YASKAWA

MP2200/MP2300 Machine Controller Motion Module User's Manual

Model: JAPMC-MC2310/JAPMC-MC2300

Using this Manual

Please read this manual to ensure correct usage of the SVB-01 Module of MP2200/MP2300. Keep this manual in a safe place for future reference.

■ Basic Terms

Unless otherwise specified, the following definitions are used:

- SVA-01: Motion Module SVA-01
- SVB-01: Motion Module SVB-01
- MP2200/MP2300: Machine Controller MP2200/MP2300
- SVR: Virtual Motion Module SVR
- PC: Programmable Logic Controller
- PP: Programming Panel
- MPE720: The Programming Device Software or a Programming Device (i.e., a personal computer) running the Programming Device Software

• SERVOPACK Series Names and Abbreviations

The SERVOPACKS applicable to the SVA-01 and SVB-01 Motion Modules are listed in the following table. The series names and abbreviations used in this manual are limited to those for the SERVOPACK model numbers listed below.

Series Name	Abbreviation	SERVOPACKs Applicable to the SVB-01	SERVOPACKs Applicable to the SVA-01
Σ Series	Σ	SGD-□□□N, SGDB-□□AN	SGDA-□□□S, SGDB-□□AD□-□, SGDB-□□DD
Σ-II Series	Σ-II	SGDH-□□□E + NS100, SGDH-□□□E + NS115	SGDM-□□□DA, SGDM-□□AD□, SGDH-□□DE, SGDH-□□AE, SGDH-□□□E
Σ-III Series	Σ-III	SGDS-□□□1□□	SGDS-□□□-01□, SGDS-□□□-02□, SGDS-□□□05, SGDS-□□A□□□, SGDS-□□F□□□

■ Manual Configuration

Read the chapters of this manual as required by the purpose.

Chapter	Selecting Models and Peripheral Devices	Studying Specifications and Ratings	Designing the System	Installation and Wiring	Trial Operation	Maintenance and Inspection
Chapter 1 Motion Module Overview	Applicable	–	–	–	–	–
Chapter 2 Module Specifications and Connections	Applicable	Applicable	Applicable	Applicable	–	–
Chapter 3 Motion Module Setup	Applicable	–	Applicable	–	Applicable	–
Chapter 4 Motion Parameters	–	–	Applicable	–	Applicable	–
Chapter 5 Motion Commands	–	–	Applicable	–	Applicable	Applicable
Chapter 6 Control Block Diagrams	–	–	Applicable	–	Applicable	Applicable
Chapter 7 Absolute Position Detection	–	–	Applicable	–	Applicable	Applicable
Chapter 8 SVR Virtual Motion Module	–	–	Applicable	–	Applicable	–
Chapter 9 Utility Functions	Applicable	–	Applicable	–	Applicable	Applicable
Chapter 10 Troubleshooting	–	–	–	–	Applicable	Applicable

■ Visual Aids

The following aids are used to indicate certain types of information for easier reference.

IMPORTANT — Indicates important information that should be memorized.

INFO — Indicates supplemental information.

◀ EXAMPLE ▶ — Indicates application examples.

TERMS — Describes technical terms that are difficult to understand, or appear in the text without an explanation being given.

■ 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:

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

■ Related Manuals

Refer to the following related manuals as required.

Thoroughly check the specifications, restrictions, and other conditions of the product before attempting to use it.

Manual Name	Manual Number	Contents
Machine Controller MP2200 User's Manual	SIEPC88070014	Describes the design and maintenance of the MP2200 Machine Controller.
Machine Controller MP2300 Basic Module User's Manual	SIEPC88070003	Describes the design and maintenance of the MP2300 Basic Module.
Machine Controller MP2300 Communication Module User's Manual	SIEPC88070004	Describes the functions, specifications, and application methods of the MP2300 Communication Modules (217IF, 218IF, 260IF, 261IF).
Machine Controller MP900/MP2000 Series User's Manual MECHATROLINK System	SIEZ-C887-5.1	Describes the communication functions, specifications, and application methods of the MECHATROLINK Modules for MP900 Machine Controllers.
Machine Controller MP900 Series User's Manual Ladder Programming	SIEZ-C887-1.2	Describes the instructions used in MP900/MP2000 ladder programming.
Machine Controller MP9□□ User's Manual Motion Programming	SIEZ-C887-1.3	Describes the instructions used in MP900/MP2000 motion programming.
Machine Controller MP900/MP2000 Series User's Manual MPE720 Software for Programming Device	SIEPC88070005	Describes how to install and operate the MP900/MP2000 Series programming system (MPE720).
Σ Series SGM□/SGD User's Manual	SIE-S800-26.3	Describes the Σ Series SERVOPACK models, specifications and capacity selection methods.
Σ Series SGM□/SGDB User's Manual	SIE-S800-26.4	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, inspection, and MECHATROLINK communication of the Σ Series SERVOPACKs and Servomotors.
Σ Series SGM□/SGDA User's Manual	TSE-S800-15	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ Series SERVOPACKs and Servomotors.
Σ Series SGMB/SGDB User's Manual	SIE-S800-16.1	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ Series SERVOPACKs and Servomotors.
Σ Series SGM□/SGDB User's Manual	TSE-S800-16.1	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ Series SERVOPACKs and Servomotors.
Σ-II Series SGM□H/SGDH User's Manual Design and Maintenance	SIEPS80000005	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ-II Series SERVOPACKs and Servomotors.

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Manual Name	Manual Number	Contents
Σ-II Series SGDH MECHATROLINK Interface Unit User's Manual	SIE-C718-4	Describes the MECHATROLINK-I communication method using the JUSP-NS100 application module installed on the Σ-II Series SERVOPACK.
Σ-II Series SGDH MECHATROLINK-II Application Module User's Manual	SIEPC71080001	Describes the MECHATROLINK-II communication method using the JUSP-NS115 application module installed on the Σ-II Series SERVOPACK.
Σ-II Series SGM☐H/SGDM User's Manual	SIEPS80000015	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ-II Series SERVOPACKs and Servomotors.
Σ-III Series SGM☐S/SGDS User's Manual For MECHATROLINK-II Communications	SIEPS80000011	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, inspection, and MECHATROLINK communication of the Σ-III Series SERVOPACKs and Servomotors.
Σ-III Series SGM☐S/SGDS User's Manual	SIEP80000000	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ-III Series SERVOPACKs and Servomotors.
Linear Σ Series SGL☐☐/SGDS User's Manual	SIEPS80000016	Describes the models, capacities, selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, panel installation, trial operation, adjustment, function application methods, maintenance, and inspection of the Σ-III Series SERVOPACKs and Linear Servomotors.
Machine Controller MP900 Series New Ladder Editor Programming Manual	SIE-C887-13.1	Describes the programming instructions of the New Ladder Editor, which assists MP900/MP2000 Series design and maintenance.
Machine Controller MP900 Series New Ladder Editor User's Manual	SIE-C887-13.2	Describes the operating methods of the New Ladder Editor, which assists MP900/MP2000 Series design and maintenance.

Safety Information

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠ WARNING	Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.
⚠ CAUTION	Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

Safety Precautions

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

⚠ WARNING

- Before starting operation in combination with the machine, 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 MP2200/MP2300.

  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 can cause damage to the machine or even accidents resulting in injury or death.
- Do not remove the front cover, cables, connector, 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 MP2200/MP2300.
- Do not attempt to modify the MP2200/MP2300 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 may start operation suddenly. Provide suitable safety measures to protect people when operation restarts.

  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 MP2200/MP2300 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 MP2200/MP2300 during transportation. There is a risk of injury or an accident.

■ Installation

⚠ CAUTION
• Never use the MP2200/MP2300 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 MP2200/MP2300 or place heavy objects on the MP2200/MP2300. There is a risk of injury. • Do not block the air exhaust port or allow foreign objects to enter the MP2200/MP2300. There is a risk of element deterioration inside, an accident, or fire. • Always mount the MP2200/MP2300 in the specified orientation. There is a risk of an accident. • Do not subject the MP2200/MP2300 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 run-away, 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 MP2200/MP2300 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

■ Selecting, Separating, and Laying External Cables

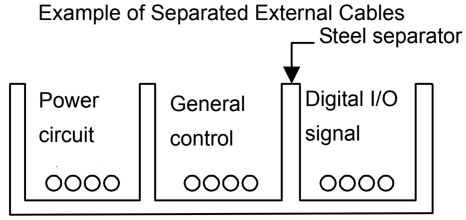
⚠ CAUTION

- Consider the following items when selecting the I/O signal lines (external cables) to connect the MP2200/MP2300 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

⚠ CAUTION

- Do not attempt to disassemble the MP2200/MP2300.

  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 MP2200/MP2300, restart operation only after transferring the programs and parameters from the old Module to the new Module.

  There is a risk of device damage.

■ Disposal

⚠ CAUTION

- Dispose of the MP2200/MP2300 as general industrial waste.

Variable Tables

■ System Variable Table (Tree View)

The following table lists details on the system variables provided by MPE720 version 6..

Variable Name			Register	Comments
OnCoil			SB000004	Always ON
Clock			-	Calendar
	DayOfWeek		SW00019	Calendar:Day of week
	HoursMinutes		SW00017	Calendar:Hours Minutes
	MonthDate		SW00016	Calendar:Month Day
	Second		SW00018	Calendar:Seconds
	Year		SW00015	Calendar:Year
CPU			-	Controller
	Error		-	CPU Error Status
		Exception	SB000413	Exception Error
		Failure	SB000410	Important Failure
		IOError	SB000419	I/O Error
		ProgramError	SB000418	User Calculation Error
	Info		-	CPU Information
		MemorySizeAvailable	SL00026	Available PRG Memory (BYTE)
		MemorySizeTotal	SL00028	All Module Memory (BYTE)
		SoftwareVersion	SW00020	System Program Software Number
	Status		-	CPU Status
		Alarm	SB000402	ALARM (1=Warning,0=Normal)
		BatteryAlarm	SB000487	Battery Alarm (1=Alarm)
		Error	SB000403	ERROR (1=Unusual,0=Normal)
		Ready	SB000400	READY (1=Normal,0=Converse/Own Diagnose Unusual)
		Running	SB000401	RUN (1=Driving,0=Driving Stop)
		RunSwitch	SB00040F	RUN switch status at power is on (1=RUN,0=STOP)
		Stopped	SB00040E	Running Stop Require (From EWS:1=STOP,0=RUN)
		WriteEnable	SB000407	WEN (Write:1=Possible,0=Impossible)
		WritingToFlash	SB000406	FLASH (1=FLASH Driving)
	Switches		-	CPU Switch
		Configure	SB000482	CNFG (0=ON,1=OFF)
		Initialize	SB000483	INIT (0=ON,1=OFF)
		Stop	SB000485	STOP (0=ON,1=OFF)
ErrorHigh			-	High-Speed Program Error
	Code		SW00085	High-Speed Program Error Code
	Count		SW00084	High-Speed Program Error Count
	ProgramNumber		SW00154	Error Program Number
	ReferProgramNumber		SW00155	Function Program Number
	ReferStep		SW00156	Function Program Step Number

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Variable Name			Register	Comments
ErrorInterrupt			-	Interrupt Program Error
	Code		SW00083	Interrupt Program Error Code
	Count		SW00082	Interrupt Program Error Count
	ProgramNumber		SW00138	Error Program Number
	ReferProgramNumber		SW00139	Function Program Number
	ReferStep		SW00140	Function Program Step Number
ErrorIO			-	I/O Error
	Count		SW00200	I/O Error Count
	InputAddress		SW00202	Input Error Address
	InputCount		SW00201	Input Error Times
	OutputAddress		SW00204	Output Error Address
	OutputCount		SW00203	Output Error Times
ErrorLow			-	Low-Speed Program Error
	Code		SW00089	Low-Speed Program Error Code
	Count		SW00088	Low-Speed Program Error Count
	ProgramNumber		SW00186	Error Program Number
	ReferProgramNumber		SW00187	Function Program Number
	ReferStep		SW00189	Function Program Step Number
ErrorStart			-	Start Program Error
	Code		SW00081	Start Program Error Code
	Count		SW00080	Start Program Error Count
	ProgramNumber		SW00122	Error Program Number
	ReferProgramNumber		SW00123	Function Program Number
	ReferStep		SW00124	Function Program Step Number
HighScan			-	High Scan Relay
	FirstScanRunning		SB000001	After High Scan Start,Only 1 Scan ON
	OnAfter		-	Start-up Relay
		FiveSecond	SB00001A	After 5.0s,Scan Start-up Relay
		OneSecond	SB000018	After 1.0s,Scan Start-up Relay
		TwoSecond	SB000019	After 2.0s,Scan Start-up Relay
	PulseEvery		-	Sampling Relay
		HalfSecond	SB000014	0.5s Sampling Relay
		OneMinute	SB000017	60.0s Sampling Relay
		OneSecond	SB000015	1.0s Sampling Relay
		TwoSecond	SB000016	2.0s Sampling Relay
	SquareWave		-	Flicker Relay
		HalfSecond	SB000011	0.5s Flicker Relay
		OneScan	SB000010	1 Scan Flicker Relay
		OneSecond	SB000012	1.0s Flicker Relay
		TwoSecond	SB000013	2.0s Flicker Relay

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Variable Name			Register	Comments
LowScan			-	Low Scan Relay
	FirstScanRunning		SB000003	After Low Scan Start,Only 1 Scan ON
	OnAfter		-	Start-up Relay
		FiveSecond	SB00003A	After 5.0s,Scan Start-up Relay
		OneSecond	SB000038	After 1.0s,Scan Start-up Relay
		TwoSecond	SB000039	After 2.0s,Scan Start-up Relay
	PulseEvery		-	Sampling Relay
		HalfSecond	SB000034	0.5s Sampling Relay
		OneMinute	SB000037	60.0s Sampling Relay
		OneSecond	SB000035	1.0s Sampling Relay
		TwoSecond	SB000036	2.0s Sampling Relay
	SquareWave		-	Flicker Relay
		HalfSecond	SB000031	0.5s Flicker Relay
		OneScan	SB000030	1 Scan Flicker Relay
		OneSecond	SB000032	1.0s Flicker Relay
		TwoSecond	SB000033	2.0s Flicker Relay
ScanTime			-	Scan Time
	ExecutionCurrentValue		SW00014	Execution Scan Current Value (0.1ms)
	High		-	High Scan
		CurrentValue	SW00005	High Scan Current Value (0.1ms)
		ExceededCount	SW00044	High Scan Over Counter
		MaximumValue	SW00006	High Scan Maximum Value (0.1ms)
		SetValue	SW00004	High Scan Set Value (0.1ms)
	Low		-	Low Scan
		CurrentValue	SW00011	Low Scan Current Value (0.1ms)
		MaximumValue	SW00012	Low Scan Maximum Value (0.1ms)
		SetValue	SW00010	Low Scan Set Value (0.1ms)
		ExceededCount	SW00046	Low Scan Over Counter

■ System Variables (Sorted by Register)

Register	Variable Name	Comments
SB000001	HighScan.FirstScanRunning	After High Scan Start,Only 1 Scan ON
SB000003	LowScan.FirstScanRunning	After Low Scan Start,Only 1 Scan ON
SB000004	OnCoil	Always ON
SB000010	HighScan.SquareWave.OneScan	1 Scan Flicker Relay
SB000011	HighScan.SquareWave.HalfSecond	0.5s Flicker Relay
SB000012	HighScan.SquareWave.OneSecond	1.0s Flicker Relay
SB000013	HighScan.SquareWave.TwoSecond	2.0s Flicker Relay
SB000014	HighScan.PulseEvery.HalfSecond	0.5s Sampling Relay
SB000015	HighScan.PulseEvery.OneSecond	1.0s Sampling Relay
SB000016	HighScan.PulseEvery.TwoSecond	2.0s Sampling Relay
SB000017	HighScan.PulseEvery.OneMinute	60.0s Sampling Relay
SB000018	HighScan.OnAfter.OneSecond	After 1.0s,Scan Start-up Relay
SB000019	HighScan.OnAfter.TwoSecond	After 2.0s,Scan Start-up Relay
SB00001A	HighScan.OnAfter.FiveSecond	After 5.0s,Scan Start-up Relay
SB000030	LowScan.SquareWave.OneScan	1 Scan Flicker Relay
SB000031	LowScan.SquareWave.HalfSecond	0.5s Flicker Relay
SB000032	LowScan.SquareWave.OneSecond	1.0s Flicker Relay
SB000033	LowScan.SquareWave.TwoSecond	2.0s Flicker Relay
SB000034	LowScan.PulseEvery.HalfSecond	0.5s Sampling Relay
SB000035	LowScan.PulseEvery.OneSecond	1.0s Sampling Relay
SB000036	LowScan.PulseEvery.TwoSecond	2.0s Sampling Relay
SB000037	LowScan.PulseEvery.OneMinute	60.0s Sampling Relay
SB000038	LowScan.OnAfter.OneSecond	After 1.0s,Scan Start-up Relay
SB000039	LowScan.OnAfter.TwoSecond	After 2.0s,Scan Start-up Relay
SB00003A	LowScan.OnAfter.FiveSecond	After 5.0s,Scan Start-up Relay
SW00004	ScanTime.High.SetValue	High Scan Set Value (0.1ms)
SW00005	ScanTime.High.CurrentValue	High Scan Current Value (0.1ms)
SW00006	ScanTime.High.MaximumValue	High Scan Maximum Value (0.1ms)
SW00010	ScanTime.Low.SetValue	Low Scan Set Value (0.1ms)
SW00011	ScanTime.Low.CurrentValue	Low Scan Current Value (0.1ms)
SW00012	ScanTime.Low.MaximumValue	Low Scan Maximum Value (0.1ms)
SW00014	ScanTime.ExecutionCurrentValue	Execution Scan Current Value (0.1ms)
SW00015	Clock.Year	Calendar:Year
SW00016	Clock.MonthDate	Calendar:Month Day
SW00017	Clock.HoursMinutes	Calendar:Hours Minutes
SW00018	Clock.Second	Calendar:Seconds
SW00019	Clock.DayOfWeek	Calendar:Day of week
SW00020	CPU.Info.SoftwareVersion	System Program Software Number
SL00026	CPU.Info.MemorySizeAvailable	Available PRG Memory (BYTE)
SL00028	CPU.Info.MemorySizeTotal	All Module Memory (BYTE)
SB000400	CPU.Status.Ready	READY (1=Normal,0=Converse/Own Diagnose Unusual)
SB000401	CPU.Status.Running	RUN (1=Driving,0=Driving Stop)
SB000402	CPU.Status.Alarm	ALARM (1=Warning,0=Normal)
SB000403	CPU.Status.Error	ERROR (1=Unusual,0=Normal)
SB000406	CPU.Status.WritingToFlash	FLASH (1=FLASH Driving)
SB000407	CPU.Status.WriteEnable	WEN (Write:1=Possible,0=Impossible)

(cont'd)

Register	Variable Name	Comments
SB00040E	CPU.Status.Stopped	Running Stop Require (From EWS:1=STOP,0=RUN)
SB00040F	CPU.Status.RunSwitch	RUN switch status at power is on (1=RUN,0=STOP)
SB000410	CPU.Error.Failure	Important Failure
SB000413	CPU.Error.Exception	Exception Error
SB000418	CPU.Error.ProgramError	User Calculation Error
SB000419	CPU.Error.IOError	I/O Error
SW00044	ScanTime.High.ExceededCount	High Scan Over Counter
SW00046	ScanTime.Low.ExceededCount	Low Scan Over Counter
SB000482	CPU.Switches.Configure	CNFG (0=ON,1=OFF)
SB000483	CPU.Switches.Initialize	INIT (0=ON,1=OFF)
SB000485	CPU.Switches.Stop	STOP (0=ON,1=OFF)
SB000487	CPU.Status.BatteryAlarm	Battery Alarm (1=Alarm)
SW00080	ErrorStart.Count	Start Program Error Count
SW00081	ErrorStart.Code	Start Program Error Code
SW00082	ErrorInterrupt.Count	Interrupt Program Error Count
SW00083	ErrorInterrupt.Code	Interrupt Program Error Code
SW00084	ErrorHigh.Count	High-Speed Program Error Count
SW00085	ErrorHigh.Code	High-Speed Program Error Code
SW00088	ErrorLow.Count	Low-Speed Program Error Count
SW00089	ErrorLow.Code	Low-Speed Program Error Code
SW00122	ErrorStart.ProgramNumber	Error Program Number
SW00123	ErrorStart.ReferProgramNumber	Function Program Number
SW00124	ErrorStart.ReferStep	Function Program Step Number
SW00138	ErrorInterrupt.ProgramNumber	Error Program Number
SW00139	ErrorInterrupt.ReferProgramNumber	Function Program Number
SW00140	ErrorInterrupt.ReferStep	Function Program Step Number
SW00154	ErrorHigh.ProgramNumber	Error Program Number
SW00155	ErrorHigh.ReferProgramNumber	Function Program Number
SW00156	ErrorHigh.ReferStep	Function Program Step Number
SW00186	ErrorLow.ProgramNumber	Error Program Number
SW00187	ErrorLow.ReferProgramNumber	Function Program Number
SW00189	ErrorLow.ReferStep	Function Program Step Number
SW00200	ErrorIO.Count	I/O Error Count
SW00201	ErrorIO.InputCount	Input Error Times
SW00202	ErrorIO.InputAddress	Input Error Address
SW00203	ErrorIO.OutputCount	Output Error Times
SW00204	ErrorIO.OutputAddress	Output Error Address

■ Axis Motion Parameters (Tree View)

The following table lists the axismotion parameters registered for each logical axis.

- Register address IW (IB/IL/IF/IA) xx00 indicates the leading input register address +00.
- Register address OW (OB/OL/OF/OA) xx00 indicates the leading output register address +00.

Variable Name		Register	Comments
Acceleration		OLxx36	Acceleration Value, units selected by UnitsWord (OWxx03)
Alarm		-	Alarm
	ABSEncoderOverrange	IBxx053	Absolute encoder number of rotations exceeded alarm
	Active	IBxx2C0	Servo status ALM
	Code	IWxx2D	Servo Alarm Code
	AllMask	ILxx04	Alarm mask
	Clear	OBxx00F	Clears servo alarms.
	FilterTimeChanged	IBxx04B	Filter time constant changed while in motion alarm
	FilterTypeChanged	IBxx04A	Filter type changed while in motion alarm
	FollowingError	IBxx049	Following error exceeded alarm
	HomingWhileMoving	IBxx04E	Zero point set while in motion alarm
	MonitorNumber	OWxx4F	This value determines which of the last 10 alarm codes are returned.
	NegativeOvertravel	IBxx041	Positive overtravel alarm
	NegativeSoftLimit	IBxx044	Negative software limit alarm
	NegativeSoftLimitN	IBxx2CD	Servo status N SOT
	NetworkServo	IBxx040	Servo alarm
	NotHomed	IBxx04D	Zero point not set alarm
	OutOfRangeParameter	IWxx01	Parameter number that is over range
	PositionCompletionTimeOut	IBxx046	Positioning timeout alarm
	PositionValueOutOfRange	IBxx047	Positioning out of range alarm
	PositiveOvertravel	IBxx042	Negative overtravel alarm
	PositiveSoftLimit	IBxx043	Positive software limit alarm
	PositiveSoftLimitN	IBxx2CC	Servo status P SOT
	ServoCommandTimeout	IBxx052	Servo command timeout alarm
	ServoCommunication	IBxx051	Servo communication alarm
	ServoCommunicationTimeout	IBxx050	Servo communication synchronization alarm
	ServoNotEnabled	IBxx045	Servo OFF alarm
	ServoParameterOutOfRange	IBxx04F	Servo parameter alarm
	SpeedOutOfRange	IBxx048	Speed out of range alarm

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Variable Name		Register	Comments
Command		-	Command
	Abort	OBxx091	Abort command
	Busy	IBxx090	Servo command busy
	Complete	IBxx098	Servo command complete
	Fail	IBxx093	Servo command failed
	GetValue	IWxx08	Servo command response
	Hold	IBxx091	Servo command holding
	JogRelativeMoveDirection	OBxx092	Selects Jog or Step direction.
	Pause	OBxx090	Pause command
	Ready	IBxx2C2	Servo status CMDRDY
	SetValue	OWxx08	SERVOPACK command
	StaticParameterNumber	OWxx5C	The number of the static parameter to be read when Command2=5
	StaticParameterValue	ILxx56	The value of the fixed parameter read by Command2=5.
	Status	IWxx09	Servo command status mask
Command2		-	Command2
	Busy	IBxx0B0	Servo Command2 busy
	Complete	IBxx0B8	Servo Command2 complete
	Fail	IBxx0B3	Servo Command2 Failed
	GetValue	IWxx0A	Servo Command2 response
	SetValue	OWxx0A	Additional servopack commands
	Status	IWxx0B	Servo Command2 status mask
CommandMask		OWxx09	Servo Command options
Deceleration		OLxx38	Deceleration value, units selected by UnitsWord (OWxx03)
Encoder		-	Encoder
	Get.AbsolutePositionLS	ILxx5E	Contains absolute position used in infinite length applications.
	Get.AbsolutePositionMS	ILxx60	Contains absolute position used in infinite length applications.
	Get.ModularPositionLS	ILxx62	Contains modularized position used in infinite length applications.
	Get.ModularPositionMS	ILxx64	Contains modularized position used in infinite length applications.
	Set.AbsolutePositionLS	OLxx5E	Used to set the absolute position used in infinite length applications.
	Set.AbsolutePositionMS	OLxx60	Used to set the absolute position used in infinite length applications.
	Set.ModularPositionLS	OLxx62	Used to set the modularized position used in infinite length applications.
	Set.ModularPositionMS	OLxx64	Used to set the modularized position used in infinite length applications.

(cont'd)

Variable Name		Register	Comments
Gain		-	Gain
	IntegralClear	OBxx00B	Resets position loop integral value.
	PhaseFeedForward	OWxx31	Add to the speed in 0.01%
	PositionFeedForward	OWxx30	Feed Forward adds to the position to increase response
	PositionIntegration	OWxx32	Time in ms used to integrate the position error
	PositionLoop	OWxx2E	Increase value for more rigid control.
	Select	OBxx014	Enables second set of servo gain parameters.
	SpeedIntegration	OWxx34	Time in ms used to integrate the speed error
	SpeedLoop	OWxx2F	Increases value for more rigid dampening.
	SpeedLoopType	OBxx013	Closes speed loop using Proportional and Integral control(0) or P control(1).
Home		-	Home
	ApproachSpeed	OLxx3E	Speed used in the first or second stage of homing depending on type
	AtHome	IBxx0C4	At home position (ZERO)
	AtHomeN	IBxx2C6	Servo status ZPOINT
	Complete	IBxx0C5	Home complete
	CompleteWindow	OWxx3D	The window used to set the home complete bit
	CreepSpeed	OLxx40	Speed used to locate the "c" channel or marker pulse
	DecelerationLS	OBxx058	Selects homing deceleration LS signal.
	Define	OLxx48	Redefine the coordinate system. In position mode, the servo will move when this variable is changed.
	Direction	OBxx093	Selects home direction.
	ForwardLimit	OBxx05A	Selects homing forward limit signal.
	InputSelect	OBxx05B	Selects homing input signal.
	Method	OWxx3C	The type of homing to perform
	Offset	OLxx42	Offset distance used at the end of homing
	ReverseLimit	OBxx059	Selects homing reverse limit signal.
IO		-	IO
	All	IWxx2E	Servo I_O mask
	Brake	IBxx2E9	Servo I_O BRK
	EXT1	IBxx2E6	Servo I_O EXT1
	EXT2	IBxx2E7	Servo I_O EXT2
	EXT3	IBxx2E8	Servo I_O EXT3
	Home	IBxx2E2	Servo I_O DEC
	IO12	IBxx2EC	Servo I_O IO12
	IO13	IBxx2ED	Servo I_O IO13
	IO14	IBxx2EE	Servo I_O IO14
	IO15	IBxx2EF	Servo I_O IO15
	NegativeOvertravel	IBxx2E1	Servo I_O N OT
	PhaseA	IBxx2E3	Servo I_O PA
	PhaseB	IBxx2E4	Servo I_O PB
	PhaseC	IBxx2E5	Servo I_O PC
	PositiveOvertravel	IBxx2E0	Servo I_O P OT

(cont'd)

Variable Name		Register	Comments
Latch			Latch
	Complete	IBxx0C2	Latch complete (LCOMP)
	CompleteN	IBxx2CA	Servo status L_CMP
	Enable	OBxx004	Sets bit to activate latch trigger.
	Value	ILxx18	Latch position (LPOS)
	WindowEnable	OBxx094	Enables the latch zone.
	WindowLowerLimit	OLxx2A	The lower limit of the latch window
	WindowUpperLimit	OLxx2C	The upper limit of the latch window
ModeMask		OWxx01	Various Servo bits packed into a word (mask)
Modulus		-	Modulus
	InitializeTurns	OBxx006	This will set the number of rotations for a modularized axis.
	SetTurns	OLxx4C	Value used to set the number of turns, or times the position has rolled over the maximum
	Turns	ILxx1E	POSMAX Number of turns
	TurnsInitialized	IBxx0C9	Number of turns initialized (TPRSE)
Monitor		-	Monitor
	Monitor2Enable	OBxx020	Enables second monitor.
	Monitor2Value	ILxx30	Monitor2
	Monitor3Value	ILxx32	Monitor3
	Monitor4Value	ILxx34	Monitor4
	PowerUp SeqDone	IBxx000	Motion controller ready
	ServoBusy	IBxx002	System is busy.
	ServoOn	IBxx001	Servo is energized.
	ServoOnN	IBxx2C3	Servo status SVON
	ServoReady	IBxx003	Servo is ready.
	ServoReadyN	IBxx2C4	Servo status PON
	Type	OWxx4E	Selects which value will be returned from the servopack. Bits 4 to 7 set monitor2and bits C to F set monitor4
	TypeResponse	IWxx2F	Servo monitor information
MonitorMask		IWxx00	Drive status mask
MotorType		IWxx3F	0=rotary, 1=linear

(cont'd)

Variable Name		Register	Comments
Position		-	Position
	AbsDataRestore	OBxx007	Loads current position with ABS encoder position at last power off.
	AbsDataRestored	IBxx0C8	Absolute data has been restored (ABSLDE).
	Actual	ILxx16	Actual (feedback) position (APOS)
	Commanded	OLxx1C	Commanded position, incremental or absolute based on MoveType
	CommandedPerScan	ILxx1C	Commanded position per each scan
	Error	ILxx1A	Position error (PERR)
	ErrorLimit	OLxx22	The value (in user units) that triggers a position error alarm or warning when exceeded
	ErrorType	OBxx010	Sets whether position error will trigger an alarm(0) or warning(1).
	IncTarget	ILxx0E	Commanded position (TPOS)
	IncTargetModularized	ILxx10	Modularized commanded position per scan (CPOS)
	IncTargetModularized2	ILxx12	Commanded position per scan (MPOS)
	InPosition	IBxx0C1	In position (POSCOMP)
	InPosition2	IBxx0C3	Second in position (NEAR)
	InPosition2N	IBxx2CB	Servo status NEAR
	InPosition2Window	OLxx20	Position window that determines when InPosition2 will be set (when Actual=Commanded ± Window2)
	InPositionN	IBxx2C7	Servo status PSET
	InPositionTimeOut	OWxx26	The value (in milliseconds) that triggers a position complete timeout alarm after the profilier is complete
	InPositionWindow	OLxx1E	Position window that determines when InPosition will be set (when Actual=Commanded ± Window)
	MoveType	OBxx95	Selects positioning. 0=incremental 1=absolete
	Offset	OLxx46	The offset distance that the motor will travel during the external positioning command if the external positioning signal is activated during the move
	PhaseCompensation	OLxx28	Position units added to the commanded position in phase control mode.
	PhasePositionLoopEnable	OBxx051	Closes position loop with OLxx16.
	ProfilerComplete	IBxx0C0	Profiler complete (DEN)
	ProfilerCompleteN	IBxx2C8	Servo status DEN
	Relative	OLxx44	Distance used in the step command
	WorkCoordinateOffset	OLxx4A	Offset for interpolation commands
S_CurveTime		OWxx3A	Softens acceleration or deceleration.
ServoOn		OBxx000	Sets bit to energize servo.
ServoParameter		-	ServoParameter
	GetNumber	IWxx36	Requested parameter number (Pn)
	GetValue	ILxx38	Requested parameter value
	SetNumber	OWxx50	The number of the amplifier parameter to be read or set
	SetSize	OWxx51	The size of the amplifier parameter data
	SetValue	OLxx52	The value to be set for the amplifier parameter

(cont'd)

Variable Name		Register	Comments
ServoParameter2		-	ServoParameter2
	GetNumber	IWxx37	Second requested parameter number (Pn)
	GetValue	ILxx3A	Second requested parameter value
	SetNumber	OWxx54	The number of the second amplifier parameter to be read or set
	SetSize	OWxx55	The size of the second amplifier parameter data
	SetValue	OLxx56	The value to be set for the second amplifier parameter
SettingsMask		OWxx00	Various Servo bits packed into a word (mask)
SignalSelectionWord		OWxx04	Selects latch input signal and offset input signal.
Simulate		OBxx001	In simulation mode, servo will not move.
SimulationActive		IBxx0C6	Simulation active or machine locked (MLKL)
SimulationActiveN		IBxx2C5	Servo status MLOCK
Speed		-	Speed
	Actual	ILxx40	Actual motor speed
	Commanded	OLxx10	Commanded speed in units based on UnitType
	CommandedResponse	ILxx20	Speed commanded response
	Override	OWxx18	The percentage of commanded speed actually achieved 100=1%
	TorqueLimit	OLxx14	Maximum torque allowed during speed control
StatusMask		IWxx0C	Status mask
StatusMaskN		IWxx2C	Servo status mask
Torque		-	Torque
	ActivateFwdLimit	OBxx008	Enables external forward torque limit set by servo parameter.
	ActivateRevLimit	OBxx009	Enables external reverse torque limit set by servo parameter.
	Actual	ILxx42	Actual motor torque
	Commanded	OLxx0C	The commanded motor torque in % of rated 100=1%
	Limited	IBxx2C9	Servo status T_LIM
	SpeedLimit	OWxx0E	Maximum speed allowed during torque control
UnitsWord		OWxx03	BITS 0 to 3, Set speed units 0=Ref/s 1=10^n ref/min 2=% BITS 4 to 7, Set acc/dec units 0=Ref/s^2 1=ms BITS 8 to 11, Set acc/dec filter 0=none 1=exponential 2=moving average
Warning		-	Warning
	Active	IBxx2C1	Servo status WARNING
	AllMask	ILxx02	Warning mask
	Communication	IBxx029	Servo communication warning
	DynamicParameterOutOfRange	IBxx021	Dynamic parameter out of range warning
	FollowingError	IBxx020	Following error warning
	InvalidCommand	IBxx024	Command Setting Error
	Mlink	IBxx023	Servo warning
	NegativeOvertravel	IBxx027	Negative overtravel warning
	PositiveOvertravel	IBxx026	Positive overtravel warning
	ServoNotEnabled	IBxx028	Servo not energized warning
	StaticParameterOutOfRange	IBxx022	Static parameter out of range warning

■ Axis Motion Parameters (Sorted by Register)

Register	Variable Name	Comments
IWxx00	MonitorMask	Drive status mask
IBxx000	Monitor.PowerUp SeqDone	Motion controller ready
IBxx001	Monitor.ServoOn	Servo is energized.
IBxx002	Monitor.ServoBusy	System is busy.
IBxx003	Monitor.ServoReady	Servo is ready.
IWxx01	Alarm.OutOfRangeParameter	Parameter number that is over range
ILxx02	Warning.AllMask	Warning mask
IBxx020	Warning.FollowingError	Following error warning
IBxx021	Warning.DynamicParameterOutOf-Range	Dynamic parameter out of range warning
IBxx022	Warning.StaticParameterOutOfRange	Static parameter out of range warning
IBxx023	Warning.Mlink	Servo warning
IBxx024	Warning.InvalidCommand	Command Setting Error
IBxx026	Warning.PositiveOvertravel	Positive overtravel warning
IBxx027	Warning.NegativeOvertravel	Negative overtravel warning
IBxx028	Warning.ServoNotEnabled	Servo not energized warning
IBxx029	Warning.Communication	Servo communication warning
ILxx04	Alarm.AllMask	Alarm mask
IBxx040	Alarm.NetworkServo	Servo alarm
IBxx041	Alarm.NegativeOvertravel	Positive overtravel alarm
IBxx042	Alarm.PositiveOvertravel	Negative overtravel alarm
IBxx043	Alarm.PositiveSoftLimit	Positive software limit alarm
IBxx044	Alarm.NegativeSoftLimit	Negative software limit alarm
IBxx045	Alarm.ServoNotEnabled	Servo OFF alarm
IBxx046	Alarm.PositionCompletionTimeOut	Positioning timeout alarm
IBxx047	Alarm.PositionValueOutOfRange	Positioning out of range alarm
IBxx048	Alarm.SpeedOutOfRange	Speed out of range alarm
IBxx049	Alarm.FollowingError	Following error exceeded alarm
IBxx04A	Alarm.FilterTypeChanged	Filter type changed while in motion alarm
IBxx04B	Alarm.FilterTimeChanged	Filter time constant changed while in motion alarm
IBxx04D	Alarm.NotHomed	Zero point not set alarm
IBxx04E	Alarm.HomingWhileMoving	Zero point set while in motion alarm
IBxx04F	Alarm.ServoParameterOutOfRange	Servo parameter alarm
IBxx050	Alarm.ServoCommunicationTimeout	Servo communication synchronization alarm
IBxx051	Alarm.ServoCommunication	Servo communication alarm
IBxx052	Alarm.ServoCommandTimeout	Servo command timeout alarm
IBxx053	Alarm.ABSEncoderOverrange	Absolute encoder number of rotations exceeded alarm
IWxx08	Command.GetValue	Servo command response
IWxx09	Command.Status	Servo command status mask
IBxx090	Command.Busy	Servo command busy
IBxx091	Command.Hold	Servo command holding
IBxx093	Command.Fail	Servo command failed
IBxx098	Command.Complete	Servo command complete
IWxx0A	Command2.GetValue	Servo Command2 response
IWxx0B	Command2.Status	Servo Command2 status mask
IBxx0B0	Command2.Busy	Servo Command2 busy
IBxx0B3	Command2.Fail	Servo Command2 Failed

(cont'd)

Register	Variable Name	Comments
IBxx0B8	Command2.Complete	Servo Command2 complete
IWxx0C	StatusMask	Status mask
IBxx0C0	Position.ProfilerComplete	Profiler complete (DEN)
IBxx0C1	Position.InPosition	In position (POSCOMP)
IBxx0C2	Latch.Complete	Latch complete (LCOMP)
IBxx0C3	Position.InPosition2	Second in position (NEAR)
IBxx0C4	Home.AtHome	At home position (ZERO)
IBxx0C5	Home.Complete	Home complete
IBxx0C6	SimulationActive	Simulation active or machine locked (MLKL)
IBxx0C8	Position.AbsDataRestored	Absolute data has been restored (ABSLDE).
IBxx0C9	Modulus.TurnsInitialized	Number of turns initialized (TPRSE)
ILxx0E	Position.IncTarget	Commanded position (TPOS)
ILxx10	Position.IncTargetModularized	Modularized commanded position per scan (CPOS)
ILxx12	Position.IncTargetModularized2	Commanded position per scan (MPOS)
ILxx16	Position.Actual	Actual (feedback) position (APOS)
ILxx18	Latch.Value	Latch position (LPOS)
ILxx1A	Position.Error	Position error (PERR)
ILxx1C	Position.CommandedPerScan	Commanded position per each scan
ILxx1E	Modulus.Turns	POSMAX Number of turns
ILxx20	Speed.CommandedResponse	Speed commanded response
IWxx2C	StatusMaskN	Servo status mask
IBxx2C0	Alarm.Active	Servo status ALM
IBxx2C1	Warning.Active	Servo status WARNING
IBxx2C2	Command.Ready	Servo status CMDRDY
IBxx2C3	Monitor.ServoOnN	Servo status SVON
IBxx2C4	Monitor.ServoReadyN	Servo status PON
IBxx2C5	SimulationActiveN	Servo status MLOCK
IBxx2C6	Home.AtHomeN	Servo status ZPOINT
IBxx2C7	Position.InPositionN	Servo status PSET
IBxx2C8	Position.ProfilerCompleteN	Servo status DEN
IBxx2C9	Torque.Limited	Servo status T_LIM
IBxx2CA	Latch.CompleteN	Servo status L_CMP
IBxx2CB	Position.InPosition2N	Servo status NEAR
IBxx2CC	Alarm.PositiveSoftLimitN	Servo status P SOT
IWxx2D	Alarm.Code	Servo Alarm Code
IBxx2CD	Alarm.NegativeSoftLimitN	Servo status N SOT
IWxx2E	IO.All	Servo I_O mask
IBxx2E0	IO.PositiveOvertravel	Servo I_O P OT
IBxx2E1	IO.NegativeOvertravel	Servo I_O N OT
IBxx2E2	IO.Home	Servo I_O DEC
IBxx2E3	IO.PhaseA	Servo I_O PA
IBxx2E4	IO.PhaseB	Servo I_O PB
IBxx2E5	IO.PhaseC	Servo I_O PC
IBxx2E6	IO.EXT1	Servo I_O EXT1
IBxx2E7	IO.EXT2	Servo I_O EXT2
IBxx2E8	IO.EXT3	Servo I_O EXT3
IBxx2E9	IO.Brake	Servo I_O BRK
IBxx2EC	IO.IO12	Servo I_O IO12
IBxx2ED	IO.IO13	Servo I_O IO13

(cont'd)

Register	Variable Name	Comments
IBxx2EE	IO.IO14	Servo I_O IO14
IBxx2EF	IO.IO15	Servo I_O IO15
IWxx2F	Monitor.TypeResponse	Servo monitor information
ILxx30	Monitor.Monitor2Value	Monitor2
ILxx32	Monitor.Monitor3Value	Monitor3
ILxx34	Monitor.Monitor4Value	Monitor4
ILxx38	ServoParameter.GetValue	Requested parameter value
IWxx36	ServoParameter.GetNumber	Requested parameter number (Pn)
IWxx37	ServoParameter2.GetNumber	Second requested parameter number (Pn)
ILxx3A	ServoParameter2.GetValue	Second requested parameter value
IWxx3F	MotorType	0=rotary, 1=linear
ILxx40	Speed.Actual	Actual motor speed
ILxx42	Torque.Actual	Actual motor torque
ILxx56	Command.StaticParameterValue	The value of the fixed parameter read by Command2=5.
ILxx5E	Encoder.Get.AbsolutePositionLS	Contains absolute position used in infinite length applications.
ILxx60	Encoder.Get.AbsolutePositionMS	Contains absolute position used in infinite length applications.
ILxx62	Encoder.Get.ModularPositionLS	Contains modularized position used in infinite length applications.
ILxx64	Encoder.Get.ModularPositionMS	Contains modularized position used in infinite length applications.
OWxx00	SettingsMask	Various Servo bits packed into a word (mask)
OBxx000	ServoOn	Sets bit to energize servo.
OBxx001	Simulate	In simulation mode, servo will not move.
OBxx004	Latch.Enable	Sets bit to activate latch trigger.
OBxx006	Modulus.InitializeTurns	This will set the number of rotations for a modularized axis.
OBxx007	Position.AbsDataRestore	Loads current position with ABS encoder position at last power off.
OBxx008	Torque.ActivateFwdLimit	Enables external forward torque limit set by servo parameter.
OBxx009	Torque.ActivateRevLimit	Enables external reverse torque limit set by servo parameter.
OBxx00B	Gain.IntegralClear	Resets position loop integral value.
OBxx00F	Alarm.Clear	Clears servo alarms.
OWxx01	ModeMask	Various Servo bits packed into a word (mask)
OBxx010	Position.ErrorType	Sets whether position error will trigger an alarm(0) or warning(1).
OBxx013	Gain.SpeedLoopType	Closes speed loop using Proportional and Integral control(0) or P control(1).
OBxx014	Gain.Select	Enables second set of servo gain parameters.
OBxx020	Monitor.Monitor2Enable	Enables second monitor.
OWxx03	UnitsWord	BITS 0 to 3, Set speed units 0=Ref/s 1=10^n ref/min 2=% BITS 4 to 7, Set acc/dec units 0=Ref/s^2 1=ms BITS 8 to 11, Set acc/dec filter 0=none 1=exponential 2=moving average
OWxx04	SignalSelectionWord	Selects latch input signal and offset input signal.
OBxx051	Position.PhasePositionLoopEnable	Closes position loop with OLxx16.
OBxx058	Home.DecelerationLS	Selects homing deceleration LS signal.
OBxx059	Home.ReverseLimit	Selects homing reverse limit signal.
OBxx05A	Home.ForwardLimit	Selects homing forward limit signal.
OBxx05B	InputSelect	Selects homing input signal.
OWxx08	Command.SetValue	SERVOPACK command

(cont'd)

Register	Variable Name	Comments
OWxx0E	Torque.SpeedLimit	Maximum speed allowed during torque control
OWxx09	CommandMask	Servo Command options
OBxx090	Command.Pause	Pause command
OBxx091	Command.Abort	Abort command
OBxx092	Command.JogRelativeMoveDirection	Selects Jog or Step direction.
OBxx093	Home.Direction	Selects home direction.
OBxx094	Latch.WindowEnable	Enables the latch zone.
OWxx0A	Command2.SetValue	Additional servopack commands
OLxx0C	Torque.Commanded	The commanded motor torque in % of rated 100=1%
OLxx10	Speed.Commanded	Commanded speed in units based on UnitType
OLxx14	Speed.TorqueLimit	Maximum torque allowed during speed control
OWxx18	Speed.Override	The percentage of commanded speed actually achieved 100=1%
OLxx1C	Position.Commanded	Commanded position, incremental or absolute based on MoveType
OLxx1E	Position.InPositionWindow	Position window that determines when InPosition will be set (when Actual=Commanded ± Window)
OLxx20	Position.InPosition2Window	Position window that determines when InPosition2 will be set (when Actual=Commanded ± Window2)
OLxx22	Position.ErrorLimit	The value (in user units) that triggers a position error alarm or warning when exceeded
OLxx28	Position.PhaseCompensation	Position units added to the commanded position in phase control mode.
OWxx26	Position.InPositionTimeOut	The value (in milliseconds) that triggers a position complete timeout alarm after the profilier is complete
OLxx2A	Latch.WindowLowerLimit	The lower limit of the latch window
OLxx2C	Latch.WindowUpperLimit	The upper limit of the latch window
OWxx2E	Gain.PositionLoop	Increase value for more rigid control.
OWxx2F	Gain.SpeedLoop	Increases value for more rigid dampening.
OWxx30	Gain.PositionFeedForward	Feed Forward adds to the position to increase response
OWxx31	Gain.PhaseFeedForward	Add to the speed in 0.01%
OWxx32	Gain.PositionIntegration	Time in ms used to integrate the position error
OWxx34	Gain.SpeedIntegration	Time in ms used to integrate the speed error
OLxx36	Acceleration	Acceleration Value, units selected by UnitsWord (OWxx03)
OLxx38	Deceleration	Deceleration value, units selected by UnitsWord (OWxx03)
OWxx3A	S_CurveTime	Softens acceleration or deceleration.
OWxx3C	Home.Method	The type of homing to perform
OWxx3D	Home.CompleteWindow	The window used to set the home complete bit
OLxx3E	Home.ApproachSpeed	Speed used in the first or second stage of homing depending on type
OLxx40	Home.CreepSpeed	Speed used to locate the "c" channel or marker pulse
OLxx42	Home.Offset	Offset distance used at the end of homing
OLxx44	Position.Relative	Distance used in the step command
OLxx46	Position.Offset	The offset distance that the motor will travel during the external positioning command if the external positioning signal is activated during the move
OLxx48	Home.Define	Redefine the coordinate system. In position mode, the servo will move when this variable is changed.
OLxx4A	Position.WorkCoordinateOffset	Offset for interpolation commands
OLxx4C	Modulus.SetTurns	Value used to set the number of turns, or times the position has rolled over the maximum

(cont'd)

Register	Variable Name	Comments
OWxx4E	Monitor.Type	Selects which value will be returned from the servopack. Bits 4 to 7 set monitor2and bits C to F set monitor4
OWxx4F	Alarm.MonitorNumber	This value determines which of the last 10 alarm codes are returned.
OWxx50	ServoParameter.SetNumber	The number of the amplifier parameter to be read or set
OWxx51	ServoParameter.SetSize	The size of the amplifier parameter data
OLxx52	ServoParameter.SetValue	The value to be set for the amplifier parameter
OWxx54	ServoParameter2.SetNumber	The number of the second amplifier parameter to be read or set
OWxx55	ServoParameter2.SetSize	The size of the second amplifier parameter data
OLxx56	ServoParameter2.SetValue	The value to be set for the second amplifier parameter
OWxx5C	Command.StaticParameterNumber	The number of the static parameter to be read when Command2=5
OLxx5E	Encoder.Set.AbsolutePositionLS	Used to set the absolute position used in infinite length applications.
OLxx60	Encoder.Set.AbsolutePositionMS	Used to set the absolute position used in infinite length applications.
OLxx62	Encoder.Set.ModularPositionLS	Used to set the modularized position used in infinite length applications.
OLxx64	Encoder.Set.ModularPositionMS	Used to set the modularized position used in infinite length applications.
OBxx95	Position.MoveType	Selects positioning. 0=incremental 1=absolete

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SVR Virtual Motion Module

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Appendix

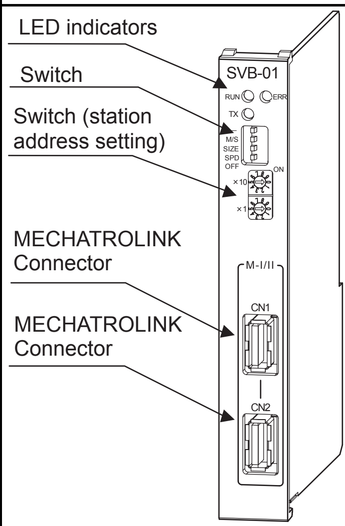
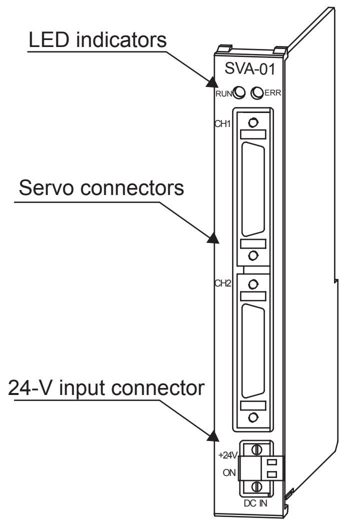
1

Motion Module Overview

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

1.1 List of Motion Modules

The Motion Modules that can be used with the MP2200/MP2300 are listed below.

Module Description		SVB-01 Module	SVA-01 Module	SVR Module
Name		SVB-01	SVA-01	SVR
Model Number		JAPMC-MC2310	JAPMC-MC2300	–
Module Appearance		 	 	Virtual Motion Module Refer to *1.4 Virtual Motion Module (SVR) Overview*.
Interface		MECHATROLINK-I/II communication	Analog outputs and feedback pulse inputs	–
Maximum Number of Controlled Axes/Module		Up to 16 axes	Up to 2 axes	Up to 16 axes
Maximum Number of Modules/Machine Controller		MP2300: 2 Modules	MP2300: 2 Modules	1
		MP2200: 16 Modules	MP2200: 16 Modules	
Control Specifications	PTP Control	Linear, rotating, and infinite-length	Linear, rotating, and infinite-length	Linear, rotating, and infinite-length
	Interpolation	Up to 16 linear axes, 2 circular axes, and 3 helical axes	Up to 16 linear axes (with the MP2200), 2 circular axes, and 3 helical axes	Up to 16 linear axes, 2 circular axes, and 3 helical axes
	Speed Reference Output	Up to 256 axes (MECHATROLINK-II, for MP2200)	Up to 32 axes (with the MP2200)	Up to 16 axes (MECHATROLINK-II)
	Torque Reference Output	Up to 256 axes (MECHATROLINK-III, for MP2200)	Up to 32 axes (with the MP2200)	Up to 16 axes (MECHATROLINK-II)
	Position Control	Positioning, External Positioning, Zero Point Return, Interpolation, Interpolation with Position Detection, JOG operation, and STEP operation	Same as at left.	Same as at left.
	Phase Control	Up to 256 axes	Up to 32 axes (with the MP2200)	Up to 16 axes
Self-configuration		Automatically sets data for Module and Slave devices.	Automatic allocation by Module is supported.	–

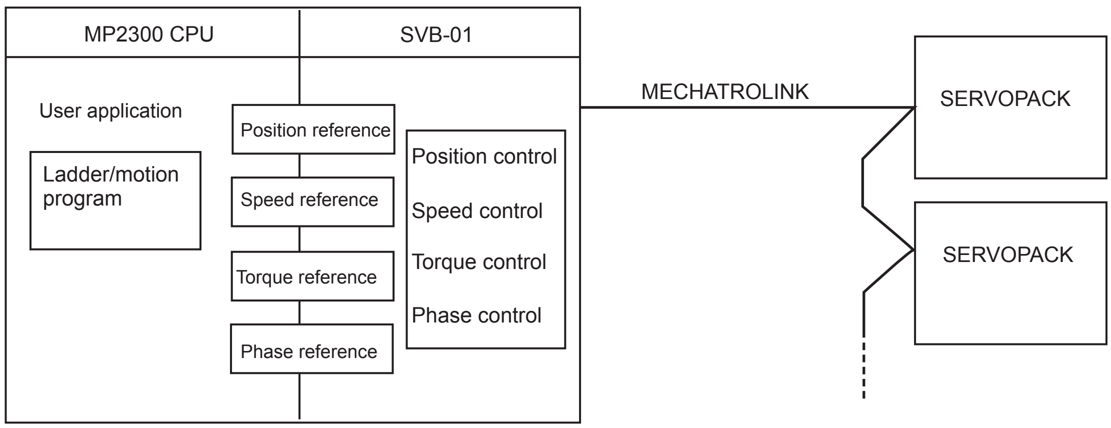
(cont'd)

Module Description	SVB-01 Module	SVA-01 Module	SVR Module
Features	• High-speed Motion Network Baud rate: 4 Mbps or 10 Mbps Communication cycle: 0.5 ms, 1 ms, 1.5 ms, or 2 ms Transmission distance: 50 m max. • Slave Functions Supported for MECHATROLINK-I/II • Synchronization between Modules Synchronization possible when high-speed scan cycle = communication cycle times n	• The control cycle is fixed at 500 μs to enable high-precision control regardless of the high-speed scan cycle. • Analog control	• Synchronization for high-speed scan • Position data refreshed every scan
Applicable SERVOPACKs/Inverters	• Supported for MECHATROLINK-I SGD-□□□N SGDB-□□AN SGDH-□□□E+NS100/NS115 SGDS-□□□1□□ CIMR-V7□□ (VS mini V7) • Supported for MECHATROLINK-II SGDH-□□□E+NS115 SGDS-□□□1□□ CIMR-V7□□ (VS mini V7)	SGDA-□□□S, SGDB-□□AD□-□, -□□DD SGDM-□□□DA, -□□AD□ SGDH-□□DE, -□□AE, -□□□E SGDS-□□□-01/02□, -□□□05, -□□A□□□, -□□F□□□	–

1.2 SVB-01 Module Overview and Features

1.2.1 Overview

The SVB-01 Module is a Motion Module with a MECHATROLINK-II-compatible interface.
The use of MECHATROLINK enables control of multiple axes with reduced wiring.
MECHATROLINK-II compatibility also enables position control, speed control, torque control, and phase control, and makes precise synchronous control possible. The control mode can also be changed during axis operation, facilitating complicated machine operations.

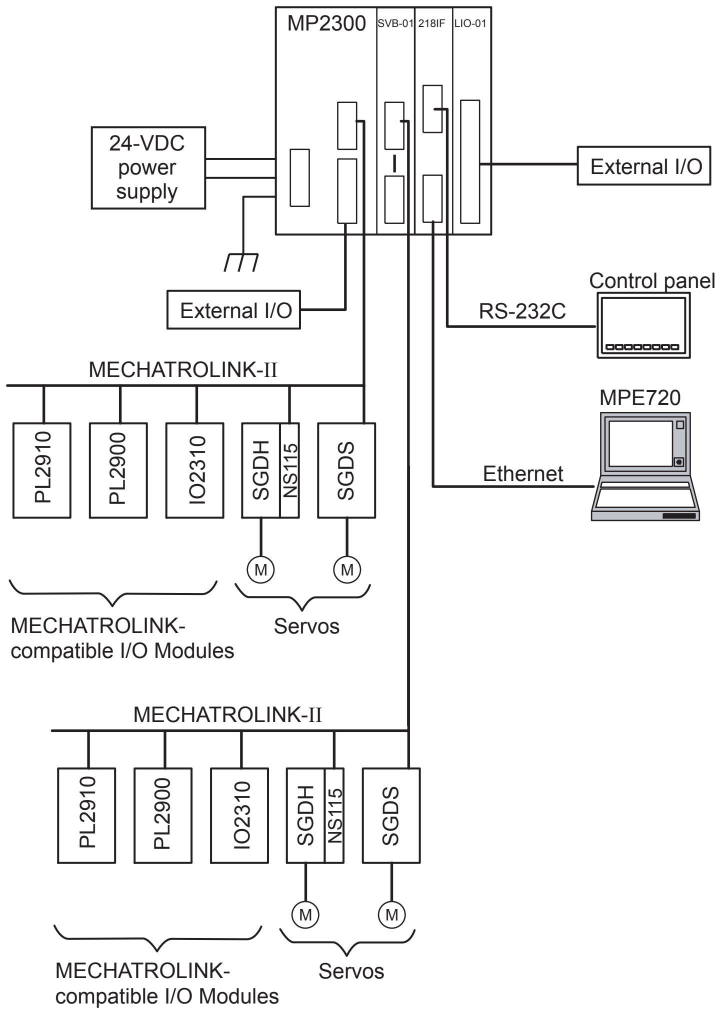


1.2.2 Features

- 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 installed in the Option Slots.
  Including the MP2300's built-in SVB, up to 48 axes can be controlled.
  MP2200: Up to 16 SVB-01 Modules can be installed in the Option Slots.
  A total of 256 axes can be controlled.
- 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.

1.2.3 System Configuration Example

The following diagram shows a system configuration example.



1.2.4 System Configuration Precautions

The following precautions must be followed when designing a system using the SVB-01 Module.

- Use the connecting cables and connectors recommended by Yaskawa.
  Yaskawa has a range of cables. Always check the device to be used and select the correct cable for the device.
- Different SERVOPACKs are connected to MECHATROLINK-I and MECHATROLINK-II.
  Refer to the list and select the appropriate SERVOPACKs.
- If devices compatible with MECHATROLINK-I (4 Mbps) and with MECHATROLINK-II (10 Mbps) are used together, make the settings for MECHATROLINK-I (4 Mbps).
- When connecting SERVOPACKs via MECHATROLINK, connect the overtravel, zero point return deceleration limit switch, and external latch signals to the SERVOPACKs.

1.2.5 Devices Connectable to MECHATROLINK

The devices that are compatible with MECHATROLINK and can be connected to the SVB-01 Module are listed below.

(1) SERVOPACKs

The following table shows SERVOPACKs that are compatible with MECHATROLINK and can be connected to the SVB-01 Module.

Model Number	Details	MECHATROLINK-I	MECHATROLINK-II
SGD-□□□N SGDB-□□AN	MECHATROLINK-I-compatible AC SERVO- PACK	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

(2) I/O Modules

The following table shows Modules that are compatible with MECHATROLINK and can be connected to the SVB-01 Module.

Model Number	Details	MECHATROLINK-I	MECHATROLINK-II
JEPMC-IO350	64-point I/O Module 24 VDC, 64 inputs, 64 outputs	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	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

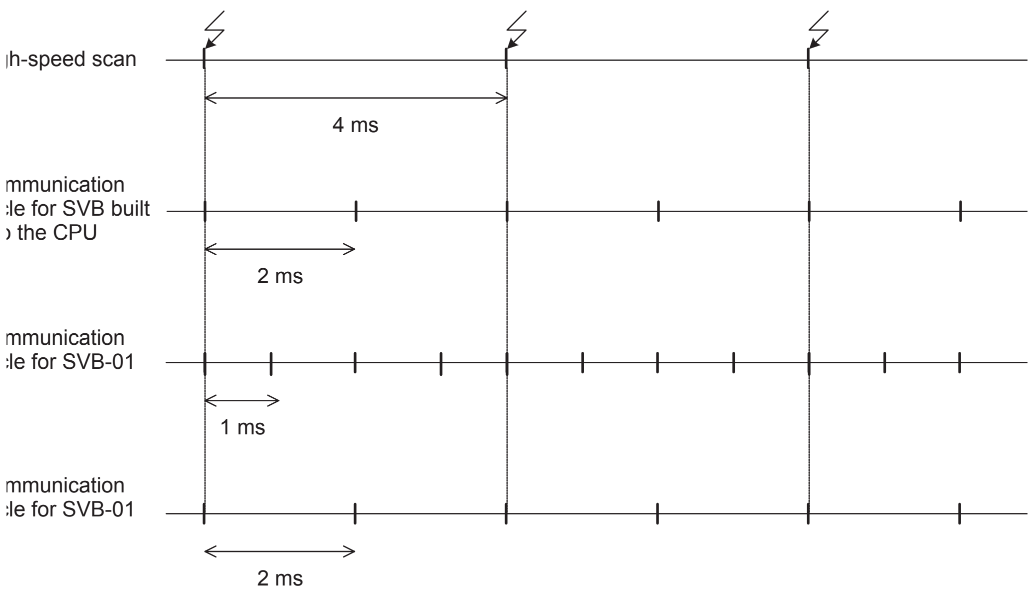
(cont'd)

Model Number	Details	MECHATROLINK-I	MECHATROLINK-II
JEPMC-AN2910	D/A Module Analog outputs, -10 to 10 V, 2 channels	Yes	Yes
JAPMC-MC2310	SVB-01 Motion Module	Yes	Yes
JEVSA-YV250	MYVIS YV250 Machine Vision System	Yes	Yes
JEPMC-MC400	MP940 Machine Controller	Yes	No

1.2.6 Synchronization between Modules

(1) Overview

Synchronization between the CPU and the Optional Modules is provided using hardware for the MP2200/MP2300.
This enables synchronization between the high-speed scan and MECHATROLINK communication, resulting in synchronization between SVB Modules built into the CPU Unit and SVB-01 Modules, as well as between different SVB-01 Modules.
Synchronization between Modules was not possible with SVB-01 Modules of the MP920 and SVB Modules of the CP9200SH.



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

"Yes" in the following table indicates combinations for which synchronized mode is used for operation.

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 ON.

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

MECHATROLINK communication for the SVB-01 will automatically continue even if the high-speed scan cycle is changed.
Distribution of position reference segments for interpolation commands from the high-speed scan to the communication cycle, however, will be affected, causing disturbance in the speed waveform. When changing the high-speed scan cycle, do so either with the CPU stopped or when motion commands 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

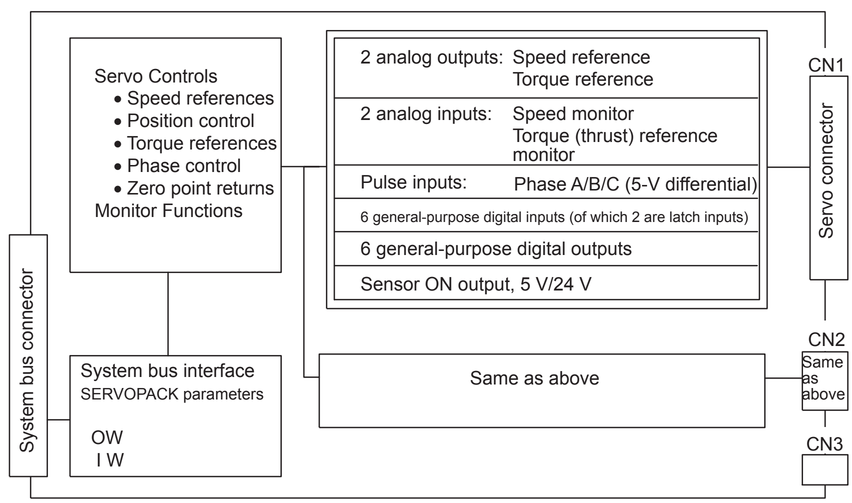
When any of the following operations is performed, save the settings to flash memory and then turn the power supply OFF and ON.

- 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

1.3 SVA-01 Module Overview and Features

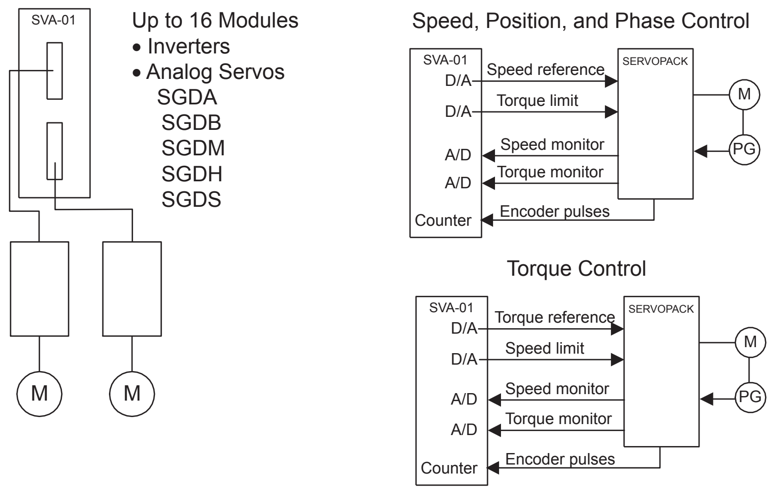
1.3.1 Overview

The SVA-01 Module is a motion control module with analog outputs. Each Module can control Servos or Inverters for up to 2 axes.
The Module has two connectors (CN1 and CN2) for connecting SERVOPACKs and external I/O.
Each connector provides analog outputs for speed references and torque references, analog inputs for feedback speed monitoring and torque monitoring, pulse input phases A, B, and C (5-V differential), and general-purpose digital I/O.
The control cycle is fixed at 500 µs, enabling high-precision control without being affected by the high-speed scan cycle.



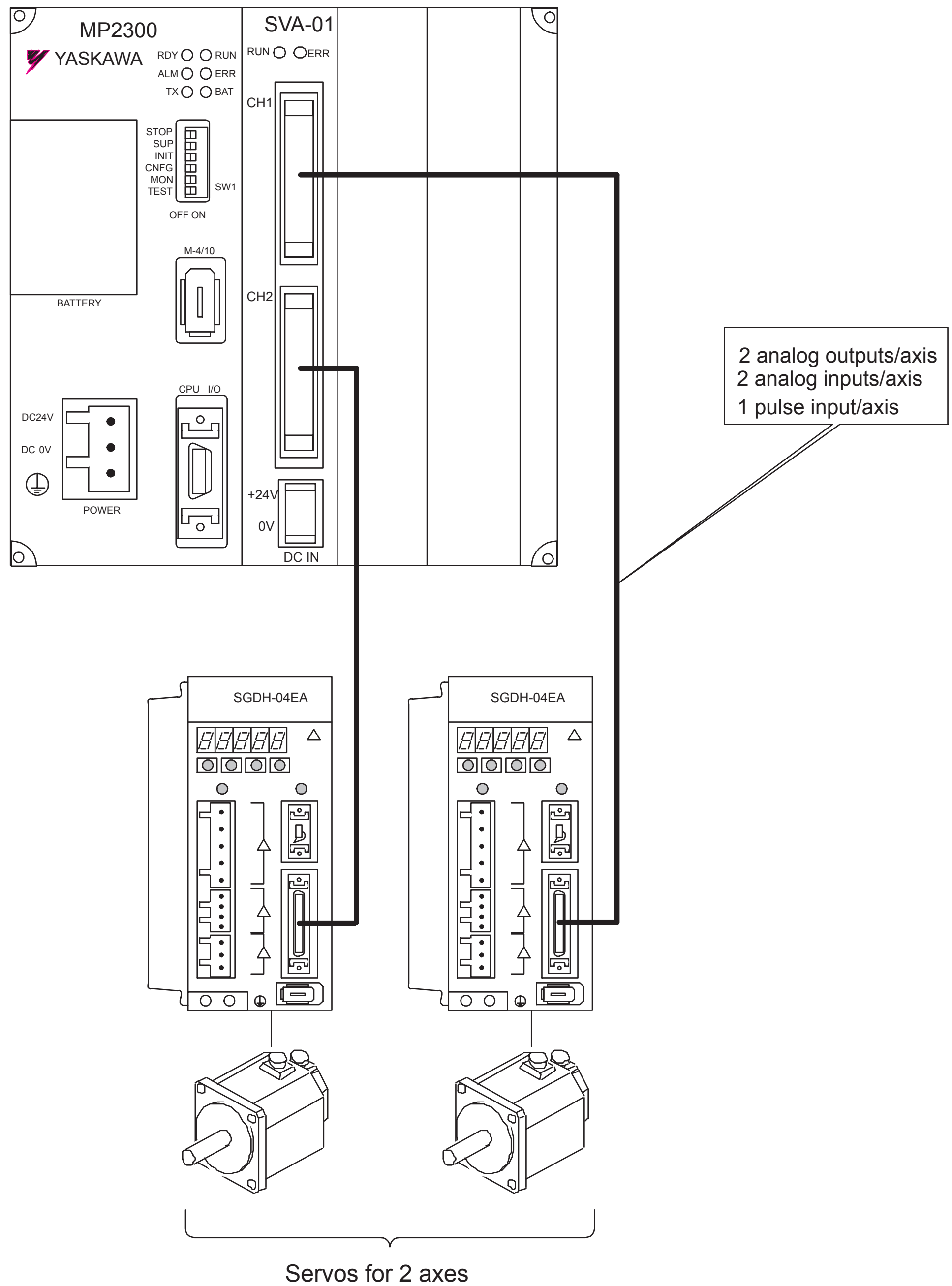
1.3.2 Features

- Two analog outputs for Servos for 2 axes
- Position control, speed reference outputs, torque reference outputs, or phase control can be performed independently for each axis.
- Maximum Number of Controlled Axes
  MP2300:
  Up to two SVA-01 Modules can be installed in the Option Slots to control up to 4 axes.
  MP2200:
  Up to 16 SVA-01 Modules can be installed in the Option Slots on the Expansion Racks to control up to 32 axes.
- Self-configuration enables automatic allocation for the Module.



1.3.3 System Configuration Example

The following diagram shows a system configuration example.



(Note) Use the connecting cables and connectors recommended by Yaskawa.
Yaskawa has a range of cables. Always check the device to be used and select the correct cable for the device.

1.4 Virtual Motion Module (SVR) Overview

1.4.1 Overview

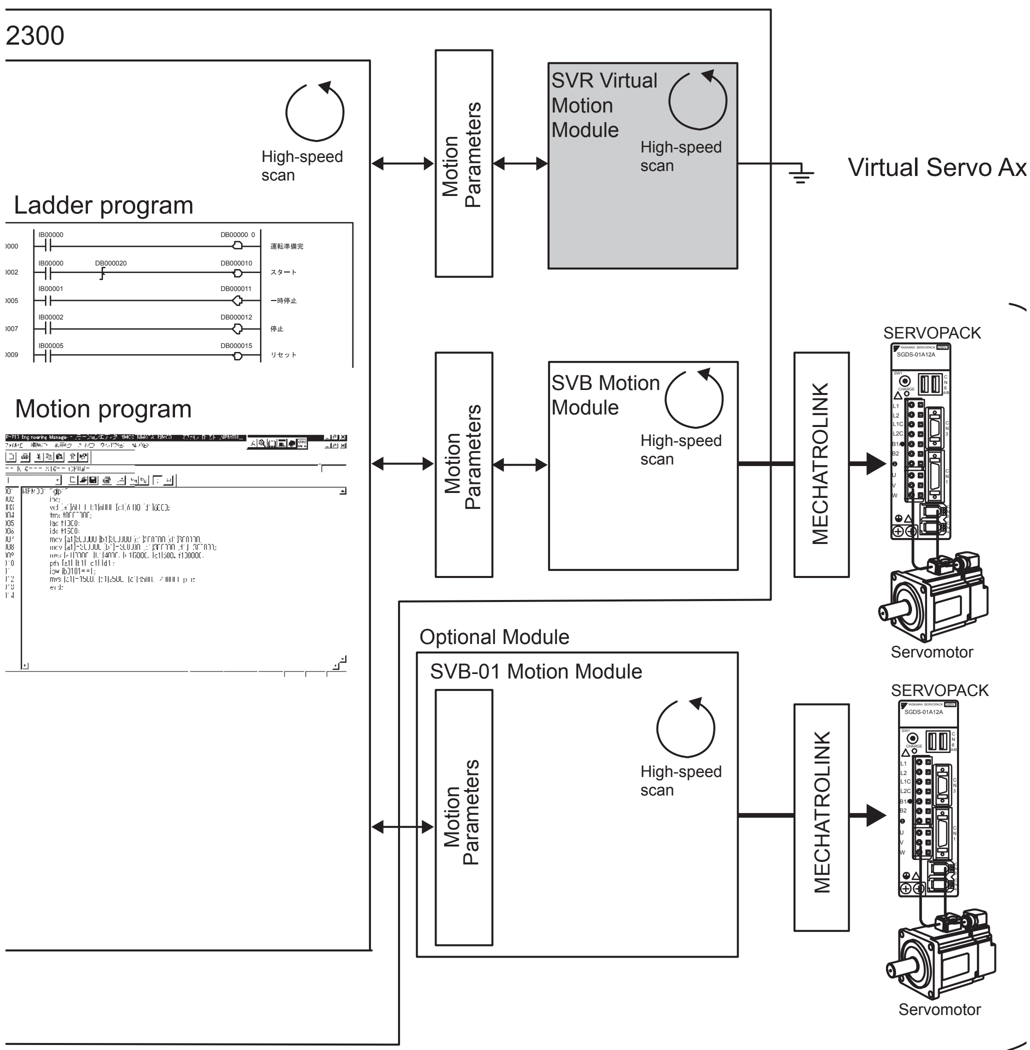
The Virtual Motion Module (SVR) is a Software Module that provides an interface for virtual axes that are not actually connected to Servomotors.

