference monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit 4: Multi-function Analog Input A2	ON when Multi-function Analog Input A2 monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit 5: Main Bus Voltage	ON when Main Bus Voltage monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit 6: Alarm Code	ON when Alarm Code monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit 7: Warning Code	ON when Warning Code monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit 8	Reserved by the system
		Bit 9: Multi-function Analog Input A3	ON when Multi-function Analog Input A3 monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit A: Multi-function Input Terminal	ON when Multi-function Input Terminal monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit B: Multi-function Analog Input A1	ON when Multi-function Analog Input A1 monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bit C: Encoder Counter (ch2)	ON when Encoder Counter (ch2) monitor is selected for Auxiliary Input Data Option Selection (OW□□0F) and the data is being normally updated.
		Bits D to F	Reserved by the system

Register No.	Name		Contents
IW☐☐10	Status	Bit 0: ALM Alarm	0: No alarm 1: Alarm activated
		Bit 1: WARNING Warning	0: No warning 1: Warning activated
		Bit 2: CMDRDY Command ready	0: Command busy 1: Command ready
		Bit 3: BB OFS Baseblock	0: Baseblock in effect 1: Baseblock cancelled
		Bit 4: PON Power ON	0: Main power supply OFF 1: Main power supply ON
		Bit 5: RUNX During Running	0: Stopped 1: Running
		Bit 6: OSP Zero Speed	0: With speed 1: 0 (zero) speed
		Bit 7: REV Reverse Operation	0: Forward 1: Reverse
		Bit 8: RESET During Reset	0: No Error Reset signal input 1: Error Reset signal being input
		Bit 9: AGREE During Speed Coincident	0: Speed disagreed 1: Speed agreed
		Bit A: INV_READY Inverter Ready	0: Inverter not ready 1: Inverter ready
		Bit B: OPE OPE Error	0: No OPE error 1: OPE error occurred
		Bit C: UV_R Momentary/Power Cut	0: Momentary 1: Power cut
		Bit D: REMOTE Remote Operation	0: Local 1: Remote
		Bits E and F	Reserved by the system
IW☐☐11	Output Frequency		Unit: According to n035 for VSminiV7, 01-03 for Varispeed F7 and G7
IW☐☐12	Output Current		• For VSminiV7, Varispeed F7 and G7 Unit: 0.1 A or 0.01 A • For A1000 and V1000 8192 = Inverter rated current
IW☐☐13	Motor Speed (Option)		Unit: Depends on n035 for VSminiV7, 01-03 for Varispeed F7 and G7
IW☐☐14	Torque Reference (U1-09) (Option)		Unit: 0.1%
IW☐☐15	Encoder Count (Option)		Unit: pulse
IW☐☐16	Frequency Reference (U1-01) (Option)		Unit: Depends on n035 for VSminiV7, 01-03 for Varispeed F7 and G7
IW☐☐17	Multi-function Analog Input A2 (Option)		Unit: 0.1%
IW☐☐18	Main Bus Voltage (Option)		Unit: 1 V
IW☐☐19	Alarm Code (Option)		
IW☐☐1A	Alarm Code (Option)		
IW☐☐1B	–		Reserved by the system
IW☐☐1C	Multi-function Analog Input A3 (Option)		Unit: 0.1%

Register No.	Name		Contents
IW□□1D	Digit Input Terminal (Option)	Bit 0: Terminal 1 Status	0: OFF, 1: ON
		Bit 1: Terminal 2 Status	0: OFF, 1: ON
		Bit 2: Terminal 3 Status	0: OFF, 1: ON
		Bit 3: Terminal 4 Status	0: OFF, 1: ON
		Bit 4: Terminal 5 Status	0: OFF, 1: ON
		Bit 5: Terminal 6 Status	0: OFF, 1: ON
		Bit 6: Terminal 7 Status	0: OFF, 1: ON
		Bit 7: Terminal 8 Status	0: OFF, 1: ON
		Bit 8: Terminal 9 Status	0: OFF, 1: ON
		Bit 9: Terminal 10 Status	0: OFF, 1: ON
		Bit A: Terminal 11 Status	0: OFF, 1: ON
		Bit B: Terminal 12 Status	0: OFF, 1: ON
		Bits C to F	Reserved by the system
IW□□1E	Multi-function Analog Input A1 (Option)		Unit: 0.1%
IW□□1F	Encoder Counter (ch2) (Option)		Unit: pulse
IW□□20 to IW□□2F	–		Reserved by the system
IW□□30	Response Alarm Code		Range: 0 to FFFFH Displays the alarm code returned in the response to the MECHATROLINK command.
IW□□31	Subcommand Response Status	Bit 0: Subcommand Alarm	0: Not used 1: Alarm Displays the response status to the subcommand. Turns ON when of subcommand alarm activation.
		Bit 1: Subcommand Warning	0: Not used 1: Warning Turns ON when subcommand warning activation.
		Bit 2: Subcommand Ready	0: Busy 1: Ready Turns ON when the subcommand execution is completed.
		Bits 3 to F	Reserved by the system
IW□□32	Inverter Alarm Code		Range: 0 to FFFFH Displays the alarm code returned in the response to the command Alarm Monitor or Alarm History Monitor.
IW□□33	Auxiliary Inverter Alarm Code		Range: 0 to FFFFH Displays the alarm codes returned in the response to the subcommand Alarm Monitor or Alarm History Monitor.
IW□□34 to IW□□3B	–		Reserved by the system
IW□□3C	Inverter User Constant Number		Range: 0 to FFFFH Displays the inverter user constant number set for the command Read User Constant or Write User Constant.
IW□□3D	–		Reserved by the system
IW□□3E	User Constant Reading Data 1		Range: 0 to 65535 Displays the value read out by executing the command Read User Constant. Valid when Inverter User Constant Number Size (OW□□3D) = 1 to 4.
IW□□3F	User Constant Reading Data 2		Range: 0 to 65535 Displays the value read out by executing the command Read User Constant. Valid when Inverter User Constant Number Size (OW□□3D) = 2 to 4.

Register No.	Name	Contents
IW□□40	User Constant Reading Data 3	Range: 0 to 65535 Displays the value read out by executing the command Read User Constant. Valid when Inverter User Constant Number Size (OW□□3D) = 3 or 4.
IW□□41	User Constant Reading Data 4	Range: 0 to 65535 Displays the value read out by executing the command Read User Constant. Valid 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 subcommand Read User Constant or Write User Constant.
IW□□43	–	Reserved by the system.
IW□□44	Auxiliary User Constant Reading Data 1	Range: 0 to 65535 Displays the value read out by executing the subcommand Read User Constant. Valid 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 subcommand Read User Constant. Valid 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 subcommand Read User Constant. Valid when Auxiliary Inverter User Constant Number Size (OW□□43) = 3 or 4.
IW□□47	Auxiliary User Constant Reading Data 4	Range: 0 to 65535 Displays the value read out by executing the subcommand Read User Constant. Valid 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 subcommand Read Fixed Parameters.
IW□□4A to IW□□4F	–	Reserved by the system.
IW□□50 to IW□□5F	Inverter/Type	Displays the connected Inverter model.
IW□□60 to IW□□67	Inverter/Software Version (Communication Board)	Displays the software version number of the optional communication board of the connected Inverter.
IW□□68 to IW□□6F	Inverter/Software Version (Main)	Displays the software version number of the connected Inverter.
IW□□70	Transmission Reference Input Data 0	Range: 0 to FFFFH Displays the 1st word of the response data to the command Transmission Reference.
IW□□71	Transmission Reference Input Data 1	Range: 0 to FFFFH Displays the 2nd word of the response data to the command Transmission Reference.
IW□□72	Transmission Reference Input Data 2	Range: 0 to FFFFH Displays the 3rd word of the response data to the command Transmission Reference.
IW□□73	Transmission Reference Input Data 3	Range: 0 to FFFFH Displays the 4th word of the response data to the command Transmission Reference.
IW□□74	Transmission Reference Input Data 4	Range: 0 to FFFFH Displays the 5th word of the response data to the command Transmission Reference.

Register No.	Name	Contents
IW□□75	Transmission Reference Input Data 5	Range: 0 to FFFFH Displays the 6th word of the response data to the command Transmission Reference.
IW□□76	Transmission Reference Input Data 6	Range: 0 to FFFFH Displays the 7th word of the response data to the command Transmission Reference.
IW□□77	Transmission Reference Input Data 7	Range: 0 to FFFFH Displays the 8th word of the response data to the command Transmission Reference.
IW□□78	Transmission Reference Input Data 8	Range: 0 to FFFFH Displays the 1st word of the subresponse data to the command Transmission Reference.
IW□□79	Transmission Reference Input Data 9	Range: 0 to FFFFH Displays the 2nd word of the subresponse data to the command Transmission Reference.
IW□□7A	Transmission Reference Input Data 10	Range: 0 to FFFFH Displays the 3rd word of the subresponse data to the command Transmission Reference.
IW□□7B	Transmission Reference Input Data 11	Range: 0 to FFFFH Displays the 4th word of the subresponse data to the command Transmission Reference.
IW□□7C	Transmission Reference Input Data 12	Range: 0 to FFFFH Displays the 5th word of the subresponse data to the command Transmission Reference.
IW□□7D	Transmission Reference Input Data 13	Range: 0 to FFFFH Displays the 6th word of the subresponse data to the command Transmission Reference.
IW□□7E	Transmission Reference Input Data 14	Range: 0 to FFFFH Displays the 7th word of the subresponse data to the command Transmission Reference.
IW□□7F	Transmission Reference Input Data 15	Range: 0 to FFFFH Displays the 8th word of the subresponse data to the command Transmission Reference.

10.4.4 Inverter Output Data Details

Register No.	Name		Varispeed G7	Varispeed F7	VSminiV7
OW□□10	Input Command	Bit 0	Forward RUN	Forward RUN	Forward RUN
		Bit 1	Reverse RUN	Reverse RUN	Reverse RUN
		Bit 2	Initial value: External Fault (EF3)	Initial value: External Fault (EF3)	Initial value: External Fault (EF3)
		Bit 3	Initial value: Error Reset	Initial value: Error Reset	Initial value: Error Reset
		Bit 4	Initial value: Multi-step Speed Reference 1	Initial value: Multi-step Speed Reference 1	Initial value: Multi-step Speed Reference 1
		Bit 5	Initial value: Multi-step Speed Reference 2	Initial value: Multi-step Speed Reference 2	Initial value: Multi-step Speed Reference 2
		Bit 6	Initial value: JOG command	Initial value: JOG command	Initial value: JOG command
		Bit 7	Initial value: External BB (baseblock)	Reserved by the system.	
		Bit 8	External Fault Input (EFO)	External Fault Input (EFO)	External Fault Input (EFO)
		Bit 9	Fault Reset	Fault Reset	Fault Reset
		Bit A	Initial value: Multi-step Speed Reference 3	Reserved by the system.	
		Bit B	Initial value: Multi-step Speed Reference 4		
		Bit C	Initial value: Acceleration/Deceleration Time Selection 1		
		Bit D	Initial value: Emergency Stop		
		Bit E	Fault Trace Clear	Fault Trace Clear	Fault Trace Clear
		Bit F	External Base Block command	External Base Block command	External Base Block command
OW□□11	Frequency Reference		Units in accordance with the inverter user constant 01-03	Unit depends on the inverter user constant 01-03	Unit depends on the inverter user constant n035
OW□□12	Torque Reference		Unit: 0.1%	Unit: 0.1%	Reserved by the system.
OW□□13	Torque Compensation		Unit: 0.1%	Unit: 0.1%	
OW□□14	Multi-function Analog Output FM (Option)		Unit: -1540 to +1540 /-11 V to +11 V	Unit: -1540 to +1540 /-11 V to +11 V	
OW□□15	Multi-function Analog Output AM (Option)		Unit: -1540 to +1540 /-11 V to +11 V	Unit: -1540 to +1540 /-11 V to +11 V	
OW□□16	Multi-function Terminal Output (Option)	Bit 0	Terminals M1-M2	Terminals M1-M2	Terminals MA-MB
		Bit 1	Terminals P1-PC	Terminals P1-PC	Terminals P1-PC
		Bit 2	Terminals P2-PC	Terminals P2-PC	Terminals P2-PC
		Bit 3	Terminals P3-C3	Reserved by the system.	
		Bit 4	Terminals P4-C4		
		Bits 5 to F	Reserved by the system.		

10.4.5 Inverter Input Data Details

Register No.	Name		Varispeed G7	Varispeed F7	VSminiV7
IW□□10	Status	Bit 0	Alarm ALM	Alarm ALM	Alarm ALM
		Bit 1	Warning WARNG	Warning WARNG	Warning WARNG
		Bit 2	Command Ready CMDRDY	Command Ready CMDRDY	Command Ready CMDRDY
		Bit 3	Base Block BB OFS	Base Block BB OFS	Base Block BB OFS
		Bit 4	Power ON PON	Power ON PON	Power ON PON
		Bit 5	During Running RUNX	During Running RUNX	During Running RUNX
		Bit 6	Zero Speed OSP	Zero Speed OSP	Zero Speed OSP
		Bit 7	Reverse Operation REV	Reverse Operation REV	Reverse Operation REV
		Bit 8	During Reset RESET	During Reset RESET	During Reset RESET
		Bit 9	During Speed Coincident AGREE	During Speed Coincident AGREE	During Speed Coincident AGREE
		Bit A	Inverter Ready INV_READY	Inverter Ready INV_READY	Inverter Ready INV_READY
		Bit B	OPE Error OPE	OPE Error OPE	OPE Error OPE
		Bit C	Momentary/Power Cut UV_R	Momentary/Power Cut UV_R	Momentary/Power Cut UV_R
		Bit D	Remote Operation REMOTE	Remote Operation REMOTE	Remote Operation REMOTE
		Bit E Bit F	Reserved by the system.	Reserved by the system.	Reserved by the system.
IW□□11	Output Frequency		Unit depends on the inverter user constant 01-03.	Unit depends on the inverter user constant 01-03.	Unit depends on the inverter user constant n035.
IW□□12	Output Current		Unit: 0.1 A or 0.01 A	Unit: 0.1 A or 0.01 A	Unit: 0.1 A or 0.01 A
IW□□13	Motor Speed (Option)		Unit depends on the inverter user constant 01-03. (Invalid in V/f with PG control mode)	Unit depends on the inverter user constant 01-03. (Invalid in V/f with PG control mode)	Unit depends on the inverter user constant n035. (Output Frequency in V/f with PG control mode)
IW□□14	Torque Reference (U1-09) (Option)		Unit: 0.1% (Invalid in V/f with PG and V/f control mode)	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 (Option)		Unit: pulse (Invalid when an optional PG is not connected.)	Unit: pulse (Invalid when an optional PG is not connected.)	Reserved by the system.
IW□□16	Frequency Reference (U1-01) (Option)		Unit depends on the inverter user constant 01-03.	Unit depends on the inverter user constant 01-03.	Unit depends on the inverter user constant n035.
IW□□17	Multi-function Analog Input A2		Unit: 0.1%	Unit: 0.1%	Unit: 0.1% (RP input)
IW□□18	Main Bus Voltage		Unit: 1 V	Unit: 1 V	Unit: 1 V
IW□□19	Alarm Code (Option)		Alarm Code (Option)	Alarm Code (Option)	Alarm Code (Option)
IW□□1A	Alarm Code (Option)		Alarm Code (Option)	Alarm Code (Option)	Alarm Code (Option)
IW□□1B	Reserved by the system		–	–	–
IW□□1C	Multi-function Analog Input A3		Unit: 0.1%	Unit: 0.1%	Reserved by the system.

Register No.	Name		Varispeed G7	Varispeed F7	VSminiV7
IW□□1D	Digital Input Terminal (Option)	Bit 0	Terminal 1 Status	Terminal 1 Status	Terminal 1 Status
		Bit 1	Terminal 2 Status	Terminal 2 Status	Terminal 2 Status
		Bit 2	Terminal 3 Status	Terminal 3 Status	Terminal 3 Status
		Bit 3	Terminal 4 Status	Terminal 4 Status	Terminal 4 Status
		Bit 4	Terminal 5 Status	Terminal 5 Status	Terminal 5 Status
		Bit 5	Terminal 6 Status	Terminal 6 Status	Terminal 6 Status
		Bit 6	Terminal 7 Status	Terminal 7 Status	Terminal 7 Status
		Bit 7	Terminal 8 Status	Terminal 8 Status	Terminal 8 Status
		Bit 8	Terminal 9 Status	Terminal 9 Status	Terminal 9 Status
		Bit 9	Terminal 10 Status	Terminal 10 Status	Terminal 10 Status
		Bit A	Terminal 11 Status	Terminal 11 Status	Terminal 11 Status
		Bit B	Terminal 12 Status	Terminal 12 Status	Terminal 12 Status
		Bits C to F	Reserved by the system.		
IW□□1E	Multi-function Analog Input A1		Unit: 0.1%	Unit: 0.1%	Unit: 0.1% (FR input)
IW□□1F	Encoder Counter (ch2) (Option)		Unit: pulse (Valid when a PG-Y2 is connected.)	Reserved by the system.	

10.5 Inverter Alarm and Warning Codes

Errors are classified by the following four types, according to where the error occurred and the error contents.

Error Type		Contents	Place the Error Occurred
Alarm	Inverter Alarm	Serious failure that can damage the inverter and machine	Inverter
	Communication Alarm	MECHATROLINK communication failure	SI-T*
Warning	Inverter Warning	Incorrect operation or minor failure that will not likely result in a serious situation.	Inverter
	Communication Warning	MECHATROLINK communication error warning	SI-T*

* SI-T refers to the MECHATROLINK option board.

- When more than one error is detected at one time, the SI-T will report the alarms in order from the smallest alarm code number.
- When another error is detected while another is being detected, the alarm code will not be refreshed.
- When more than one minor failure (warning) is detected at one time, the SI-T will report alarms in order from the smallest warning code number.

Inverter alarms and warnings are described below.

10.5.1 Inverter Alarms

Alarm Code (IW☐☐30)	Status (IW☐☐10)		Digital Operator Display	Contents	Varispeed G7	Varispeed F7	VSminiV7
	WARNG	ALM					
01H	–	ON	PUF	Blown fuse	✓	✓	×
02H	–	ON	UV1	Main circuit undervoltage	✓	✓	✓
03H	–	ON	UV2	Control circuit undervoltage	✓	✓	✓
04H	–	ON	UV3	MC failure	✓	✓	×
06H	–	ON	GF	Ground fault	✓	✓	✓*1
07H	–	ON	OC	Overcurrent	✓	✓	✓
08H	–	ON	OV	Overvoltage	✓	✓	✓
09H	–	ON	OH	Inverter overheat	✓	✓	✓
0AH	–	ON	OH1	Inverter overheat	✓	✓	×
0BH	–	ON	OL1	Motor overload	✓	✓	✓
0CH	–	ON	OL2	Inverter overload	✓	✓	✓
0DH	–	ON	OL3	Overtorque 1	✓	✓	✓
0EH	–	ON	OL4	Overtorque 2	✓	✓	×
0FH	–	ON	RR	Control transistor fault	✓	✓	×
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	Excessive Speed	✓	✓	×
19H	–	ON	DEV	Excessive speed deviation	✓	✓	×
1AH	–	ON	PGO	PG disconnected	✓	✓	×
1BH	–	ON	PF	Input open phase	✓	✓	✓
1CH	–	ON	LF	Output open phase	✓	✓	✓
1DH	–	ON	OH3	Motor overheat 1	✓	✓	×
1EH	–	ON	OPR	Operator disconnected	✓	✓	✓
1FH	–	ON	ERR	EEPROM writing error	✓	✓	×

(cont'd)

Alarm Code (IW□□30)	Status (IW□□10)		Digital Operator Display	Contents	Varispeed G7	Varispeed F7	VSminiV7
	WARNG	ALM					
20H	–	ON	OH4	Motor overheat 2	✓	✓	×
21H	–	ON	CE	MEMOBUS transmission error	✓	✓	✓
25H	–	ON	CF	Control fault	✓	✓	×
26H	–	ON	SVE	Zero servo error	✓	✓	×
27H	–	ON	EFO	External fault	✓	✓	✓
28H	–	ON	FBL	PID feedback reference loss	✓	✓	×
29H	–	ON	UL3	Undertorque 1	✓	✓	✓
2AH	–	ON	UL4	Undertorque 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	×	×	✓
83H	–	ON	CPF02	Baseblock circuit fault	✓	✓	×
84H	–	ON	CPF03	EEPROM fault	✓	✓	✓*2
85H	–	ON	CPF04	CPU internal A/D fault	✓	✓	✓*3
86H	–	ON	CPF05	CPU external A/D fault	✓	✓	×
87H	–	ON	CPF06	Optional board fault	✓	✓	✓
88H	–	ON	CPF07	ASIC internal RAM fault	✓	✓	×
89H	–	ON	CPF08	Watchdog timer fault	✓	✓	×
8AH	–	ON	CPF09	CPU-ASIC mutual diagnosis error	✓	✓	×
8BH	–	ON	CPF10	Incorrect ASIC version	✓	✓	×
8CH			CPF07	Digital operator control circuit fault	×	×	✓
91H	–	ON	CPF20	Communication optional board fault	✓	✓	×
92H	–	ON	CPF21	Communication optional board self-diagnosis error	✓	✓	✓
93H	–	ON	CPF22	Incorrect communication optional board model	✓	✓	✓
94H	–	ON	CPF23	Communication optional board mutual diagnosis error	✓	✓	✓

–: Unchanged, ON: The corresponding bit turns ON, ✓: Supported, ×: Not supported

* 1. Only for 5.5 kW and 7.5 kW VSminiV7
* 2. Digital Operator Display for VSminiV7: CPF04
* 3. Digital Operator Display for VSminiV7: CPF05

10.5.2 Inverter Warnings

Alarm Code (IW□□30)	Status (IW□□10)		Digital Operator Display	Contents	Varispeed G7	Varispeed F7	VSminiV7
	WARNG	ALM					
01H	ON	–	UV	Main circuit undervoltage	✓	✓	✓
02H	ON	–	OV	Overvoltage	✓	✓	✓
03H	ON	–	OH	Inverter overheat	✓	✓	✓
04H	ON	–	OH2	Inverter overheat	✓	✓	×
05H	ON	–	OL3	Overtorque 1	✓	✓	✓
06H	ON	–	OL4	Overtorque 2	✓	✓	×
07H	ON	–	EF	External fault	✓	✓	✓
08H	ON	–	BB	Externally baseblocked	✓	✓	✓
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 fault	×	×	✓
10H	ON	–	OS	Excessive Speed	✓	✓	×
11H	ON	–	DEV	Excessive speed deviation	✓	✓	×
12H	ON	–	PGO	PG disconnected	✓	✓	×
13H	ON	–	OPR	Operator disconnected	✓	✓	✓
14H	ON	–	CE	MEMOBUS transmission error	✓	✓	✓
17H	ON	–	OL1	Motor overload	✓	✓	×
18H	ON	–	OL2	Inverter overload	✓	✓	×
1AH	ON	–	EFO	External fault	✓	✓	×
1BH	ON	–	RUN	Motor running	✓	✓	×
1CH	ON	–	FBL	PID feedback reference loss	✓	✓	✓
1DH	ON	–	CALL	Waiting for transmission data	✓	✓	✓
1EH	ON	–	UL3	Undertorque 1	✓	✓	✓
1FH	ON	–	UL4	Undertorque 2	✓	✓	×
20H	ON	–	SER	Sequence input error	×	×	✓
22H	ON	–	OH3	Motor overheated 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	Urgent stop	×	×	✓

–: Unchanged, ON: The corresponding bit turns ON, ✓: Supported, ×: Not supported

10.5.3 Communication Warnings

Alarm Code (IW□□30)	Status (IW□□10)		Digital Operator Display	Contents	Varispeed G7	Varispeed F7	VSminiV7
	WARNG	ALM					
94H	ON	–		Data setting warning	✓	✓	✓
95H	ON	–		Command warning	✓	✓	✓
96H	ON	–		MECHATROLINK-II communication error warning	✓	✓	✓

–: Unchanged, ON: The corresponding bit turns ON, ✓: Supported

10.5.4 Communication Alarm

Alarm Code (IW□□30)	Status (IW□□10)		Digital Operator Display	Contents	Varispeed G7	Varispeed F7	VSminiV7
	WARNG	ALM					
E5H	–	ON	E5	MECHATROLINK-II WDT timeout error	✓	✓	✓
E6H	–	ON	BUS	MECHATROLINK-II communication error	✓	✓	✓
ECH	–	ON		WDC timeout error in communication with Inverter	✓	✓	✓
EDH	–	ON		Inverter access permission error	✓	✓	✓
EEH	–	ON		Inverter watchdog timeout	✓	✓	✓

–: Unchanged, ON: The corresponding bit turns ON, ✓: Supported

10.5.5 Optional Interface Settings

The hardware switch settings for SI-T and SI-T/V7, which are MECHATROLINK-I and -II communication optional boards for general-purpose inverter Varispeed F7, Varispeed G7, and VSminiV7, are described below.