The SVR is configured in the same way as the SVB-01 or SVA-01 Motion Module with fixed parameters, setting parameters, and monitoring parameters, and can be accessed from application programs using I/O registers.

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

1.4.2 System Configuration

■ Using MP2300



INFO

■ Comparison with SVB-01/SVA-01 Simulation Mode

Simulation mode does not support a positioning function, so the position data is updated to the final target position for 1 scan. The SVR uses its positioning function to perform distribution and refreshes the position data for every scan up to the final target position.

2

Module Specifications and Connections

This chapter explains the specifications and connections for the SVB-01 and SVA-01 Modules.

2.1 SVB-01 Module Specifications and Connections

2.1.1 General Specifications

(1) Hardware Specifications

The following table shows the hardware specifications of the SVB-01 Module.

Item		Specifications
Name		Motion Modules
Model Number		JAPMC-MC2310
Description		SVB-01
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		– M/S (Master/Slave) SIZE (Number of transfer bytes) SPD (Baud rate) ×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% (with no condensation)
	Ambient Storage Humidity	5% to 95% (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
Installation Requirements	Ground	Ground to 100 Ω max.
	Cooling Method	Natural cooling
Dimensions (mm)		125 × 95 (H×D)
Mass		80 g

(2) Function Lists

The following table shows the list of motion control functions for the SVB-01 Module.

<table>
<tr><th colspan="3">Item</th><th colspan="2">Details</th></tr>
<tr><td rowspan="18">MECHATROLINK Communication</td><td colspan="2">Number of Communication Lines</td><td colspan="2">1 line</td></tr>
<tr><td colspan="2">Number of Communication Ports (Connectors)</td><td colspan="2">2 ports</td></tr>
<tr><td colspan="2">Terminating Resistance</td><td colspan="2">JEPMC-W6022 Terminator must be purchased separately.</td></tr>
<tr><td colspan="2">Transmission Distance</td><td colspan="2">MECHATROLINK-II: Total Network length of 50 m, minimum distance between stations of 0.5 m
MECHATROLINK-I: Total Network length of 50 m, minimum distance between stations of 0.3 m</td></tr>
<tr><td rowspan="9">Master Functions</td><td>Communication Interface</td><td>MECHATROLINK-II (2:N synchronous)</td><td>MECHATROLINK-I (1:N synchronous)</td></tr>
<tr><td>Baud Rate</td><td>10 Mbps</td><td>4 Mbps</td></tr>
<tr><td>Transmission Cycle</td><td>0.5 ms, 1 ms, 1.5 ms, or 2 ms</td><td>2 ms</td></tr>
<tr><td>Number of Link Communication Bytes</td><td>17 bytes or 32 bytes</td><td>17 bytes</td></tr>
<tr><td>Number of Connectable Stations</td><td>Up to 21 stations (SERVOPACK for up to 16 axes)</td><td>Up to 14 stations</td></tr>
<tr><td>C1 Messaging (Master Function)</td><td>Provided (selectable).</td><td>Not provided.</td></tr>
<tr><td>C2 Messaging (Allocations)</td><td>Provided (selectable).</td><td>Not provided.</td></tr>
<tr><td>Retry Function</td><td>Provided (selectable).</td><td>Not provided.</td></tr>
<tr><td>Supported Slave Devices</td><td colspan="2">For details, refer to 1.2.5 Devices Connectable to MECHATROLINK.</td></tr>
<tr><td rowspan="5">Slave Functions</td><td>Communication Interface</td><td>MECHATROLINK-II (2:N asynchronous)</td><td>MECHATROLINK-I (1:N asynchronous)</td></tr>
<tr><td>Baud Rate</td><td>10 Mbps</td><td>4 Mbps</td></tr>
<tr><td>Transmission Cycle</td><td>0.5 ms, 1 ms, 1.5 ms, or 2 ms</td><td>2 ms</td></tr>
<tr><td>Number of Link Communication Bytes</td><td>17 bytes or 32 bytes</td><td>17 bytes</td></tr>
<tr><td>Messaging (Slave Function)</td><td>Yes</td><td>Not supported.</td></tr>
</table>

(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 cleared).
	I/O Registers	Input/output using motion registers (synchronized on high-speed scan)
	Command Mode	Motion Command Mode/MECHATROLINK Transparent Command 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*, Torque Reference*, Phase Control, etc.
	Acceleration/Deceleration Method	One-step asymmetric trapezoidal acceleration/deceleration, exponential acceleration/deceleration filter, moving average filter
	Position Unit	pulse, mm, inch, degree
	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 by clearing alarm).
	I/O Registers	Input/output using motion registers (synchronized on high-speed scan)
	Command Mode	Motion Command Mode/MECHATROLINK Transparent Command 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 not 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

* Only with MECHATROLINK-II

(3) MECHATROLINK Communication Specifications

The following table shows the MECHATROLINK communication specifications for the SVB-01 Module.

Item	MECHATROLINK-I	MECHATROLINK-II
Topology	Bus	Bus
Transmission Media	Twisted-pair cable	Twisted-pair cable
Transmission Distance	50 m max.	50 m max.
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 *1 (SERVOPACK for up to 16 axes)
Communication Control Method	Cyclic	Cyclic
Media Access Control Method	1:N	2:N *2
Communication Mode	Control communication	Control communication
Error Control	CRC check	CRC check

* 1. 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 User's Manual MECHATROLINK System* (Manual No. SIEZ-887-5.1) for details.

* 2. Media access control of 2:N is supported only when SigmaWin is used. Otherwise, 1:N is supported.

(4) Maximum Number of Slave Stations

The maximum numbers of slave stations that can be connected to the SVB-01 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)

(Note) For details on MECHATROLINK communication setting methods, refer to *Chapter 3 Motion Module Setup*.

■ Transmission Distance and Maximum No. of Slave Stations

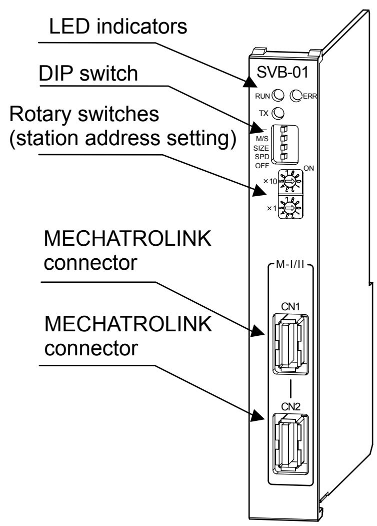
Communication Method	Transmission Distance (Total Network Length)	Maximum Number of Slave Stations
MECHATROLINK-I	50 m	14
MECHATROLINK-II	30 m	16 (21)*
	50 m	15 (21)*

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

2.1.2 LED Indicators and Switch Settings

(1) External Appearance

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



(2) Indicators

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

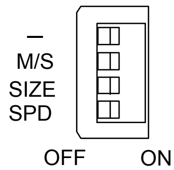
Indicators	Indicator Name	Color	Significance when Lit
RUN ○ ○ ERR TX ○	RUN	Green	Lights during normal operation of the microprocessor used for control. Not lit if an error has occurred.
	ERR	Red	Lights/blinks for failures. Not lit during normal operation.
	TX	Green	MECHATROLINK transmission in progress

(3) 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.

[a] 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.
	OFF	32 bytes		
SPD	ON	4 Mbps	OFF	Select the baud rate.
	OFF	10 Mbps		

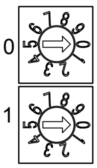
◀ EXAMPLE ▶

■ Setting Example

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

[b] 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 station address when in Slave Mode (10s digit)	0	Sets the 10s digit of the local slave address.
×1	0 to 9	Local station address when in Slave Mode (1s digit)	1	Sets the 1s digit of the local slave address.

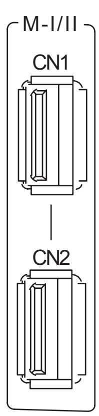
2.1.3 Module Connections

This section explains the connections for the SVB-01 Module.

(1) Connector and Cable Specifications

■ Connectors

The MECHATROLINK-I/II Connectors (M-I/II) on the SVB-01 Module connect the SVB-01 to the SERVOPACK and distributed I/O.
The MECHATROLINK-I/II Connectors (M-I/II) are shown in the following diagram.



Pin No.	Signal Name	Description
1	(NC)	Not used.
2	/DATA	Signal –
3	DATA	Signal +
4	SH	Not used.
Shell	Shield	Connects the shield wire.

INFO

- Two connectors are provided, but the communication line supports one channel only.
- When connecting the SVB-01 Module to the end of the network, connect a JEPMC-W6022 Terminator to the unused connector.
- Both the top and bottom connectors are the same, so either can be connected.

■ Connector Specifications

Name	Connector Name	No. of Pins	Connector Model		
			Module Side	Cable Side	Manufacturer
MECHATROLINK Connector	M-I/II	4	USB-AR41-T11	DUSB-APA41B1-C50	DDK Ltd.

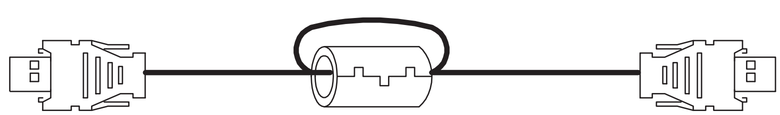
■ Cables

Name and Specification	Model Number	Length
MECHATROLINK Cables USB Connector – USB 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 Cables USB Connector – USB 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
MECHATROLINK Cables USB Connector – Loose Wires	JEPMC-W6011-A5	0.5 m
	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	–

■ External Appearance of MECHATROLINK-I/II Cables

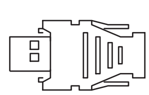
JEPMC-W6002-□□

JEPMC-W6003-□□



JEPMC-W6011-□□

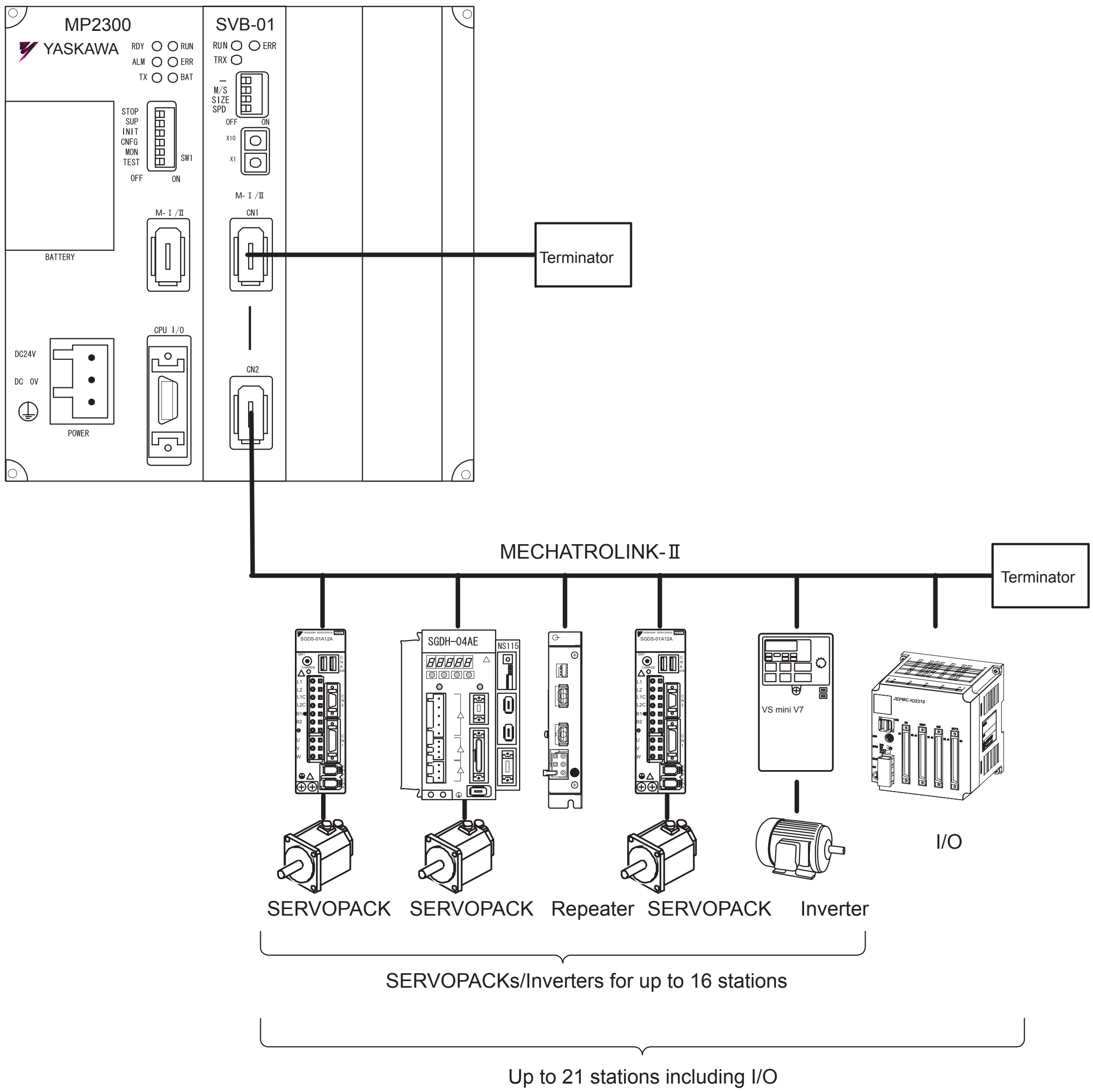
JEPMC-W6022



(2) SVB-01 Module Network Connections

■ Connecting the SVB-01 Module to the End of the MECHATROLINK Network

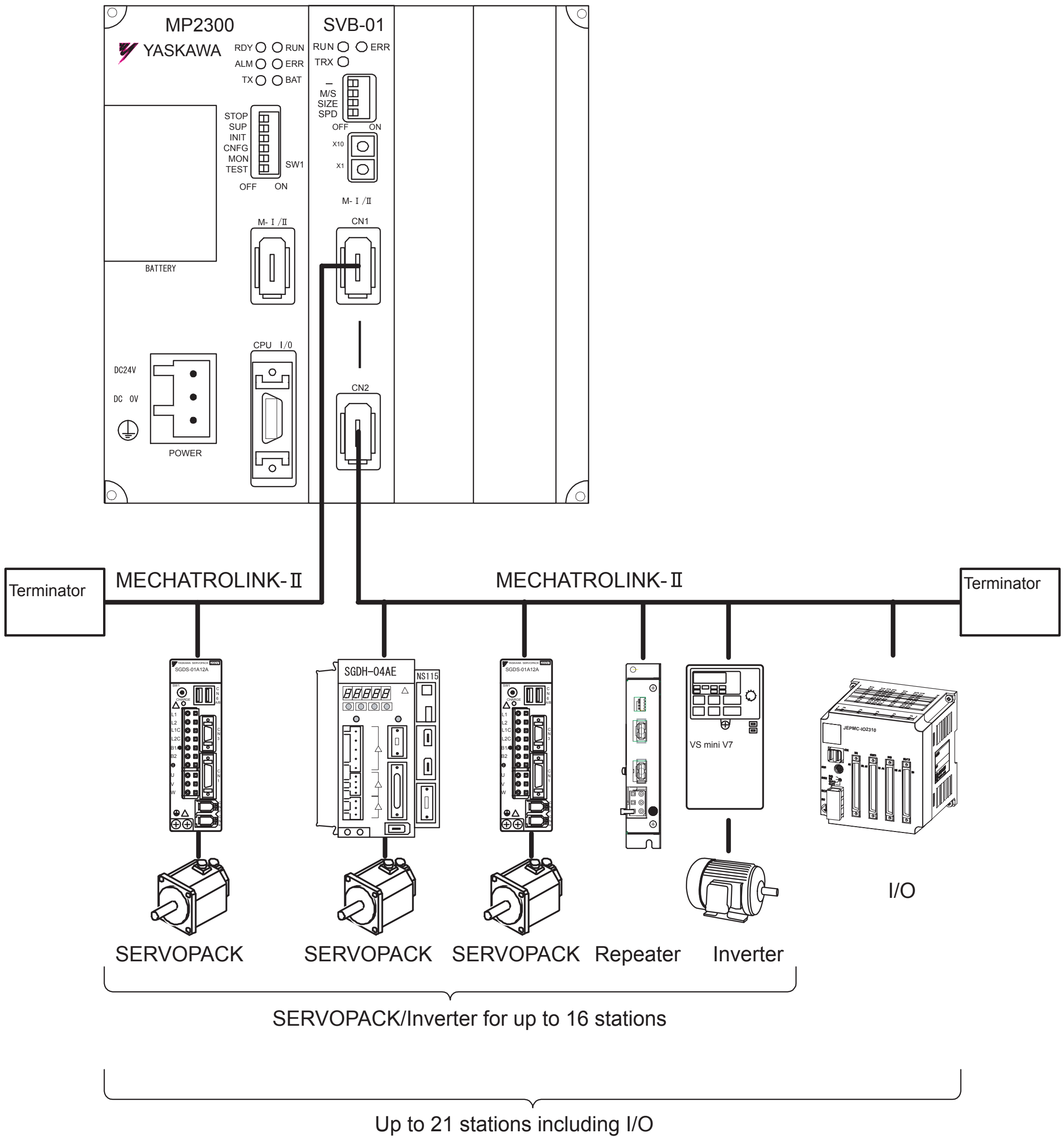
The following diagram shows a network configuration example.



（Note） Insert a JEPMC-W6022 Terminator into the unused MECHATROLINK port.

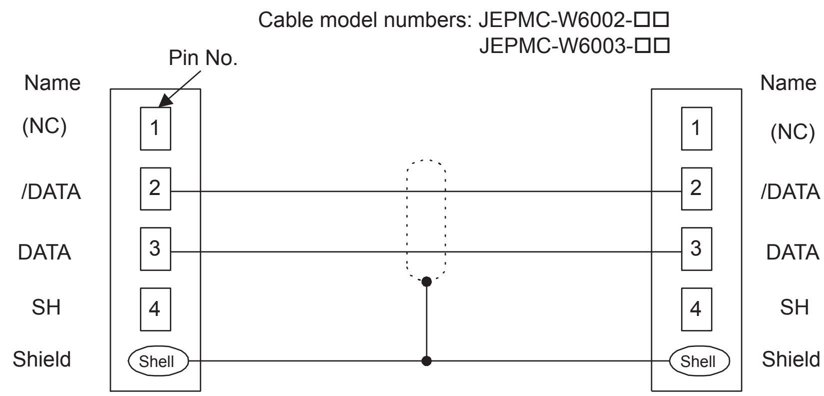
■ Connecting the SVB-01 Module in the Middle of the MECHATROLINK Network

The following diagram shows a system configuration example.



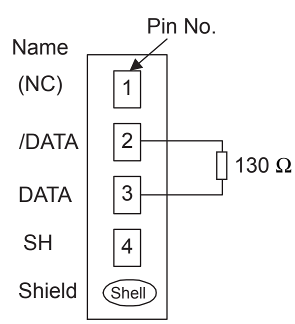
(3) Connections between Devices

■ Cable Connections between the SVB-01 and I/O Units and the SVB-01 and SERVOPACKs



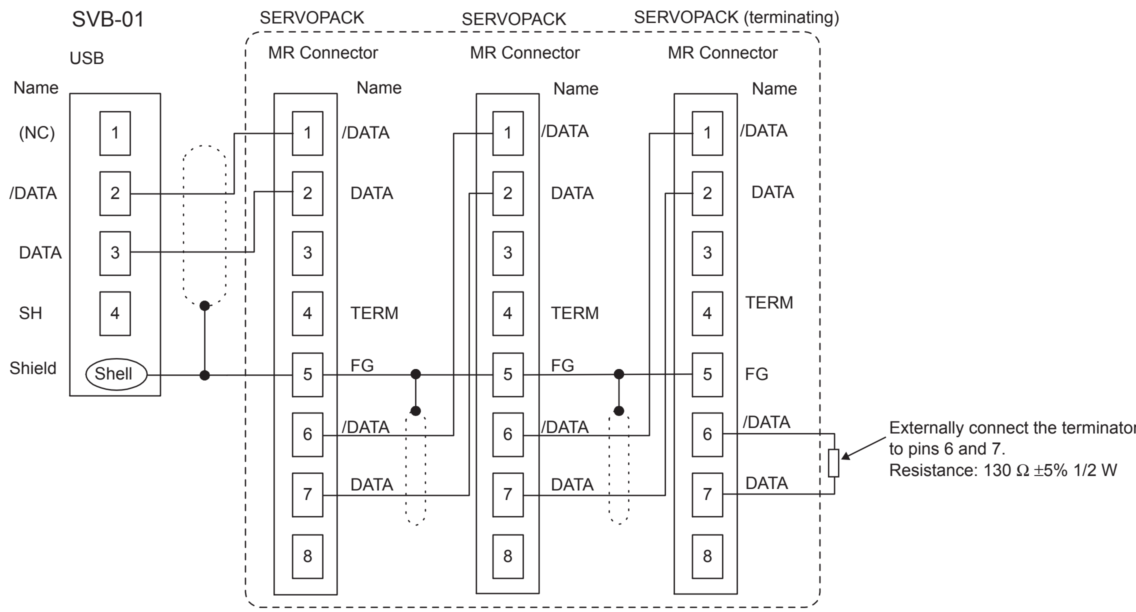
(Note) The JEPMC-W6003-□□ Cable has a ferrite core.

■ Terminator Connections



■ Cable Connections between the SVB-01 and SGD-□□□N and SGDB-□□AN SERVOPACKs

Cable model number: JEPMC-W6011-□□



(Note) 1. The JEPMC-W6011-□□ has a USB connector on one end and loose wires on the other end. Use an MR connector and wiring material to create a 1:N cable.

2. The terminator for SGD-□□□N and SGDB-□□AN must be provided by the user.

3. Prepare the cables according to MECHATROLINK-I specifications. Connections that do not meet the specifications will prevent normal communication due to the influence of reflected waves or other factors.

- Total Network Length: 50 m max.
- Maximum Number of Slave Stations: 14 stations max.
- Minimum Distance between Stations: 0.3 m min.

2.2 SVA-01 Module Specifications and Connections

2.2.1 General Specifications

(1) Hardware Specifications

The following table shows the hardware specifications of the SVA-01 Module.

Item		Specifications
Name		Motion Modules
Model Number		JAPMC-MC2300
Abbreviation		SVA-01
Servo Interface	Digital Inputs	6 inputs × 2 channels (source mode/sink mode inputs, 24 V/4.3 mA) DI_0: General-purpose input (ALM) DI_1: General-purpose input (RDY) DI_2: General-purpose input (ZERO: External latch signal input) DI_3: General-purpose input DI_4: General-purpose input DI_5: General-purpose input (EXT: External latch signal input)
	Digital Outputs	6 outputs × 2 channels (sink mode outputs, 24 V/100 mA) DO_0: General-purpose output (SV_ON) DO_1: General-purpose output (ALM_RST) DO_2: General-purpose output (PCON): Used as the C-SEL (control mode select) signal. DO_3: General-purpose output DO_4: General-purpose output DO_5:General-purpose output (SEN signal): 5-V and 24-V outputs
	Pulse Inputs	1 input × 2 channels, phases A/B/C, 5-V differential input, pulse rate: 4 Mpps (16 Mpps for × 4)
	Analog Outputs	2 outputs × 2 channels, –10 to 10 V, D/A 16 bits
	Analog Inputs	2 inputs × 2 channels, –10 to 10 V (applicable: –9.9 V to 9.9 V), A/D 16 bits
Connectors		CN1: Servo connector CN2: Servo connector CN3: 24-V input
Indicators		RUN (green) ERR (red)
Environmental Conditions	Ambient Operating Temperature	0 to 55°C
	Ambient Storage Temperature	–25 to 85°C
	Ambient Operating Humidity	30% to 95% (with no condensation)
	Ambient Storage Humidity	5% to 95% (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

(cont'd)

<table>
<tr><th colspan="2">Item</th><th>Specifications</th></tr>
<tr><td rowspan="2">Mechanical Operating Conditions</td><td>Vibration Resistance</td><td>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</td></tr>
<tr><td>Shock Resistance</td><td>Conforms to JIS B 3502.
Peak acceleration of 147 m/s^2 twice for 11 ms each in the X, Y, and Z directions</td></tr>
<tr><td>Electrical Operating Conditions</td><td>Noise Resistance</td><td>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</td></tr>
<tr><td rowspan="2">Installation Requirements</td><td>Ground</td><td>Ground to 100 Ω max.</td></tr>
<tr><td>Cooling Method</td><td>Natural cooling</td></tr>
<tr><td colspan="2">Dimensions (mm)</td><td>125 × 95 (H × D)</td></tr>
<tr><td colspan="2">Mass</td><td>80 g</td></tr>
</table>

(2) Function Lists

The following table provides a list of motion control functions for SVA-01 Module.

Item		Details	
Control functions	Torque Reference (Open Loop)	Torque Reference	According to the torque unit selection parameter.
		Speed Limit at Torque Reference	Rated speed percentage designation [0.01%]
	Speed Reference (Open Loop)	Speed Reference	According to the speed unit selection parameter.
		Acceleration	According to the acceleration unit selection parameter.
		Deceleration	According to the acceleration unit selection parameter.
		Moving Average Filter Time Constant Setting	ms
		Torque Limits	According to the torque unit selection parameter.
		Positive Speed Limit	Rated speed percentage designation [0.01%]
		Negative Speed Limit	Rated speed percentage designation [0.01%]
	Position Control	Position References	mm, inch, deg, pulse
		Speed References	According to the speed unit selection parameter.
		Acceleration	According to the acceleration unit selection parameter.
		Deceleration	According to the acceleration unit selection parameter.
		Filter Type	Moving average or exponential acceleration/deceleration
		Filter Time Constant	ms
		Position Compensation	mm, inch, deg, pulse
		Speed Compensation	According to the speed unit selection parameter.
		Position Loop Gain	1/s
		Position Loop Integration Time Constant	ms
		Speed Feed Forward Gain	Position derivative percentage designation [0.01%]
		Primary Delay Time Constant	ms
		Torque Limit	Rated torque percentage designation [0.01%]
		Positive Speed Limit	Rated speed percentage designation [0.01%]
		Negative Speed Limit	Rated speed percentage designation [0.01%]
	Phase Control	Speed References	According to the speed unit selection parameter.
		Speed Compensation	According to the speed unit selection parameter.
		Phase Compensation	mm, inch, deg, pulse
		Phase Control Proportional Gain	Same as position loop gain parameter.
		Phase Control Integral Time Constant	Same as position loop integral time constant parameter.
		Torque Limit	Rated torque percentage designation [0.01%]
		Positive Speed Limit	Rated speed percentage designation [0.01%]
		Negative Speed Limit	Rated speed percentage designation [0.01%]

(cont'd)

Item		Details
Motion Functions	Motion Commands	Positioning, external positioning, zero point return, interpolation, interpolation with position detection function, JOG operation, STEP operation, speed references, torque references, phase control, etc.
	Acceleration/ Deceleration Method	1-step asymmetrical trapezoidal acceleration/deceleration, exponential acceleration/ deceleration filter, moving average filter
	Position Units	pulse, mm, inch, degree
	Speed Units	Reference unit/s, 10^n reference unit/min, rated speed percentage designation
	Acceleration Units	Reference unit/s^2, ms (acceleration time from 0 to rated speed)
	Torque Units	Rated torque percentage designation
	Electronic Gear	Supported
	Position Control Methods	Finite length position control, infinite length position control, absolute infinite length position control, simple absolute infinite length position control
	Software Limits	1 each in forward and reverse directions
	Zero Point Return Types	17
	Latch Function	Phase-C latch, external signal input latch
Self-configuration Function		Automatic allocation by Module is supported.

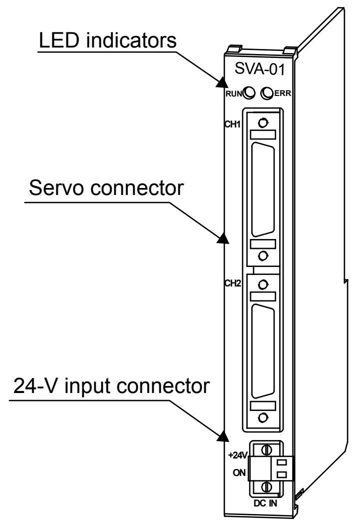
(3) Performance Specifications

Item		Contents	Remarks
Control Cycle		500 µs	
D/A	Resolution	16 bits	PWM output
	Output Delay	1 ms (*)	* When changing full-scale from −10 to 10 V
	Accuracy	100 mV max.	
	Temperature Drift	100 µV/°C max.	
A/D	Resolution	16 bits	
	Input Delay	250 µs	
	Accuracy	100 mV max.	
	Temperature Drift	100 µV/°C max.	
DO	OFF→ON	1 µs	
	ON→OFF	1 µs	
DI	OFF→ON	30 µs	
	ON→OFF	600 µs	
Pulse Input Rate		4 Mpps	16 Mpps for input pulse multiplier of 4

2.2.2 LED Indicators and Switch Settings

(1) External Appearance

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



(2) Indicators

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

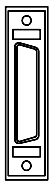
Indicators	Indicator Name	Color	Significance When Lit
RUN ○ ○ ERR	RUN	Green	Lights during normal operation of the microprocessor used for control. Not lit if an error has occurred.
	ERR	Red	Lights/blinks for failures. Not lit during normal operation.

2.2.3 Module Connections

This section explains the connections for the SVA-01 Module.

(1) Connector and Cable Specifications

[a] Servo Interface Connectors (CN1 and CN2)



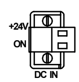
These connectors connect the SVA-01 Module to two SERVOPACKs.
They are connected using the following standard cable.

- JEPMC-W2040-□□ (For SGDH, SGDM, and SGDS SERVOPACKs)

(Note) The customer must provide cables for the SGDA and SGDB SERVOPACKs.

[b] 24-V Input Connector (CN3)

This connector connects the SVA-01 Module to +24 VDC as a Servo I/O power supply.
A screw terminal connector is used (BL3.5/2F-AU manufactured by Weidmuller).



Pin No.	Signal Name	Name
2	24V	+24 VDC input
1	0V	0 V

[c] Servo Connector Specifications

The following table shows the connector specifications.

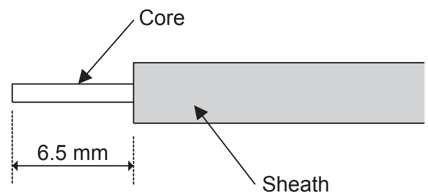
Name	Connector Name	No. of Pins	Connector Model			Cable Model Numbers
			Module Side	Cable Side	Manufacturer	
Servo Interface Connector 1 and Connector 2	CN1 CN2	36	10236-52A2JL	• Connector body: 10136-3000VE • Shell: 10336-52A0-008 (Screw locking) 10336-52F0-008 (One-touch locking)	3M	JEPMC-W2040-□□ (For the SGDH/ SGDM/SGDS SERVOPACKs)
24-V Input Connector	CN3	2	–	• BL3.5/2F-AU	Weidmuller	The CN3 connector is included with the SVA-01 Module, but a cable is not included. The user must connect the cable.

[d] Connection Procedure for 24-V Input Cable

Use a 0.2 mm^2 to 0.51 mm^2 (AWG24 to AWG20) twisted-pair cable.
Use the following connection procedure.

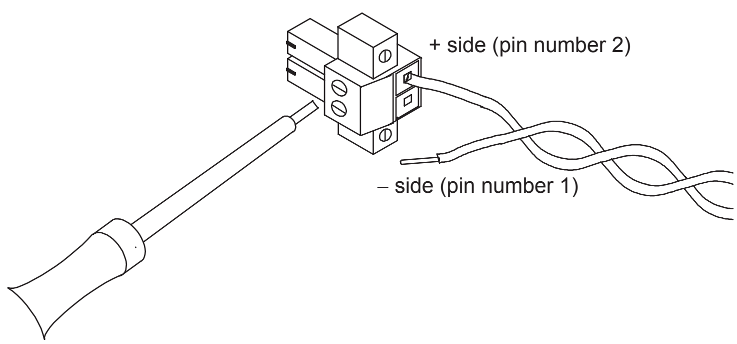
1. **Strip the wire for approximately 6.5 mm.**

   Strip approximately 6.5 mm from the end of the wire.



2. **Tighten the wires with the screws.**

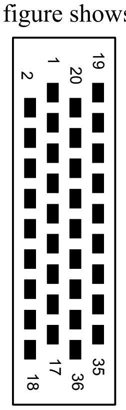
   Insert the wire into the opening and then tighten the screws to a tightening torque of approximately 0.3 to 04 N·m.



Pin No.	Signal Name	Name
2	24V	+24 VDC input
1	0V	0 V

[e] Connector Pin Arrangement (CN1 and CN2)

The following figure shows the 36-pin arrangement of CN1 and CN2.



Arrangement from Connector
Wiring Side on Cable Side

The following figure shows the pin names and assignments for connectors CN1 and CN2.

2	AO_0 (NREF)	General-purpose analog output 0 (speed reference output)
4	PAL	5-V differential phase A pulse input (–)
6	PCL	5-V differential phase C pulse input (–)
8	AI_0	General-purpose analog input 0 (Feedback speed monitor input)
10	0V (For 24 V)	0 V (for 24 V) output
12	DO_2 (PCON)	General-purpose output DO_2 ★ (P action reference output)
14	DO_3	General-purpose output DO_3
16	+24V	+24 V output
18	DI_2 ◥ (ZERO/HOME LS)	General-purpose input DI_2 (ZERO/HOME LS input)

1	SG	Ground (analog)
3	PA	5-V differential phase A pulse input (+)
5	PC	5-V differential phase C pulse input (+)
7	SG	Ground
9	AO_1 (TREF)	General-purpose analog output 1 (torque reference output)
11	0V (For 24 V)	0 V (for 24 V) output
13	DO_4	General-purpose output DO_4
15	DI_3 (P-OT)	General-purpose input DI_3 (positive overtravel input)
17	DI_0 (SVALM)	General-purpose input DI_0 ★ (Servo alarm input)

20	SEN (5V)	SEN Signal (Servo)
22	–	Not connected
24	PBL	5-V differential phase B pulse input (–)
26	AI-GND	Analog input ground
28	0V (For 24 V)	0 V (for 24 V) output
30	DO_1 (ALMRST)	General-purpose output DO_1 ★ (Alarm reset ouput)
32	DO_5 (SEN)	General-purpose output DO_5 ★ (VS866 24-V SEN signal)
34	+24V	+24 output
36	DI_5 ◥ (EXT/DEC)	General-purpose input DI_5 (EXT/DEC signal input)

19	SG	Ground (For SEN signal)
21	AI_1	General-purpose analog input 1 (Torque (thrust) reference monitor input)
23	PB	5-V differential phase B pulse input (+)
25	SG	Ground
27	AO-GND	Analog output ground
29	0V (For 24 V)	0 V (for 24 V) output
31	DO_0 (SV ON)	General-purpose output DO_0 ★ (Servo ON output)
33	DI_4 (N-OT)	General-purpose input DI_4 (Negative overtravel input)
35	DI_1 (SRDY)	General-purpose input DI_1 ★ (Servo delay input)

Note 1. ◥: Inputs signals with a latch function.
2. ★: Signals that can be used as general-purpose I/O signals only in general-purpose I/O mode.
In normal operation mode, the SVA-01 Module uses these as system I/O.

INFO Either 5 V or 24 V can be selected for the SEN signal. Connect pin 20 or pin 32 according to the application. Pin 20 (5 V) is connected in the standard cable.

[f] Cables

The following standard cables are available for use with the SVA-01 Module. These cables are used to connect the SVA-01 Module to SERVOPACKs, overtravel limit switches, and other machines.

Table 2.1 Cables

Applicable SERVOPACKs	Model	Length
SGDA-□□□S, SGDB-□□	No standard cable is available.	–
SGDM, SGDH, SGDS-□□□01□, SGDS-□□□02□	JEPMC-W2040-A5	0.5 m
	JEPMC-W2040-01	1.0 m
	JEPMC-W2040-03	3.0 m

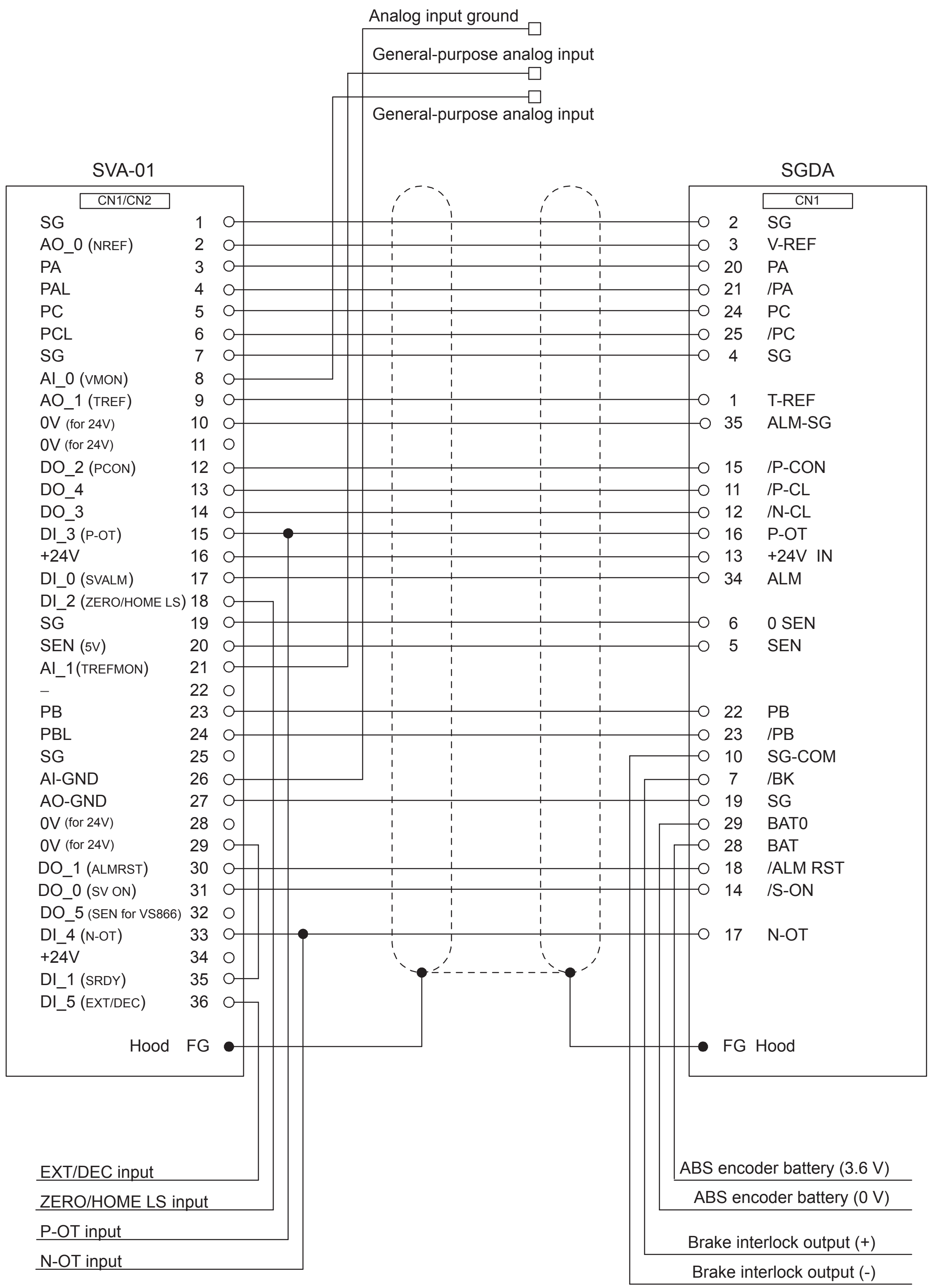
Refer to the following pages for details on these cables.

[g] SERVOPACK Connection Cables for SGDA-□□□S

■ Model

No standard cable is available. Prepare a cable referring to the following cable connections diagram.

■ Cable Connections Diagram

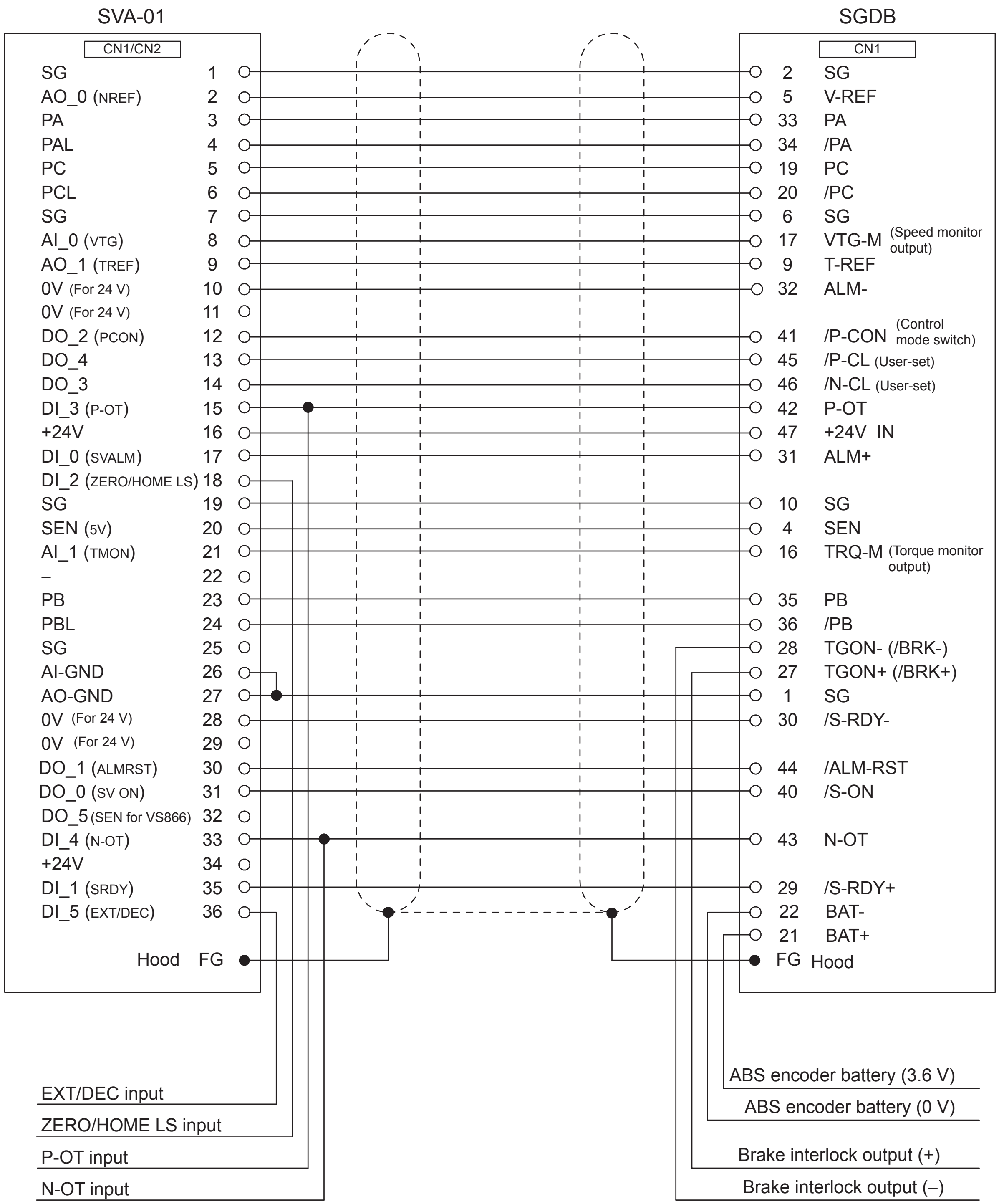


[h] SERVOPACK Connection Cables for SGDB-□□

■ Model

No standard cable is available. Prepare a cable referring to the following cable connections diagram.

■ Cable Connections Diagram

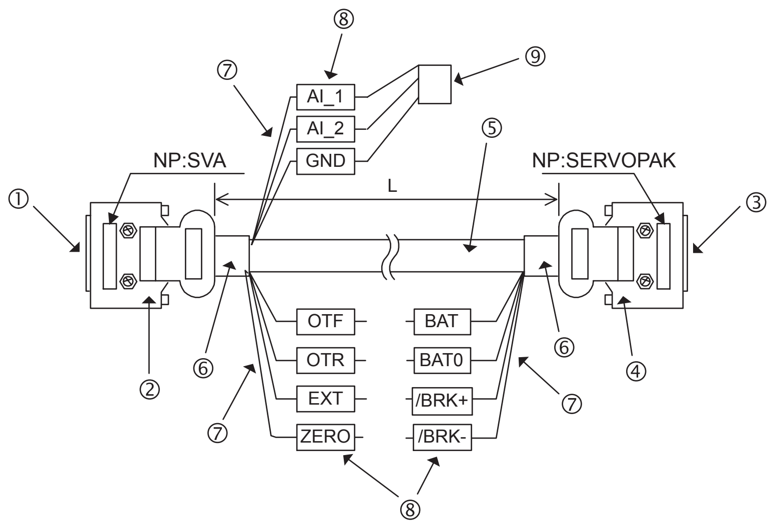


[i] SERVOPACK Connection Cables for SGDM/SGDH/SGDS-□□□01□/□□□02□

■ Model

JEPMC-W2040-05: 0.5 m
JEPMC-W2040-10: 1.0 m
JEPMC-W2040-30: 3.0 m

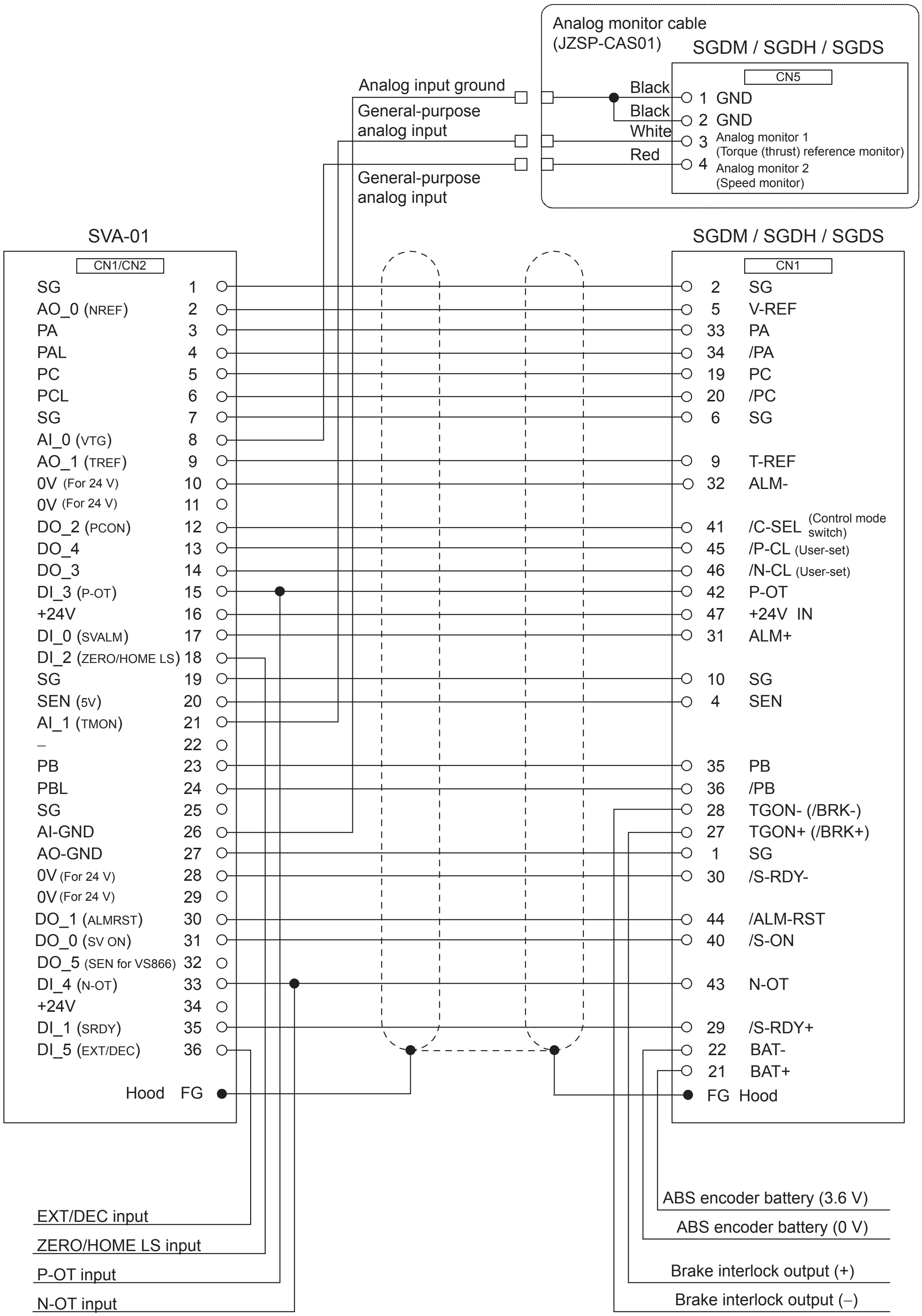
■ Appearance



■ Cable Specifications

Diagram No.	Name	Model	Qty	Manufacturer	Remarks
①	Plug on SVA end	10136-3000VE	1	Sumitomo 3M	Soldered
②	Shell on SVA end	10336-52A0-008	1	Sumitomo 3M	–
③	Plug on SERVOPACK end	10150-3000VE	1	Sumitomo 3M	Soldered
④	Shell on SERVOPACK end	10350-52A0-008	1	Sumitomo 3M	–
⑤	Cable	HP-SB/20276SR 26 × AWG28	–	Taiyo Electric Wire & Cable Co., Ltd.	Shield wire
⑥	Heat-shrinking tube	F2 (Z)	–	Sumitomo Electric Industries. Ltd.	Or equivalent
⑦	Wires	UL1061 AWG28	–	–	OTF: Brown OTR: Orange EXT: Black ZERO: – BAT: Blue BAT0: Purple *BRK+: Gray *BRK-: White AI_1: White AI_2: Red GND: Black
⑧	Marking tubes	2-mm dia., white	11	–	Printing color: Black
⑨	Socket	DF11-4DS-2C	1	Hirose Electric Corporation	–
	Contacts	DF11-2428SCF	1	Hirose Electric Corporation	–

■ Cable Connections Diagram



3

Motion Module Setup

This chapter explains the setup methods for the SVB-01, SVA-01, and SVR Modules.

3.1 SVB-01 Module Setup

This chapter explains the setup methods for the SVB-01 Module.

3.1.1 Setup Methods

(1) Settings Required for Setup

The following settings are required to set up the SVB-01 Module.

[a] DIP Switch Setting

Refer to *(1) External Appearance* in *2.1.2 LED Indicators and Switch Settings* and set the DIP switch of the SVB-01 Module.

[b] Module Configuration Definition Setting

Define the SVB-01 Module in the MPE720's Module configuration definition.

[c] MECHATROLINK Definition Setting

Set the MPE720 MECHATROLINK transmission definitions.
Allocate I/O to the slaves connected to MECHATROLINK.

[d] Motion Parameter Settings

Set the MPE720 motion fixed parameters, motion setting parameters, and SERVOPACK parameters for each axis.

INFO

■ Motion Parameter Definitions

1. Commands for Motion Modules are made using Motion Parameters.
2. There are three types of Motion Parameters: Fixed Parameters, Setting Parameters, and Monitoring Parameters.
   - Fixed Parameters: Define the motor to use and machine parameters.
   - Setting Parameters: Sets commands for the application.
   - Monitoring Parameters: Provide alarms, position information, and other current status information.

[e] Saving to Flash Memory

Be sure to save the settings to flash memory in the MP2200/MP2300 using the MPE720.

(2) Allocation Method

Use either of the following two methods to allocate the data in items (b), (c), and (d) above for the SVB-01 Module.

- Self-configuration (automatic generation of definition files) (For details, refer to *3.1 SVB-01 Module Setup*.)
- Set in the MPE720's Module Configuration Definition Window. (For details, refer to *3.1 SVB-01 Module Setup*.)

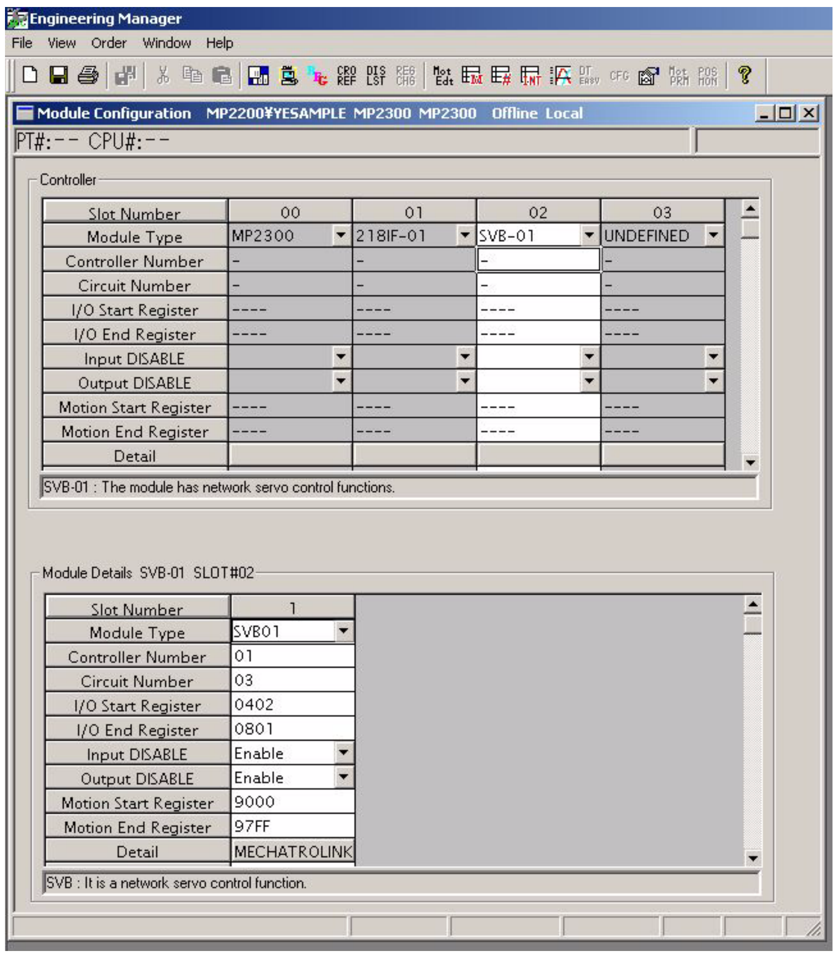
3.1.2 Self-configuration

Self-configuration automatically recognizes all the MP2200/MP2300 Optional Modules (including the SVB-01 Module), and automatically generates definition files.
The SVB-01 Module (master) also collects information on the slaves connected to the MECHATROLINK Network. Self-configuration can be used to reduce setup time.

(1) Module Configuration Definition

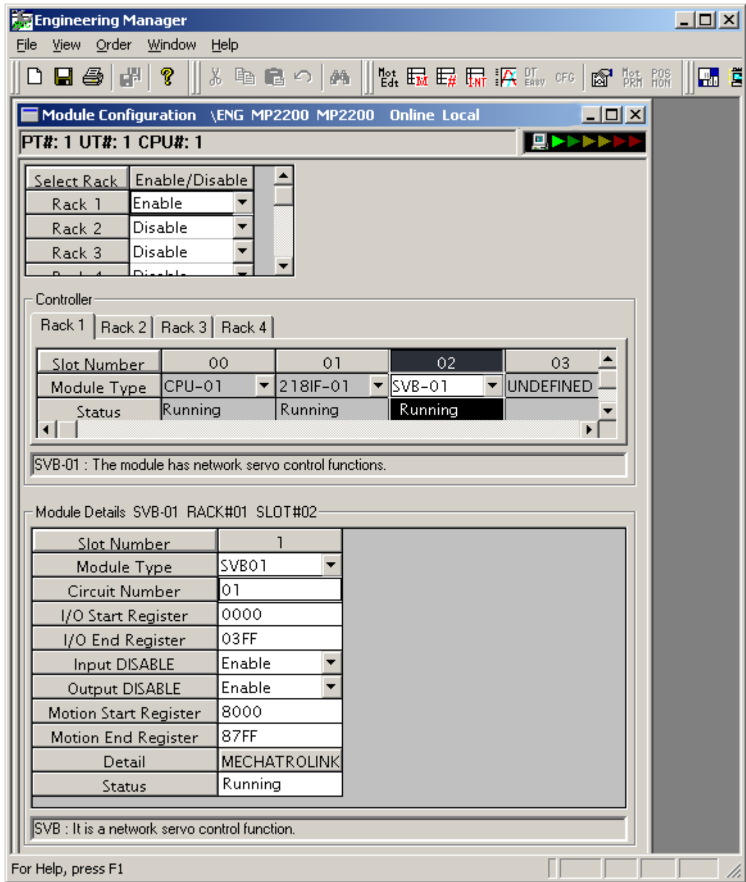
The following example shows a sample Module configuration definition achieved by installing a 218IF-01 Module and SVB-01 Module in the MP2200/MP2300 Option Slot, and executing self-configuration.

◀ EXAMPLE ▶ ■ Example for the MP2300



◀ EXAMPLE ▶

■ Example for the MP2200



INFO

■ Self-configuration Execution Method

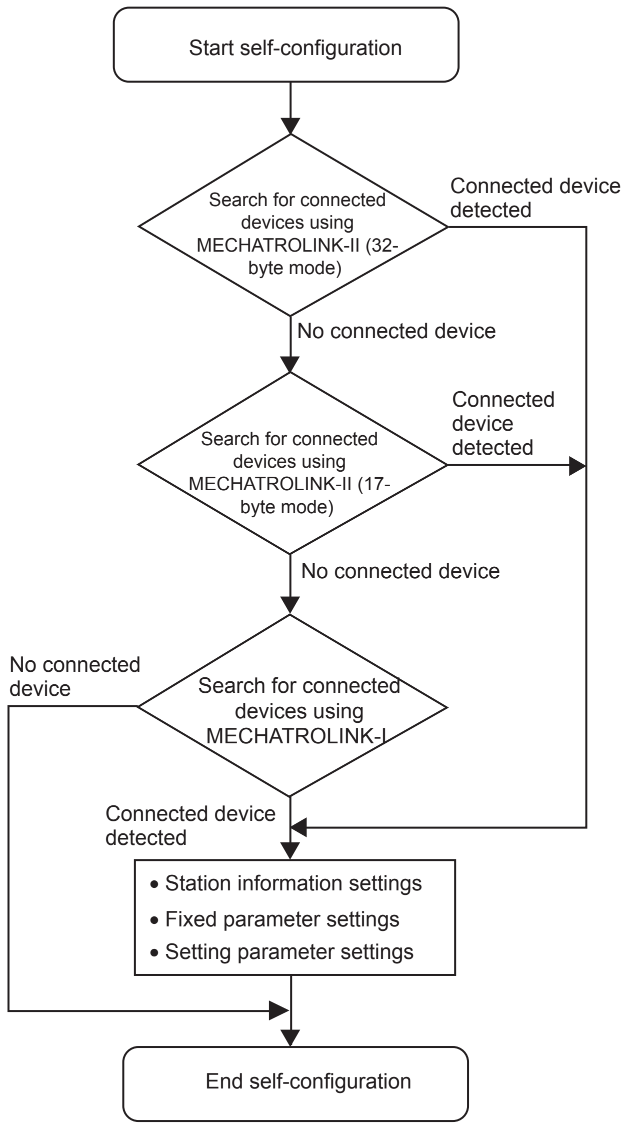
The following two methods are available:

- Execution at power ON
- Execution from Engineering Manager

For details, refer to *6.5 Self-configuration* of the *Machine Controller MP2200 User's Manual* (Manual No. SIEPC88070014).

(2) MECHATROLINK Transmission Definitions

Self-configuration collects MECHATROLINK transmission definition data and slave data using the following procedure.
The communication method is determined when the slave is detected, after which communication method switching and slave detection are not performed. When not even a single slave station is detected, MECHATROLINK-I communication continues.



(Note)1. Slaves detection is performed for each communication in the following order: SERVOPACK, I/O, inverter.
2. No connection is detected for stations with the same station number as another station, with disconnected cables, for which a communication error has occurred, or from which no response is received.

[a] Common Setting Items

Item	Setting Contents	Default Value
Communication type	Sets the communication method. Selections: • MECHATROLINK-I • MECHATROLINK-II (17-byte mode) • MECHATROLINK-II (32-byte mode)	MECHATROLINK-II (32-byte mode)
Master/Slave	Sets the Module to a master or a slave. Selections: • Master • Slave	Master
My station address (local station address)	The local station address for the master is 0 (fixed). The local station address for a slave is 1 to the number of slaves. The number of slaves can be changed using communication.	0

(Note)1. The hardware switch has priority for the master/slave setting.
Definitions for the MPE720 must match the hardware switch settings.
2. Slaves function as intelligent I/O.

[b] Settings and Display Items by Communication Method

■ MECHATROLINK-I

• Master

Item	Details	Default Value
Transmission speed	Fixed value; display only.	4 Mbps
Communication cycle	Fixed value; display only.	2 ms
Message confidence level	0, 1, or 2	0
Number of slaves	Fixed value; display only.	14

• Slaves

Item	Details	Default Value
Transmission speed	Fixed value; display only. 4 Mbps	4 Mbps
Communication cycle	Fixed value; display only. 2 ms	2 ms
Message confidence level	Setting not required.	0
Number of slaves	Fixed value; display only. 15	15

■ MECHATROLINK-II (17-byte Mode)

• Master

Item	Details	Default Value
Transmission speed	Fixed value; display only.	10 Mbps
Transmission byte	Fixed value; display only.	16 bytes
Communication cycle	0.5 ms or 1 ms	1 ms
SigmaWin	Set whether or not there is a SigmaWin connection. Selections: Use/Not use	Not use
No. of retry to slaves	Sets the number of retry stations. Setting range: 0 to 7	1
Number of slaves	Automatically determined by the SigmaWin setting and the number of retry stations setting. The results is displayed and cannot be changed. Setting range: 0 to 15 The number of slave stations is calculated using the following equation. SigmaWin Yes: 1, No: 0 • Communication cycle: 0.5 ms Number of slave stations = 6 – (No. of retry stations* + SigmaWin) • Communication cycle: 1 ms Number of slave stations = 15 – (No. of retry stations + SigmaWin)	14

* If the communication cycle is 0.5 ms, the maximum number of retry stations is 5.

• Slaves

Item	Details	Default Value
Transmission speed	Fixed value; display only.	10 Mbps
Transmission byte	Fixed value; display only.	16 bytes
Communication cycle	Setting not required.	1 ms
SigmaWin	Setting not required.	Not use
No. of retry to slaves	Setting not required.	1
Number of slaves	Fixed value; display only.	30

■ MECHATROLINK-II (32-byte Mode)

• Master

Item	Details	Default Value
Transmission speed	Fixed value; display only.	10 Mbps
Transmission byte	Fixed value; display only.	31 bytes
Communication cycle	0.5 ms, 1 ms, 1.5 ms, or 2 ms	1 ms
SigmaWin	Set whether or not there is a SigmaWin connection. Selections: Use/Not use	Not use
No. of retry to slaves	Sets the number of retry stations. Setting range: 0 to 7	1
Number of slaves	Automatically determined by the SigmaWin setting and the number of retry stations setting. The results is displayed and cannot be changed. Setting range: 0 to 15 The number of slave stations is calculated using the following equation. SigmaWin Yes: 1, No: 0 • Communication cycle: 0.5 ms Number of slave stations = 4 – (No. of retry stations* + SigmaWin) • Communication cycle: 1 ms Number of slave stations = 9 – (No. of retry stations + SigmaWin) • Communication cycle: 1 ms Number of slave stations = 15 – (No. of retry stations + SigmaWin) • Communication cycle: 1 ms Number of slave stations = 21 – (No. of retry stations + SigmaWin)	8

* If the communication cycle is 0.5 ms, the maximum number of retry stations is 3.

• Slaves

Item	Details	Default Value
Transmission speed	Fixed value; display only.	10 Mbps
Transmission byte	Fixed value; display only.	31 bytes
Communication cycle	Setting not required.	1 ms
SigmaWin	Setting not required.	Not use
No. of retry to slaves	Setting not required.	1
Number of slaves	Fixed value; display only.	30

INFO

■ MECHATROLINK Transmission Definitions for SVB in MP2300 CPU

The MECHATROLINK transmission definition is automatically set according to the detected communication method and number of slaves.

Communication Method	MECHATROLINK-II (32 Bytes)		MECHATROLINK-II (17 Bytes)		MECHATROLINK-I
Transmission speed	10 Mbps		10 Mbps		4 Mbps
Transmission byte	32		17		17
Communication cycle	1 ms *	2 ms *	1 ms		2 ms
Number of slaves	*	*	14	15	14
No. of retry to slaves	*	*	1	0	–
SigmaWin	Not use		Not use		–

* The communication cycle and number of retry stations in MECHATROLINK-II 32-byte Mode change according to the highest station number of the detected slaves, as shown in the following table.

Highest Slave Station Number	Communication cycle (ms)	No. of retry to slaves
1 to 8	1	1
9	1	0
10 to 16	2	5
17 to 21	2	Determined by the following equation. 21 – (Highest station number)

■ Slave Devices Not Recognized by Self-configuration

The following slave devices (I/O Module) are detected as wildcard I/O (***** I/O), because no type code exists for them. Therefore, allocate these slaves again using the MPE720's Module Configuration Definition Window.

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

SERVOPACKs with special specifications that cannot be automatically detected are recognized as wildcard SERVOPACKs (***** SERVO). Therefore, allocate these SERVOPACKs again using the MPE720's Module Configuration Definition Window.

(3) Automatically Setting Motion Parameters

The motion parameters for each axis are set using self-configuration as shown below.
For details on motion parameters, refer to *Chapter 4 Motion Parameters*.

[a] Motion Fixed Parameters

Motion fixed parameters and SERVOPACK parameters are automatically set as follows:

■ SERVOPACK to SVB-01 Module

SVB-01 Module Fixed Parameters			SERVOPACK			
No.	Name		SGD-N, SGDB-N	SGDH+ NS100	SGDH+ NS115	SGDS
29	Motor Type	←	Depends on the specifications of the connected Servomotor.			
30	Encoder Type	←				
34	Rated Speed	←				
36	Encoder Resolution	←				
38	Max. Revolution of Absolute Encoder	←		Pn205		

(Note)1. The above processing is not performed when the axis has been set.
2. The default settings are used for all those parameters not included in the above list.

■ SVB-01 Module to SERVOPACK

SVB-01 Module Fixed Parameters			SERVOPACK			
No.	Name		SGD-N, SGDB-N	SGDH+ NS100	SGDH+ NS115	SGDS
16	Backlash Compensation	→	–		Pn81B	Pn214

(Note)1. The default settings are written if the axis is not set.
2. The above parameters are written to the SERVOPACK’s RAM.

[b] Motion Setting Parameters

Motion setting parameters and SERVOPACK parameters are automatically set as follows:

■ SERVOPACK to SVB-01 Module

SVB-01 Module Setting Parameters			SERVOPACK			
Address	Name		SGD-N, SGDB-N	SGDH+ NS100	SGDH+ NS115	SGDS
OW□□2E	Position Loop Gain	←	Cn-001A	Pn102		
OW□□2F	Speed Loop Gain	←	Cn-0004	Pn100		
OW□□30	Speed Feed Forward Compensation	←	Cn-001D	Pn109		
OW□□32	Position Integration Time Constant	←	–	Pn11F		
OW□□34	Speed Integration Time Constant	←	Cn-0005	Pn101		
OW□□3A	S-curve Acceleration Time	←	Cn-0026	Pn812		

(Note)1. The above processing is not performed when the axis has been set.
2. The default settings are used for all those parameters not included above.

■ SVB-01 Module to SERVOPACK

SVB-01 Module			SERVOPACK			
Setting Parameters						
Address	Name		SGD-N, SGDB-N	SGDH+ NS100	SGDH+ NS115	SGDS
OL□□1E	Positioning Completed Width	→	–		Pn500	Pn522
OL□□36	Linear Acceleration Time	→	Cn-0020	Pn80B		
OL□□38	Linear Deceleration Time	→	–	Pn80E		

(Note)1. The default settings are written if the axis is not set.
2. When the axis has been set, parameters are written only when bit 10 of fixed parameter 1 is set to enable automatic updating of parameters.
3. The positioning completed width is written only when MECHATROLINK-II (32-byte mode) is used.
4. The above parameters are written to the SERVOPACK's RAM.

[c] SERVOPACK Parameters

The SERVOPACK parameters are automatically set, as shown below.
These settings, however, are not written to the set values for the SERVOPACK parameters saved in the SVB-01 Module.
The MPE720 is required to change SERVOPACK parameters in the SVB-01 Module. For details, refer to (4) SVB Definitions of *3.1.3 Module Configuration Definitions*.

SVB-01 Module			SERVOPACK			
SERVOPACK Parameters						
Name	Set Value		SGD-N, SGDB-N	SGDH+ NS100	SGDH+ NS115	SGDS
P-OT Signal Mapping	Not valid.	→	Cn-0001 Bit 2	Pn50A.3		
N-OT Signal Mapping	Not valid.	→	Cn-0001 Bit 3	Pn50B.0		
SERVOPACK Software Limit Function (Positive)	Not valid.	→	Cn-0014 Bit 2	Pn801.0		
SERVOPACK Software Limit Function (Negative)	Not valid.	→	Cn-0014 Bit 3			
SERVOPACK Electronic Gear Ratio (Numerator)	1	→	Cn-0024	Pn202		Pn20E
SERVOPACK Electronic Gear Ratio (Denominator)	1	→	Cn-0025	Pn203		Pn210
Autotuning Application Switch	Not valid.	→	–	Pn110		
/DEC Signal Mapping	CN1-9 input terminal	→	–	Pn511.0		
/EXT1 Signal Mapping	CN1-10 input terminal	→	–	Pn511.1		
/EXT2 Signal Mapping	CN1-11 input terminal	→	–	Pn511.2		
/EXT3 Signal Mapping	CN1-12 input terminal	→	–	Pn511.3		
Speed Reference Command Options	Use T-REF as external torque limit value.	→	–	Pn002.0		
Torque Reference Command Options	Use V-REF as external speed limit input.	→	–	Pn002.1		

(Note)1. The above processing is not performed when the axis has been set.
2. The above set values are written to the SERVOPACK's EEPROM.

SVB-01 Module: SERVOPACK Parameters — Name	Set Value		SERVOPACK: SGD-N, SGDB-N	SGDH+ NS100	SGDH+ NS115	SGDS
Excessive Following Error Area	65535	→	Cn-001E	–		
Overtravel Level	32767	→	–	Pn505		–
Excessive Following Error Alarm Detection Level	$2^{30}-1$	→	–			Pn520
Excessive Following Error Warning Detection Level	100	→	–	Pn51E		
Reverse Latching Area	Pn820 value	→	–		Pn822	

(Note) The above set values are written to the SERVOPACK's RAM, except for Reverse Latching Area, which is written to the EEPROM.

3.1.3 Module Configuration Definitions

This section explains the methods using the MPE720 for setting the SVB-01 Module's Module configuration definitions and each of the other definitions.

(1) Opening the Module Configuration Definition Window

The Module Configuration Window can be opened from the File Manager or Engineering Manager. Use the following procedure to open the window.

[a] Opening from File Manager

Open the **Definition Folder** on the Directory Tree and double-click ***Module Configuration***.

[b] Opening from Engineering Manager

Click ***File – Open – Definition – Module Configuration***.

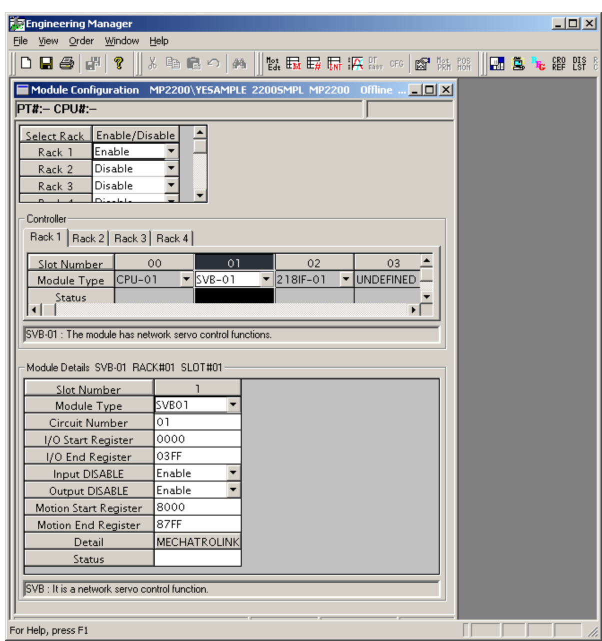


Fig. 3.1 Module Configuration Window for SVB-01

(2) Module Configuration Definition Settings

[a] Setting Items

The setting names and details for the Module configuration definition are shown in the following table.