(1) S1: DIP Switches

Device Code	Switch Name	Status	Description
S1-1	BRS10/4	OFF	4 Mbps
		ON	10 Mbps
S1-2	BYTE16/31	OFF	17-byte transmission mode (For MECHATROLINK-I and MECHATROLINK-II 17-byte mode only)
		ON	32-byte transmission mode (For 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 or 20, in which the two digits are set by the S1-3 DIP switch and the S2 rotary switch, is 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 or 3F, in which the two digits are set by the S1-3 DIP switch and the S2 rotary switch, is invalid.
S1-4	TEST	OFF	Normal mode
		ON	Diagnosis mode

(2) S2: Hexadecimal Rotary Switch

Device Code	Switch Name	Status	Description
S2	SA	0 to F	Sets the first digit of the station address □0H to □FH in hexadecimal.

(3) Station Address List: S1-3 and S2 Switches

S1-3	S2	Station Address (ST#)		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. The station address cannot be used because of the design of the inverters.
* 2. The station address cannot be used because of the design of the SVB Module.

11

Utility Functions

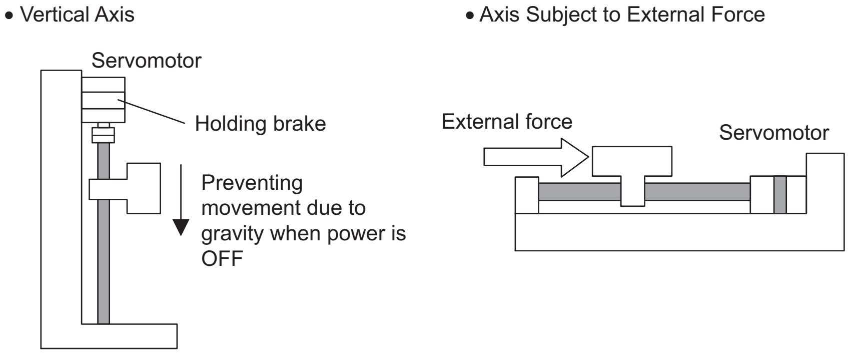
This chapter describes MP2000-series Machine Controller and SERVOPACK utility functions such as vertical axis control, overtravel, and software limits, modal latch, and bank switching. Also, the parameters automatically updated under the specified conditions are explained.

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.



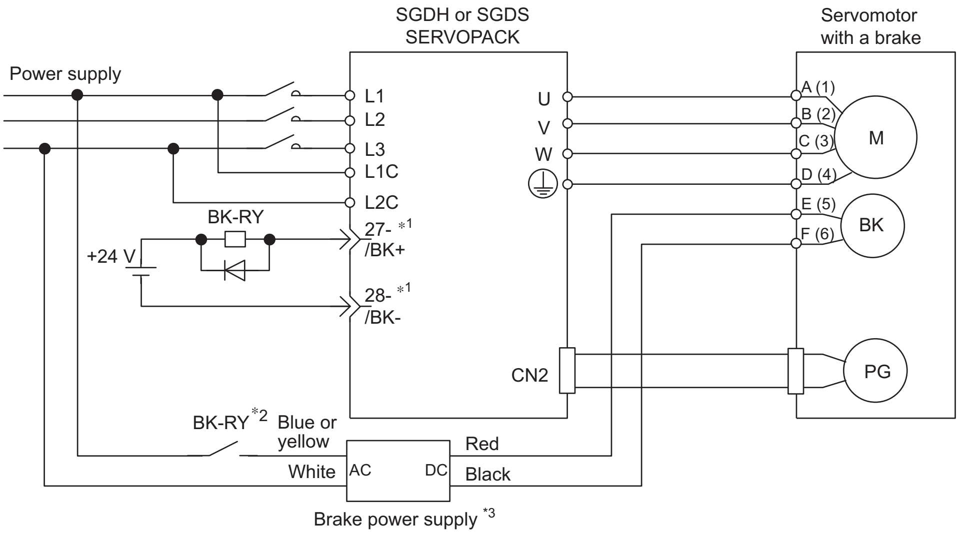
The holding brake of the Servomotor is controlled through the brake interlock output (/BK) signal from the SERVOPACK. The brake is not controlled from the Machine Controller.

- 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/III SGDH or SGDS 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 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.

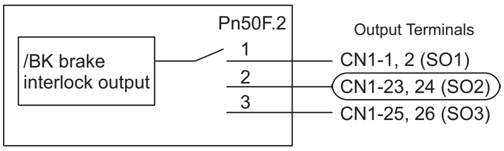
(2) Parameter Settings

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

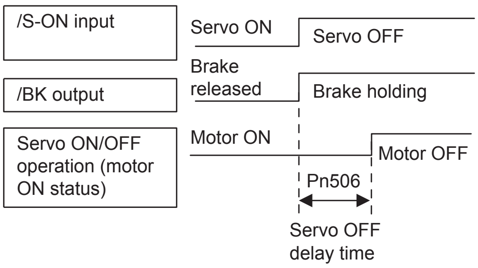
The following parameter determines which CN1 pin (0 to 3 above) will be used to output the /BK signal.



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.

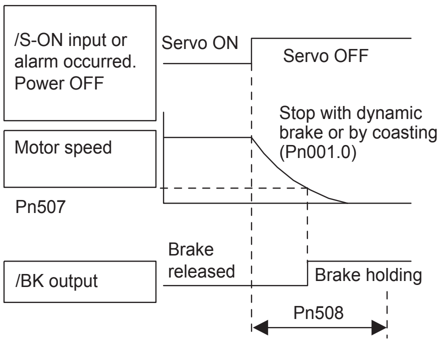


- This parameter is used to set the timing when the motor is stopped. Brake operation while the motor is running is set in Pn507 and Pn508.
- For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this 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.

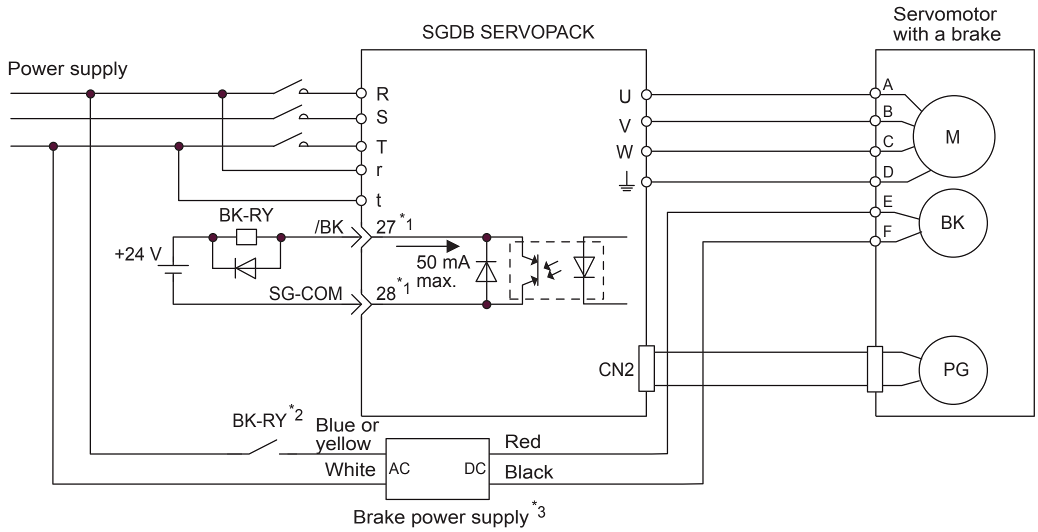


- The brake on the Servomotor is designed as a holding brake and it must be applied only after the motor has stopped. Adjust this parameter while observing machine operation.

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

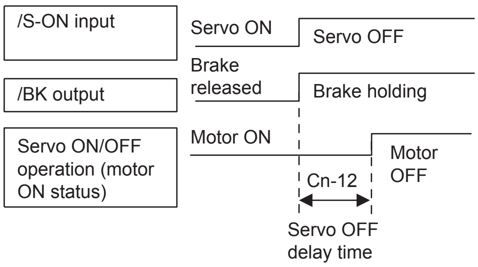
The following parameter determines which pin of the 1CN will be used to output the /BK signal (4 in the lower right column). In the figure above, 4 is allocated to the 2nd digit and the setting is □4□. So, the /BK signal is output to pins 27 and 28.

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.



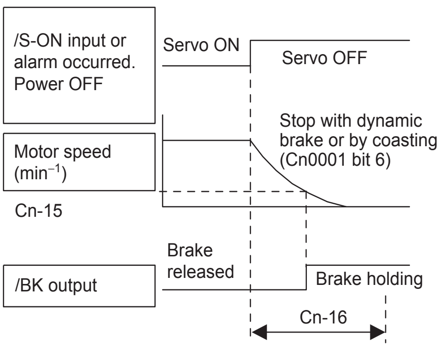
- This parameter is used to set the timing when the motor is stopped. Brake operation while the motor is running is set in Cn-15 and Cn-16.
- For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this 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.

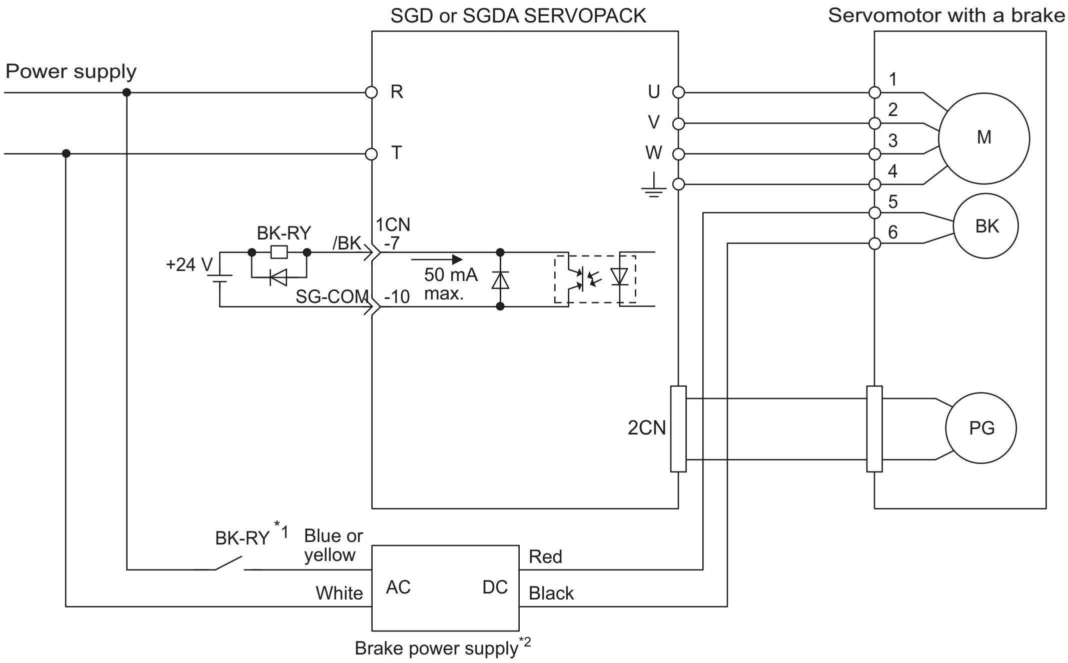


- The brake on the Servomotor is designed as a holding brake and it must be applied only after the motor has stopped. Adjust this parameter while observing machine operation.

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.

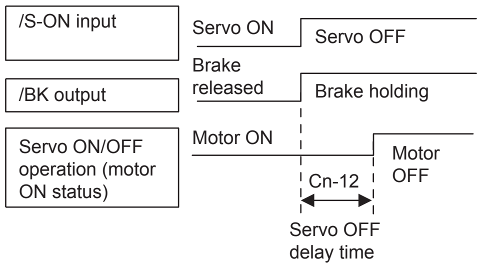
(2) Parameter Settings

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.



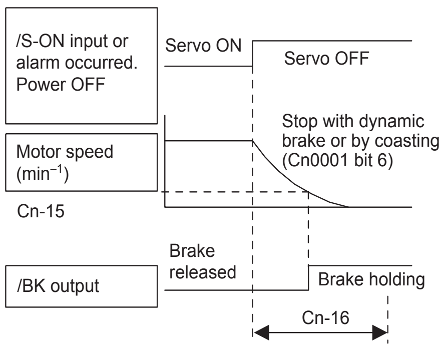
- This parameter is used to set the timing when the motor is stopped. Brake operation while the motor is running is set in Cn-15 and Cn-16.
- For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this 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.

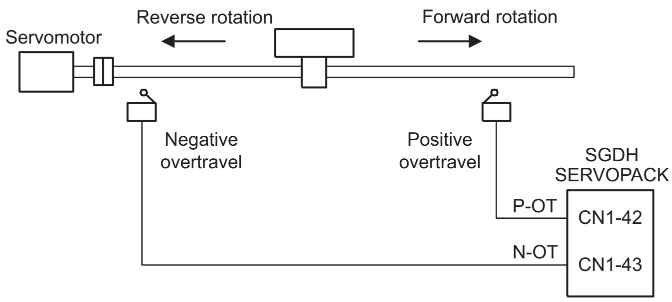
11.2.1 Connections to Σ-II/III/V Series SGDH, SGDS, or SGDV SERVOPACK

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

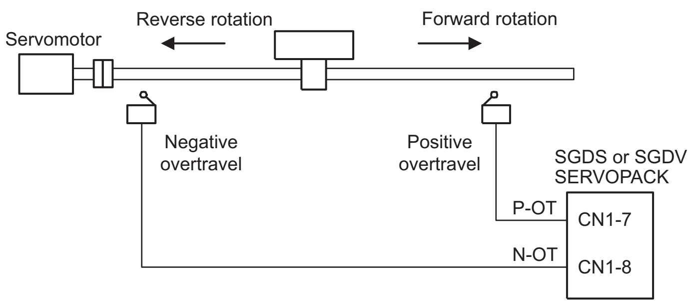
Correctly connect the input signals for the overtravel limit switches shown below to the corresponding pins on the SERVOPACK CN1 or 1CN connector.

■ When Σ-II Series SGDH SERVOPACK is Used



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.)

■ When Σ-III Series SGDS SERVOPACK or Σ-V Series SGDV SERVOPACK is Used



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.	

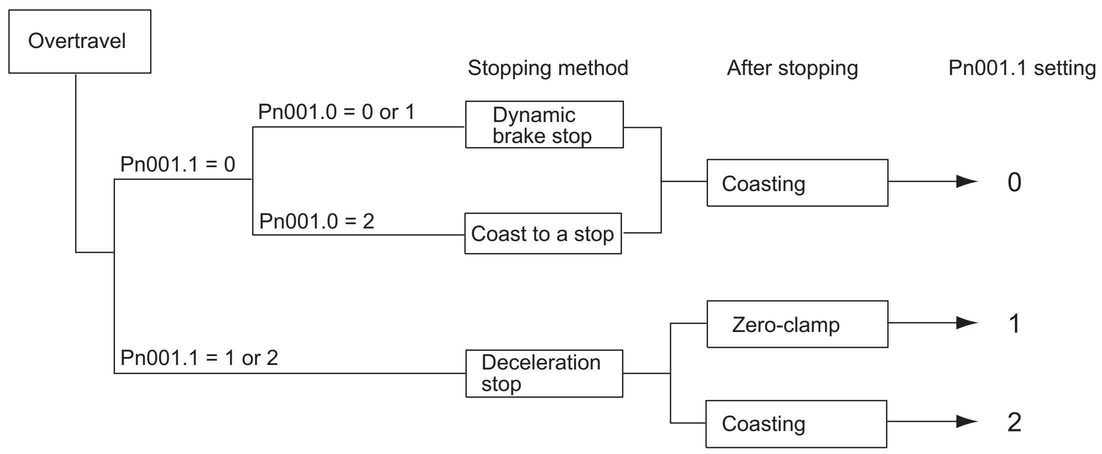
• SGDS and SGDV SERVOPACKs

Parameter		Item
Pn50A.0	n.1□□□	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.0	n.□□□2	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.	



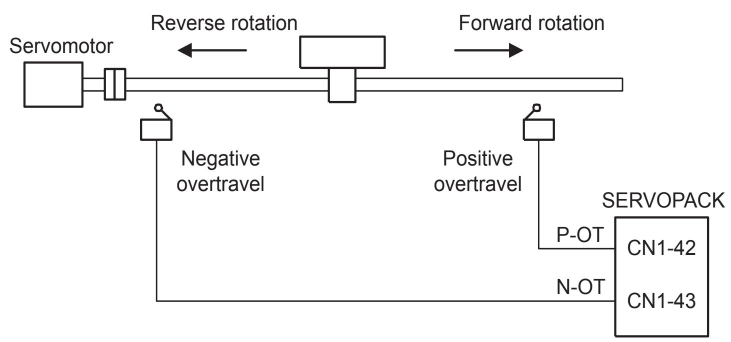
11.2.2 Connections to Σ-I Series SGDB or SGD SERVOPACK

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

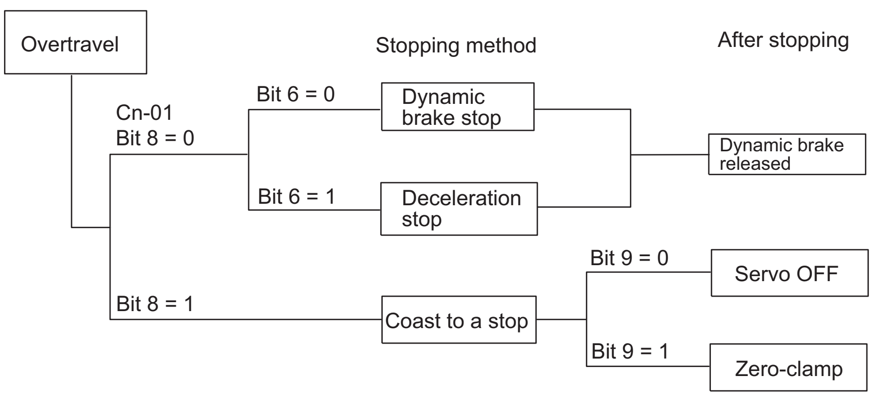
The following parameters are used to enable and disable the overtravel input signals.

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.

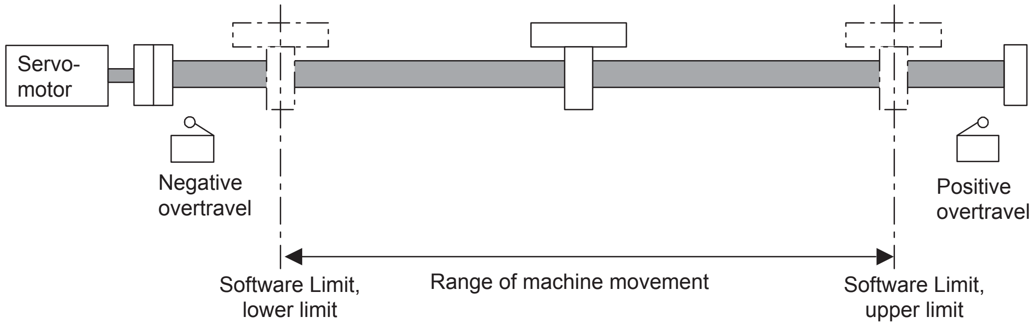
Parameter	Name	Set Value	Item	Default
Cn-01 Bit 8	Selection of stopping method for overtravel	0 (Recommended)	Uses the same stopping method as for Servo OFF. Stops the motor according to Cn-01 bit 6 setting (dynamic brake or coasting) when overtravel is detected.	0
		1	Decelerates the motor to a stop 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 an axis exceeds a software limit, 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

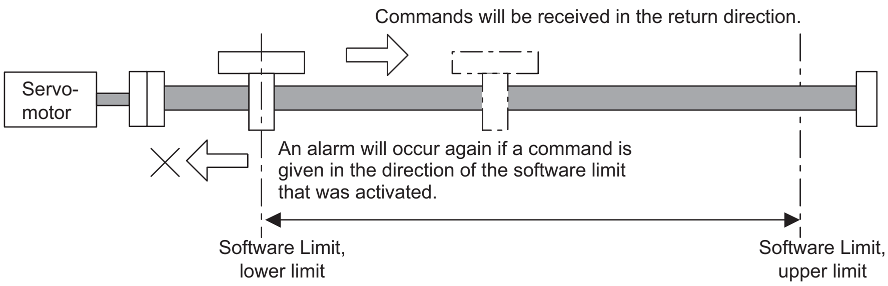
Clear software limit alarms using the procedure below.

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.



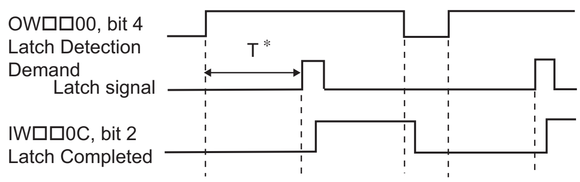
11.4 Modal Latch Function

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).



* $T \geqq t_1 + t_2 + t_3$ where T: Latch processing time
t_1: Communication cycle
t_2: 2 scans
t_3: SERVOPACK preparation time for latch processing (≦4 ms)

■ Cancelling 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. Cancelled 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: 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 10 and 11. 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	Value	Size / Description	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		Unit	Factory Setting	Valida-tion	Setting
			Min.	Max.				
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		Unit	Factory Setting	Valida-tion	Setting
			Min.	Max.				
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

Pn900 = 3	Number of Banks
Pn901 = 3	Number of Members
Pn902 = 80BH	Member 1
Pn903 = 80EH	Member 2
Pn904 = 80CH	Member 3

	Bank Number
Pn920 = 80BH value (0)	Bank 0
Pn921 = 80EH value (0)	
Pn922 = 80CH value (0)	
Pn923 = 80BH value (1)	Bank 1
Pn924 = 80EH value (1)	
Pn925 = 80CH value (1)	
Pn926 = 80BH value (2)	Bank 2
Pn927 = 80EH value (2)	
Pn928 = 80CH value (2)	

- 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 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="5">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></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="2">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="3">Pn102*1</td></tr>
<tr><td>Speed Loop Gain</td><td>OW□□2F</td><td>→</td><td>–</td><td>–</td><td colspan="3">Pn100*1</td></tr>
<tr><td>Speed Feed Forward Amends</td><td>OW□□30</td><td>→</td><td>–</td><td>–</td><td colspan="3">Pn109*1</td></tr>
<tr><td>Position Integration Time Constant</td><td>OW□□32</td><td>→</td><td>–</td><td>–</td><td colspan="3">Pn11F*1</td></tr>
<tr><td>Speed Integration Time Constant</td><td>OW□□34</td><td>→</td><td>–</td><td>–</td><td colspan="3">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>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>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="4">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="4">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="6">Settings are automatically enabled.</td><td></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	
Fixed parameters	No.16: Backlash Compensation Amount		–	–	Pn81B	Pn214	–	–
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	
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	
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				SERVOPACK			
Fixed Parameters				SGD-N, SGDB-N	SGDH + NS100	SGDH+ NS115	SGDS, SGDV
No.		Name					
		Motor Type Selection*	←	Depends on the specifications of the connected Servomotor.			
30		Encoder Selection	←				
Rotary	34	Rated Motor Speed	←				
Rotary	36	Number of Pulses per Motor Rotation	←				
Rotary	38	Maximum Number of Absolute Encoder Turns Rotation	←		Pn205		
Linear	6	Linear Scale Pitch	←	Depends on the connected servomotor.			
Linear	34	Rated Motor Speed	←				
Linear	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 *Motor Type Selection* is written to the *Motor Type* on the upper right of the SVB Definition Window.

[b] Motion Setting Parameters

■ SERVOPACK to Machine Controller

MP2000 Series Machine Controller			SERVOPACK			
Setting Parameters			SGD-N, SGDB-N	SGDH + NS100	SGDH + NS115	SGDS, SGDV
Address	Name					
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
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	*1	→	–	Pn511.0			
/EXT1 Signal Mapping	*1	→	–	Pn511.1			
/EXT2 Signal Mapping	*1	→	–	Pn511.2			
/EXT3 Signal Mapping	*1	→	–	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*2
Linear Accel/Decel Constant Selection	1	→	–				Pn833.0*3

* 1. 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
	Other SGDV models	CN1-9
/EXT1	SGDS	CN1-10
	SGDH	CN1-44
	SGDV-□□□J1□□	CN1-44
	SGDV-□□□E1□□	N/A
	Other SGDV models	CN1-10

Signal Name	SERVOPACK Model	Setting
/EXT2	SGDS	CN1-11
	SGDH	CN1-45
	SGDV-□□□J1□□	CN1-45
	SGDV-□□□E1□□	N/A
	Other SGDV models	CN1-11
/EXT3	SGDS	CN1-12
	SGDH	CN1-46
	SGDV-□□□J1□□	CN1-46
	SGDV-□□□E1□□	N/A
	Other SGDV models	CN1-12

* 2. Allocated for the TFF/TLIM function of the position control command.

* 3. 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)

<table>
<tr><th colspan="2">MP2000 Series Machine Controller</th><th rowspan="3"></th><th colspan="5">SERVOPACK</th></tr>
<tr><th colspan="2">SERVOPACK Parameters</th><th rowspan="2">SGD-N,
SGDB-N</th><th rowspan="2">SGDH +
NS100</th><th rowspan="2">SGDH +
NS115</th><th rowspan="2">SGDS</th><th rowspan="2">SGDV</th></tr>
<tr><th>Name</th><th>Setting</th></tr>
<tr><td>Position Error Overflow Range</td><td>65535</td><td>→</td><td>Cn-001E</td><td colspan="4">–</td></tr>
<tr><td>Overflow Level</td><td>32767</td><td>→</td><td>–</td><td colspan="2">Pn505</td><td colspan="2">–</td></tr>
<tr><td>Excessive Position Error Alarm Level</td><td>2^{30}-1</td><td>→</td><td colspan="3">–</td><td colspan="2">Pn520</td></tr>
<tr><td>Excessive Position Error Warning Level</td><td>100</td><td>→</td><td>–</td><td colspan="4">Pn51E</td></tr>
</table>

- The above set values are written to the SERVOPACK’s RAM.

11.7 Precautions for the Use of 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)).

12

Troubleshooting

This chapter explains error details and corrective actions for each error.

12.1 Troubleshooting

This section describes the basic troubleshooting methods and provides a list of errors.

12.1.1 Basic Flow of Troubleshooting

When problems occur, it is important to quickly find the cause of the problems and get the system running again as soon as possible. The basic flow of troubleshooting is illustrated below.

Step 1	Visually confirm the following items.

- Machine movement (or status if stopped)
- Power supply
- I/O device status
- Wiring status
- Indicator status (LED indicators on each Module)
- Switch settings (e.g., DIP switches)
- Parameter settings and program contents

↓

Step 2	Monitor the system to see if the problem changes for the following operations.

- Switching the Controller to STOP status
- Resetting alarms
- Turning the power supply OFF and ON

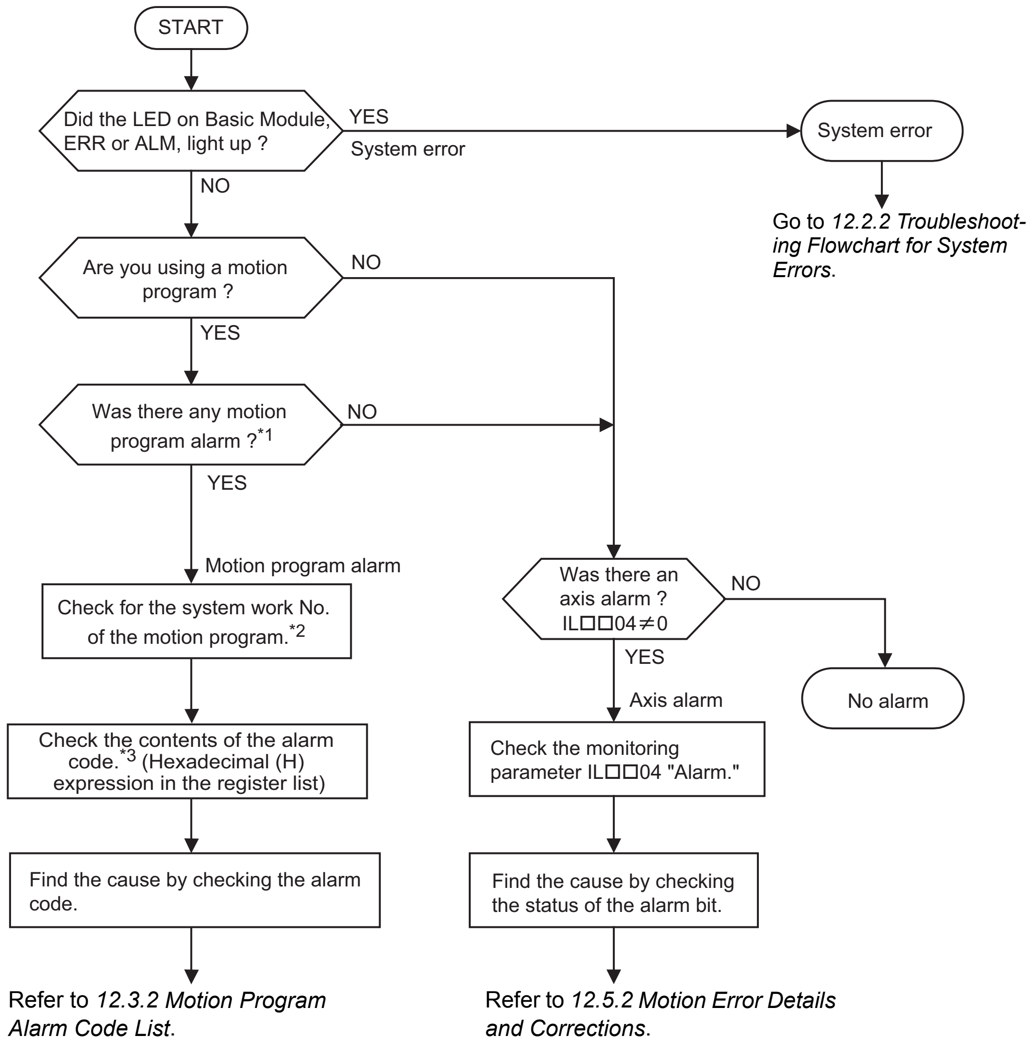
↓

Step 3	Determine the location of the cause from the results of steps 1 and 2.

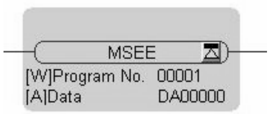
- Controller or external?
- Sequence control or motion control?
- Software or hardware?

12.1.2 MP2000 Series Machine Controller Error Check Flowchart

Find the correction to the problem using the following flowchart if the cause of the problem is thought to be the Machine Controller or SERVOPACK.



* 1. Check the status flag Program Alarm Occurrence (MSEE work, bit 8 of the 0 word) to see whether a motion program alarm is occurring or not.
<Example> When an MSEE instruction is executed in the ladder program shown below, bit 8 of DW00000 indicates an alarm occurrence.



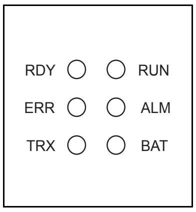
* 2. To find the system work number, find the SW register that stores the motion program number where the alarm is occurring from the Main Program Number in Execution (SW03200 to SW03215), and obtain the system work number from the SW register.
Refer to *12.2.4 (9) Motion Program Execution Information* for the relationship between SW register and system work number.

* 3. Obtain the motion program alarm code from Work Using Program Information (58 words). Obtain the system work number and then determine the contents of the alarm code referring to *12.2.4 (9) Motion Program Execution Information*.
An alarm code is prepared for each Parallel. When a parallel execution instruction such as PFORK, JOINTO, PJOINT is not used, the alarm code will be stored in Parallel 0.

12.1.3 LED Indicators (MP2200/MP2300)

- For explanations of the LED indicators on MP2100/MP2100M and MP2500/MP2500M/MP2500D/MP2500MD respectively, refer to Machine Controller MP2100/MP2100M User's Manual Design and Maintenance (manual number: SIEP C880700 01) and Machine Controller MP2500/MP2500M/MP2500D/MP2500MD User's Manual (manual number: SIEP C880752 00).

(1) LED Indicators



The status of the LED indicators on the front of the MP2200/MP2300 can be used to determine the error status and meaning.
The locations in the program that need to be corrected can be determined by using the LED indicator status to determine the general nature of the error, using the contents of system (S) registers to check drawings and function numbers causing the error, and knowing the meaning of operation errors.

(2) LED Indicator Meanings

The following table shows how to use the LED indicators to determine the operating status of the MP2200/MP2300, as well as relevant error information when the LED indicator status indicates an error.

<table>
<tr><th rowspan="2">Classification</th><th colspan="5">LED Indicator</th><th rowspan="2">Indicator Details</th><th rowspan="2">Countermeasures</th></tr>
<tr><th>RDY</th><th>RUN</th><th>ALM</th><th>ERR</th><th>BAT</th></tr>
<tr><td rowspan="5">Normal operation</td><td>Not lit</td><td>Not lit</td><td>Lit</td><td>Lit</td><td>Not lit</td><td>Hardware reset status</td><td rowspan="3">Usually the CPU will start within 10 seconds. If this status continues for more than 10 seconds, either a program error or hardware failure has occurred. Refer to 12.2 Troubleshooting System Errors and correct any system errors.</td></tr>
<tr><td>Not lit</td><td>Not lit</td><td>Not lit</td><td>Not lit</td><td>Not lit</td><td>Initialization</td></tr>
<tr><td>Not lit</td><td>Lit</td><td>Not lit</td><td>Not lit</td><td>Not lit</td><td>Drawing A (DWG.A) being executed.</td></tr>
<tr><td>Lit</td><td>Not lit</td><td>Not lit</td><td>Not lit</td><td>Not lit</td><td>User program stopped.
(Offline Stop Mode)</td><td>This status occurs
• When the stop operation is executed from the MPE720
• When the STOP switch is turned ON
This status does not indicate an error.</td></tr>
<tr><td>Lit</td><td>Lit</td><td>Not lit</td><td>Not lit</td><td>Not lit</td><td>User program being executed normally.</td><td>This is the normal status.</td></tr>
</table>

(cont'd)

Classification	LED Indicator					Indicator Details	Countermeasures
	RDY	RUN	ALM	ERR	BAT		
Errors	Not lit	Not lit	Not lit	Lit	Not lit	A serious error has occurred.	Refer to *12.2.3 Correcting User Program Errors*.
	No lit	Not lit	Lit	Not lit	Not lit		
	Not lit	Not lit	Not lit	Blinking	Not lit	Software Error Number of LED blinks indicates error type. 3: Address error (read) exception 4: Address error (write) exception 5: FPU exception 6: Illegal general command exception 7: Illegal slot command exception 8: General FPU inhibited exception 9: Slot FPU inhibited exception 10: TLB multibit exception 11: LTB error (read) exception 12: LTB error (write) exception 13: LTB protection violation (read) exception 14: LTB protection violation (write) exception 15: Initial page write exception	A hardware error has occurred. Replace the Module.
	Not lit	Not lit	Blinking	Blinking	Not lit	Hardware Error Number of LED blinks indicates error type. 2: RAM diagnostic error 3: ROM diagnostic error 4: CPU function diagnostic error 5: FPU function diagnostic error	
Warnings	-	-	-	-	Lit	Battery alarm	Replace the battery to save the memory.
	Lit	Lit	Lit	Not lit	Not lit	Operation error I/O error	Refer to *12.2.4 (3) Ladder Program User Operation Error Status* and *12.2.4 (4) System Service Execution Status*.

12.2 Troubleshooting System Errors

This section provides troubleshooting information for system errors.

12.2.1 Outline of System Errors

The LED indicators on the front of the Basic Module can be used to determine Machine Controller operating status and error status. To obtain more detailed information on errors, the system (S) registers can be used. A detailed check of the contents of system registers can be used to determine the location of the error and take the corrective measures.
Details on system registers are provided below.

(1) System Register Allocations

The following table shows the overall structure of the system registers. Refer to the sections given on the right for details.

SW00000	System Service Register	
SW00030	System Status	→ *12.2.4 (1) System Status*
SW00050	System Error Status	→ *12.2.4 (2) System Error Status*
SW00080	User Operation Error Status	→ *12.2.4 (3) Ladder Program User Operation Error Status*
SW00090	System Service Execution Status	→ *12.2.4 (4) System Service Execution Status*
SW00110	User Operation Error Status Details	→ *12.2.4 (3) Ladder Program User Operation Error Status*
SW00190	Alarm Counter and Alarm Clear	→ *12.2.4 (5) Alarm Counter and Alarm Clear*
SW00200	System I/O Error Status	→ *12.2.4 (6) System I/O Error Status*
SW00504	Reserved by the system	
SW00698	Interrupt Status	
SW00800	Module Information	→ *12.2.4 (8) Module Information*
SW01312	Reserved by the system	
SW02048	Reserved by the system	
SW03200	Motion Program Information	→ *12.3 Motion Program Alarms*
SW05200 to SW08191	Reserved by the system	

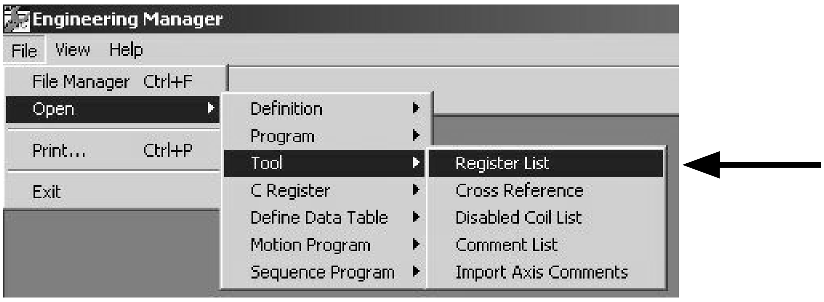
(2) Accessing System Registers

To access the contents of system registers, start the MPE720 Programming Tool and use the Register List or Quick Reference function.
The Register List on the MPE720 version 5.□□ is displayed differently from that on the MPE720 version 6.□□. The display of each version is as follows.

[a] Register List Display Procedure (MPE720 Version 5.□□)

Use the following procedure to display the register list on the MPE720 version 5.□□.

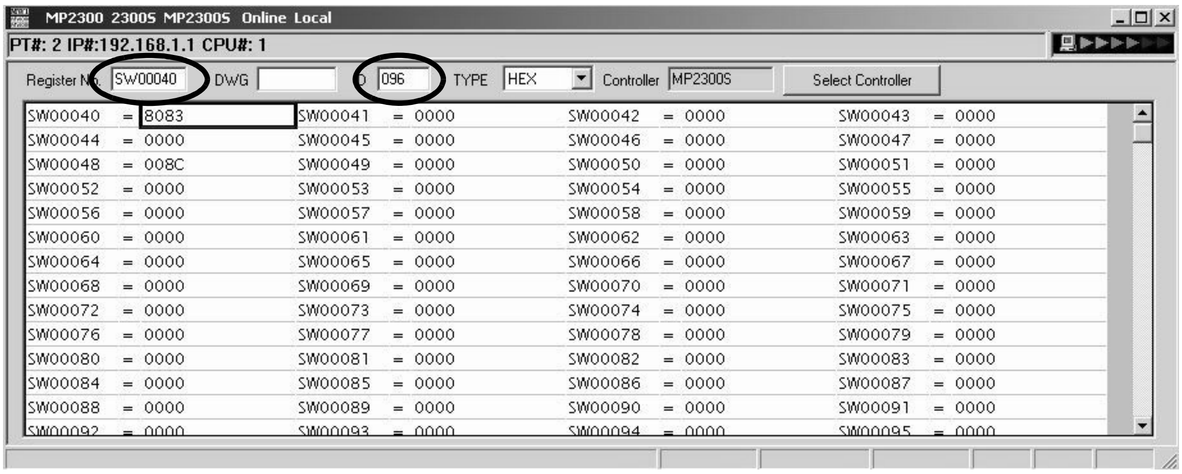
1. Select ***File - Open - Tool - Register List*** from the MPE720 Engineering Manager Window to open the **Register List** Window.



- Refer to *3.4.1 Module Configuration Definition* for details on how to display the **Engineering Manager** Window.

2. Select ***View Mode - HEX*** to change the view mode to hexadecimal.

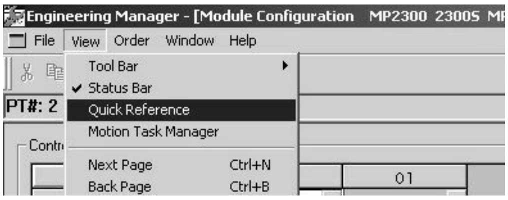
3. Input the register number of the first system register to be accessed for *Register*, input the register number of the last system register to be accessed for *D*, and click anywhere in the list. The contents of the specified range of register numbers will be displayed.



[b] Displaying a Register List with the Quick Reference (MPE720 Version 5)

Register lists can also be accessed with the Quick Reference.

1. Select ***View - Quick Reference*** from the MPE720 Engineering Manager Window.

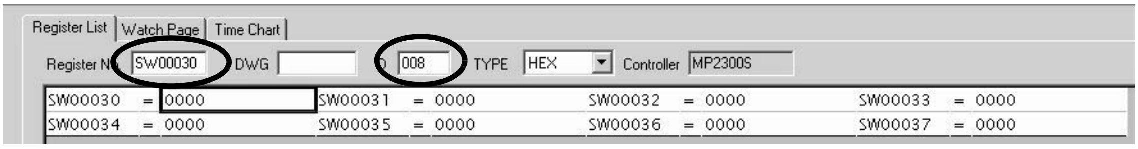


The Quick Reference will be displayed at the bottom of the **Engineering Manager** Window.

- Refer to *3.4.1 Module Configuration Definition* for details on how to display the **Engineering Manager** Window.

2. Click the **Register List** Tab to switch to the register list.

3. Enter the register number of the first system register to be accessed for *Register*, input the register number of the last system register to be accessed for *D*, and click anywhere in the list. The contents of the specified range of register numbers will be displayed.



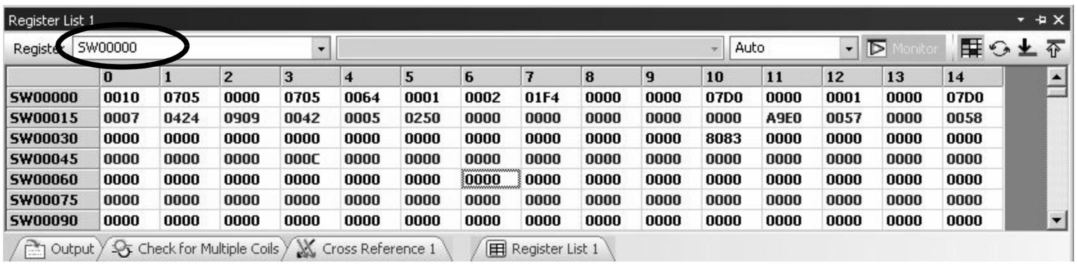
[c] Register List Display Procedure (MPE720 Version 6 or 7)

Use the following procedure to display the register list.

1. Open the Register List Subwindow on MPE720 version 6 or 7.

The **Register List** Tab will appear by default on the bottom of the subwindow.

2. Enter the first register number SW□□□□□ of the system registers to be accessed in the ***Register*** input field. The contents of system registers from the first register number will be displayed.