Setting	Details
Slot Number	Displays the slot number.
Module Type	Sets the Module to be installed in each slot.
Circuit Number	Sets the circuit number in order from 01 for the Module.
I/O Start Register	Sets the I/O register start (leading) address for the I/O Modules connected to MECHATROLINK.
I/O End Register	Sets the I/O register ending address for the I/O Modules connected to MECHATROLINK.
Input DISABLE	Sets to enable/disable the input registers. Blank: Setting not allowed, D: Disabled, E: Enabled
Output DISABLE	Sets to enable/disable the output registers. Blank: Setting not allowed, D: Disabled, E: Enabled
Motion Start Register	Sets the start address for the motion parameters register. This address is set automatically according to the circuit number.
Motion End Register	Sets the end address for the motion parameters register. This address is set automatically according to the circuit number.
Detail	Sets the MECHATROLINK transmission definitions. Double-click ***MECHATROLINK*** to open the MECHATROLINK Transmission Configuration Window.
Status	Displays each Module's status when online.

INFO

■ I/O Start Register Numbers and End Register Numbers

- Setting range: 0000 to 7FFF hex
- Up to 400 hex words are allocated per SVB-01 Module.
- Make sure that the register number ranges for the Modules do not overlap with each other.
- The I/O start and end register numbers must be set even if no I/O Module is connected to MECHATROLINK.

[b] Saving Module Configuration Definitions

Nothing has been set immediately after installation, so be sure to save the data at least one time.

1. Select ***File*** – ***Save*** from the menus.

2. Verify the displayed message and click the **Yes** Button to save the definition data.

[c] Deleting Module Configuration Definitions

When deleting the module configuration definitions file, the definition files for all the individual Modules are also deleted.

1. Select ***File*** – ***Delete*** from the menus.

2. Verify the displayed message and click the **Yes** Button to delete the definition data.

[d] Ending the Module Configuration Definitions

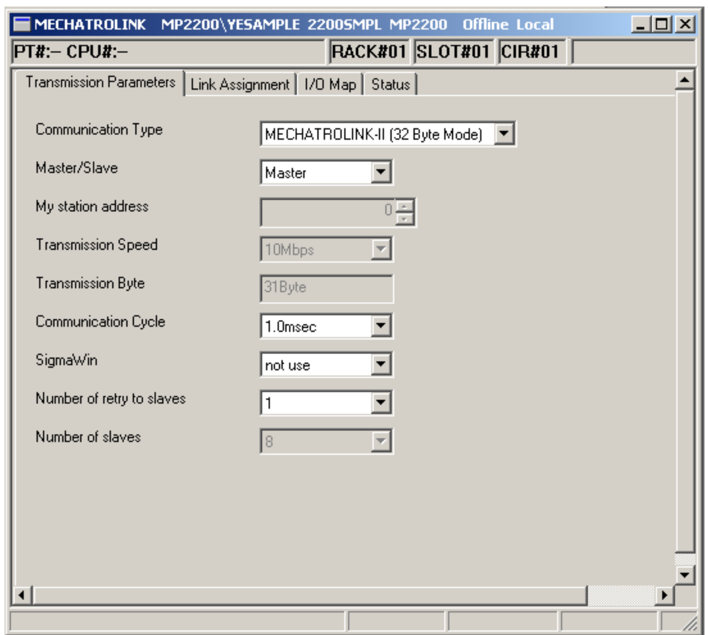
Select ***File – Close*** from the menus to return to the Module Configuration Window.

(3) MECHATROLINK Settings

This section explains the MECHATROLINK settings.

[a] Opening the MECHATROLINK Definitions Window

Double-click ***MECHATROLINK*** in the *details* of the Module Configuration Window.



The MECHATROLINK Definitions Window is composed of four tab pages.

Tab Page	Details
Transmission Parameters	Sets the MECHATROLINK transmission definitions.
Link Assignment	Allocates the MECHATROLINK slaves.
I/O Map	Allocates the I/O map.
Status	Displays the transmission status.

[b] MECHATROLINK Definitions Menu

The following table shows the menu commands and functions displayed in the *MECHATROLINK Definitions* menu.

Menu Command	Function
Edit	
Parameter Setting	Returns the allocation settings to default values.
Assignment Delete	Clears the allocation settings.

[c] MECHATROLINK Definition Settings

■ Transmission Parameters Tab Page

This tab sets the parameters required to use the MECHATROLINK communication system.

<table>
<tr><th>Setting</th><th colspan="2">Details</th></tr>
<tr><td>Communication Type</td><td colspan="2">Sets the communication type, from among MECHATROLINK-I, MECHATROLINK-II (32 Byte Mode), and MECHATROLINK-II (17 Byte Mode).</td></tr>
<tr><td>Master/Slave</td><td colspan="2">Sets whether the SVB-01 Module is used as a Master station or a Slave station. Make sure that the setting matches the SVB-01 Module’s DIP switch setting.</td></tr>
<tr><td>My Station Address (Local Station Address)</td><td colspan="2">When the Machine Controller is being used as a master station, the local station address is fixed at 0 and cannot be changed. When it is being used as a slave station, set a station address between 1 and 30.
The upper limit value for the station address depends on the master specifications.</td></tr>
<tr><td>Transmission Speed*1</td><td colspan="2">Displays the transmission speed for communication. The Transmission Speed varies depending on the Communication Type.</td></tr>
<tr><td>Transmission Byte (Transfer Byte)</td><td colspan="2">Sets the number of transfer bytes.</td></tr>
<tr><td>Communication Cycle*2</td><td colspan="2">Sets the communication cycle. Select either 0.5, 1, 1.5, or 2.0 ms. The Communication Cycle varies depending on the Communication Type.</td></tr>
<tr><td rowspan="4">Message Confidence Level</td><td colspan="2">Sets the error recovery level for sending MEMOBUS commands.
Set only for MECHATROLINK-I.</td></tr>
<tr><td>0</td><td>Send command just once and wait indefinitely for a response from the destination.</td></tr>
<tr><td>1</td><td>Send command once and resend if a response is not received within 8 seconds.</td></tr>
<tr><td>2</td><td>When sending the command, send each word of data twice consecutively and wait indefinitely for a response from the destination. This method improves transmission quality but reduces transmission efficiency by 50%.</td></tr>
<tr><td>SigmaWin</td><td colspan="2">Sets whether or not to use SigmaWin. Set only for MECHATROLINK-II.</td></tr>
<tr><td>Number of retry to slaves[1]</td><td colspan="2">Sets the number of retries to slaves. Set only for MECHATROLINK-II.</td></tr>
<tr><td>Number of slaves</td><td colspan="2">Displays the maximum number of slaves depending on the Communication Type, Communication Cycle, SigmaWin, and Number of retry to slaves.*3</td></tr>
</table>

* 1.

Communication Type	Transmission Speed
MECHATROLINK-I	Fixed at 4 Mbps.
MECHATROLINK-II (17 Byte Mode)	Fixed at 10 Mbps.
MECHATROLINK-II (32 Byte Mode)	Fixed at 10 Mbps.

* 2.

Communication Type	Communication Cycle
MECHATROLINK-I	Fixed at 2 ms.
MECHATROLINK-II (17 Byte Mode)	Select either 0.5 or 1 ms.
MECHATROLINK-II (32 Byte Mode)	Select either 0.5, 1, 1.5, or 2.0 ms.

It is recommended to set the communication cycle to an integral fraction (1/n, where n is an integer) of the high-speed of the CPU Module. Always set the same communication cycle when performing interpolation between different SVB-01 Modules.

TERMS

[1]Number of retry to slaves

Communication will be retried for slave stations from which a normal response is not received. This setting specifies the maximum number of stations for which communication is to be retried in one transmission cycle.

* 3. In the MECHATROLINK-II, the *Number of slaves* varies depending on the settings for *SigmaWin* and *Number of retry to slaves*. The *Number of slaves* is calculated as shown below.

X = The value set in *Number of retry to slaves*

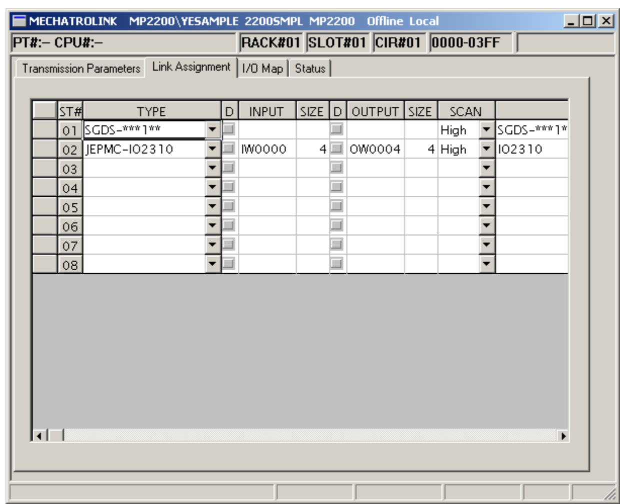
Y = 1 when *SigmaWin* is set to ***use***, and 0 when *SigmaWin* is set to ***not use***

- When the *Communication Type* is set to ***MECHATROLINK-II (17 Byte Mode)*** and the *Communication Cycle* is set to ***1 ms***
  Number of slaves = 15 - (X + Y)
- When the *Communication Type* is set to ***MECHATROLINK-II (32 Byte Mode)*** and the *Communication Cycle* is set to ***1 ms***
  Number of slaves = 9 - (X + Y)
- When the *Communication Type* is set to ***MECHATROLINK-II (32 Byte Mode)*** and the *Communication Cycle* is set to ***2 ms***
  Number of slaves = 21 - (X + Y)

[d] Link Assignment Tab Page

1. Setting Assignment Data

The I/O Assignment Tab Page is used to set the SERVOPACK, I/O, inverter, etc., connected in the MECHATROLINK.



Setting	Details
ST#	Displays the station number.
TYPE	Sets the type of slave device connected at the station. Select a slave device type from the pull-down list.
D (Register Enable/ Disable)	Sets the input register's enable/disable setting. • : Enabled • : Disabled
INPUT, SIZE	Sets the leading input register number (INPUT) and number of registers (SIZE). The maximum number of registers is set automatically. Be sure that the range of registers set for each station does not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Window.

(cont'd)

Setting	Details
D (Register Enable/ Disable)	Sets the output register's enable/disable setting. • : Enabled • : Disabled
OUTPUT, SIZE	Sets the leading output register number (OUTPUT) and number of registers (SIZE). The maximum number of registers is set automatically. Be sure that the range of registers set for each station do not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Window.
SCAN	Set the scans to be synchronized with the MP2200/MP2300. The scan will be fixed at ***High*** when a SERVOPACK has been selected for the *TYPE*. • ***High***: High-speed scan • ***Low***: Low-speed scan
Comment (Station Name)	Comments up to 32 characters can be input for each station.

2. Deleting I/O Assignments

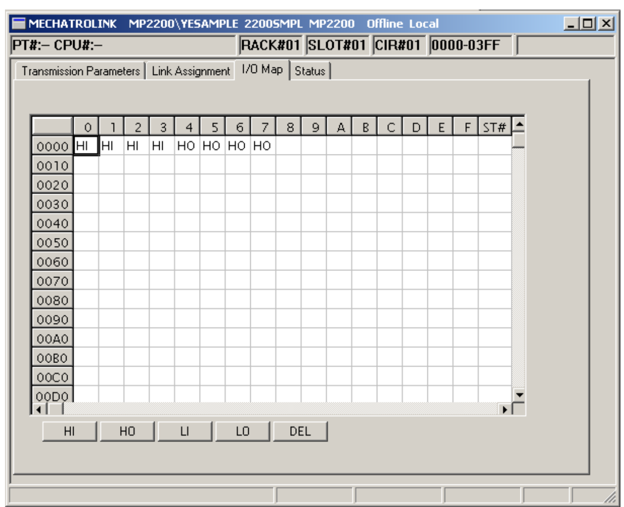
Delete the allocation data for one station at a time using the following procedure.

a) To delete a station's allocation data, move the cursor to the row of the station, to be deleted, select ***Edit – Assignment Delete*** from the menus.

b) The station's allocation data will be deleted.

■ I/O Map Tab Page

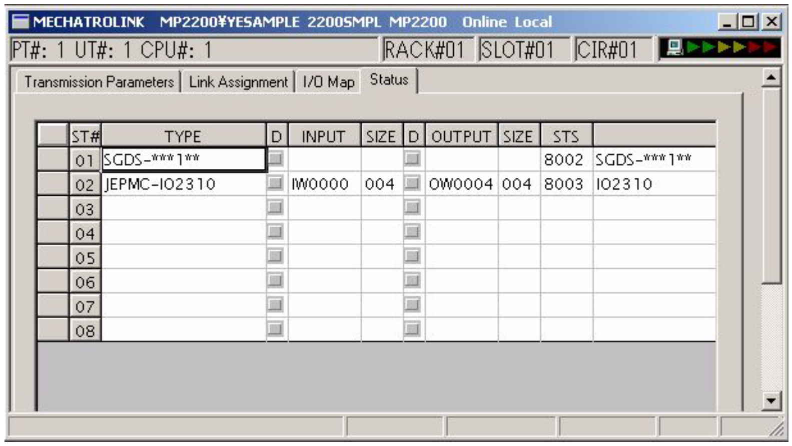
The I/O Map Tab Page displays the status of the I/O Module's I/O allocations.



HI	Allocates to an input set for a high-speed scan.
HO	Allocates to an output set for a high-speed scan.
LI	Allocates to an input set for a low-speed scan.
LO	Allocates to an output set for a low-speed scan.
DEL	Deletes allocations.

■ Status Tab Page

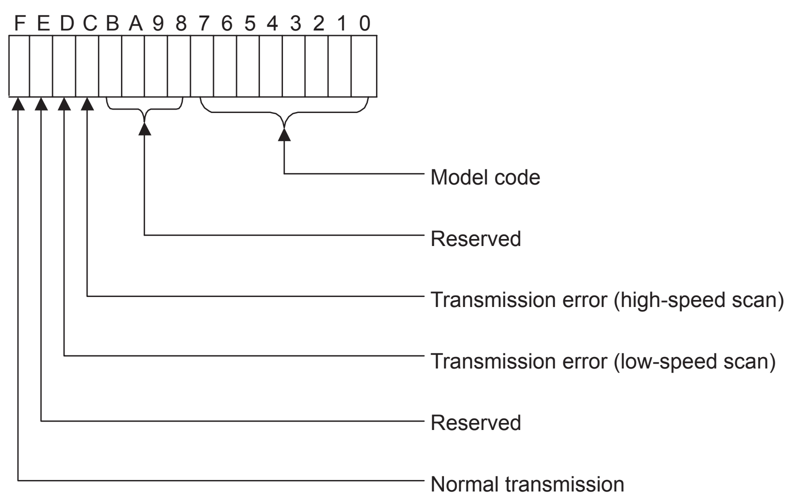
The Status Tab Page displays the data that is currently being transmitted by the MECHATROLINK. The tab only displays the status; the displayed values cannot be changed here.



The meaning of each column is identical to the columns in the Link Assignment Tab Page except for the additional *STS* column.

- STS

  In online mode, the MECHATROLINK transmission status information is displayed in hexadecimal. The meaning of each bit is shown in the following figure. In offline mode, nothing will be displayed.



[e] Saving, Deleting, and Closing MECHATROLINK Definitions

Refer to *(2) Module Configuration Definition Settings* under *3.1.3 Module Configuration Definitions*.

(4) SVB Definitions

This section explains the method used to set the motion parameters for each axis.

[a] SVB Definitions Window

Use one of the following procedures to open the Module Definitions Window.

■ Opening the Motion Parameter Setting Screen (SVB Definition Window)

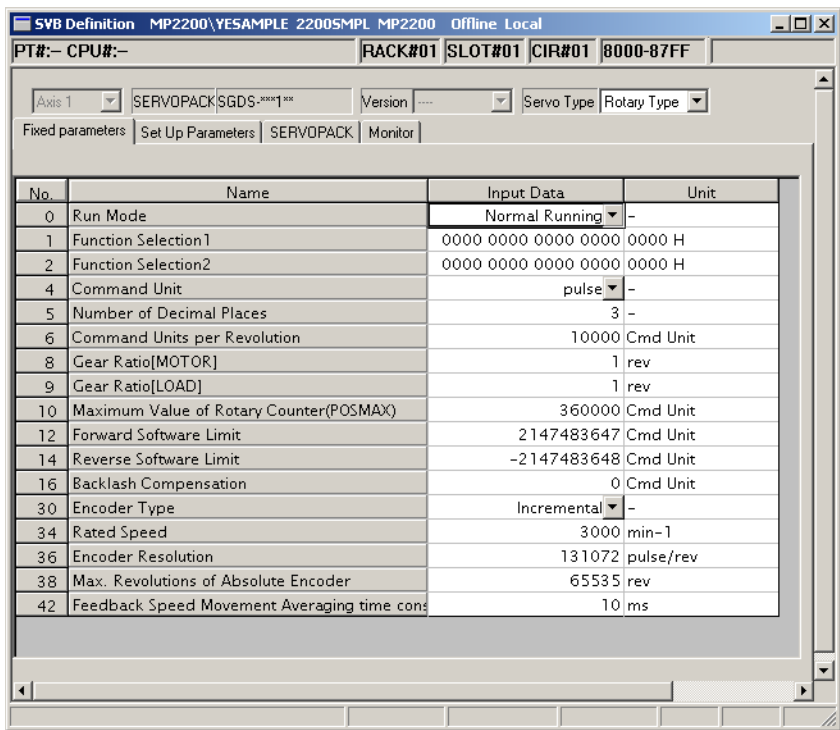
a) Click the Module name in the Module Details section of the Module Configuration Window.

b) Select ***File – Open Slot*** to display the SVB Definitions Window.

■ Using the Slot Number

Double-click the slot number in the Module Details section of the Module Configuration Window to display the SVB Definitions Window.

The following diagram shows the SVB Definitions Window.



The SVB-01 Definitions Window is composed of four tab pages: the Fixed Parameters, Set Up Parameters, SERVOPACK, and Monitor Tab Pages.

Table 3.1 Motion Parameter Window Tab Pages

Tab Page	Details
Fixed Parameters	Sets the Motion Fixed Parameters.
Set Up Parameters	Sets the Motion Setting Parameters.
SERVOPACK	Sets the SERVOPACK Parameters.
Monitor	Displays the Motion Monitoring Parameters.

It is possible to switch between these tab pages by selecting ***View – Next Page*** or ***View – Back Page*** from the motion parameters window's menus.

[b] SVB Definitions Menus

These menus can be used only in the SVB Definitions Windows.

Menu Command		Function
Edit		
	Axis Data Copy	Temporarily saves the displayed axis setting data.
	Axis Data Paste	Copies the temporarily saved axis data to the currently selected axis data.
	Details	Displays individual data in bit format.
	Default Set	Sets the default value.
	Copy Current Value	Sets the current value to the set data.
View		
	Update Current Value	Updates the display of the current value of the servo parameters.

■ Axis Data Copy

Select the axis data to be copied, and then select ***Edit – Axis Data Copy*** from the menu. The source axis data will be copied and saved temporarily in the cut buffer.

■ Axis Data Paste

Select the axis data to be copied, and then select ***Edit – Axis Data Paste*** from the menu. The axis data saved temporarily in the cut buffer will overwrite the axis data at the copy destination.

IMPORTANT

Copying between axes is possible using the Copy Axis Data and the Paste Axis Data functions. Copying between axes requires separate operations for fixing, setting, and SERVOPACK parameters. If the pasted data is for a different type of motor, an error message will be displayed.

■ Details

Use this function to display setting data as bit images for motion parameters except for servo parameters. The information can be displayed for each bit by selecting ***Edit – Details*** from the menu.

■ Default Set

Use this function to restore the settings data for the motion fixed parameters, setting parameters, and servo parameters to their default values.
Select ***Edit – Default Set*** from the menu. The axis parameters currently displayed will be set to their default values. Parameters whose current values are displayed will have their current values updated.

■ Copy Current Value

This function is enabled only for servo parameters. It overwrites the settings data using the data displayed in the *Current Value*. Select ***Edit – Copy Current Value*** from the menu. The data on the SERVOPACK will be overwritten temporarily.
Check the details displayed, and then select ***File – Save*** from the menu to save the data permanently. This operation is possible while the servo is ON.

■ Update Current Value

This function is enabled only for servo parameters. Current values are not automatically updated when the servo parameters are displayed. Select ***View – Update Current Value*** to read and display the most recent values.

The following table shows the functions given above.

	Motion Fixed Parameters	Motion Setting Parameters	SERVOPACK Parameters*	Motion Monitoring Parameters	Remarks
Axis Data Copy /Axis Data Paste	Yes	Yes	No	No	–
Details	Yes	Yes	No	Yes	Parameters in bit format only
Default Set	Yes	Yes	Yes	No	–
Copy Current Value	No	No	Yes	No	Enabled only when online
Update Current Value	No	No	Yes	No	Enabled only when online

* Possible when the servo is ON.

（Note）Yes: Operation possible, NO: Operation not possible.

[c] Motion Parameter Settings

■ Fixed Parameters Tab Page

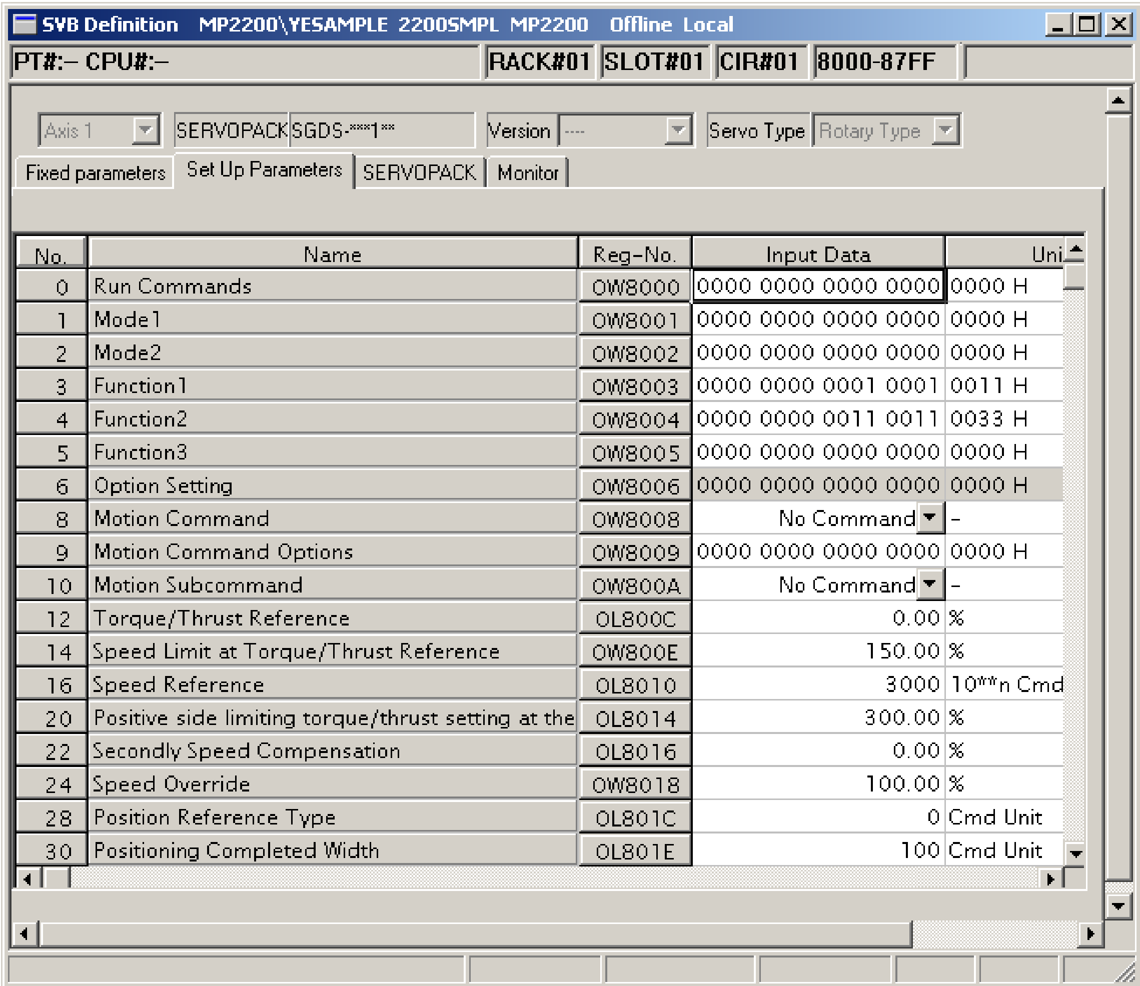
Set the parameters required for motion control on the Fixed Parameters Tab Page.

Setting	Details
Axis Number	Select the desired axis number. Set the fixed parameters for each axis.
SERVOPACK	Displays the type of SERVOPACK.
Version	Displays the version of SERVOPACK.
Servo Type (Motor Type)	Displays the motor type.
No.	Displays the parameter number of the motion fixed parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.

INFO For details on each of the fixed parameter settings, refer to *4.3.1 Motion Fixed Parameter Details*.

■ Set Up Parameters Tab Page

Set the parameters required for motion control on the Set Up Parameters Tab Page.

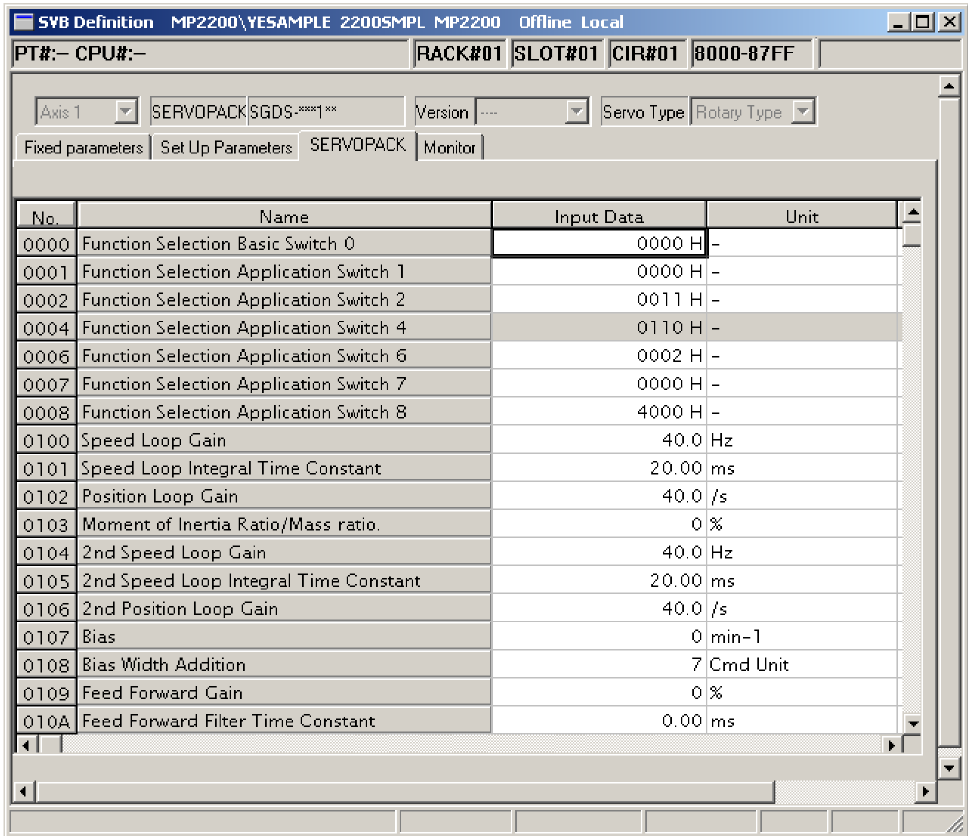


Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 14***). Set the setting parameters for each axis.
SERVOPACK	Displays the type of SERVOPACK.
Version	Displays the version of SERVOPACK.
Servo Type (Motor Type)	Displays the motor type.
No.	Displays the parameter number of the setting parameter.
Name (Parameter Name)	Displays the parameter name.
Reg-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being selected. Refer to *4.1.1 Motion Parameter Register Numbers for the SVB-01 Module* for details.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

INFO For details on each of the setting parameter settings, refer to *4.3.2 Motion Setting Parameter Details*.

■ SERVOPACK Tab Page

Set the SERVOPACK parameters required for motion control on the SERVOPACK Tab Page.



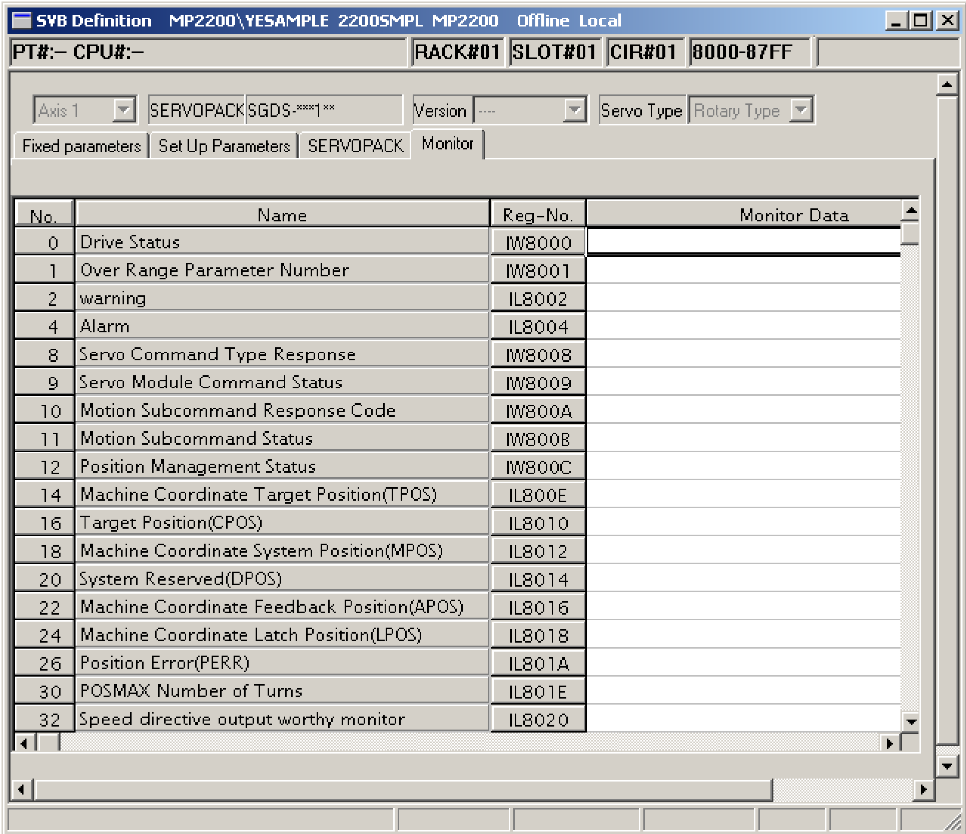
Setting	Details
Axis Number	Select the desired axis number. Set the SERVOPACK for each axis.
SERVOPACK	Displays the type of SERVOPACK.
Version	Displays the version of SERVOPACK.
Servo Type (Motor Type)	Displays the motor type.
No.	Displays the parameter number of the SERVOPACK parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value (set value at the SVB-01 Module).
Unit	Displays the units of the corresponding parameter.
Current Value	Displays the current value of the SERVOPACK parameter that is saved in the SERVOPACK when online.

INFO

- Refer to each SERVOPACK manual for information on the SERVOPACK parameters.
- When online, select ***Copy Current Value*** followed by ***Save*** so that the data saved in the SVB-01 Module and the data saved in the SERVOPACK will be the same.
- Some SERVOPACK parameter values are automatically assigned. Refer to *9.4 Parameters That Are Automatically Updated* for details.

■ Monitor Tab Page

The Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Monitor Tab Page; the settings cannot be changed here.



Setting	Details
Axis Number	Select the desired axis number. The parameters for each axis are displayed.
SERVOPACK	Displays the type of SERVOPACK.
Version	Displays the version of SERVOPACK.
Servo Type (Motor Type)	Displays the motor type.
No.	Displays the parameter number of the motion monitoring parameter.
Name (Parameter Name)	Displays the parameter name.
Reg-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed, as shown in *4.1.1 Motion Parameter Register Numbers for the SVB-01 Module*.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.
Unit	Displays the units of the corresponding parameter.

INFO Refer to *4.3.3 Motion Monitoring Parameter Details* for details on monitoring parameter settings.

[d] Saving, Deleting, and Closing the SVB Motion Parameters

Refer to *(2) Module Configuration Definition Settings* under *3.1.3 Module Configuration Definitions*.

IMPORTANT

- The Delete operation deletes the motion fixed parameter, setting parameter, and SERVOPACK parameter settings of all axes.
- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.

3.2 SVA-01 Module Setup

This chapter explains the setup methods for the SVA-01 Module.

3.2.1 Setup Method

(1) Settings Required for Setup

The following settings are required to set up the SVA-01 Module.

[a] Module Configuration Definition Settings

Defines the SVA-01 Module in the MPE720's Module configuration definition.

[b] Saving to Flash Memory

Be sure to save the settings to flash memory in the MP2200/MP2300 using the MPE720.

(2) Allocation Method

Use either of the following two methods to allocate data for the SVA-01 Module.

- Self-configuration (automatic generation of definition files) (Refer to *3.2.2 Self-configuration*.)
- Set in the MPE720 Module Configuration Definition Window (Refer to *3.2.3 Module Configuration Definitions*.)

3.2.2 Self-configuration

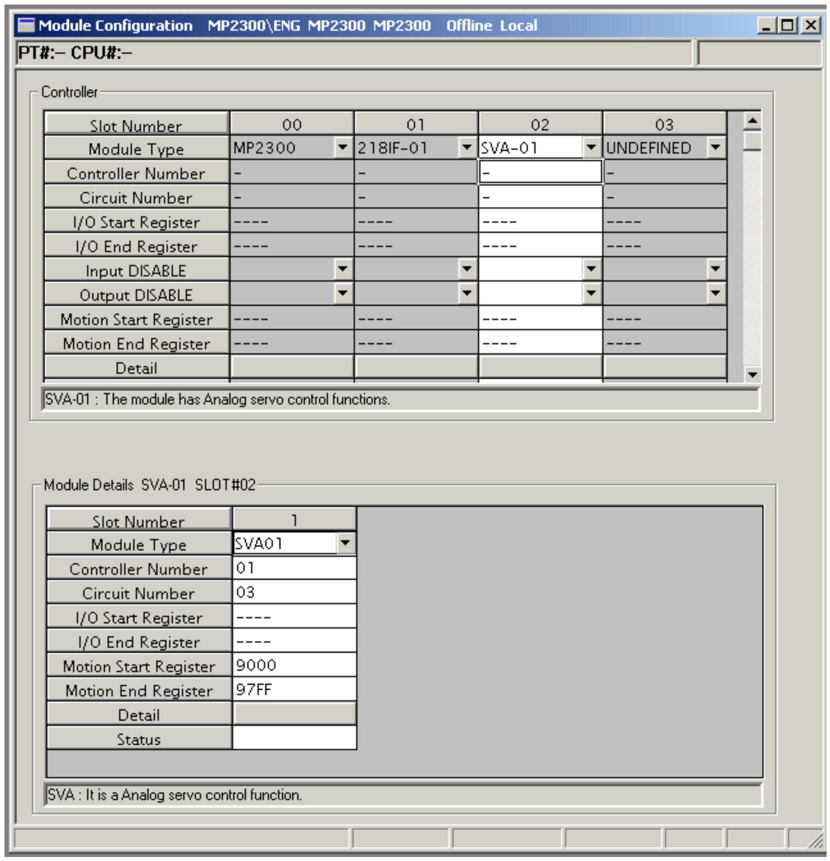
Self-configuration for the SVA-01 Module automatically recognizes all the MP2200/MP2300 Optional Modules, and automatically generates definition files. Self-configuration can be used to reduce setup time.

(1) Module Configuration Definitions

The following diagram shows a sample Module configuration definition achieved by installing a 218IF-01 Module and SVA-01 Module in the MP2200/MP2300 Option Slot, and executing self-configuration.

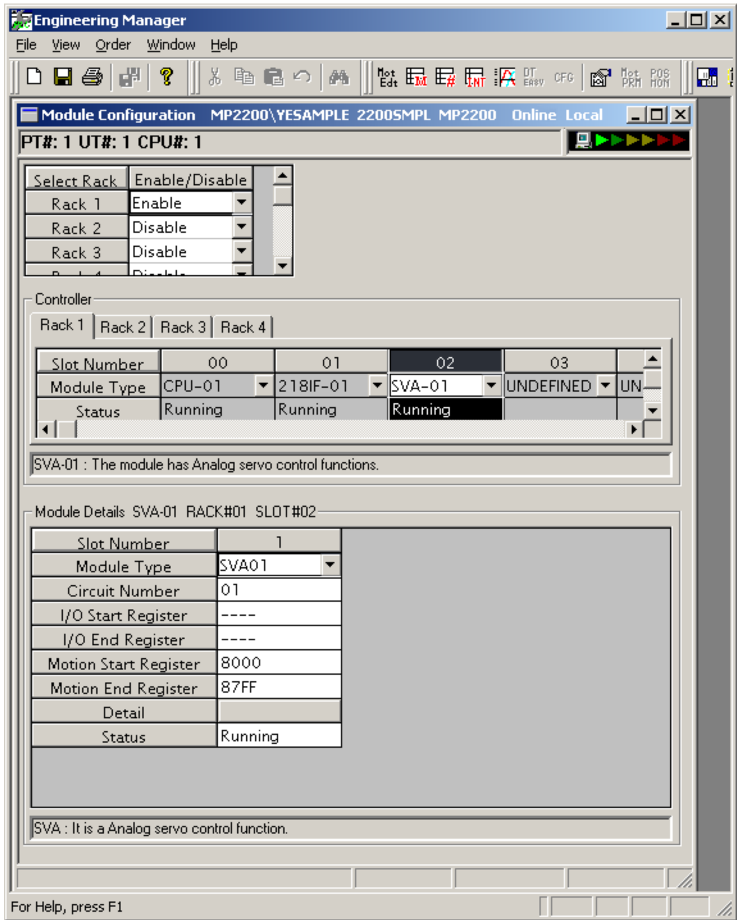
◀ EXAMPLE ▶

■ MP2300 Example



◀ EXAMPLE ▶

■ MP2200 Example



3.2.3 Module Configuration Definitions

This section explains the methods using the MPE720 for setting the SVA-01 Module's Module configuration definitions and each of the other definitions.

(1) Opening the Module Configuration Definition Window

The Module Configuration Definition Window can be opened from the File Manager or Engineering Manager. Use the following procedure to open the window.

[a] Opening from File Manager

Double-click the Module Configuration File in the Definition Folder of the directory tree.

[b] Opening from Engineering Manager

Click ***File – Open – Definition – Module Configuration Definition***.

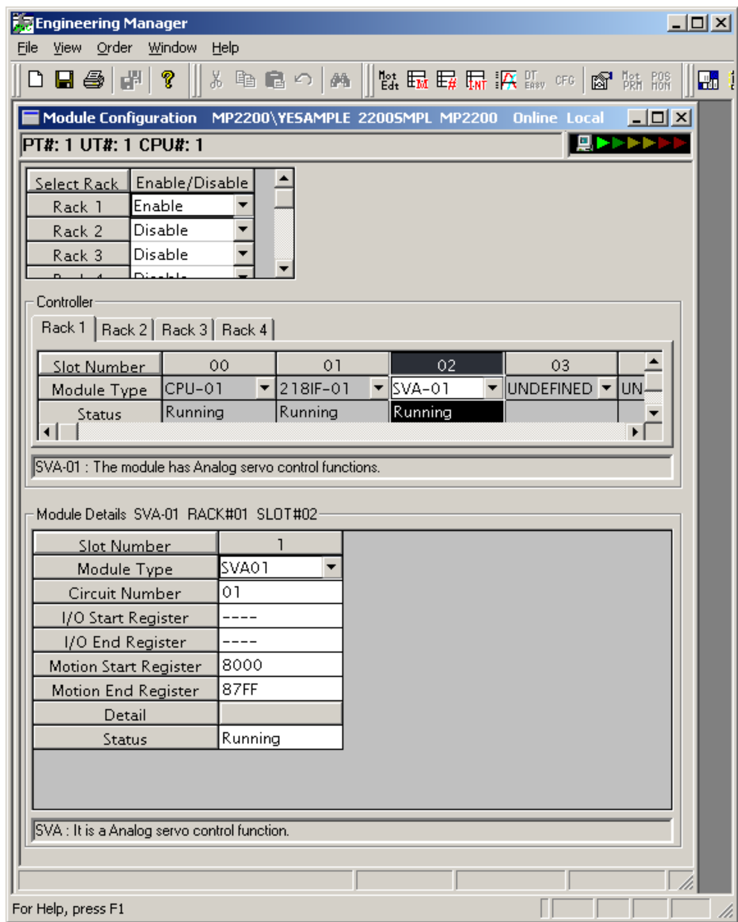


Fig. 3.2 SVA-01 Module Configuration Definition Window

(2) Module Configuration Definition Settings

[a] Setting Items

The setting names and details for the Module configuration definition are shown in the following table.

Setting	Details
Slot Number	Displays the slot number.
Module Type	Sets the Module to be installed in each slot.
Circuit Number	Sets the circuit number for the Module.
I/O Start Register	Reserved
I/O End Register	Reserved
Motion Start Register	Sets the start address for the motion parameters register. This address is set automatically according to the circuit number.
Motion End Register	Sets the end address for the motion parameters register. This address is set automatically according to the circuit number.
Detail	–
Status	Displays each Module's status when online.

[b] Saving Module Configuration Definitions

1. Select ***File*** – ***Save*** from the menus.
2. Verify the displayed message and click the **Yes** Button to save the definition data.

[c] Deleting Module Configuration Definitions

1. Select ***File*** – ***Delete*** from the menus.
2. Verify the displayed message and click the **Yes** Button to delete the definition data.

[d] Ending the Module Configuration Definitions

Select ***File*** – ***Close*** from the menus to return to the Module Configuration Definition Window.

(3) SVA Definitions

This section explains the method used to set the motion parameters for each axis.

[a] SVA Definitions Window

Use one of the following procedures to open the Module Definitions Window.

■ Opening the Motion Parameter Setting Screen (SVA Definition Window)

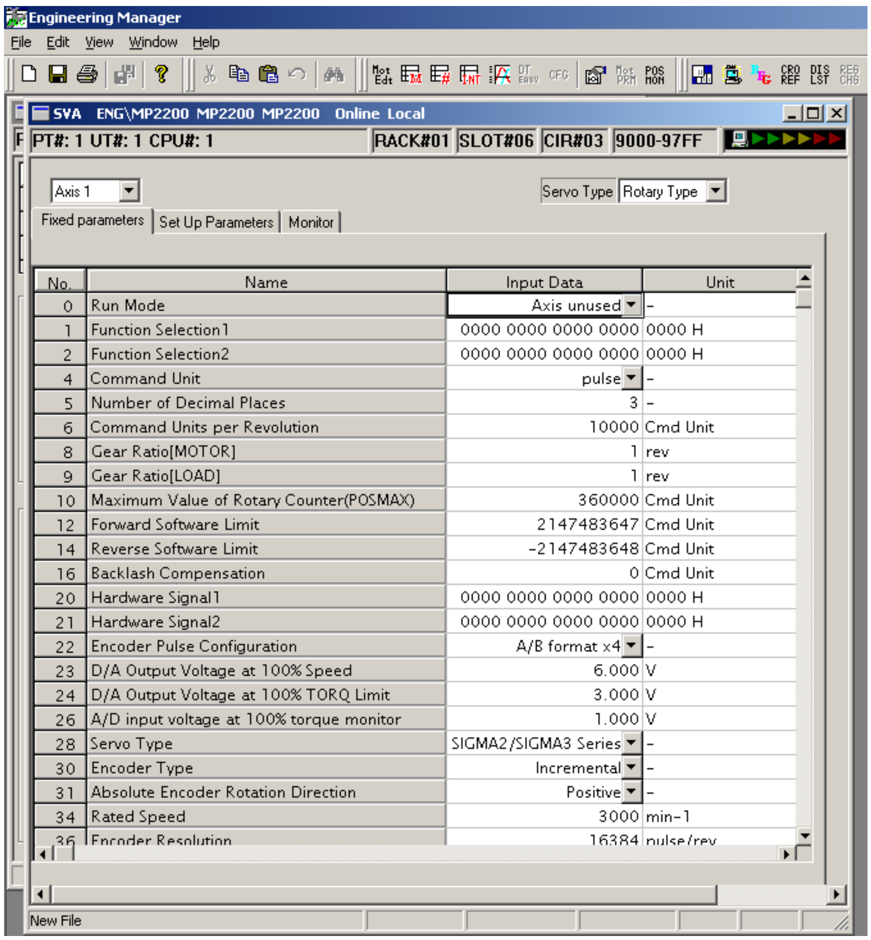
a) Click the Module name in the Module Details section of the Module Configuration Window.

b) Select ***File – Open Slot*** to display the SVA Definitions Window.

■ Using the Slot Number

Double-click the slot number in the Module Details section of the Module Configuration Window to display the SVA Definitions Window.

The following diagram shows the SVA Definitions Window.



The SVA-01 Definitions Window is composed of three tab pages: the Fixed Parameters, Set Up Parameters, and Monitor Tab Pages.

Table 3.2 Motion Parameter Window Tab Pages

Tab Page	Details
Fixed Parameters	Sets the Motion Fixed Parameters.
Set Up Parameters	Sets the Motion Setting Parameters.
Monitor	Displays the Motion Monitoring Parameters.

It is possible to switch between these tab pages by selecting ***View – Next Page*** or ***View – Back Page*** from the motion parameters window's menus.

[b] SVA Definitions Menus

These menus can be used only in the SVA Definitions Windows.

Menu Command		Function
Edit		
	Axis Data Copy	Temporarily saves the displayed axis setting data.
	Axis Data Paste	Copies the temporarily saved axis data to the currently selected axis data.
	Details	Displays individual data in bit format.
	Default Set	Sets the default value.

■ Axis Data Copy

Select the axis data to be copied, and then select ***Edit – Axis Data Copy*** from the menu. The source axis data will be copied and saved temporarily in the cut buffer.

■ Axis Data Paste

Select the axis data to be copied, and then select ***Edit – Axis Data Paste*** from the menu. The axis data saved temporarily in the cut buffer will overwrite the axis data at the copy destination.

IMPORTANT

Copying between axes is possible using the Axis Data Copy and the Axis Data Paste functions. Copying between axes requires separate operations for fixing and setting parameters. If the pasted data is for a different type of motor, an error message will be displayed.

■ Details

Use this function to display setting data as bit images for motion parameters except for SERVOPACK parameters. The information can be displayed for each bit by selecting ***Edit – Details*** from the menu.

■ Default Set

Use this function to restore the settings data for the fixed and setting parameters to their default values.
Select ***Edit – Default Set*** from the menu. The axis parameters currently displayed will be set to their default values. Parameters whose current values are displayed will have their current values updated.

The following table shows the functions given above.

	Motion Fixed Parameters	Motion Setting Parameters	Motion Monitoring Parameters	Remarks
Axis Data Copy /Axis Data Paste	Yes	Yes	No	–
Details	Yes	Yes	Yes	Parameters in bit format only
Default Set	Yes	Yes	No	–

（Note）Yes: Operation possible, NO: Operation not possible.

[c] Motion Parameter Settings

■ Fixed Parameters Tab Page

Set the parameters required for motion control on the Fixed Parameters Tab Page.

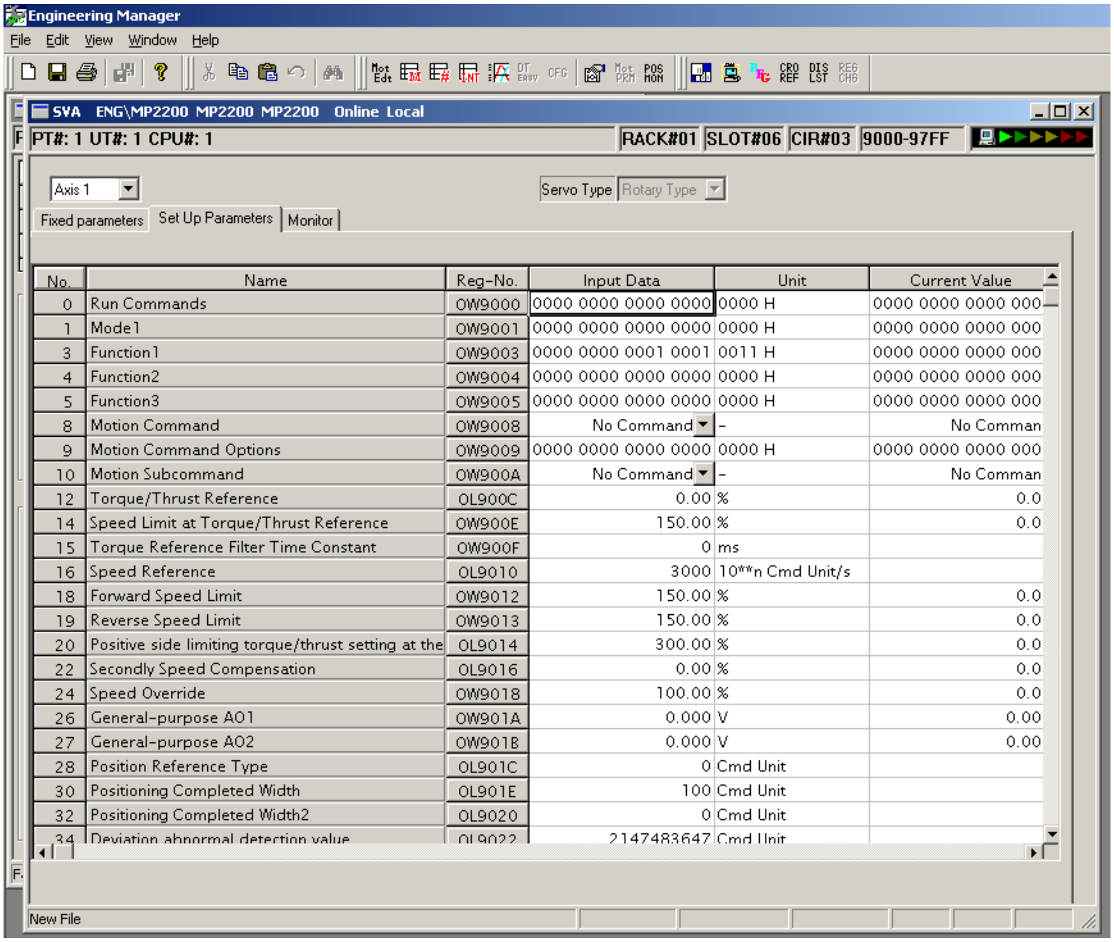
Setting	Details
Axis Number	Select the desired axis number. Set the fixed parameters for each axis.
Servo Type (Motor Type)	Displays the motor type.
No.	Displays the parameter number of the motion fixed parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.

INFO

For details on each of the fixed parameter settings, refer to *4.4.1 Motion Fixed Parameter Details*.

■ Set Up Parameters Tab Page

Set the parameters required for motion control on the Set Up Parameters Tab Page.

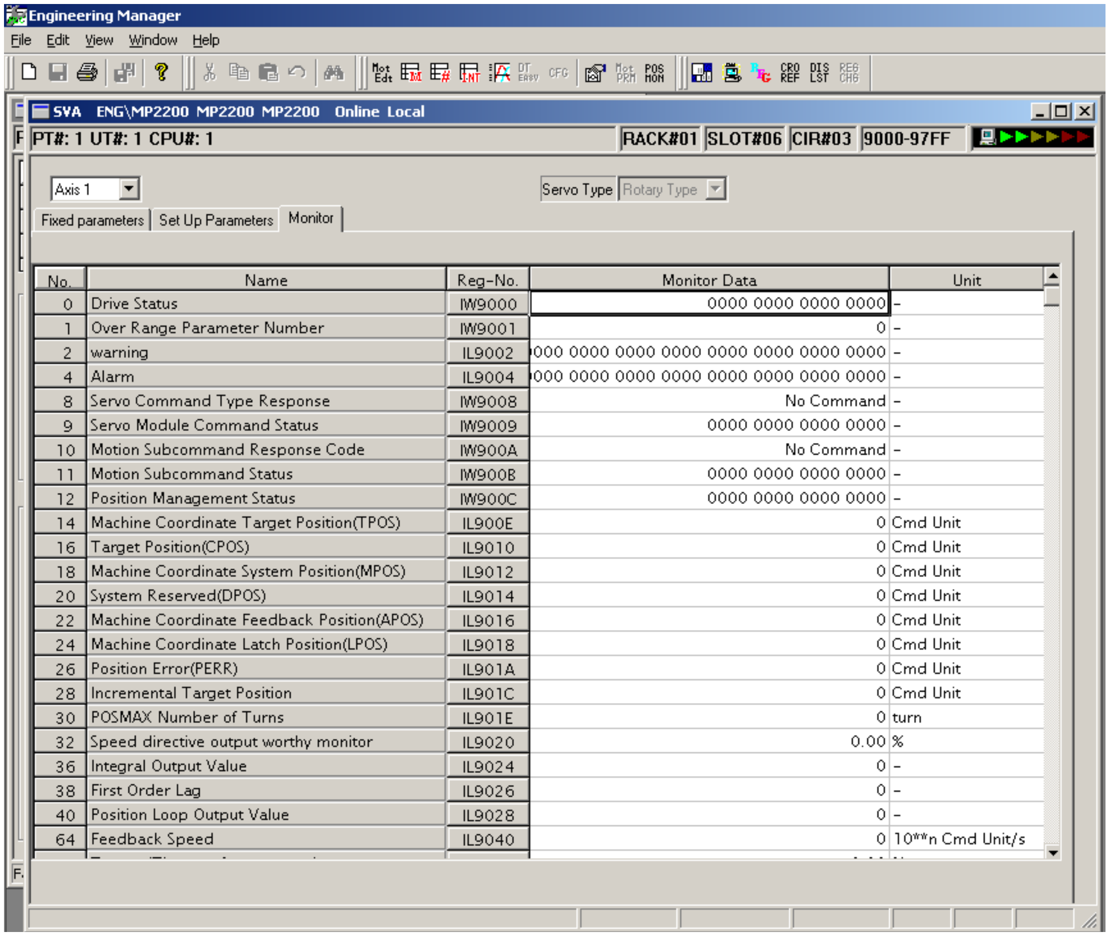


Setting	Details
Axis Number	Select the desired axis number. Set the setting parameters for each axis.
Servo Type (Motor Type)	Displays the motor type.
No.	Displays the parameter number of the setting parameter.
Name (Parameter Name)	Displays the parameter name.
Reg-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being selected. Refer to *4.1.2 SVA-01 Module Motion Parameter Register Numbers* for details.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed.

INFO For details on each of the setting parameter settings, refer to *4.4.2 Motion Setting Parameter Details*.

■ Monitor Tab Page

The Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Monitor Tab Page; the settings cannot be changed here.



Setting	Details
Axis Number	Select the desired axis number. The parameters for each axis are displayed.
Servo Type (Motor Type)	Displays the motor type.
No.	Displays the parameter number of the motion monitoring parameter.
Name (Parameter Name)	Displays the parameter name.
Reg-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed, as shown in *4.1.2 SVA-01 Module Motion Parameter Register Numbers*.
Monitor Data	In online mode, the current values of the parameters are displayed.
Unit	Displays the units of the corresponding parameter.

INFO

Refer to *4.4.3 Motion Monitoring Parameter Details* for details on monitoring parameter settings.

[d] Saving, Deleting, and Closing the SVB Motion Parameters

Refer to *(2) Module Configuration Definition Settings* under *3.1.3 Module Configuration Definitions*.

IMPORTANT

- The Delete operation deletes the motion fixed parameter and setting parameter settings of all axes.
- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.

3.2.4 Servo Parameter Settings

(1) SERVOPACK Parameter Settings

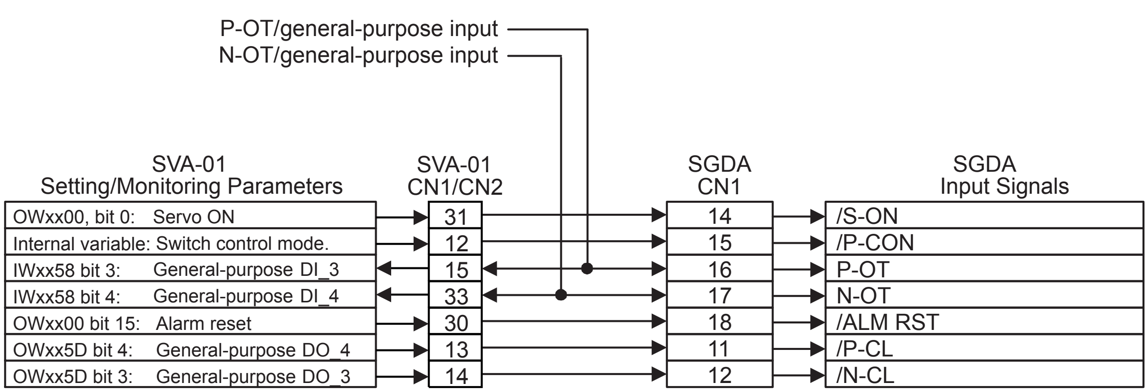
The SERVOPACK parameters must be set as described in this section when using a SERVOPACK in combination with an SVA-01 Module.

[a] SGDA SERVOPACK Parameter Settings

Parameter No.	Name	Default Value	Set Value	Setting Contents	Remarks
Cn-01, bit 0	Servo ON input (/S-ON) enable/disable	0	0	Enables the Servo ON input (/S-ON).	
Cn-01, bit 1	SEN signal input enable/disable	0	0	Enables the SEN signal input (SEN).	
Cn-01, bit 2	Forward rotation prohibited input (P-OT) enable/disable	0	0	Enables the forward rotation prohibited input (P-OT).	This input can also be disabled.
Cn-01, bit 3	Reverse rotation prohibited input (N-OT) enable/disable	0	0	Enables the reverse rotation prohibited input (N-OT).	This input can also be disabled.
Cn-01, bit A	Control mode selection	0	1	Torque control II (Torque Control↔ Speed Control)	
Cn-01, bit B		0	1		
Cn-01, bit F	Torque feed forward function	0	0	Disables the torque forward function.	*
Cn-02, bit F	Torque reference input selection	0	1	In speed control mode, TREF is used as the torque limit.	*

* Both CN-01, bit B and Cn-02, bit F cannot be turned ON. If they are both turned ON, Cn-01, bit F takes priority. If Cn-01, bit F is set to 1, the value of OL□□14 (Positive Side Limiting Torque Setting at Speed Reference) will be treated as the torque feed forward.

The I/O signals related to the SVA-01 are shown in the following connection diagram.

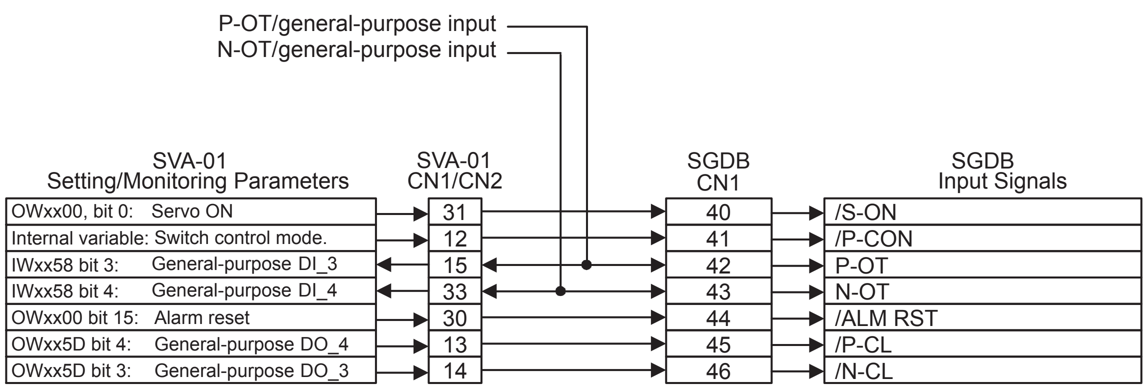


[b] SGDB SERVOPACK Parameter Settings

Parameter No.	Name	Default Value	Set Value	Setting Contents	Remarks
Cn-01, bit 0	Servo ON input (/S-ON) enable/ disable	0	0	Enables the Servo ON input (/S-ON).	Used by SVA-01 system.
Cn-01, bit 1	SEN signal input enable/disable	0	0	Enables the SEN signal input (SEN).	Used by SVA-01 system.
Cn-01, bit 2	Forward rotation prohibited input (P-OT) enable/disable	0	0	Enables the forward rotation prohibited input (P-OT).	This input can also be disabled.
Cn-01, bit 3	Reverse rotation prohibited input (N-OT) enable/disable	0	0	Enables the reverse rotation prohibited input (N-OT).	This input can also be disabled.
Cn-02, bit 2	Analog speed limit function	0	1	In torque control mode, VREF is used as the analog speed limit.	
Cn-02, bit 6	TRQ-M analog monitor selection	0	0	Outputs torque to TRQ-M.	
Cn-02, bit 7	VTG-M analog monitor selection	0	0	Outputs torque to VTG-M.	
Cn-02, bit 8	Analog current limit function	0	1	In speed control mode, TREF is used as the analog current limit (torque limit).	*
Cn-02, bit 9	Torque feed-forward function	0	0	In speed control mode, TREF is used as the torque feed forward.	*
Cn-2B	Control method selection	0	9	Torque control (analog reference) ↔ Speed control (analog reference)	

* Both CN-02, bit 8 and Cn-02, bit 9 cannot be turned ON. If Cn-02, bit 8 is set to 0 and Cn-02, bit 9 is set to 1, the value of OL□□14 (Positive Side Limiting Torque Setting at Speed Reference) will be treated as the torque feed forward.

The I/O signals related to the SVA-01 are shown in the following connection diagram.



[c] SGDM, SGDH, and SGDS SERVOPACK Parameter Settings

■ Parameters That Are the Same for the SGDM, SGDH, and SGDS

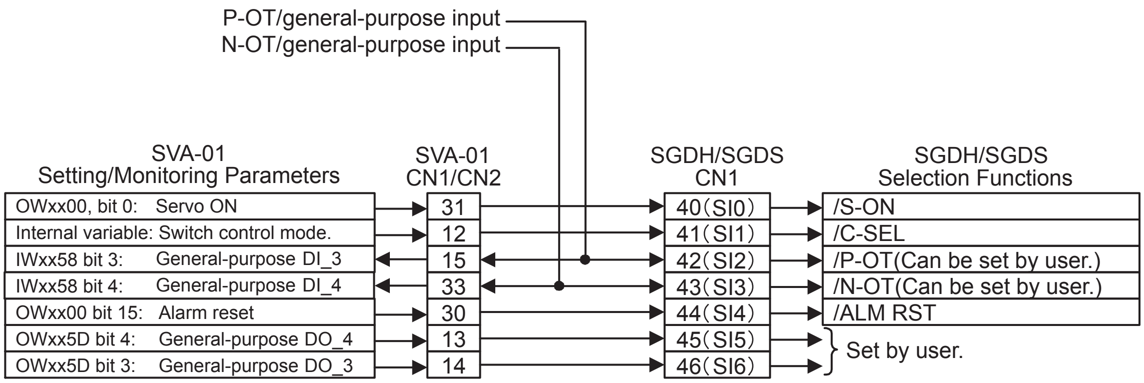
Parameter No.	Name	Default Value	Set Value	Setting Contents	Remarks
Pn000.1	Control method selection	0	9	Torque control (analog reference) ↔ Speed control (analog reference)	
Pn002.0	Speed control option	0	1	Use T-REF as external torque limit input.	*1
Pn002.1	Torque control option	0	1	Use V-REF as external speed limit input.	
Pn003.0	Analog monitor 1	2	2	Torque (Thrust) Reference monitor	
Pn003.1	Analog monitor 2	0	0	Motor speed	
Pn50A.0	Input signal allocation mode	0	1	Enables freely allocating input signals.	
Pn50A.1	/S-ON signal mapping	0	0	SI0 (CN1-40) input from input terminal.	Used by SVA-01 system.
Pn50A.2	/P-CON signal mapping	1	8	Signal always disabled.	*2
Pn50A.3	P-OT signal mapping	2	2	SI2 (CN1-42) input from input terminal.	*2
Pn50B.0	N-OT signal mapping	3	3	SI3 (CN1-43) input from input terminal.	*2
Pn50B.1	/ALM-RST signal mapping	4	4	SI4 (CN1-44) input from input terminal.	Used by SVA-01 system.
Pn50B.2	/P-CL signal mapping	5	8	Signal always disabled.	*2
Pn50B.3	/N-CL signal mapping	6	8	Signal always disabled.	*2
Pn50C.0	/SPD-D signal mapping	8	8	Signal always disabled.	Cannot be used.
Pn50C.1	/SPD-A signal mapping	8	8	Signal always disabled.	Cannot be used.
Pn50C.2	/SPD-B signal mapping	8	8	Signal always disabled.	Cannot be used.
Pn50C.3	/C-SEL signal mapping	8	1	SI1 (CN1-41) input from input terminal.	Used by SVA-01 system.
Pn50D.0	/ZCLAMP signal mapping	8	8	Signal always disabled.	Cannot be used.
Pn50D.1	/INHIBIT signal mapping	8	8	Signal always disabled.	Cannot be used.
Pn50D.2	/G-SEL 1 signal mapping	8	8	Signal always disabled.	*2

■ Additional Parameters for the SGDS

Parameter No.	Name	Default Value	Set Value	Setting Contents	Remarks
Pn515.0	/G-SEL2 signal mapping	8	8	Signal always disabled.	*2

* 1. If Pn002.0 is set to 2, T-REF can be used as the torque feed forward input. If this is done, the value of OL□□14 (Positive Side Limiting Torque Setting at Reference) will be treated as the torque feed forward.
* 2. The user can freely allocated functions to the following input terminals: SI2 (CN1-42), SI3 (CN1-43), SI5 (CN1-45), SI6 (CN1-46). Of these, SI2 (CN1-42) and SI3 (CN1-43) are external input signals. SI5(CN1-45) and SI6 (CN1-46) can be controlled from SVA-01 setting parameters.

The I/O signals related to the SVA-01 are shown in the following connection diagram.



(2) SVA-01 Module Fixed Parameter Settings

The SVA-01 Module fixed parameters must be set as shown in this section when using a SERVOPACK and motor in combination with the SVA-01 Module.

[a] SGDA

SERVOPACK and Motor Specifications				SVA-01 Module Fixed Parameter Settings	
Rated speed [min^{-1}] ÷ Cn-03 (Speed reference gain) × 1000			→	No. 23	D/A Output Voltage at 100% Speed
Cn-13 (Torque reference gain) × 0.1 × 1000			→	No. 24	D/A Output Voltage at 100% Torque
Servo type	Σ-I	0 (fixed value)	→	No. 28	Servo Drive Selection
Motor type	Rotary	0 (fixed value)	→	No. 29	Motor Type Selection
Encoder	Cn-01, bit F = 0 (INC)	0 (fixed value)	→	No. 30	Encoder Selection
	Cn-01, bit F = 1 (ABS)	1 (fixed value) or 2 (fixed value)			
Reverse rotation connection	Cn-02, bit 0 = 0 (Forward)	0 (fixed value)	→	No. 31	Rotational Direction of Absolute Encoder
	Cn-02, bit 0 = 1 (Reverse)	1 (fixed value)			
Rated speed	Rotary	Rated speed [min^{-1}]	→	No. 34	Rated Speed
Encoder resolution	Rotary	Pulses per motor revolution (before multiplication) [pulse/rev]	→	No. 36	Encoder Resolution (before Multiplication)
99999 (fixed value)			→	No. 38	Max. Revolutions of Absolute Encoder

[b] SGDB

SERVOPACK and Motor Specifications				SVA-01 Module Fixed Parameter Settings	
Rated speed [min^{-1}] ÷ Cn-03 (Speed reference gain) × 1000			→	No. 23	D/A Output Voltage at 100% Speed
Cn-13 (Torque reference gain) × 0.1 × 1000			→	No. 24	D/A Output Voltage at 100% Torque
2000 (fixed value)			→	No. 26	A/D Input Voltage at 100% Torque Monitor
Servo type	Σ-I	0 (fixed value)	→	No. 28	Servo Drive Selection
Motor type	Rotary	0 (fixed value)	→	No. 29	Motor Type Selection
Encoder	Cn-01, bit F = 0 (INC)	0 (fixed value)	→	No. 30	Encoder Selection
	Cn-01, bit F = 1 (ABS)	1 (fixed value) or 2 (fixed value)			
Reverse rotation connection	Cn-02, bit 0 = 0 (Forward)	0 (fixed value)	→	No. 31	Rotational Direction of Absolute Encoder
	Cn-02, bit 0 = 1 (Reverse)	1 (fixed value)			
Rated speed	Rotary	Rated speed [min^{-1}]	→	No. 34	Rated Speed
Encoder resolution	Rotary	Pulses per motor revolution (before multiplication) [pulse/rev]	→	No. 36	Encoder Resolution (before Multiplication)
99999 (fixed value)			→	No. 38	Max. Revolutions of Absolute Encoder

[c] SGDM and SGDH

■ With a Rotary Motor Connected

SERVOPACK and Motor Specifications				SVA-01 Module Fixed Parameter Settings	
Pn300 (Speed reference input gain) × 0.01 × 1000			→	No. 23	D/A Output Voltage at 100% Speed
Pn400 (Torque reference input gain) × 0.1 × 1000			→	No. 24	D/A Output Voltage at 100% Torque
1000 (fixed value)			→	No. 26	A/D Input Voltage at 100% Torque Monitor
Servo type	Σ-II (including Σ-III)	1 (fixed value)	→	No. 28	Servo Drive Selection
Motor type	Rotary	0 (fixed value)	→	No. 29	Motor Type Selection
Encoder	INC	0 (fixed value)	→	No. 30	Encoder Selection
	For ABS, Pn002.2 = 0 (ABS)	1 (fixed value) or 2 (fixed value)			
	For ABS, Pn002.2 = 1 (INC)	0 (fixed value)			
Reverse rotation connection	Pn000.0 = 0 (Forward)	0 (fixed value)	→	No. 31	Rotational Direction of Absolute Encoder
	Pn000.0 = 1 (Reverse)	1 (fixed value)			
Rated speed	Rotary	Rated speed [min^{-1}]	→	No. 34	Rated Speed
Encoder resolution	Rotary	Pn201 (PG dividing ratio (for 16-bit or less)) or Pn212 (PG dividing ratio (for 17-bit or more)) [pulse/rev]	→	No. 36	Encoder Resolution (before multiplication) or Serial Converter Resolution
Multiturn limit	Rotary	Pn205 (Multiturn limit setting)	→	No. 38	Max. Revolutions of Absolute Encoder
	DD motor	0 (fixed value)			

■ With a Linear Motor Connected

SERVOPACK and Motor Specifications				SVA-01 Module Fixed Parameter Settings	
Pn280 (Linear scale pitch) [μm] converted to UNIT.*			→	No. 6	Command Units per Revolution (Rotary Motor) or Linear Scale Pitch (Linear Motor)
Pn300 (Speed reference input gain) × 0.01 × 1000			→	No. 23	D/A Output Voltage at 100% Speed
Pn400 (Torque reference input gain) × 0.1 × 1000			→	No. 24	D/A Output Voltage at 100% Torque
1000 (fixed value)			→	No. 26	A/D Input Voltage at 100% Torque Monitor
Servo type	Σ-II (including Σ-III)	1 (fixed value)	→	No. 28	Servo Drive Selection
Motor type	Linear	1 (fixed value)	→	No. 29	Motor Type Selection
Rated speed	Linear	Rated speed [0.1 m/s]	→	No. 34	Rated Speed [0.1 m/s]
Encoder resolution	Linear	Pn281 (PG dividing ratio) ÷ 4 [pulses/scale pitch] *	→	No. 36	Encoder Resolution (before Multiplication) or PG Dividing Ratio per Scale Pitch (before Multiplication)

* When converting the unit of Pn280 from μm to UNIT, multiply by 10^n and set the results in fixed parameter No. 6 so that fractions do not result. In the same way for Pn281, multiply by 10^n and set the results in fixed parameter No. 36.

[d] SGDS

■ With a Rotary Motor Connected

SERVOPACK and Motor Specifications				SVA-01 Module Fixed Parameter Settings	
Pn300 (Speed reference input gain)× 0.01 × 1000			→	No. 23	D/A Output Voltage at 100% Speed
Pn400 (Torque reference input gain) × 0.1 × 1000			→	No. 24	D/A Output Voltage at 100% Torque
1000 (fixed value)			→	No. 26	A/D Input Voltage at 100% Torque Monitor
Servo type	Σ-II (including Σ-III)	1 (fixed value)	→	No. 28	Servo Drive Selection
Motor type	Rotary	0 (fixed value)	→	No. 29	Motor Type Selection
Encoder	INC	0 (fixed value)	→	No. 30	Encoder Selection
	For ABS, Pn002.2 = 0 (ABS)	1 (fixed value) or 2 (fixed value)			
	For ABS, Pn002.2 = 1 (INC)	0 (fixed value)			
Reverse rotation connection	Pn000.0 = 0 (Forward)	0 (fixed value)	→	No. 31	Rotational Direction of Absolute Encoder
	Pn000.0 = 1 (Reverse)	1 (fixed value)			
Rated speed	Rotary	Rated speed [min^{-1}]	→	No. 34	Rated Speed
Encoder resolution	Rotary	Pn212 (PG dividing pulse) [pulse/rev]	→	No. 36	Encoder Resolution (before Multiplication) or Serial Converter Resolution
Multiturn limit	Rotary	Pn205 (Multiturn limit setting)	→	No. 38	Max. Revolutions of Absolute Encoder
	DD motor	0 (fixed value)			

■ With a Linear Motor Connected

SERVOPACK and Motor Specifications				SVA-01 Module Fixed Parameter Settings	
Pn282 (Linear scale pitch) [0.01 μm] converted to UNIT.*			→	No. 6	Command Units per Revolution (Rotary Motor) or Linear Scale Pitch (Linear Motor)
Pn300 (Speed reference input gain) × 0.01 × 1000			→	No. 23	D/A Output Voltage at 100% Speed
Pn400 (Torque reference input gain)× 0.1 × 1000			→	No. 24	D/A Output Voltage at 100% Torque
1000 (fixed value)			→	No. 26	A/D Input Voltage at 100% Torque Monitor
Servo type	Σ-II (including Σ-III)	1 (fixed value)	→	No. 28	Servo Drive Selection
Motor type	Linear	1 (fixed value)	→	No. 29	Motor Type Selection
Rated speed	Linear	Rated speed [0.1m/s]	→	No. 34	Rated Speed [0.1 m/s]
Encoder resolution	Linear	Pn281 (Encoder output resolution) ÷ 4 [pulses/scaling pitch] *	→	No. 36	Encoder Resolution (before Multiplication) or PG Dividing Ratio per Scale Pitch (before Multiplication)

* When converting the unit of Pn282 from μm to UNIT, multiply by 10^n and set the results in fixed parameter No. 6 so that fractions do not result. In the same way for Pn281, multiply by 10^n and set the results in fixed parameter No. 36.

(3) Restrictions for Feedback Pulse Inputs

[a] Restrictions for SERVOPACK Pulse Output Frequency

The limits to the SERVOPACK pulse output frequency are as shown in the following tables.

Upper Limit (Actual Values) of Phase-A/B Divided Output Pulse Frequency for Σ-II/Σ-III SERVOPACKs = 1.6384 MHz (before multiplication)

However;

Motor Speed at a Divided Output Pulse Frequency of 1.6384 MHz = 1.6384 × 106 × 60 ÷ Pn212 set value

The following tables show the relationship between the number of encoder bits and the maximum speed for a pulse frequency of 1.6384 MHz output by Σ-II/Σ -III SERVOPACKs.
Application must be within the ranges shown in these tables when a Σ-II/Σ-III SERVOPACK is connected to the SVA-01.

- Σ-II SERVOPACK Connection

Encoder Bits	Pn201 Setting Range	Pn201 Setting Example	Motor Speed (min^{-1}) at a Divided Output Pulse Frequency of 1.6384 MHz
17 bits	16 to 16384 (in increments of pulses)	16384	6000
20 bits	16 to 16384 (in increments of pulses)	16384	6000

- Σ-III SERVOPACK Connection

Encoder Bits	Pn212 Setting Range	Pn212 Setting Example	Motor Speed (min^{-1}) at a Divided Output Pulse Frequency of 1.6384 MHz
17 bits	16 to 16384 (in increments of pulses)	16384	6000
	16386 to 32768 (in increments of pulses)	32768	3000
20 bits	16 to 16384 (in increments of pulses)	16384	6000
	16386 to 32768 (in increments of pulses)	32768	3000
	32772 to 65536 (in increments of pulses)	65536	1500
	65544 to 131072 (in increments of pulses)	131072	750
	131088 to 262144 (in increments of pulses)	262144	375

[b] Restrictions in the SVA-01 Pulse Input Frequency

The limits to the SVA-01 pulse input frequency are as shown in the following tables.

Upper limit to the SVA-01 phase A/B input pulse frequency = 4 MHz (before multiplication)

Therefore;

Motor speed at a pulse input frequency of 4 MHz = $4 \times 10^6 \times 60 \div$ Encoder resolution

The following table shows the relationship between the number of encoder bits and the maximum speed for a pulse input frequency of 4 MHz to the SVA-01.

Application must be within the ranges shown in these tables when inputting pulses to the SVA-01.

Encoder Bits*	Encoder Resolution (before Multiplication)	Motor Speed (min^{-1}) at a Pulse Input Frequency of 4 MHz
12 bits	1024	234375
13 bits	2048	117187
15 bits	8192	29296
16 bits	16384	14648
17 bits	32768	7324
18 bits	65536	3662
19 bits	131072	1831
20 bits	262144	915
21 bits	524288	457
22 bits	1048576	228

* This table is used to explain restrictions in the SVA-01 pulse input frequency. It contains some numbers of bits that do not actually exist on the products.

3.3 SVR Module Setup

This chapter explains the setup methods (Module Definitions) for the SVR Module.

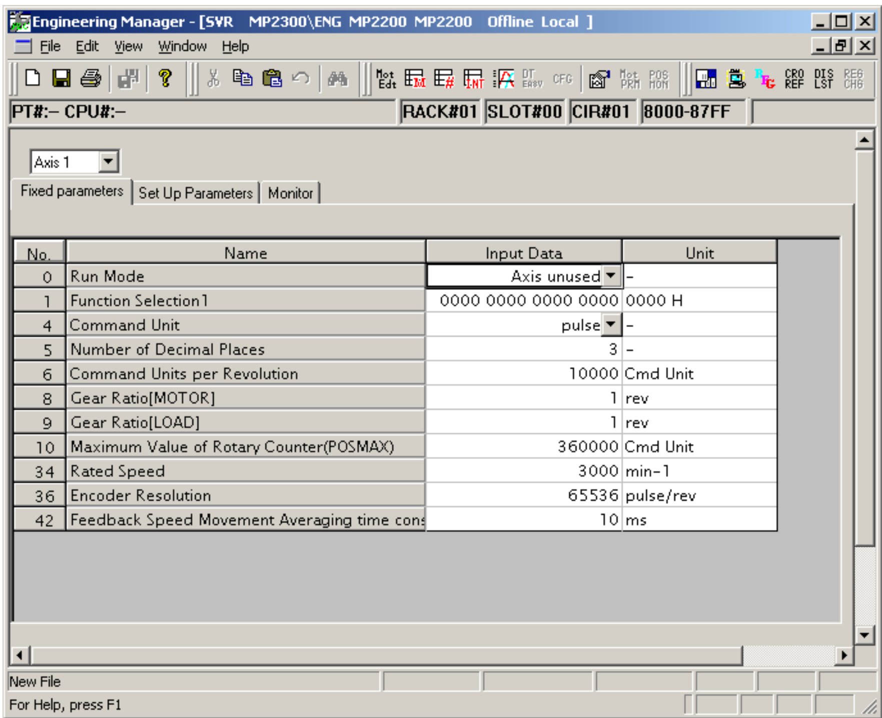
3.3.1 Module Configuration Definition

Open the SVR Window using the procedure in *(1) Opening the Module Configuration Definition Window* under *3.1.3 Module Configuration Definitions*.

(1) SVR Definitions

[a] SVR Definitions Window

Open the SVR Definitions Window using the same procedure as for *(4) SVB Definitions* under *3.1.3 Module Configuration Definitions*. The following diagram shows the SVR Definitions Window.



The SVR Definitions Window is composed of three tab pages: the Fixed Parameters, Set Up Parameters, and Motion Monitor Tab Pages.

Tab Page	Details
Fixed parameters	Sets the motion fixed parameters.
Set Up parameters	Sets the motion setting parameters.
Monitor	Displays the motion monitoring parameters.

[b] Menu Items Enabled Only in SVR Definition Window

Refer to *[b] SVB Definitions* under *3.1.3 Module Configuration Definitions* for details.

(2) Motion Parameter Settings

[a] Fixed Parameters Tab Page

The fixed parameters required for Servo adjustment are set in the Fixed Parameters Tab Page.

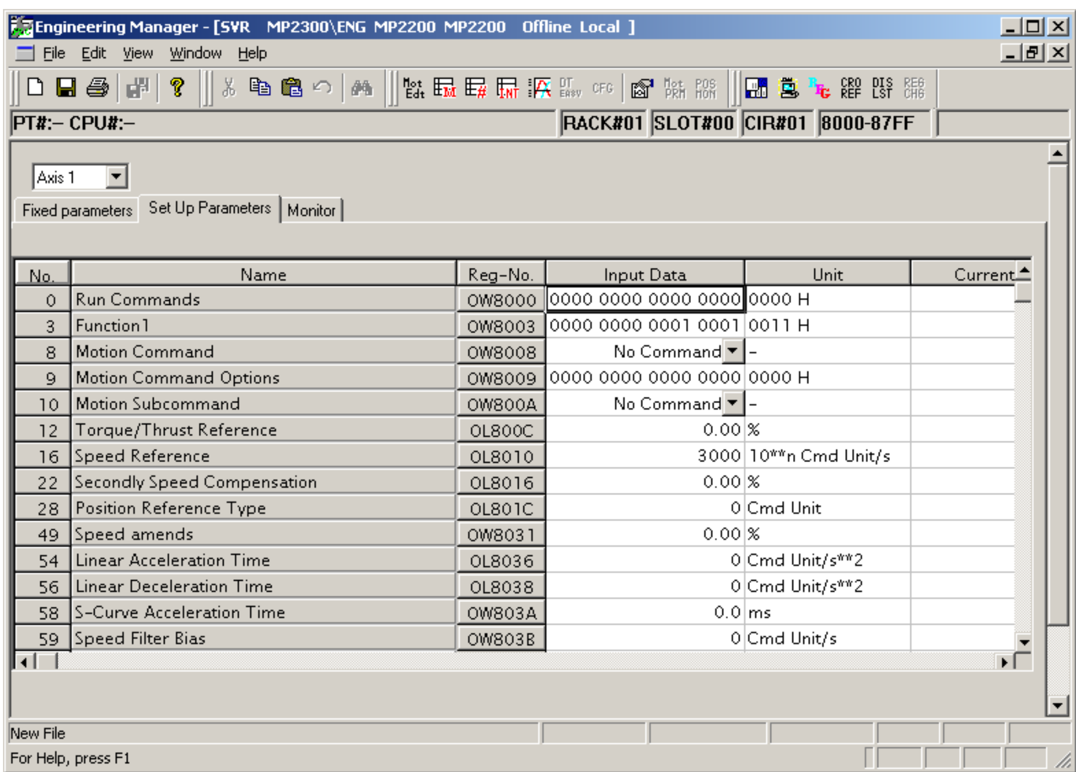
Setting	Details
Axis Number	Select the desired axis number. Set the motion fixed parameters for each axis.
No.	Displays the parameter number for the fixed parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the parameter unit.

INFO

Refer to *(1) Motion Fixed Parameters* under *8.2.2 Motion Parameter Settings* for details on motion fixed parameter settings.

[b] Set Up Parameters Tab Page

Parameters required for Servo adjustment are set in the Set Up Parameters Tab Page.



Setting	Details
Axis Number	Select the desired axis number. Set the parameters for each axis.
No.	Displays the parameter number for the setting parameter.
Name (Parameter Name)	Displays the parameter name.
Reg-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being selected. Refer to *4.1.1 Motion Parameter Register Numbers for the SVB-01 Module*.

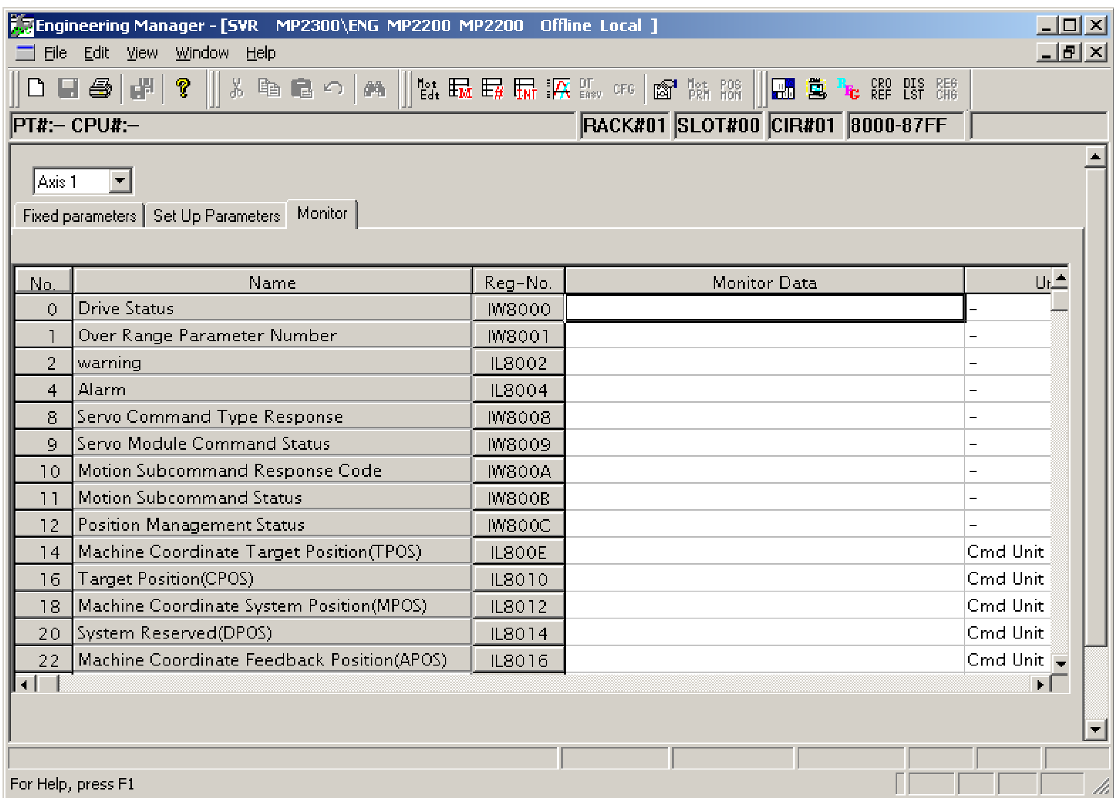
Setting	Details
Input Data (Set Data)	Input (select) the parameter value.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

INFO

Refer to *(2) Motion Setting Parameters* under *8.2.2 Motion Parameter Settings* for details on setting parameter settings.

[c] Monitor Tab Page

The Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Monitor Tab Page; the settings cannot be changed here.



Setting	Details
Axis Number	Select the desired axis number. The parameter monitor data is displayed in axis units.
No.	Displays the parameter number for the monitoring parameter.
Name (Parameter Name)	Displays the parameter name.
Reg-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed. Refer to *4.1 Motion Parameters Register Numbers*.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.
Unit	Displays the units of the corresponding parameter.

INFO

Refer to *(3) Motion Monitoring Parameters* under *8.2.2 Motion Parameter Settings* for details on monitoring parameter settings.

(3) Saving, Deleting, and Closing the SVR Definitions Data

Refer to *(2) Module Configuration Definition Settings* under *3.1.3 Module Configuration Definitions*.

IMPORTANT

- The Delete operation deletes the motion fixed parameter and setting parameter settings of all axes.
- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.

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 the SVB-01 Module

The motion parameters register numbers (I and O register numbers) are determined by the circuit number and axis number.

INFO

The register numbers for each axis's motion parameters can be obtained using the following equation.

Motion parameters register number =

I (O) W 8000 + (Circuit number $-$ 1) $\times$ 800 hex + (Axis number $-$ 1) $\times$ 80 hex

The following table lists the motion parameters register numbers.

Circuit No.	Axis Number 1	Axis Number 2	Axis Number 3	Axis Number 4	Axis Number 5	Axis Number 6	Axis Number 7	Axis Number 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

(cont'd)

Circuit No.	Axis Number 1	Axis Number 2	Axis Number 3	Axis Number 4	Axis Number 5	Axis Number 6	Axis Number 7	Axis Number 8
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

4.1.2 SVA-01 Module Motion Parameter Register Numbers

The motion parameter register numbers (I or O register numbers) are determined by the module number and axis (axes 1 to 16).

INFO

Motion parameter register numbers can be obtained using the following equation.

Motion parameters register number =
I(O)W 8000 + (Module number – 1) × 800 hex + (Axis number – 1) × 80 hex

The following tables lists the motion parameters register numbers.

Module No.	Axis No. 1	Axis No. 2
1	8000 to 807F	8080 to 80FF
2	8800 to 887F	8880 to 88FF
3	9000 to 907F	9080 to 90FF
4	9800 to 987F	9880 to 98FF
5	A000 to A07F	A080 to A0FF
6	A800 to A87F	A880 to A8FF
7	B000 to B07F	B080 to B0FF
8	B800 to B87F	B880 to B8FF
9	C000 to C07F	C080 to C0FF
10	C800 to C87F	C880 to C8FF
11	D000 to D07F	D080 to D0FF
12	D800 to D87F	D880 to D8FF
13	E000 to E07F	E080 to E0FF
14	E800 to E87F	E880 to E8FF
15	F000 to F07F	F080 to F0FF
16	F800 to F87F	F880 to F8FF

The maximum number of axes that can be allocated per Module differs for the MP2300 and MP2200. The maximum numbers of axes are given in the following table.

MP2000 Series		Number of Modules	Maximum Number of Axes
MP2300		0 to 2	4 axes
MP2200	1-rack configuration	0 to 7	14 axes
	2-rack configuration	0 to 14	28 axes
	3-rack configuration	0 to 16	32 axes
	4-rack configuration		

4.2 Motion Parameter Lists

4.2.1 Fixed Parameter List

No.	Name	Description	SVB -01	SVA -01	SVR
0	Run Mode	0: Normal Running	Yes	Yes	Yes
		1: Axis Unused	Yes	Yes	Yes
		2: Simulation Mode	Yes	Yes	
		3: Servo Driver Command (SERVOPACK Transparent Command Mode)	Yes		
		4: General-purpose I/O mode		Yes	
		5: Reserved mode 1 (factory adjustment mode)		Yes	
1	Function Selection 1	Bit 0: Axis Type (0: Finite length axis/1: Infinite length axis)	Yes	Yes	Yes
		Bit 1: Forward Software Limit Enabled (0: Disabled/1: Enabled)	Yes	Yes	
		Bit 2: Reverse Software Limit Enabled (0: Disabled/1: Enabled)	Yes	Yes	
		Bit 3: Positive Overtravel (0: Disabled/1: Enabled)	Yes	Yes	
		Bit 4: Negative Overtravel (0: Disabled/1: Enabled)	Yes	Yes	
		Bit 5: Deceleration Limit Switch Inversion (0: Not inverted/1: Inverted)		Yes	
		Bit 6: Reserved			
		Bit 7: Read Absolute Data after Power-up (0: Executed/1: Not executed.)		Yes	
		Bit 8: Segment Distribution Processing	Yes		
		Bit 9: Simple ABS Infinite Axis (0: Disabled/1: Enabled)	Yes	Yes	
		Bit A: User Constants Self-Writing Function	Yes		
		Bits B to F: Reserved			
2	Function Selection 2	Bit 0: Communication Error Mask	Yes		
		Bit 1: WDT Error Mask	Yes		
		Bit 2: Reserved			
		Bit 3: Analog Adjustment Unfinished Warning Mask (0: Disabled/1: Enabled)		Yes	
		Bit 4: PG Disconnected Alarm Mask (0: Disabled/1: Enabled)			
		Bits 5 to F: Reserved			
3	–	Reserved			
4	Command Unit	0: pulse 1: mm 2: deg 3: inch	Yes	Yes	Yes
5	Number of Decimal Places	1 = 1 digit	Yes	Yes	Yes
6	Command Units per Revolution (rotary motor) or Linear Scale Pitch (linear motor)	1 = 1 reference unit	Yes	Yes	Yes
8	Gear Ratio [MOTOR]	1 = 1 rotation This setting is ignored if a linear motor is selected.	Yes	Yes	Yes
9	Gear Ratio [LOAD]	1 = 1 rotation This setting is ignored if a linear motor is selected.	Yes	Yes	Yes
10	Maximum Value of Rotary Counter (POSMAX)	1 = 1 reference unit	Yes	Yes	Yes
12	Forward Software Limit	1 = 1 reference unit	Yes	Yes	

(cont'd)

No.	Name	Description	SVB-01	SVA-01	SVR
14	Reverse Software Limit	1 = 1 reference unit	Yes	Yes	
16	Backlash Compensation	1 = 1 reference unit	Yes	Yes	
18	–	Reserved			
20	Hardware Signal 1	Bit 0: Pulse A/B Input Signal Polarity (0: Positive logic/1: Negative logic)		Yes	
		Bit 1: Pulse C Input Signal Polarity (0: Positive logic/1: Negative logic)		Yes	
		Bits 2 to F: Reserved			
21	Hardware Signal 2	Bit 0: Deceleration Limit Switch Signal (0: Use setting parameter/1: Use the DI signal)		Yes	
		Bits 1 to F: Reserved			
22	Pulse Count Mode Selection	0: Sign mode (Input pulse multiplier: 1) 1: Sign mode (Input pulse multiplier: 2) 2: Up/Down mode (Input pulse multiplier: 1) 3: Up/Down mode (Input pulse multiplier: 2) 4: Pulse A/B mode (Input pulse multiplier: 1) 5: Pulse A/B mode (Input pulse multiplier: 2) 6: Pulse A/B mode (Input pulse multiplier: 4)		Yes	
23	D/A Output Voltage at 100% Speed	1 = 0.001 V		Yes	
24	D/A Output Voltage at 100% Torque	1 = 0.001 V		Yes	
25	–	Reserved			
26	A/D Input Voltage at 100% Torque Monitor	1 = 0.001 V		Yes	
27	–	Reserved			
28	Servo Driver Series	0: Σ-I 1: Σ-II/Σ-III 2: Reserved		Yes	
29	Motor Type	0: Rotary motor 1: Linear motor	Yes	Yes	
30	Encoder Type	0: Incremental encoder 1: Absolute encoder 2: Absolute encoder used as an incremental encoder. 3: Reserved	Yes	Yes	
31	Rotational Direction of Absolute Encoder	0: Forward 1: Reverse		Yes	
32	–	Reserved			
34	Rated Speed (Rotary Motor or Linear Motor)	1 = 1 min^{-1} (with rotary motor) or 1 = 0.1 m/s (with linear motor)	Yes	Yes	Yes
36	Encoder Resolution in Pulses/ Revolution (Rotary Motor)	1 = 1 pulse/rev Set the value before multiplication. Refer to *(2) SVA-01 Module Fixed Parameter Settings* under *3.2.4 Servo Parameter Settings* for setting methods.		Yes	
		1 = 1 pulse/rev Set the value before multiplication.	Yes		Yes
	Encoder Output Resolution per Linear Scale Pitch (Linear Motor)	1 = 1 pulse/linear scale pitch Set the value before multiplication. Refer to *(2) SVA-01 Module Fixed Parameter Settings* under *3.2.4 Servo Parameter Settings* for setting methods.		Yes	
		1 = 1 pulse/linear scale pitch Set the value before multiplication.	Yes		

(cont'd)

No.	Name	Description	SVB -01	SVA -01	SVR
38	Max. Revolution of Absolute Encoder	1 = 1 rotation Set to 0 when a direct drive motor is being used.	Yes	Yes	
40	–	Reserved			
42	Feedback Speed Moving Average Time Constant	1 = 1 ms	Yes	Yes	Yes

4.2.2 Setting Parameter List

Register No.	Name	Description	SVB -01	SVA -01	SVR
OW□□00	Run Commands	Bit 0: Servo ON (0: OFF/1: ON)	Yes	Yes	Yes
		Bit 1: Machine Lock (0: Normal operation/1: Machine locked)	Yes	Yes	
		Bits 2 and 3: Reserved			
		Bit 4: Latch Request (0: Latch request OFF/1: Latch request ON)	Yes	Yes	
		Bit 5: Absolute Read Request (0: OFF/1: ON)		Yes	
		Bit 6: POSMAX Preset (0: OFF/1: ON)	Yes	Yes	Yes
		Bit 7: Infinite Length Axis Position Information LOAD (0: OFF/1: ON)	Yes	Yes	
		Bit 8: Forward External Torque Limit Input	Yes		
		Bit 9: Reverse External Torque Limit Input	Yes		
		Bit A: Reserved			
		Bit B: Integration Reset (0: OFF/1: ON)	Yes	Yes	
		Bit C to E: Reserved			
		Bit F: Alarm Clear (0: OFF/1: ON)	Yes	Yes	Yes
OW□□01	Mode 1	Bit 0: Deviation Abnormal Detection Error Level (0: Alarm/1: Warning)	Yes	Yes	
		Bit 1: Reserved			
		Bit 2: Speed Amends during Position Control (0: Disabled/1: Enabled)		Yes	
		Bit 3: Speed Loop P/PI Switch	Yes		
		Bit 4: Gain Switch	Yes		
		Bits 5 to F: Reserved			
OW□□02	Mode 2	Bit 0: Monitor 2 Enabled (0: Disabled/1: Enabled)	Yes		
		Bits 1 to F: Reserved			

(cont'd)

Register No.	Name	Description	SVB-01	SVA-01	SVR
OW□□03	Function 1	Bits 0 to 3: Speed Unit 0: Reference unit/s 1: 10^n reference unit/min 2: 0.01% (1 = 0.01%) 3: 0.0001% (1 = 0.0001%)	Yes	Yes	Yes
		Bits 4 to 7: Acceleration/Deceleration Units 0: Reference units/s^2 1: ms	Yes	Yes	Yes
		Bits 8 to B: Filter Type 0: No filter 1: Exponential acceleration/deceleration filter 2: Moving average filter	Yes	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	Yes
OW□□04	Function 2	Bits 0 to 3: Latch Input Signal Type			
		0: DI_5 (DEC/EXT)		Yes	
		1: DI_2 (ZERO/HOME LS)		Yes	
		2: Phase-C pulse input signal	Yes	Yes	
		3: /EXT1	Yes		
		4: /EXT2	Yes		
		5: /EXT3	Yes		
		Bits 4 to 7: External Positioning Signal			
		0: DI_5 (DEC/EXT)		Yes	
		1: DI_2 (ZERO/HOME LS)		Yes	
		2: Phase-C pulse input signal	Yes	Yes	
		3: /EXT1	Yes		
		4: /EXT2	Yes		
		5: /EXT3	Yes		
		Bits 8 to F: Reserved			
OW□□05	Function 3	Bit 0: Reserved			
		Bit 1: Disable Phase Reference Generation (0: Enabled/1: Disabled)	Yes	Yes	
		Bits 2 to 7: Reserved			
		Bit 8: Deceleration Limit Switch Signal for Zero Point Return (0: OFF/1: ON)		Yes	
		Bit 9: Reverse Limit Signal for Zero Point Return (0: OFF/1: ON)		Yes	
		Bit A:Forward Limit Signal for Zero Point Return (0: OFF/1: ON)		Yes	
		Bit B: INPUT Signal for Zero Point Return (0: OFF/1: ON)	Yes	Yes	
		Bits C to F: Reserved			
OL□□06	–	Reserved			
OL□□07	–	Reserved			

(cont'd)

Register No.	Name	Description	SVB -01	SVA -01	SVR
OW□□08	Motion Command	0: NOP 1: POSING 2: EX_POSING 3: ZRET 4: INTERPOLATE 5: ENDOF_INTERPOLATE 6: LATCH 7: FEED 8: STEP 9: ZSET	Yes	Yes	Yes
		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	Yes		Yes
		23: VELO 24: TRQ 25: PHASE	Yes	Yes	Yes
		26: KIS	Yes		Yes
OW□□09	Motion Command Control Flags	Bit 0: Command Pause (0: OFF/1: ON)	Yes	Yes	Yes
		Bit 1: Command Abort (0: OFF/1: ON)	Yes	Yes	Yes
		Bit 2: JOG/STEP Direction (0: Forward rotation/1: Reverse rotation)	Yes	Yes	Yes
		Bit 3: Home Direction (0: Reverse rotation/1: Forward rotation)	Yes	Yes	
		Bit 4: Latch Zone Enable (0: Disabled/1: Enabled)	Yes	Yes	
		Bit 5: Position Reference Type (0: Incremental Addition Mode/1: Absolute Mode)	Yes	Yes	Yes
		Bits 6 to F: Reserved			
OW□□0A	Motion Subcommand	0: NOP	Yes	Yes	Yes
		1: PRM_RD 2: PRM_WR 3: Reserved 4: SMON	Yes		
		5: FIXPRM_RD	Yes	Yes	Yes
OW□□0B	—	Reserved			
OL□□0C	Torque Reference	Unit is according to OW□□03, bits 12 to 15 (Torque Unit).	Yes	Yes	Yes
OW□□0E	Speed Limit during Torque Reference	1 = 0.01% (percentage of rated speed)	Yes	Yes	
OW□□0F	Torque Reference Primary Lag Filter	1 = 1 ms		Yes	
OL□□10	Speed Reference	Unit is according to OW□□03, bits 0 to 3 (Speed Unit).	Yes	Yes	Yes
OW□□12	Forward Speed Limit	1 = 0.01% (percentage of rated speed)		Yes	
OW□□13	Reverse Speed Limit	1 = 0.01% (percentage of rated speed)		Yes	
OL□□14	Positive Side Limiting Torque Setting at Speed Reference	Unit is according to OW□□03, bits 0 to 3 (Speed Unit).	Yes	Yes	

(cont'd)

Register No.	Name	Description	SVB -01	SVA -01	SVR
OL☐☐16	Secondly Speed Compensation	Unit is according to OW☐☐03, bits 0 to 3 (Speed Unit).	Yes	Yes	Yes
OW☐☐18	Speed Override	1 = 0.01%	Yes	Yes	
OW☐☐19	—	Reserved			
OW☐☐1A	General-purpose AO1	1 = 0.001 V		Yes	
OW☐☐1B	General-purpose AO2	1 = 0.001 V		Yes	
OL☐☐1C	Position Reference Setting	1 = 1 reference unit	Yes	Yes	Yes
OL☐☐1E	Positioning Completed Width	1 = 1 reference unit	Yes	Yes	
OL☐☐20	Positioning Completed Width 2	1 = 1 reference unit	Yes	Yes	
OL☐☐22	Deviation Abnormal Detection Value	1 = 1 reference unit	Yes	Yes	
OL☐☐24	Position Compensation	1 = 1 reference unit		Yes	
OW☐☐26	Position Complete Timeout	1 = 1 ms	Yes	Yes	
OW☐☐27	—	Reserved			
OL☐☐28	Phase Compensation	1 = 1 reference unit	Yes	Yes	
OL☐☐2A	Latch Zone Lower Limit Setting	1 = 1 reference unit	Yes	Yes	
OL☐☐2C	Latch Zone Upper Limit Setting	1 = 1 reference unit	Yes	Yes	
OW☐☐2E	Position Loop Gain	1 = 0.1/s	Yes	Yes	
OW☐☐2F	Speed Loop Gain	1 = 1 Hz	Yes		
OW☐☐30	Speed Feed Forward Compensation	1 = 0.01% (percentage of distribution segment)	Yes	Yes	
OW☐☐31	Speed Amends	1 = 0.01% (percentage of rated speed)	Yes	Yes	Yes
OW☐☐32	Position Integration Time Constant	1 = 1 ms	Yes	Yes	
OW☐☐33	Primary Lag Time Constant	1 = 1 ms		Yes	
OW☐☐34	Speed Integration Time Constant	1 = 0.01 ms	Yes		
OW☐☐35	—	Reserved			
OL☐☐36	Linear Acceleration Time	Unit is according to OW☐☐03, bits 0 to 3 (Speed Unit).	Yes	Yes	Yes
OL☐☐38	Linear Deceleration Time	Unit is according to OW☐☐03, bits 0 to 3 (Speed Unit).	Yes	Yes	Yes
OW☐☐3A	S-curve Acceleration Time	1 = 0.1 ms	Yes	Yes	Yes
OW☐☐3B	Bias Speed for Exponential Acceleration/Deceleration Filter	Unit is according to OW☐☐03, bits 0 to 3 (Speed Unit).		Yes	Yes

(cont'd)

Register No.	Name	Description	SVB -01	SVA -01	SVR
OW□□3C	Home Return Type	0: DEC1 + Phase C 1: ZERO Signal 2: DEC1 + ZERO Signals 3: Phase-C signal	Yes	Yes	
		4: DEC2 + ZERO Signal 5: DEC1 + LMT + ZERO Signals 6: DEC2 + Phase-C Signals 7: DEC1 + LMT + Phase-C Signals		Yes	
		8 to 10: Reserved			
		11: Phase-C Signal (New Method) 12: P-OT + Phase-C Signals 13: P-OT 14: HOME LS + Phase-C Signals 15: HOME LS 16: N-OT + Phase-C Signals 17: N-OT 18: INPUT + Phase-C Signals 19: INPUT	Yes	Yes	
OW□□3D	Home Window	1 = 1 reference unit	Yes	Yes	Yes
OL□□3E	Approach Speed	Unit is according to OW□□03, bits 0 to 3 (Speed Unit).	Yes	Yes	
OL□□40	Creep Speed	Unit is according to OW□□03, bits 0 to 3 (Speed Unit).	Yes	Yes	
OL□□42	Home Offset	1 = 1 reference unit	Yes	Yes	
OL□□44	Step Distance	1 = 1 reference unit	Yes	Yes	Yes
OL□□46	External Positioning Move Distance	1 = 1 reference unit	Yes	Yes	
OL□□48	Zero Point Offset	1 = 1 reference unit	Yes	Yes	Yes
OL□□4A	Work Coordinate System Offset	1 = 1 reference unit	Yes	Yes	Yes
OL□□4C	Preset Data of POSMAX Turn	1 = 1 reference unit	Yes	Yes	Yes
OW□□4E	Servo User Monitor	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		
OW□□4F	Servo Alarm Monitor Number	Set the number of the alarm to monitor.	Yes		
OW□□50	Servo Constant Number	Set the number of the SERVOPACK parameter.	Yes		
OW□□51	Servo Constant Number Size	Set the number of words in the SERVOPACK parameter.	Yes		
OW□□52	Servo User Constant	Set the setting for the SERVOPACK parameter.	Yes		
OW□□54	Auxiliary Servo User Constant Number	Set the number of the SERVOPACK parameter.	Yes		
OW□□55	Auxiliary Servo Constant Number Size	Set the number of words in the SERVOPACK parameter.	Yes		
OW□□56	Auxiliary Servo User Constant	Set the setting for the SERVOPACK parameter.	Yes		
OW□□5C	Fixed Parameter Number	Set the number of the fixed parameter to read with the FIXPRM_RD motion subcommand.	Yes	Yes	Yes

(cont'd)

Register No.	Name	Description	SVB -01	SVA -01	SVR
OW□□5D	General-purpose DO	Bit 0: General-purpose DO_0 (0: OFF/1: ON)		Yes	
		Bit 1: General-purpose DO_1 (0: OFF/1: ON)		Yes	
		Bit 2: General-purpose DO_2 (0: OFF/1: ON)		Yes	
		Bit 3: General-purpose DO_3 (0: OFF/1: ON)		Yes	
		Bit 4: General-purpose DO_4 (0: OFF/1: ON)		Yes	
		Bit 5: General-purpose DO_5 (0: OFF/1: ON)		Yes	
		Bits 6 to F: Reserved			
OL□□5E	Absolute Position at Power OFF (Low Value)	1 = 1 pulse	Yes	Yes	
OL□□60	Absolute Position at Power OFF (High Value)	1 = 1 pulse	Yes	Yes	
OL□□62	Modularized Position at Power OFF (Low Value)	1 = 1 pulse	Yes	Yes	
OL□□64	Modularized Position at Power OFF (High Value)	1 = 1 pulse	Yes	Yes	
OL□□66	Monitor Data Command	0: Disable 1: Read 2: Write 3: Read analog adjustment data		Yes	
OL□□68	Write Data Type	0: Disable 1: Byte (8 Bits) 2: Word (16 Bits) 3: Long (32 Bits)		Yes	
OL□□6A	Monitor Address	Read/write address		Yes	
OL□□6C	Write Data	Write data		Yes	
OL□□6E	Stop Distance	Reserved			
OW□□70 to OW□□7F	Command Buffer for Transparent Command Mode	This area is used for command data when MECHATROLINK servo commands are specified directly.	Yes		

4.2.3 Monitoring Parameter List

Register No.	Name	Description	SVB -01	SVA -01	SVR
IW□□00	Drive Status	Bit 0: Motion Controller Operation Ready	Yes	Yes	Yes
		Bit 1: Running (Servo ON)	Yes	Yes	Yes
		Bit 2: System Busy	Yes		
		Bit 3: Servo Ready	Yes	Yes	
		Bits 4 to F: Reserved			
IW□□01	Over Range Parameter Number	Setting parameters: 0 to 999 Fixed parameters: 1000 or higher	Yes	Yes	Yes
IL□□02	Warning	Bit 0: Excessively Following Error	Yes	Yes	
		Bit 1: Setting Parameter Error	Yes	Yes	Yes
		Bit 2: Fixed Parameter Error	Yes	Yes	Yes
		Bit 3: Servo Driver Error	Yes		
		Bit 4: Motion Command Setting Error	Yes	Yes	Yes
		Bit 5: Reserved			
		Bit 6: Positive Overtravel	Yes		
		Bit 7: Negative Overtravel	Yes		
		Bit 8: Servo Not ON	Yes		
		Bit 9: Servo Driver Communication Warning	Yes		
		Bit A: Reserved			
		Bits B to 1F: Reserved			
IL□□04	Alarm	Bit 0: Servo Driver Error	Yes	Yes	
		Bit 1: Positive Overtravel	Yes	Yes	
		Bit 2: Negative Overtravel	Yes	Yes	
		Bit 3: Positive Soft Limit (Positive Software Limit)	Yes	Yes	
		Bit 4: Negative Soft Limit (Negative Software Limit)	Yes	Yes	
		Bit 5: Servo OFF	Yes	Yes	Yes
		Bit 6: Positioning Time Over	Yes	Yes	
		Bit 7: Excessive Positioning Moving Amount	Yes		
		Bit 8: Excessive Speed	Yes	Yes	
		Bit 9: Excessively Following Error	Yes	Yes	
		Bit A: Filter Type Change Error	Yes		
		Bit B: Filter Time Constant Change Error	Yes		
		Bit C: Reserved			
		Bit D: Zero Point Not Set	Yes	Yes	
		Bit E: Zero Point Set during Travel	Yes		
		Bit F: Servo Driver Parameter Setting Error	Yes		
		Bit 10: Servo Driver Synchronization Communication Error	Yes		
		Bit 11: Servo Driver Communication Error	Yes		
		Bit 12: Servo Driver Command Timeout Error	Yes		
		Bit 13: ABS Encoder Count Exceeded	Yes	Yes	
		Bit 14: PG Disconnected Error		Yes	
		Bit 15: Accumulated Rotations Receive Error		Yes	
		Bits 16 to 1F: Reserved			
IL□□06	—	Reserved			
IW□□08	Motion Command Type Response	Same as OW□□08 (Motion Command).	Yes	Yes	Yes

(cont'd)

Register No.	Name	Description	SVB -01	SVA -01	SVR
IW□□09	Motion Command Status	Bit 0: Command Executing (BUSY) Flag	Yes	Yes	Yes
		Bit 1: Command Hold Completed (HOLDL)	Yes	Yes	Yes
		Bit 2: Reserved			
		Bit 3: Command Error Occurrence (FAIL)	Yes	Yes	Yes
		Bits 4 to 7: Reserved			
		Bit 8: Command Execution Completed (COMPLETE)	Yes	Yes	Yes
		Bits 9 to F: Reserved			
IW□□0A	Motion Subcommand Response Code	Same as OW□□0A (Motion Subcommand).	Yes	Yes	Yes
IW□□0B	Motion Subcommand Status	Bit 0: Command Executing (BUSY) Flag	Yes	Yes	Yes
		Bits 1 and 2: Reserved			
		Bit 3: Command Error Occurrence (FAIL)	Yes	Yes	Yes
		Bits 4 to 7: Reserved			
		Bit 8: Command Execution Completed (COMPLETE)	Yes	Yes	Yes
		Bits 9 to F: Reserved			
IW□□0C	Position Management Status	Bit 0: Distribution Completed (DEN)	Yes	Yes	Yes
		Bit 1: Positioning Completed (POSCOMP)	Yes	Yes	Yes
		Bit 2: Latch Completed (LCOMP)	Yes	Yes	
		Bit 3: Position Proximity (NEAR)	Yes	Yes	Yes
		Bit 4: Zero Point Position (ZERO)	Yes	Yes	Yes
		Bit 5: Zero Point Return (Setting) Completed (ZRNC)	Yes	Yes	Yes
		Bit 6: Machine Lock (MLOCK)	Yes	Yes	
		Bit 7: Absolute Position Read Completed		Yes	
		Bit 8: ABS System Infinite Length Position Control Information LOAD Completed (ABSLDE)	Yes	Yes	
		Bit 9: POSMAX Turn Number Presetting Completed (TPRSE)	Yes	Yes	Yes
		Bit A: Rotational Direction of Absolute Encoder		Yes	
		Bits B to F: Reserved			
IW□□0D	—	Reserved			
IL□□0E	Machine Coordinate Target Position (TPOS)	1 = 1 reference unit	Yes	Yes	Yes
IL□□10	Target Position (CPOS)	1 = 1 reference unit	Yes	Yes	Yes
IL□□12	Machine Coordinate System Position (MPOS)	1 = 1 reference unit	Yes	Yes	Yes
IL□□14	32-bit Coordinate System Position (DPOS)	1 = 1 reference unit	Yes	Yes	
IL□□16	Machine Coordinate Feedback Position (APOS)	1 = 1 reference unit	Yes	Yes	Yes
IL□□18	Machine Coordinate Latch Position (LPOS)	1 = 1 reference unit	Yes	Yes	
IL□□1A	Position Error (PERR)	1 = 1 reference unit	Yes	Yes	
IL□□1C	Target Position Difference Monitor	1 = 1 reference unit	Yes	Yes	Yes
IL□□1E	POSMAX Number of Turns	1 = 1 turn	Yes	Yes	Yes
IL□□20	Speed Reference Output Monitor	Unit is according to OW□□03, bits 0 to 3 (Speed Unit).	Yes	Yes	
IL□□22	—	Reserved			
IL□□24	Integral Output Monitor	Unit is according to OW□□03, bits 0 to 3 (Speed Unit).		Yes	

(cont'd)

Register No.	Name	Description	SVB -01	SVA -01	SVR
IL□□26	Primary Lag Monitor	Unit is according to OW□□03, bits 0 to 3 (Speed Unit). Stores IL□□24 – (Output from primary delay element).		Yes	
IL□□28	Position Loop Output Monitor	Unit is according to OW□□03, bits 0 to 3 (Speed Unit).		Yes	
IL□□2A	—	Reserved			
IW□□2C	Network Servo Status	Bit 0: Alarm Occurred (ALM) Bit 1: Warning Occurred (WARNING) Bit 2: Command Ready (CMDRDY) Bit 3: Servo ON (SVON) Bit 4: Main Power ON (PON) Bit 5: Machine Lock (MLOCK) Bit 6: Zero Point Position (ZPOINT) Bit 7: Positioning Completed (PSET)/ Speed Coincidence (V-CMP) Bit 8: Distribution Completed (DEN)/Zero Speed (ZSPD) Bit 9: Torque Being Limited (T_LIM) Bit A: Latch Completed (L_CMP) Bit B:Position Proximity (NEAR)/Speed Limit (V_LIM) Bit C: Positive Soft Limit (Positive Software Limit) (P_SOT) Bit D: Negative Soft Limit (Negative Software Limit) (N_SOT)	Yes		
		Bits E to F: Reserved			
IW□□2D	Servo Alarm Code	Stores the alarm code from the SERVOPACK.	Yes		
IW□□2E	Network Servo I/O Monitor	Bit 0: Positive Drive Prohibited Input (P_OT) Bit 1: Negative Drive Prohibited Input (N_OT) Bit 2: Zero Point Return Deceleration Limit Switch Input (DEC) Bit 3: Encoder Phase-A Input (PA) Bit 4: Encoder Phase-B Input (PB) Bit 5: Encoder Phase-C Input (PC) Bit 6: First External Latch Input (EXT1) Bit 7: Second External Latch Input (EXT2) Bit 8: Third External Latch Input (EXT3) Bit 9: Brake Output (BRK) Bit A: Reserved Bit B: Reserved 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		
IW□□2F	Network Servo 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		
IW□□30	Servo User Monitor 2	Stores the result of the selected monitor.	Yes		
IW□□32	Servo User Monitor 3	Stores the result of the selected monitor.	Yes		
W□□34	Servo User Monitor 4	Stores the result of the selected monitor.	Yes		
IW□□36	Servo Constant Number	Stores the number of the parameter being processed.	Yes		
IW□□37	Auxiliary Servo User Constant Number	Stores the number of the parameter being processed.			
IW□□38	Servo User Constant	Stores the data of the parameter being read.	Yes		
IW□□3A	Auxiliary Servo User Constant	Stores the data of the parameter being read.	Yes		
IW□□3F	Motor Type	Stores the type of motor actually connected. 0: Rotary motor 1: Linear motor	Yes		
IL□□40	Feedback Speed	Unit is according to OW□□03, bits 0 to 3 (Speed Unit).	Yes	Yes	Yes

(cont'd)

Register No.	Name	Description	SVB -01	SVA -01	SVR
IL□□42	Torque (Thrust) Reference Monitor	Unit is according to OW□□03, bits 12 to 15 (Torque Unit).	Yes	Yes	Yes
IW□□44 to IW□□49	–	Reserved			
IL□□4A	Absolute Encoder Cumulative Revolutions	1 = 1 revolution		Yes	
IL□□4C	Initial Number of Incremental Pulses	1 = 1 pulse		Yes	
IW□□4E to IW□□55	–	Reserved			
IL□□56	Fixed Parameter Monitor	Stores the data of the fixed parameter when FIXPRM-RD has been specified in the Motion Subcommand.	Yes	Yes	Yes
IW□□58	General-purpose Digital Input (DI) Monitor	Bit 0: General-purpose DI_0		Yes	
		Bit 1: General-purpose DI_1		Yes	
		Bit 2: General-purpose DI_2		Yes	
		Bit 3: General-purpose DI_3		Yes	
		Bit 4: General-purpose DI_4		Yes	
		Bit 5: General-purpose DI_5		Yes	
		Bit 6: Reserved			
		Bit 7: PG Disconnected Status (ON: Normal/OFF: Error)		Yes	
		Bits 8 to F: Reserved			
IW□□59	General-purpose AI Monitor 1	1 = 0.001 V In factory adjustment mode, stores the contents of the FPGA register.		Yes	
IW□□5A	General-purpose AI Monitor 2	1 = 0.001 V In factory adjustment mode, stores the contents of the FPGA register.		Yes	
IW□□5B to IW□□5C	–	Reserved			
IL□□5E	Absolute Position at Power OFF (Lower 2 Words)	1 = 1 pulse	Yes	Yes	
IL□□60	Absolute Position at Power OFF (Upper 2 Words)	1 = 1 pulse	Yes	Yes	
IL□□62	Modularized Position at Power OFF (Lower 2 Words)	1 = 1 pulse	Yes	Yes	
IL□□64	Modularized Position at Power OFF (Upper 2 Words)	1 = 1 pulse	Yes	Yes	
IL□□66	Monitor Data Status	Status for execution of the Write monitor data command. (1: Normal response/–1: Error)		Yes	
IL□□68	Monitor Data	Read data		Yes	
IW□□6A to IW□□6F	–	Reserved			
IW□□70 to IW□□7F	Response Buffer for Transparent Command Mode	Stores the response data when MECHATROLINK Servo commands are specified directly.	Yes		

4.3 SVB-01 Module Parameter Details

4.3.1 Motion Fixed Parameter Details

The motion fixed parameters are listed in the following tables.

(1) Run Mode

<table>
<tr><td rowspan="3">No. 0</td><td colspan="3">Run Mode</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 3</td><td>–</td><td>0</td></tr>
<tr><td colspan="4">Specify the application method of the axis.
0: Normal Running (default)
Use this setting when actually using an axis.
1: Axis Unused
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 Drive Status (monitoring parameter IW□□00), which will be cleared to zeros. Set any axis that is not being used to this mode to reduce the processing time.
2: Simulation Mode
In Simulation Mode, position information will be stored in the monitoring parameters even if a Servodrive is not connected.
This mode is used to virtually check the operation of the applications program.
3: Servo Driver Command (SERVOPACK Transparent Command Mode)
Servo Driver Command 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 and responses are stored in the area starting with monitoring parameter IW□□70.</td></tr>
</table>

(2) Function Selection 1

<table>
<tr><td colspan="2" rowspan="3">No. 1</td><td colspan="3">Function Selection 1</td></tr>
<tr><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">No. 1</td><td>Bit 0</td><td colspan="3">Axis Type
Set whether or not there is a limit on controlled axis travel.
0: Linear (finite length axis) (default); The axis will have limited movement. The software limit function is enabled.
1: Rotating (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 is exceeded the value set for the Maximum Value of Rotary Counter (fixed parameter 10).</td></tr>
<tr><td>Bit 1</td><td colspan="3">Forward Soft Limit Enabled (Forward Software Limit Enabled)
Set whether or not to use the software limit function in the positive direction.
Set the software limit as the Forward Software Limit (fixed parameter 12).
This setting is disabled if the axis is set to an infinite length axis.
The software limit function is enabled after a Zero Point Return or Zero Point Setting (IB□□0C5 is ON) has been completed.
For details, refer to 9.3 Software Limit Function.
0: Disabled (default)
1: Enabled</td></tr>
</table>

(cont'd)

No. 1 (cont'd)	Bit 2	Reverse Soft Limit Enabled (Reverse Software Limit Enabled) Set whether or not to use the software limit function in the negative direction. Set the software limit as the Reverse Software Limit (fixed parameter 14). This setting is disabled if the axis is set to an infinite length axis. The software limit function is enabled after a Zero Point Return or Zero Point Setting (IB□□0C5 is ON) has been completed. For details, refer to *9.3 Software Limit Function*. 0: Disabled (default) 1: Enabled
	Bit 3	Positive Over Travel 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. For details, refer to *9.2 Overtravel Function*. 0: Disabled (default) 1: Enabled
	Bit 4	Negative Over Travel 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. For details, refer to *9.2 Overtravel Function*. 0: Disabled (default) 1: Enabled
	Bit 8	Segment Distribution Processing When executing an interpolation command (INTERPOLATE, LATCH or PHASE), converts reference value that is generated with high-speed scan to reference value for MECHATROLINK communication cycle. Set to 0 when using an interpolation command. 0: Enabled (default) 1: Disabled
	Bit 9	Simple ABS Infinite Axis Controls infinite length position 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 ladder program and simplifying handling. 0: Disabled (default) 1: Enabled Refer to *7.3.2 Infinite Length Axis* for details.
	Bit A	User Constants Self-Writing Function Automatically writes MP2200/MP2300 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 *9.4 Parameters That Are Automatically Updated* for details.

(3) Function Selection 2

<table>
<tr><td rowspan="3">No. 2</td><td colspan="4">Function Selection 2</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td colspan="2">Default Value</td></tr>
<tr><td>–</td><td>–</td><td colspan="2">0000H</td></tr>
<tr><td rowspan="2">No. 2</td><td>Bit 0</td><td colspan="3">Communication Error Mask
Masks MECHATROLINK communication errors detected at the MP2200/MP2300.
0: Disabled (default)
1: Enabled</td></tr>
<tr><td>Bit 1</td><td colspan="3">WDT Error Mask
Masks MECHATROLINK watchdog timeout errors detected at the MP2200/MP2300.
0: Disabled (default)
1: Enabled</td></tr>
</table>

(4) Reference Unit Settings

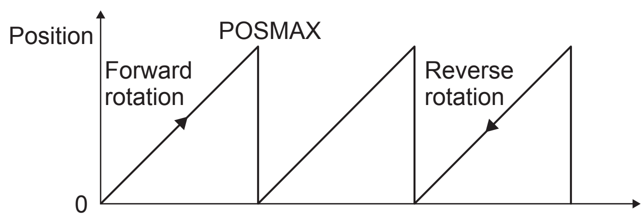
<table>
<tr><td rowspan="3">No. 4</td><td colspan="3">Command Unit</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 3</td><td>–</td><td>0</td></tr>
<tr><td colspan="4">Set the unit for the reference that is input.
The minimum reference unit is determined by this parameter and, the Number of Decimal Places (fixed parameter 5). If pulse is selected, the Gear Ratio (fixed parameters 8 and 9) will be disabled.
Refer to (1) Reference Unit in 4.5 Example of Setting Motion Parameters for the Machine for details.
0: pulse (electronic gear disabled)
1: mm
2: deg
3: inch</td></tr>
<tr><td rowspan="3">No. 5</td><td colspan="3">Number of Decimal Places</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 5</td><td>–</td><td>3</td></tr>
<tr><td colspan="4">Set the number of places to the right of the decimal point in input references.
The minimum reference unit is determined by this parameter and the Command Unit (fixed parameter 4).
Example: If Command Unit = mm and Number of Decimal Places = 3
Then, a reference unit of 1 = 0.001 mm
The setting of this parameter is disabled if the Command Unit is set to pulse in fixed parameter 4.
Refer to (1) Reference Unit in 4.5 Example of Setting Motion Parameters for the Machine for details.</td></tr>
<tr><td rowspan="3">No. 6</td><td colspan="3">Command Unit per Revolution</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>1 to 2^{31}–1</td><td>Reference unit</td><td>10000</td></tr>
<tr><td colspan="4">Specify the amount of travel in the load as the number of reference units for each turn of the load shaft.
Refer to (1) Reference Unit in 4.5 Example of Setting Motion Parameters for the Machine for details.</td></tr>
<tr><td rowspan="3">No. 8</td><td colspan="3">Gear Ratio [MOTOR]</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>1 to 65535</td><td>rev (revolutions)</td><td>1</td></tr>
<tr><td colspan="4">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.
• Gear ratio at Servomotor: m
• Gear ratio at load: n
The setting of this parameter is disabled if the Command Unit (Reference Unit) is set to pulse in fixed parameter 4.
Refer to (2) Electronic Gear in 4.5 Example of Setting Motion Parameters for the Machine for details.</td></tr>
</table>

(cont'd)

No. 9	Gear Ratio [LOAD]		
	Setting Range	Setting Unit	Default Value
	1 to 65535	rev (revolutions)	1
Same as for No. 8.			

(5) Infinite Axis Reset Position

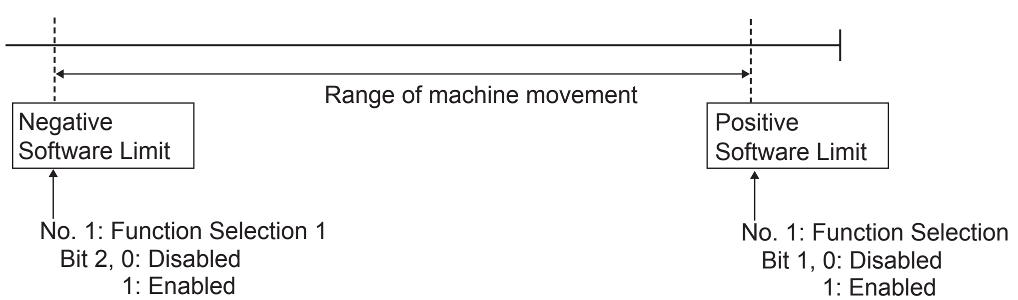
No. 10	Maximum Value of Rotary Counter (POSMAX)		
	Setting Range	Setting Unit	Default Value
	1 to $2^{31}-1$	Reference unit	360000
Set the reset position when an infinite length axis is set. Enabled when bit 0 of the Function Selection 1 (fixed parameter 1) is set to infinite axis.			



The position data for infinite axes is controlled in the range from 0 to POSMAX.

(6) Software Limits

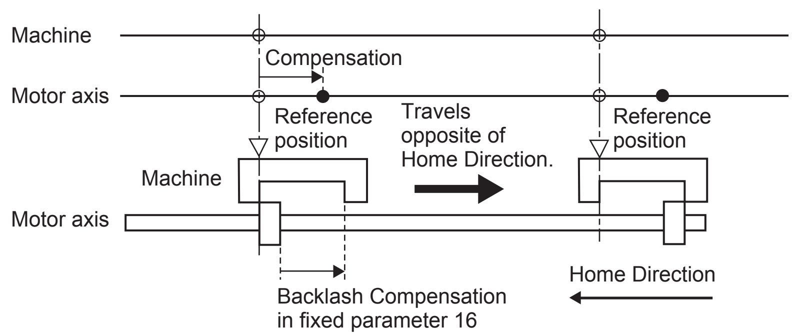
No. 12	Forward Software Limit		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	$2^{31}-1$
Set the position to be detected for the software limit in the positive direction at the MP2200/MP2300. If an axis attempts to move in the positive direction past the position set here, a positive software limit alarm (IB□□043) will occur.			
No. 14	Reverse Software Limit		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	-2^{31}
Set the position to be detected for the software limit in the negative direction at the MP2200/MP2300. If an axis attempts to move in the negative direction past the position set here, a negative software limit alarm (IB□□044) will occur.			

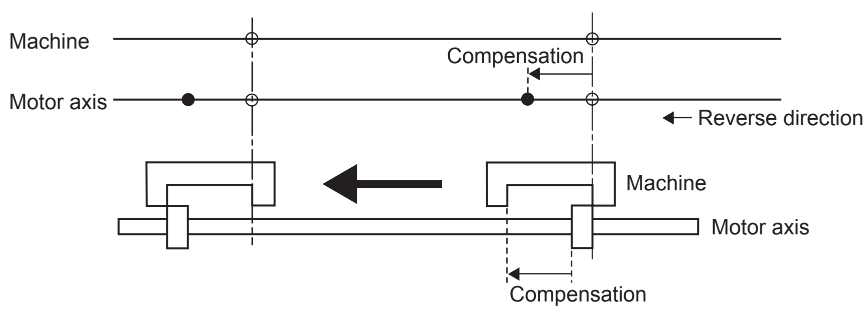


The software limit function is enabled only after completing a Zero Point Return or Zero Point Setting operation (i.e., when IB□□0C5 is ON). For details, refer to *9.3 Software Limit Function*.

(7) Backlash Compensation

<table>
<tr><td rowspan="3">No. 16</td><td colspan="3">Backlash Compensation</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>-2^{31} to $2^{31}-1$</td><td>Reference unit</td><td>0</td></tr>
<tr><td colspan="4">Set the backlash compensation in reference units.
Backlash compensation can be disabled by setting this parameter to 0.
Perform backlash compensation using the functions at the SERVOPACK. The setting is enabled when communication is established with the SERVOPACK (NS115: Pn81B, SGDS: Pn214).
Backlash compensation cannot be used for the SERVOPACK SGD-N, SGDB-N, or SGDH + NS100 because they do not have a parameter to set the backlash compensation.

• Using Backlash Compensation in Forward Direction


• Using Backlash Compensation in Reverse Direction

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

(8) SERVOPACK Settings

<table>
<tr><td rowspan="3">No. 29</td><td colspan="3">Motor Type</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 or 1</td><td>–</td><td>0</td></tr>
<tr><td colspan="4">Set the type of motor that is used.
An alarm (IL□□04, bit 30) will occur if this setting does not match with the type of motor actually used.
0: Rotary motor (default)
1: Linear motor</td></tr>
<tr><td rowspan="3">No. 30</td><td colspan="3">Encoder Type</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 3</td><td>–</td><td>0</td></tr>
</table>

Set the type of encoder that is used. 0: Incremental encoder 1: Absolute encoder (default) 2: Absolute encoder used as an incremental encoder. 3: Reserved

(9) Encoder Settings

No. 34	Rated Speed		
	Setting Range	Setting Unit	Default Value
	1 to 32000	min^{-1}	3000

Set the rated motor speed in 1 min^{-1} units.
Set this parameter based on the specifications of the motor that is used.

No. 36	Encoder Resolution		
	Setting Range	Setting Unit	Default Value
	1 to 2^{31}–1	pulse	65536

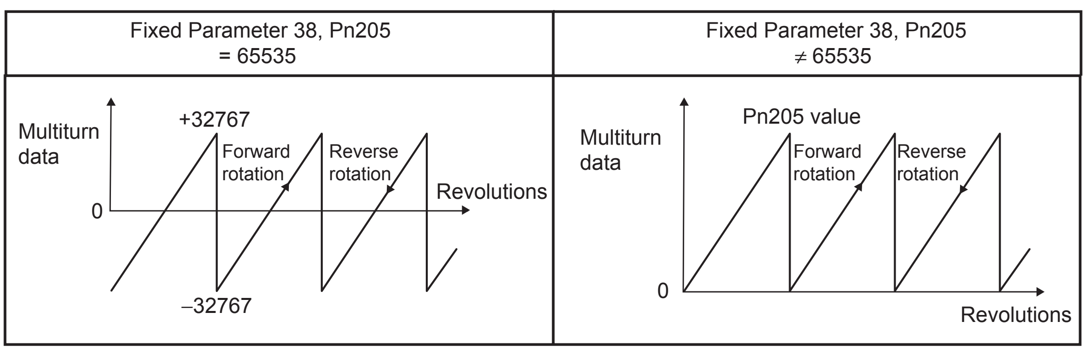
Set the number of feedback pulses per motor rotation.

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. 38	Max. Revolution of Absolute Encoder		
	Setting Range	Setting Unit	Default Value
	1 to 2^{31}–1	rev	65534

This parameter is used to manage position information when an absolute encoder is used and an infinite length axis has been set. Set it according to the setting of the encoder to be used.

- Σ Series: Always set to 99999.
- Σ-II or Σ-III Series: Set to the same value as the multiturn limit in the SERVOPACK.
  For axes set as infinite axes (Function Selection 1 (fixed parameter 1), bit 0 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	Feedback Speed Moving Average Time Constant		
	Setting Range	Setting Unit	Default Value
	0 to 32	ms	10

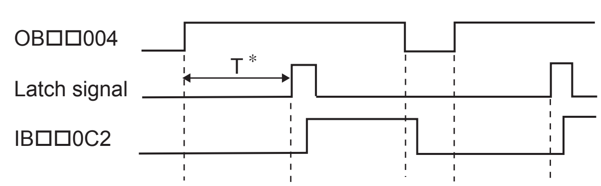
The Feedback Speed (monitoring parameter IL☐☐40) is the value obtained by calculating the moving average for the time constant from the feedback position for every scan.

4.3.2 Motion Setting Parameter Details

The motion setting parameters are listed in the following tables.

(Note) Position : The labels shown in reverse type indicate that the parameter is enabled during the corresponding control mode (position control shown here).

(1) RUN Commands

<table>
<tr><td colspan="2" rowspan="3">OW□□00</td><td colspan="3">RUN Commands Position Phase Speed Torque</td></tr>
<tr><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="3">OW□□00</td><td>Bit 0</td><td colspan="3">Servo ON
Set whether or not to turn ON (excite) the SERVOPACK.
0: Servo OFF (default)
1: Servo ON</td></tr>
<tr><td>Bit 1</td><td colspan="3">Machine Lock
During the machine lock mode, the Target Position (CPOS) (monitoring parameter IL□□10) will be updated but no movement will occur on the axis. Changes to the machine lock mode are valid after all pulses have been distributed. The machine lock mode cannot be changed during speed or torque control.
0: Machine lock mode released (default)
1: Machine lock mode</td></tr>
<tr><td>Bit 4</td><td colspan="3">Latch Request
Store the current position when the latch signal turns ON in the Machine Coordinate Latch Position (LPOS) (monitoring parameter IL□□18).
When latch detection is completed, the Latch Completed bit will turn ON in the Position Management Status (monitoring parameter IW□□0C, bit 2).
To perform latch detection again, change this bit from 0 to 1.
Set the latch signal to be used in Latch Input Signal Type of Function 2 (setting parameter OW□□04, bits 0 to 3).
This function is achieved using the Servo command expansion area and can be executed only with the MECHATROLINK-II, 32-byte Mode communication method.
Do not change this bit to 1 during execution of the motion commands for zero point return, external positioning, or latching. Doing so may result in a warning at the SERVOPACK.

* $T \geq t_1 + t_2 + t_3$
Where
T: Latch processing time
t_1: Communication cycle
t_2: Two scans
t_3: SERVOPACK latch processing preparations time (≤ 4 ms)
0: Latch request OFF (default)
1: Latch request ON</td></tr>
</table>

(cont'd)

OW□□00 (cont'd)	Bit 6	POSMAX Preset Presets the POSMAX Number of Turns (monitoring parameter IL□□1E) to the value set for the Preset Data of POSMAX Turn (setting parameter OL□□4C). 0: POSMAX Preset OFF (default) 1: POSMAX Preset ON
	Bit 7	Infinite Length Axis Position Information LOAD When an infinite length axis is used with an absolute encoder, reset the position information with the encoder position that existed when the power was OFF and the data set for the pulse position when the power was OFF. When processing has been completed for this bit, the ABS System Infinite Length Position Control Information LOAD Completed bit will be turned ON in the Position Management Status (monitoring parameter IW□□0C, bit 8). 0: Infinite Length Axis Position Information LOAD OFF (default) 1: Infinite Length Axis Position Information LOAD ON
	Bit 8	Forward External Torque Limit 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: Forward External Torque Limit Input OFF (default) 1: Forward External Torque Limit Input ON
	Bit 9	Reverse External Torque Limit 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: Reverse External Torque Limit Input OFF (default) 1: Reverse External Torque Limit Input ON
	Bit B	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
	Bit F	Clear Alarm Clear alarms. If a communication error occurs, communication can be reestablished by clearing the alarm. 0: Clear alarm OFF (default) 1: Clear alarm ON

(2) Mode 1

<table>
<tr><td colspan="2" rowspan="3">OW□□01</td><td colspan="3">Mode 1 Position Phase Speed Torque</td></tr>
<tr><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="3">OW□□01</td><td>Bit 0</td><td colspan="3">Deviation Abnormal Detection Error Level
Set whether excessively following errors are treated as warnings or as alarms.
0: Warning (default): Axis continues to operate even if an excessively following error is detected.
1: Alarm: Axis stops operating when an excessive following error is detected.

■ Related Parameters
OL□□22 Deviation Abnormal Detection Value
IB□□020 Warning (Excessively Following Error)
IB□□049 Error (Excessively Following Error)</td></tr>
<tr><td>Bit 3</td><td colspan="3">Speed Loop P/PI Switch
Switch the SERVOPACK's speed loop between PI control and P control.
The setting is enabled when the move command or the SERVO ON command is sent.
0: PI control (default)
1: P control</td></tr>
<tr><td>Bit 4</td><td colspan="3">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/NS115 SERVOPACKs, so the Gain Switch cannot be used.
0: Gain Switch OFF (default)
1: Gain Switch ON</td></tr>
</table>

(3) Mode 2

<table>
<tr><td colspan="2" rowspan="3">OW□□02</td><td colspan="3">Mode 2 Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>–</td><td>–</td><td>0000H</td></tr>
<tr><td>OW□□02</td><td>Bit 0</td><td colspan="3">Monitor 2 Enabled
Disable/enable Monitor 2 in the Servo User Monitor (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>
</table>

(4) Function 1

<table>
<tr><td colspan="2" rowspan="3">OW□□03</td><td colspan="3">Function 1 Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>–</td><td>–</td><td>0011H</td></tr>
<tr><td rowspan="4">OW□□03</td><td>Bit 0 to Bit 3</td><td colspan="3">Speed Units
Set the unit for speed references.
0: Reference unit/s
1: 10^n reference unit/min (default)
2: 0.01%
3: 0.0001%</td></tr>
<tr><td>Bit 4 to Bit 7</td><td colspan="3">Acceleration/Deceleration Units
Set whether to specify acceleration/deceleration rates or acceleration/deceleration time constants for acceleration/deceleration commands.
0: Reference unit/s^2
1: ms (default)</td></tr>
<tr><td>Bit 8 to Bit B</td><td colspan="3">Filter Type
Set the acceleration/deceleration filter type.
The filter type changes when the motion command Change Filter Type is executed. When a filter is used, set the type in this parameter and execute the motion command Change Filter Type.
For details, refer to 5.2.12 Change Filter Type (CHG_FILTER).
0: No filter (default)
1: Exponential acceleration/deceleration filter
2: Moving average filter</td></tr>
<tr><td>Bit C to Bit F</td><td colspan="3">Torque Unit Selection
Set the unit for torque references.
0: 0.01% (default)
1: 0.0001%</td></tr>
</table>

(5) Function 2

<table>
<tr><td colspan="2" rowspan="3">OW□□04</td><td colspan="3">Function 2 Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>–</td><td>–</td><td>0033H</td></tr>
<tr><td rowspan="2">OW□□04</td><td>Bit 0 to Bit 3</td><td colspan="3">Latch Input Signal Type
Set the latch detection signal.
0: –
1: –
2: Phase-C pulse input signal
3: /EXT1 (default)
4: /EXT2
5: /EXT3
(Note) 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 4 to Bit 7</td><td colspan="3">External Positioning Signal
Set the external signal for external positioning.
0: –
1: –
2: Phase-C pulse input signal
3: /EXT1 (default)
4: /EXT2
5: /EXT3
(Note) 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>
</table>

(6) Function 3

<table>
<tr><td colspan="2" rowspan="3">OW□□05</td><td colspan="3">Function 3 Position Phase Speed Torque</td></tr>
<tr><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">OW□□05</td><td>Bit 1</td><td colspan="3">Close Position Loop Using OL□□16
Disable/enable phase reference generation processing when executing phase reference commands. Enable this processing when an electronic shaft is being used, and disable it when an electronic cam is being used.
0: Enabled (default)
1: Disabled
Speed feed forward control cannot be used for the SGD-N or SGDB-N SERVOPACK, so Close Position Loop Using OL□□16 cannot be used.</td></tr>
<tr><td>Bit B</td><td colspan="3">INPUT Signal for Zero Point Return
Use this bit as an input signal for the INPUT & C pulse or INPUT Only method.
0: INPUT signal OFF (default)
1: INPUT signal ON</td></tr>
</table>

(7) Motion Command

OW□□08	Motion Command Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 26	–	0

Set motion commands.

0: NOP	No command
1: POSING	Positioning
2: EX_POSING	External Positioning
3: ZRET	Zero Point Return
4: INTERPOLATE	Interpolation
5: ENDOF_ INTERPOLATE	Reserved
6: LATCH	Latch
7: FEED	JOG Operation
8: STEP	STEP Operation
9: ZSET	Zero Point Setting
10: ACC	Change Linear Acceleration Time Constant
11: DCC	Change Linear Deceleration Time Constant
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 SERVOPACK Parameter
18: PRM_WR	Write SERVOPACK Parameter
19: ALM_MON	Monitor SERVOPACK Alarms
20: ALM_HIST	Monitor SERVOPACK Alarm History
21: ALMHIST_CLR	Clear SERVOPACK Alarm History
22: ABS_RST	Reset Absolute Encoder
23: VELO	Speed Reference
24: TRQ	Torque Reference
25: PHASE	Phase Reference
26: KIS	Change Position Loop Integration Time Constant

Refer to *Chapter 5 Motion Commands* for details.

(8) Motion Command Control Flags

<table>
<tr><td rowspan="3" colspan="2">OW□□09</td><td colspan="3">Motion Command Options Position Phase Speed Torque</td></tr>
<tr><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">OW□□09</td><td>Bit 0</td><td colspan="3">Command Pause
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 Servo Module Command Status (monitoring parameter IW□□09, bit 1).
0: Command Pause OFF (default)
1: Command Pause ON</td></tr>
<tr><td>Bit 1</td><td colspan="3">Command Abort
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: Command Abort OFF (default)
1: Command Abort ON</td></tr>
<tr><td>Bit 2</td><td colspan="3">JOG/STEP Direction
Set the movement direction for JOG or STEP.
0: Forward (default)
1: Reverse</td></tr>
<tr><td>Bit 3</td><td colspan="3">Home Direction
Set the direction to move for a 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="3">Latch Zone Enabled
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 or ZRET) other than those for external positioning.
■ Related Parameters
Latch Zone Lower Limit (setting parameter OL□□2A) and Latch Zone Upper Limit (setting parameter OL□□2C)</td></tr>
<tr><td>Bit 5</td><td colspan="3">Position Reference Type
Specify the value set for the Position Reference Value (setting parameter OL□□1C).
Always set this parameter to Incremental Addition Mode when using motion programs or infinite axes. Refer to (4) Position References in 4.5 Example of Setting Motion Parameters for the Machine for details.
0: Incremental addition mode (default)
1: Absolute mode</td></tr>
</table>

(9) Motion Subcommands

<table>
<tr><td rowspan="3">OW□□0A</td><td colspan="3">Motion Subcommand Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 5</td><td>–</td><td>0</td></tr>
<tr><td colspan="4">Set the motion subcommand to be used with the motion command.
0: NOP No command
1: PRM_RD Read SERVOPACK Parameter
2: PRM_WR Write SERVOPACK Parameter
3: Reserved Reserved.
4: SMON Monitor Status
5: FIXPRM_RD Read Fixed Parameters
These commands can be used only with MECHATROLINK-II in 32-byte mode, except for Read Fixed Parameters.</td></tr>
</table>

(10) Torque Reference

<table>
<tr><td rowspan="3">OL□□0C</td><td colspan="3">Torque Reference/Torque Feed Forward Compensation Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>-2^{31} to $2^{31}-1$</td><td>Depends on the torque unit set in Function 1 (setting parameter OW□□03, bits C to F).</td><td>0</td></tr>
<tr><td colspan="4">The meaning will depend on the command.
• Set the torque reference for torque reference commands. Refer to 5.2.23 Torque Reference (TRQ) for details.
• Set the torque feed forward gain* for interpolation commands.

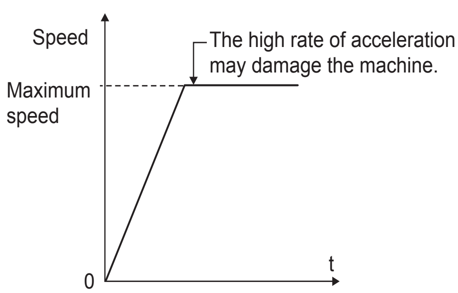
* Torque Feed Forward Gain Function
Torque feed forward gain can be used when interpolation commands (INTERPOLATE, LATCH) are sent using SGDS SERVOPACKs.
Torque feed forward gain is set in Torque Reference (setting parameter OL□□0C).
Conditions of Use
• SERVOPACK parameter Pn002.0 = 2
• MP2300 software version 2.02 or later
• SGDS communication interface version 8 or later</td></tr>
</table>

(cont'd)

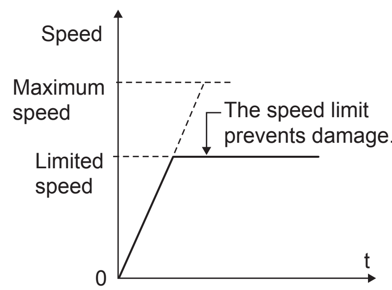
OW□□0E	Speed Limit at Torque Reference (Position / Phase / Speed / **Torque**)		
	Setting Range	Setting Unit	Default Value
	–32768 to 32767	0.01%	15000

Set the speed limit for torque 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 Speed Limit at Torque Reference functions to limit the Servomotor speed during torque control to protect the machine.