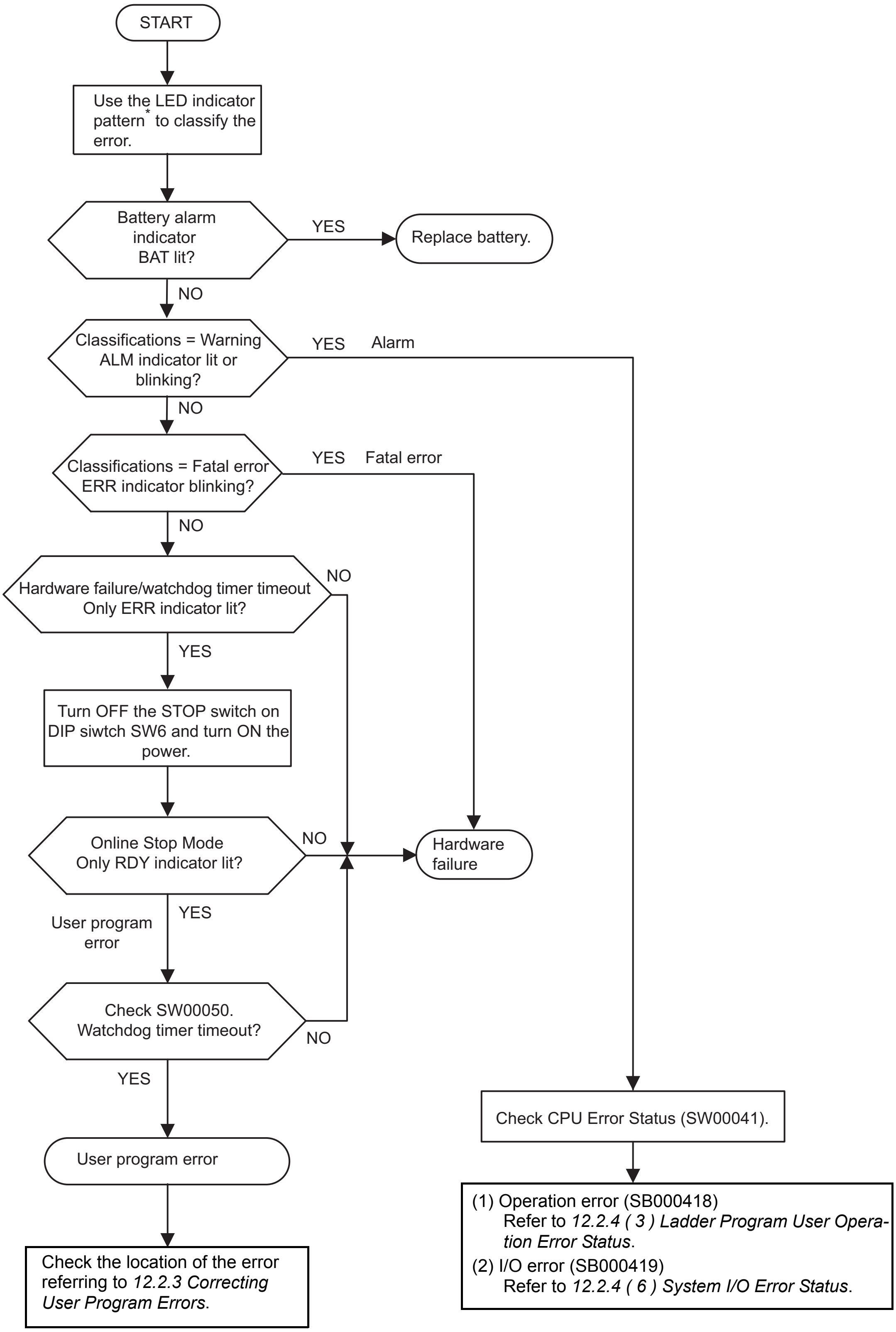


	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SW00000	0010	0705	0000	0705	0064	0001	0002	01F4	0000	0000	07D0	0000	0001	0000	07D0
SW00015	0007	0424	0909	0042	0005	0250	0000	0000	0000	0000	0000	A9E0	0057	0000	0058
SW00030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	8083	0000	0000	0000	0000
SW00045	0000	0000	0000	000C	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
SW00060	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
SW00075	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
SW00090	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

- The data type is set by default to decimal. To display data in hexadecimal as shown above, right-click anywhere in the list and select ***Hexadecimal*** from the pop-up menu that opens.

12.2.2 Troubleshooting Flowchart for System Errors

A troubleshooting flowchart for system errors is provided below.



* For LED indicator pattern, refer to *12.1.3 (2) LED Indicator Meanings*.

12.2.3 Correcting User Program Errors

A serious error may have occurred if the ALM and ERR indicators on the front of the Machine Controller Basic Module are lit red. Set the Machine Controller in stop status (STOP switch on DIP switch 6: ON) and investigate the error. Use the following procedure to investigate ladder program errors.

■ When the ERR LED Lights Up

(1) Investigate type of serious error	Check the contents of SW00050 (Error Type) to determine if the type of the serious error is a system error or a user program error.

⬇

(2) Investigate type of program in which there is an error	Check the contents of SW00055 (Program Type) to determine if the error is in a drawing or function.

⬇

(3) Investigate the drawing with the error	Check the contents of SW00054 (Error Task) and SW00056 (Drawing Number) to determine the drawing with the error.

⬇

(4) Investigate the function with the error	If SW00056 (Drawing Number) contains 0100H, the error is in a function. Check the contents of SW00057 (Error Task) and SW00058 (Drawing Number) to determine the drawing with the error. Check the contents of SW00059 (Function Referencing Drawing Step No.) to determine the step number with the operation error.

⬇

(5) Correct the program	Correct the program at the point where the error occurred.

■ When the ALM LED Lights Up

(1) Check to see whether an operation error has occurred	Check the error count for each drawing in SW00080 to SW00088. If errors have been counted, an operation error has occurred. Go to (2).

⬇

(2) Investigate the type of operation error and its location If an operation error occurs, the □00 (H00, L00, I00, and A00) drawings will execute. These drawings can also be used to correct or confirm operation.	1. Check Error Details Check error codes for drawings where the error is counted. DWG.A: SW00111, DWG.H: SW00143 DWG.I: SW00127, DWG.L: SW00175 2. Check the Drawing Number Check the error drawing number for the drawing number where an error occurred. DWG.A: SW00122, DWG.H: SW00154 DWG.I: SW00138, DWG.L: SW00186 3. Errors in Functions Check the Function Referencing Drawing Number and Function Referencing STEP Number. DWG.A: SW00123, SW00124, DWG.H: SW00155, SW00156 DWG.I: SW00139, SW00140, DWG.L: SW00187, SW00188

⬇

(3) Correct the Program	Correct the program at the point where the error occurred.

12.2.4 System Register Configuration and Error Status

(1) System Status

System operating status and error status is stored in registers SW00040 to SW00048. Checking of system status details are used to determine whether hardware or software is the cause of an error.

Name	Register No.	Description		
Reserved by the system	SW00030 to SW00039	–		
CPU Status	SW00040	SW00040 Bit0	READY	0: Failure 1: Normal
		SW00040 Bit1	RUN	0: Stopped, 1: Running
		SW00040 Bit2	ALARM	0: Normal, 1: Alarm
		SW00040 Bit3	ERROR	0: Normal, 1: Error
		SW00040 Bit4	Reserved by the system	–
		SW00040 Bit5	Reserved by the system	–
		SW00040 Bit6	FLASH	1: Flash operation
		SW00040 Bit7	WEN	0: Write-disabled, 1: Write-enabled
		SW00040 Bit8 to SW00040 BitD	Reserved by the system	–
		SW00040 BitE	Operation Stop Request	0: RUN selection, 1: STOP selection
		SW00004 BitF	Run Switch Status at Power ON	0: STOP 1: RUN
CPU Error Status	SW00041	SW00041 Bit0	Serious Failure	1: WDGE, undefined command See SW00050 for details.
		SW00041 Bit1	Reserved by the system	–
		SW00041 Bit2	Reserved by the system	–
		SW00041 Bit3	Exception Error	–
		SW00041 Bit4 to SW00041 Bit7	Reserved by the system	–
		SW00041 Bit8	User operation error	1: User operation error
		SW00041 Bit9	I/O Error	1: I/O error
		SW00041 BitA to SW00041 BitF	Reserved by the system	–
H Scan Time Over Counter	SW00044	–	–	–
L Scan Time Over Counter	SW00046	–	–	–
Reserved by the system	SW00047	SW00047 Bit0 to SW00047 BitF	Reserved by the system	–
Hardware Configuration Status	SW00048	SW00048 Bit0	TEST	DIP switch status 0: ON, 1: OFF
		SW00048 Bit1	MON	
		SW00048 Bit2	CNFG	
		SW00048 Bit3	INIT	
		SW00048 Bit4	SUP	
		SW00048 Bit5	STOP	
		SW00048 Bit6	–	
		SW00048 Bit7	Battery Alarm	–
		SW00048 Bit8 to SW00048 BitF	Reserved by the system	–
Reserved by the system	SW00049	SW00049 Bit0 to SW00049 BitF	Reserved by the system	–

(2) System Error Status

System error status is stored in registers SW00050 to SW00079.

Name	Register No.	Description		
32-bit Error Code	SW00050	0001H	Watchdog timer timeout error	
		0041H	ROM diagnosis error	
		0042H	RAM diagnosis error	
		0043H	CPU diagnosis error	
		0044H	FPU diagnosis error	
		00E0H	Address read exception error	
		0100H	Address write exception error	
		0120H	FPU exception error	
		0180H	Illegal general command error	
		01A0H	Illegal slot command error	
		01E0H	User break after command execution	
		0800H	General FPU inhibited exception error	
		0820H	Slot FPU inhibited exception error	
	SW00051	For system error analysis		
32-bit Error Addresses	SW00052 SW00053	For system error analysis		
Ladder Program Error Task	SW00054	0000H: System 0001H: DWG.A	0002H: DWG.I 0003H: DWG.H	0005H: DWG.L
Ladder Program Type	SW00055	0000H: System 0001H: DWG.A	0002H: DWG.I 0003H: DWG.H	0005H: DWG.L 0008H: Function
Ladder Program Error Drawing Number	SW00056	Ladder program parent drawing: FFFFH Ladder program function: 8000H Ladder program child drawing: □□00H (H□□: Child drawing number) Ladder program grandchild drawing: □□yyH (Hyy: Grandchild drawing number) Motion program: F0□□H (H□□: Program number)		
Ladder Program Function Calling Drawing Type	SW00057	Type of drawing that calls the ladder program function in which an error occurred.		
		0001H: DWG.A 0002H: DWG.I 0003H: DWG.H	0005H: DWG.L 0008H: Ladder program function	0010H: Reserved by system. 0011H: Reserved by system.
Ladder Program Function Calling Drawing Number	SW00058	Number of drawing that calls the ladder program function in which an error occurred.		
		Parent drawing: FFFFH Function: 0100H	Child drawing: □□00H (H□□: Child drawing number) Grandchild drawing: □□yyH (Hyy: Grandchild drawing number)	
Ladder Program Function Calling Drawing Number	SW00059	STEP number of the drawing that calls the ladder program function in which an error occurred. 0 when there is an error in the drawing.		
Error Data	SW00060 and SW00061	Reserved by the system		
	SW00062 to SW00065	Name of Task Generating Error		
	SW00066 and SW00067	Reserved by the system		
	SW00068	Year Generated		
	SW00069	Month Generated		
	SW00070	Day of Week Generated		
	SW00071	Day of Month Generated		
	SW00072	Hour Generated		
	SW00073	Minutes Generated		
	SW00074	Seconds Generated		
	SW00075	Milliseconds Generated (Not used)		
	SW00076 to SW00079	Reserved by the system		

(3) Ladder Program User Operation Error Status

Error information for user operation errors in ladder programs is stored in registers SW00080 to SW00089 (Error Status 1) and SW00110 to SW00189 (Error Status 2).

[a] Ladder Program User Operation Error Status 1

Name	Register No.	Description
DWG.A Error Count Error Code	SW00080	Operation error code: See *Ladder Program User Operation Error Codes 1*. Error code when an index error occurs: See *Ladder Program User Operation Error Codes 2*.
	SW00081	
DWG.I Error Count Error Code	SW00082	
	SW00083	
DWG.H Error Count Error Code	SW00084	
	SW00085	
Reserved by the system.	SW00086	
	SW00087	
DWG.L Error Count Error Code	SW00088	
	SW00089	

[b] Ladder Program User Operation Error Status 2

Name	Register No.				Remarks
	DWG.A	DWG.I	DWG.H	DWG.L	
Error Count	SW00110	SW00126	SW00142	SW00174	<Error Drawing Number > Parent drawing: FFFFH Child drawing: □□00H (H□□: Child drawing number) Grandchild drawing: □□yyH (Hyy: Grandchild drawing number) Function: 8000H Motion program: F0□□H (H□□: Program number) <Function Calling Drawing Number> Number of the drawing that calls the function in which an error occurred. <Function Calling DWG Step Number> Step number of the drawing that calls the function in which an error occurred. 0 when there is an error in the parent drawing.
Error Code	SW00111	SW00127	SW00143	SW00175	
Error A Register	SW00112	SW00128	SW00144	SW00176	
	SW00113	SW00129	SW00145	SW00177	
Modification A Register	SW00114	SW00130	SW00146	SW00178	
	SW00115	SW00131	SW00147	SW00179	
Error F Register	SW00116	SW00132	SW00148	SW00180	
	SW00117	SW00133	SW00149	SW00181	
Modification F Register	SW00118	SW00134	SW00150	SW00182	
	SW00119	SW00135	SW00151	SW00183	
Error Address	SW00120	SW00136	SW00152	SW00184	
	SW00121	SW00137	SW00153	SW00185	
Error Drawing Number	SW00122	SW00138	SW00154	SW00186	
Function Calling Drawing Number	SW00123	SW00139	SW00155	SW00187	
Function Calling DWG Step Number	SW00124	SW00140	SW00156	SW00188	
Reserved by the system.	SW00125	SW00141	SW00157	SW00189	

[c] Ladder Program User Operation Error Codes 1

<table>
<tr><th></th><th>Error Code</th><th colspan="2">Error Contents</th><th>User*</th><th>System Default Value</th></tr>
<tr><td rowspan="7">Integer Operations</td><td>0001H</td><td colspan="2">Integer operation - underflow</td><td>Yes</td><td>–32768 [–32768]</td></tr>
<tr><td>0002H</td><td colspan="2">Integer operation - overflow</td><td>Yes</td><td>32767 [32767]</td></tr>
<tr><td>0003H</td><td colspan="2">Integer operation - division error</td><td>Yes</td><td>The A register remains the same.</td></tr>
<tr><td>0009H</td><td colspan="2">Double-length integer operation - underflow</td><td>Yes</td><td>–2147483648 [–2147483648]</td></tr>
<tr><td>000AH</td><td colspan="2">Double-length integer operation - overflow</td><td>Yes</td><td>2147483647 [2147483647]</td></tr>
<tr><td>000BH</td><td colspan="2">Double-length integer operation - division error</td><td>Yes</td><td>The A register remains the same.</td></tr>
<tr><td>010□H</td><td colspan="2">Operation error drawing - integer operation error (□ = 1 to B)</td><td>No</td><td>Default indicated above.</td></tr>
<tr><td rowspan="21">Real Number Operation</td><td>0010H</td><td colspan="2">Integer storage - non-numeric error</td><td>Yes</td><td>Store not executed. [00000]</td></tr>
<tr><td>0011H</td><td colspan="2">Integer storage - underflow</td><td>Yes</td><td>Store not executed. [–32768]</td></tr>
<tr><td>0012H</td><td colspan="2">Integer storage - overflow</td><td>Yes</td><td>Store not executed. [+32767]</td></tr>
<tr><td>0021H</td><td colspan="2">Real number storage - underflow</td><td>Yes</td><td>Store not executed. [–1.0E+38]</td></tr>
<tr><td>0022H</td><td colspan="2">Real number storage - overflow</td><td>Yes</td><td>Store not executed. [1.0E+38]</td></tr>
<tr><td>0023H</td><td colspan="2">Real number operation - division-by-zero error</td><td>Yes</td><td>Operation not executed.
The F register remains the same.</td></tr>
<tr><td>0030H</td><td colspan="2">Real number operation - invalid operation (non-numeric)</td><td>No</td><td>Operation not executed.</td></tr>
<tr><td>0031H</td><td colspan="2">Real number operation - exponent underflow</td><td>No</td><td>0.0</td></tr>
<tr><td>0032H</td><td colspan="2">Real number operation - exponent overflow</td><td>No</td><td>Maximum value</td></tr>
<tr><td>0033H</td><td colspan="2">Real number operation - division error (non-numeric 0/0)</td><td>No</td><td>Operation not executed.</td></tr>
<tr><td>0034H</td><td colspan="2">Real number storage - exponent underflow</td><td>No</td><td>Stores 0.0.</td></tr>
<tr><td>0035H</td><td colspan="2">Real number operation - stack error</td><td></td><td></td></tr>
<tr><td rowspan="9">0040H
to
0059H</td><td colspan="2">Standard System Functions
Real number operation errors</td><td>No</td><td>Interrupt operation and output = 0.0</td></tr>
<tr><td>0040H: SQRT</td><td>0041H: SIN</td><td>0042H: COS</td><td>0043H: TAN</td></tr>
<tr><td>0044H: ASIN</td><td>0045H: ACOS</td><td>0046H: ATAN</td><td>0047H: EXP</td></tr>
<tr><td>0048H: LN</td><td>0049H: LOG</td><td>004AH: DZA</td><td>004BH: DZB</td></tr>
<tr><td>004CH: LIM</td><td>004DH: PI</td><td>004EH: PD</td><td>004FH: PID</td></tr>
<tr><td>0050H: LAG</td><td>0051H: LLAG</td><td>0052H: FGN</td><td>0053H: IFGN</td></tr>
<tr><td>0054H: LAU</td><td>0055H: SLAU</td><td>0056H: REM</td><td>0057H: RCHK</td></tr>
<tr><td>0058H: BSRCH</td><td>0059H: SQRT</td><td></td><td></td></tr>
<tr><td colspan="4">1000H or 2000H is added for an index error.</td></tr>
</table>

* Yes: Can be set to value other than system default from the user program.
No: The system default cannot be changed from the user program.

[d] Ladder Program User Operation Error Codes 2

<table>
<tr><th></th><th>Error Code</th><th colspan="2">Error Contents</th><th>User*</th><th>System Default</th></tr>
<tr><td rowspan="2">Integer - Real Number Operations</td><td>1000H</td><td colspan="2">Index error within drawing</td><td>No</td><td>Execute again with i, j = 0.
The i and j register remains the same.</td></tr>
<tr><td>2000H</td><td colspan="2">Index error within function</td><td>No</td><td>Execute again with i, j = 0.
The i and j register remains the same.</td></tr>
<tr><td rowspan="4">Integer Operation</td><td rowspan="4">□060H
to
□077H
(□ = 1, 2)</td><td colspan="2">Integer system functions
Index error</td><td>No</td><td>Operation stopped and output = input.
The A register remains the same.</td></tr>
<tr><td>□06DH: PI</td><td>□06DH: PD</td><td>□06FH: PID</td><td>□070H: LAG</td></tr>
<tr><td>□071H: LLAG</td><td>□072H: FGN</td><td>□073H: IFGN</td><td>□074H: LAU</td></tr>
<tr><td>□075H: SLAU</td><td>□076H: FGN</td><td>□077H: IFGN</td><td></td></tr>
</table>

* No: The system default cannot be changed from the user program.

(4) System Service Execution Status

[a] Data Trace Execution Status

Name	Register No.	Remarks
Reserved by the system	SW00090 to SW00097	
Existence Of Data Trace Definition	SW00098	Bits 0 to 3 = Group 1 to 4 Definition exists = 1, No definition = 0
Data Trace Execution Status	SW00099	Bits 0 to 3 = Group 1 to 4 Trace stopped = 1, Trace executing = 0

[b] Latest Data Trace Record Numbers

Name	Register No.	Remarks
Data Trace Group 1	SW00100	Latest record number
Data Trace Group 2	SW00101	Latest record number
Data Trace Group 3	SW00102	Latest record number
Data Trace Group 4	SW00103	Latest record number

(5) Alarm Counter and Alarm Clear

Name	Register No.	Remarks
Number of Alarm Occurrences	SW00190	Number of alarm occurrences
Number of Alarm Histories	SW00191	Number of alarm histories
Alarm Clear	SW00192	1: Clear alarms. 2: Clear the number of alarm occurrences and alarm histories.

(6) System I/O Error Status

[a] MP2100 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IW□□□□ register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OW□□□□ register address)
Reserved for the system	SW00205	Not used.
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	MP2100 Machine Controller error status

[b] MP2100M Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IW□□□□ register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OW□□□□ register number)
Reserved for the system	SW00205	Not used.
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	MP2100M Machine Controller error status
	SW00216 to SW00223	Reserved for the system
	SW00224 to SW00228	SVB-01 Module error status
	SW00229 to SW00239	Reserved for the system
	SW00240 to SW00247	Error status of slot 1 of rack 2 * (Depends on the mounted module and error code.)
	SW00248 to SW00255	Error status of slot 2 of rack 2 * (Depends on the mounted module and error code.)
	SW00256 to SW00263	Error status of slot 3 of rack 2 * (Depends on the mounted module and error code.)
	SW00264 to SW00271	Error status of slot 4 of rack 2 * (Depends on the mounted module and error code.)
	⋮	⋮
	SW00448 to SW00455	Error status of slot 9 of rack 4 * (Depends on the mounted module and error code.)

* Racks 2 to 4 can be used only when using MP2100MEX.

[c] MP2200 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IW□□□□ register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OW□□□□ register number)
Reserved for the system	SW00205	Not used.
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Not used.
	SW00216 to SW00223	Reserved for the system
	SW00224 to SW00228	Error status of slot 1 of rack 1 (Depends on the mounted module and error code.)
	SW00229 to SW00239	Error status of slot 2 of rack 1 (Depends on the mounted module and error code.)
	SW00240 to SW00247	Error status of slot 3 of rack 1 (Depends on the mounted module and error code.)
	SW00248 to SW00255	Error status of slot 4 of rack 1 (Depends on the mounted module and error code.)
	⋮	⋮
	SW00496 to SW00503	Error status of slot 9 of rack 4 * (Depends on the mounted module and error code.)

* Racks 2 to 4 can be used only when using EXIOIF.

[d] MP2300 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IW□□□□ register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OW□□□□ register number)
Reserved for the system	SW00205	Not used.
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Slot 0 error status (Depends on the mounted module and error code)
	SW00216 to SW00223	Reserved for the system
	SW00224 to SW00231	Slot 1 error status (Depends on the mounted module and error code.)
	SW00232 to SW00239	Slot 2 error status (Depends on the mounted module and error code.)
	SW00240 to SW00247	Slot 3 error status (Depends on the mounted module and error code.)

(7) Details on I/O Error Status

When a system I/O error occurs, the error status will be written in the system register.
The registers allocated for each error status when an I/O Module (LIO-01/02), SVB-01 Module, and Communication Module (260IF-01) are mounted in slots 1, 2, and 3 of the MP2300 Machine Controller respectively are described below.

[a] MP2300 Machine Controller Basic Module Error Status

Name	Register No.	Remarks
Slot 0 Error Status	SW00208 to SW00215	(Depends on the mounted module and error code.)
Reserved by the system	SW00216 to SW00223	(Depends on the mounted module and error code.)
Slot 1 Error Status	SW00224 to SW00231	(Depends on the mounted module and error code.)
Slot 2 Error Status	SW00232 to SW00239	(Depends on the mounted module and error code.)
Slot 3 Error Status	SW00240 to SW00247	(Depends on the mounted module and error code.)

■ Register Allocation: Slot 0 (Reserved for Basic Module)

(Bit No.)	F ········ 8	7 ········ 0
SW00208	Error code (I/O error = 2)	Subslot No. (= 2)
SW00209	Error code (Station error = 1)	Subslot No. (= 3)

SW00210	ST#15	············	ST#2	ST#1	Not used
SW00211	Not used	ST#30	············	ST#17	ST#16
SW00212	Not used	············			Not used
SW00213	Not used	············			Not used
SW00214	Not used	············			Not used
SW00215	Not used	············			Not used

[b] LIO-01/LIO-02 Module Error Status (Slot 1)

(Bit No.)	F ······ 8	7 ······ 0
SW00224	Error code (I/O error = 2)	Subslot No. (= 1)
SW00225	Error code (I/O error = 2)	Subslot No. (= 2)

SW00226	Not used	············	Not used
SW00227	Not used	············	Not used
SW00228	Not used	············	Not used
SW00229	Not used	············	Not used
SW00230	Not used	············	Not used
SW00231	Not used	············	Not used

[c] SVB-01 Module Error Status (Slot 2)

(Bit No.)	F ······ 8	7 ······ 0
SW00232	Error code (Station error = 1)	Subslot No. (= 1)

SW00233	ST#15	············	ST#2	ST#1	Not used
SW00234	Not used	ST#30	············	ST#17	ST#16
SW00235	Not used	············			Not used
SW00236	Not used	············			Not used
SW00237	Not used	············			Not used
SW00238	Not used	············			Not used
SW00239	Not used	············			Not used

- The above error status is meant to check I/O errors when an I/O Module is connected. Errors when SERVOPACKs and/or MECHATROLINK-II inverters are connected will not be written. Use the monitoring parameter to check errors when SERVOPACKs and/or MECHATROLINK-II inverters are connected.

[d] 260IF-01 Module Error Status (Slot 3)

(Bit No.)	F ········ 8	7 ········ 0
SW00240	Error code (Station error = 1)	Subslot No. (= 2)

SW00241	ST#15	············	ST#0
SW00242	ST#31	············	ST#16
SW00243	ST#47	············	ST#32
SW00244	ST#63	············	ST#48

<Error Status Details>

Item	Code	Description
ST#n	0	Normal communication
	1	Communication error at the station n (n = local station number in slave mode)

(8) Module Information

[a] MP2100 Machine Controller

Name	Register No.	Description
Module Information	SW00800	MP2100 ID (C180H)
	SW00801	Reserved by the system
	SW00802	CPU Software version (BCD)
	SW00803	Number of subslots (Version 2.45 or before: 0004H, Version 2.46 or later: 0007H)
	SW00804	CPU Function Module ID (C110H)
	SW00805	CPU Function Module status
	SW00806	I/O Function Module ID (8070H)
	SW00807	I/O 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 to SW00815	Reserved by the system

[b] MP2100M Machine Controller

Name	Register No.	Description
CPU Information	SW00800	MP2100M ID (C181H)
	SW00801	Reserved by the system
	SW00802	CPU Software version (BCD)
	SW00803	Number of subslots (Version 2.45 or before: 0004H, Version 2.46 or later: 0007H)
	SW00804	CPU Function Module ID (C110H)
	SW00805	CPU Function Module status
	SW00806	I/O Function Module ID (8070H)
	SW00807	I/O 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 to SW00815	Reserved by the system
SVB-01 Information	SW00816	SVB-01 (9195H)
	SW00817	Hardware version (BCD)
	SW00818	SVB-01 Software version (BCD)
	SW00819	Number of subslots (0001H)
	SW00820	SVB-01 Function Module ID (9115H)
	SW00821	SVB-01 Function Module status
	SW00822 to SW00823	Reserved by the system
EXIOIF Information	SW00824	EXIOIF (808FH)
	SW00825	Hardware version (BCD)
	SW00826	Reserved by the system
	SW00827	Number of subslots (0001H)
	SW00828	EXIOIF Function Module ID (800FH)
	SW00829	EXIOIF Function Module status
	SW00830 to SW00831	Reserved by the system
Rack 2, Slot 1 Information	SW00832	Module ID
	SW00833	Hardware version (BCD)
	SW00834	Software version (BCD)
	SW00835	Number of subslots
	SW00836	Subslot 1 Function Module ID
	SW00837	Subslot 1 Function Module status
	SW00838	Subslot 2 Function Module ID
	SW00839	Subslot 2 Function Module status
Rack 2, Slot 2 Information	SW00840 to SW00847	Same as above
Rack 2, Slot 3 Information	SW00848 to SW00855	Same as above
Rack 2, Slot 4 Information	SW00856 to SW00863	Same as above
Rack 2, Slot 5 Information	SW00864 to SW00871	Same as above
Rack 2, Slot 6 Information	SW00872 to SW00879	Same as above
Rack 2, Slot 7 Information	SW00880 to SW00887	Same as above
Rack 2, Slot 8 Information	SW00888 to SW00895	Same as above

(cont'd)

Name	Register No.	Description
Rack 2, Slot 9 Information	SW00896 to SW00903	Same as above
Rack 3, Slot 1 Information	SW00904	Module ID
	SW00905	Hardware version (BCD)
	SW00906	Software version (BCD)
	SW00907	Number of subslots
	SW00908	Subslot 1 Function Module ID
	SW00909	Subslot 1 Function Module status
	SW00910	Subslot 2 Function Module ID
	SW00911	Subslot 2 Function Module status
Rack 3, Slot 2 Information	SW00912 to SW00919	Same as above
Rack 3, Slot 3 Information	SW00920 to SW00927	Same as above
Rack 3, Slot 4 Information	SW00928 to SW00935	Same as above
Rack 3, Slot 5 Information	SW00936 to SW00943	Same as above
Rack 3, Slot 6 Information	SW00944 to SW00951	Same as above
Rack 3, Slot 7 Information	SW00952 to SW00959	Same as above
Rack 3, Slot 8 Information	SW00960 to SW00967	Same as above
Rack 3, Slot 9 Information	SW00968 to SW00975	Same as above
Rack 4, Slot 1 Information	SW00976	Module ID
	SW00977	Hardware version (BCD)
	SW00978	Software version (BCD)
	SW00979	Number of subslots
	SW00980	Subslot 1 Function Module ID
	SW00981	Subslot 1 Function Module status
	SW00982	Subslot 2 Function Module ID
	SW00983	Subslot 2 Function Module status
Rack 4, Slot 2 Information	SW00984 to SW00991	Same as above
Rack 4, Slot 3 Information	SW00992 to SW00999	Same as above
Rack 4, Slot 4 Information	SW01000 to SW01007	Same as above
Rack 4, Slot 5 Information	SW01008 to SW01015	Same as above
Rack 4, Slot 6 Information	SW01016 to SW01023	Same as above
Rack 4, Slot 7 Information	SW01024 to SW01031	Same as above
Rack 4, Slot 8 Information	SW01032 to SW01039	Same as above
Rack 4, Slot 9 Information	SW01040 to SW01047	Same as above

- Information of EXIOIF and Racks 2 through 4 is available only when MP2100MEX is used.

[c] MP2200 Machine Controller

Name	Register No.	Description	
CPU Information	SW00800	Module ID	CPU-01: (C280H)
			CPU-02: (C281H)
	SW00801	Reserved by the system	
	SW00802	CPU Software version (BCD)	
	SW00803	Number of subslots	CPU-01: (0002H)
			CPU-02: (0004H)
	SW00804	CPU Function Module ID (C210H)	
	SW00805	CPU Function Module status	
	SW00806	SVR Function Module ID (9210H)	
	SW00807	SVR Function Module status	
	SW00808	CPU-02: CARD Function Module ID (8170H)	CPU-01: Reserved by the system
	SW00809	CPU-02: CARD Function Module status	
	SW00810	CPU-02: USB Function Module ID (8F20H)	
	SW00811	CPU-02: USB Function Module status	
	SW00812 to SW00815	Reserved by the system	
Rack 1, Slot 1 Information	SW00816	Module ID	
	SW00817	Hardware version (BCD)	
	SW00818	Software version (BCD)	
	SW00819	Number of subslots	
	SW00820	Subslot 1 Function Module ID	
	SW00821	Subslot 1 Function Module status	
	SW00822	Subslot 2 Function Module ID	
	SW00823	Subslot 2 Function Module status	
Rack 1, Slot 2 Information	SW00824 to SW00831	Same as above	
Rack 1, Slot 3 Information	SW00832 to SW00839	Same as above	
Rack 1, Slot 4 Information	SW00840 to SW00847	Same as above	
Rack 1, Slot 5 Information	SW00848 to SW00855	Same as above	
Rack 1, Slot 6 Information	SW00856 to SW00863	Same as above	
Rack 1, Slot 7 Information	SW00864 to SW00871	Same as above	
Rack 1, Slot 8 Information	SW00872 to SW00879	Same as above	

(cont'd)

Name	Register No.	Description
Rack 2, Slot 1 Information	SW00880	Module ID
	SW00881	Hardware version (BCD)
	SW00882	Software version (BCD)
	SW00883	Number of subslots
	SW00884	Subslot 1 Function Module ID
	SW00885	Subslot 1 Function Module status
	SW00886	Subslot 2 Function Module ID
	SW00887	Subslot 2 Function Module status
Rack 2, Slot 2 Information	SW00888 to SW00895	Same as above
Rack 2, Slot 3 Information	SW00896 to SW00903	Same as above
Rack 2, Slot 4 Information	SW00904 to SW00911	Same as above
Rack 2, Slot 5 Information	SW00912 to SW00919	Same as above
Rack 2, Slot 6 Information	SW00920 to SW00927	Same as above
Rack 2, Slot 7 Information	SW00928 to SW00935	Same as above
Rack 2, Slot 8 Information	SW00936 to SW00943	Same as above
Rack 2, Slot 9 Information	SW00944 to SW00951	Same as above
Rack 3, Slot 1 Information	SW00952	Module ID
	SW00953	Hardware version (BCD)
	SW00954	Software version (BCD)
	SW00955	Number of subslots
	SW00956	Subslot 1 Function Module ID
	SW00957	Subslot 1 Function Module status
	SW00958	Subslot 2 Function Module ID
	SW00959	Subslot 2 Function Module status
Rack 3, Slot 2 Information	SW00960 to SW00967	Same as above
Rack 3, Slot 3 Information	SW00968 to SW00975	Same as above
Rack 3, Slot 4 Information	SW00976 to SW00983	Same as above
Rack 3, Slot 5 Information	SW00984 to SW00991	Same as above
Rack 3, Slot 6 Information	SW00992 to SW00999	Same as above
Rack 3, Slot 7 Information	SW01000 to SW01007	Same as above
Rack 3, Slot 8 Information	SW01008 to SW01015	Same as above
Rack 3, Slot 9 Information	SW01016 to SW01023	Same as above

(cont'd)

Name	Register No.	Description
Rack 4, Slot 1 Information	SW01024	Module ID
	SW01025	Hardware version (BCD)
	SW01026	Software version (BCD)
	SW01027	Number of subslots
	SW01028	Subslot 1 Function Module ID
	SW01029	Subslot 1 Function Module status
	SW01030	Subslot 2 Function Module ID
	SW01031	Subslot 2 Function Module status
Rack 4, Slot 2 Information	SW01032 to SW01039	Same as above
Rack 4, Slot 3 Information	SW01040 to SW01047	Same as above
Rack 4, Slot 4 Information	SW01048 to SW01055	Same as above
Rack 4, Slot 5 Information	SW01056 to SW01063	Same as above
Rack 4, Slot 6 Information	SW01064 to SW01071	Same as above
Rack 4, Slot 7 Information	SW01072 to SW01079	Same as above
Rack 4, Slot 8 Information	SW01080 to SW01087	Same as above
Rack 4, Slot 9 Information	SW01088 to SW01095	Same as above

- Information of Racks 2 through 4 are available only when EXIOIF is used.

[d] MP2300 Machine Controller

Name	Register No.	Description
Module Information	SW00800	Basic Module (C380H)
	SW00801	Reserved by the system
	SW00802	CPU Software version (BCD)
	SW00803	Number of subslots (0004H)
	SW00804	CPU Function Module ID (C310H)
	SW00805	CPU Function Module status
	SW00806	I/O Function Module ID (8070H)
	SW00807	I/O Function Module status
	SW00808	SVB Function Module ID (9113H)
	SW00809	SVB Function Module status
	SW00810	SVR Function Module ID (9210H)
	SW00811	SVR Function Module status
	SW00812 to SW00815	Reserved by the system
	SW00816 to SW00823	Slot 1 Information
	SW00824 to SW00831	Slot 2 Information
	SW00832 to SW00839	Slot 3 Information
	⋮	⋮
	SW01008 to SW01015	Reserved by the system (Slot 26)

[e] SVB-01 Module Information

- Module ID = 9195H
- SVB Function Module ID = 9115H

9195H will be written as Module ID, and 9115H as Function Module ID in the SVB-01 mounted slot description.
For example, when an SVB-01 Module is mounted in Slot 1 of Rack 1,

SW00816 = 9195H
SW00820 = 9115H

(9) Motion Program Execution Information

System Work	Main Program No. in Execution	Program Information Used by Work	Motion Program Alarm							
			Parallel 0	Parallel 1	Parallel 2	Parallel 3	Parallel 4	Parallel 5	Parallel 6	Parallel 7
			Offset * +4	Offset +7	Offset +10	Offset +13	Offset +16	Offset +19	Offset +22	Offset +25
1	SW3200	SW03264 to SW03321	SW03268	SW03271	SW03274	SW03277	SW03280	SW03283	SW03286	SW03289
2	SW3201	SW03322 to SW03379	SW03326	SW03329	SW03332	SW03335	SW03338	SW03341	SW03344	SW03347
3	SW3202	SW03380 to SW03437	SW03384	SW03387	SW03390	SW03393	SW03396	SW03399	SW03402	SW03405
4	SW3203	SW03438 to SW03495	SW03442	SW03445	SW03448	SW03451	SW03454	SW03457	SW03460	SW03463
5	SW3204	SW03496 to SW03553	SW03500	SW03503	SW03506	SW03509	SW03512	SW03515	SW03518	SW03521
6	SW3205	SW03554 to SW03611	SW03558	SW03561	SW03564	SW03567	SW03570	SW03573	SW03576	SW03579
7	SW3206	SW03612 to SW03669	SW03616	SW03619	SW03622	SW03625	SW03628	SW03631	SW03634	SW03637
8	SW3207	SW03670 to SW03727	SW03674	SW03677	SW03680	SW03683	SW03686	SW03689	SW03692	SW03695
9	SW3208	SW03728 to SW03785	SW03732	SW03735	SW03738	SW03741	SW03744	SW03747	SW03750	SW03753
10	SW3209	SW03786 to SW04843	SW03790	SW03793	SW03796	SW03799	SW03802	SW03805	SW03808	SW03811
11	SW3210	SW03844 to SW03901	SW03848	SW03851	SW03854	SW03857	SW03860	SW03863	SW03866	SW03869
12	SW3211	SW03902 to SW03959	SW03906	SW03909	SW03912	SW03915	SW03918	SW03921	SW03924	SW03927
13	SW3212	SW03960 to SW04017	SW03964	SW03967	SW03970	SW03973	SW03976	SW03979	SW03982	SW03985
14	SW3213	SW04018 to SW04075	SW04022	SW04025	SW04028	SW04031	SW04034	SW04037	SW04040	SW04043
15	SW3214	SW04076 to SW04133	SW04080	SW04083	SW04086	SW04089	SW04092	SW04095	SW04098	SW04101
16	SW3215	SW04134 to SW04191	SW04138	SW04141	SW04144	SW04147	SW04150	SW04153	SW04156	SW04159

* Offset: Offset value from the first register number of Program Information Used by Work

12.3 Motion Program Alarms

If the result of investigation using *12.1.2 MP2000 Series Machine Controller Error Check Flowchart* indicates that a motion program alarm has occurred, use the alarm code to determine the cause of the error.

12.3.1 Motion Program Alarm Configuration

Motion program alarms stored in the alarm output register (default: SW03268) are displayed as shown in the following diagram.

Bit 15	Bit 12 Bit 8	Bit 7 Bit 0
	Alarm axis information (1 to 16)	Alarm code (Axis alarm when bit 7 turns ON.)

- Refer to the relevant Machine Controller user's manual for information on finding the alarm output register.

12.3.2 Motion Program Alarm Code List

The motion program alarm codes are listed in the following table.

- When displaying these on the register list, set the view mode to hexadecimal.

	Alarm Code	Description	Correction
Program alarms	0	No alarm	Check the specifications for the instruction that was being executed in the motion program when the alarm occurred according to the meaning of the alarm code.
	10h	Complete circle specified for radius designation	
	11h	Interpolation feed speed exceeded	
	12h	Interpolation feed speed not specified	
	13h	Range exceeded after acceleration/deceleration speed parameter conversion	
	14h	LONG_MAX exceeded for circular arc length	
	15h	No vertical specification for circular plane designation	
	16h	No horizontal specification for circular plane designation	
	17h	Specified axes exceeded	
	18h	Specified number of turns exceeded	
	19h	LONG_MAX exceeded for radius	
	1Bh	Emergency stop in progress	
	1Ch	LONG_MAX exceeded for linear interpolation block moving amount	
	1Dh	FMX not defined	
	1Eh	Address T out of range	
	1Fh	Address P out of range	
	20h	REG data error	
	21h	Function work duplication (Function work in second PFORK column was used at a different nesting level.)	
	22h	Indirect register designation range error	
	23h	Overflow when converting reference unit	
Axis alarms*	80h	During use of logical axis prohibited	
	81h	Specifications exceeding POSMAX made for infinite length axis designation	
	82h	LONG_MAX exceeded for axis moving distance	
	84h	Motion command duplication	
	85h	Motion command response duplication	
	87h	VEL setting data out of range	
	88h	INP setting data out of range	
	89h	ACC/SCC/DCC setting data out of range	
	8Ah	T reference for MVT instruction is 0	
	8Bh	Instruction designated that cannot be executed for the Motion Module model	
	8Ch	Prohibition command executed when pulse distribution was not completed	
	8Dh	Motion command error occurrence status	

* The axis number is stored in bits 8 to 12 for axis alarms.

12.4 List of Causes for Command Error Occurrence

The Command Error Completed Status (Command Error Occurrence) bit (IW☐☐09, bit 3) turns ON when the set motion command cannot be executed or when the execution of a motion command ends error. The triggers for which this bit turns ON depend on the motion command.
The following table describes the causes of Command Error Occurrence for each motion command.

Motion Command Code		Cause of Command Error Occurrence	Warning (W:) and Alarm (A:) That Occur at Command Error Occurrence
1	Position Mode (Positioning) (POSING)	The positioning movement exceeds the allowable range.	A: Excessive Positioning Moving Amount
		The axis is ABS infinite-length, and the zero point return setting is not completed.	A: Zero Point Unsetting
		In servo OFF status	A: Servo OFF
		Alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
2	Latch Torque Positioning (External positioning) (EX_POSING)	The positioning movement exceeds the allowable range.	A: Excessive Positioning Moving Amount
		The axis is ABS infinite-length, and the zero point return setting is not completed.	A: Zero Point Unsetting
		In servo OFF status	A: Servo OFF
		Alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		SERVOPACK parameter writing was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Warning A.94 or A.95 occurred in the SERVOPACK.	W: Servo Driver Error
		The selected external signal is outside the setting range.	W: Set Parameter Error
3	Zero Point Return (ZRET)	In machine lock status	–
		In servo OFF status	A: Servo OFF
		An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		SERVOPACK parameter reading or writing was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Warning A.94 or A.95 is occurring in the SERVOPACK.	W: Servo Driver Error
		The selected zero point return method is outside the setting range.	W: Set Parameter Error
		POT method is selected for zero point return, but the approach speed is a negative value.	W: Set Parameter Error
		NOT method is selected for zero point return, but the approach speed is a positive value.	W: Set Parameter Error
		During zero point return using the DEC1 + Phase-C pulse, ZERO signal, DEC1 + ZERO signal, or Phase-C pulse method, the OT signal in the zero point return direction was ON.	OT alarm or OT warning in zero point return direction

(cont'd)

Motion Command Code		Cause of Command Error Occurrence	Warning (W:) and Alarm (A:) That Occur at Command Error Occurrence
4 and 5	Interpolation (INTERPOLATE) Last Interpolation Segment (ENDOF_INTERPOLATE)	The commanded movement for one scan exceeds the segment that can be commanded to the MECHATROLINK SERVOPACK, or the speed feed forward value exceeds the maximum allowable speed.	A: Excessive Speed
		The axis is ABS infinite length, and the zero point return (setting) is not completed.	A: Zero Point Unsetting
		In servo OFF status	A: Servo OFF
		An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
6	Interpolation Mode with Latch Input (LATCH)	The commanded movement for one scan exceeds the segment that can be commanded to the MECHATROLINK SERVOPACK, or the speed feed forward value exceeds the maximum allowable speed.	A: Excessive Speed
		The axis is ABS infinite length, and the zero point return (setting) is not completed.	A: Zero Point Unsetting
		In servo OFF status	A: Servo OFF
		An alarm is occurring.	–
		The selected latch signal is out of the setting range.	W: Set Parameter Error
7	JOG Mode (FEED)	In machine lock status	–
		In servo OFF status	A: Servo OFF
		An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
8	Relative Position Mode (Step mode) (STEP)	Positioning movement exceeds the allowable value.	A: Excessive Positioning Moving Amount
		In servo OFF status	A: Servo OFF
		An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
9	Set Zero Point (ZSET)	An alarm is occurring.	–
		Asynchronized communication status	A: Servo Driver Synchronization Communications Error
10 and 11	Change Acceleration Time (ACC) Change Deceleration Time (DCC)	An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		Executed before distribution has been completed (DEN = OFF)	–
		SERVOPACK parameter writing was not completed within the specified time.	A: Servo Command Timeout Error
		Warning A.94 or A.95 occurred in the SERVOPACK.	W: Servo Driver Error
12	Change Filter Time Constant (SCC)	An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		Executed before distribution has been completed (DEN = OFF)	A: Filter Time Constant Change Error
		SERVOPACK parameter writing was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Warning A.94 or A.95 occurred in the SERVOPACK.	W: Servo Driver Error

(cont'd)

Motion Command Code		Cause of Command Error Occurrence	Warning (W:) and Alarm (A:) That Occur at Command Error Occurrence
13	Change Filter Type (CHG_FILTER)	An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		Executed before distribution has been completed (DEN = OFF).	A: Filter Time Constant Change Error
		The selected filter type is out of the setting range.	W: Set Parameter Error
14, 15, and 16	Change Speed Loop Gain (KVS) Change Position Loop Gain (KPS) Change Feed Forward (KFS)	An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		SERVOPACK parameter writing was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Warning A.94 or A.95 occurred in the SERVOPACK.	W: Servo Driver Error
17 and 18	Read User Constant (PRM_RD) Write User Constant (PRM_WR)	An alarm is occurring.	–
		Asynchronized communication status	A: Servo Driver Synchronization Communications Error
		SERVOPACK parameter reading was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Warning A.94 or A.95 occurred in the SERVOPACK.	W: Servo Driver Error
		SERVOPACK parameter number or size is outside the setting range.	W: Set Parameter Error
19 and 20	Alarm Monitor (ALM_MON) Alarm History Monitor (ALM_HIST)	The command to the SERVOPACK was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Servo driver alarm monitor number is outside setting range.	W: Set Parameter Error
21	Clear Alarm History (ALMHIST_CLR)	The command to the SERVOPACK was not completed within the specified time.	A: Servo Driver Command Timeout Error
22	Absolute Encoder Reset (ABS_RST)	This command was used for Σ-I SERVOPACK.	–
		Executed while servo was ON.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		The command to the SERVOPACK was not completed within the specified time.	A: Servo Driver Command Timeout Error
23	Speed Reference (VELO)	Commanded while connected to MECHATROLINK-I.	–
		An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
24	Torque/Thrust Reference (TRQ)	Commanded while connected to MECHATROLINK-I.	–
		An alarm is occurring	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
25	Phase Reference (PHASE)	The axis is ABS infinite length, and the zero point return (setting) is not completed.	A: Zero Point Unsetting
		In servo OFF status	A: Servo OFF
		An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error