No speed limit



Speed limit used



Either the Speed Limit at Torque Reference (OW□□0E) or SERVOPACK's Torque Control Speed Limit (Pn407) is effective, whichever is lower.

■ Related Parameters

SGDS, SGDH+NS115, SGDH+NS110	SGD-N, SGDB-N
Pn002.1	Cn-02, bit 2
Pn407	Cn-14
Pn408.1	–
Pn300	Cn-03

(11) Speed Reference

OL□□10	Speed Reference (**Position** / **Phase** / **Speed** / Torque)		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Depends on the Speed Units set in Function 1 (setting parameter OW□□03, bits 0 to 3).	3000

Set the speed reference.
This parameter is used by the following commands.

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

Refer to *Chapter 5 Motion Commands* for details.

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

OL□□14	Positive Side Limiting Torque Setting at the Speed Reference	Position Phase **Speed** Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Depends on torque unit selection. (OW□□03, bits C to F)	30000

Set the torque limit for the speed references.
The same value is used for both the positive and negative 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.

(13) Secondary Speed Compensation

OL□□16	Secondary Speed Compensation	Position **Phase** Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Depends on Speed Units.	0

Set the speed feed forward amount for the Phase Reference command (PHASE).
The setting unit for Speed Amends (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 applied twice.

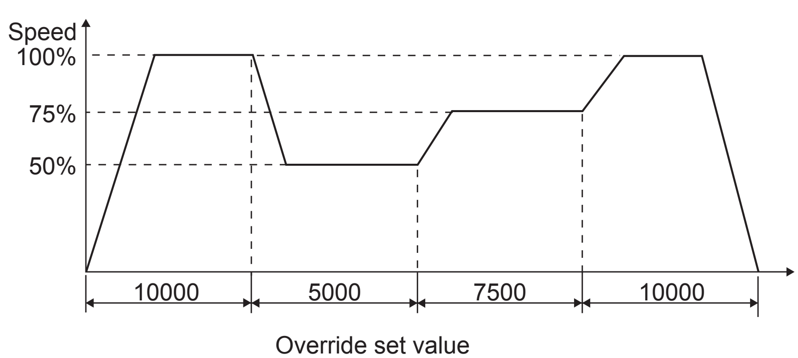
(14) Speed Override

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

Set the percentage of the Speed Reference (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 × Speed override = Output speed
(OL□□10) (OL□□18)

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 Speed Override is set to 0, the output speed is 0 and the motor will not operate.

(15) Position Reference Setting

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

Set the position reference.
This parameter is used by the following commands.

1: POSING	Positioning
2: EX_POSING	External Positioning
4: INTERPOLATE	Interpolation
6: LATCH	Latch

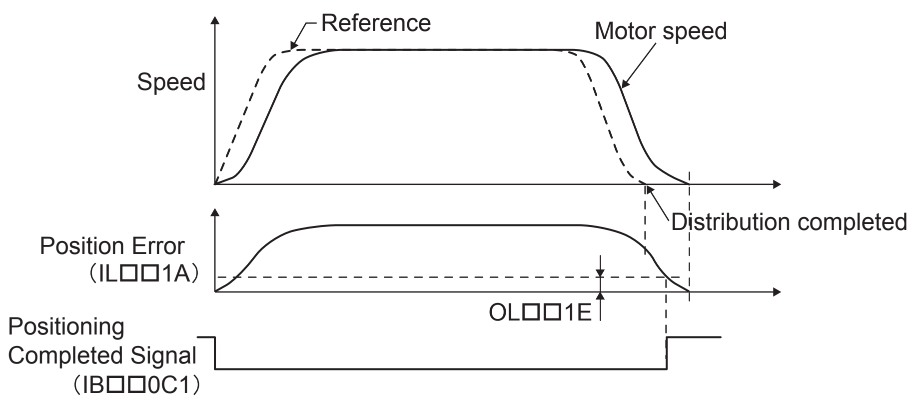
■ Related Parameters

OW□□09.Bit 5 Position Reference Type

(16) Positioning Completed Width

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

This bit shows the set value of a SERVOPACK parameter. Refer to *9.4 Parameters That Are Automatically Updated* for details.
When the Positioning Completed Signal (IB□□2C7) turns ON after position reference distribution has completed for position control, the Positioning Completed Signal (IB□□0C1) turns ON.
Set values that are suitable for all machines in the system. If the value is too small, a long time will be required for positioning to complete.



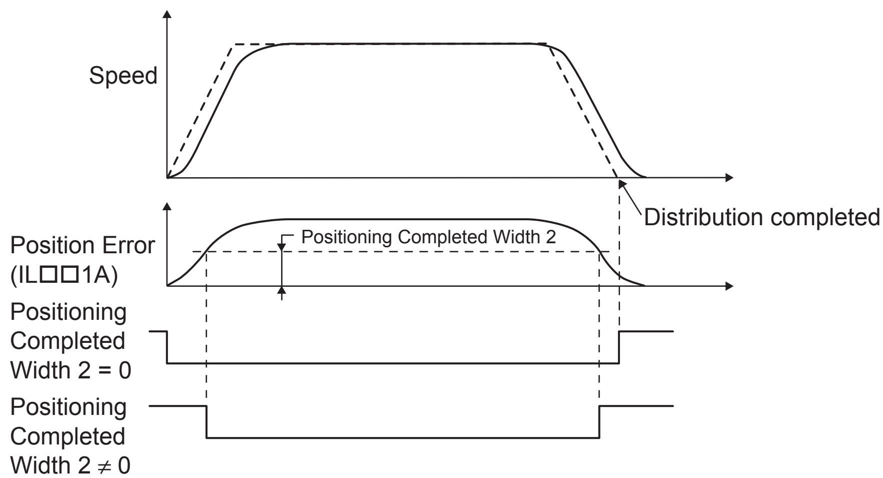
■ Related Parameters

Fixed Parameter 4	Command Unit
Fixed Parameter 5	Number of Decimal Places
Fixed Parameter 6	Command Units per Revolution
Fixed Parameter 8	Gear Ratio [MOTOR]
Fixed Parameter 9	Gear Ratio [LOAD]
OW□□2E	Position Loop Gain
IB□□0C0	Distribution Completed (DEN)
IB□□0C1	Positioning Completed (POSCOMP)

(17) Positioning Completed Width 2

OL□□20	Positioning Completed Width 2	Position Phase	Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to 65535	Reference unit	0

The Position Proximity (IB□□0C3) 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 Positioning Completed Width 2 is set to 0, the Position Proximity bit (monitoring parameter IB□□0C3) will be turned ON when the reference pulses have been distributed. (monitoring parameter IB□□0C0)
If the Positioning Completed Width 2 is set to a value other than 0, this bit will be turned ON when the result of subtracting the Machine Coordinate Feedback Position (monitoring parameter IL□□16) from the Machine Coordinate System Position (monitoring parameter IL□□12) is less than the Position Completed Width 2, even if the reference pulses have not been distributed. This parameter has no relation to the SERVOPACK parameter Position Proximity (NEAR) Signal Width.



■ Related Parameters

IB□□0C3 Position Proximity

(18) Deviation Abnormal Detection Value

OL□□22	Deviation Abnormal Detection Value	Position	Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Reference unit	$2^{31}-1$

Set the value to detect an excessively following error during position control.
The Excessively Following Error bit (IB□□049) will turn ON if the result from subtracting the Machine Coordinate Feedback Position (monitoring parameter IL□□16) from the Machine Coordinate System Position (monitoring parameter IL□□12) exceeds the value set here. An excessive following error will not be detected if this value is set to 0.

■ Related Parameters

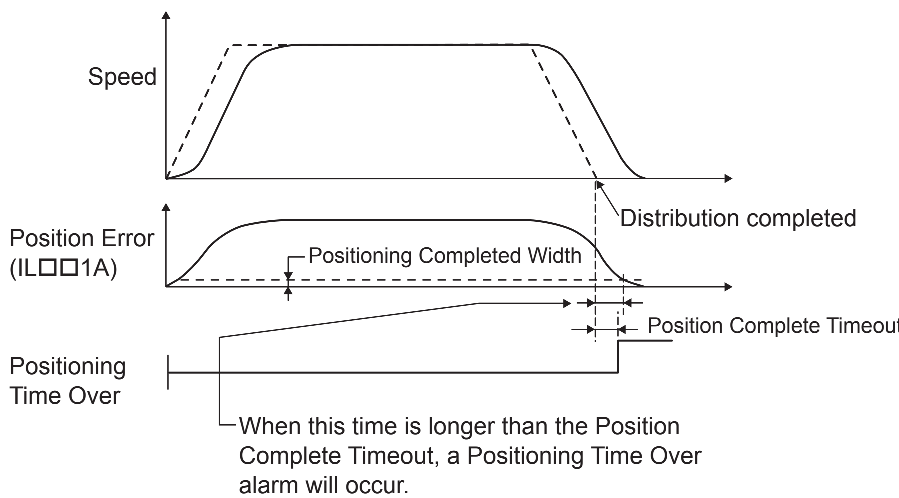
An excessively following error can be set to be treated either as a warning or as an alarm in the Deviation Abnormal Detection Error Level in Mode 1 (setting parameter OB□□010).

OB□□010 = 0 Warning (continues axis operation)

OB□□010 = 1 Alarm (stops axis operation)

(19) Position Complete Timeout

<table>
<tr><td rowspan="3">OW☐☐26</td><td colspan="3">Position Complete Timeout　**Position**　Phase　Speed　Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 65535</td><td>ms</td><td>0</td></tr>
<tr><td colspan="4">Set the time to detect a Positioning Time Over.
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 IB☐☐046) will occur. The completion of positioning will not be checked if this parameter is set to 0.</td></tr>
</table>



(20) Phase Compensation

<table>
<tr><td rowspan="3">OL☐☐28</td><td colspan="3">Phase Compensation　Position　**Phase**　Speed　Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>-2^{31} to $2^{31}-1$</td><td>Reference unit</td><td>0</td></tr>
<tr><td colspan="4">Set the phase compensation in reference units for phase reference commands.
Use this parameter to compensate for reference pulses in control systems with lower rigidity or gain.
Refer to 5.2.24 Phase References (PHASE) for details on phase reference commands.</td></tr>
</table>

(21) Latch

OL□□2A	Latch Zone Lower Limit	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	-2^{31}
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 Enabled bit in Motion Command Options (setting parameter OW□□09, bit 4). The latch zone setting is supported for SGDS SERVOPACKs for MECHATROLINK-II communication only. Latching Area Upper Limit: Pn820 Latching Area Lower Limit: Pn822			
OL□□2C	Latch Zone Upper Limit	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	$2^{31}-1$
Same as for OL□□2A.			

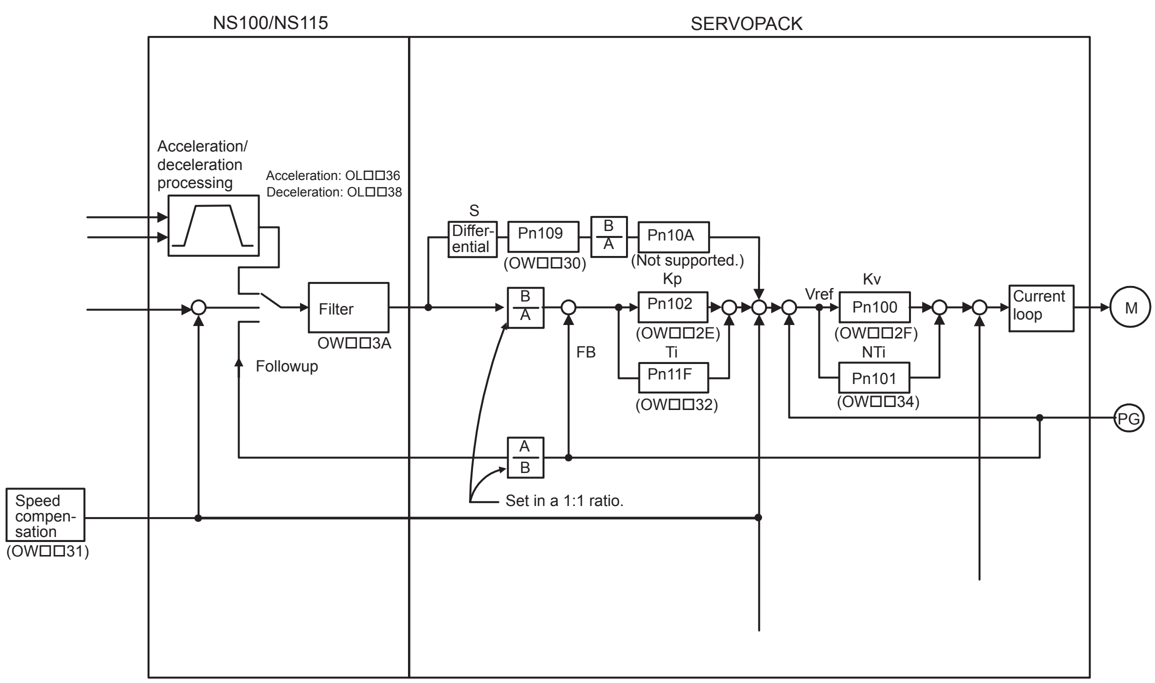
(22) Gain and Bias Settings

OW□□2E	Position Loop Gain	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	0.1/s	300
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 *9.4 Parameters That Are Automatically Updated* for details on making parameters automatically effective. 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.			
OW□□2F	Speed Loop Gain	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	1 to 2000	Hz	40
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 *9.4 Parameters That Are Automatically Updated* for details on making parameters automatically effective. 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.			
OW□□30	Speed Feed Forward Compensation	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	0.01%	0
Reduces positioning time by applying feed forward compensation. This setting is effective for position 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.			

(cont'd)

OW□□31	Speed Amends — Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	–32768 to 32767	0.01%	0
Set the speed feed forward gain as a percentage of the rated speed for the phase reference command (PHASE). The setting unit for this parameter is 0.01% (fixed). The unit for Secondary Speed Compensation (OL□□16), however, can be selected by the user. 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
Set the position loop 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 *9.4 Parameters That Are Automatically Updated* for details on making parameters automatically effective. 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.			
OW□□34	Speed Integration Time Constant — Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	15 to 65535	0.01 ms	2000
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 *9.4 Parameters That Are Automatically Updated* for details on making parameters automatically effective.			

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

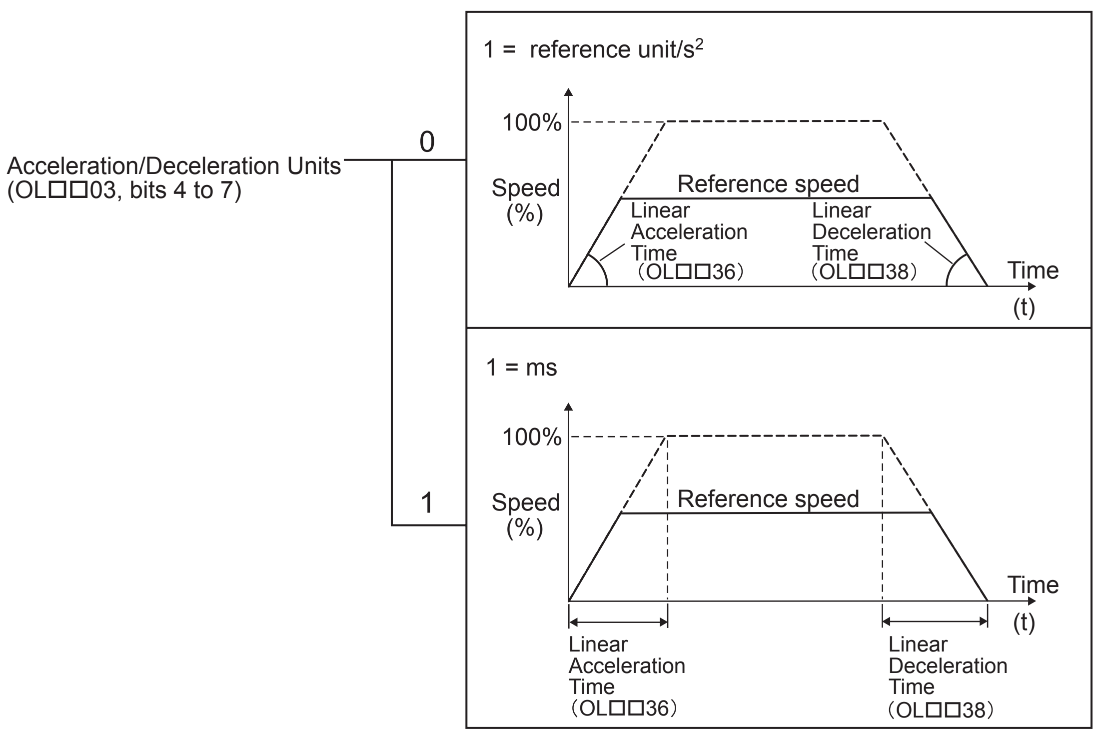


(23) Acceleration/Deceleration Settings

OL□□36	Linear Acceleration Time	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Depends on the Acceleration/ Deceleration Units (OW□□03, bits 4 to 7).	0
Set the rate or the time constant for linear acceleration. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *9.4 Parameters That Are Automatically Updated* for details on making parameters automatically effective.			
OL□□38	Linear Deceleration Time	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Depends on the Acceleration/ Deceleration Units (OW□□03, bits 4 to 7).	0
Set the rate or the time constant for linear deceleration. The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *9.4 Parameters That Are Automatically Updated* for details on making parameters automatically effective.			

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

- Setting the acceleration/deceleration speed.
- Setting the time to reach the rated speed from zero speed.
  For this method, the setting range is 0 to 32767 ms. A setting parameter error will occur if the value exceeds 32767.



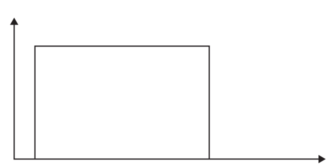
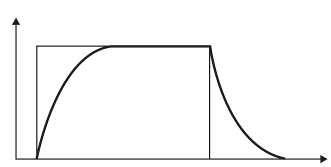
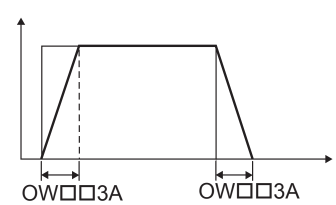
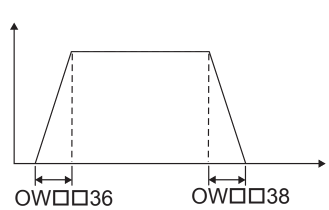
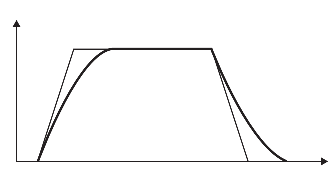
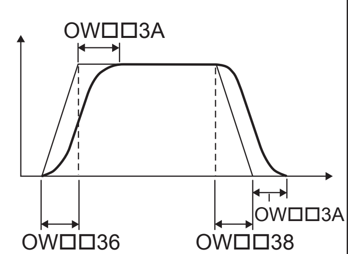
(24) Filter Time Constant

OW□□3A	S-curve Acceleration Time Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 65535	0.1 ms	0

Set the acceleration/deceleration filter time constant.
Always make sure that pulse distribution has been completed (i.e., that monitoring parameter IB□□0C0 is ON) before changing the time constant.
The actual machine operation depends on the settings in the SERVOPACK parameters. Refer to *9.4 Parameters That Are Automatically Updated* for details on making parameters automatically effective.
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 1 (setting parameter OW□□03, bits 8 to B).
   ↓
2. Execute the motion command Change Filter Type (CHG_FILTER).
   ↓
3. Set the S-curve Acceleration Time (setting parameter OW□□3A).
   ↓
4. Execute the motion command Change Filter Time Constant.

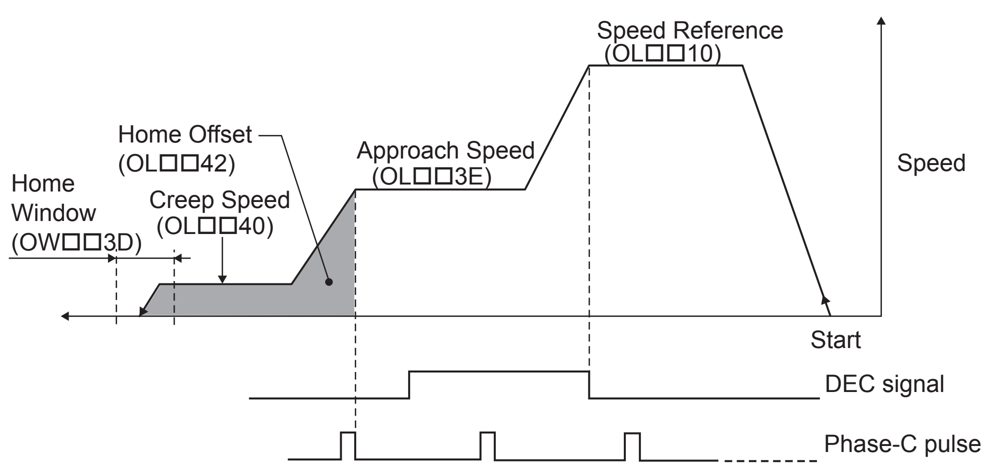
Once the filter type is set using the motion command, the setting is held until the power is turned OFF or the filter type is changed.
There are two types of acceleration/deceleration filter: An exponential acceleration/deceleration filter and a moving average filter.
The following table shows the relationship with related parameters.

No Filter	Exponential Acceleration/Deceleration Filter	Moving Average Filter
OW□□38, Bits 8 to B = 0	OW□□38, bits 8 to B = 1	OW□□38, bits 8 to B = 2
 Step input		
 Acceleration/deceleration used		

(25) Zero Point Return

OW□□3C	Home Return Type		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to 19	–	0
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 used for the zero point return operation. 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	Home Window		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to 65535	Reference unit	100
Set the width to turn ON the Zero Point Position bit in the Position Management Status (monitoring parameter IB□□0C4).			
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
Set the approach speed for a zero point return operation after the deceleration LS is passed.			
OL□□40	Creep Speed		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Depends on Speed Units.	500
Set the creep speed for a zero point return operation after the ZERO signal is detected.			
OL□□42	Home Offset		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	0
Set the distance from where the signal is detected to the zero point position.			

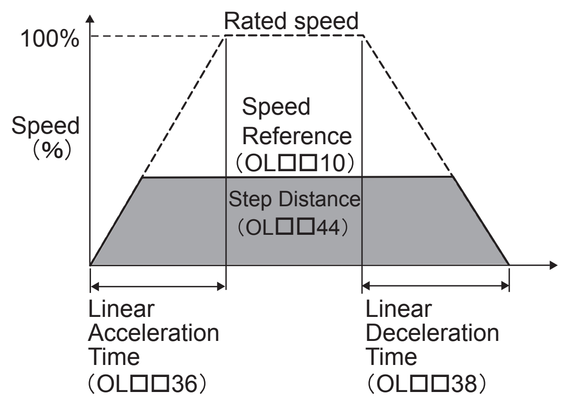
A typical example of a zero point return operation is shown below.
Refer to *5.2.3 Zero Point Return (ZRET)* for details on zero point return.



(26) Step Distance

OL□□44	Step Distance		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Reference unit	1000

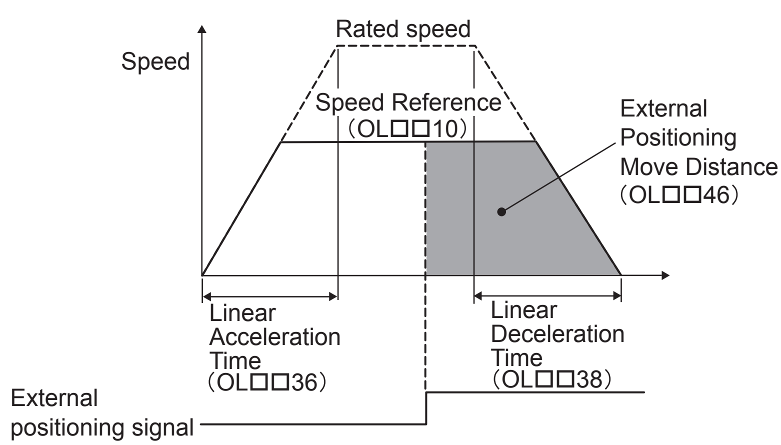
Set the moving amount for STEP commands.
Refer to *5.2.7 STEP Operation (STEP)* for details on STEP commands.



(27) External Positioning Move Distance

OL□□46	External Positioning Move Distance		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	0

Set the distance from the time the external signal is input for external positioning commands (EX_POSING).
Refer to *5.2.2 External Positioning (EX_POSING)* for details.



(28) Coordinate System Settings

OL□□48	Zero Point Offset		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	0
Set the offset to shift the machine coordinate system. Note: This parameter is always enabled, so make sure that the setting is correct.			

OL□□4A	Work Coordinate System Offset		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	0
Set the offset to shift the work coordinate system. Note: This parameter is always effective, so make sure that the setting is correct.			

OL□□4C	Preset Data of POSMAX Turn		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Rev	0
When the POSMAX Preset bit (setting parameter OW□□00, bit 6) is set to 1, the value set here will be preset as the POSMAX Number of Turns (monitoring parameter IL□□1E).			

(29) SERVOPACK User Monitor

OW□□4E	Servo User Monitor		Position Phase Speed Torque
	Setting Range	Setting Unit	Default Value
	–	–	0E00H

OW□□4E	Bit	Description
OW□□4E	Bit 4 to Bit 7	Monitor 2 Monitor 2 is used with the MECHATROLINK-I and the MECHATROLINK-II in 17-byte Mode when bit 0 of OW□□02 is 1. 0: Reference position in command coordinate system (reference unit) 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: Reserved 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: Reserved D: Reserved E: Option Monitor 1 (default) F: Option Monitor 2
	Bit C to Bit F	Monitor 4 Monitor 4 is used only with the MECHATROLINK-II in 32-byte Mode. 0 to F: Same as for Monitor 2.

(30) SERVOPACK Commands

OW□□4F	Servo Alarm Monitor Number Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 10	–	0
Set the number of the alarm to monitor. Set the number of the alarm to monitor for the ALM_MON or ALM_HIST motion command. The result of monitoring will be stored as the Servo Alarm Code (monitoring parameter IW□□2D). Refer to *Chapter 5 Motion Commands* for details.			
OW□□50	Servo Constant Number Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 65535	–	0
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 command. Refer to *Chapter 5 Motion Commands* for details.			
OW□□51	Servo Constant Number Size Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	1, 2	–	1
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 command. Refer to *Chapter 5 Motion Commands* for details.			
OL□□52	Servo User Constant Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	–	0
Set the setting for the SERVOPACK parameter. Set the setting value to be written to the SERVOPACK parameter with the PRM_WR motion command. Refer to *Chapter 5 Motion Commands* for details.			
OW□□54	Auxiliary Servo User Constant Number Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 65535	–	0
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 5 Motion Commands* for details.			
OW□□55	Auxiliary Servo Constant Number Size Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	1, 2	–	1
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 5 Motion Commands* for details.			
OL□□56	Auxiliary Servo User Constant Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	–	0
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 5 Motion Commands* for details.			

(31) Supplemental Settings

OW□□5C	Fixed Parameter Number Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 65535	–	0
Set the number of the fixed parameter to read with the FIXPRM_RD motion subcommand. The results of reading the fixed parameter will be stored[1] in the Fixed Parameter Monitor (monitoring parameter IL□□56).			

(32) Absolute Infinite Length Axis Position Control Information

OL□□5E	Absolute Position at Power OFF (Low Value) Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	pulse	0
This information is for infinite length axis position control when an absolute encoder is used. The encoder position is stored in 4 words. If the Infinite Length Axis Position Information LOAD bit is set to 1 in the RUN Commands (setting parameter OW□□00, bit 7), the position information will be recalculated with the values set here and the Modularized Position at Power OFF (OL□□62 and OL□□64).			
OL□□60	Absolute Position at Power OFF (High Value) Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	pulse	0
Same as for OL□□5E.			
OL□□62	Modularized Position at Power OFF (Low Value) Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	pulse	0
This information is 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 Infinite Length Axis Position Information LOAD bit is set to ON in the RUN Commands (setting parameter OW□□00, bit 7), the position information will be recalculated with the values set here and the Absolute Position at Power OFF (OL□□5E and OL□□60).			
OL□□64	Modularized Position at Power OFF (High Value) Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	pulse	0
Same as for OL□□62.			

(33) Transparent Command Mode

OW□□70 to OW□□7E	Command Buffer for Transparent Command Mode Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	–	–	0
This area is used for command 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			

TERMS

[1]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 when explaining motion monitoring parameters.

4.3.3 Motion Monitoring Parameter Details

The motion monitoring parameters are listed in the following table.

(1) Drive Status

<table>
<tr><td colspan="2" rowspan="3">IW□□00</td><td colspan="3">Drive Status</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>–</td><td>–</td><td></td></tr>
<tr><td rowspan="4">IW□□00</td><td>Bit 0</td><td colspan="3">Motion Controller Operation Ready
This bit turns ON when RUN preparations for the Motion Module have been completed.
This bit will be OFF for 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.
OFF: Operation not ready
ON: Operation ready

(Note) Configure an OR circuit with IB□□002 when using as a Servo ON interlock.</td></tr>
<tr><td>Bit 1</td><td colspan="3">Running (Servo ON)
This bit is ON during the Servo ON condition for the axis.
OFF: Stopped
ON: Running (Servo ON)</td></tr>
<tr><td>Bit 2</td><td colspan="3">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.
OFF: System not busy
ON: System busy</td></tr>
<tr><td>Bit 3</td><td colspan="3">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.
OFF: Servo not ready
ON: Servo ready</td></tr>
</table>

(2) Over Range Parameter Number

<table>
<tr><td rowspan="3">IW□□01</td><td colspan="3">Over Range Parameter Number</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>0 to 65535</td><td>–</td><td></td></tr>
<tr><td colspan="4">Stores the number of a parameter set outside the setting range.
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.
• Setting parameters: 0 to 999
• Fixed parameters: 1000 or higher</td></tr>
</table>

(3) Warning

<table>
<tr><td colspan="2" rowspan="3">IL□□02</td><td colspan="3">Warning</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>–</td><td>–</td><td></td></tr>
<tr><td rowspan="9">IL□□02</td><td>Bit 0</td><td colspan="3">Excessively Following Error
This bit turns ON if the following error exceeds the value set for Deviation Abnormal Detection Value (setting parameter OL□□22) when excessively following error is set to be treated as warnings by setting the Deviation Abnormal Detection Error Level to 1 in Mode 1 (setting parameter OW□□01, bit 0).
OFF: In normal deviation range
ON: Abnormal deviation detected</td></tr>
<tr><td>Bit 1</td><td colspan="3">Setting Parameter Error
This bit turns ON when one or more of the motion setting parameter values is set outside the setting range. The number of the parameter for which the value is out of range is stored as the Over Range Parameter Number (monitoring parameter IW□□01).
OFF: In setting range
ON: Outside setting range</td></tr>
<tr><td>Bit 2</td><td colspan="3">Fixed Parameter Error
This bit turns ON when one or more of the motion fixed parameter values is set outside the setting range. The number of the parameter for which the value is out of range is stored as the Over Range Parameter Number (monitoring parameter IW□□01).
OFF: In setting range
ON: Outside setting range</td></tr>
<tr><td>Bit 3</td><td colspan="3">Servo Driver Error
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 Alarm Code (monitoring parameter IW□□2D).
OFF: No warning
ON: Warning</td></tr>
<tr><td>Bit 4</td><td colspan="3">Motion Command Setting Error
This bit turns ON when a motion command that cannot be used is set.
OFF: Command setting normal
ON: Command setting error</td></tr>
<tr><td>Bit 6</td><td colspan="3">Positive Overtravel
This bit turns ON when positive overtravel is disabled in the fixed parameter settings and the positive overtravel signal is input.
OFF: No positive overtravel
ON: Positive overtravel</td></tr>
<tr><td>Bit 7</td><td colspan="3">Negative Overtravel
This bit turns ON when negative overtravel is disabled in the fixed parameter settings and the negative overtravel signal is input.
OFF: No negative overtravel
ON: Negative overtravel</td></tr>
<tr><td>Bit 8</td><td colspan="3">Servo Not ON
This bit turns ON when the Servo ON bit in the RUN Commands (setting parameter OW□□00, bit 0) set to 1 but the SERVOPACK is not in the Servo ON condition.
OFF: Servo ON
ON: Servo not ON</td></tr>
<tr><td>Bit 9</td><td colspan="3">Servo Driver Communication Warning
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.
OFF: Communication normal
ON: Communication error detected</td></tr>
</table>

(4) Alarm

<table>
<tr><td colspan="2" rowspan="3">IL□□04</td><td colspan="3">Alarm</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>–</td><td>–</td><td></td></tr>
<tr><td rowspan="8">IL□□04</td><td>Bit 0</td><td colspan="3">Servo Driver Error
This bit turns ON when there is an alarm in the SERVOPACK for MECHATROLINK communication. The content of the alarm can be confirmed using the Servo Alarm Code (monitoring parameter IW□□2D).
OFF: No Servo Driver alarm
ON: Servo Driver alarm occurred</td></tr>
<tr><td>Bit 1</td><td colspan="3">Positive Overtravel
This bit turns ON when the positive overtravel signal is input and a move command is executed in the positive direction. For details, refer to 9.2 Overtravel Function.
OFF: No positive overtravel
ON: Positive overtravel occurred</td></tr>
<tr><td>Bit 2</td><td colspan="3">Negative Overtravel
This bit turns ON when the negative overtravel signal is input and a move command is executed in the negative direction. For details, refer to 9.2 Overtravel Function.
OFF: No negative overtravel
ON: Negative overtravel occurred</td></tr>
<tr><td>Bit 3</td><td colspan="3">Positive Soft Limit (Positive Software Limit)
This bit turns ON if a move command that exceeds the positive software limit is executed with the following conditions:
• Zero point return has been completed
• The positive software limit function is enabled
• A finite length axis is selected.
For details, refer to 9.3 Software Limit Function.
OFF: In positive software limit range
ON: Outside positive software limit range</td></tr>
<tr><td>Bit 4</td><td colspan="3">Negative Soft Limit (Negative Software Limit)
This bit turns ON if a move command that exceeds the negative software limit is executed with the following conditions:
• Zero point return has been completed
• The negative software limit function is enabled
• A finite length axis is selected.
For details, refer to 9.3 Software Limit Function.
OFF: In negative software limit range
ON: Outside negative software limit range</td></tr>
<tr><td>Bit 5</td><td colspan="3">Servo OFF
This bit turns ON when a move command is executed during Servo OFF status.
OFF: Servo ON
ON: Servo OFF</td></tr>
<tr><td>Bit 6</td><td colspan="3">Positioning Time Over
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 Position Complete Timeout (setting parameter OW□□26).
OFF: No timeout
ON: Timeout occurred</td></tr>
<tr><td>Bit 7</td><td colspan="3">Excessive Positioning Moving Amount
This bit turns ON when a moving amount is specified that exceeds the setting range for the positioning moving amount.
OFF: Moving amount normal
ON: Excessive moving amount</td></tr>
</table>

(cont'd)

IL□□04 (cont'd)	Bit 8	Excessive Speed This bit turns ON when a speed is set that exceeds the setting range for the speed reference. OFF: Speed normal ON: Excessive speed
	Bit 9	Excessively Following Error This bit turns ON if the following error exceeds the value set for the Deviation Abnormal Detection Value (setting parameter OL□□22) when an excessively Following Error is set to be treated as an alarm by setting the Deviation Abnormal Detection Error Level to 0 in Mode 1 (setting parameter OW□□01, bit 0). OFF: In normal deviation range ON: Abnormal deviation detected
	Bit A	Filter Type Change Error This bit turns ON if the filter type is changed while the pulses are still distributing. OFF: No change error ON: Change error occurred
	Bit B	Filter Time Constant Change Error This bit turns ON if the filter time constant is changed when the pulses are still distributing. OFF: No change error ON: Change error occurred
	Bit D	Zero Point Not Set 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. OFF: Zero point set ON: Zero point not set error
	Bit E	Zero Point Set during Travel This bit turns ON if the zero point is set during axis moving. OFF: Zero point not set during travel ON: Zero point set during travel
	Bit F	Servo Driver Parameter Setting Error This bit turns ON if a failure occurs while changing MECHATROLINK Servo parameter settings. OFF: User parameters changed normally ON: Changing user parameters failed
	Bit 10	Servo Driver Synchronization Communication Error This bit turns ON if a synchronization communication error is detected with the SERVOPACK for MECHATROLINK communication. OFF: No synchronization communication error ON: Synchronization communication error
	Bit 11	Servo Driver Communication Error This bit turns ON if two communication errors are detected consecutively in communication with the SERVOPACK for MECHATROLINK communication. OFF: No consecutive synchronization communication error ON: Consecutive synchronization communication errors
	Bit 12	Servo Driver Command Timeout Error 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	ABS Encoder Count Exceeded This bit turns ON if the number of turns from the absolute encoder exceeds the range that the SVB-01 Module can handle. This parameter is valid when using an absolute encoder and a finite-length axis. This bit also turns ON if the result of the operation converting the current position to reference units when the power is turned ON exceeds 32 bits. OFF: In count range ON: Outside count range
	Bit 1E	SERVOPACK Motor Type Mismatch OFF: Motor type matches ON: Motor type does not match

(cont'd)

IL□□04 (cont'd)	Bit 1F	SERVOPACK Encoder Type Mismatch OFF: Encoder type matches ON: Encoder type does not match

(5) Motion Command Response Codes

IW□□08	Servo Command Type Response		
	Range	Unit	
	0 to 65535	–	
Stores the motion command code for the command that is 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 • Clear alarms: 31			

(6) Motion Command Status

IW□□09		Servo Module Command Status		
		Range	Unit	
		–	–	
IW□□09	Bit 0	Command Executing (BUSY) This bit indicates the motion command status. Refer to *Chapter 5 Motion Commands* for details on command timing charts. OFF: READY (completed) ON: BUSY (processing) This bit turns ON during execution of commands that have completions or during abort processing.		
	Bit 1	Command Hold Completed (HOLDL) This bit turns ON when command hold processing has been completed. Refer to *Chapter 5 Motion Commands* for details on command timing charts. OFF: Command hold processing not completed ON: Command hold completed		
	Bit 3	Command Error Occurrence (FAIL) 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 5 Motion Commands* for details on command timing charts. OFF: Normal completion ON: Abnormal completion		
	Bit 7	Reset Absolute Encoder Completed This bit turns ON when the Reset Absolute Encoder command (ABS_RST) is executed and initialization is completed. Refer to *Chapter 5 Motion Commands* for details on command timing charts. OFF: Reset not completed ON: Reset completed		
	Bit 8	Command Execution Completed (COMPLETE) This bit turns ON when motion command processing completes normally. Refer to *Chapter 5 Motion Commands* for details on command timing charts. OFF: Normal execution not completed ON: Normal execution completed		

(7) Motion Subcommand Response Code

IW□□0A	Motion Subcommand Response Code		
	Range	Unit	
	0 to 65535	–	
Stores the motion subcommand code 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). (Note) Subcommands are used by the system for latch commands and reading/writing parameters.			

(8) Motion Subcommand Status

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

(9) Position Management Status

<table>
<tr><td colspan="2" rowspan="3">IW□□0C</td><td colspan="3">Position Management Status</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>–</td><td>–</td><td></td></tr>
<tr><td rowspan="8">IW□□0C</td><td>Bit 0</td><td colspan="3">Distribution Completed (DEN)
This bit turns ON when pulse distribution has been completed for a move command.
This bit turns ON when the SERVOPACK parameter Distribution Completed (monitoring parameter IB□□2C8) turns ON and the SVB-01 Module’s internal distribution processing is completed.
OFF: Distributing pulses
ON: Distribution completed</td></tr>
<tr><td>Bit 1</td><td colspan="3">Positioning Completed (POSCOMP)
This bit turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width (i.e., after SERVOPACK Positioning Completed (IB□□2C7) turns ON).
OFF: Outside Positioning Completed Width
ON: In Positioning Completed Width</td></tr>
<tr><td>Bit 2</td><td colspan="3">Latch Completed (LCOMP)
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 Latch Position (monitoring parameter IL□□18).
OFF: Latch not completed
ON: Latch completed</td></tr>
<tr><td>Bit 3</td><td colspan="3">Position Proximity (NEAR)
The operation of this bit depends on the setting of the Positioning Completed Width 2 (setting parameter OL□□20).
• OL□□20 = 0: This bit turns ON when pulse distribution has been completed (monitoring parameter IB□□0C0).
• OL□□20 ≠ 0: This bit turns ON when the result of subtracting the Machine Coordinate Feedback Position (IL□□16) from the Machine Coordinate System Position (IL□□12) is less than the Position Completed Width 2, even if pulse distribution has not been completed.
OFF: Outside position proximity range
ON: In position proximity range</td></tr>
<tr><td>Bit 4</td><td colspan="3">Zero Point Position (ZERO)
This bit turns ON when the Machine Coordinate System Position (monitoring parameter IL□□12) is within the Home Window (setting parameter OW□□3D) after a zero point return (setting) has been completed.
OFF: Outside zero point position range
ON: In zero point position range</td></tr>
<tr><td>Bit 5</td><td colspan="3">Zero Point Return (Setting) Completed (ZRNC)
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.
OFF: Zero point return (setting) not completed
ON: Zero point return (setting) completed</td></tr>
<tr><td>Bit 6</td><td colspan="3">Machine Lock ON (MLKL)
This bit turns ON when the Machine Lock bit is set to 1 in the RUN Commands (setting parameter OW□□00, bit 1) and the axis has actually entered machine lock mode.
OFF: Machine lock mode released
ON: Machine lock mode</td></tr>
<tr><td>Bit 8</td><td colspan="3">ABS System Infinite Length Position Control Information LOAD Completed (ABSLDE)
This bit turns ON when the Infinite Length Axis Position Information Load bit is set to 1 in the RUN Commands (setting parameter OW□□00, bit 7) and loading of the information has been completed.
OFF: Load not completed
ON: Load completed</td></tr>
</table>

(cont'd)

IW☐☐0C (cont'd)	Bit 9	POSMAX Turn Number Presetting Completed (TPRSE) This bit turns ON when the POSMAX Preset bit in the RUN Commands (setting parameter OW☐☐00, bit 6) is set to 1 and the POSMAX Number of Turns has been preset with the Preset Data of POSMAX Turn (setting parameter OL☐☐4C). OFF: Preset not completed ON: Preset completed

(10) Position Information

IL☐☐0E	Machine Coordinate Target Position (TPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	

Stores the target position in the machine coordinate system[1] 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.

(Note) This parameter will not be reset even when an infinite length axis type is set.

IL☐☐10	Target Position (CPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	

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 refreshed even when the machine lock mode is enabled.

(Note) When an infinite length axis type is selected, a range of 0 to (Maximum Value of Rotary Counter (POSMAX) (fixed parameter 10) – 1) is stored.

IL☐☐12	Machine Coordinate System Position (MPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	

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 parameter is not updated while the machine is in lock mode. (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	32-bit Calculated Position (DPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	

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	Machine Coordinate Feedback Position (APOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	

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.

(Note) When an infinite length axis type is selected, a range of 0 to (Maximum Value of Rotary Counter (POSMAX) (fixed parameter 10) – 1) is stored.

IL☐☐18	Machine Coordinate Latch Position (LPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	

Stores the latch position when the latch has been completed.

(cont'd)

IL□□1A	Position Error (PERR)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the following error (Machine Coordinate System Position (IL□□12) – Machine Coordinate Feedback Position (IL□□16)) managed by the Motion Module.			
IL□□1C	Target Position Difference Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the number of pulses distributed each scan.			
IW□□1E	POSMAX Number of Turns		
	Range	Unit	
	-2^{31} to $2^{31}-1$	rev	
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 Maximum Value of Rotary Counter (POSMAX) (fixed parameter 10).			

TERMS

[1]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 MP2200/MP2300 manages the positions using this machine coordinate system.

(11) Reference Monitor

IL□□20	Speed Reference Output Monitor		
	Range	Unit	
	–32768 to 32767 (-2^{31} to $2^{31}-1$)	pulse/s	
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) SERVOPACK Status

<table>
<tr><td colspan="2" rowspan="3">IW□□2C</td><td colspan="3">Network Servo Status</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>–</td><td>–</td><td></td></tr>
<tr><td rowspan="6">IW□□2C</td><td>Bit 0</td><td colspan="3">Alarm Occurred (ALM)
OFF: No alarm occurred.
ON: Alarm occurred.</td></tr>
<tr><td>Bit 1</td><td colspan="3">Warning Occurred (WARNING)
OFF: No warning occurred.
ON: Warning occurred.</td></tr>
<tr><td>Bit 2</td><td colspan="3">Command Ready (CMDRDY)
OFF: Command cannot be received.
ON: Command can be received.</td></tr>
<tr><td>Bit 3</td><td colspan="3">Servo ON (SVON)
OFF: Servo OFF.
ON: Servo ON.</td></tr>
<tr><td>Bit 4</td><td colspan="3">Main Power ON (PON)
OFF: Main power OFF.
ON: Main power ON.</td></tr>
<tr><td>Bit 5</td><td colspan="3">Machine Lock (MLOCK)
OFF: Machine lock mode released.
ON: Machine lock mode.</td></tr>
</table>

(cont'd)

<table>
<tr><td rowspan="12">IW□□2C
(cont'd)</td><td>Bit 6</td><td>Zero Point Position (ZPOINT)
OFF: Outside Zero Point Position Range.
ON: In Zero Point Position Range.</td></tr>
<tr><td rowspan="2">Bit 7</td><td>Positioning Completed (PSET)
OFF: Outside Positioning Completed Width.
ON: In Positioning Completed Width (for position control).</td></tr>
<tr><td>Speed Coincidence (V-CMP)
OFF: Speed does not agree.
ON: Speed agrees (for speed control).</td></tr>
<tr><td rowspan="2">Bit 8</td><td>Distribution Completed (DEN)
OFF: Distributing pulses.
ON: Distribution completed (for position control).</td></tr>
<tr><td>Zero Speed (ZSPD)
OFF: Zero speed not detected.
ON: Zero speed detected (for speed control).</td></tr>
<tr><td>Bit 9</td><td>Torque Being Limited (T_LIM)
OFF: Torque not being limited.
ON: Torque being limited.</td></tr>
<tr><td>Bit A</td><td>Latch Completed (L_CMP)
OFF: Latch not completed.
ON: Latch completed.</td></tr>
<tr><td rowspan="2">Bit B</td><td>Position Proximity (NEAR)
OFF: Outside Position Proximity Range.
ON: In Position Proximity Range.</td></tr>
<tr><td>Speed Limit (V_LIM)
OFF: Speed limit not detected.
ON: Speed limit detected.</td></tr>
<tr><td>Bit C</td><td>Positive Soft Limit (Positive Software Limit) (P_SOT)
OFF: In Positive Software Limit Range.
ON: Outside Positive Software Limit Range.</td></tr>
<tr><td>Bit D</td><td>Negative Soft Limit (Negative Software Limit) (N_SOT)
OFF: In Negative Software Limit Range.
ON: Outside Negative Software Limit Range.</td></tr>
</table>

(13) SERVOPACK Information

<table>
<tr><td rowspan="3">IW□□2D</td><td colspan="3">Servo Alarm Code</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>–32768 to 32767</td><td>–</td><td></td></tr>
<tr><td colspan="4">Stores the alarm code (leftmost 2 digits) from the SERVOPACK.
Example: The code for a communication error that occurs in an SGDS SERVOPACK is E6.
Refer to the manual for the SERVOPACK for details on alarms.</td></tr>
</table>

(14) SERVOPACK I/O Monitor

Stores I/O information of the SERVOPACK.

<table>
<tr><td colspan="2" rowspan="3">IW□□2E</td><td colspan="3">Network Servo I/O Monitor</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>–</td><td>–</td><td></td></tr>
<tr><td rowspan="14">IW□□2E</td><td>Bit 0</td><td colspan="3">Positive Drive Prohibited Input (P_OT)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 1</td><td colspan="3">Negative Drive Prohibited Input (N_OT)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 2</td><td colspan="3">Zero Point Return Deceleration Limit Switch Input (DEC)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 3</td><td colspan="3">Encoder Phase-A Input (PA)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 4</td><td colspan="3">Encoder Phase-B Input (PB)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 5</td><td colspan="3">Encoder Phase-C Input (PC)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 6</td><td colspan="3">First External Latch Input (EXT1)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 7</td><td colspan="3">Second External Latch Input (EXT2)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 8</td><td colspan="3">Third External Latch Input (EXT3)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit 9</td><td colspan="3">Brake Output (BRK)
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit C</td><td colspan="3">CN1 Input Signal (IO12) selected in parameter Pn81E.0
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit D</td><td colspan="3">CN1 Input Signal (IO13) selected in parameter Pn81E.1
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit E</td><td colspan="3">CN1 Input Signal (IO14) selected in parameter Pn81E.2
OFF: OFF
ON: ON</td></tr>
<tr><td>Bit F</td><td colspan="3">CN1 Input Signal (IO15) selected in parameter Pn81E.3
OFF: OFF
ON: ON</td></tr>
</table>

(15) SERVOPACK User Monitor Information

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

IW□□2F		Network Servo User Monitor Information		
		Range	Unit	
		–	–	
IW□□2F	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) SERVOPACK Information 2

IL□□30	Servo User Monitor 2		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	
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 parameter OW□□4E, bits 4 to 7). (Note) 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 User Monitor 3		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	
Reserved.			
IL□□34	Servo User Monitor 4		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	
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 parameter OW□□4E, bits C to F).			
IW□□36	Servo Constant Number		
	Range	Unit	
	0 to 65535	–	
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 5 Motion Commands* for details.			
IW□□37	Auxiliary Servo User Constant Number		
	Range	Unit	
	0 to 65535	–	
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 5 Motion Commands* for details.			
IL□□38	Servo User Constant		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	

(cont'd)

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 5 Motion Commands* for details.			
IL□□3A	Auxiliary Servo User Constant		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	
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 5 Motion Commands* for details.			
IW□□3F	Motor Type		
	Range	Unit	
	0, 1	–	
Stores the type of motor that is actually connected. 0: Rotary motor 1: Linear motor			
IL□□40	Feedback Speed		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Depends on speed unit.	
Stores the feedback speed. The unit for this parameter is set in the Speed Units in Function 1 (setting parameter OW□□03, bits 0 to 3). The value is determined by the moving average time constant and unit set from the difference with the Machine Coordinate Feedback Position (monitoring parameter IL□□16) in each scan.			
IL□□42	Torque (Thrust) Reference Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Depends on the Torque Unit (OW□□03, bits C to F).	
Stores the value of the torque reference. The Torque (Thrust) Reference Monitor is achieved using the Servo command expansion area and can be executed only with the MECHATROLINK-II, 32-byte Mode communication method.			

(17) Supplemental Information

IL□□56	Fixed Parameter Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	
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	Absolute Position at Power OFF (Low Value)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	pulse	
Stores information used for infinite length axis position control when an absolute encoder is used. These parameters store the encoder position in 4 words.			
IL☐☐60	Absolute Position at Power OFF (High Value)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	pulse	
Same as for IL☐☐5E.			
IL☐☐62	Modularized Position at Power OFF (Low Value)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	pulse	
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	Modularized Position at Power OFF (High Value)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	pulse	
Same as for IL☐☐62.			

(19) Transparent Command Mode

IW☐☐70 to IW☐☐7E	Response Buffer for Transparent Command Mode		
	Range	Unit	
	–	–	
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			

4.4 SVA-01 Module Parameter Details

4.4.1 Motion Fixed Parameter Details

(1) Run Mode

<table>
<tr><td rowspan="3">No. 0</td><td colspan="3">Run Mode</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 5</td><td>–</td><td>0</td></tr>
<tr><td colspan="4">Specify the application method of the axis.
0: Normal Running (default)
Use this setting when actually using an axis.
1: Axis Unused
All axis control is disabled when the axis is set to unused.
The monitoring parameters are not 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 Drive Status (monitoring parameter IW☐☐00), which will be cleared to zeros. Set any axis that is not being used to this mode to reduce the processing time.
2: Simulation Mode
In Simulation Mode, position information will be stored in the monitoring parameters even if a Servodrive is not connected.
This mode is used to virtually check the operation of the applications program.
4: General-purpose I/O Mode
The following functions are enabled in General-purpose I/O Mode.
• General-purpose DO outputs (6 points/axis)
• General-purpose AO outputs (2 channels/axis)
• General-purpose DI inputs (6 points/axis)
• General-purpose AI inputs (2 channels/axis)
• Counter inputs (1 channel/axis)
5: Reserved Mode 1
This mode is reserved for the system. Do not use this setting.</td></tr>
</table>

(2) Function Selection 1

<table>
<tr><td colspan="2" rowspan="3">No. 1</td><td colspan="3">Function Selection 1</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>Bit Setting</td><td>–</td><td>0000 Hex</td></tr>
<tr><td rowspan="2">No. 1</td><td>Bit 0</td><td colspan="3">Axis Type
Set whether or not there is a travel limit on the controlled axis.
0: Finite length axis (default)
Selects an axis with a travel limit. The software limit function is enabled.
1: Infinite length axis
Selects an axis without a travel limit. The software limit function is disabled.
When an infinite length axis is set, the position information will be reset each time the position exceeds the value set for the Maximum Value of Rotary Counter (fixed parameter 10).</td></tr>
<tr><td>Bit 1</td><td colspan="3">Forward Software Limit Enabled
Set whether or not to use the software limit function in the positive direction.
Set the software limit as the Forward Software Limit (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 (IB☐☐C5 is ON).
For details, refer to 9.3 Software Limit Function.
0: Disabled (default)
1: Enabled</td></tr>
</table>

(cont'd)

No. 1 (cont'd)	Bit 2	Reverse Software Limit Enabled Set whether or not to use the software limit function in the negative direction. Set the software limit as the Reverse Software Limit (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 (IB□□C5 is ON). For details, refer to *9.3 Software Limit Function*. 0: Disabled (default) 1: Enabled
	Bit 3	Positive Overtravel Set whether or not to use the overtravel detection function in the positive direction. A setting must also be made in the SERVOPACK. For details, refer to *9.2 Overtravel Function*. 0: Disabled (default) 1: Enabled
	Bit 4	Negative Overtravel Set whether or not to use the overtravel detection function in the negative direction. A setting must also be made in the SERVOPACK. For details, refer to *9.2 Overtravel Function*. 0: Disabled (default) 1: Enabled
	Bit 5	Deceleration Limit Switch Inversion Set whether or not to invert the polarity of the DI_5 signal, which is used for DEC1. 0: Do not invert. 1: Invert. The Deceleration Limit Switch Signal for Zero Point Return (bit 8 of OW□□05) is not inverted.
	Bit 7	Read Absolute Data after Power-up Set whether or not to read absolute data from the absolute encoder when the power is turned on or the fixed parameters are saved. 0: Read data. 1: Do not read data.
	Bit 9	Simple ABS Infinite Axis This function performs infinite length position control on the condition that the number of turns counted by the encoder is an integer multiple of the number of turns in the reference unit reset period. This function reduces ladder programming since a ladder program section is not needed to save and load the absolute infinite length position control information. 0: Disabled (default) 1: Enabled For details, refer to *7.3.2 Infinite Length Axis*.

(3) Function Selection 2

No. 2		Function Selection 2		
		Setting Range	Setting Unit	Default Value
		Bit Setting	–	0000 Hex
No.2	Bit 0 to Bit 2	Reserved for the system		
	Bit 3	Analog Adjustment Unfinished Warning Mask 0: Disabled (default) 1: Enabled		
	Bit 4	PG Disconnected Alarm Mask In general-purpose I/O mode, this function masks detection of disconnected counter input pin wiring alarms. 0: Disabled (default) 1: Enabled		

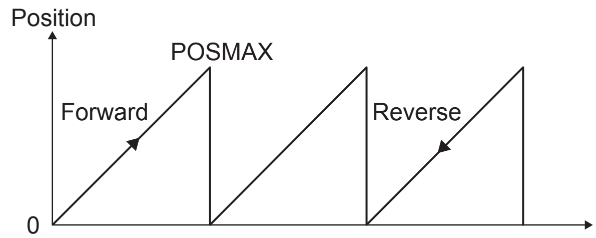
(4) Reference Unit Settings

No. 4	Command Unit		
	Setting Range	Setting Unit	Default Value
	0 to 3	–	0
Set the units for the reference that is input. The minimum reference unit is determined by this parameter and the Number of Decimal Places setting (fixed parameter 5). If pulse is selected, the Electronic Gear Ratio (fixed parameters 8 and 9) will be disabled. For details, refer to *(1) Reference Unit* under *4.5 Example of Setting Motion Parameters for the Machine*. 0: pulse (electronic gear disabled) 1: mm 2: deg 3: inch			
No. 5	Number of Decimal Places		
	Setting Range	Setting Unit	Default Value
	0 to 5	–	3
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 Command Unit (fixed parameter 4). Example: When the Command Unit is set to mm and the Number of Decimal Places is set to 3, a reference unit of 1 will be 0.001 mm. The setting of this parameter is disabled if the Command Unit is set to pulse in fixed parameter 4. For details, refer to *(1) Reference Unit* under *4.5 Example of Setting Motion Parameters for the Machine*.			
No. 6	Command Units per Revolution (rotary motor) or Linear Scale Pitch (linear motor)		
	Setting Range	Setting Unit	Default Value
	1 to 2^{31}–1	Reference unit	10000
When using a rotary motor, specify the amount of travel in the load as the number of reference units for each turn of the load shaft. When using a linear motor, specify the linear scale pitch in reference units. For details, refer to *(1) Reference Unit* under *4.5 Example of Setting Motion Parameters for the Machine*.			
No. 8	Gear Ratio [MOTOR]		
	Setting Range	Setting Unit	Default Value
	1 to 65535	rev (revolutions)	1
These parameters determine the gear ratio between the motor and the load. Set the following values for a configuration in which the load shaft turns n times in response to m turns of the motor shaft. • Gear ratio at Servomotor: m • Gear ratio at load: n This parameter setting is disabled if the Reference Unit is set to pulse in fixed parameter 4 and a linear motor is selected. For details, refer to *(2) Electronic Gear* under *4.5 Example of Setting Motion Parameters for the Machine*.			

No. 9	Gear Ratio [LOAD]		
	Setting Range	Setting Unit	Default Value
	1 to 65535	rev (revolutions)	1
Same as the setting for the Gear Ratio (MOTOR).			

(5) Infinite Axis Reset Position

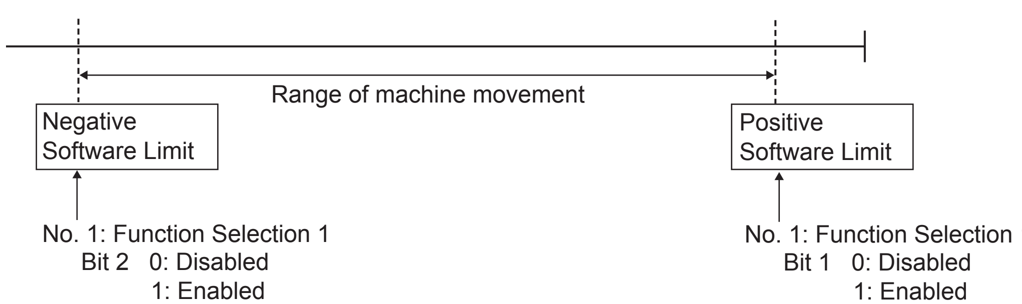
No. 10	Maximum Value of Rotary Counter (POSMAX)		
	Setting Range	Setting Unit	Default Value
	1 to $2^{31}-1$	Reference unit	360000
When an infinite length axis is being used, this parameter sets the position information's reset position. Enabled when bit 0 of the fixed parameter “Function Selection 1” 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	Forward Software Limit		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	$2^{31}-1$
Set the position to be detected for the software limit in the positive direction at the MP2200/MP2300. If an axis attempts to move in the positive direction past the position set here, a positive software limit alarm (IB□□043) will occur.			
No. 14	Reverse Software Limit		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	-2^{31}
Set the position to be detected for the software limit in the negative direction at the MP2200/MP2300. If an axis attempts to move in the negative direction past the position set here, a negative software limit alarm (IB□□044) will occur.			

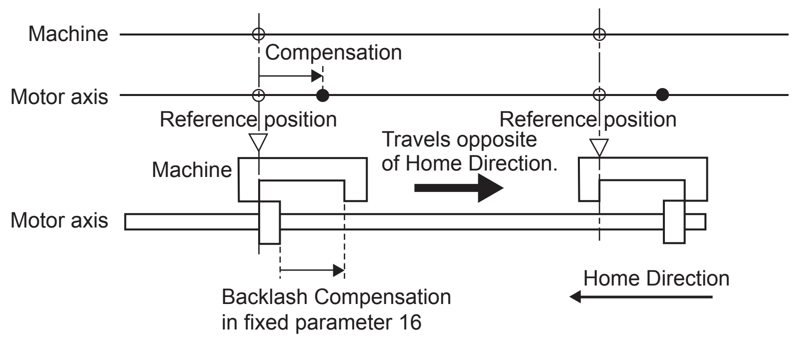


The software limit function is enabled only after completing a Zero Point Return or Zero Point Setting operation (IB□□0C5 is ON).
For details, refer to *9.3 Software Limit Function*.

(7) Backlash Compensation

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

Set the backlash compensation in reference units.
Backlash compensation can be disabled by setting this parameter to 0.
The backlash compensation's compensation direction is the opposite of the Home Direction (setting parameter OW□□09, bit 3).
This parameter is used for the backlash compensation's compensation direction even with the Zero Point Return and Zero Point Setting operations, which do not use the Home Direction (setting parameter OW□□09, bit 3).
The backlash compensation method is somewhat different for the SVB-01 Module.



(8) Hardware Signals

No. 20		Hardware Signal 1		
		Setting Range	Setting Unit	Default Value
		Bit Setting	–	0000 Hex
No. 20	Bit 0	Pulse A/B Input Signal Polarity 0: Positive logic (default) 1: Negative logic		
	Bit 1	Pulse C Input Signal Polarity 0: Positive logic (default) 1: Negative logic		
No. 21		Hardware Signal 2		
		Setting Range	Setting Unit	Default Value
		Bit Setting	–	0000 Hex
No. 21	Bit 0	Deceleration Limit Switch Signal Set the signal to use for DEC1. 0: Use the Deceleration Limit Switch for Zero Point Return (setting parameter OW□□05, bit 8). (default) 1: Use the DI_5 signal.		

(9) Pulse Measurement

No. 22	Pulse Count Mode Selection		
	Setting Range	Setting Unit	Default Value
	0 to 6	–	6

Set one of the following pulse count modes for pulse measurement.

0: Sign mode (Input pulse multiplier: 1)
1: Sign mode (Input pulse multiplier: 2)
2: Up/Down mode (Input pulse multiplier: 1)
3: Up/Down mode (Input pulse multiplier: 2)
4: Pulse A/B mode (Input pulse multiplier: 1)
5: Pulse A/B mode (Input pulse multiplier: 2)
6: Pulse A/B mode (Input pulse multiplier: 4) (default)

(10) D/A Outputs

No. 23	D/A Output Voltage at 100% Speed		
	Setting Range	Setting Unit	Default Value
	1 to 10000	0.001 V	6000

Set the D/A output voltage level when the speed reference is 100%.
Normally, the servodrive's rated input voltage is set. Set this parameter based on the specifications of the servodrive being used.

- Range: 0.001 to 10.000 V
- D/A output value =
  (Speed Reference in OL□□10 × D/A Output Voltage at 100% Speed in fixed parameter 23) / 10,000

Example: When the “D/A Output Voltage at 100% Speed” is set to 6 V and the speed reference value is 100%, a voltage of (10,000 × 6 V) / 10,000 = 6.0 V is output.

No. 24	D/A Output Voltage at 100% Torque		
	Setting Range	Setting Unit	Default Value
	1 to 10000	0.001 V	3000

Set the D/A output voltage level when the torque control reference is 100%.
The same value is used for both forward and reverse. When using a SERVOPACK, the current limit value is usually set.

- Range: 0.001 to 10.000 V
- D/A output value =
  (Positive Side Limiting Torque Setting at the Speed Reference in OL□□14 × D/A Output Voltage at 100% Torque in fixed parameter 24) / 10,000

Example: When the “D/A Output Voltage at 100% Torque” is set to 3 V and the Positive Side Limiting Torque Setting is 200%, a voltage of (20,000 × 3 V) / 10,000 = 6.0 V is output.

(11) A/D Inputs

No. 26	A/D Input Voltage at 100% Torque Monitor		
	Setting Range	Setting Unit	Default Value
	1 to 10000	0.001 V	3000

Set the scaling factor in mV units. The analog-digital converter uses the scaling factor to convert the input voltage to a monitor value (%).

- Range: 0.001 to 10.000 V

The torque monitor value is calculated with the following equation and the result is indicated with the Torque (Thrust) Reference Monitor in IL□□42.

- Torque monitor value = (A/D input voltage x 10,000) / (A/D Input Voltage at 100% Torque Monitor)

Example: When the “A/D Input Voltage at 100% Torque Monitor” is set to 3 V and the actual A/D input voltage is 1.5 V, a value of (1.5 V × 10,000) / 3 V = 5,000 is indicated in IL□□42.

(12) Servo Driver Settings

No. 28	Servo Driver Series		
	Setting Range	Setting Unit	Default Value
	0 to 2	–	1
Select the series of the Servo Driver being used. 0: Σ 1: Σ-II or Σ-III (default) 2: Reserved			
No. 29	Motor Type		
	Setting Range	Setting Unit	Default Value
	0 or 1	–	0
Set whether a rotary or linear motor is being used. 0: Rotary motor (default) 1: Linear motor			
No. 30	Encoder Type		
	Setting Range	Setting Unit	Default Value
	0 to 3	–	0
Set the type of encoder that is being used. 0: Incremental encoder 1: Absolute encoder (default) 2: Absolute encoder used as an incremental encoder. 3: Reserved			
No. 31	Rotational Direction of Absolute Encoder		
	Setting Range	Setting Unit	Default Value
	0 or 1	–	0
Select the rotational direction when using an absolute encoder. 0: Forward (default) 1: Reverse (Note) Specify reverse operation (a setting of 1) in the following cases. A SERVOPACK compatible with absolute encoders is being used and a “reverse rotation connection” is selected in the SERVOPACK’s parameters*. For details, refer to *9.2.2 Overtravel Input Signal Connections*.			

* With the SGDA and SGDB: Cn-02.Bit 0 = 1 (Reverse rotation mode)
With the SGDM, SGDH, and SGDS: Pn000.0 = 1 (Reverse rotation mode)

(13) Encoder Settings

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

Set this parameter based on the specifications of the motor that is being used.
Set the motor's rated speed in the appropriate units for a rotary motor or linear motor, as shown below.

Rotary motor units: min^{-1}
Linear motor units: 0.1 m/s

No. 36	Encoder Resolution in Pulses/Revolution (Rotary Motor) or Encoder Output Resolution per Linear Scale Pitch (Linear Motor)		
	Setting Range	Setting Unit	Default Value
	1 to 2^{31}–1	Pulse	16384

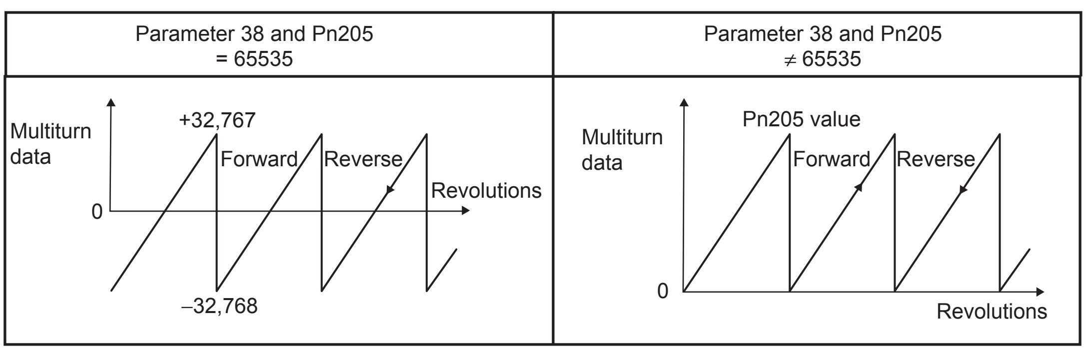
Set this parameter based on the specifications of the motor that is being used.
For a rotary motor, set the number of feedback pulses per motor rotation.
Set the value before multiplication (by the input pulse multiplier) to match the specifications of the motor being used. (For a 16-bit encoder, set 2^{14} = 16384.)
When using a linear motor, set the value of the encoder output resolution per linear scale pitch before multiplication by the input pulse multiplier.

For a rotary motor: 1 = 1 pulse/rev
For a linear motor: 1 = 1 pulse/linear scale pitch

No. 38	Max. Revolution of Absolute Encoder		
	Setting Range	Setting Unit	Default Value
	1 to 2^{31}–1	Rev	65536

Set the maximum number of rotations for the absolute encoder when an absolute encoder is being used.
Set this parameter to match the settings of the encoder being used.

- Σ-series: Set to 99999 (fixed).
- Σ-II or Σ-III Series: Set to the same value as the multiturn limit setting in the SERVOPACK.
  For axes set as infinite axes (bit 0 of fixed parameter Function Selection 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.
(Note) Set to 0 when a direct drive motor is being used.

(14) Feedback Speed

No. 42	Feedback Speed Moving Average Time Constant		
	Setting Range	Setting Unit	Default Value
	0 to 32	ms	10

Set the moving average time constant for the feedback speed.
The Feedback Speed (monitoring parameter IL□□40) is the moving average value calculated from each scan's feedback position using this time constant.

4.4.2 Motion Setting Parameter Details

The motion setting parameters are listed in the following tables.

(Note) Position : The labels shown in reverse type indicate that the parameter is enabled during the corresponding control mode (position control here).

(1) Run Commands

<table>
<tr><td colspan="2" rowspan="3">OW□□00</td><td colspan="3">Run Commands Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>Bit Setting</td><td>–</td><td>0000 Hex</td></tr>
<tr><td rowspan="5">OW□□00</td><td>Bit 0</td><td colspan="3">Servo ON
Sends a SERVO ON command to the SERVOPACK.
0: Servo OFF (default)
1: Servo ON</td></tr>
<tr><td>Bit 1</td><td colspan="3">Machine Lock
In machine lock mode, the Target Position (CPOS) (monitoring parameter IL□□10) will be updated but no movement will actually occur in the axis.
A change in the machine lock mode status is put into effect after all pulses have been distributed. The machine lock mode cannot be changed during speed or torque control.
0: Machine lock mode released (default)
1: Machine lock mode</td></tr>
<tr><td>Bit 4</td><td colspan="3">Latch Request
Store the current position when the latch signal turns ON as the Machine Coordinate Latch Position (LPOS) (monitoring parameter IL□□18).
When latch detection is completed, the Latch Completed bit will turn ON in the Position Management Status (monitoring parameter IW□□0C, bit 2).
To perform latch detection again, change this bit from 0 to 1.
Set the latch signal to be used in Latch Input Signal Type of Function 2 (setting parameter OW□□04, bits 0 to 2).
Do not set this bit to 1 during execution of the motion commands for zero point return, external positioning, or latch.
0: Latch request OFF (default)
1: Latch request ON</td></tr>
<tr><td>Bit 5</td><td colspan="3">Absolute Data Read Request
An Absolute Data Read can be started by setting this bit to 1 (effective on leading edge of signal) from the ladder program.
Up to two reads will be performed, including the one retry.
0: OFF (default)
1: ON</td></tr>
<tr><td>Bit 6</td><td colspan="3">POSMAX Preset
Preset the POSMAX Number of Turns (monitoring parameter IL□□1E) to the value set for the Preset Data of POSMAX Turn (setting parameter OL□□4C).
0: POSMAX Preset OFF (default)
1: POSMAX Preset ON</td></tr>
</table>

(cont'd)

<table>
<tr><td rowspan="3">OW□□00
(cont'd)</td><td>Bit 7</td><td>Infinite Length Axis Position Information 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 System Infinite Length Position Control Information LOAD Completed bit will be turned ON in the Position Management Status (monitoring parameter IW□□0C, bit 8).
0: Infinite Length Axis Position Information LOAD OFF (default)
1: Infinite Length Axis Position Information LOAD Request ON</td></tr>
<tr><td>Bit B</td><td>Integration Reset
Set this bit to 1 to reset the position loop integral term.
0: Integration Reset OFF (default)
1: Integration reset ON</td></tr>
<tr><td>Bit F</td><td>Clear Alarm
Set this bit to 1 (0 to 1) to clear alarms and warnings.
0: Clear alarm OFF (default)
1: Clear alarm ON</td></tr>
</table>

(2) Mode 1

<table>
<tr><td colspan="2" rowspan="3">OW□□01</td><td colspan="3">Mode 1 Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>Bit Setting</td><td>–</td><td>0000 Hex</td></tr>
<tr><td rowspan="2">OW□□01</td><td>Bit 0</td><td colspan="3">Deviation Abnormal Detection Error Level
Sets whether excessively following errors are treated as warnings or as alarms.
0: Warning (default)
Axis continues to operate even if an excessively following error is detected.
1: Alarm
Axis stops operating when an excessively following error is detected.
■ Related Parameters
OL□□22 Deviation Abnormal Detection Value
IB□□020 Warning (excessively following error)
IB□□049 Error (excessively following error)</td></tr>
<tr><td>Bit 2</td><td colspan="3">Speed Amends during Position Control
This parameter specifies whether speed compensation will be performed during position control.
0: Disabled (default)
1: Enabled
The following speed compensation values are enabled when this parameter is set to 1 (Enabled).
• OW□□31: Speed Amends
• OL□□16: Secondary Speed Compensation</td></tr>
</table>

(3) Function 1

OW□□03		Function 1 Position Phase Speed Torque		
		Setting Range	Setting Unit	Default Value
		Bit Setting	–	0011 Hex
OW□□03	Bit 0 to Bit 3	Speed Units Set the units for speed references. 0: Reference unit/s 1: 10^n reference unit/min (default) 2: 0.01% 3: 0.0001% (Note) This parameter expresses the resolution of the speed reference, it does not ensure the precision of the speed.		
	Bit 4 to Bit 7	Acceleration/Deceleration Units Set whether to specify acceleration/deceleration rates or acceleration/deceleration time constants for acceleration/deceleration commands. 0: Reference unit/s^2 1: ms (default)		
	Bit 8 to Bit B	Filter Type Set the acceleration/deceleration filter type. 0: No filter (default) 1: Exponential acceleration/deceleration filter 2: Moving average filter		
	Bit C to Bit F	Torque Unit Selection Set the units for torque references as a percentage of the rated torque. 0: 0.01% (default) 1: 0.0001% (Note) This parameter expresses the resolution of the torque reference, it does not ensure the precision of the torque.		