(cont'd)

Motion Command Code		Cause of Command Error Occurrence	Warning (W:) and Alarm (A:) That Occur at Command Error Occurrence
26	Change Position Loop Integral Time Constant (KIS)	An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		SERVOPACK parameter writing was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Warning A.94 or A.95 occurred in the SERVOPACK.	W: Servo Driver Error
27	Stored Parameter Write (PPRM_WR)	An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		SERVOPACK parameter reading was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Warning A.94 or A.95 occurred in the SERVOPACK.	W: Servo Driver Error
		SERVOPACK parameter number or size is outside the setting range.	W: Set Parameter Error
39	Multiturn Limit Setting (MLTTRN_SET)	The command was used for a SERVOPACK that doesn't support it.	–
		Executed while servo was ON.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		The command to the SERVOPACK was not completed within the specified time.	A: Servo Driver Command Timeout Error
	Others Automatic Parameter Updating when Move Command Starts *	An alarm is occurring.	–
		Asynchronous communication status	A: Servo Driver Synchronization Communications Error
		SERVOPACK parameter writing was not completed within the specified time.	A: Servo Driver Command Timeout Error
		Warning A.94 or A.95 occurred in the SERVOPACK.	W: Servo Driver Error
		The distribution was not completed (DEN = OFF).	–

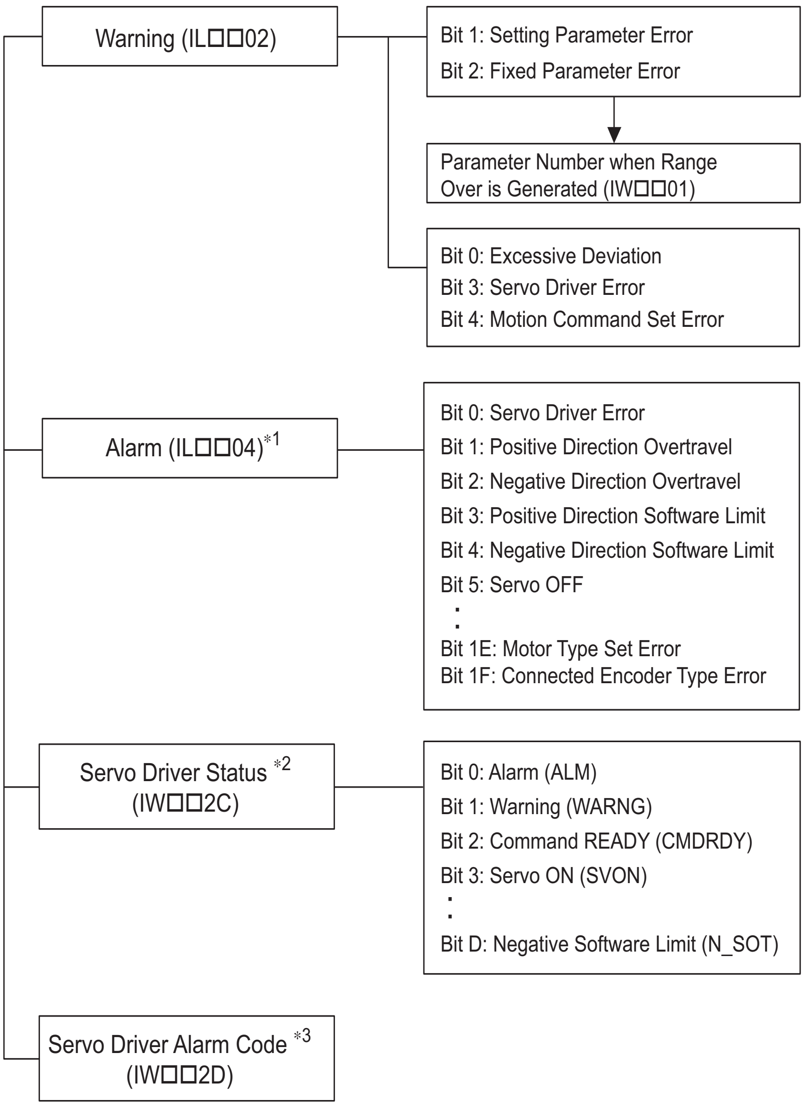
* When Automatic Updating of Parameter was enabled for fixed parameters, and the settings of Filter Time Constant, Acceleration Rate/Time Constant, or Deceleration Rate/Time Constant were changed at the time a move command was set.

12.5 Troubleshooting Motion Errors

This section explains the details and corrective actions for errors that occur in motion control functions.

12.5.1 Overview of Motion Errors

Motion errors in the MP2000-series Machine Controller include axis alarms detected for individual SERVOPACKs. The failure location can be determined and appropriate corrections can be taken simply by checking the contents of the Warning (IL□□02) and Alarm (IL□□04) monitoring parameters.
The motion alarms for the Machine Controller Basic Module's MECHATROLINK-I or MECHATROLINK-II functionality are shown below.



* 1. Refer to *12.5.2 Motion Error Details and Corrections*.
* 2. Refer to *12.5.3 (1) Servo Driver Status (IW□□2C) List*.
* 3. Refer to *12.5.3 (2) Servo Driver Alarm Code (IW□□2D)*.

12.5.2 Motion Error Details and Corrections

The following tables show the contents of the axis alarms (IL□□04) (subsection 1) and axis alarm details (subsection 2).

(1) Alarm IL□□04 List

IL□□04	Alarm Contents	IL□□04	Alarm Contents
Bit 0	Servo Driver Error	Bit 10	Servo Driver Synchronization Communications Error
Bit 1	Positive Direction Overtravel	Bit 11	Servo Driver Communication Error
Bit 2	Negative Direction Overtravel	Bit 12	Servo Driver Command Timeout Error
Bit 3	Positive Direction Software Limit	Bit 13	Excessive ABS Encoder Rotations
Bit 4	Negative Direction Software Limit	Bit 14	Reserved by the system.
Bit 5	Servo OFF	Bit 15	Reserved by the system.
Bit 6	Positioning Time Over	Bit 16	Not used
Bit 7	Excessive Positioning Moving Amount	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 Unsetting	Bit 1D	Detected Servo Driver Type Error
Bit E	Not used	Bit 1E	Motor Type Set Error
Bit F	Not used	Bit 1F	Connected Encoder Type Error

(2) Bit 0: Servo Driver Error

Detection Timing	• SERVOPACK alarms are continuously monitored by the alarm management section.
Processing when Alarm Occurs	• The current command will be aborted. If a SERVOPACK error is detected during execution of a POSING command, the positioning will be aborted and the axis will decelerate to a stop. • The Command Error Completed Status in the Motion Command Status (IW□□09,bit 3) will turn ON.
Error and Cause	• The cause of the error depends on the type of alarm. The contents of an alarm is monitored in IW□□2D. Refer to the list of SERVOPACK alarms in *12.5.3 (2) Servo Driver Alarm Code (IW□□2D)* for details.
Correction	• Confirm the SERVOPACK alarm and remove the cause. • Reset the alarm.

- The above status bit will turn ON for any of the SERVOPACK alarm codes for alarms classified as SERVOPACK alarms.

(3) Bit 1: Positive Direction Overtravel and Bit 2: Negative Direction Overtravel

Detection Timing	• Overtravel is continuously monitored by the position management section during execution of a motion command. • Overtravel is detected when the overtravel signal in the direction of movement turns OFF.
Processing when Alarm Occurs	• The SERVOPACK performs stop processing. The stop method and processing after stopping depends on the SERVOPACK parameter settings. • The Command Error Completed Status in the Motion Command Status (IW□□09, bit 3) will turn ON. • Machine Controller Processing The command is canceled and the axis decelerates to a stop. Follow-up processing (each scan the current position of the machine is adjusted to the reference position) is executed.
Error and Cause	One of the following is possible. • A move command that exceeded the travel limit of the machine was executed as follows: A user program command exceeded the travel limit. The software limit was exceeded in manual operation. • Overtravel signal malfunction.
Correction	• Check the following. Check the overtravel signal. Check the program or manual operation. • Then, after clearing the motion command code and resetting the alarm, use a return operation to eliminate the overtravel status. (Commands in the overtravel direction will be disabled and an alarm will occur again if one is executed.)

- For a vertical axis, the following should be set at the SERVOPACK to avoid dropping and vibration at the overtravel limit.
  - An emergency deceleration stop
  - Zero clamp status after the deceleration stop

(4) Bit 3: Positive Direction Software Limit and Bit 4: Negative Direction Software Limit

Detection Timing	• Enabled when using a motion command and detected by the position management section. • The software limits are valid after a ZRET or ZSET command has been completed.
Processing when Alarm Occurs	• The axis decelerates to a stop at the software limit. • The Command Error Completed Status in the Motion Command Status (IW□□09, bit 3) will turn ON.
Error and Cause	• A move command that exceeded a software limit of the machine was executed as follows: A user program command exceeded the software limit. The software limit was exceeded in manual operation.
Correction	• Check the program or manual operation. • Then, after clearing the motion command code and resetting the alarm, use a return operation to eliminate the software limit status. (Commands in the direction of the software limit will be disabled and an alarm will occur again if one is executed.)

(5) Bit 5: Servo OFF

Detection Timing	• Servo OFF status is detected when a move command is executed.
Processing when Alarm Occurs	• The specified movement command will not be executed. • The Command Error Completed Status in the Motion Command Status (IW□□09, bit 3) will turn ON.
Error and Cause	• A move command (commands for positioning, external positioning, STEP operation, JOG operation, etc.) was executed when the SERVOPACK was Servo OFF status.
Correction	• After clearing the motion command and resetting the alarm, turn the SERVOPACK to the Servo ON status.

(6) Bit 6: Positioning Time Over

Detection Timing	• Positioning was not completed within the time specified in OW□□26 (Positioning Completion Check Time) after completing pulse distribution.
Processing when Alarm Occurs	• The current command was ended forcibly. • The Command Error Completed Status in the Motion Command Status (IW□□0,9 bit 3) will turn ON.
Error and Cause	One of the following is possible. • The position loop gain and speed loop gain are not set correctly, creating poor response. Or, there is oscillation. • The Positioning Completion Check Time (OW□□26) is too short. • The capacity of the motor is insufficient for the machine load. • Connections are not correct between the SERVOPACK and the motor.
Correction	Check the following. • Check the SERVOPACK gain parameters. • Check connections between the SERVOPACK and the motor. • Check the motor capacity. • Check the Positioning Completion Check Time (OW□□26).

- The above check is not performed if the Positioning Completion Check Time (OW□□26) is set to 0.

(7) Bit 7: Excessive Positioning Moving Amount

Detection Timing	• Positioning command is executed.
Processing when Alarm Occurs	• The move command is not executed. • The Command Error Completed Status in the Motion Command Status (IW□□09, bit 3) will turn ON.
Error and Cause	• A move command (commands for positioning, external positioning, or STEP operation) was executed that exceeded the limit of the positioning moving amount.
Correction	• Check the moving amount for the axis being positioned.

The limit on the positioning travel distance is determined as follows depending on the setting for fixed parameter No.4 “Reference Unit Selection”.

Setting of fixed parameter No.4	0	1	2	3	4
Reference unit	pulse	mm	deg	inch	μm
Limit on the positioning travel distance	2147483647	$2147483647 \times \dfrac{\text{No.6: Travel Distance per Machine Rotation} \times \text{No.9: Machine Gear Ratio}}{\text{No.36: Number of Pulses per Motor Rotation} \times \text{No.8: Servo Motor Gear Ratio}}$			

Troubleshooting

12

(8) Bit 8: Excessive Speed

Detection Timing	• A move command is executed.
Processing when Alarm Occurs	• The move command is not executed. • The Command Error Completed Status in the Motion Command Status (IW☐☐09, bit 3) will turn ON.
Error and Cause	• The speed (movement output for one scan in case of interpolation) commanded to MECHATROLINK servo exceeds the upper limit.
Correction	• Check the settings for speed reference, interpolation command movement per scan, and speed compensation.

The maximum value for speed that can be specified is as follows, depending on the connected SERVOPACK.
In simulation mode, the maximum value for the speed is always 32767000 for all SERVOPACK models.

Model	Details	Maximum Value for Speed (Pulse/s)
SGD-☐☐☐N SGDB-☐☐AN	MECHATROLINK-I-compatible AC SERVOPACK	16384000
SGDH-☐☐☐E JUSP-NS100	SGDH SERVOPACK NS100 MECHATROLINK-I Application Module	131068000
SGDH-☐☐☐E JUSP-NS115	SGDH SERVOPACK NS115 MECHATROLINK-II Application Module	32767000
SGDS-☐☐☐1☐☐	SGDS SERVOPACK	1048576000
SGDX-☐☐☐12☐	SGDX SERVOPACK	1048576000
SGDV-☐☐☐☐1☐☐	SGDV SERVOPACK	2097152000
SJDE-☐☐AN☐	SJDE SERVOPACK	1048576000

(9) Bit 9: Excessive Deviation

Detection Timing	• Always, except during speed control and torque control
Processing when Alarm Occurs	• The move command is not executed. • The Command Error Completed Status in the Motion Command Status (IW☐☐09, bit 3) will turn ON.
Error and Cause	One of the following is possible. • The position loop gain and speed loop gain are not set correctly, creating poor response. • The Error Count Alarm Detection (OL☐☐22) is too small. • The capacity of the motor is insufficient for the machine load. • SERVOPACK failure
Correction	Check the following and correct the problem. If the problem persists, contact the maintenance department. • Check the position loop gain and speed loop gain. • Check the Error Count Alarm Detection (OL☐☐22). • Check the motor capacity.

- The above check is not performed if the Error Count Alarm Detection (OL☐☐22) is set to 0.

(10) Bit A: Filter Type Change Error

Detection Timing	• Continuously monitored by the motion command processing section.
Processing when Alarm Occurs	• The Change Filter Type command will not be executed. • The Command Error Completed Status in the Motion Command Status (IW□□09, bit 3) will turn ON.
Error and Cause	• An error occurs if the Change Filter Type command is executed before the specified pulse distribution has not been completed (i.e., when IW□□0C, bit 0 was OFF).
Correction	• Correct the program to execute the Change Filter Type command after Distribution Completed status (i.e., that IW□□0C, bit 0 is ON) is checked.

- The command running will not stop even if the above error occurs. The stop processing from the user program is needed to stop running commands when necessary.

(11) Bit B: Filter Time Constant Change Error

Detection Timing	• Continuously monitored by the motion command processing section.
Processing when Alarm Occurs	• The SCC (Change Filter Time Constant) command will not be executed. • The Command Error Completed Status in the Motion Command Status (IW□□09, bit 3) will turn ON.
Error and Cause	• An error occurs if the SCC command is executed before the specified pulse distribution has not been completed (i.e., when IW□□0C0, bit 0 was OFF).
Correction	• Correct the program to execute the SCC command after Distribution Completed status (i.e., that IW□□0C, bit 0 is ON) is checked.

- The command running will not stop even if the above error occurs. The stop processing from the user program is needed to stop running commands when necessary.

(12) Bit D: Zero Point Unsetting

Detection Timing	• Enabled only when an absolute encoder is used for an infinite length axis and detected when the next command is set in the Motion Command (OW□□08). Commands: Positioning, External Positioning, Interpolation, Interpolation with position detection function, phase reference
Processing when Alarm Occurs	• The set command will not be executed. • The Command Error Completed Status in the Motion Command Status (IW□□09, bit 3) will turn ON.
Error and Cause	• A move command was set without executing the ZSET command (IW□□0C, bit 5 is OFF).
Correction	• After clearing the motion command and resetting the alarm, execute a Zero Point Setting operation.

(13) Bit 10: Servo Driver Synchronization Communications Error

Detection Timing	• Detected by the communication control section when communication are synchronized between the Machine Controller and SERVOPACK.
Processing when Alarm Occurs	• The current command will be aborted.
Error and Cause	• Data of either Machine Controller or servo was not correctly updated.
Correction	• Check the MECHATROLINK cable and reset the alarm.

(14) Bit 11: Servo Driver Communication Error

Detection Timing	• Detected by the communication control section when communication is not synchronized between the Machine Controller and SERVOPACK.
Processing when Alarm Occurs	• The current command will be aborted. • The SERVOPACK will be Servo OFF status.
Error and Cause	• MECHATROLINK communication stopped because the cable was disconnected, there is noise interference to the communication line or the power supply to the SERVOPACK was turned OFF.
Correction	• Check the MECHATROLINK cable and reset the alarm. • If this error occurs frequently, refer to *MECHATROLINK-II Installation Manual* (manual number: MMA TDEP 011A) published by the MECHATROLINK Members Association to correct wiring and eliminate noise interference. Download this manual from the homepage of the MECHATROLINK Members Association.

(15) Bit 12: Servo Driver Command Timeout Error

Detection Timing	• Detected during execution of each motion commands. • Detected by the MECHATROLINK communication control section when the Servo command responses are checked for each process.
Processing when Alarm Occurs	• The current command will be aborted.
Error and Cause	• The MECHATROLINK Servo command did not complete within the specified time (5 s).
Correction	• Check for alarms in the SERVOPACK for MECHATROLINK communication.

- The above error occurs when Module allocations of SERVOPACK for MECHATROLINK communication have been completed and the power is not being supplied to the SERVOPACK.

(16) Bit 13: Excessive ABS Encoder Rotations

Detection Timing	• Enabled only when an absolute encoder is used for a finite length axis, and the electronic gear used. Detected by the position management section when power is turned ON.
Processing when Alarm Occurs	• The absolute position information read from the absolute encoder when the SEN signal turned ON is ignored.
Error and Cause	• An operation error occurred when the absolute position information read from the absolute encoder is converted from pulses to reference units at power ON.
Correction	• Check the gear ratio, number of encoder pulses for other motion fixed parameters.

(17) Bit 1D: Detected Servo Driver Type Error

Detection Timing	• Detected by the communication control section when communications with the SERVOPACK are established.
Processing when Alarm Occurs	• None
Error and Cause	• The models set in link allocation do not match the models actually connected.
Correction	• Correct the allocation to agree with the models actually connected.

(18) Bit 1E: Motor Type Set Error

Detection Timing	• Detected when communications with the SERVOPACK are established.
Processing when Alarm Occurs	• None
Error and Cause	• The motor type setting (rotary/linear) of the Machine Controller fixed parameter does not agree with that of SERVOPACK parameter (Start Selection Pn000.3 for SGDH, Rotary/Linear for SGDS).
Correction	• Check the setting and model of the SERVOPACK.

(19) Bit 1F: Connected Encoder Type Error

Detection Timing	• Detected when communications with the SERVOPACK are established.
Processing when Alarm Occurs	• None
Error and Cause	• The motor type setting (rotary/linear) of the Machine Controller fixed parameter does not agree with the motor type connected to the SERVOPACK.
Correction	• Check the motor.

12.5.3 Servo Driver Status and Servo Driver Error Codes

(1) Servo Driver Status (IW□□2C) List

The status of a SERVOPACK for MECHATROLINK communication can be monitored in Servo Driver Status monitoring parameter IW□□2C.
A list is provided in the following table.

Bit No.	Status	Description
Bit 0	Alarm (ALARM)	0: No alarm occurred. 1: Alarm occurred.
Bit 1	Warning (WARNG)	0: No warning occurred. 1: Warning occurred.
Bit 2	Command Ready (CMDRDY)	0: Command reception not possible (busy). 1: Command reception possible (ready).
Bit 3	Servo ON (SVON)	0: Servo OFF (baseblock) 1: Servo ON (baseblock cleared)
Bit 4	Main Power Supply ON (PON)	0: Main power OFF 1: Main power ON
Bit 5	Machine Lock (MLOCK)	0: Machine lock released 1: Machine locked
Bit 6	Zero Position (ZPOINT)	0: The APOS (absolute position) is not in the zero point. 1: The APOS (absolute position) is in the zero point range.
Bit 7	Locating Complete (PSET)	0: Pulse distribution is not completed or the APOS is not in the positioning completed width. 1: Pulse distribution is completed and the APOS is within the positioning completed width.
Bit 8	Commanded Profile Complete (DEN)	0: Pulse distribution is being performed for positioning command. 1: Pulse distribution for positioning commands has been completed
Bit 9	Torque Restriction (T_LIM)	0: A torque limit is not being applied. 1: A torque limit is being applied.
Bit A	Latch Complete (L_CMP)	0: Latch not completed. 1: Latch completed.
Bit B	Locating Neighborhood (NEAR)	0:The APOS is outside the NEAR Signal Output Width. 1: The APOS is inside the NEAR Signal Output Width.
Bit C	Position Software Limit (P-SOT)	0: The positive software limit has not been exceeded. 1: The positive software limit has been exceeded.
Bit D	Negative Software Limit (N-SOT)	0: The negative software limit has not been exceeded. 1: The negative software limit has been exceeded.
Bit E	Reserved	–
Bit F	Reserved	–

(2) Servo Driver Alarm Code (IW□□2D)

When the Servo Driver Error (IL□□04, bit 0) turns ON, a SERVOPACK alarm will exist. The content of the alarm can be confirmed using the Servo Driver Alarm Code (monitoring parameter IW□□2D).
The Servo alarm codes are listed in the following tables.

[a] Σ-I Series

Name	Register Number	Code	Meaning
Servo Driver Alarm Code	IW□□2D	99	Normal
		94	Parameter Setting Warning
		95	MECHATROLINK Command Warning
		96	MECHATROLINK Communication Error Warning
		00	Absolute Value Data Error
		02	Parameter Corrupted
		10	Overcurrent
		11	Ground Fault
		40	Overvoltage
		41	Undervoltage
		51	Excessive Speed
		71	Overload (Instantaneous)
		72	Overload (Continuous)
		7A	Heat Sink Heating
		80	Absolute Encoder Error
		81	Absolute Encoder Backup Error
		82	Absolute Encoder Checksum Error
		83	Absolute Encoder Battery Error
		84	Absolute Encoder Data Error
		85	Absolute Encoder Excessive Speed
		B1	Gate Array 1 Error
		B2	Gate Array 2 Error
		B3	Current Feedback Phase-U Error
		B4	Current Feedback Phase-V Error
		B5	Watchdog Detector Error
		C1	Servo Run-away
		C2	Encoder Phase Error Detected
		C3	Encoder Phase-A or -B Disconnection
		C4	Encoder Phase-C Disconnection
		C5	Incremental Encoder Initial Pulses Error
		D0	Position Error Exceeded
		E5	MECHATROLINK Sync Error
		E6	MECHATROLINK Communication Error
		F1	Open Phase in Power Line
		F3	Momentary Power Loss

[b] Σ-II Series

Name	Register Number	Code	Meaning
Servo Driver Alarm Code	IW□□2D	99	Normal
		90	Excessive Position Deviation Warning
		91	Overload Warning
		92	Regeneration Overload Warning
		93	Absolute Encoder Battery Error
		94	Data Setting Warning
		95	Command Warning
		96	Communication Warning
		02	Parameter Corrupted
		03	Main Circuit Detector Error
		04	Parameter Setting Error
		05	Combination Error
		09	Divider Setting Error
		0A	Encoder Type Unmatch
		10	Overcurrent or Heat Sink Overheat
		30	Regeneration Error
		32	Regeneration Overload
		33	Main Circuit Wiring Error
		40	Overvoltage
		41	Undervoltage
		51	Excessive Speed
		71	Overload (Instantaneous Maximum Load)
		72	Overload (Continuous Maximum Load)
		73	DB Overload
		74	Inrush Resistance Overload
		7A	Heat Sink Overheat
		81	Encoder Backup Alarm
		82	Encoder Checksum Alarm
		83	Encoder Battery Alarm
		84	Encoder Data Alarm
		85	Encoder Excessive Speed
		86	Encoder Overheat
		B1	Speed Reference A/D Error
		B2	Torque Reference A/D Error
		B3	Current Sensor Error
		B6	Gate Array Error
		BF	System Alarm
		C1	Servo Run-away
		C6	Full-closed Loop Phase-A or -B Disconnection
		C7	Full-closed Loop Phase-C Disconnection
		C8	Encoder Clear Error Multiturn Limit Setting Error
		C9	Encoder Communication Error
		CA	Encoder Parameter Error
		CB	Encoder Echoback Error
		CC	Multiturn Limit Mismatch
		D0	Excessive Position Error
		D1	Excessive Error between Motor and Load
		E0	No Option
		E1	Option Timeout

Name	Register Number	Code	Meaning
Servo Driver Alarm Code (cont'd)	IW□□2D (cont'd)	E2	Option WDC Error
		E5	WDT Error
		E6	Communication Error
		E7	Application Module Detection Failure
		E9	Bus OFF Error
		EA	SERVOPACK Failure
		EB	SERVOPACK Initial Access Error
		EC	SERVOPACK WDC Error
		ED	Command Execution Not Completed
		EF	Application Module Alarm
		F1	Open Phase in Power Line
		F5	Motor Wire Disconnection (when control power supply is turned ON)
		F6	Motor Wire Disconnection (when Servo is ON)

[c] Σ-III Series

Name	Register Number	Code	Meaning
Servo Driver Alarm Code	IW□□2D	000	Normal
		900	Excessive Position Error
		901	Excessive Position Error at Servo ON
		910	Overload
		911	Vibration
		920	Regeneration Overload
		930	Absolute Encoder Battery Error
		94A	Data Setting Warning 1 (Parameter Number)
		94B	Data Setting Warning 2 (Outside Data Range)
		94C	Data Setting Warning 3 (Calculation Error)
		94D	Data Setting Warning 4 (Parameter Size)
		95A	Command Warning 1 (Command Conditions Not Met)
		95B	Command Warning 2 (Unsupported Command)
		95C	Command Warning 3
		95D	Command Warning 4
		95E	Command Warning 5
		960	MECHATROLINK Communication Warning
		020	Parameter Checksum Error 1
		021	Parameter Format Error 1
		022	System Constant Checksum Error 1
		023	Parameter Password Error 1
		02A	Parameter Checksum Error 2
		02B	System Constant Checksum Error 2
		030	Main Circuit Detector Error
		040	Parameter Setting Error 1
		04A	Parameter Setting Error 2
		041	Divided Pulse Output Setting Error
		042	Parameter Combination Error
		050	Combination Error
		051	Unsupported Product Alarm

Name	Register Number	Code	Meaning
Servo Driver Alarm Code (cont'd)	IW□□2D (cont'd)	0B0	Servo ON Reference Invalid Alarm
		100	Overcurrent or Heat Sink Overheat
		300	Regeneration Error
		320	Regeneration Overload
		330	Main Circuit Wiring Error
		400	Overvoltage
		410	Undervoltage
		510	Excessive Speed
		511	Divided Pulse Output Excessive Speed
		520	Vibration Alarm
		710	Overload (Instantaneous Maximum Load)
		720	Overload (Continuous Maximum Load)
		730, 731	DB Overload
		740	Inrush Resistance Overload
		7A0	Heat Sink Overheat
		810	Encoder Backup Alarm
		820	Encoder Checksum Alarm
		830	Encoder Battery Alarm
		840	Encoder Data Alarm
		850	Encoder Over Speed
		860	Encoder Overheat
		870	Fully-closed Serial Encoder Checksum Alarm
		880	Fully-closed Serial Encoder Data Alarm
		8A0	Fully-closed Serial Encoder Scale Error
		8A1	Fully-closed Serial Encoder Module Error
		8A2	Fully-closed Serial Encoder Sensor Error (Incremental Value)
		8A3	Fully-closed Serial Encoder Position Error (Absolute Value)
		B31	Current Detection Error 1
		B32	Current Detection Error 2
		B33	Current Detection Error 3
		B6A	MECHATROLINK Communication ASIC Error 1
		B6B	MECHATROLINK Communication ASIC Error 2
		BF0	System Alarm 0
		BF1	System Alarm 1
		BF2	System Alarm 2
		BF3	System Alarm 3
		BF4	System Alarm 4
		C10	Servo Run-away
		C80	Encoder Clear Error Multiturn Limit Setting Error
		C90	Encoder Communication Error
		C91	Encoder Communication Position Data Acceleration Error
		C92	Encoder Communication Timer Error
		CA0	Encoder Parameter Error
		CB0	Encoder Echoback Error
		CC0	Multiturn Limit Mismatch
		CF1	Fully-closed Serial Conversion Unit Communication Error (Reception Failure)

Name	Register Number	Code	Meaning
Servo Driver Alarm Code (cont'd)	IW□□2D (cont'd)	CF2	Fully-closed Serial Conversion Unit Communication Error (Timer Stopped)
		D00	Excessive Position Error
		D01	Excessive Position Error Alarm at Servo ON
		D02	Excessive Position Error Alarm for Speed Limit at Servo ON
		D10	Excessive Error between Motor and Load
		E00	COM Alarm 0
		E01	COM Alarm 1
		E02	COM Alarm 2
		E07	COM Alarm 7
		E08	COM Alarm 8
		E09	COM Alarm 9
		E40	MECHATROLINK-II Transmission Cycle Setting Error
		E50	MECHATROLINK-II Sync Error
		E51	MECHATROLINK-II Sync Failure
		E60	MECHATROLINK-II Communication Error
		E61	MECHATROLINK-II Transmission Cycle Error
		EA0	DRV Alarm 0
		EA1	DRV Alarm 1
		EA2	DRV Alarm 2

- Alarm codes are normally two digits, but three-digit codes are stored in the Alarm Monitor for motion commands.

[d] Σ-V Series

Name	Register Number	Code	Meaning
Servo Driver Alarm Code	IW□□2D	020	Parameter Checksum Error 1
		021	Parameter Format Error 1
		022	System Checksum Error 1
		030	Main Circuit Detector Error 1
		040	Parameter Setting Error 1
		041	Encoder Output Pulse Setting Error
		042	Parameter Combination Error
		044	Semi-closed/Fully-closed Loop Control Parameter Setting Error
		04A	Parameter Setting Error 2
		050	Combination Error
		051	Unsupported Device Alarm
		080	Linear Scale Pitch Setting Error
		0b0	Cancelled Servo ON Command Alarm
		100	Overcurrent or Heat Sink Overheated
		300	Regeneration Error
		320	Regenerative Overload
		330	Main Circuit Power Supply Wiring Error
		400	Overvoltage
		410	Undervoltage
		450	Main-Circuit Capacitor Overvoltage
		510	Overspeed
		511	Overspeed of Encoder Output Pulse Rate
		520	Vibration Alarm
		521	Autotuning Alarm
		550	Maximum Speed Setting Error

Name	Register Number	Code	Meaning
Servo Driver Alarm Code (cont'd)	IW□□2D (cont'd)	710	Overload: High Load
		720	Overload: Low Load
		730 731	Dynamic Brake Overload
		740	Overload of Surge Current Limit Resistor
		7A0	Heat Sink Overheated
		7AB	Built-in Fan in SERVOPACK Stopped
		810	Encoder Backup Error
		820	Encoder Checksum Error
		830	Absolute Encoder Battery Error
		840	Encoder Data Error
		850	Encoder Overspeed
		860	Encoder Overheated
		890	Encoder Scale Error
		891	Encoder Module Error
		8A0*	External Encoder Error of Scale
		8A1*	External Encoder Error of Module
		8A2*	External Encoder Error of Sensor (Incremental)
		8A3*	External Encoder Error of Position (Absolute)
		8A5*	External Encoder Overspeed
		8A6*	External Encoder Overheated
		b31	Current Detection Error 1 (Phase-U)
		b32	Current Detection Error 2 (Phase-V)
		b33	Current Detection Error 3 (Current detector)
		b6A	MECHATROLINK Communications ASIC Error 1
		bF0	System Alarm 0
		bF1	System Alarm 1
		bF2	System Alarm 2
		bF3	System Alarm 3
		bF4	System Alarm 4
		C10	Servo Overrun Detected
		C20	Phase Detection Error
		C21	Hall Sensor Error
		C22	Phase Information Disagreement
		C50	Polarity Detection Error
		C51	Overtravel Detection at Polarity Detection
		C52	Polarity Detection Uncompleted
		C53	Out of Range for Polarity Detection
		C54	Polarity Detection Error 2
		C80	Absolute Encoder Clear Error and Multi-turn Limit Setting Error
		C90	Encoder Communications Error
		C91	Encoder Communications Position Data Error
		C92	Encoder Communications Timer Error
		CA0	Encoder Parameter Error
		Cb0	Encoder Echoback Error
		CC0	Multi-turn Limit Disagreement
		CF1*	Feedback Option Module Communications Error (Reception error)
		CF2*	Feedback Option Module Communications Error (Timer stop)
		d00	Position Error Pulse Overflow
		d01	Position Error Pulse Overflow Alarm at Servo ON

Name	Register Number	Code	Meaning
Servo Driver Alarm Code (cont'd)	IW□□2D (cont'd)	d02	Position Error Pulse Overflow Alarm by Speed Limit at Servo ON
		d10*	Motor-load Position Error Pulse Overflow
		d30	Position Data Overflow
		E02	MECHATROLINK-II Internal Synchronization Error 1
		E40	MECHATROLINK-II Transmission Cycle Setting Error
		E50	MECHATROLINK-II Synchronization Error
		E51	MECHATROLINK-II Synchronization Failed
		E60	MECHATROLINK-II Communications Error (Reception error)
		E61	MECHATROLINK-II Transmission Cycle Error (Synchronization interval error)
		E72*	Feedback Option Module Detection Failure
		EA2	DRV Alarm 2 (SERVOPACK WDT error)
		Eb1	Safety Function Signal Input Timing Error
		ED1	Command Execution Timeout
		F10	Main Circuit Cable Open Phase
		–	Not an error

* Only when using the Fully-closed Module.

Appendices

Appendix A System Registers Lists

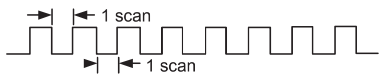
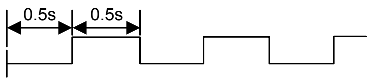
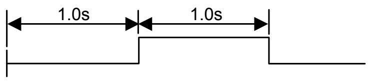
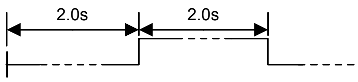
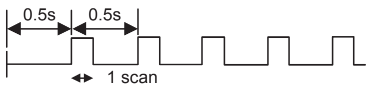
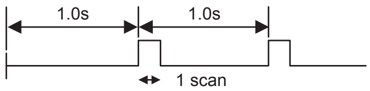
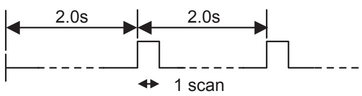
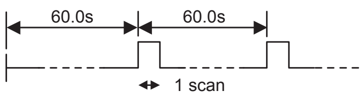
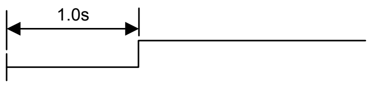
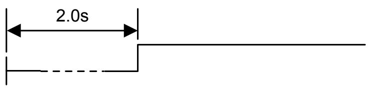
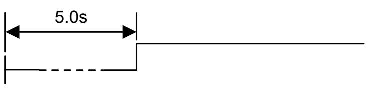
A.1 System Service Registers

(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.

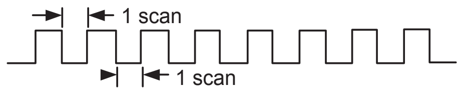
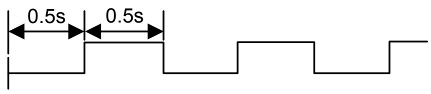
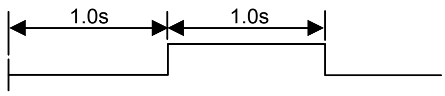
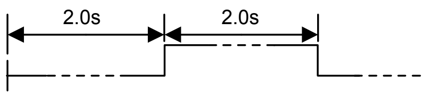
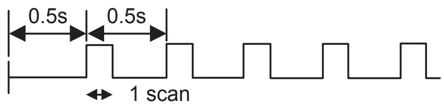
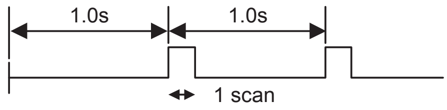
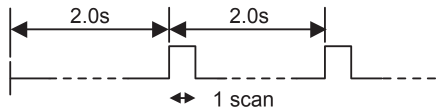
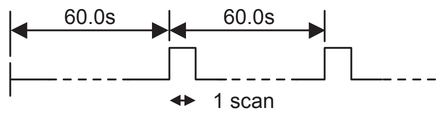
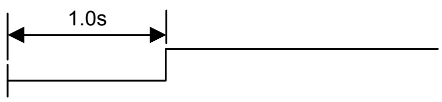
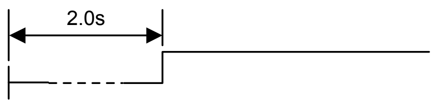
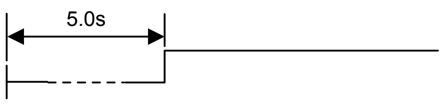
Name	Register No.	Remarks
1-scan Flicker Relay	SB000010	
0.5-s Flicker Relay	SB000011	
1.0-s Flicker Relay	SB000012	
2.0-s Flicker Relay	SB000013	
0.5-s Sampling Relay	SB000014	
1.0-s Sampling Relay	SB000015	
2.0-s Sampling Relay	SB000016	
60.0-s Sampling Relay	SB000017	
1.0 s After Start of Scan Relay	SB000018	
2.0 s After Start of Scan Relay	SB000019	
5.0 s After Start of Scan Relay	SB00001A	

Appendices

App

(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 MECHATROLINK Transmission Definition Window.

- Refer to *3.4.2 (1) How to Open the MECHATROLINK Transmission Definition Window* for further information.

B.1 Settings in Link Assignment Tab Page

After setting the required items in the parameter setting tab pages, set the items as shown in the following table in the **Link Assignment** Tab Page, and save the settings.

Supported Communication Method		Model	Setting TYPE	SIZE INPUT	SIZE OUTPUT	SCAN
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		4	4	Can be set
		JEPMC-PL2900		7	8	Can be set
		JEPMC-PL2910		8	8	Can be set
		JEPMC-AN2900		7	2	Can be set
		JEPMC-AN2910		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
		AB023-M1		8 (16)	8 (16)	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 ***TYPE*** column in the Link Assignment Tab Page.

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, and JEPMC-IO2330 (64-point I/O)

	Command Data	
OW□□□□		High-speed/ Low-speed control data (4 words)
OW□□□□+1		
OW□□□□+2		
OW□□□□+3		

	Response Data	
IW□□□□		High-speed/ Low-speed control data (4 words)
IW□□□□+1		
IW□□□□+2		
IW□□□□+3		

(7) JEPMC-IO2320 (128-point I/O)

Register	Command Data	Register	Response Data
OW□□□□		IW□□□□	
OW□□□□+1		IW□□□□+1	
OW□□□□+2		IW□□□□+2	
OW□□□□+3		IW□□□□+3	
OW□□□□+4		IW□□□□+4	
OW□□□□+5		IW□□□□+5	
OW□□□□+6		IW□□□□+6	
OW□□□□+7		IW□□□□+7	

Command Data: High-speed/ Low-speed control data (8 words)

Response Data: High-speed/ Low-speed control data (8 words)

(8) 120AVI02030 and JEPMC-AN2900 (Analog Input)

Register	Command Data	Register	Response Data
OW□□□□	(Reserved by the system)	IW□□□□	
OW□□□□+1	Not used	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

Command Data: High-speed/ Low-speed control data (2 words)

Response Data: High-speed/ Low-speed control data (7 words)

(9) 120AVO01030 and JEPMC-AN2910 (Analog Output)

Register	Command Data	Register	Response Data
OW□□□□	(Reserved by the system)	IW□□□□	
OW□□□□+1	Not used	IW□□□□+1	
OW□□□□+2	CH1 Analog output value		
OW□□□□+3	CH2 Analog output value		

Command Data: High-speed/ Low-speed control data (4 words)

Response Data: High-speed/ Low-speed control data (2 words)

(10) 120EHC21140 and JEPMC-PL2900 (Counter with Preset Function)

	Command Data		
OW□□□□		Scan counter	High-speed/ Low-speed control data (8 words)
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		

	Response Data	
IW□□□□		High-speed/ Low-speed control data (7 words)
IW□□□□+1		
IW□□□□+2	Input relay	
IW□□□□+3	Input register	
IW□□□□+4	Input register	
IW□□□□+5	Input register	
IW□□□□+6	Input register	

- For counters with the preset function, the first two words are reserved by the system, and various settings are required for outputs. Refer to *Chapter 5 Reversible Counter with Preset Function* and *Chapter 6 Pulse Output Module* of *Machine Controller MP900/MP2000 Series Distributed I/O Module User's Manual for MECHATROLINK* (manual number SIE-C887-5.1) for details.

(11) 120MMB20230 and JEPMC-PL2910 (Pulse MC)

	Command Data		
OW□□□□		Scan counter	High-speed/ Low-speed control data (8 words)
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		

	Response Data	
IW□□□□		High-speed/ Low-speed control data (8 words)
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	

- For pulse output modules, the first two words are reserved by the system, and various settings are required for outputs. Refer to *Chapter 5 Reversible Counter with Preset Function* and *Chapter 6 Pulse Output Module* of *Machine Controller MP900/MP2000 Series Distributed I/O Module User's Manual for MECHATROLINK* (manual number SIE-C887-5.1) for details.

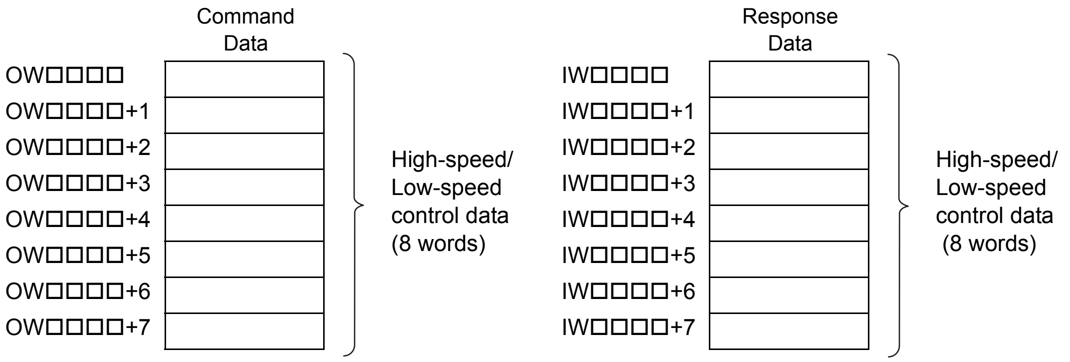
(12) MP940 (Machine Controller)

	Command Data	
OW□□□□		High-speed/ Low-speed control data (8 words)
OW□□□□+1		
OW□□□□+2		
OW□□□□+3		
OW□□□□+4		
OW□□□□+5		
OW□□□□+6		
OW□□□□+7		

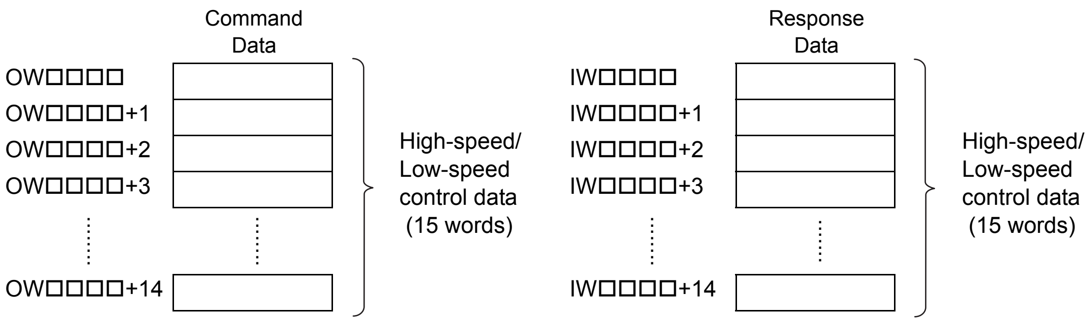
	Response Data	
IW□□□□		High-speed/ Low-speed control data (8 words)
IW□□□□+1		
IW□□□□+2		
IW□□□□+3		
IW□□□□+4		
IW□□□□+5		
IW□□□□+6		
IW□□□□+7		

(13) MP2200/MP2300 SVB-01 (Motion Module)/MP2100M (Option)

<In 17-byte mode>

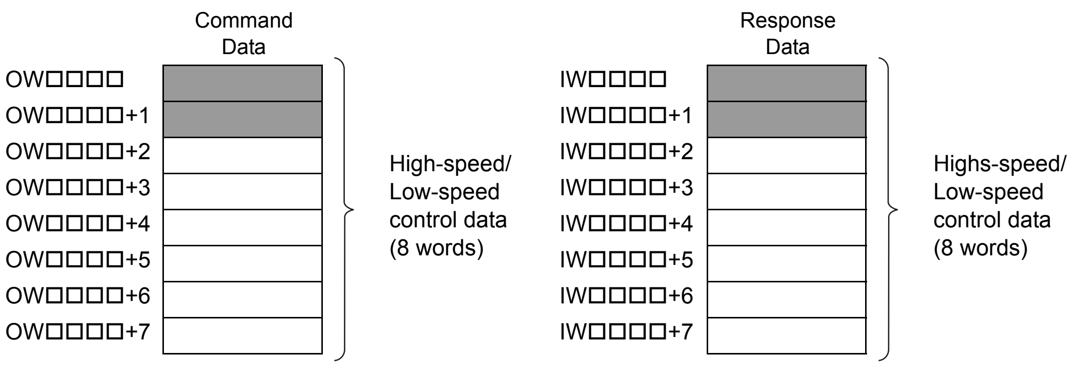


<In 32-byte mode>

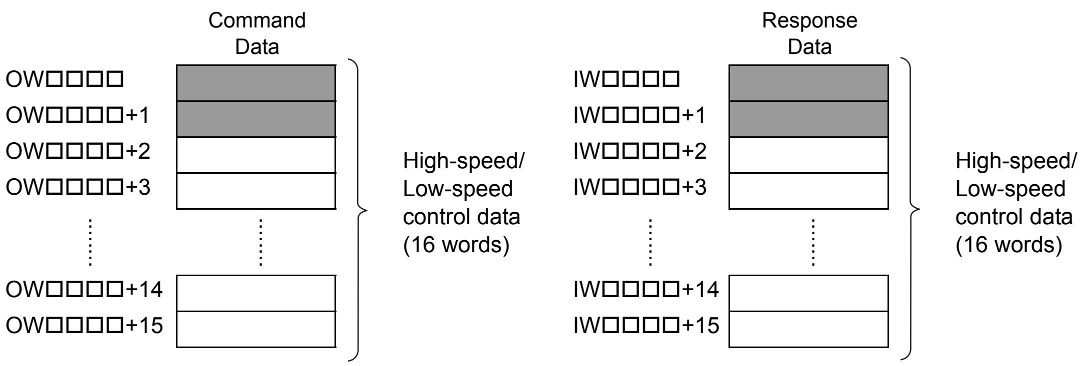


(14) MYVIS YV250 and MYVIS YV260 (Machine Vision System)

<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 procedure for initializing an absolute encoder for a Σ-I, Σ-II, Σ-III, or Σ-V SERVOPACK is given below.