(4) Function 2

OW□□04		Function 2 Position Phase Speed Torque		
		Setting Range	Setting Unit	Default Value
		Bit Setting	–	0000 Hex
OW□□04	Bit 0 to Bit 3	Latch Input Signal Type Set the latch signal type. 0: DI_5 (DEC/EXT) (default) 1: DI_2 (ZERO/HOME LS) 2: Phase-C pulse input signal		
	Bit 4 to Bit 7	External Positioning Signal Set the external signal for external positioning. 0: DI_5 (DEC/EXT) (default) 1: DI_2 (ZERO/HOME LS) 2: Phase-C pulse input signal		

(5) Function 3

<table>
<tr><td colspan="2" rowspan="3">OW□□05</td><td colspan="3">Function 3 Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>Bit Setting</td><td>–</td><td>0000 Hex</td></tr>
<tr><td rowspan="5">OW□□05</td><td>Bit 1</td><td colspan="3">Disable Phase Reference Generation
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</td></tr>
<tr><td>Bit 8</td><td colspan="3">Deceleration Limit Switch Signal for Zero Point Return
When the Deceleration Limit Switch Signal parameter is set to 0 (fixed parameter 21, bit 0 = 0), this bit is used to input the deceleration limit switch signal for Zero Point Return (DEC1).
0: OFF (default)
1: ON</td></tr>
<tr><td>Bit 9</td><td colspan="3">Reverse Limit Signal for Zero Point Return
This bit is used to input the reverse limit signal for Zero Point Return.
0: OFF (default)
1: ON</td></tr>
<tr><td>Bit A</td><td colspan="3">Forward Limit Signal for Zero Point Return
This bit is used to input the forward limit signal for Zero Point Return.
0: OFF (default)
1: ON</td></tr>
<tr><td>Bit B</td><td colspan="3">INPUT Signal for Zero Point Return
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: INPUT signal OFF (default)
1: INPUT signal ON</td></tr>
</table>

(6) Motion Command

<table>
<tr><td rowspan="3">OW□□08</td><td colspan="3">Motion Command Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 25</td><td>–</td><td>0</td></tr>
<tr><td colspan="4">Set motion command.
0: NOP — No command
1: POSING — Positioning
2: EX_POSING — External Positioning
3: ZRET — Zero Point Return
4: INTERPOLATE — Interpolation
5: ENDOF_ INTERPOLATE — Used by the system.
6: LATCH — Latch
7: FEED — JOG Operation
8: STEP — STEP Operation
9: ZSET — Zero Point Setting
23: VELO — Speed Reference
24: TRQ — Torque Reference
25: PHASE — Phase Reference
Refer to Chapter 5 Motion Commands for details.</td></tr>
</table>

(7) Motion Command Control Flags

<table>
<tr><td colspan="2" rowspan="3">OW□□09</td><td colspan="3">Motion Command Control Flags Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>Bit Setting</td><td>–</td><td>0000 Hex</td></tr>
<tr><td rowspan="6">OW□□09</td><td>Bit 0</td><td colspan="3">Command Pause
The axis will decelerate to a stop if this bit is set to 1 while an axis is moving during positioning, external positioning, STEP operation, or speed reference.
While this bit is set to 1, the command is held. When this bit is reset to 0, the hold is canceled and operation restarts. After the axis has been stopped, the Command Hold Completed bit will turn ON in the Servo Module Command Status (monitoring parameter IW□□09, bit 1).
0: Command Pause OFF (default)
1: Command Pause ON</td></tr>
<tr><td>Bit 1</td><td colspan="3">Command Abort
The axis will decelerate to a stop if this bit is set to 1 while an axis is moving during positioning, external positioning, zero point return, JOG, STEP, speed reference, or torque reference, and the remaining movement will be canceled.
0: Command Abort OFF (default)
1: Command Abort ON</td></tr>
<tr><td>Bit 2</td><td colspan="3">Jog/Step Direction
Set the movement direction for JOG or STEP.
0: Forward (default)
1: Reverse</td></tr>
<tr><td>Bit 3</td><td colspan="3">Home Direction
Set the movement direction for zero point returns (valid for DEC1 + C, ZERO, DEC1 + ZERO, and phase-C).
0: Reverse (default)
1: Forward</td></tr>
<tr><td>Bit 4</td><td colspan="3">Latch Zone Enable
Enables or disables the area (called the latch zone) where the external signal is valid for external positioning.
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
Setting parameter OL□□2A: Latch Zone Lower Limit Setting
Setting parameter OL□□2C: Latch Zone Upper Limit Setting</td></tr>
<tr><td>Bit 5</td><td colspan="3">Position Reference Type
Specify whether the value set for the Position Reference (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 (4) Position References in 4.5 Example of Setting Motion Parameters for the Machine.
0: Incremental Addition Mode (default)
1: Absolute Mode</td></tr>
</table>

(8) Motion Subcommand

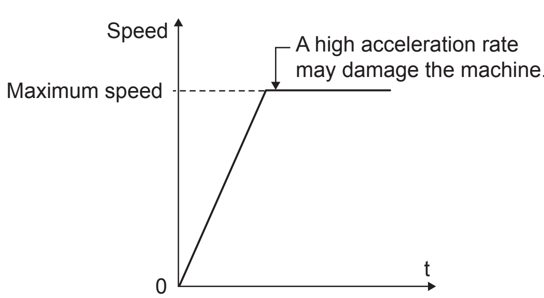
<table>
<tr><td rowspan="3">OW□□0A</td><td colspan="3">Motion Subcommand Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 5</td><td>–</td><td>0</td></tr>
<tr><td colspan="4">Set the motion subcommands that can be used with the motion command.
The Fixed Parameter Monitor function is the only valid motion subcommand.
0: NOP (No command)
1 to 4: Reserved (Reserved for the system)
5: FIXPRM_RD (Read Fixed Parameters)</td></tr>
</table>

(9) Torque Reference

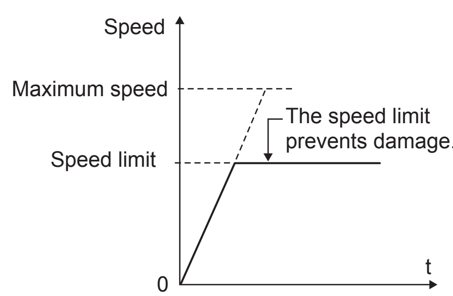
<table>
<tr><td rowspan="3">OL□□0C</td><td colspan="3">Torque Reference Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>-2^{31} to $2^{31}-1$</td><td>Torque Units (setting parameter OW□□03, bits C to F)</td><td>0</td></tr>
<tr><td colspan="4">Set the torque reference for torque reference commands. Refer to 5.2.23 Torque Reference (TRQ) for details.</td></tr>
<tr><td rowspan="3">OW□□0E</td><td colspan="3">Speed Limit during Torque Reference Position Phase Speed Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>–32768 to 32767</td><td>0.01%</td><td>15000</td></tr>
</table>

Set the speed limit for torque reference commands 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 will be overpowered by the torque reference and the motor speed greatly increases.
The torque reference speed limit functions to limit the Servomotor speed during torque control to protect the machine.

No speed limit



Speed limit used



Either the Torque Reference Speed Limit setting (OW□□0E) or the SERVOPACK's torque control speed limit (Pn407), whichever is lower, will be used as the speed limit.

■ Related Parameters

SGDH, SGDM, SGDS	SGDA, SGDB
Pn002.1	Cn-02, bit 2
Pn407	Cn-14
Pn408.1	–
Pn300	Cn-03

(cont'd)

OW□□0F	Torque Reference Primary Lag Filter	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	ms	0

A primary lag filter can be applied to the torque reference and torque limit.
The Torque Reference Primary Lag Filter is cleared to 0 in the following cases.

- The filter is cleared to 0 when the command is switched from another motion command to a TRQ command.
- The filter is cleared to 0 when the command is switched from a TRQ command to another motion command.

(10) Speed Reference

OL□□10	Speed Reference	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Speed Units (setting parameter OW□□03, bits 0 to 3)	3000

Set the speed reference.
This parameter is used for the following commands.

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

Refer to *Chapter 5 Motion Commands* for details.

OL□□12	Forward Speed Limit	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	0.01%	15000

Specify the maximum forward speed as a percentage of the rated speed.

OL□□13	Reverse Speed Limit	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	0.01%	15000

Specify the maximum reverse speed as a percentage of the rated speed.

(11) Torque Limit Setting at Speed Reference

OL□□14	Positive Side Limiting Torque Setting at Speed Reference	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Torque Units (setting parameter OW□□03, bits C to F)	30000

Set the torque limit for the speed reference command.
The same value is used for both the forward and reverse directions.
Use this parameter when a torque limit is required at certain times while the machine is operating. For example, use this parameter to hold a workpiece or press an object to stop it.

(12) Secondary Speed Compensation

OL□□16	Secondary Speed Compensation — Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Same as the Speed Units	0

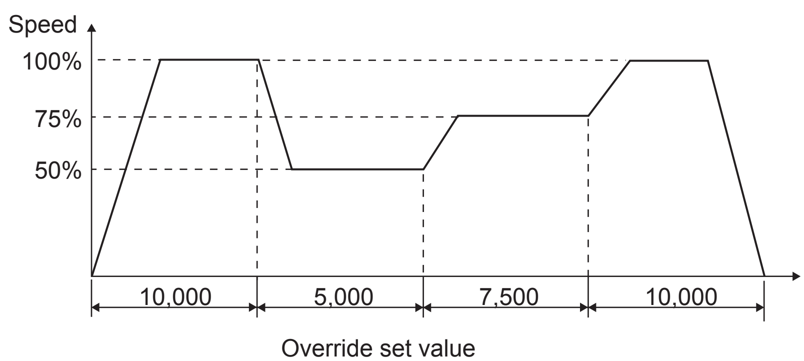
Set the speed feed forward amount for the Phase Reference command (PHASE).
The setting unit for Speed Amends (setting parameter OW□□31) is 0.01% (fixed). The units for this parameter can be selected by the user.
When used at the same time as OW□□31, speed compensation can be performed twice.

(13) Speed Override

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

Set the percentage of the Speed Reference (OL□□10) to output in units of 0.01%.
The override value is always enabled. Set to 10000 (fixed) when not using the speed override function.
Speed reference (OL□□10) × Speed override (OL□□18) = Output speed

This parameter can be changed at any time during speed reference operation, and the machine will be accelerated or decelerated immediately according to the set value.



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

(14) General-purpose Analog Output (AO)

OL□□1A	General-purpose AO1 — Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	–10000 to 10000	0.001 V	0

This parameter can be used only in General-purpose I/O Mode.
The analog data set in OL□□1A is output.

OL□□1B	General-purpose AO2 — Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	–10000 to 10000	0.001 V	0

This parameter can be used only in General-purpose I/O Mode.
The analog data set in OL□□1B is output.

(15) Position Reference

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

Set the position reference.
This parameter is used for the following commands.

1: POSING	Positioning
2: EX_POSING	External Positioning
4: INTERPOLATE	Interpolation
6: LATCH	Latch

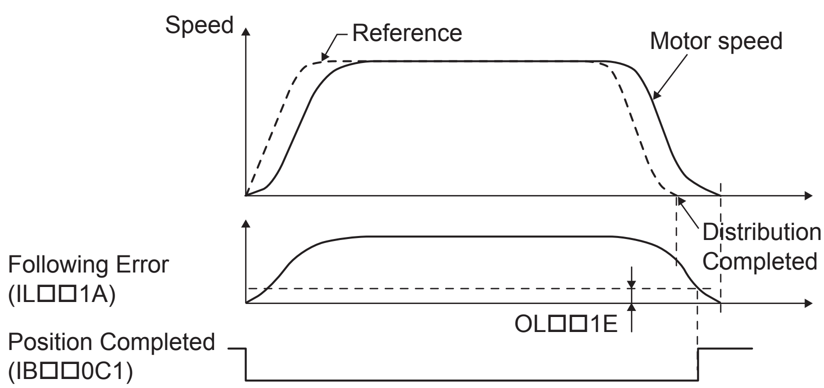
■ Related Parameters

OW□□09, bit 5: Position Reference Type

(16) Position Completed Width

OL□□1E	Position Completed Width (Position / Phase / Speed / Torque)		
	Setting Range	Setting Unit	Default Value
	0 to 65535	Reference unit	0

When pulse distribution has been completed during position control, the Positioning Completed bit (IB□□01C) will turn ON. Set values that are appropriate for all machines in the system. If the value is too small, it will take a long time to complete positioning.



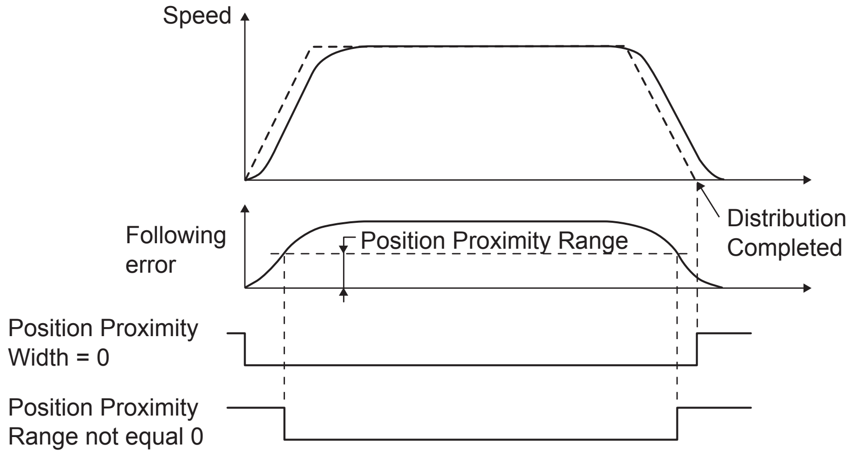
■ Related Parameters

Fixed Parameter 4: Command Unit
Fixed Parameter 5: Number of Decimal Places
Fixed Parameter 6: Command Units per Revolution
Fixed Parameter 8: Gear Ratio [MOTOR]
Fixed Parameter 9: Gear Ratio [LOAD]
OW□□2E: Position Loop Gain
IB□□0C0: Distribution Completed (DEN)
IB□□0C1: Positioning Completed (POSCOMP)

(17) Position Proximity Range

OL□□20	Position Proximity Range　Position　Phase　Speed　Torque		
	Setting Range	Setting Unit	Default Value
	0 to 65535	Reference unit	0

Position Proximity (IB□□0C3) 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.
Set value = 0: Position Proximity bit (monitoring parameter IB□□0C3) turns ON when pulse distribution has been completed (monitoring parameter IB□□0C0).
Set value ≠ 0: This bit turns ON when the result of subtracting the Machine Coordinate Feedback Position (monitoring parameter IL□□16) from the Machine Coordinate System Position (monitoring parameter IL□□12) is less than the Position Completed Width 2, even if pulse distribution has not been completed. This parameter has no relation to the SERVOPACK parameter Position Proximity (NEAR) signal width.



■ Related Parameters

IB□□0C3: Position Proximity

(18) Deviation Abnormal Detection Value

OL□□22	Deviation Abnormal Detection Value　Position　Phase　Speed　Torque		
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Reference unit	$2^{31}-1$

Set the value used to detect an excessively following error during position control.
The Excessively Following Error (IB□□049) turns ON if the result from subtracting the Machine Coordinate Feedback Position (monitoring parameter IL□□16) from the Machine Coordinate System Position (monitoring parameter IL□□12) is greater than the Deviation Abnormal Detection Value. An excessively following error will not be detected if this value is set to 0.

■ Related Parameters

An excessively following error can be set to be treated either as a warning or as an alarm in the Deviation Abnormal Detection Error Level Setting in Mode 1 (setting parameter OB□□010).

OB□□010 = 0: Warning (continues axis operation)

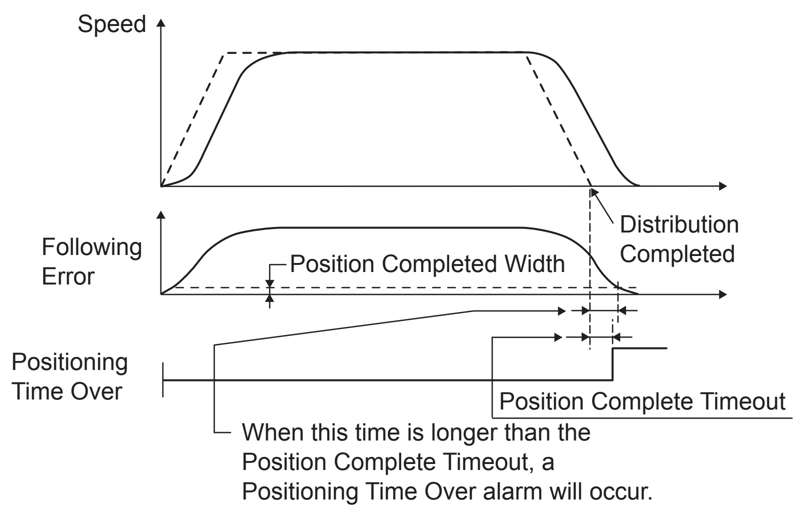
OB□□010 = 1: Alarm (stops axis operation)

(19) Position Compensation

OL□□24	Position Compensation **Position** Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	0
Set the value used for position compensation.			

(20) Position Complete Timeout

OW□□26	Position Complete Timeout **Position** Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 65535	ms	0
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 IB□□046) will occur. The completion of positioning will not be checked if this parameter is set to 0.			



(21) Phase Compensation

OL□□28	Phase Compensation Position **Phase** Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	0
Set the phase compensation in reference units for phase reference commands. Use this parameter to compensate for reference pulses in control systems without rigidity, in which higher gain cannot be applied. Refer to *5.2.24 Phase References (PHASE)* for details on phase reference commands.			

(22) Latch

OL□□2A	Latch Zone Lower Limit Setting	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	$2^{31}-1$
Set the range in which the latch signal is valid (position from the zero position) for external positioning.			
OL□□2C	Latch Zone Upper Limit Setting	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	$2^{31}-1$
Same as above.			

(23) Gain and Bias Settings

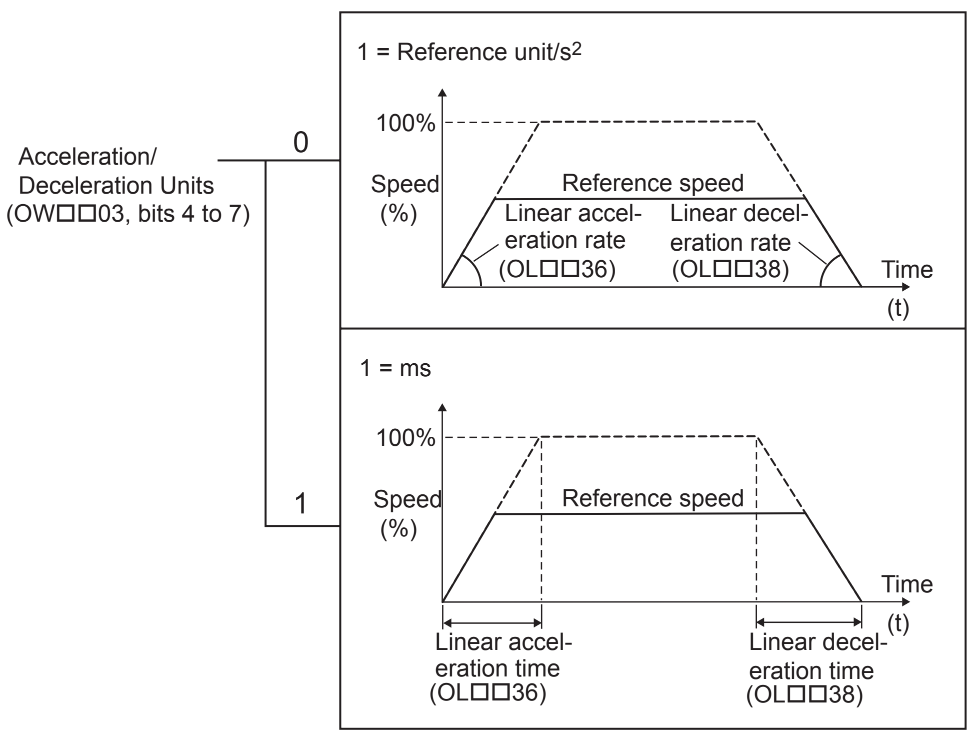
OW□□2E	Position Loop Gain	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	0.1/s	300
Determines the responsiveness of the position loop. If the position loop gain is set high, the responsiveness is high and the positioning time is short. Set the optimum value to match the machine's rigidity and inertia, as well as the type of Servomotor being used.			
OW□□30	Speed Feed Forward Compensation	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	0.01%	0
The positioning time can be reduced by applying feed forward compensation. This setting is effective for positioning control commands. Always set this parameter to 0 when using phase control.			
OW□□31	Speed Amends	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	–32768 to 32767	0.01%	0
Set the speed feed forward gain as a percentage of the rated speed for the phase reference command (PHASE). The setting units for this parameter is 0.01% (fixed). The setting unit for Secondary Speed Compensation (OL□□16), however, can be selected by the user. When used at the same time as OW□□16, speed compensation is applied twice.			
OW□□32	Position Integration Time Constant	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	ms	0
This is the integration function for the position loop. Use this parameter to improve the following precision in applications such as electronic cams or shafts.			
OW□□33	Primary Lag Time Constant	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 32767	ms	0
Set the primary lag time constant (in ms) in the position loop. If the time constant is set to 0, the primary lag calculation is not performed. This filter is used in Position Control Mode and Zero Point Return Mode. (Note) Set this parameter to 0 unless it is needed, because the primary lag may cause oscillation.			

(24) Acceleration/Deceleration Settings

OL□□36	Linear Acceleration Time Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Acceleration/Deceleration Units (setting parameter OW□□03, bits 4 to 7)	0
Set the linear acceleration rate or linear acceleration time constant.			
OL□□38	Linear Deceleration Time Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Acceleration/Deceleration Units (setting parameter OW□□03, bits 4 to 7)	0
Set the linear deceleration rate or linear deceleration time constant.			

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

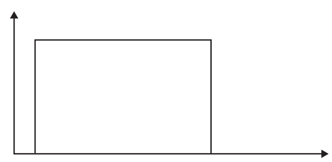
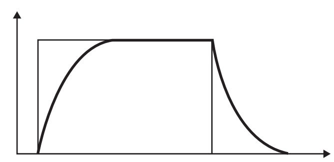
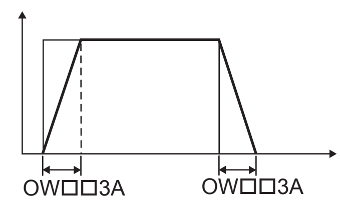
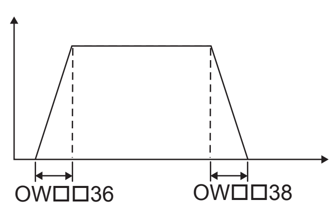
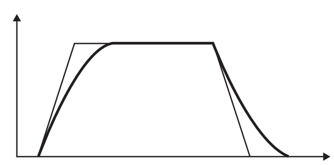
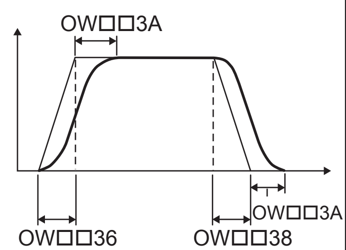
1. Setting the acceleration/deceleration rate
2. Setting the time required to reach the rated speed from zero
   For this method, the setting range is 0 to 32,767 ms. A parameter setting error will occur if the value exceeds 32,767.



(25) Filters

OW□□3A	S-curve Acceleration Time Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 65535	0.1 ms	0

Sets the acceleration/deceleration filter time constant.
Always verify that pulse distribution has been completed (monitoring parameter IB□□0C0 is ON) before changing the time constant.
After setting the filter type to be used, change the time constant.
Once the filter type is set, the setting is held until the power is turned OFF or the filter type is changed.
There are two types of acceleration/deceleration filter: an exponential acceleration/deceleration filter and a moving average filter.
The following table shows the relationship with related parameters.

No filter	Exponential Acceleration/ Deceleration Filter	Moving Average Filter
OW□□03, bits 8 to B = 0	OW□□03, bits 8 to B = 1	OW□□03, bits 8 to B = 2
 Step input		
 Acceleration/deceleration used		

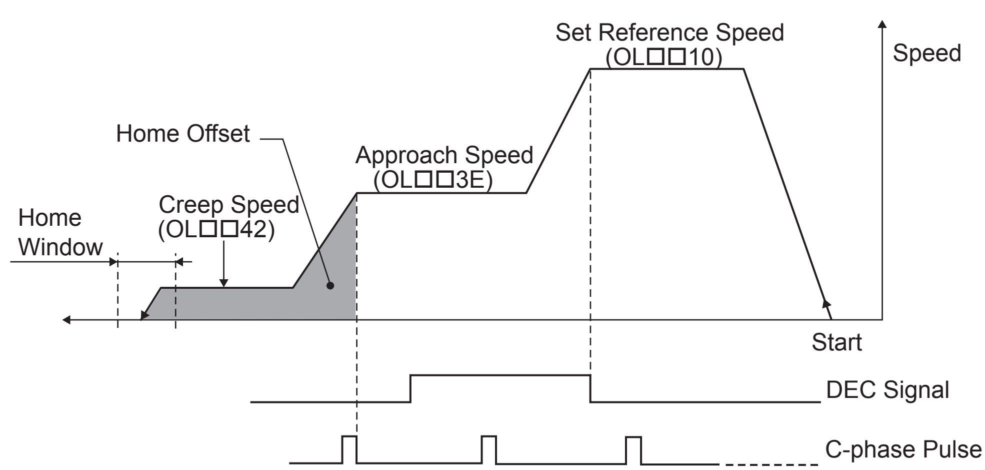
OW□□3B	Bias Speed for Exponential Acceleration/Deceleration Filter Position Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 32767	Speed Units (setting parameter OW□□03, bits 0 to 3)	0

Set the bias speed for exponential acceleration/deceleration with bias.

(26) Zero Point Return

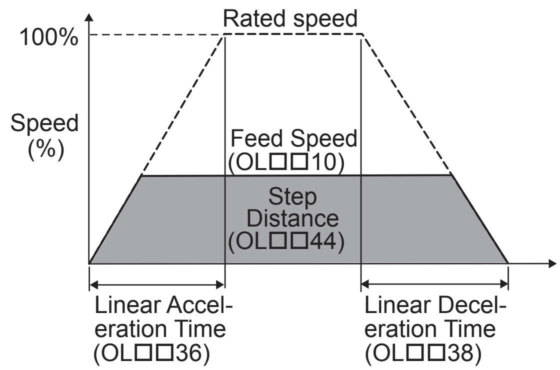
OW□□3C	Home Return Type	Position	Phase	Speed	Torque
	Setting Range	Setting Unit	Default Value		
	0 to 19	–	0		
Set the operation method used when the Zero Point Return (ZRET) motion command is executed. With an incremental encoder, there are 17 different methods that can be used for the Zero Point Return operation. 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	Home Window	Position	Phase	Speed	Torque
	Setting Range	Setting Unit	Default Value		
	0 to 65535	Reference unit	100		
Set the width in which the Zero Point Position bit (monitoring parameter IB□□0C4) will be ON.					
OL□□3E	Approach Speed	Position	Phase	Speed	Torque
	Setting Range	Setting Unit	Default Value		
	-2^{31} to $2^{31}-1$	Same as Speed Units setting	1000		
Set the approach speed (speed after the deceleration limit switch is passed) for Zero Point Return operations.					
OL□□40	Creep Speed	Position	Phase	Speed	Torque
	Setting Range	Setting Unit	Default Value		
	-2^{31} to $2^{31}-1$	Same as Speed Units setting	500		
Set the creep speed (speed after detection of the Zero Point signal) for Zero Point Return operations.					
OL□□42	Home Offset	Position	Phase	Speed	Torque
	Setting Range	Setting Unit	Default Value		
	-2^{31} to $2^{31}-1$	Reference unit	0		
Set the distance between the zero point signal position and the zero point position.					

A typical example of a Zero Point Return operation is shown below.
Refer to *5.2.3 Zero Point Return (ZRET)* for details on zero point return.



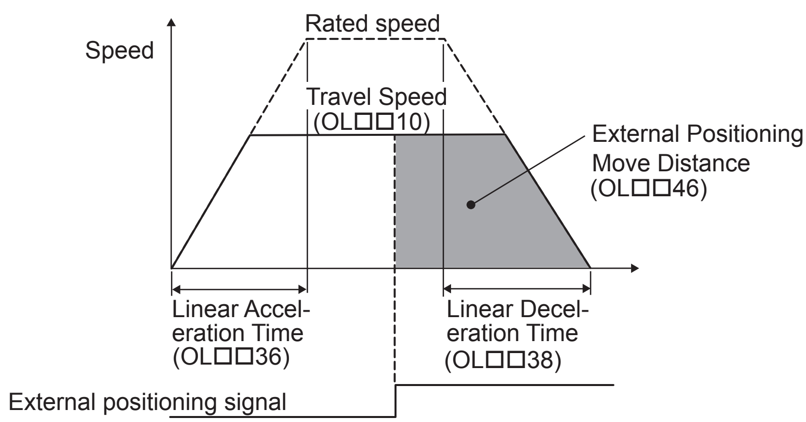
(27) Step Distance

<table>
<tr><td rowspan="3">OL□□44</td><td colspan="3">Step Distance   Position   Phase   Speed   Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 2^{31}–1</td><td>Reference unit</td><td>1000</td></tr>
<tr><td colspan="4">Set the amount of movement for the STEP command.
Refer to 5.2.7 STEP Operation (STEP) for details on STEP command.</td></tr>
</table>



(28) External Positioning Move Distance

<table>
<tr><td rowspan="3">OL□□46</td><td colspan="3">External Positioning Move Distance   Position   Phase   Speed   Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>-2^{31} to 2^{31}–1</td><td>Reference unit</td><td>0</td></tr>
<tr><td colspan="4">Set the distance to travel from the time the external signal is detected for the external positioning command (EX_POSING).
Refer to 5.2.2 External Positioning (EX_POSING) for details.</td></tr>
</table>



(29) Coordinate System Settings

OL□□48	Zero Point Offset	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	0
Set the offset to shift the machine coordinate system. This parameter is always effective, so be sure that the setting is correct.			

OL□□4A	Work Coordinate System Offset	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference unit	0
Set the offset to shift the work coordinate system. This parameter is always effective, so be sure that the setting is correct.			

OL□□4C	Preset Data of POSMAX Turn	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Rev	0
When the POSMAX Preset bit (setting parameter OW□□00, bit 6) is set to 1, the value set here will be preset as the POSMAX Number of Turns (monitoring parameter IL□□1E).			

(30) Supplemental Settings

OW□□5C	Fixed Parameter Number	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 65535	–	0
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 IL□□56).			

(31) General-purpose Digital Output (DO)

OW□□5D		General-purpose DO	Position Phase Speed Torque	
		Setting Range	Setting Unit	Default Value
		Bit Setting	–	0000 Hex
OW□□5D	Bit 0	General-purpose DO _0 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode. 0: OFF (default) 1: ON		
	Bit 1	General-purpose DO _1 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode. 0: OFF (default) 1: ON		
	Bit 2	General-purpose DO_2 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode. 0: OFF (default) 1: ON		

(cont'd)

OW□□5D (cont'd)	Bit 3	General-purpose DO _3 0: OFF (default) 1: ON
	Bit 4	General-purpose DO _4 0: OFF (default) 1: ON
	Bit 5	General-purpose DO _5 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode. 0: OFF (default) 1: ON

(32) Absolute Infinite Length Axis Position Control Information

OL□□5E	Absolute Position at Power OFF (Lower 2 words)	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Pulse	0
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 Infinite Length Axis Position Information LOAD bit is set to 1 in the Run Commands (setting parameter OW□□00, bit 7), the position information will be recalculated with the values set here and the Modularized Position at Power OFF (OL□□62 and OL□□64).			
OL□□60	Absolute Position at Power OFF (Upper 2 words)	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Pulse	0
Same as above.			
OL□□62	Modularized Position at Power OFF (Lower 2 words)	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Pulse	0
This is the information for infinite length axis position control when an absolute encoder is used. The axis position in pulses (managed internally in the controller) is stored in 4 words. The encoder position is stored in 4 words. If the Infinite Length Axis Position Information LOAD bit is set to 1 in the Run Commands (setting parameter OW□□00, bit 7), the position information will be recalculated with the values set here and the Absolute Position at Power OFF (OL□□5E and OL□□60).			
OL□□64	Modularized Position at Power OFF (Upper 2 words)	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Pulse	0
Same as above.			

(33) Various Data

OL□□66	Monitor Data Command	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	–	0
This parameter is reserved for the system. Do not use this setting.			
OL□□68	Write Data Type	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	0 to 3	–	0
This parameter is reserved for the system. Do not use this setting.			
OL□□6A	Monitor Address	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	–	0
This parameter is reserved for the system. Do not use this setting.			
OL□□6C	Write Data	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	–	0
This parameter is reserved for the system. Do not use this setting.			

(34) Stop Distance

OW□□6E	Stop Distance	Position Phase Speed Torque	
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	–	0
This parameter is reserved for the system. Do not use this setting.			

4.4.3 Motion Monitoring Parameter Details

The motion monitoring parameters are listed in the following table.

(1) Drive Status

<table>
<tr><td colspan="2" rowspan="3">IW□□00</td><td colspan="3">Drive Status</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>Bit Setting</td><td>–</td><td></td></tr>
<tr><td rowspan="3">IW□□00</td><td>Bit 0</td><td colspan="3">Motion Controller Operation Ready
This bit is turned ON when preparations are completed and the Motion Module is ready for operation.
This bit will be OFF under the following conditions:
• Serious failure
• An unused axis was selected
• Motion fixed parameter setting error
• Motion fixed parameters are being changed
• The Motion Parameter Window (SVA Definition Window) has been opened using the MPE720.
OFF: Operation not ready
ON: Operation ready

(Note) Configure an OR circuit with IB□□002 when using as a Servo ON interlock.</td></tr>
<tr><td>Bit 1</td><td colspan="3">Running (Servo ON)
This bit is ON while the axis is in Servo ON status.
OFF: Stopped
ON: Running (Servo ON)</td></tr>
<tr><td>Bit 3</td><td colspan="3">Servo Ready
This bit is ON when all of the following conditions are satisfied.
• The main power supply for the SERVOPACK is ON.
• There are no alarms in the SERVOPACK.
OFF: Servo not ready
ON: Servo ready</td></tr>
</table>

(2) Over Range Parameter Number

<table>
<tr><td rowspan="3">IW□□01</td><td colspan="3">Over Range Parameter Number</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>0 to 65,535</td><td>–</td><td></td></tr>
<tr><td colspan="4">Stores the number of a parameter set outside the setting range.
This parameter stores the number of the most recent setting parameter or fixed parameter that was set incorrectly because the setting was outside of the specified setting range (either individually or in combination with the settings of other parameters).
If the parameter is a motion fixed parameter, 1,000 is added to the parameter number to identify it as a motion fixed parameter.
• Setting parameters: 0 to 999
• Fixed parameters: 1000 or higher</td></tr>
</table>

(3) Warning

<table>
<tr><td colspan="2" rowspan="3">IL□□02</td><td colspan="3">Warning</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>–</td><td>–</td><td></td></tr>
<tr><td rowspan="5">IL□□02</td><td>Bit 0</td><td colspan="3">Excessively Following Error
This bit turns ON if the following error exceeds the value set for Deviation Abnormal Detection Value (setting parameter OL□□22) when following errors are set to be treated as warnings by setting the Deviation Abnormal Detection Error Level to 1 in Mode 1 (setting parameter OW□□01, bit 0).
OFF: In normal deviation range
ON: Abnormal deviation detected</td></tr>
<tr><td>Bit 1</td><td colspan="3">Setting Parameter Setting Error
This bit turns ON when one or more motion setting parameters is set outside the setting range. The number of the most recent out-of-range parameter is stored as the Over Range Parameter Number (monitoring parameter IW□□01).
OFF: In setting range
ON: Outside setting range</td></tr>
<tr><td>Bit 2</td><td colspan="3">Fixed Parameter Setting Error
This bit turns ON when one or more motion fixed parameters is set outside the setting range. The number of the most recent out-of-range parameter is stored as the Over Range Parameter Number (monitoring parameter IW□□01).
OFF: In setting range
ON: Outside setting range</td></tr>
<tr><td>Bit 4</td><td colspan="3">Motion Command Setting Error
This bit turns ON when a motion command that cannot be used has been set.
OFF: Command setting normal
ON: Command setting error</td></tr>
<tr><td>Bit 11</td><td colspan="3">Analog Adjustment Unfinished Warning
OFF: Normal condition
ON: Error detected</td></tr>
</table>

(4) Alarm

IL□□04		Alarm		
		Range	Unit	
		Bit Setting	–	
IL□□04	Bit 0	Servo Driver Error This bit turns ON when there is an alarm in the SERVOPACK. The content of the alarm can be confirmed by connecting a Digital Operator to the SERVOPACK. Refer to the *(4) Analog Servo Alarm List* on *10.1.2 Motion Error Details and Corrections*. OFF: No Servo Driver alarm ON: Servo Driver alarm occurred		
	Bit 1	Positive Overtravel This bit turns ON when the positive overtravel signal has been input and a move command is executed in the positive direction. For details, refer to *9.2 Overtravel Function*. OFF: No positive overtravel ON: Positive overtravel occurred		
	Bit 2	Negative Overtravel This bit turns ON when the negative overtravel signal has been input and a move command is executed in the negative direction. For details, refer to *9.2 Overtravel Function*. OFF: No negative overtravel ON: Negative overtravel occurred		
	Bit 3	Positive Software Limit 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. For details, refer to *9.3 Software Limit Function*. OFF: In positive software limit range ON: Not in positive software limit range		
	Bit 4	Negative Software Limit 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. For details, refer to *9.3 Software Limit Function*. OFF: In negative software limit range ON: Not in negative software limit range		
	Bit 5	Servo OFF This bit turns ON when a move command is executed during Servo OFF status. OFF: Servo ON ON: Servo OFF		
	Bit 6	Positioning Time Over This bit turns ON when positioning is not completed within the specified time after pulse distribution ends. The specified time is set in Position Complete Timeout (setting parameter OW□□26). OFF: No timeout ON: Timeout occurred		
	Bit 8	Overspeed This bit turns ON when a speed was set that exceeds the setting range for the speed reference. OFF: Speed normal ON: Excessive speed		
	Bit 9	Excessively Following Error This bit turns ON if the following error exceeds the value set for the Deviation Abnormal Detection Value (setting parameter OL□□22) when Excessively Following Error is set to be treated as an alarm by setting the Deviation Abnormal Detection Error Level to 0 in Mode 1 (setting parameter OW□□01, bit 0). OFF: Normal following error ON: Excessive following error		

(cont'd)

IL□□04 (cont'd)	Bit D	Zero Point Not Set This bit turns ON if a move command (other than JOG or STEP) is performed on an infinite length axis, but the zero point has not been set for the axis. OFF: Zero point set ON: Zero point not set error
	Bit 13	ABS Encoder Count Exceeded This bit turns ON if the number of turns from the absolute encoder exceeds the range that the SVA-01 Module can handle. This parameter is valid when using an absolute encoder and a finite-length axis. This bit turns ON if the result of the current position to reference units conversion operation (performed when the power is turned ON) exceeds 32 bits. OFF: In count range ON: Outside count range
	Bit 14	PG Disconnected Error This bit turns ON when a PG disconnection is detected. This parameter is valid when the Pulse Count Mode Selection setting (motion fixed parameter 22) is set to "Pulse A/B mode." OFF: Not disconnected ON: Disconnection occurred
	Bit 15	Accumulated Rotations Receive Error This alarm will be sent when the Read Absolute Data after Power-up setting (motion fixed parameter 1, bit 7) is set to "0: Do not read data." OFF: No alarm ON: Alarm occurred.

(5) Motion Command Type Response

IW□□08	Motion Command Type Response		
	Range	Unit	
	0 to 26	–	

Stores the motion command code for the command that is currently being executed.
This is the motion command code that is currently being executed, so it is the same as the Motion Command (setting parameter OW□□08).

(6) Motion Command Status

IW□□09	Motion Command Status		
	Range	Unit	
	–	–	

IW□□09	Bit 0	Command Executing (BUSY) Flag This bit indicates the motion command's execution status. Refer to *Chapter 5 Motion Commands* for details on command timing charts. OFF: READY (completed) ON: BUSY (processing) This bit turns ON during execution of commands that have completions or during abort processing.
	Bit 1	Command Hold Completed (HOLDL) This bit turns ON when command hold processing has been completed. Refer to *Chapter 5 Motion Commands* for details on command timing charts. OFF: Command hold processing not completed ON: Command hold completed
	Bit 3	Command Error Occurrence (FAIL) This bit turns ON if motion command processing was not completed normally. If motion command execution ends in an error, moving axes will be stopped. Refer to *Chapter 5 Motion Commands* for details on command timing charts. OFF: Normal completion ON: Abnormal completion
	Bit 8	Command Execution Completed (COMPLETE) This bit turns ON when motion command processing was completed normally. Refer to *Chapter 5 Motion Commands* for details on command timing charts. OFF: Normal execution not completed ON: Normal execution completed

(7) Motion Subcommand Response Code

IW□□0A	Motion Subcommand Response Code		
	Range	Unit	
	0 to 5	–	
Stores the code of the motion subcommand that is being executed. This is the motion subcommand code that is currently being executed, so it is the same as the Motion Subcommand (setting parameter OW□□0A).			

(8) Motion Subcommand Status

<table>
<tr><td colspan="2" rowspan="3">IW□□0B</td><td colspan="3">Motion Subcommand Status</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>Bit Setting</td><td>–</td><td></td></tr>
<tr><td rowspan="3">IW□□0B</td><td>Bit 0</td><td colspan="3">Command Executing (BUSY) Flag
This bit indicates the motion subcommand's execution status.
OFF: READY (completed)
ON: BUSY (processing)
This bit turns ON during execution of commands that have completions or during abort processing.</td></tr>
<tr><td>Bit 3</td><td colspan="3">Command Error Occurrence (FAIL)
This bit turns ON if motion subcommand processing was not completed normally.
OFF: Normal completion
ON: Abnormal completion</td></tr>
<tr><td>Bit 8</td><td colspan="3">Command Execution Completed (COMPLETE)
This bit turns ON when motion subcommand processing was completed normally.
OFF: Normal execution not completed
ON: Normal execution completed</td></tr>
</table>

(9) Position Management Status

<table>
<tr><td colspan="2" rowspan="3">IW□□0C</td><td colspan="3">Position Management Status</td></tr>
<tr><td>Range</td><td>Unit</td><td></td></tr>
<tr><td>Bit Setting</td><td>–</td><td></td></tr>
<tr><td rowspan="8">IW□□0C</td><td>Bit 0</td><td colspan="3">Distribution Completed (DEN)
This bit turns ON when pulse distribution has been completed for a move command.
OFF: Distributing pulses.
ON: Distribution completed.</td></tr>
<tr><td>Bit 1</td><td colspan="3">Positioning Completed (POSCOMP)
Turns ON when pulse distribution has been completed and the current position is within the Position Completed Width.
OFF: Outside Positioning Completed Width.
ON: In Positioning Completed Width.</td></tr>
<tr><td>Bit 2</td><td colspan="3">Latch Completed (LCOMP)
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 Latch Position (monitoring parameter IL□□18).
OFF: Latch not completed.
ON: Latch completed.</td></tr>
<tr><td>Bit 3</td><td colspan="3">Position Proximity (NEAR)
The operation of this bit depends on the setting of Positioning Completed Width 2 (setting parameter OL□□20).
• OL□□20 = 0: This bit turns ON when pulse distribution has been completed (monitoring parameter IB□□0C0).
• OL□□20 ≠ 0: This bit turns ON when the following inequality is true, even if pulse distribution has not been completed:
|Machine Coordinate System Position (IL□□12) – Machine Coordinate Feedback Position (IL□□16)| < Position Completed Width (OL□□12)
OFF: Outside Position Proximity Range.
ON: Inside Position Proximity Range.</td></tr>
<tr><td>Bit 4</td><td colspan="3">Zero Point Position (ZERO)
This bit turns ON when the Machine Coordinate System Position (monitoring parameter IL□□12) is within the Home Window (setting parameter OW□□3D) after a Zero Point Return (Zero Point Setting) has been completed.
OFF: Not in zero point position range.
ON: In zero point position range.</td></tr>
<tr><td>Bit 5</td><td colspan="3">Zero Point Return (Zero Point Setting) Completed (ZRNC)
This bit turns ON when a Zero Point Return (Zero Point Setting) has been completed. This bit is OFF while a Zero Point Return (Zero Point Setting) is being executed.
OFF: Zero Point Return (Zero Point Setting) not completed
ON: Zero Point Return (Zero Point Setting) completed</td></tr>
<tr><td>Bit 6</td><td colspan="3">Machine Lock (MLOCK)
This bit turns ON when the Machine Lock bit is set to 1in the Run Commands (setting parameter OW□□00, bit 1) and the axis is actually in machine lock mode.
OFF: Machine lock mode released.
ON: Machine lock mode.</td></tr>
<tr><td>Bit 7</td><td colspan="3">Absolute Position Read Completed
This bit turns ON after the Absolute Read Request bit (setting parameter OW□□00, bit 5) was set to 1 and the absolute data read operation has been completed.
OFF: OFF
ON: ON (Read completed.)
This bit is turned OFF when the Absolute Read Request bit (setting parameter OW□□00, bit 5) is reset to 0.</td></tr>
</table>

(cont'd)

IW□□0C (cont'd)	Bit 8	ABS System Infinite Length Position Control Information LOAD Completed (ABSLDE) This bit turns ON when the Infinite Length Axis Position Information LOAD bit is set to 1 in the Run Commands (setting parameter OW□□00, bit 7) and loading of the information has been completed. OFF: LOAD not completed ON: LOAD completed
	Bit 9	POSMAX Turn Number Presetting Completed (TPRSE) This bit turns ON when the POSMAX Preset bit in the Run Commands (setting parameter OW□□00, bit 6) is set to 1 and the POSMAX Number of Turns has been preset with the Preset Data of POSMAX Turn (setting parameter OL□□4C). OFF: Preset not completed ON: Preset completed
	Bit A	Rotational Direction of Absolute Encoder OFF: Forward ON: Reverse

(10) Position Information

IL□□0E	Machine Coordinate Target Position (TPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
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 in machine lock mode. (Note) This parameter will not be reset even when an infinite length axis type is selected.			
IL□□10	Calculated Target Position (CPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
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 refreshed even in machine lock mode. (Note) When an infinite length axis type is selected, the position ranges from 0 to (Infinite Length Axis Reset Position – 1).			
IL□□12	Machine Coordinate System Position (MPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
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 refreshed 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 function is not being used, this position is the same as that in IL□□10.			
IL□□14	32-bit Coordinate System Position (DPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
When a finite length axis is being used, this position is the same as the machine coordinate system's Calculated Target Position (CPOS). The position is refreshed in the range -2^{31} to $2^{31}-1$, whether a finite or infinite length axis is being used.			

(cont'd)

IL□□16	Machine Coordinate Feedback Position (APOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
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. (Note) When an infinite length axis type is selected, the position ranges from 0 to (Infinite Length Axis Reset Position – 1).			
IL□□18	Machine Coordinate Latch Position (LPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the latch position when the latch has been completed.			
IL□□1A	Position Error (PERR)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the following error (Machine Coordinate System Position (IL□□12) – Machine Coordinate Feedback Position (IL□□16)) managed by the Motion Module.			
IL□□1C	Reference Position Increment Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the pulse distribution amount calculated every 500 µs cycle.			
IW□□1E	POSMAX Number of Turns		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Rev	
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 Maximum Value of Rotary Counter (POSMAX) (fixed parameter 10).			

(11) Speed Information

IL☐☐20	Speed Reference Output Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Speed Units (setting parameter OW☐☐03, bits 0 to 3)	
Stores the speed reference that is being output. This parameter will be 0 for interpolation or phase control.			
IL☐☐24	Integral Output Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Speed Units (setting parameter OW☐☐03, bits 0 to 3)	
Stores the integral output value when using PI control in the position loop (see setting parameter OW☐☐21, bit 8). This parameter is used in Position Control Mode and Zero Point Return Mode.			
IL☐☐26	Primary Lag Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Speed Units (setting parameter OW☐☐03, bits 0 to 3)	
Stores the following value: IL☐☐24 – the primary lag element's output. This parameter is used in Position Control Mode and Zero Point Return Mode.			
IL☐☐28	Position Loop Output Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Speed Units (setting parameter OW☐☐03, bits 0 to 3)	
Stores the position loop output value (before the feed forward value is added). This parameter is used in Position Control Mode and Zero Point Return Mode.			

(12) Servo Driver Information 2

IL□□40	Feedback Speed		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Speed Units (setting parameter OW□□03, bits 0 to 3)	
Stores the feedback speed. The units for this parameter are set with the Speed Units parameter in Function 1 (setting parameter OW□□03, bits 0 to 3). The value is determined by the moving average time constant and unit set from the difference with the Machine Coordinate Feedback Position (monitoring parameter IL□□16) in each scan.			
IL□□42	Torque (Thrust) Reference Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Torque Units (setting parameter OW□□03, bits C to F)	
Stores the value of the torque reference.			

(13) Position Information 2

IL□□4A	Absolute Encoder Cumulative Revolutions		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Rev	
Stores the accumulated number of revolutions read from the absolute encoder when the power is turned ON or the Read Absolute Data function is executed.			
IL□□4C	Initial Number of Incremental Pulses		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Pulse	
Stores the initial incremental pulse number read from the absolute encoder when the power is turned ON or the Read Absolute Data function is executed.			

(14) Supplemental Information 1

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

(15) Supplemental Information 2

IW□□58		General-purpose Digital Input (DI) Monitor		
		Range	Unit	
		Bit Setting	–	
IW□□58	Bit 0	General-purpose DI 0 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode to store the Servo Alarm input.		
	Bit 1	General-purpose DI 1 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode to store the Servo Ready input.		
	Bit 2	General-purpose DI 2 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode to store the ZERO/HOME Limit Switch input.		
	Bit 3	General-purpose DI 3 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode to store the Positive Overtravel input.		
	Bit 4	General-purpose DI 4 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode to store the Negative Overtravel input.		
	Bit 5	General-purpose DI 5 This parameter can be used only in General-purpose I/O Mode. Used by the system in normal Run Mode to store the EXT/DEC Signal input.		
	Bit 7	PG Disconnected Status Stores the status of the PG Disconnected signal.		

(16) Supplemental Information 3

IL□□59	General-purpose AI Monitor 1		
	Range	Unit	
	–32768 to 32767	0.001 V	
Stores a general-purpose analog input. When a standard servo cable is being used, this parameter stores the servo's analog speed monitor value. The effective signal range is –9.9 to 9.9 V.			
IL□□5A	General-purpose AI Monitor 2		
	Range	Unit	
	–32768 to 32767	0.001 V	
Stores a general-purpose analog input. When a standard servo cable is being used, this parameter stores the servo's torque monitor value. The effective signal range is –9.9 to 9.9 V.			

(17) Absolute Infinite Length Axis Position Control Information

IL□□5E	Absolute Position at Power OFF (Lower 2 Words)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Pulse	
This is the information for infinite length axis position control when an absolute encoder is used. The encoder position is normally stored in 4 words.			
IL□□60	Absolute Position at Power OFF (Upper 2 Words)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Pulse	
Same as above.			
IL□□62	Modularized Position at Power OFF (Lower 2 Words)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Pulse	
This is the information 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	Modularized Position at Power OFF (Upper 2 Words)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Pulse	
Same as above.			

(18) Monitor Data

IL□□66	Monitor Data Status		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	
This parameter is reserved for the system. Do not use this setting.			
IL□□68	Monitor Data		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	
This parameter is reserved for the system. Do not use this setting.			

4.5 Example of Setting Motion Parameters for the Machine

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

- Reference Unit
- Electronic Gear
- Axis Type
- Position Reference
- Speed Reference
- Acceleration/Deceleration Settings
- Acceleration/Deceleration Filter Settings

(1) Reference Unit

Pulses, millimeters, degrees, or inches can be used as the reference unit for motion control. The reference unit is specified in Command Unit (motion fixed parameter 4). The minimum reference unit that can be specified is determined by the above unit selection and the setting of Number of Decimal Places (motion fixed parameter 5).

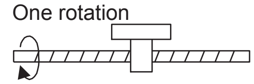
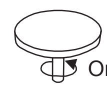
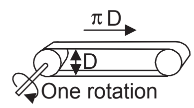
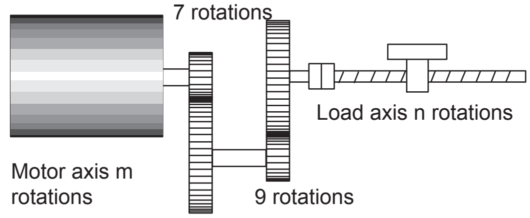
		Motion Fixed Parameter 4: Command Unit (Reference Unit)			
		0: pulse	1: mm	2: deg	3: inch
Motion Fixed Parameter 5: Number of Decimal Places	0: 0 digits	1 pulse	1 mm	1 deg	1 inch
	1: 1 digits	1 pulse	0.1 mm	0.1 deg	0.1 inch
	2: 2 digits	1 pulse	0.01 mm	0.01 deg	0.01 inch
	3: 3 digits	1 pulse	0.001 mm	0.001 deg	0.001 inch
	4: 4 digits	1 pulse	0.0001 mm	0.0001 deg	0.0001 inch
	5: 5 digits	1 pulse	0.00001 mm	0.00001 deg	0.00001 inch

(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.

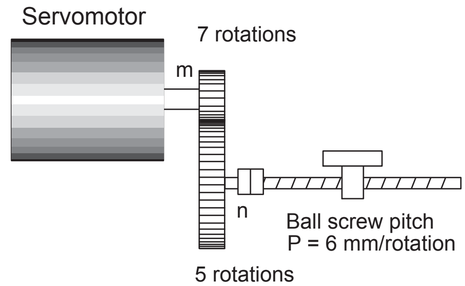
When the axis at the motor has rotated m times and the mechanical configuration allows the axis at the load to rotate n times, this electronic gear function can be used to make the reference unit equal to the output unit.

The electronic gear function is set using the motion fixed parameters shown in following table. The electronic gear is disabled when pulse is specified as the reference unit.

<table>
<tr><th>Parameter Type</th><th>Parameter No. (Register No.)</th><th>Name</th><th>Description</th><th>Default Value</th></tr>
<tr><td>Motion Fixed Parameters</td><td>No. 6</td><td>Command Unit per Revolution</td><td>• This parameter shows the load moving amount for each rotation of the load axis. Sets the load moving amount value divided by the reference unit.
$$\text{No. 6} = \frac{\text{Load travel distance per load axis rotation}}{\text{Reference unit}}$$
• Some examples of the load moving amount are shown below.
<table>
<tr><th>Reference Units per Revolution</th><th colspan="2">Load Configuration Examples</th></tr>
<tr><td>P [mm]</td><td>Ball screw</td><td></td></tr>
<tr><td>360 [°]</td><td>Rotating table</td><td></td></tr>
</table></td><td>10000</td></tr>
<tr><td rowspan="3">Motion Fixed Parameters (cont’d)</td><td>No. 6 (cont’d)</td><td>Command Unit per Revolution (cont’d)</td><td><table>
<tr><td>D [mm]</td><td>Belt</td><td></td></tr>
</table>• Setting range: 1 to 2^{31}–1 [1 = 1 reference unit]
■ Setting Examples
• Load moving amount per load axis rotation = 12 mm
• Reference unit = 0.001 mm
$$\text{No. 6} = \frac{12\ \text{mm}}{0.001\ \text{mm}} = 12000$$</td><td>10000</td></tr>
<tr><td>No. 8</td><td>Gear Ratio [MOTOR]</td><td rowspan="2">• These parameters are used to set the gear ratio between the motor and the load. When the motor axis has rotated m times and the mechanical configuration allows the load axis to rotate n times, set the following values:
No. 8 = m rotations
No. 9 = n rotations
• Setting range: 1 to 65,535 [rotations]
■ Setting Example

$$\text{Gear ratio} = \frac{n}{m} = \frac{3}{7} \times \frac{4}{9} = \frac{4}{21}$$
Therefore, set the following values:
No. 8 = 21
No. 9 = 4</td><td>1</td></tr>
<tr><td>No. 9</td><td>Gear Ratio [LOAD]</td><td>1</td></tr>
</table>

[a] Parameter Setting Example Using Ball Screw

◀ EXAMPLE ▶

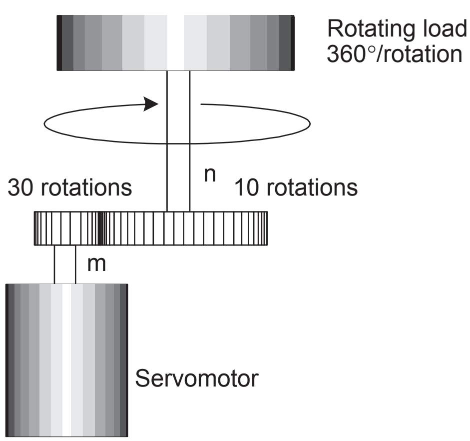


In the above machine system, if the requirement is reference unit = output unit = 0.001 mm, the setting of each parameter will be as follows:

- No. 6 = $\dfrac{6\text{ mm}}{0.001\text{ mm}} = \boxed{6000}$
- Gear ratio = $\dfrac{n}{m}$
- No. 8 = $\boxed{7}$
- No. 9 = $\boxed{5}$

[b] Parameter Setting Example Using Rotating Load

◀ EXAMPLE ▶



In the above machine system, if the requirement is reference unit = output unit = 0.1°, the setting of each parameter will be as follows:

- No. 6 = $\dfrac{360°}{0.1°} = \boxed{3600}$
- Gear ratio = $\dfrac{n}{m} = \dfrac{10}{30} = \dfrac{1}{3}$
- No. 8 = $\boxed{3}$
- No. 9 = $\boxed{1}$

IMPORTANT

Set the SERVOPACK gear ratio to 1:1.

(3) Axis Type Selection

There are two types of position control:

Finite length position control: Return and other operations are performed only within a specified range, i.e., within a prescribed positioning interval.

Infinite length position control: Used for moving in one direction only.

- Resets the position to 0 after one rotation.
- Moves 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 settings for 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	Function Selection 1, Axis Type	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. 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	Maximum Value of Rotary Counter (POSMAX)	Set the reset position of the position data when an infinite length axis has been set for the axis type.	360000

(4) Position References

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 parameters relating to position references.

Parameter Type	Parameter No. (Register No.)	Name	Description	Default Value
Motion Setting Parameters	OB□□095	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. Note: • Always set to 0 when using a motion program. • Always set to 0 when using an infinite length axis.	0
	OL□□1C	Position Reference Setting	Set the position data. • Incremental Addition Mode (OB□□095 = 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 (OB□□095 = 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

INFO

Use incremental addition mode for an infinite length axis. In other words, the new moving amount (an incremental moving amount) is added to the previous position reference in OL□□1C and set as the new position reference in OL□□1C.

It is important to note that the position reference is not necessarily set between 0 and one less than the Maximum Value of Rotary Counter (POSMAX).

Position Reference Type	Merits	Demerits
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. Absolute mode cannot be used for an infinite length axis type.

(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	Number of Decimal Places	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 Command Unit (fixed parameter 4). Example: Command Unit = mm, Number of Decimal Places = 3 1 reference unit = 0.001 mm	3
	No. 34	Rated 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	Encoder Resolution	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	Speed Units	Set the unit for reference speeds. 0: Reference unit/s 1: 10^n reference units/min (n: Number of Decimal Places) 2: 0.01% 3: 0.0001%	1
	OL□□10	Speed Reference	Set the feed speed. The unit for this parameter is set in OW□□03, bits 0 to 3. When the Number of Decimal Places is set to 3, units are as follows for the setting of the Command 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 • Speed Unit Set to 1: 10^n reference units/min Pulse unit: 1 = 1,000 pulses/min mm unit: 1 = 1 mm/min Deg unit: 1 = 1 deg/min Inch unit: 1 = 1 inch/min • Speed Unit Set to 2: 0.01% Set as a percentage of the rated speed (1 = 0.01%) unrelated to the reference unit setting.	3000
	OW□□18	Speed Override	This parameter allows the positioning speed to be changed without changing the Speed Reference setting. Set the speed as a percentage of the Speed Reference setting. Setting unit: 1 = 0.01%	10000

[a] Speed Reference Parameter Setting Examples (1)

◀ EXAMPLE ▶

No. 5 = 3 digits

No. 34 = 3,000 min^{-1}

No. 36 = 65,536 pulses/rotation

Therefore, rated speed = 3,000 min^{-1}
= 3000 × 65,536
= 196,608,000 ppm

1. Speed Unit Set to 0 (reference units/s)

a)Command Unit = Pulses

For a feed speed of 1,500 min^{-1} with the above settings:

OL□□10= 1,500 [min^{-1}] × 65,536 [pulse] ÷ 60
= 1638400 [pulse/s]

OW□□18 = 10000 (100%)

b)Command Unit = mm (1 reference unit = 0.001 mm)

For a feed speed of 500 mm/s with a machine that travels 10 mm for each rotation with the above settings:

OL□□10 = 500000 (reference units/s)

OW□□18 = 10000 (100%)

2.Speed Unit set to 1 (10^n reference units/min)

a)Command Unit = Pulses

For a feed speed of 1500 min^{-1} with the above settings:

OL□□10= 1,500 [min^{-1}] × 65,536 [pulse] ÷ 1,000
= 98304 [1,000 pulses/min]

OW□□18 = 10000 (100%)

b)Command Unit = mm

For a feed speed of 900 mm/s with a machine that travels 10 mm for each rotation with the above settings:

OL□□10 = 900

OW□□18 = 10000 (100%)

3.Speed Unit set to 2 (percentage)

For a feed speed of 1,500 min^{-1} with the above settings:

$$\text{OL}\square\square10 = \frac{1{,}500\ [\text{min}^{-1}]}{3{,}000\ [\text{min}^{-1}]} \times 10{,}000$$

$$= 5{,}000$$

OW□□18 = 10000 (100%)

4.To leave the setting of Speed Reference (OL□□10) unchanged and reduce the operating speed to half (50%):

OW□□18 = 5000 (50.00%)

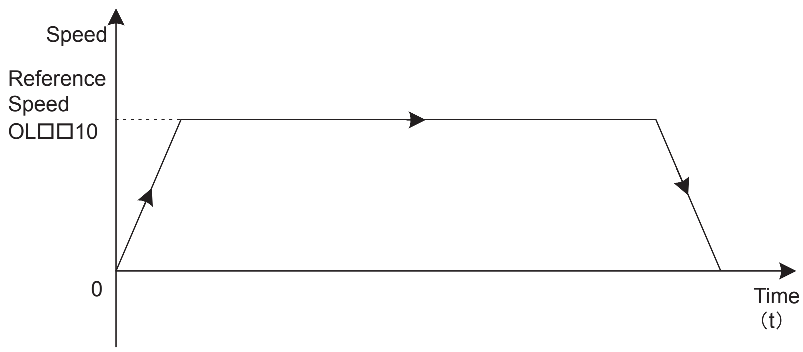
[b] Speed Reference Parameter Setting Examples (2)

◀ EXAMPLE ▶

1.When the Speed Unit (OW□□03, bits 0 to 3) is set as follows:

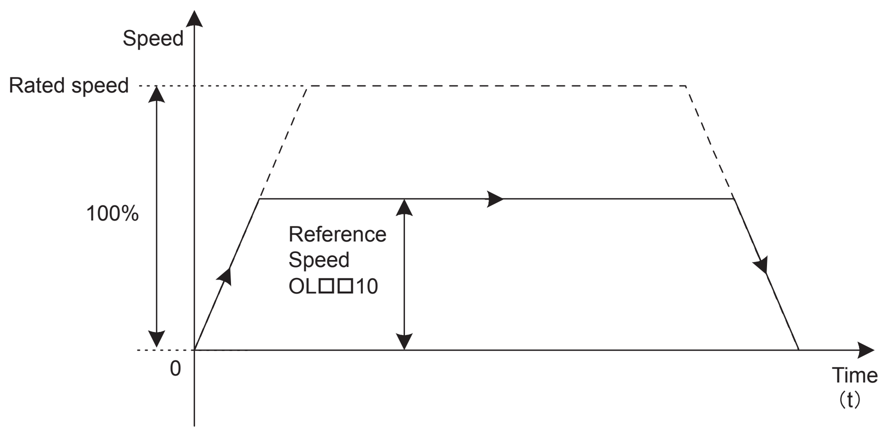
0: Reference units/s

1: 10^n reference units/min



2.When the Speed Unit (OW□□03, bits 0 to 3) is set as follows:

2: Percentage



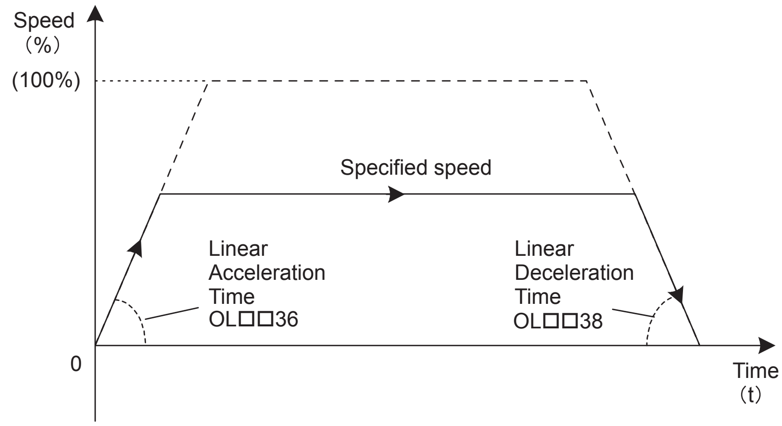
(6) Acceleration/Deceleration Settings

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 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	Number of Decimal Places	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 Command Unit (fixed parameter 4). Example: Command Unit = mm, Number of Decimal Places = 3 1 reference unit = 0.001 mm	3
	No. 34	Rated 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	Encoder Resolution	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	Acceleration/ Deceleration Units	Set the unit for acceleration/deceleration. 0: Reference unit/s^2 1: ms	0
	OL□□36	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant according to the setting of OW□□03, bits 4 to 7. • Acceleration/Deceleration Units 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 Example: Number of Decimal Places = 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 • When Acceleration/Deceleration Units 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	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant according to the setting of OW□□03, bits 4 to 7. • Acceleration/Deceleration Units is 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 • Acceleration/Deceleration Units is 1 (ms), set the time constant to go from the rated speed to 0 without relation to the reference unit.	0

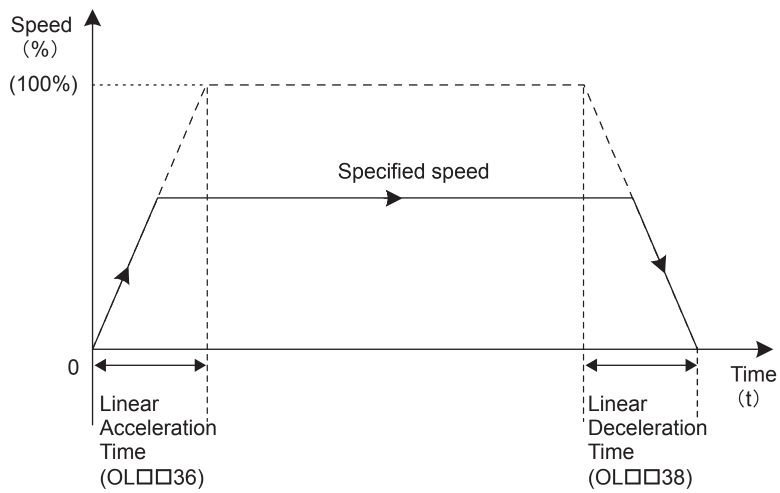
[a] When the Acceleration/Deceleration Unit (OW□□03, Bits 4 to 7) Set to 0: Reference Unit/s^2

◀ EXAMPLE ▶



[b] When the Acceleration/Deceleration Unit (OW□□03, Bits 4 to 7) Set to 1: ms

◀ EXAMPLE ▶



(7) Acceleration/Deceleration Filter Settings

There are two types of acceleration/deceleration filter: The exponential acceleration/deceleration filter and the moving average filter. The parameters related to the acceleration/deceleration filter settings are listed in the following table. When using an acceleration/deceleration filter, always execute the Change Filter Type command (OW□□08 = 13) in advance to enable the filter type selection.

Parameter Type	Parameter No. (Register No.)	Name	Description	Default Value
Motion Setting Parameters	OW□□03 Bits 8 to B	Filter Type	Set the acceleration/deceleration filter type. 0: No filter 1: Exponential acceleration/deceleration filter 2: Moving average filter Note: The Change Filter Type command (OW□□08 = 13) must be executed in advance to enable the Filter Type.	0
	OW□□3A	S-curve Acceleration Time	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 (1)) before changing the time constant.	0

5

Motion Commands

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

5.1 Motion Commands

5.1.1 Motion Command Table

Command Code	Command	Name	Description
0	NOP	No command	
1	POSING	Positioning	Positions to the specified position using the specified acceleration/deceleration times and the specified speed.
2	EX_POSING	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.
3	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.
4	INTERPOLATE	Interpolation	Performs interpolation feeding using positioning data distributed consecutively from the Basic Module.
5		Reserved	
6	LATCH	Latch	Memorizes the current position when the latch signal is input during an interpolation feed operation.
7	FEED	JOG Operation	Moves the axis at the specified speed in the specified direction until the command is canceled.
8	STEP	STEP Operation	Positions the specified travel distance in the specified direction at the specified speed.
9	ZSET	Zero Point Setting	Sets the zero point in the machine coordinate system and enables the soft limit function.
10	ACC	Change Linear Acceleration Time Constant	Changes the acceleration time for linear acceleration/deceleration.
11	DCC	Change Linear Deceleration Time Constant	Changes the deceleration time for linear acceleration/deceleration.
12	SCC	Change Filter Time Constant	Changes the time constant for a moving average filter for acceleration/deceleration.
13	CHG_FILTER	Change Filter Type	Changes the acceleration/deceleration filter type.
14	KVS	Change Speed Loop Gain	Changes the speed loop gain.
15	KPS	Change Position Loop Gain	Changes the position loop gain.
16	KFS	Change Feed Forward	Changes the feed forward control gain.
17	PRM_RD	Read SERVOPACK Parameter	Reads a SERVOPACK parameter.
18	PRM_WR	Write SERVOPACK Parameter	Write a SERVOPACK parameter.
19	ALM_MON	Monitor SERVOPACK Alarms	Monitors SERVOPACK alarms.
20	ALM_HIST	Monitor SERVOPACK Alarm History	Monitors SERVOPACK alarm history.
21	ALMHIST_CLR	Clear SERVOPACK Alarm History	Clears SERVOPACK alarm history data.
22	ABS_RST	Reset Absolute Encoder	Initializes an absolute encoder.
23	VELO	Speed Reference	Operates with speed control mode.
24	TRQ	Torque Reference	Operates with torque control mode.
25	PHASE	Phase Reference	Operates with phase control mode.
26	KIS	Change Position Loop Integration Time Constant	Changes the integration time constant for the position loop.