- Refer to *9.2.1 System Startup Flowchart* for the procedure for absolute-position detection.

C.1 Σ-III and Σ-V SERVOPACK

- For details on the Σ-III and Σ-V 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

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.

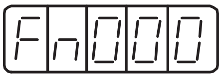
This completes setting up the absolute encoder. Turn the power supply OFF and then back ON to reset the SERVOPACK.

C.2 Σ-II SERVOPACK

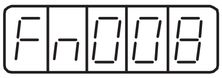
- Refer to the following manuals for information on Σ-II SERVOPACKs.
  AC Servo Drives Σ-II Series SGM□□/SGDH User's Manual Rotational Motor/Analog Voltage and Pulse Train Reference (Manual No. SIEP S8000000 05)
  AC Servo Drives Σ-II Series SGM□□/SGDM User's Manual Rotational Motor/Analog Voltage and 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.

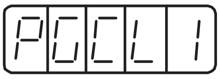


2. Select parameter Fn008 by pressing the LEFT (<) and RIGHT (>) Keys to select the digit to be changed and then using the UP (∧) and DOWN (∨) Keys to change the value of the digit.



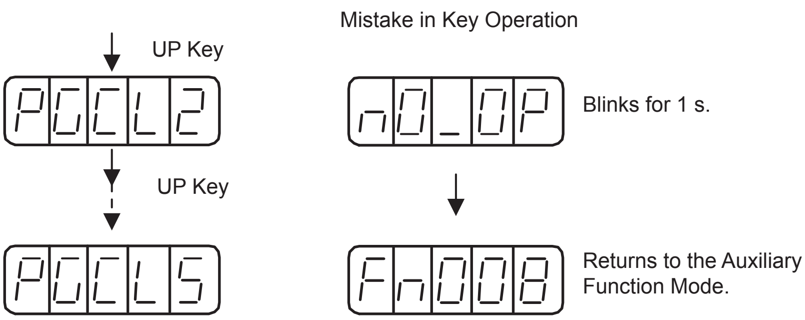
3. Press the DATA/ENTER Key.

The following display will appear.



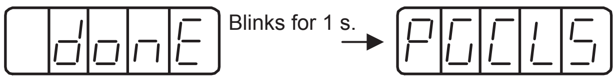
4. The rightmost digit will be incremented each time the UP (∧) Key is pressed. Press the UP (∧) Key several times until "PGCL5" is displayed.

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.

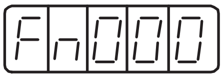
The display will change as shown below and the clear operation will be performed for multiturn data for the absolute encoder.



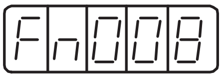
This completes initializing the absolute encoder. Reset the SERVOPACK to turn the power supply OFF and then back ON.

(2) Initialization Using the Built-in Panel Operator

1. Press the MODE/SET Key to select the Auxiliary Function Mode.

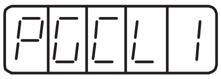


2. Press the UP (▲) and DOWN (▼) Keys to select parameter Fn008.



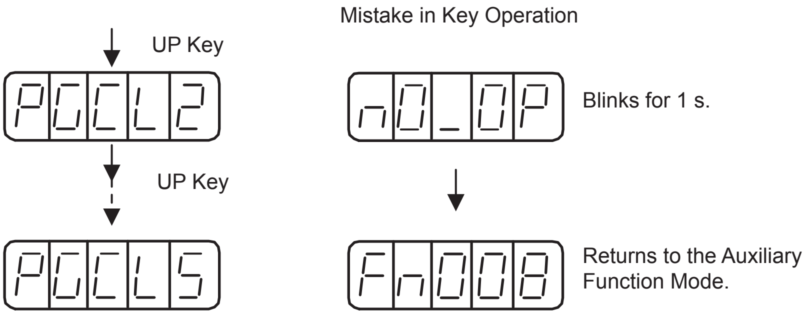
3. Press the DATA/ < Key for more than one second.

The following display will appear.



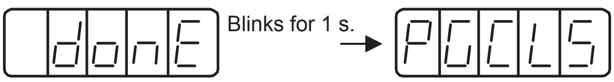
4. The rightmost digit will be incremented each time the UP (▲) Key is pressed. Press the UP (▲) Key several time until “PGCL5” is displayed.

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

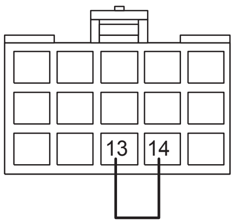
- Refer to the following manuals for information on Σ-I SERVOPACKS.
  Σ Series SGM□/SGD User's Manual High-speed Field Network MECHATROLINK-compatible AC Servo Driver (Manual No. SIE-S800-26.3)
  Σ Series SGM□/SGDB User's Manual High-speed Field Network MECHATROLINK-compatible AC Servo Driver (Manual 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.

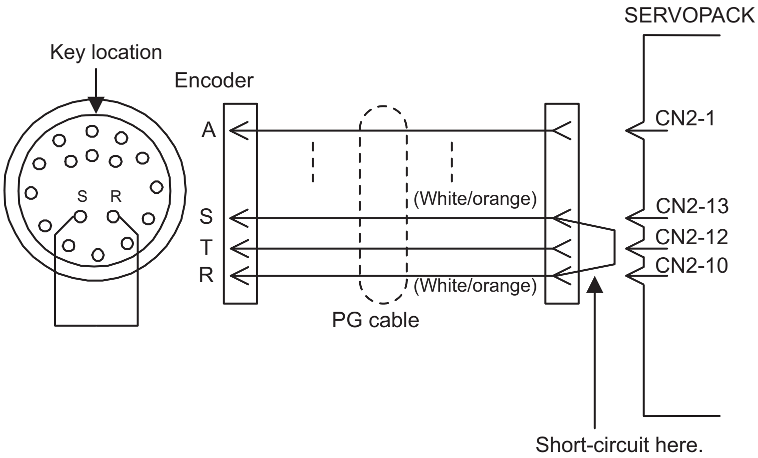
2. Discharge the large-capacity capacitor in the encoder using one of the following methods.

■ 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, or Σ-V 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].

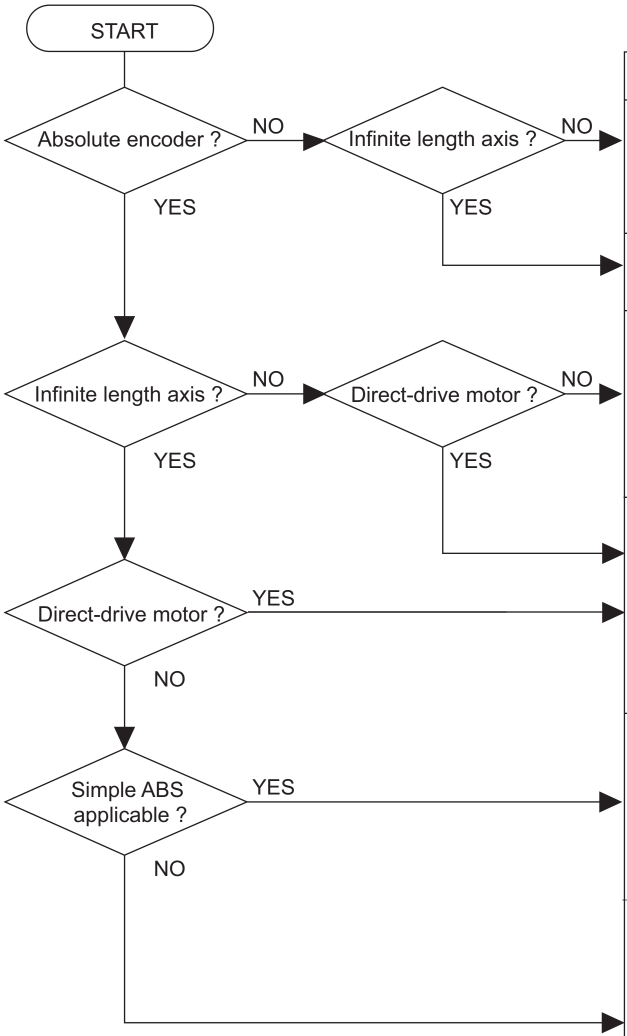
4. Click [Continue].

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)

<table>
<tr><th>Coordinate Zero Point is Determined By</th><th>Precautions When Turning the Power Back ON</th><th>Setting Mode</th><th>How to Change the Coordinate Zero Point</th></tr>
<tr><td rowspan="2">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.)</td><td rowspan="2">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.</td><td>Either Absolute mode or in Incremental Addition mode (relative value).
Depends on the setting of OW□□09, bit 5.
Setting range: $-2^{31} \sim 2^{31}-1$</td><td rowspan="5">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.</td></tr>
<tr><td>In Incremental Addition mode (relative value)</td></tr>
<tr><td>Encoder zero-point position (incremental pulses) and Machine Controller coordinate zero point offset (OL□□48).
Encoder zero-point position is set by encoder initialization.</td><td>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</td><td>Either Absolute mode or in Incremental Addition mode (relative value).
Depends on the setting of OW□□09, bit 5.
Setting range: $-2^{31} \sim 2^{31}-1$</td></tr>
<tr><td>Encoder zero-point position (incremental pulses) and Machine Controller coordinate zero point offset (OL□□48).
Encoder zero-point position is set by encoder initialization.</td><td>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.</td><td>Incremental Addition mode (relative value)</td></tr>
<tr><td>Encoder zero-point position (incremental pulses) and Machine Controller coordinate zero point offset (OL□□48).
Encoder zero-point position is set by encoder initialization.</td><td>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.)</td><td>Incremental Addition mode (relative value)</td></tr>
<tr><td>Encoder zero-point position (incremental pulses) and by executing ZSET (Set Zero Point) command.</td><td>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.</td><td>Incremental Addition mode (relative value)</td><td>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.</td></tr>
</table>

Appendices

App

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	Version 2.46 or later
	MP2100M	JAPMC-MC2140	Version 2.46 or later
	MP2300	JEPMC-MP2300	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
	MP2500	JEPMC-MP2500-*□□ (* = A, B, or C)	Version 2.46 or later
	MP2500M	JEPMC-MP2540-*□□ (* = A, B, or C)	Version 2.46 or later
	MP2500D	JEPMC-MP2500-D□□	Version 2.46 or later
	MP2500MD	JEPMC-MP2540-D□□	Version 2.46 or later
Optional SVB Module	SVB-01	JAPMC-MC2310	Version 1.18 or later
Engineering Tool	MPE720 Version 5	CPMC-MPE720	Version 5.34 or later
	MPE720 Version 6	CPMC-MPE770	Version 6.00 or later
	MPE720 Version 7	CPMC-MPE780	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	✓	✓	✓	✓	✓	✓	✓
	MP2500	✓	–	✓	–	✓	✓	✓
	MP2500M (with built-in SVB)	✓	–	✓	–	✓	✓	✓
	MP2500M (with SVB board)	✓	✓	✓	✓	✓	✓	✓
	MP2500D	✓	✓	✓	✓	✓	✓	✓
	MP2500MD (with built-in SVB)	✓	–	✓	–	✓	✓	✓
	MP2500MD (with SVB board)	✓	✓	✓	✓	✓	✓	✓
	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 Link Assignment

To control an M-II Stepper through MECHATROLINK-II communications, the M-II Stepper must be allocated to a station. Start the MPE720 and open the Link Assignment Tab Page in the **MECHATROLINK Transmission Definition** Window. Make the setting as shown below in the station number to which you want to allocate the M-II Stepper in the Link Assignment Tab Page.

TYPE	INPUT	SIZE	OUTPUT	SIZE	SCAN
SteppingMotorDRV	Blank	Blank	Blank	Blank	HIGH (Fixed)

- Refer to *3.4.2 (1) How to Open the MECHATROLINK Transmission Definition Window* for information on how to open the **MECHATROLINK Transmission 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 11: 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 11: Filter Type Selection
		0 or 1	0	Bits 12 to 15: Torque Unit Selection
OW□□05	Function Setting 3	Bit setting	0	Bit 1: Phase Reference Creation Calculation Disable
				Bit 11: 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 15: Copied in the option field of MECHATROLINK stepper command
OW□□4E	Servo User Monitor Setting	Bit setting	0E00H	Bits 8 to 11: Monitor 3

(3) Stepper Parameters

For the axis for which “SteppingMotorDRV” is allocated on the **Link Assignment** Tab Page, the stepper parameter can be set on the **SERVOPACK** Tab bed Page in the **SVB Definition** Window.

- Refer to *3.4.3 (1) Opening the SVB Definition Window* for information on how to open the **SVB Definition** 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.

Appendices

App

(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 10) and Home Offset Parameter Options (bit 11) 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 10) 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 10) 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 10) 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 10

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 10

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 10) will be changed to 1 (disabled).

	Machine Controller/Fixed Parameter		Details	Value
→	No.1	Function Selection Flag 1	Bit 10: 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
10	Zero Point Return Speed (Approach Speed and Creep Speed) Parameter Options	0	Use standard parameter
		1	Use unique parameter
11	Home Offset (Zero Point Return Final Travel Distance) Parameter Options	0	Use standard parameter
		1	Use unique parameter
12	Current at Run Parameter Options	0	Use standard parameter
		1	Use unique parameter
13	Current at Stop Parameter Options	0	Use standard parameter
		1	Use unique parameter
14	Undefined		
15	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 14	Undefined		
15	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 15	Undefined		

(5) No. 3: Memory Switch 3

Bit	Name	Setting	
0 to 9	Undefined		
10	MECHATROLINK Communication Check (For Debugging)	0	With communication check
		1	Without communication check Ignores the command errors 01, 02, and 03.
11	WDT Check (For Debugging)	0	With WDT check
		1	Without WDT check Ignores error 04.
12	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.
13			
14			
15			

(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.
10	P-OT Signal Logic	0	Positive logic
		1	Negative logic
11	N-OT Signal Logic	0	Positive logic
		1	Negative logic
12	DEC Signal Logic	0	Positive logic
		1	Negative logic
13 to 15	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	Version 2.48 or later
	MP2100M	JAPMC-MC2140	Version 2.48 or later
	MP2300	JEPMC-MP2300	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
	MP2500	JEPMC-MP2500-*□□ (* = A, B, or C)	Version 2.48 or later
	MP2500M	JEPMC-MP2540-*□□ (* = A, B, or C)	Version 2.48 or later
	MP2500D	JEPMC-MP2500-D□□	Version 2.48 or later
	MP2500MD	JEPMC-MP2540-D□□	Version 2.48 or later
Optional SVB Module	SVB-01	JAPMC-MC2310	Version 1.19 or later
Engineering Tool	MPE720 Version 5	CPMC-MPE720	Version 5.36 or later
	MPE720 Version 6	CPMC-MPE770	Version 6.00 or later
	MPE720 Version 7	CPMC-MPE780	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	✓	✓	✓	✓	✓	✓	✓
	MP2500	✓	–	✓	–	✓	✓	✓
	MP2500M (Built-in SVB)	✓	–	✓	–	✓	✓	✓
	MP2500M (SVB board)	✓	✓	✓	✓	✓	✓	✓
	MP2500D	✓	✓	✓	✓	✓	✓	✓
	MP2500MD (Built-in SVB)	✓	–	✓	–	✓	✓	✓
	MP2500MD (SVB board)	✓	✓	✓	✓	✓	✓	✓
	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

Start the MPE720 to open the **Link Assignment** Tab bed Page in the **MECHATROLINK Transmission Definition** Window. Make the settings as shown in the table below in the station where you want to allocate a wild card servo.

TYPE	INPUT	SIZE	OUTPUT	SIZE	SCAN
*****SERVO	Blank	Blank	Blank	Blank	HIGH (Fixed)

- SVB Module operates as though the actual object is true, despite the setting. If "*****SERVO" 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 12 to 15: Bank Selector
OW□□06	Option Setting	Bit setting	0	Bits 10 to 15: 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.

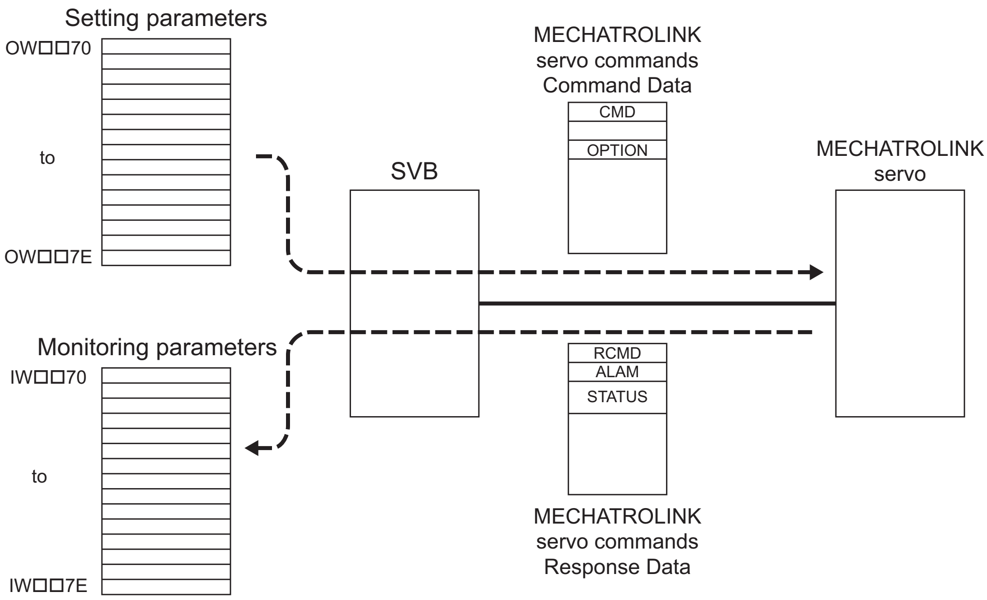
(5) Self-configuration

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.

Appendices
App

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 14: Communication Reset * Bit 15: 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 16: Servo Driver Synchronization Communication Error Bit 17: 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)

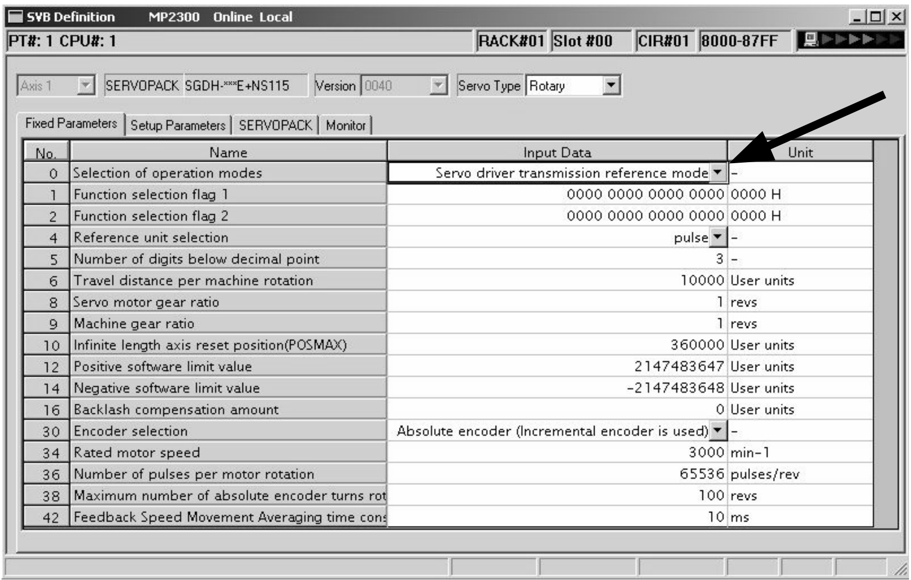
I.5 Operation Procedure in Servo Driver Transmission Reference Mode

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 bed Page in the **SVB Definition** Window from the **Module Configuration** Window.

- Refer to *3.4.3 (1) Opening the SVB Definition Window* for information on how to open the SVB Definition Window.

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 save the setting.



3. Display the registers OW□□70 to OW□□7E in the Register List.

MPE720 Version 5.□□: Select ***File*** - ***Open*** - ***Tool*** - ***Register List*** in the **Engineering Manager** Window. In the **Register List** Window that opens, enter OW□□70 in ***Register No***. column and 16 in ***/D*** column.

MPE720 Version 6.□□: Open the Register List Subwindow, and enter OW□□70 in ***Register*** column.

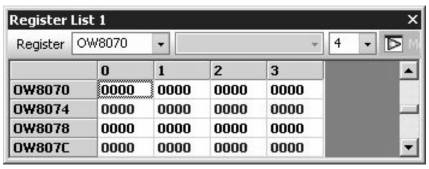
4. Enter MECHATROLINK application layer commands for the registers OW□□70 to OW□□7E in the Register List.

Set commands in OW□□70 to OW□□77, and subcommands in OW□□78 to OW□□7E.

■ <Setting Example> Sending the main command PPRM_WR

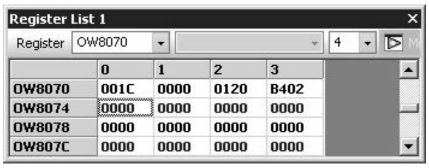
In the MECHATROLINK application layer command setting example given below, the main command PPRM_WR is sent.

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.



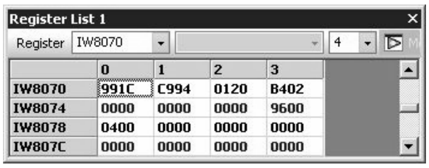
- Use the little-endian format to set the data.

<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 MP900/MP2000 Series User's Manual Motion Programming* (manual number: SIEZ-C887-1.3) 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 10 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.	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

Index

Symbols

Numerics

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

R

Revision History

The revision dates and numbers of the revised manuals are given on the bottom of the back cover.

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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
June 2010		0	–	Based on Japanese user's manual, SIJP C880700 33D <12>-1, available on the Web in May 2010.
			All chapters	Completely revised
			12.5.3 (2) [d]	Revision: Servo driver alarm code
			Back cover	Revision: Address

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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)
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			6.4.2	Addition: Step1 in (1) Executing/Operating Procedure
September 2009		3	4.4.2 (14)	Revision: Control mode
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
			11.1.2 (2)	Revision: Output terminals for Pn50F.2
			Back cover	Revision: Address
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			Back cover	Revision: Address
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Machine Controller MP2000 Series

Built-in SVB/SVB-01 Motion Module

USER'S MANUAL

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Specifications are subject to change without notice for ongoing product modifications and improvements.

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