5.1.2 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	SGD-□□□E +NS100	SGDH-□□□E +NS115		SGDS- □□□1□□		Σ-II, -III Analog SERVOP ACKs *
				M-I	M-II	M-I	M-II	
Main Command (OW□□08)	NOP	A	A	A	A	A	A	A
	POSING	A	A	A	A	A	A	A
	EX_POSING	A	A	A	A	A	A	A
	ZRET	A	A	A	A	A	A	A
	INTERPOLATE	A	A	A	A	A	A	A
	ENDOF_INTERPOLATE	A	A	A	A	A	A	C
	LATCH	A	A	A	A	A	A	C
	FEED	A	A	A	A	A	A	C
	STEP	A	A	A	A	A	A	C
	ZSET	A	A	A	A	A	A	C
	ACC	A	A	A	A	A	A	C
	DCC	C	A	A	A	A	A	C
	SCC	A	A	A	A	A	A	C
	CHG_FILTER	A	A	A	A	A	A	C
	KVS	A	A	A	A	A	A	C
	KPS	A	A	A	A	A	A	C
	KFS	A	A	A	A	A	A	C
	PRM_RD	A	A	A	A	A	A	C
	PRM_WR	A	A	A	A	A	A	C
	ALM_MON	A	A	A	A	A	A	C
	ALM_HIST	A	A	A	A	A	A	C
	ALMHIST_CLR	A	A	A	A	A	A	C
	ABS_RST	C	A	A	A	A	A	C
	VELO	C	C	C	A	C	A	A
	TRQ	C	C	C	A	C	A	A
	PHASE	C	A	A	A	A	A	A
	KIS	C	A	A	A	A	A	C
Subcommand (OW□□0A)	NOP	A	A	A	A	A	A	C
	PRM_RD	C	C	C	B	C	B	C
	PRM_WR	C	C	C	B	C	B	C
	SMON	C	C	C	B	C	B	C
	FIXPRM_RD	A	A	A	A	A	A	C

* Σ-II, -III Analog SERVOPACKs:
SGD-□□□S, SGDB-□□, SGDM, SGDH, SGDS-□□□01□/□□□02□

(Note)1. M-I: MECHATROLINK-I
M-II: MECHATROLINK-II

2. A: Can be specified.
B: Can be specified in 32-byte mode only.
C: Cannot be specified.

5.2 Motion Command Details

5.2.1 Positioning (POSING)

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.
The speed and 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.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Positioning Speed: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01

⇩

Execute the positioning (POSING) motion command.
- Set OW□□08 to 1.

⇩

Set the target position.
- Target Position Setting: OL□□1C*

⇩

Positioning starts.
- IW□□08 will be 1 during positioning.

⇩

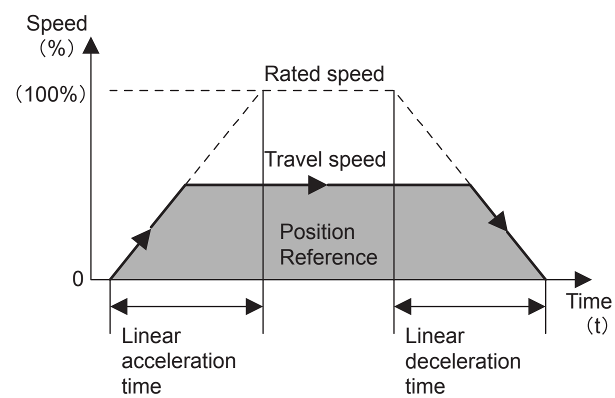
Position proximity reached.
- IB□□0C3 will turn ON.

⇩

Positioning completed.
- IB□□0C1 will turn ON.

⇩

Executed NOP motion command.
- Set OW□□08 to 0.



- The target position can be changed while the axis is moving.
- The positioning speed can be changed while the axis is moving.
- An override of between 0% to 327.67% can be set for the positioning speed.
- Set OB□□090 to 1 to hold the command.
- Set OB□□091 to 1 or execute the NOP motion command to abort the command.

* If the Position Reference Type (OB□□095) is set for an absolute mode, the target position can be set before executing the command.

(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 Command Pause bit (OB□□090) to 1.

1. Set the Command Pause bit (OB□□090) to 1. The axis will decelerate to a stop. When the axis has stopped, the Command Hold Completed bit (IB□□091) will turn ON.

2. Reset the Command Pause bit (OB□□090) 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 cancelled by aborting execution of a command. A command is aborted by setting the Command Abort bit (OB□□091) to 1.

1. Set the Command Abort bit (OB□□091) 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 (IB□□01C) will turn ON.

2. The positioning will restart if the Command Abort bit (OB□□091) is reset to 0 during abort processing.

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
OB□□000	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.
OB□□013	Speed Loop P/PI Switch	Switch the speed control loop between PI control and P control. 0: PI control, 2: P control
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
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.
OB□□090	Command Pause	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.
OB□□091	Command Abort	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 stopping, the operation depends on the setting of the Position Reference Type (OB□□095).
OB□□095	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.
OL□□10	Speed Reference	Specify the speed for the positioning. This setting can be changed during operation. The unit depends on the setting of OW□□03.

Parameter	Name	Setting
OL□□18	Speed Override	This parameter allows the positioning speed to be changed without changing the Speed Reference (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 OB□□095.
OL□□1E	Positioning Completed Width	Set the width in which to turn ON the Positioning Completed bit (IB□□0C1).
OL□□20	Positioning Completed Width 2	Set the range in which the Position Proximity bit (IB□□0C3) will turn ON. The Position Proximity 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	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant for positioning.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/ deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

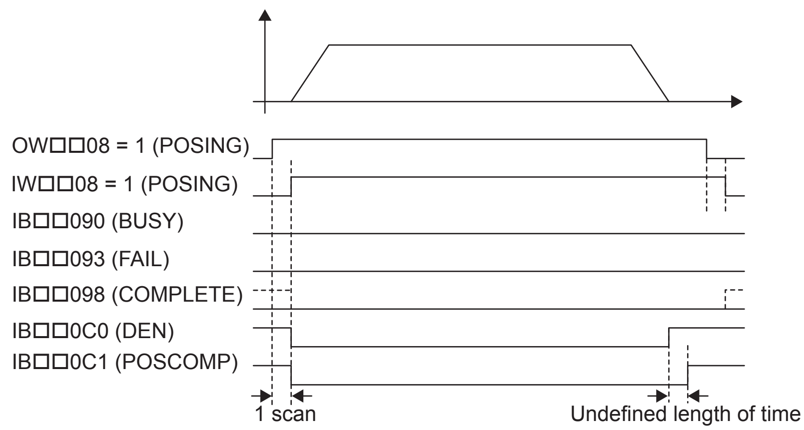
（Note） : Parameters only for the SVB-01 Module.

[b] Monitoring Parameters

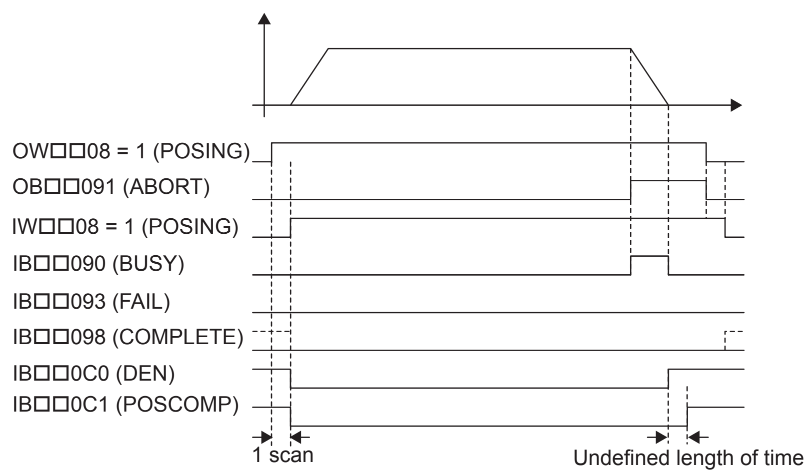
Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 1 during POSING command execution.
IB□□090	Command Executing	Turns ON when abort processing is being performed for POSING command. Turns OFF when abort processing has been completed.
IB□□091	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of setting the Command Pause (OB□□090) bit to 1 during POSING command execution.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for POSING command. Use the Positioning Completed bit (IB□□0C1) to confirm completion of this command.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a pulse distribution.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width. OFF in all other cases.
IB□□0C3	Position Proximity	The operation depends on the setting of the Positioning Completed Width 2 (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). OL□□20≠0: Turns ON when │MPOS - APOS│< Position Proximity Setting even if pulse distribution has not been completed. OFF in all other cases.

(5) Timing Charts

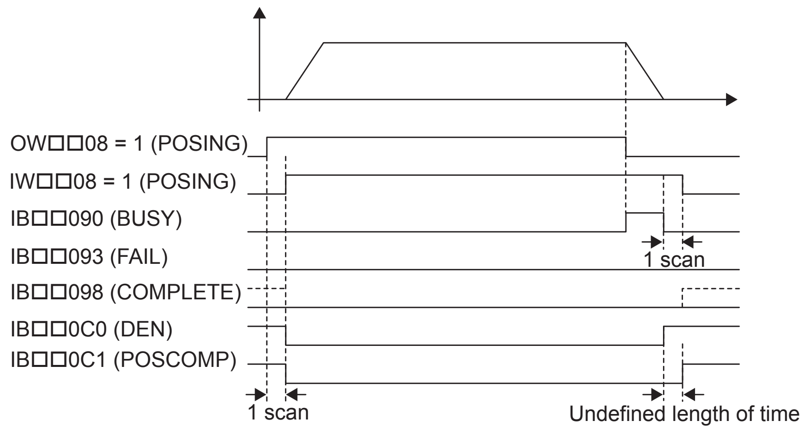
[a] Normal Execution



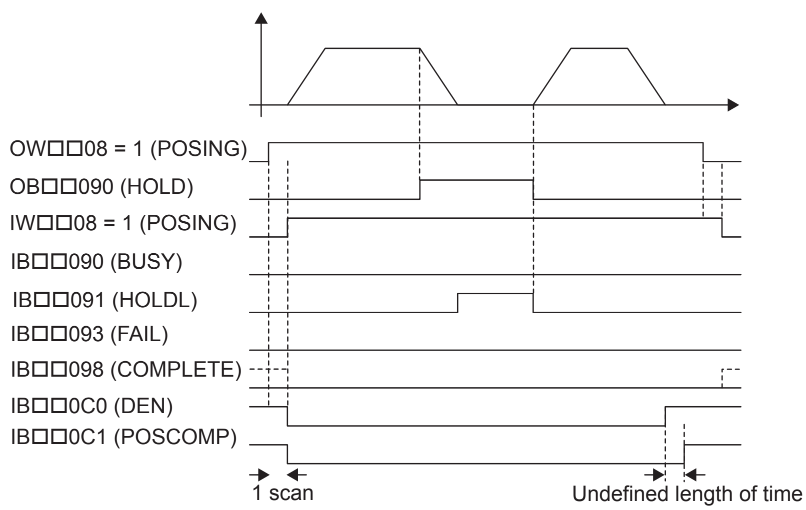
[b] Execution when Aborted



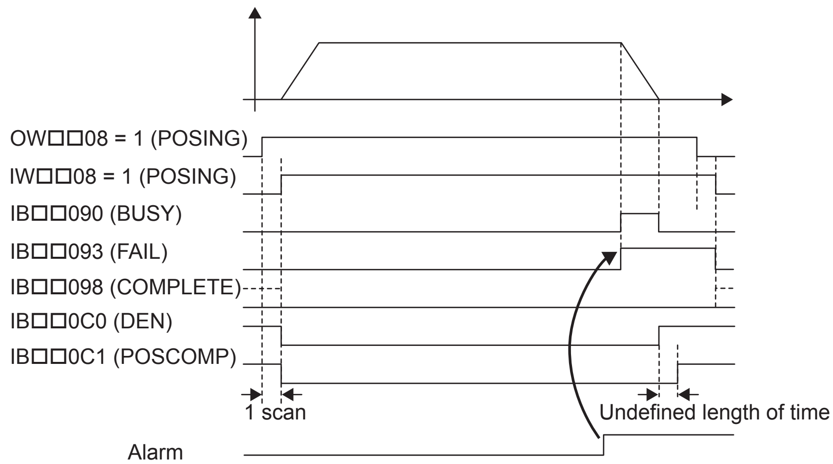
[c] Execution when Aborting by Changing the Command



[d] Command Hold



[e] Execution when an Alarm Occurs



5.2.2 External Positioning (EX_POSING)

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 Move 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.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- External Positioning Move Distance: OL□□46
- External Positioning Signal: OW□□04
- Positioning Speed: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01

⇩

Execute the External Positioning (EX_POSING) motion command.
- Set OW□□08 to 2.

⇩

Set the target position.
- Target Position Setting: OL□□1C*

⇩

Positioning starts.
- IW□□08 will be 2 during positioning.

⇩

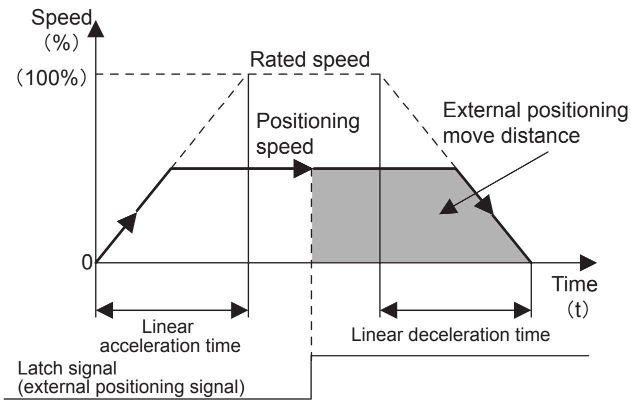
Turn ON the external positioning signal. The axis will be moved the External Positioning Move Distance and decelerate to a stop.

⇩

Positioning completed.
- IB□□098 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- The target position can be changed while the axis is moving. The target position cannot be changed after the external positioning signal is input.
- The positioning speed can be changed while the axis is moving.
- An override of between 0% to 327.67% can be set for the positioning speed.
- Set OB□□090 to 1 to hold the command.
- Set OB□□091 to 1 or execute the NOP motion command to abort the command.
- A latch zone can be set as long as it is supported by the SERVOPACK being used.

* If the Position Reference Type (OB□□095) is set for an absolute mode, the target position can be set before executing the command.

(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 Command Pause bit (OB□□090) to 1.

1. Set the Command Pause bit (OB□□090) to 1. The axis will decelerate to a stop. When the axis has stopped, the Command Hold Completed bit (IB□□091) will turn ON.

2. Reset the Command Pause bit (OB□□090) 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 cancelled by aborting execution of a command. A command is aborted by setting the Command Abort bit (OB☐☐091) to 1.

Set the Command Abort bit (OB☐☐091) 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 (IB☐☐01C) 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
OB☐☐000	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.
OB☐☐013	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 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW☐☐04	Function 2	Set the external positioning signal. 2: phase-C pulse, 3: /EXT1, 4: /EXT2, 5: /EXT3
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.
OB☐☐090	Command Pause	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.
OB☐☐091	Command Abort	The axis will decelerate to a stop if this bit is set to 1 during EX_POSING command execution.
OB☐☐094	Latch Zone Enabled	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
OB☐☐095	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.
OL☐☐10	Speed Reference	Specify the speed for the positioning. This setting can be changed during operation. The unit depends on the setting of OW☐☐03.
OL☐☐18	Speed Override	This parameter allows the positioning speed to be changed without changing the Speed Reference (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 OB☐☐095.
OL☐☐1E	Positioning Completed Width	Set the width in which to turn ON the Positioning Completed bit (IB☐☐0C1).
OL☐☐2A	Latch Zone Lower Limit	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	Set the boundary in the positive direction of the area in which the external positioning signal is to be valid.
OL☐☐20	Positioning Completed Width 2	Set the range in which the Position Proximity bit (IB☐☐0C3) will turn ON. The Position Proximity 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.

(cont'd)

Parameter	Name	Setting
OL□□36	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant for positioning.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).
OL□□46	External Positioning Move Distance	Set the moving amount to move after the external positioning signal is input.

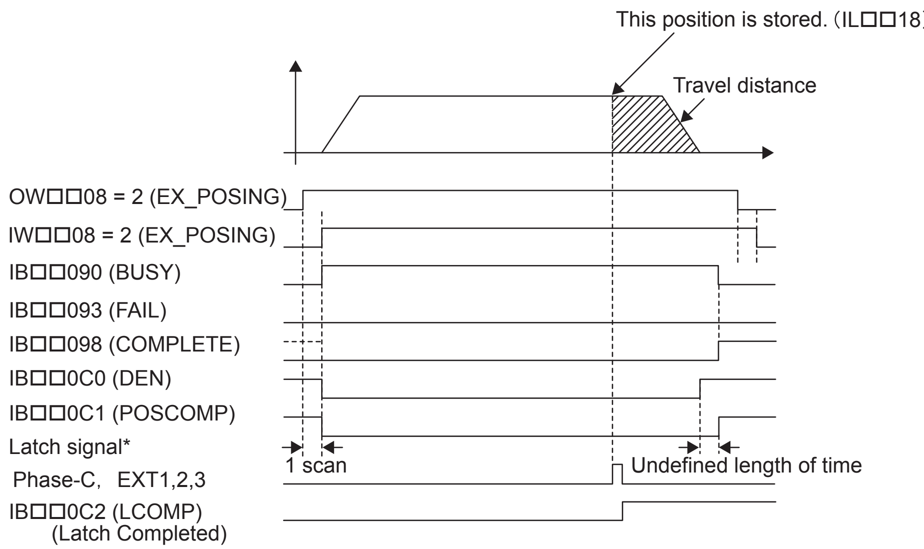
(Note) : Parameters only for the SVB-01 Module.

[b] Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 2 during EX_POSING command execution.
IB□□090	Command Executing	The Command Executing bit will turn ON during EX_POSING command execution and then turn OFF when command execution has been completed.
IB□□091	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of setting the Command Pause bit to 1 (OB□□090 to 1) during EX_POSING command execution.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Turns ON when EX_POSING command execution has been completed.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width. OFF in all other cases.
IB□□0C2	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 Latch Position (monitoring parameter IL□□18).
IB□□0C3	Position Proximity	The operation depends on the setting of the Positioning Completed Width 2 (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). OL□□20≠0: Turns ON when $\lvert$MPOS - APOS$\rvert$ < Position Proximity Setting even if pulse distribution has not been completed. OFF in all other cases.
IL□□18	Machine Coordinate Latch Position	Stores the current position in the machine coordinate system when the latch signal turned ON.

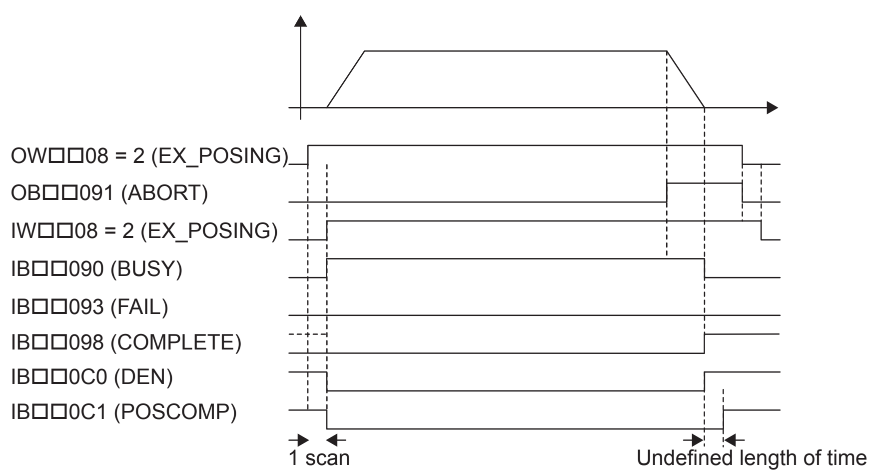
(5) Timing Charts

[a] Normal Execution

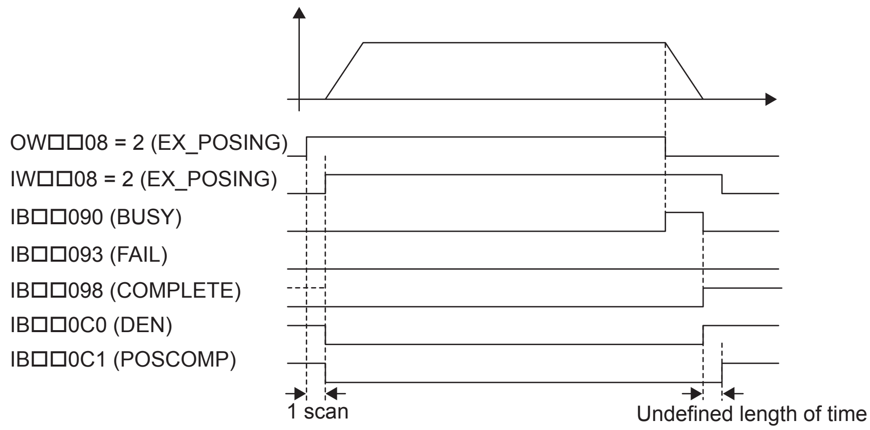


* Latch signal:
SVB-01 Module: Phase-C pulse, EXT1, EXT2, or EXT3 signal
SVA-01 Module: Phase-C pulse, EXT, or ZERO signal

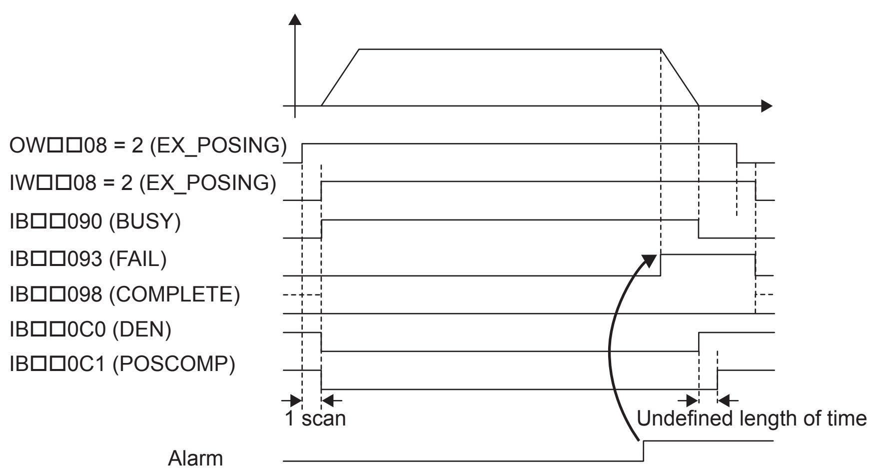
[b] Execution when Aborted



[c] Execution when Aborting by Changing the Command



[d] Execution when an Alarm Occurs



5.2.3 Zero Point Return (ZRET)

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 17 different methods that can be performed for the Zero Point Return operation.

(1) Selecting the Zero Point Return Method

With an incremental encoder, 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 17 methods that are provided for the zero point return are listed in the following table. Select the best method for the machine in the setting parameters.

Setting Parameter OW☐☐3C	Name	Method	Signal Meaning	
			SVB-01	SVA-01
0	DEC1 + C-Phase	Applies a 3-step deceleration method using the deceleration limit switch and phase-C pulse.	DEC1 signal: SERVOPACK DEC signal	DEC1: DI_5 or OW☐☐05, bit 8* (Latched on phase-C signal.)
1	ZERO signal	Uses the ZERO signal.	ZERO signal: SERVOPACK EXT1 signal	ZERO signal: DI_2 (Latched on ZERO signal.)
2	DEC 1 + ZERO signal	Applies a 3-step deceleration method using the deceleration limit switch and ZERO signal.	DEC1 signal: SERVOPACK DEC signal ZERO signal: SERVOPACK EXT1 signal	DEC1: DI_5 or OW☐☐05, bit 8* ZERO signal: DI_2 (Latched on ZERO signal.)
3	C-Phase	Uses the phase-C pulse.		(Latched on phase-C signal.)
4	DEC2 + ZERO Signal Method	This method uses the deceleration limit switch as an area signal and the ZERO signal as the zero point signal.	–	DEC2: DI_5 or OW☐☐05, bit 8* ZERO signal: DI_2 (Latched on ZERO signal.)
5	DEC1 + LMT+ ZERO Signal Method	This method uses the deceleration limit switch and the two home return limit signals (LMT) as area signals and the ZERO signal as the zero point signal.	–	DEC1: DI_5 or OW☐☐05, bit 8 * Reverse LMT: OW☐☐05, bit 9 Forward LMT: OW☐☐05, bit 10 ZERO signal: DI_2 (Latched on ZERO signal.)
6	DEC2 + Phase-C Signal Method	This method uses the deceleration limit switch as an area signal and the phase-C signal as the zero point signal.	–	DEC2: DI_5 or OW☐☐05, bit 8* (Latched on phase-C signal.)
7	DEC1 + LMT+ Phase-C Signal Method	This method uses the deceleration limit switch and the two home return limit signals (LMT) as area signals and the phase-C signal as the zero point signal.	–	DEC1: DI_5 or OW☐☐05, bit 8* Reverse LMT: OW☐☐05, bit 9 Forward LMT: OW☐☐05, bit 10 (Latched on phase-C signal.)
11	C pulse Only	Uses only the phase-C pulse.	–	P-OT: DI_3 N-OT: DI_4 (Latched on phase-C signal.)
12	POT & C pulse	Uses the positive overtravel signal and phase-C pulse.	POT: SERVOPACK P-OT signal	P-OT: DI_3 (Latched on phase-C signal.)

(cont'd)

Setting Parameter OW□□3C	Name	Method	Signal Meaning	
			SVB-01	SVA-01
13	POT Only	Uses only the positive overtravel signal.	POT: SERVOPACK P-OT signal This method must not be used if repeat accuracy is required.	P-OT: DI_3
14	Home LS & C pulse	Uses the home signal and phase-C pulse.	HOME: SERVOPACK EXT1 signal	P-OT: DI_3 N-OT: DI_4 HOME LS: DI_2 (Latched on phase-C signal.)
15	Home Only	Uses only the home signal.	HOME: SERVOPACK EXT1 signal	P-OT: DI_3 N-OT: DI_4 HOME LS: DI_2 (Latched on HOME LS signal.)
16	NOT & C pulse	Uses the negative overtravel signal and phase-C pulse.	NOT: SERVOPACK N-OT signal	N-OT: DI_4 (Latched on phase-C signal.)
17	NOT Only	Uses only the negative overtravel signal.	NOT: SERVOPACK N-OT signal This method must not be used if repeat accuracy is required.	N-OT: DI_4
18	INPUT & C pulse	Uses the INPUT signal and phase-C pulse.	INPUT: Setting parameter OB□□05B	INPUT: OW□□05.Bit11 (Latched on phase-C signal.)
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 OB□□05B. This method must not be used if repeat accuracy is required.	INPUT: OW□□05.Bit11

* Select using bit 0 of the Hardware Signal Selection 2 (fixed parameter No. 21).

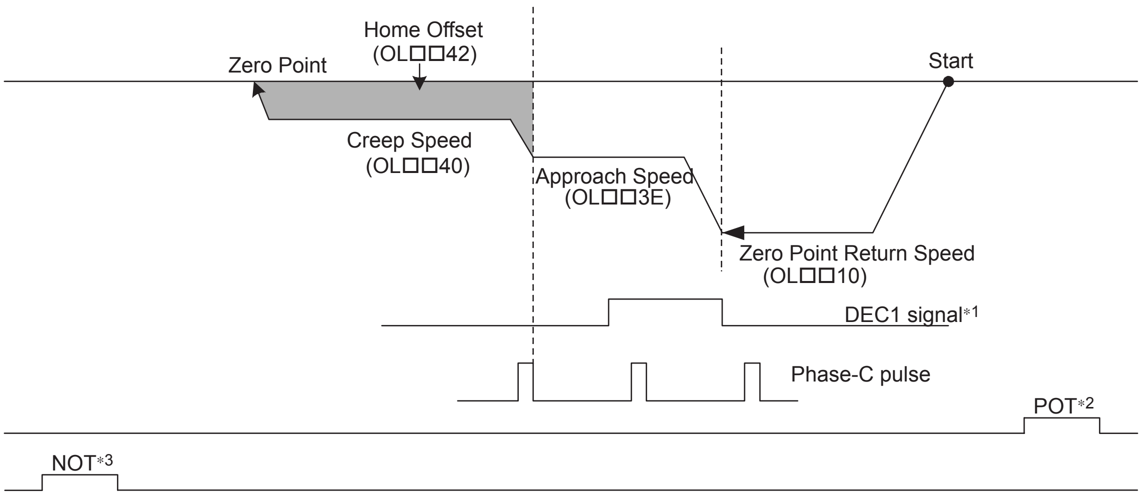
(Note) Reverse type in [ ]: Parameters only for the SVA-01 Module.

(2) Zero Point Return Operation and Parameters

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.

[a] DEC1 + C-Phase Method (OW□□3C = 0)

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, the speed is reduced to the creep speed and positioning is performed. When 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 Home Offset. If an OT signal is detected during the zero point return operation, an OT alarm will occur.



* 1. SVB-01: SERVOPACK DEC signal, SVA-01: DI_5 or OW□□05, bit 8 signal
* 2. The SERVOPACK P-OT signal.
* 3. The SERVOPACK N-OT signal.

Parameter	Name	Setting
OW□□3C	Home Return Type	0: DEC1 + C-Phase
OB□□093	Home Direction	Set the zero point return direction.
OL□□10	Speed Reference	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□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (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 Speed	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	Home Offset	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.

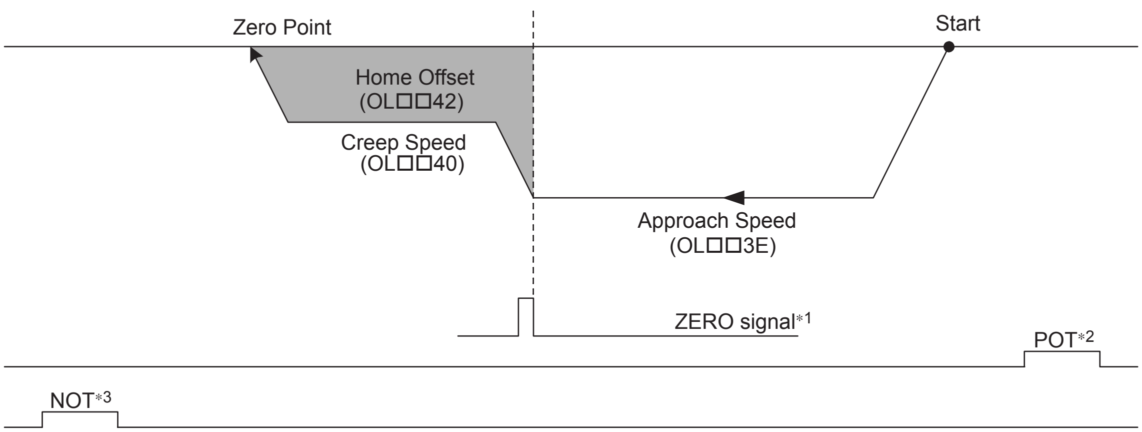
(cont'd)

Parameter	Name	Setting
Fixed Parameter No. 1, Bit 5	Deceleration Limit Switch Inversion	Set whether or not to invert the polarity of the DI_5 signal, which is used for DEC1. (OW□□05, bit 8, will not reverse status.)
Fixed Parameter No. 21, Bit 0	Deceleration Limit Switch Signal	Set the signal to use for DEC1.
OB□□058	Deceleration LS Signal (DEC1) for Zero Point Return	When bit 0 of fixed parameter No. 21 is 0, input the DEC1 signal from the ladder program.

(Note) Reverse type in ▭: Parameters only for the SVA-01 Module.

[b] ZERO Signal Method (OW□□3C = 1)

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 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 Home Offset. If an OT signal is detected during the zero point return operation, an OT alarm will occur.

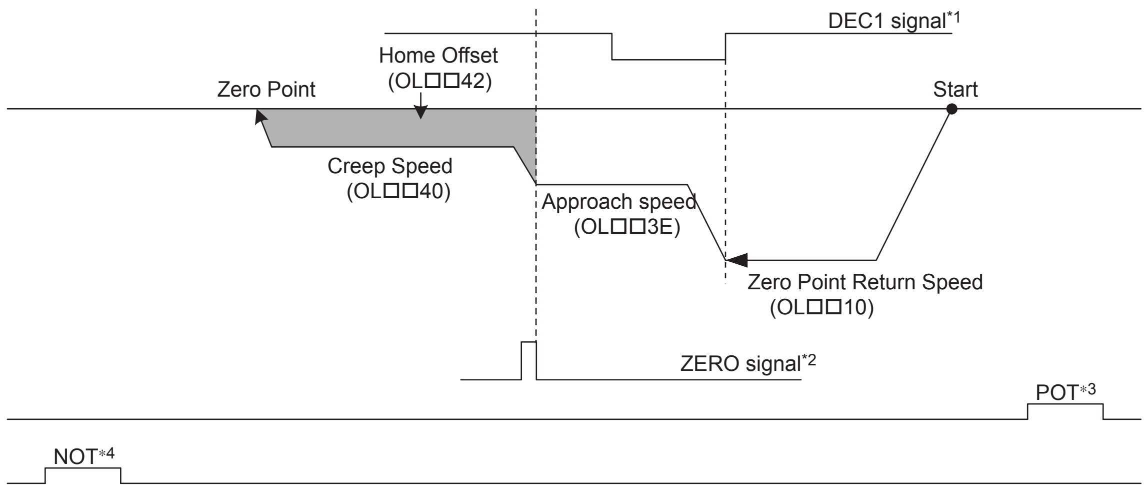


* 1. SVB-01: SERVOPACK EXT1 signal, SVA-01: DI_2 signal
* 2. The SERVOPACK P-OT signal.
* 3. The SERVOPACK N-OT signal.

Parameter	Name	Setting
OW□□3C	Home Return Type	1: ZERO Signal Method
OB□□093	Home Direction	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 Speed	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	Home Offset	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 Signal Method (OW□□3C = 2)

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, the speed is reduced to the creep speed and positioning is performed. When 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 Home Offset. If an OT signal is detected during the zero point return operation, an OT alarm will occur.



* 1. SVB-01: SERVOPACK DEC signal, SVA-01: DI_5 signal or OW□□05, bit 8 signal
* 2. SVB-01: SERVOPACK EXT1 signal, SVA-01: DI_2 signal
* 3. The SERVOPACK P-OT signal.
* 4. The SERVOPACK N-OT signal.

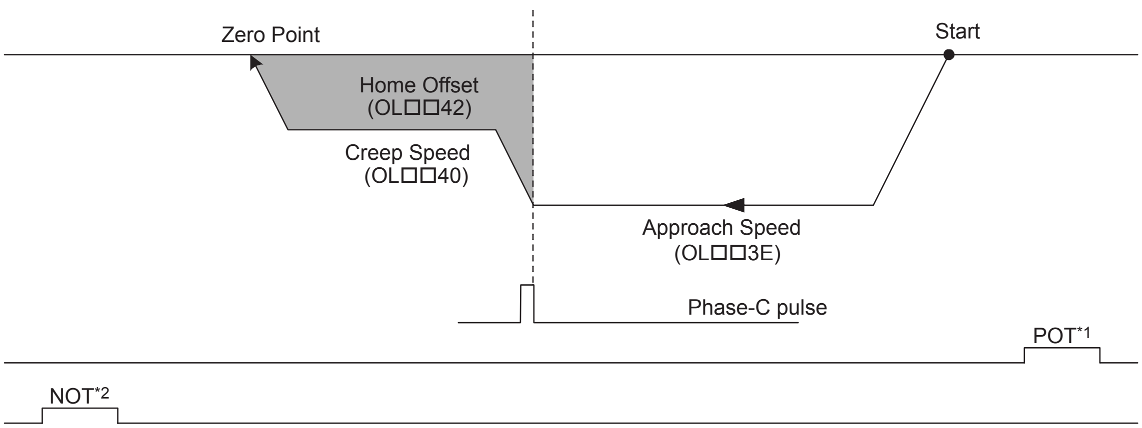
Parameter	Name	Setting
OW□□3C	Home Return Type	2: DEC1 + ZERO Signal Method
OB□□093	Home Direction	Set the zero point return direction.
OL□□10	Speed Reference	Set the speed to use when starting a zero point return. Only a positive value can be set; a negative value will result in an error.
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (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 Speed	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	Home Offset	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.
Fixed Parameter No. 1, Bit 5	Deceleration Limit Switch Inversion	Set whether or not to invert the polarity of the DI_5 signal, which is used for DEC1. (OW□□05, bit 8, will not reverse status.)
Fixed Parameter No. 21, Bit 0	Deceleration Limit Switch Signal	Set the signal to use for DEC1.

OB□□058	Deceleration LS Signal (DEC1) for Zero Point Return	When bit 0 of fixed parameter No. 21 is 0, input the DEC1 signal from the ladder program.

(Note) Reverse type in ▭: Parameters only for the SVA-01 Module.

[d] C-Phase Method (OW□□3C = 3)

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 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 Home Offset. 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.

Parameter	Name	Setting
OW□□3C	Home Return Type	3： C-Phase Method
OB□□093	Home Direction	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 Speed	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	Home Offset	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.

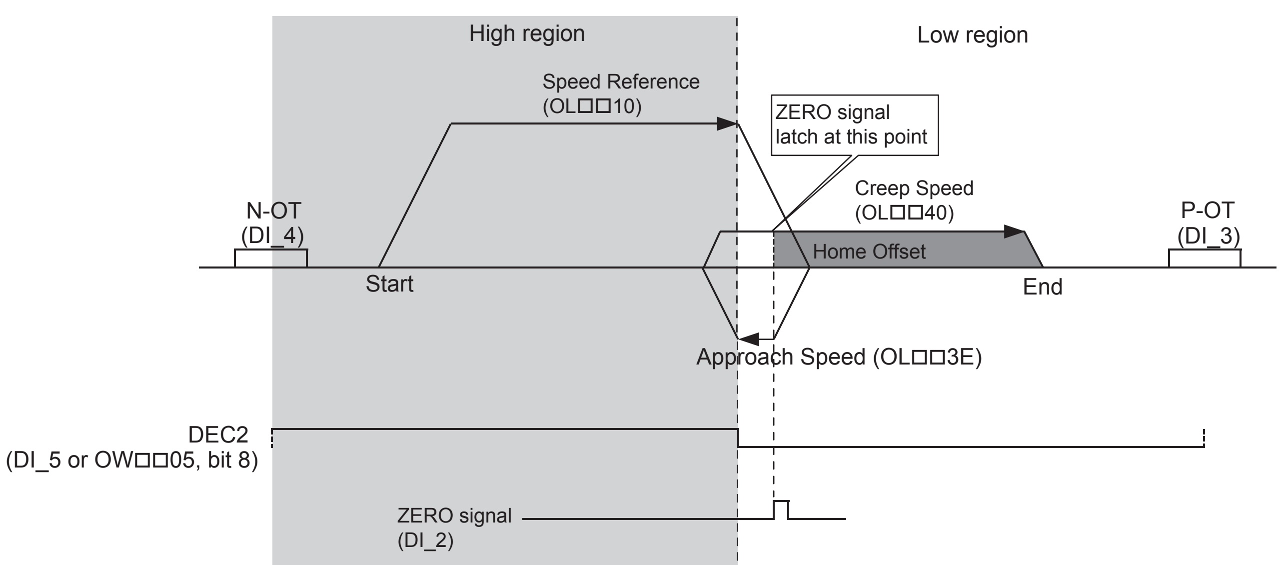
[e] DEC2 + ZERO Signal Method (OW□□3C = 4)

With this method, the machine's position is confirmed by the ON/OFF status of the DEC2 signal and the retracting operation is performed automatically, so the zero point return is always performed with the same conditions.

INFO This zero point return method can be used with the SVA-01 Module only.

■ Starting the Zero Point Return in the High Region

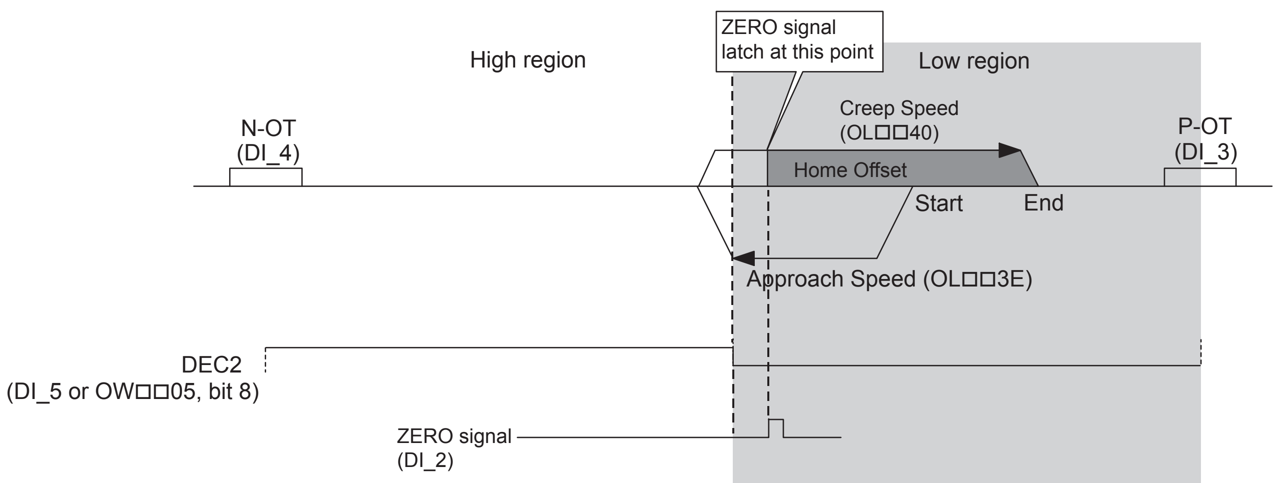
1. Travel is started in the forward direction at the speed specified by the Speed Reference (setting parameter OL□□10).
2. When the falling edge of the DEC2 signal is detected, the axis decelerates to a stop.
3. After decelerating to a stop, the axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).
4. When the rising edge of the DEC2 signal is detected, the axis decelerates to a stop.
5. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).
6. After the falling edge of the DEC2 signal is detected, the position is latched when the rising edge of the ZERO signal is detected.
7. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Starting the Zero Point Return in the Low Region

1. The axis travels in the reverse direction at the Approach Speed (setting parameter OL☐☐3E).
2. When the rising edge of the DEC2 signal is detected, the axis decelerates to a stop.
3. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL☐☐40).
4. After the falling edge of the DEC2 signal is detected, the position is latched when the rising edge of the ZERO signal is detected.
5. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL☐☐42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT

If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Related Parameters

Parameter	Name	Setting Contents
OW□□3C	Home Return Type	4: DEC2 + ZERO Signal Method
OL□□10	Speed Reference	Sets the speed to use when starting a zero point return. Only a positive value can be set. An error will occur if a negative value is set.
OL□□3E	Approach Speed	Sets the approach speed shown in the preceding diagrams. Only a positive value can be set. An error will occur if a negative value is set. An error will also occur if the speed is set to 0.
OL□□40	Creep Speed	Sets the creep speed shown in the preceding diagrams. Only a positive value can be set. An error will occur if a negative value is set. An error will also occur if the speed is set to 0.
OL□□42	Home Offset	Sets the home offset distance shown in the preceding diagrams. If the sign is positive, travel will be in the forward direction. If the sign is negative, travel will be in the reverse direction.
Fixed parameter 1, bit 5	Deceleration Limit Switch Inversion	It is possible to set whether or not to invert the polarity of the DI_5 signal, which is used for DEC2. (The status of OW□□05, bit 8 cannot be inverted.) 0: Do not invert. 1: Invert.
Fixed parameter 21, bit 0	Deceleration Limit Switch Signal	It is possible to select the signal to use for DEC2. 0: Use setting parameter OW□□05, bit 8. 1: Use the DI_5 signal.
OW□□05, bit 8	Deceleration Limit Switch Signal for Zero Point Return (DEC2)	When fixed parameter 21, bit 0 is set to 0, the DEC2 signal is input from the ladder program. 0: OFF 1: ON
OW□□03, bits 0 to 3	Speed Units	Sets the units for the Speed Reference (OL□□10), Approach Speed (OL□□3E), and Creep Speed (OL□□40). 0: Reference unit/s 1: 10^n reference unit/min. 2: 0.01% 3: 0.0001%
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). This setting can be changed during operation. This parameter has no effect on the Approach Speed (OL□□3E) or Creep Speed (OL□□40). Setting range: 0 to 32768 (0% to 327.67%) Setting units: 1 = 0.01% Example: Setting for 50% = 5000

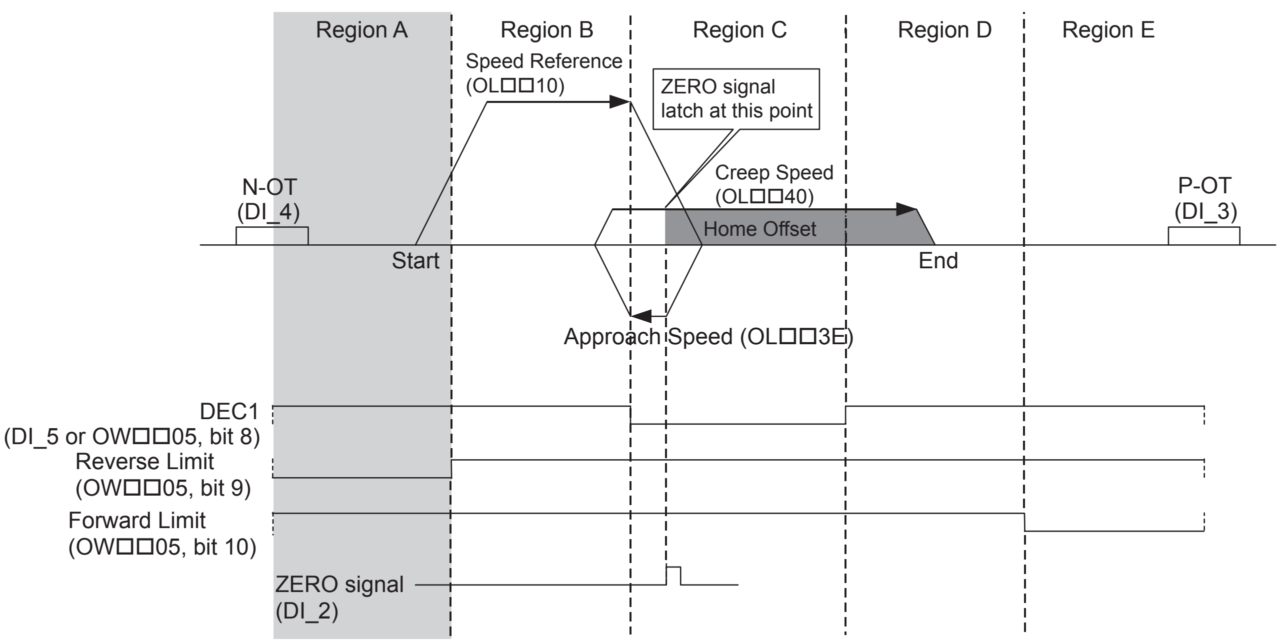
[f] DEC1 + LMT + ZERO Signal Method (OW☐☐3C = 5)

With this method, the machine's position is confirmed by the ON/OFF status of the DEC1, Reverse Limit, and Forward Limit signals and the retracting operation is performed automatically, so the zero point return is always performed with the same conditions.

INFO This zero point return method can be used with the SVA-01 Module only.

■ Starting the Zero Point Return in Region A

1. Travel is started in the positive direction at the speed specified by the Speed Reference (setting parameter OL☐☐10).
2. When the falling edge of the DEC1 signal is detected, the axis decelerates to a stop.
3. After decelerating to a stop, the axis travels in the reverse direction at the Approach Speed (setting parameter OL☐☐3E).
4. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.
5. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL☐☐40).
6. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the ZERO signal is detected.
7. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL☐☐42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT

1. If an OT signal is detected during the zero point return operation, an OT alarm will occur.
2. The command will end in an error at the start of the Zero Point Return operation if the status of the DEC1, Forward Limit, and Reverse Limit signals is not the same as the status shown in the diagram above.

■ Related Parameters

Parameter	Name	Setting Contents
OW□□3C	Home Return Type	5: DEC1 + LMT + ZERO Signal Method
OL□□10	Speed Reference	Sets the speed to use when starting a zero point return. Only a positive value can be set. An error will occur if a negative value is set.
OL□□3E	Approach Speed	Sets the approach speed shown in the preceding diagram. Only a positive value can be set. An error will occur if a negative value is set. An error will also occur if the speed is set to 0.
OL□□40	Creep Speed	Sets the creep speed shown in the preceding diagram. Only a positive value can be set. An error will occur if a negative value is set. An error will also occur if the speed is set to 0.
OL□□42	Home Offset	Sets the home offset distance shown in the preceding diagram. If the sign is positive, travel will be in the forward direction. If the sign is negative, travel will be in the reverse direction.
Fixed parameter 1, bit 5	Deceleration Limit Switch Inversion	It is possible to set whether or not to invert the polarity of the DI_5 signal, which is used for DEC1. (The status of OW□□05, bit 8 cannot be inverted.) 0: Do not invert. 1: Invert.
Fixed parameter 21, bit 0	Deceleration Limit Switch Signal	It is possible to select the signal to use for DEC1. 0: Use setting parameter OW□□05, bit 8. 1: Use the DI_5 signal.
OW□□05, bit 8	Deceleration Limit Switch Signal for Zero Point Return (DEC1)	When fixed parameter 21, bit 0 is set to 0, the DEC1 signal is input from the ladder program. 0: OFF 1: ON
OW□□03, bits 0 to 3	Speed Units	Sets the units for the Speed Reference (OL□□10), Approach Speed (OL□□3E), and Creep Speed (OL□□40). 0: Reference unit/s 1: 10^n reference unit/min. 2: 0.01% 3: 0.0001%
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). This setting can be changed during operation. This parameter has no effect on the Approach Speed (OL□□3E) or Creep Speed (OL□□40). Setting range: 0 to 32768 (0% to 327.67%) Setting units: 1 = 0.01% Example: Setting for 50% = 5000

■ Starting the Zero Point Return in Region B

1. The axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).

2. When the falling edge of the Reverse Limit signal is detected, the axis decelerates to a stop.

3. After decelerating to a stop, travel starts in the forward direction at the speed specified by the Speed Reference (setting parameter OL□□10).

4. When the falling edge of the DEC1 signal is detected, the axis decelerates to a stop.

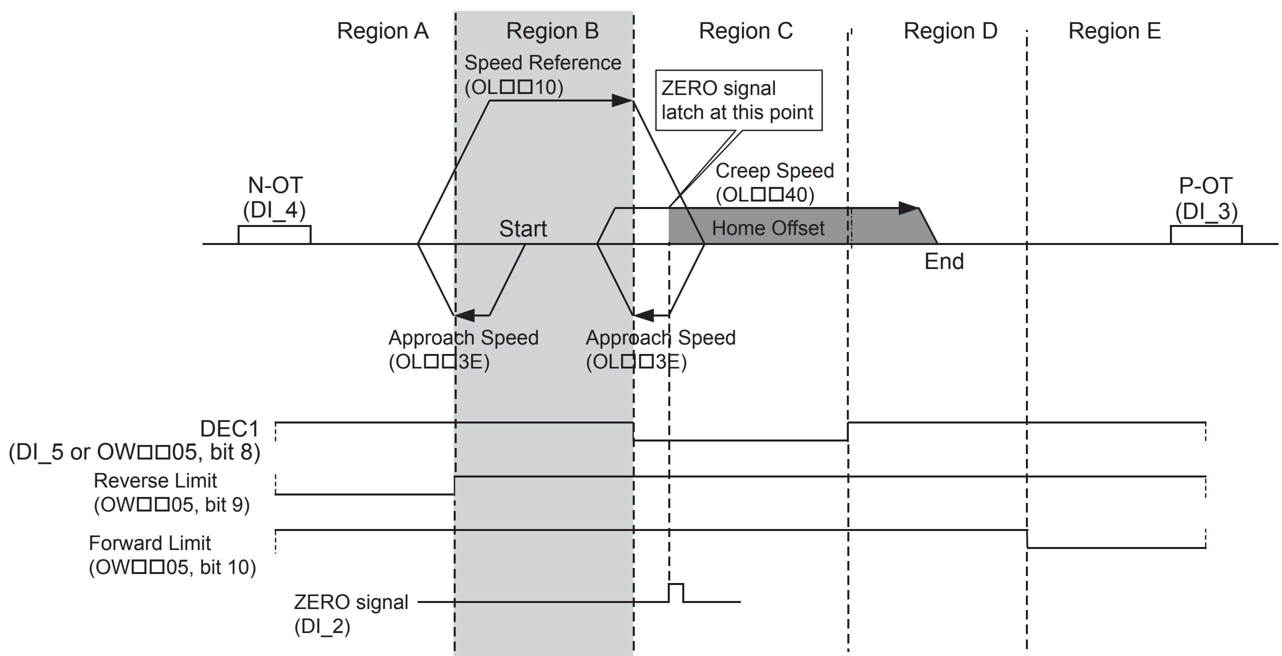
5. After decelerating to a stop, the axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).

6. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.

7. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).

8. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the ZERO signal is detected.

9. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT

If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Starting the Zero Point Return in Region C

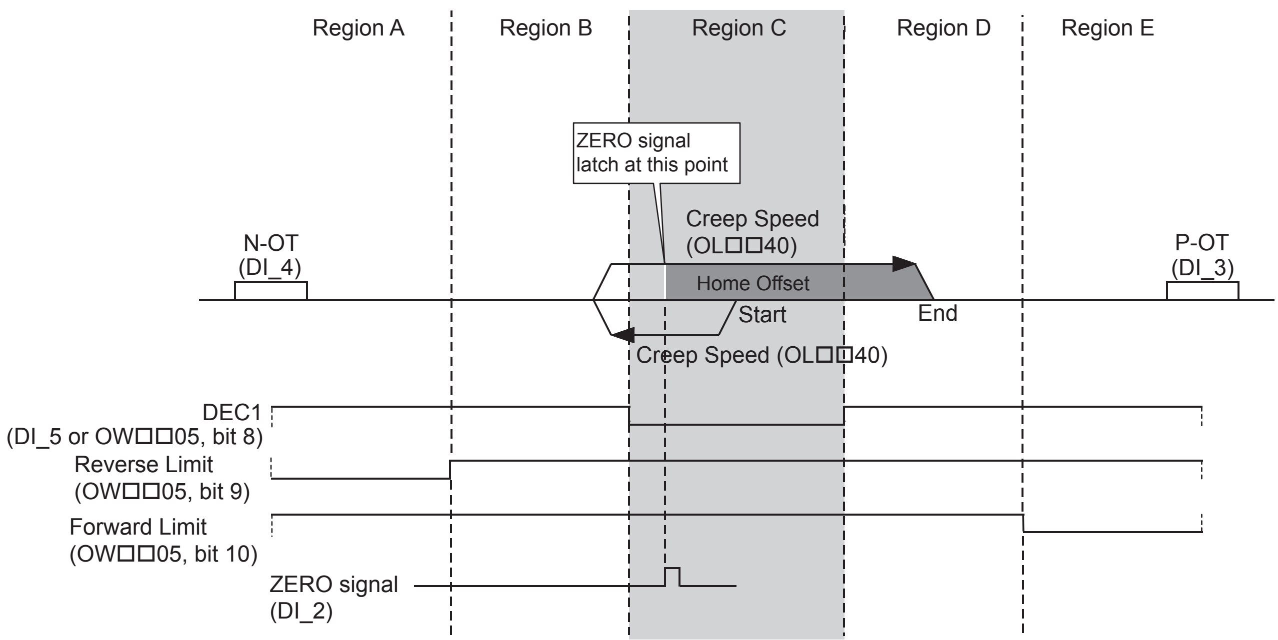
1. The axis travels in the reverse direction at the Creep Speed (setting parameter OL□□40).

2. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.

3. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).

4. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the ZERO signal is detected.

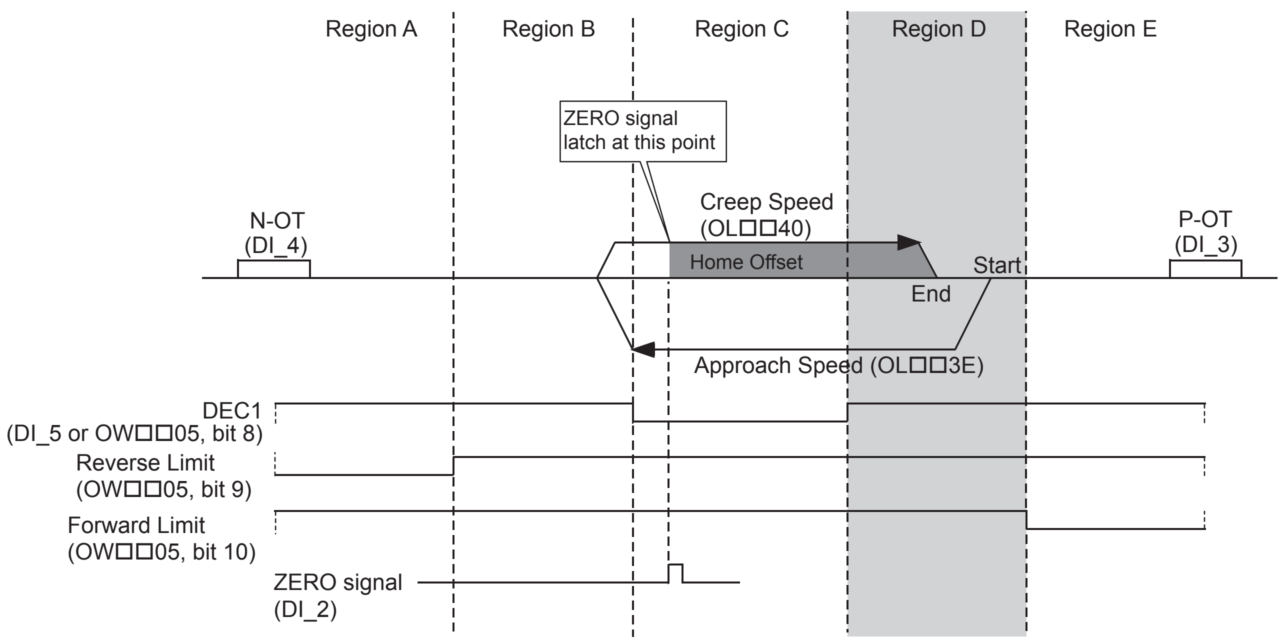
5. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT	If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Starting the Zero Point Return in Region D

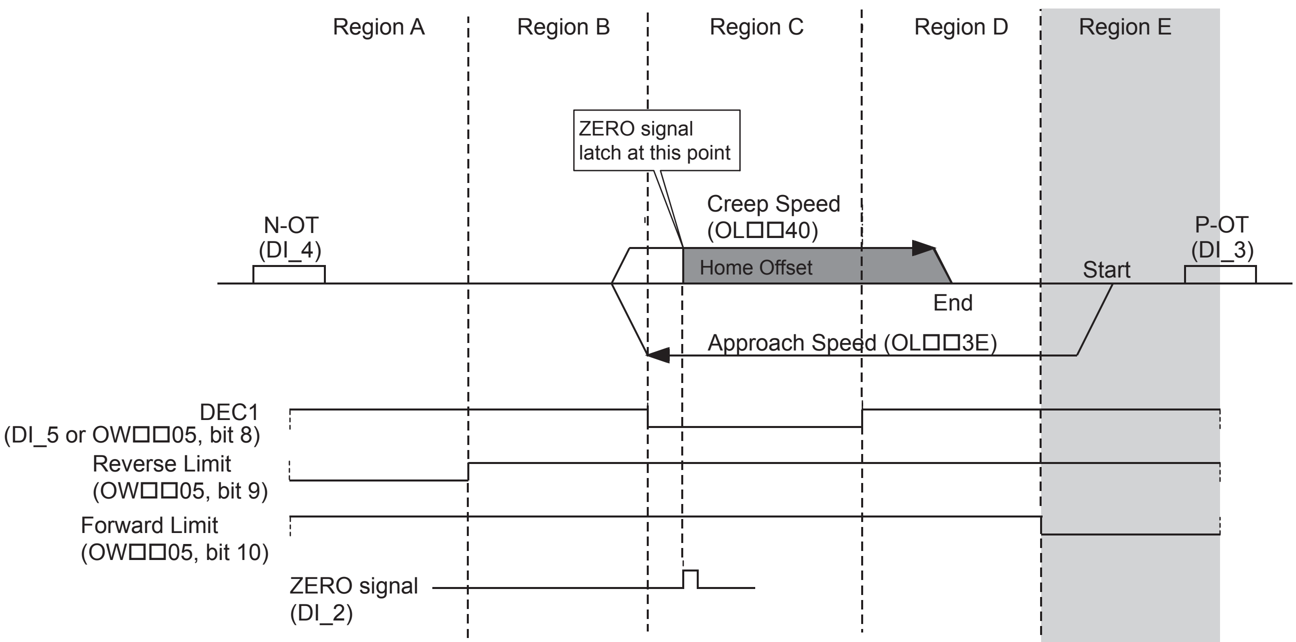
1. The axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).
2. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.
3. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).
4. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the ZERO signal is detected.
5. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT	If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Starting the Zero Point Return in Region E

1. The axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).
2. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.
3. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).
4. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the ZERO signal is detected.
5. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT	If an OT signal is detected during the zero point return operation, an OT alarm will occur.

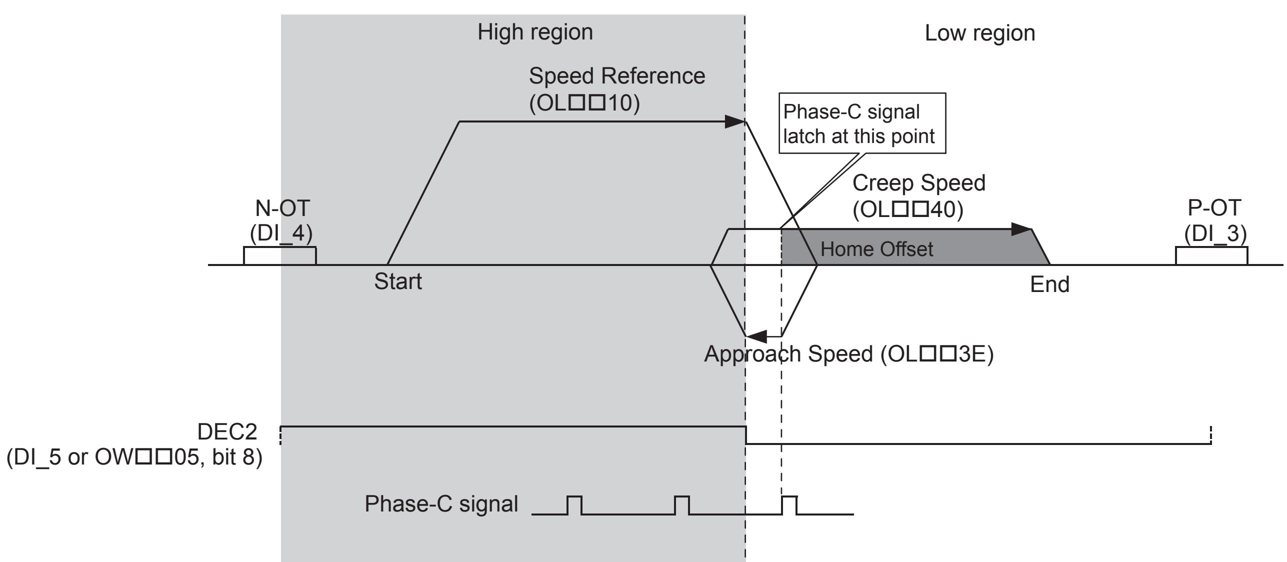
[g] DEC2 + Phase-C Pulse Method (OW□□3C = 6)

With this method, the machine's position is confirmed by the ON/OFF status of the DEC2 signal and the retracting operation is performed automatically, so the zero point return is always performed with the same conditions.

INFO This zero point return method can be used with the SVA-01 Module only.

■ Starting the Zero Point Return in the High Region

1. Travel is started in the positive direction at the speed specified by the Speed Reference (setting parameter OL□□10).
2. When the falling edge of the DEC2 signal is detected, the axis decelerates to a stop.
3. After decelerating to a stop, the axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).
4. When the rising edge of the DEC2 signal is detected, the axis decelerates to a stop.
5. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).
6. After the falling edge of the DEC2 signal is detected, the position is latched when the rising edge of the first phase-C pulse is detected.
7. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Starting the Zero Point Return in the Low Region

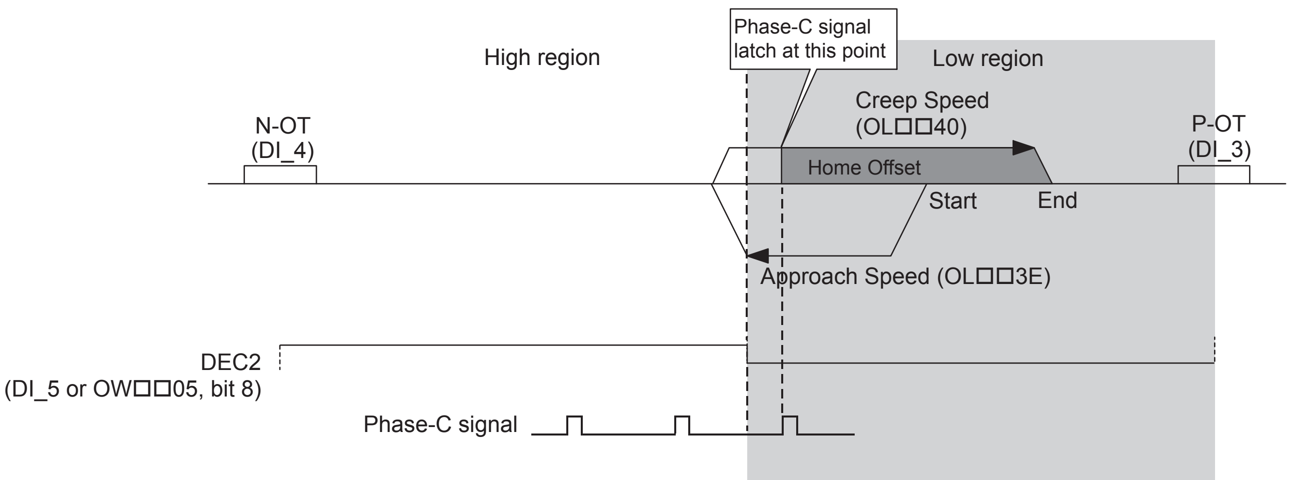
1. The axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).

2. When the rising edge of the DEC2 signal is detected, the axis decelerates to a stop.

3. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).

4. After the falling edge of the DEC2 signal is detected, the position is latched when the rising edge of the first phase-C pulse is detected.

5. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT

If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Related Parameters

Parameter	Name	Setting Contents
OW□□3C	Home Return Type	6: DEC2 + Phase-C Pulse Method
OL□□10	Speed Reference	Sets the speed to use when starting a zero point return. Only a positive value can be set. An error will occur if a negative value is set.
OL□□3E	Approach Speed	Sets the approach speed shown in the preceding diagram. Only a positive value can be set. An error will occur if a negative value is set.
OL□□40	Creep Speed	Sets the creep speed shown in the preceding diagram. Only a positive value can be set. An error will occur if a negative value is set.
OL□□42	Home Offset	Sets the home offset distance shown in the preceding diagram. If the sign is positive, travel will be in the same direction as the zero point return direction. if the sign is negative, travel will be in the direction opposite of the zero point return direction.
Fixed parameter 21, bit 0	Deceleration Limit Switch Signal	It is possible to select the signal to use for DEC2. 0: Use setting parameter OW□□05, bit 8. 1: Use the DI_5 signal.
Fixed parameter 1, bit 5	Deceleration Limit Switch Inversion	It is possible to set whether or not to invert the polarity of the DI_5 signal, which is used for DEC2. (The status of OW□□05, bit 8 cannot be inverted.) 0: Do not invert. 1: Invert.
OW□□05, bit 8	Deceleration Limit Switch Signal for Zero Point Return (DEC2)	When fixed parameter 21, bit 0 is set to 0, the DEC2 signal is input from the ladder program. 0: OFF 1: ON
OW□□03, bits 0 to 3	Speed Units	Sets the units for the Speed Reference (OL□□10), Approach Speed (OL□□3E), and Creep Speed (OL□□40). 0: Reference unit/s 1: 10^n reference unit/min. 2: 0.01% 3: 0.0001%
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). This setting can be changed during operation. This parameter has no effect on the Approach Speed (OL□□3E) or Creep Speed (OL□□40). Setting range: 0 to 32768 (0% to 327.67%) Setting units: 1 = 0.01% Example: Setting for 50% = 5000

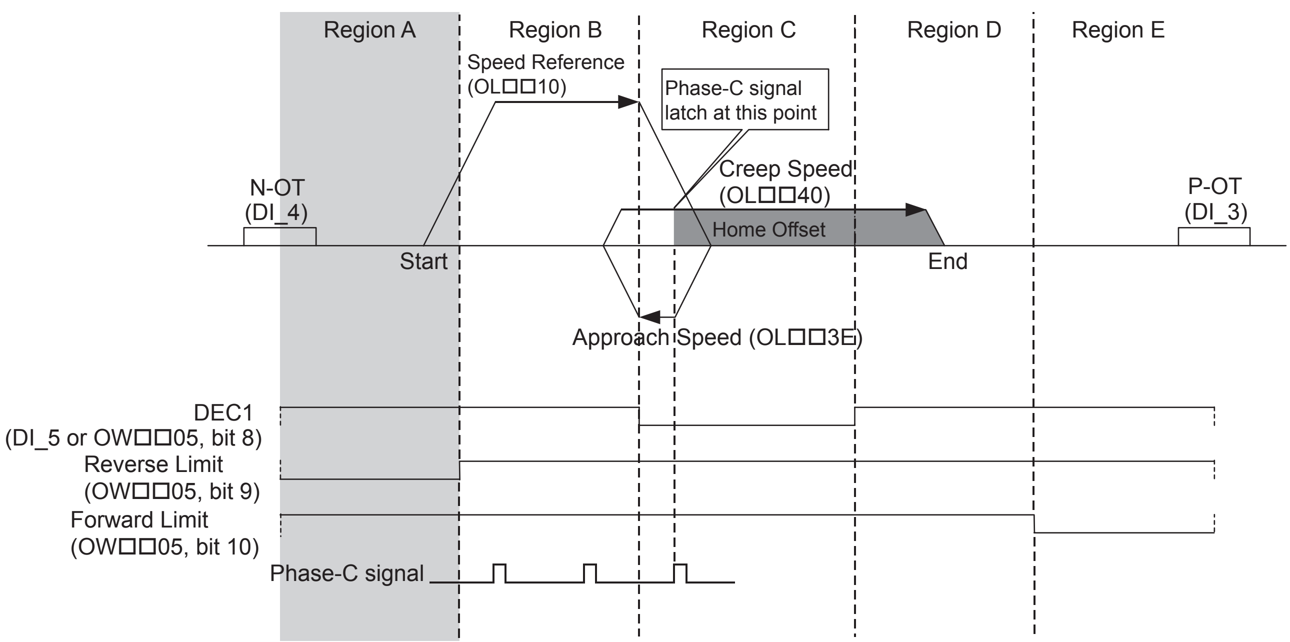
[h] DEC1 + LMT + Phase-C Pulse Method (OW□□3C = 7)

With this method, the machine's position is confirmed by the ON/OFF status of the DEC1, Reverse Limit, and Forward Limit signals and the retracting operation is performed automatically, so the zero point return is always performed with the same conditions.

INFO This zero point return method can be used with the SVA-01 Module only.

■ Starting the Zero Point Return in Region A

1. Travel is started in the positive direction at the speed specified by the Speed Reference (setting parameter OL□□10).
2. When the falling edge of the DEC1 signal is detected, the axis decelerates to a stop.
3. After decelerating to a stop, the axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).
4. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.
5. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).
6. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the first phase-C pulse is detected.
7. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



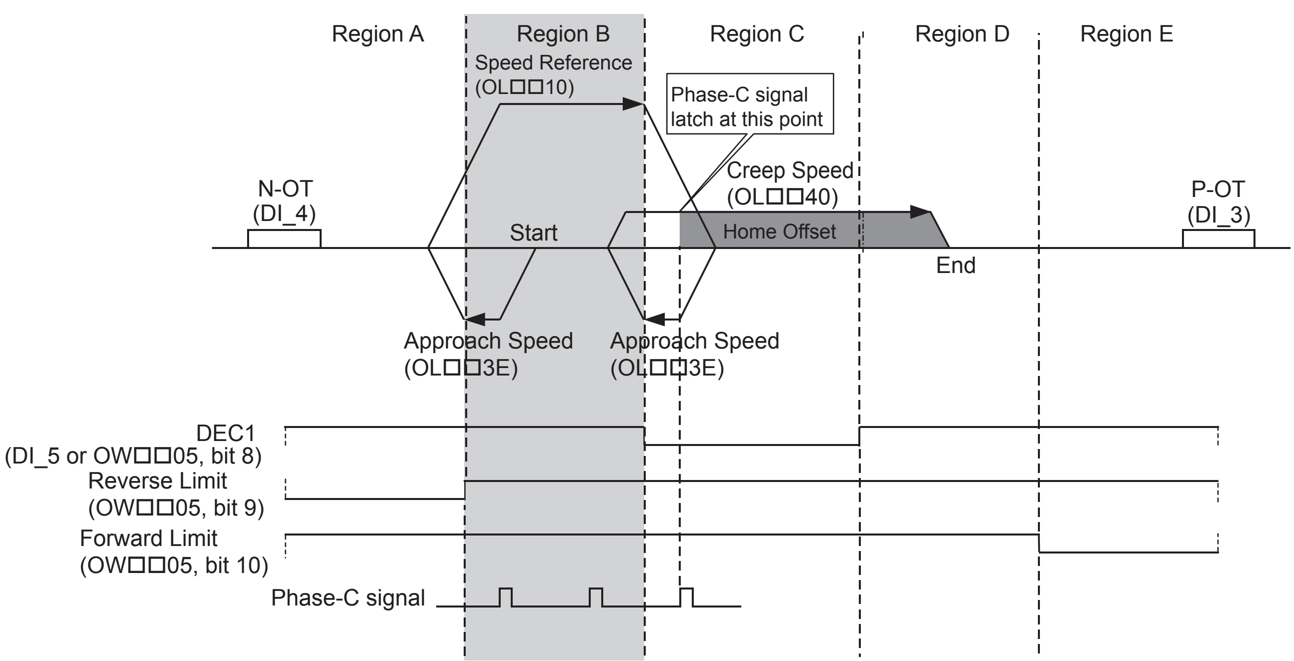
IMPORTANT If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Related Parameters

Parameter	Name	Setting Contents
OW☐☐3C	Home Return Type	7: DEC1 + LMT + Phase-C Pulse Method
OL☐☐10	Speed Reference	Sets the speed to use when starting a zero point return. Only a positive value can be set. An error will occur if a negative value is set.
OL☐☐3E	Approach Speed	Sets the approach speed shown in the preceding diagram. Only a positive value can be set. An error will occur if a negative value is set.
OL☐☐40	Creep Speed	Sets the creep speed shown in the preceding diagram. Only a positive value can be set. An error will occur if a negative value is set.
OL☐☐42	Home Offset	Sets the home offset distance shown in the preceding diagram. If the sign is positive, travel will be in the same direction as the zero point return direction. if the sign is negative, travel will be in the direction opposite of the zero point return direction.
Fixed parameter 1, bit 5	Deceleration Limit Switch Inversion	It is possible to set whether or not to invert the polarity of the DI_5 signal, which is used for DEC1. (The status of OW☐☐05, bit 8 cannot be inverted.) 0: Do not invert. 1: Invert.
Fixed parameter 21, bit 0	Deceleration Limit Switch Signal	It is possible to select the signal to use for DEC1. 0: Use setting parameter OW☐☐05, bit 8. 1: Use the DI_5 signal.
OW☐☐05, bit 8	Deceleration Limit Switch Signal for Zero Point Return (DEC1)	When fixed parameter 21, bit 0 is set to 0, the DEC1 signal is input from the ladder program. 0: OFF 1: ON
OW☐☐03, bits 0 to 3	Speed Units	Sets the units for the Speed Reference (OL☐☐10), Approach Speed (OL☐☐3E), and Creep Speed (OL☐☐40). 0: Reference unit/s 1: 10^n reference unit/min. 2: 0.01% 3: 0.0001%
OL☐☐18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL☐☐10). This setting can be changed during operation. This parameter has no effect on the Approach Speed (OL☐☐3E) or Creep Speed (OL☐☐40). Setting range: 0 to 32768 (0% to 327.67%) Setting units: 1 = 0.01% Example: Setting for 50% = 5000

■ Starting the Zero Point Return in Region B

1. The axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).
2. When the falling edge of the Reverse Limit signal is detected, the axis decelerates to a stop.
3. After decelerating to a stop, travel starts in the forward direction at the speed specified by the Speed Reference (setting parameter OL□□10).
4. When the falling edge of the DEC1 signal is detected, the axis decelerates to a stop.
5. After decelerating to a stop, the axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).
6. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.
7. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).
8. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the first phase-C pulse is detected.
9. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT	If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Starting the Zero Point Return in Region C

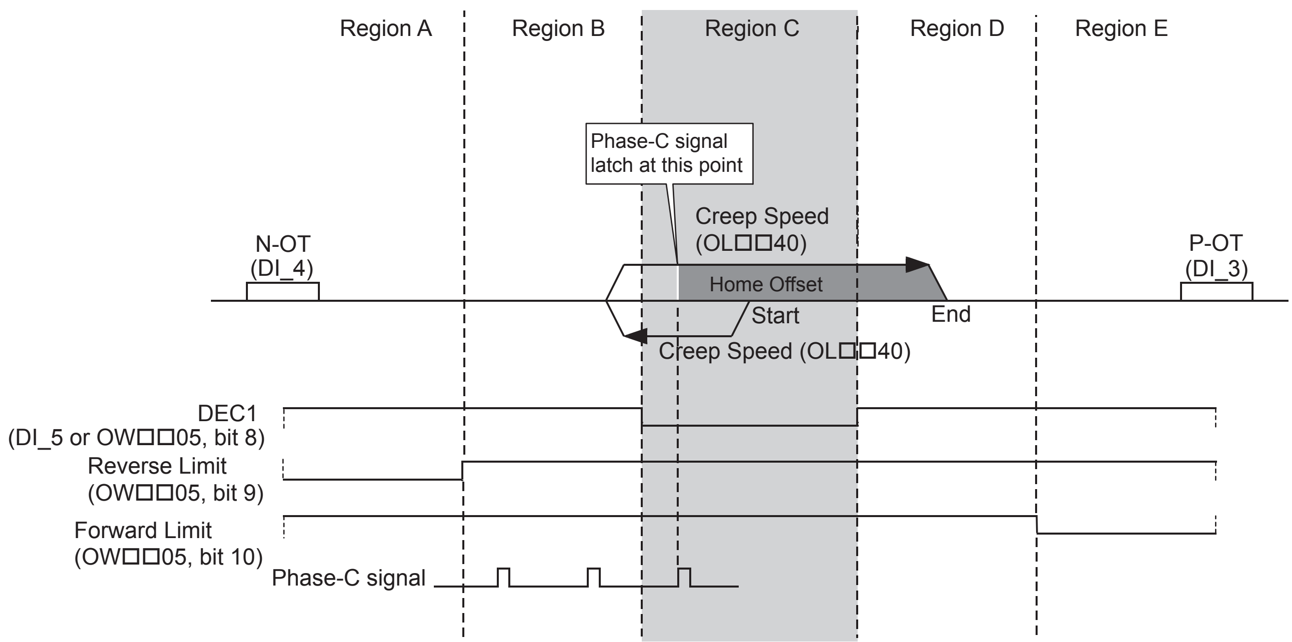
1. The axis travels in the reverse direction at the Creep Speed (setting parameter OL□□40).

2. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.

3. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).

4. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the first phase-C pulse is detected.

5. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT	If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Starting the Zero Point Return in Region D

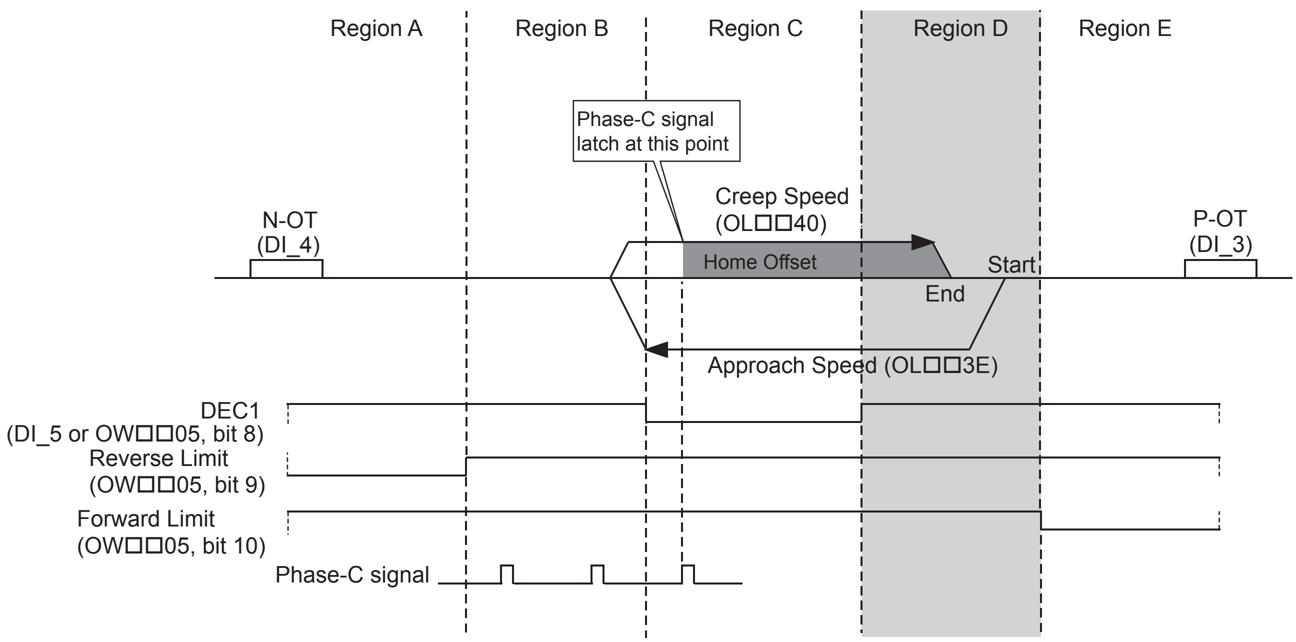
1. The axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).

2. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.

3. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).

4. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the first phase-C pulse is detected.

5. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.



IMPORTANT	If an OT signal is detected during the zero point return operation, an OT alarm will occur.

■ Starting the Zero Point Return in Region E

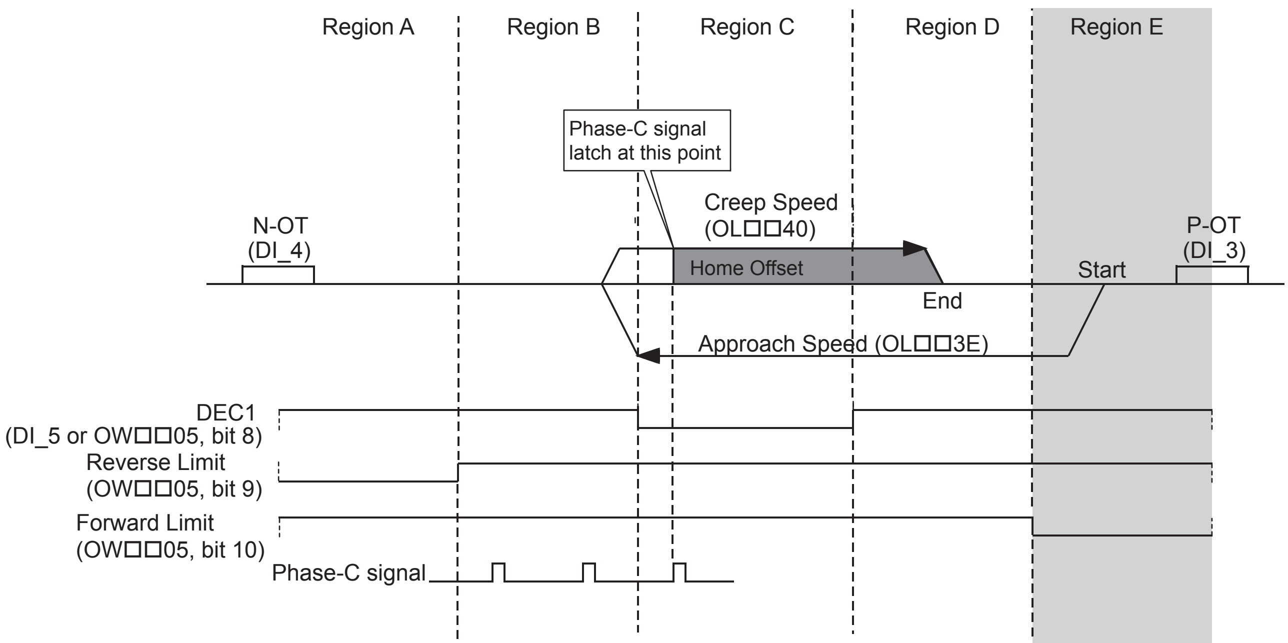
1. The axis travels in the reverse direction at the Approach Speed (setting parameter OL□□3E).

2. When the rising edge of the DEC1 signal is detected, the axis decelerates to a stop.

3. After decelerating to a stop, the axis travels in the forward direction at the Creep Speed (setting parameter OL□□40).

4. After the falling edge of the DEC1 signal is detected, the position is latched when the rising edge of the first phase-C pulse is detected.

5. The axis moves from the latched position by the distance set in the Home Offset (setting parameter OL□□42) and stops. The machine coordinate system is established with this final position as the zero point.

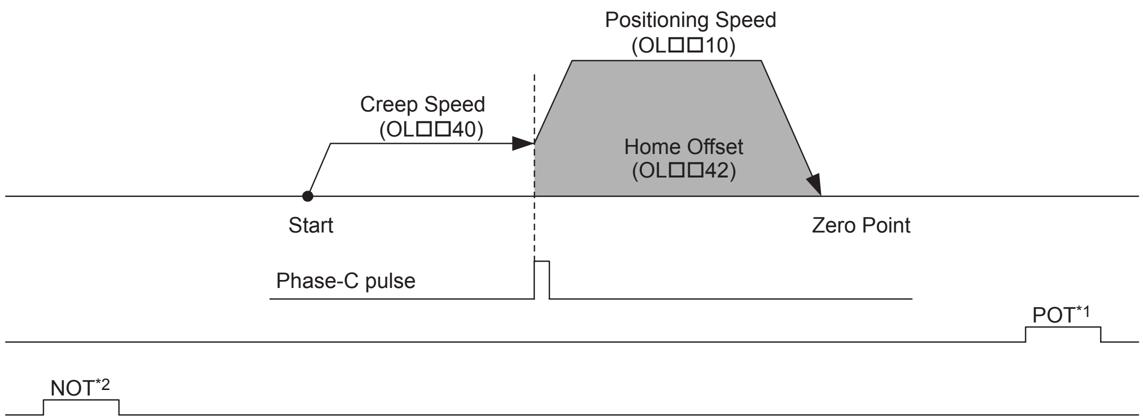


IMPORTANT	If an OT signal is detected during the zero point return operation, an OT alarm will occur.

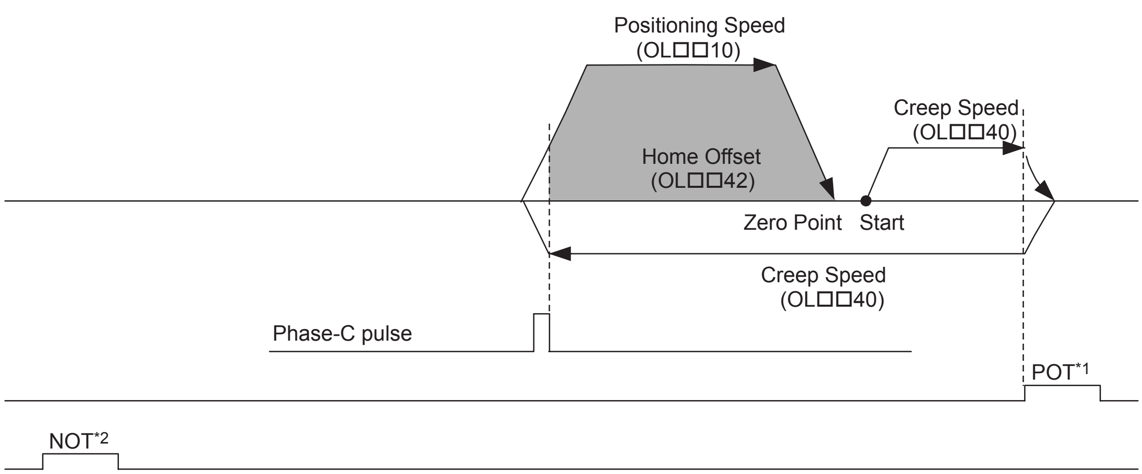
[i] New Phase-C Pulse Method (OW□□3C = 11)

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 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 Home Offset. 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.

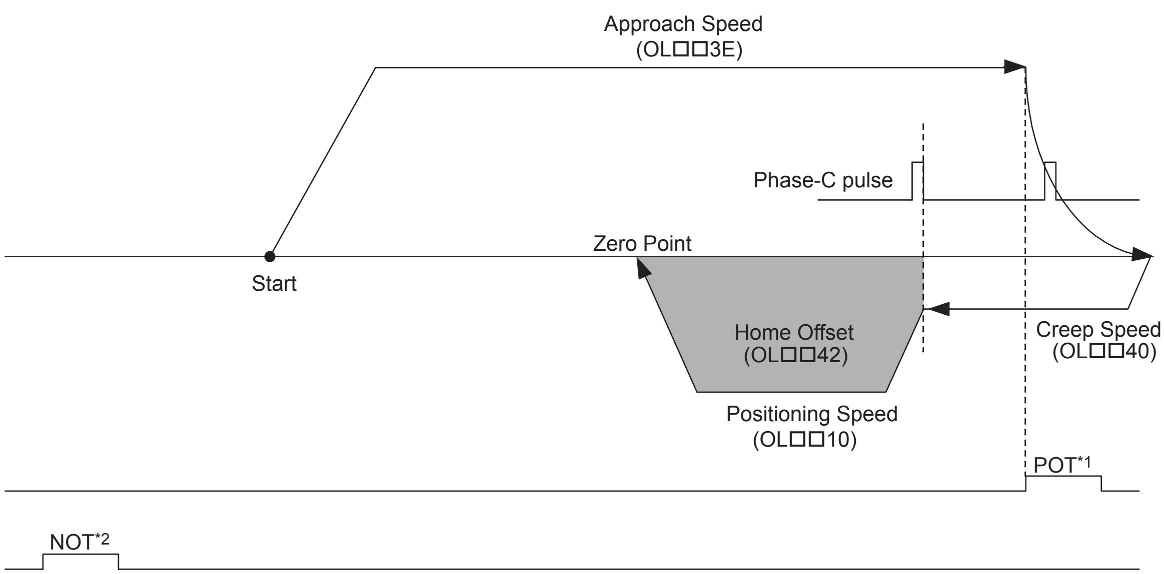
(Note) The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

Parameter	Name	Setting
OW□□3C	Home Return Type	11: C Pulse Only Method
OL□□10	Speed Reference	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□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
OL□□40	Creep Speed	Set the speed to use when starting a zero point return. The travel direction will depend on the sign of the creep speed.
OL□□42	Home Offset	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.

(Note) Reverse type in [ ]: Parameters only for the SVA-01 Module.

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

Travel is started at the approach speed in the positive direction until the stroke limit is reached. When the POT 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 POT signal, positioning is performed. When 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 Home Offset. 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.

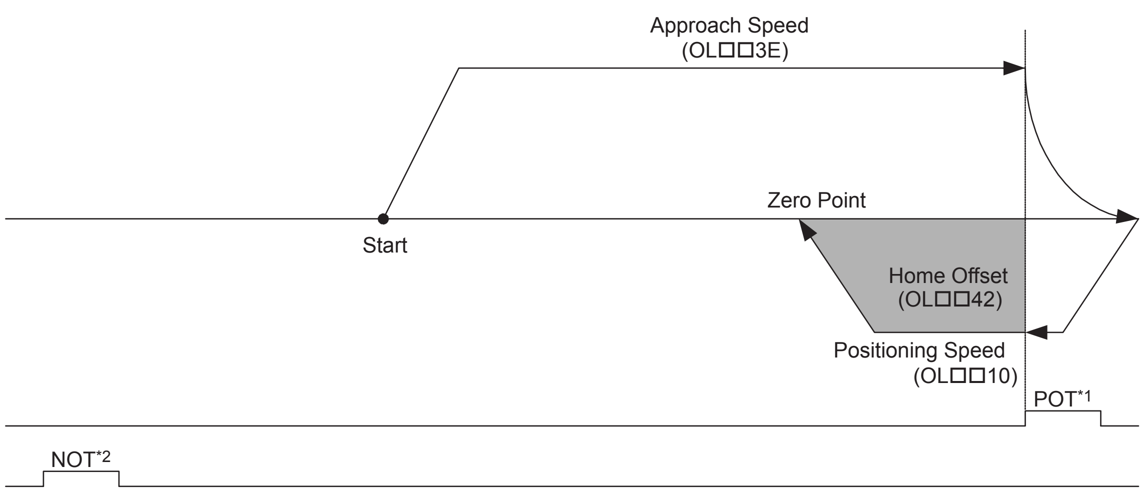
(Note) The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

Parameter	Name	Setting
OW□□3C	Home Return Type	12：POT & C pulse Method
OL□□10	Speed Reference	Set the zero point return speed 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□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
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 Speed	Set the speed to reverse at after detecting the POT signal. The sign is ignored. The travel direction will be negative.
OL□□42	Home Offset	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.

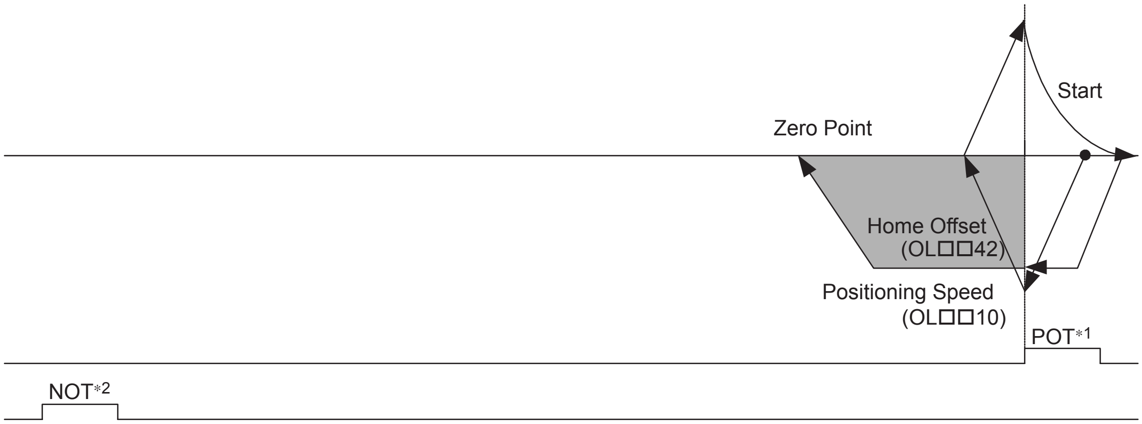
（Note） Reverse type in ▒: Parameters only for the SVA-01 Module.

[k] POT Signal Method (OW□□3C = 13)

Travel is started at the approach speed in the positive direction until the stroke limit is reached. When the POT signal is detected, the direction is reversed to return at Positioning speed. When a change in the POT signal status from ON to OFF is detected, positioning is performed. When positioning has been completed, a machine coordinate system is established with the final position as the zero point. The moving amount after the POT signal changed is detected is set in the Home Offset. 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 vary with 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 Overtravel Limit (POT)



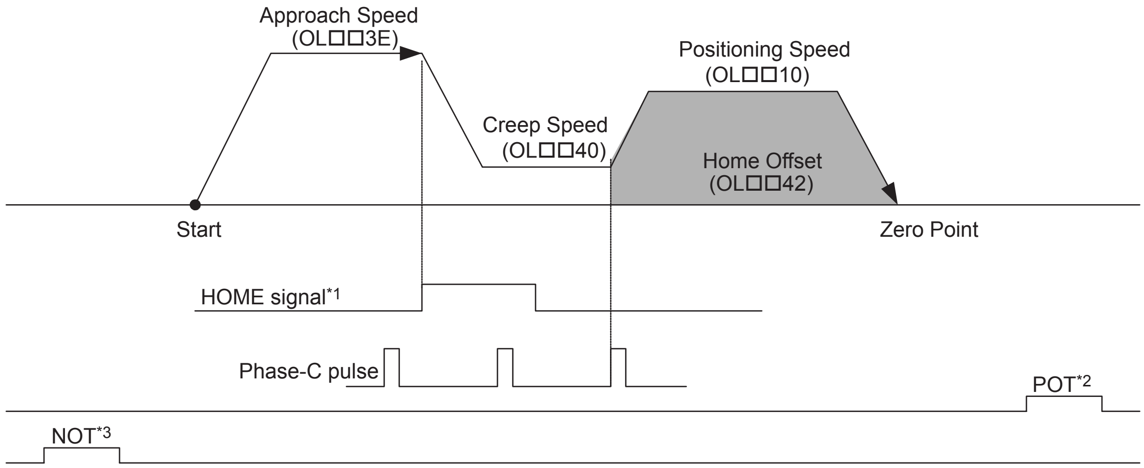
* 1. The SERVOPACK P-OT signal.
* 2. The SERVOPACK N-OT signal.
(Note) The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

Parameter	Name	Setting
OW□□3C	Home Return Type	13: POT Only Method
OL□□10	Speed Reference	Set the positioning speed to use after detecting the POT signal change. The sign is ignored. The travel direction will depend on the sign of the Home Offset.
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
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	Home Offset	Set the travel distance from the point where the POT signal change is detected. The travel direction will depend on the sign.

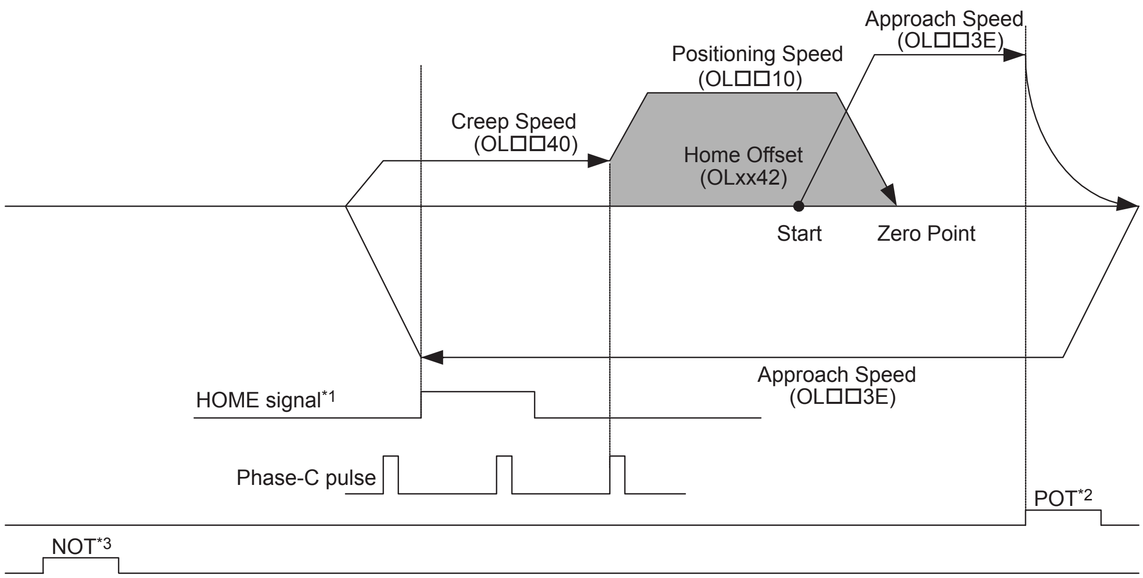
(Note) Reverse type in [ ]: Parameters only for the SVA-01 Module.

[l] Home LS & Phase-C Pulse Method (OW□□3C = 14)

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, positioning is performed at positioning speed. When 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 Home Offset. 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 alarm will occur.



Detecting the OT Signal during Approach Speed Movement



* 1. SVB-01: SERVOPACK EXT1 signal, SVA-01: DI_2 signal
* 2. The SERVOPACK P-OT signal.
* 3. The SERVOPACK N-OT signal.

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

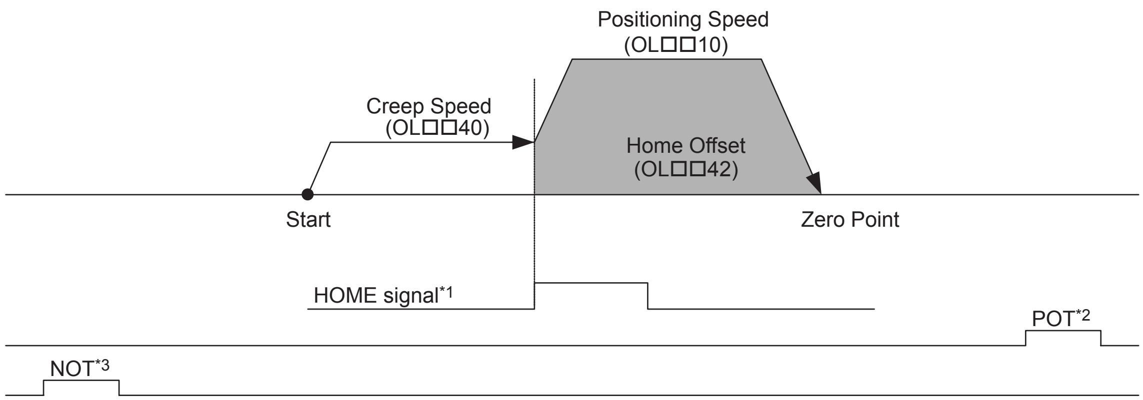
Parameter	Name	Setting
OW□□3C	Home Return Type	14： Home LS & C pulse Method
OL□□10	Speed Reference	Set the positioning speed to use after detecting the phase-C pulse. The sign is ignored. The travel direction depends on the sign of the Home Offset.
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
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 Speed	Set the speed to use after detecting the home signal. The travel direction will depend on the sign of the creep speed.
OL□□42	Home Offset	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.

Fixed Parameter No. 1, Bit 5	Deceleration Limit Switch Inversion	Set whether or not to invert the polarity of the DI_5 signal, which is used for HOME. (OW□□05, bit 8, will not reverse status.)

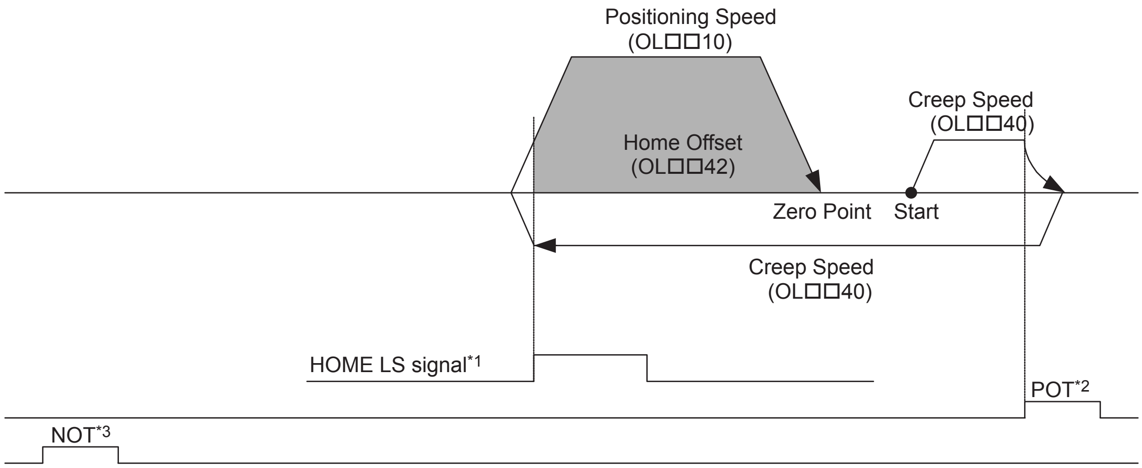
（Note） Reverse type in ▭ : Parameters only for the SVA-01 Module.

[m] Home LS Signal Method (OW□□3C = 15)

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 positioning has been completed, a machine coordinate system is established with the final position as the zero point.
The moving amount after the home signal is detected is set in the Home Offset. 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 home signal. If an OT signal is detected during positioning speed operation, an OT alarm will occur.



Detecting the OT Signal during Creep Speed Movement



* 1. SVB-01: SERVOPACK EXT1 signal, SVA-01: DI_2 signal
* 2. The SERVOPACK P-OT signal.
* 3. The SERVOPACK N-OT signal.

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

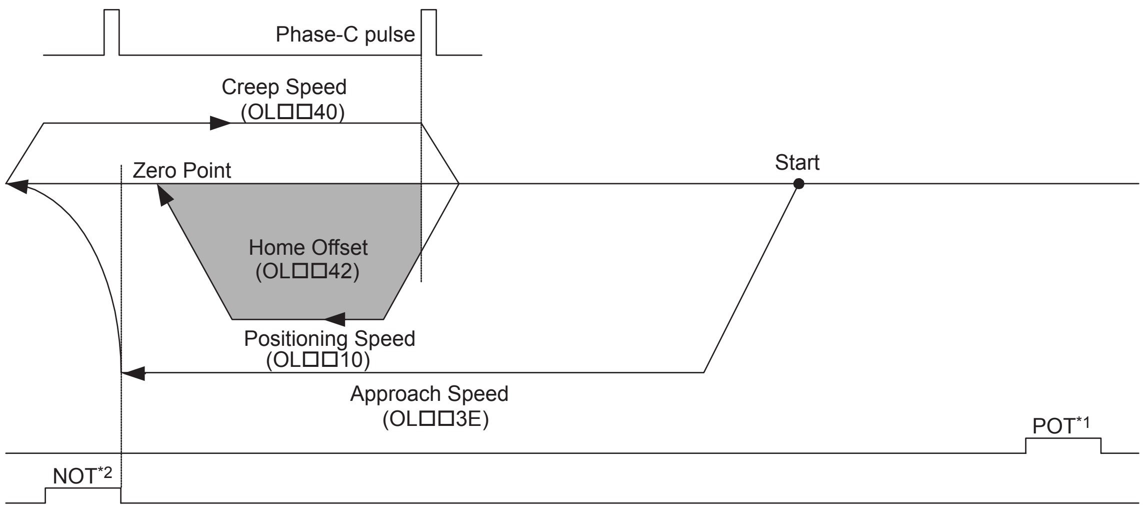
Parameter	Name	Setting
OW□□3C	Home Return Type	15: Home Only Method
OL□□10	Speed Reference	Set the positioning speed to use after detecting the home signal. The sign is ignored. The travel direction will depend on the sign of the Home Offset.
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
OL□□40	Creep Speed	Set the speed to use when starting a zero point return. The travel direction will depend on the sign of the creep speed.
OL□□42	Home Offset	Set the travel distance from the point where the home signal is detected. The travel direction will depend on the sign.
Fixed Parameter No. 1, Bit 5	Deceleration Limit Switch Inversion	Set whether or not to invert the polarity of the DI_5 signal, which is used for HOME. (OW□□05, bit 8, will not reverse status.)

（Note） Reverse type in [ ]: Parameters only for the SVA-01 Module.

[n] NOT & Phase-C Pulse Method (OW□□3C = 16)

Travel is started at the approach speed in the negative direction until the stroke limit is reached. When the NOT 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 NOT signal, positioning is performed. When 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 Home Offset. 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.

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

Parameter	Name	Setting
OW□□3C	Home Return Type	16: NOT & C pulse Method
OL□□10	Speed Reference	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□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
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 Speed	Set the speed to use after detecting the NOT signal. The travel direction will be positive.
OL□□42	Home Offset	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.

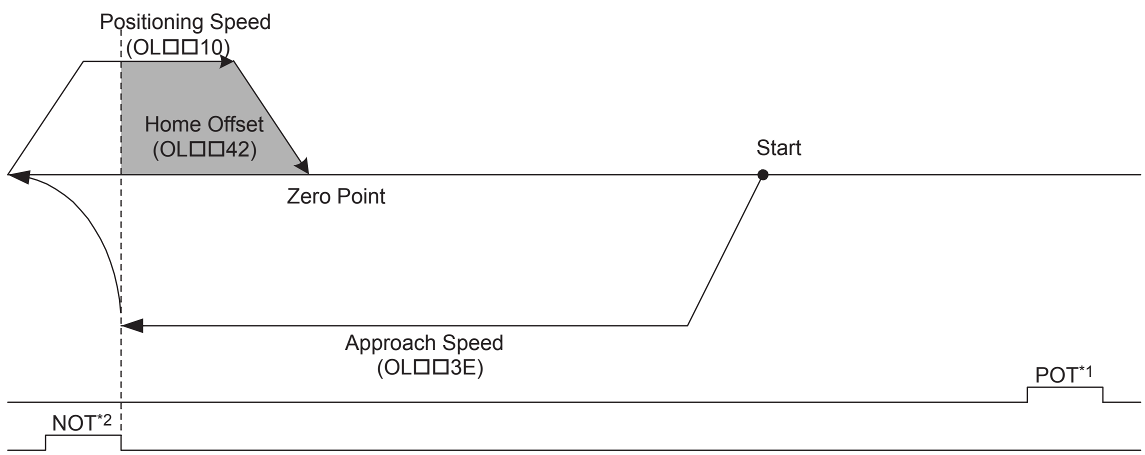
(Note) Reverse type in ▭: Parameters only for the SVA-01 Module.

[o] NOT Signal Method (OW□□3C = 17)

Travel is started at the approach speed in the negative direction until the stroke limit is reached. When the NOT signal is detected, the direction is reversed to return at Positioning speed. When a change in the NOT signal status from ON to OFF is detected, positioning is performed. When positioning has been completed, a machine coordinate system is established with the final position as the zero point.

The moving amount after the NOT signal changed is detected is set in the Home Offset. 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 NOT signal status is performed using software processing. The position where positioning is completed will vary with 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.

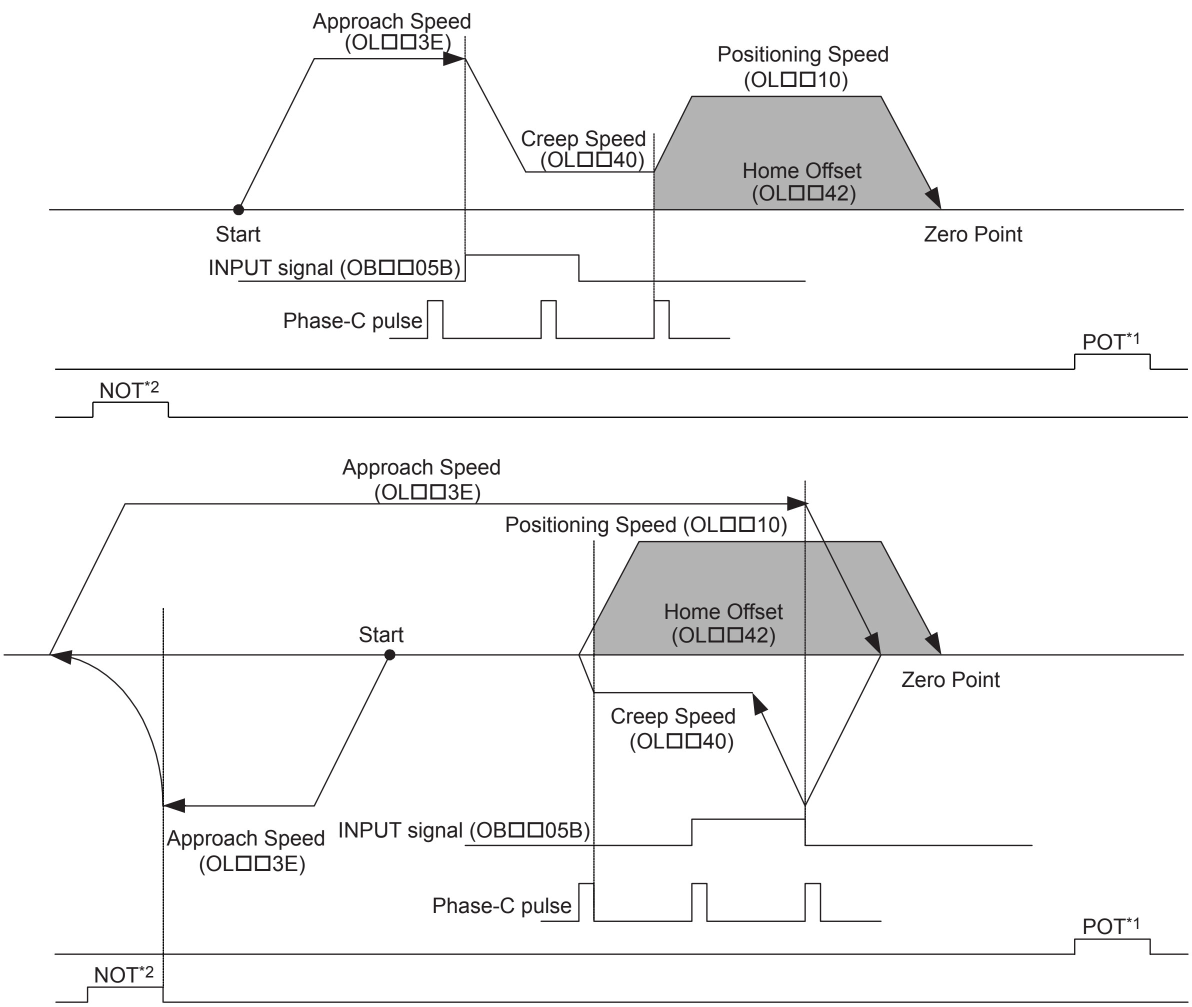
（Note）The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

Parameter	Name	Setting
OW□□3C	Home Return Type	17: NOT Only Method
OL□□10	Speed Reference	Set the positioning speed to use after detecting the NOT signal change. The sign is ignored. The travel direction will depend on the sign of the Home Offset.
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
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	Home Offset	Set the travel distance from the point where the NOT signal change is detected. The travel direction will depend on the sign.

（Note） Reverse type in ▭: Parameters only for the SVA-01 Module.

[p] INPUT & Phase-C Pulse Method (OW□□3C = 18)

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 creep speed. When the first phase-C pulse is detected after the falling edge of the INPUT signal, positioning is performed at positioning speed. When 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 Home Offset. The positioning speed is set in the Speed Reference. 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 INPUT signal. If an OT signal is detected during positioning speed operation, an OT alarm will occur.



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

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

Parameter	Name	Setting
OW□□3C	Home Return Type	18：INPUT & C pulse Method
OL□□10	Speed Reference	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□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
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 Speed	Set the speed to use after detecting the INPUT signal. The travel direction will depend on the sign of the creep speed.
OL□□42	Home Offset	Set the travel distance from the point where a phase-C pulse is detected. The travel direction will depend on the sign.
OB□□05B	INPUT Signal for Zero Point Return	This signal must be turned ON from the ladder program.

（Note） Reverse type in ▒: Parameters only for the SVA-01 Module.

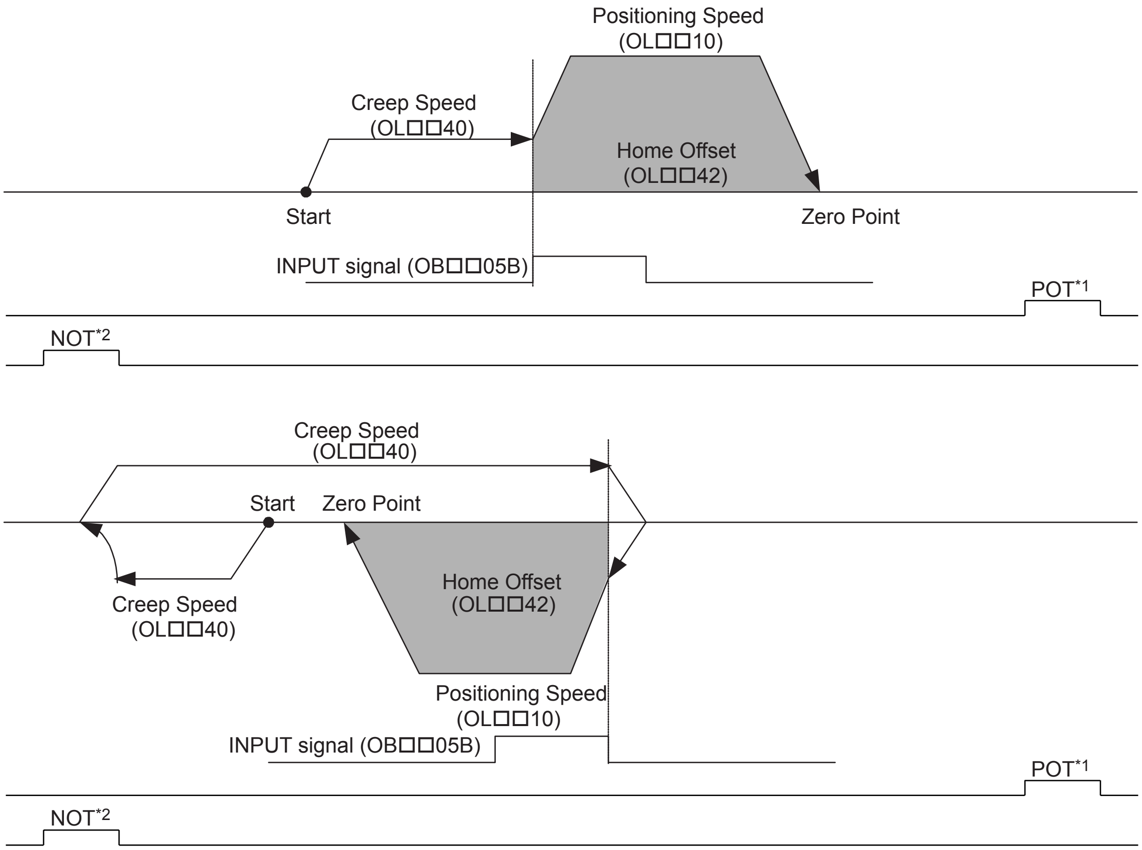
[q] INPUT Signal Method (OW□□3C = 19)

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, positioning is performed at the positioning speed. When positioning has been completed, a machine coordinate system is established with the final position as the zero point.

The moving amount after the INPUT signal is detected is set in the Home Offset. 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 INPUT signal. If an OT signal is detected during positioning speed operation, an OT alarm will occur.

The INPUT signal is allocated to the motion setting parameter OB□□05B, 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 INPUT signal is performed using software processing. The position where positioning is completed will vary with 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.
(Note) The stopping method when the OT signal is detected depends on the setting of SERVOPACK parameters.

Parameter	Name	Setting
OW□□3C	Home Return Type	19: INPUT Only Method
OL□□10	Speed Reference	Set the positioning speed to use after detecting the INPUT signal. The sign is ignored. The travel direction will depend on the sign of the Home Offset.
OL□□18	Speed Override	This parameter allows the Zero Point Return speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. This setting can be changed during operation. Setting range: 0 to 32767 (0% to 327.67%); Setting unit: 1 = 0.01%
OL□□40	Creep Speed	Set the speed to use when starting a zero point return. The travel direction will depend on the sign of the creep speed.
OL□□42	Home Offset	Set the distance to travel from the point the INPUT signal is detected. The travel direction will depend on the sign.
OB□□05B	INPUT Signal for Zero Point Return	This signal must be turned ON from the ladder program.

(Note) Reverse type in [shaded]: Parameters only for the SVA-01 Module.

(3) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
The parameters that need to be set will depend on the zero point return method. Refer to the previous pages for details.

⇩

Execute the zero point return (ZRET) motion command.
- Set OW□□08 to 3.

⇩

Zero point return operation starts.
- IW□□08 will be 3 during execution.

⇩

Zero point return operation completed.
- IB□□0C5 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- The software limit function will be enabled after the Zero Point Return operation has been completed.
- The Command Pause (OB□□090) cannot be used.
- Set OB□□091 to 1 to abort the command.

(4) Holding

Holding execution is not possible during zero point return operation. The Command Pause bit (OB□□090) is ignored.

(5) Aborting

Axis travel can be stopped during command execution and the remaining travel cancelled by aborting execution of a command. A command is aborted by setting the Command Abort bit (OB□□091) to 1.
Set the Command Abort bit (OB□□091) to 1. The axis will decelerate to a stop. When the axis has stopped, the Positioning Completed bit (IB□□01C) will turn ON.
This type of operation will also be performed if the motion command is changed during axis movement.

(6) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting
OB□□000	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 Code (OW□□08) to 3.
OB□□013	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 1	SVB-01: Sets the speed unit, acceleration/deceleration unit, and filter type. SVA-01: Sets the speed unit.
OW□□08	Motion Command	The zero point return operation starts when this parameter is set to 3. The operation will be canceled if this parameter is set to 0 during ZRET command execution.
OB□□091	Command Abort	The axis will decelerate to a stop if this bit is set to 1 during zero point return operation.
OB□□095	Position Reference Type	Switch the type of position reference. 0: Incremental addition mode, 1: Absolute mode Set this parameter before setting the Motion Command Code (OW□□08) to 3.
OL□□36	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant for positioning.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).
OW□□3D	Home Window	Set the width in which the Zero Point Position bit (IB□□0C4) will turn ON.

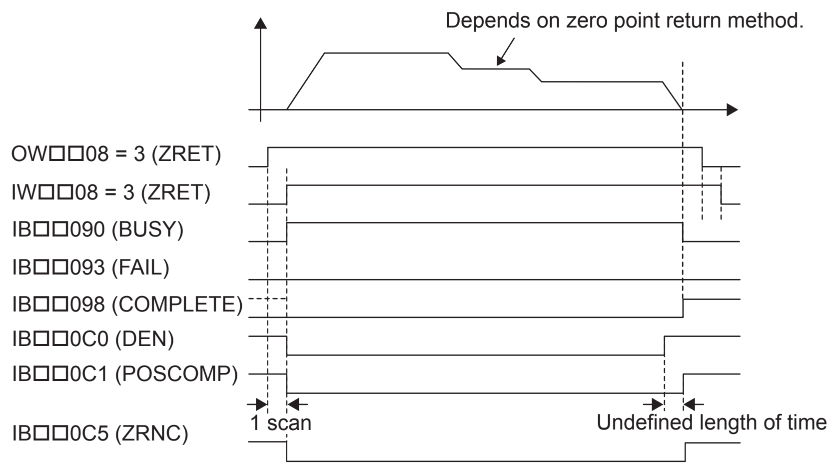
(Note) ▭ : Parameters only for the SVB-01 Module.

[b] Monitoring Parameters

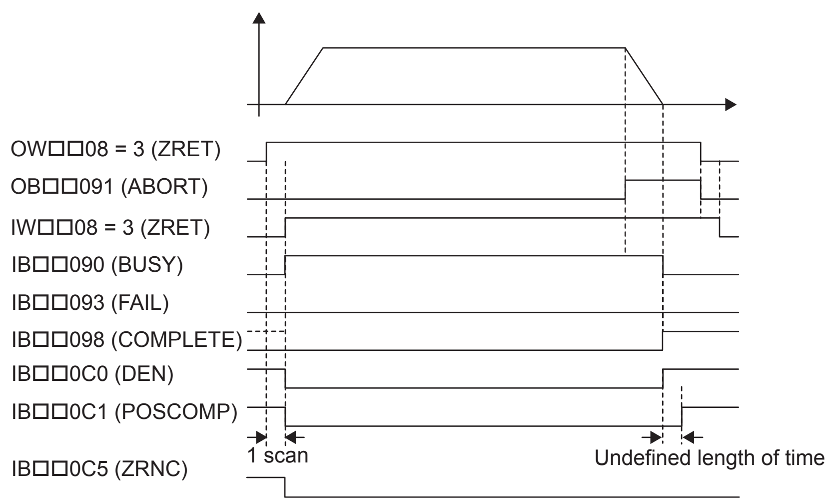
Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 3 during ZRET command execution.
IB□□090	Command Executing	Turns ON during zero point return operation. Turns OFF when ZRET command execution has been completed.
IB□□091	Command Hold Completed	Always OFF for ZRET command.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Turns ON when ZRET command execution has been completed.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C3	Position Proximity	The operation depends on the setting of the Positioning Completed Width 2 (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). OL□□20≠0: Turns ON when │MPOS - APOS│< Position Proximity Setting even if pulse distribution has not been completed. OFF in all other cases.
IB□□0C4	Zero Point Position	Turns ON if the current position after the zero point return operation has been completed is within the Zero Point Position Output Wide from the zero point position. Turns OFF is the current position is not within this width.
IB□□0C5	Zero Point Return Completed	Turns ON when the zero point return has been completed.

(7) Timing Charts

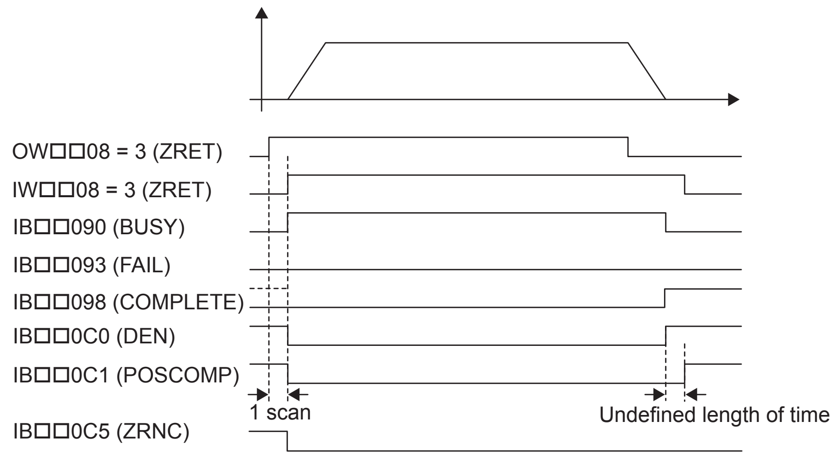
[a] Normal Execution



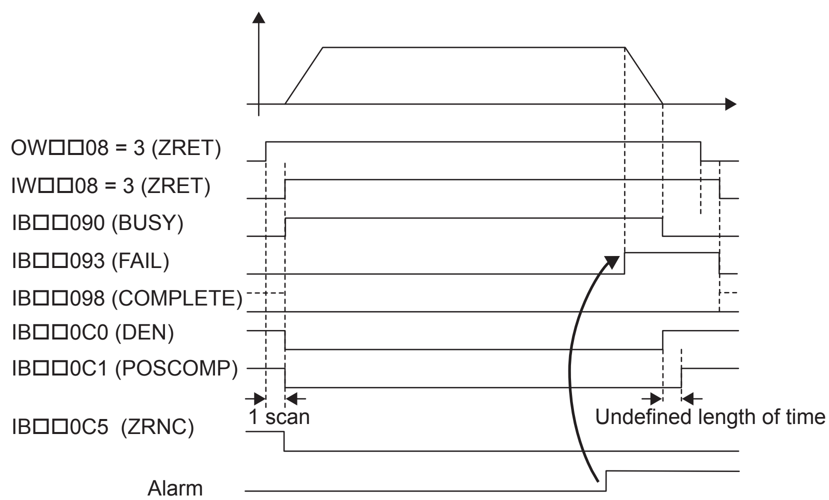
[b] Execution when Aborted



[c] Execution when Aborting by Changing the Command



[d] Execution when an Alarm Occurs



5.2.4 Interpolation (INTERPOLATE)

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.

INFO

■ Torque Feed Forward Gain Function

Torque feed forward gain can be used when interpolation commands (INTERPOLATE) are sent using SGDS SERVOPACKs.

Torque feed forward gain is set in Torque Reference (setting parameter OL□□0C). The required conditions are as follows:

- SERVOPACK parameter Pn002.0 = 2
- MP2300 software version 2.02 or later
- SGDS communication interface version 8 or later

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Target Position: OL□□1C
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01
- Speed Feed Forward Compensation: OW□□30

⇩

Execute the interpolation (INTERPOLATE) motion command.
- Set OW□□08 to 4.

⇩

Positioning starts.
- IW□□08 will be 4 during positioning.

⇩

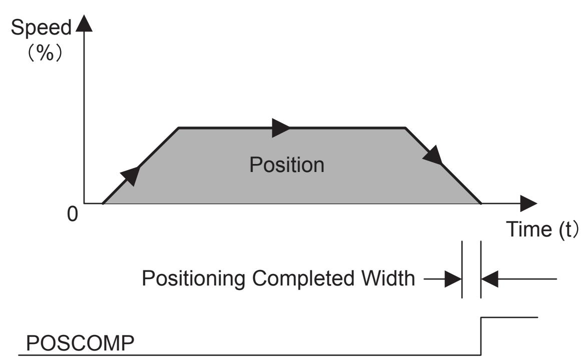
Change the Target Position (OL□□1C) every high-speed scan.

⇩

Positioning Completed
- IB□□0C1 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- Speed feed forward compensation can be applied.
- Generate the positioning data each high-speed scan from the ladder logic program.
- The travel speed is calculated automatically.
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.
- Change a motion command to stop interpolation execution.

(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 Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OW□□03	Function 1	SVB-01: Sets the speed unit, acceleration/deceleration unit, and filter type. SVA-01: Sets the filter type.
OW□□08	Motion Command	The positioning starts when this parameter is set to 4.
OB□□095	Position Reference Setting	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.
OL□□1C	Position Reference Setting	Set the target position for positioning. The setting can be changed every high-speed scan.
OL□□1E	Positioning Completed Width	Set the width in which to turn ON the Positioning Completed bit (IB□□0C1).
OL□□20	Positioning Completed Width 2	Set the range in which the Position Proximity bit (IB□□0C3) will turn ON. The Position Proximity 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□□30	Speed Feed Forward Compensation	Set the feed forward amount as a percentage of the rated speed.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

(Note) ▒: Parameters only for the SVB-01 Module.

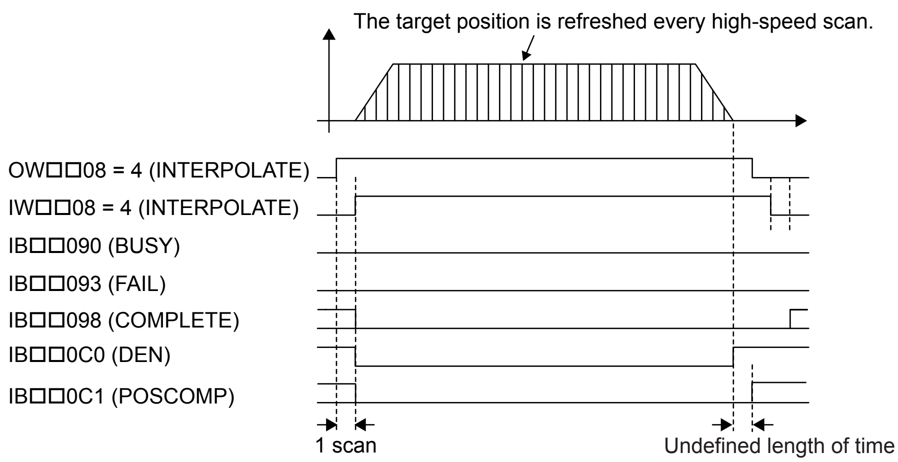
[b] Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 4 during INTERPOLATE command execution.
IB□□090	Command Executing	Always OFF for INTERPOLATE command.
IB□□091	Command Hold Completed	Always OFF for INTERPOLATE command.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for INTERPOLATE command.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width. OFF in all other cases.

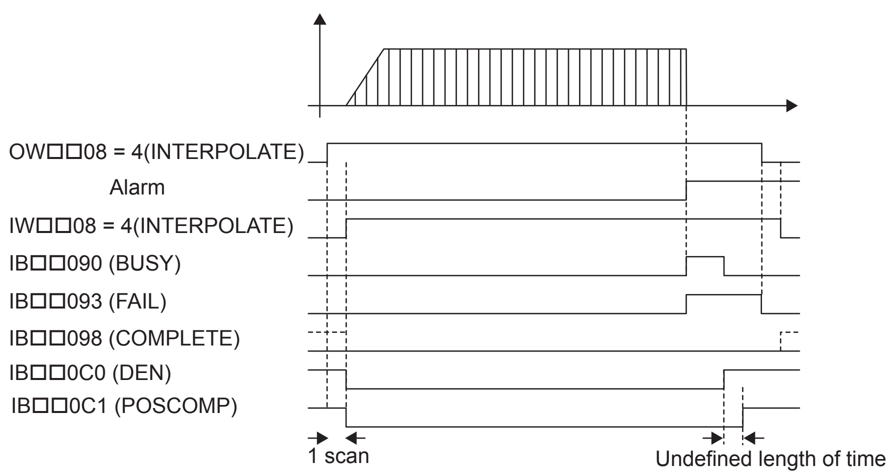
IB□□0C3	Position Proximity	The operation depends on the setting of the Positioning Completed Width 2 (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). OL□□20≠0: Turns ON when │MPOS - APOS│< Position Proximity Setting even if pulse distribution has not been completed. OFF in all other cases.

(4) Timing Charts

[a] Normal Execution



[b] Execution when an Alarm Occurs



5.2.5 Latch (LATCH)

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 for the SVB-01 and to the EXT signal, ZERO signal, or phase-C pulse for the SVA-01.
When executing the LATCH command more than once, change the Motion Command to NOP for at least one scan before executing LATCH again.

INFO

■ Torque Feed Forward Gain Function

Torque feed forward gain can be used when LATCH commands are sent using SGDS SERVOPACKs.

Torque feed forward gain is set in Torque Reference (setting parameter OL□□0C). The required conditions are as follows:

- SERVOPACK parameter Pn002.0 = 2
- MP2300 software version 2.02 or later
- SGDS communication interface version 8 or later

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Target Position: OL□□1C
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01
- Speed Feed Forward Compensation: OW□□30
- Latch Signal Selection: OW□□04

⇩

Execute the LATCH motion command.
- Set OW□□08 to 6.

⇩

Positioning starts.
- IW□□08 will be 6 during execution.

⇩

Change the Target Position (OL□□1C) every high-speed scan.

⇩

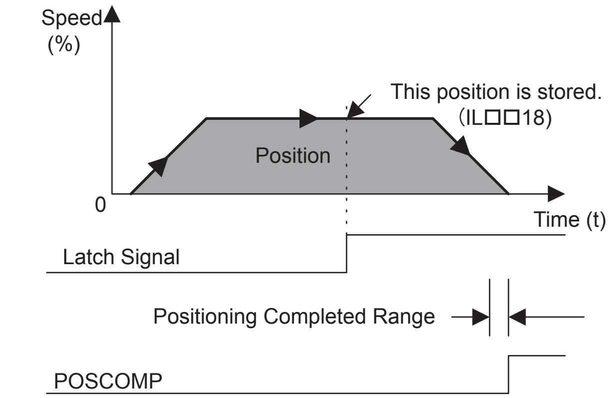
When the latch signal turns ON, the current position will be stored in the Register (IL□□18).

⇩

Positioning Completed
- IB□□0C1 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- Speed feed forward compensation can be applied.
- Generate the target position data each high-speed scan from the ladder program.
- The travel speed is calculated automatically.
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.
- Change a motion command to stop interpolation execution.
- Select the latch signal from the SERVOPACK phase-C pulse, /EXT1, /EXT2, or /EXT3 signals for the SVB-01 and from the CN1/CN2 connector EXT, ZERO, or phase-C pulse for the SVA-01.

(Note) Take into consideration the latch processing time obtained from the following equation when sending the LATCH command.

Latch processing time = 2 scans + MECHATROLINK cycle + SERVOPACK processing time (4 ms max.)

(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 Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OW□□03	Function 1	SVB-01: Sets the speed unit, acceleration/deceleration unit, and filter type. SVA-01: Sets the filter type.
OW□□04	Function 2	Set the latch signal type.
OW□□08	Motion Command	The positioning starts when this parameter is set to 6.
OB□□095	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.
OL□□1C	Position Reference Setting	Set the target position for positioning. The setting can be changed every high-speed scan.
OL□□1E	Positioning Completed Width	Set the width in which to turn ON the Positioning Completed bit (IB□□0C1).
OL□□20	Positioning Completed Width 2	Set the range in which the Position Proximity bit (IB□□0C3) will turn ON. The Position Proximity 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□□30	Speed Feed Forward Compensation	Set the feed forward amount as a percentage of the rated speed.
OL□□38	Linear Deceleration Time	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 OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

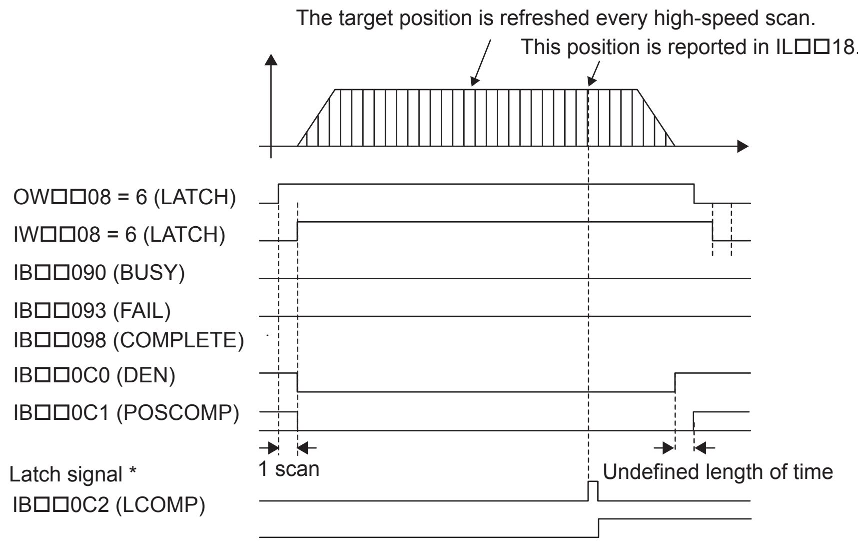
（Note） ▭ : Parameters only for the SVB-01 Module.

[b] Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates any alarms that have occurred during execution. The response code is 6 during LATCH operation.
IB□□090	Command Executing	Always OFF for LATCH operation.
IB□□091	Command Hold Completed	Always OFF for LATCH operation.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for LATCH operation.
IB□□0C0	Distribution Completed	Turns ON when distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when distribution has been completed and the current position is within the Positioning Completed Width. OFF in all other cases.
IB□□0C2	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 Latch Position (monitoring parameter IL□□18).
IB□□0C3	Position Proximity	The operation depends on the setting of the Positioning Completed Width 2 (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). OL□□20≠0: Turns ON when |MPOS - APOS|< Position Proximity Setting even if pulse distribution has not been completed. OFF in all other cases.
IL□□18	Machine Coordinate Latch Position	Stores the current position in the machine coordinate system when the latch signal turned ON.

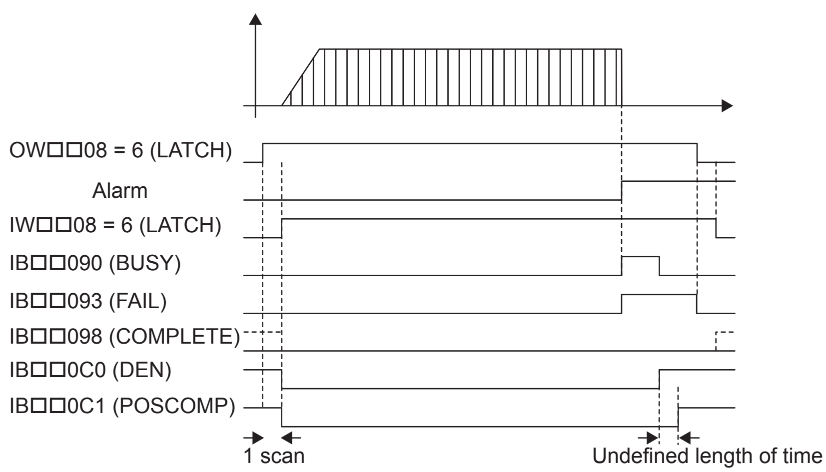
(4) Timing Charts

[a] Normal Execution



* Latch signal:
SVB-01 Module: Phase-C pulse, /EXT1, /EXT2, or /EXT3 signal
SVA-01 Module: Phase-C pulse, EXT, or ZERO signal

[b] Execution when an Alarm Occurs



5.2.6 JOG Operation (FEED)

The FEED command starts movement in the specified travel direction at the specified travel speed. To stop the operation, execute the NOP motion command. The axis will decelerate to a stop when the NOP motion command is executed.
Parameters related to acceleration and deceleration are set in advance. The speed can be changed during axis movement.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Direction of Movement: OB□□092
- Speed Reference: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01

⇩

Execute the JOG operation (FEED) motion command.
- Set OW□□08 to 7.

⇩

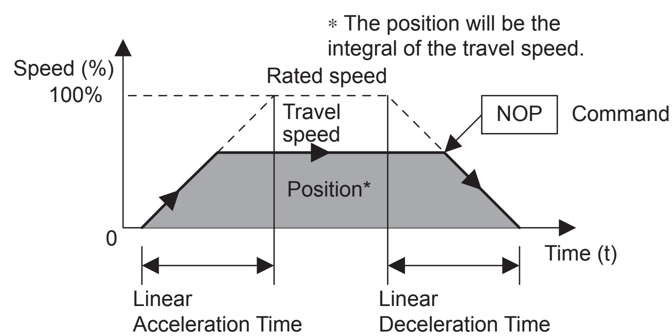
JOG operation starts.
- IW□□08 will be 7 during execution.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

⇩

Positioning completed.
- IB□□0C1 will turn ON.



- The travel speed can be changed during movement.
- The Command Pause (OB□□090) cannot be used.
- The axis will decelerate to a stop if the Command Abort bit (OB□□091) is set to 1 during execution.

(2) Holding

Holding execution is not possible during FEED command execution. The Command Pause bit (OB□□090) 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 Command Abort bit (OB□□091) to 1.

1. Set the Command Abort bit (OB□□091) to 1. The axis will decelerate to a stop. When the axis has stopped, the Positioning Completed bit (IB□□01C) will turn ON.

2. The JOG operation will restart if the Command Abort bit (OB□□091) is reset to 0 during abort processing.

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
OB□□000	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.
OB□□013	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 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The JOG operation starts when this parameter is set to 7. The operation will be canceled if this parameter is set to 0 during FEED command execution.
OB□□091	Command Abort	The axis is decelerated to a stop if this bit is set to 1 during JOG operation.
OB□□092	JOG/STEP Direction	Set the travel direction for JOG operation. 0: Positive direction, 1: Negative direction
OL□□10	Speed Reference	Specify the speed for the JOG operation. This setting can be changed during operation. The unit depends on the setting of OW□□03.
OL□□18	Speed Override	This parameter allows the feed speed to be changed without changing the Speed Reference (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	Positioning Completed Width	Set the width in which to turn ON the Positioning Completed bit (IB□□0C1).
OL□□20	Positioning Completed Width 2	Set the range in which the Position Proximity bit (IB□□0C3) will turn ON. The Position Proximity 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	Linear Acceleration Time	Set the rate of acceleration of the acceleration time constant for fixed-speed feeding.
OL□□38	Linear Deceleration Time	Set the rate of deceleration of the deceleration time constant for fixed-speed feeding.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

(Note) ▭ : Parameters only for the SVB-01 Module.

[b] Monitoring Parameters

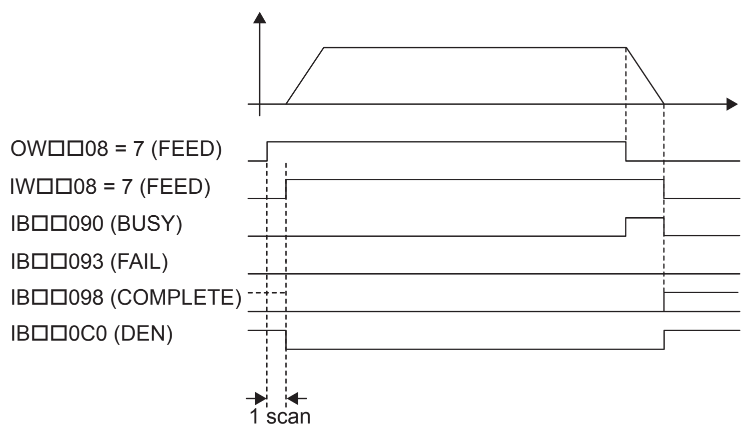
Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 7 during FEED command execution.
IB□□090	Command Executing	Turns ON when abort processing is being performed for FEED command. Turns OFF when abort processing has been completed.
IB□□091	Command Hold Completed	Always OFF for FEED command.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for FEED command.

(cont'd)

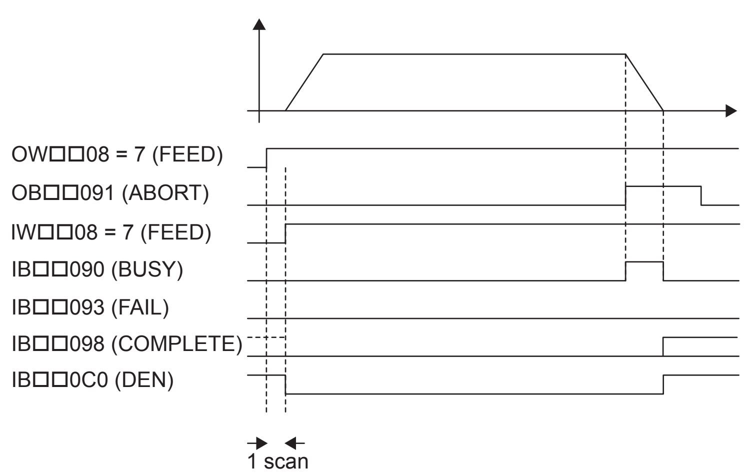
Parameter	Name	Monitor Contents
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width. OFF in all other cases.
IB□□0C3	Position Proximity	The operation depends on the setting of the Positioning Completed Width 2 (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). OL□□20 ≠ 0: Turns ON when |MPOS - APOS| < Position Proximity Setting even if pulse distribution has not been completed. OFF in all other cases.

(5) Timing Charts

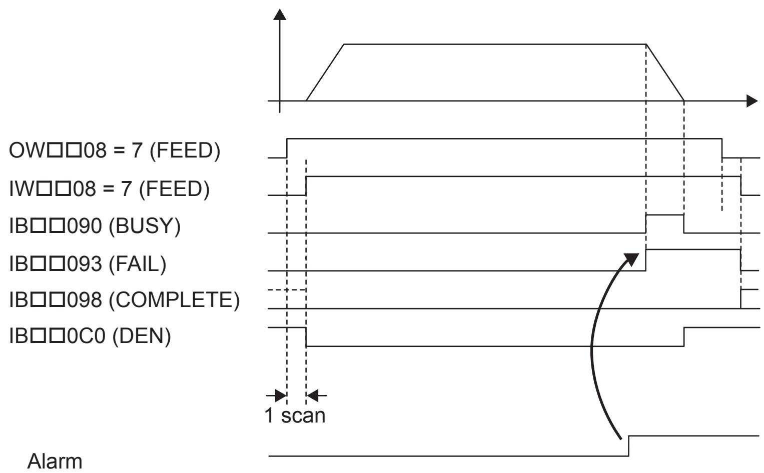
[a] Normal Execution



[b] Execution when Aborted



[c] Execution when an Alarm Occurs



5.2.7 STEP Operation (STEP)

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. The speed can be changed during axis movement.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Step Distance: OL□□44
- Direction of Movement: OB□□092
- Travel Speed: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01

⇩

Execute the STEP operation command.
- Set OW□□08 to 8.

⇩

STEP operation starts.
- IW□□08 will be 8 during execution.

⇩

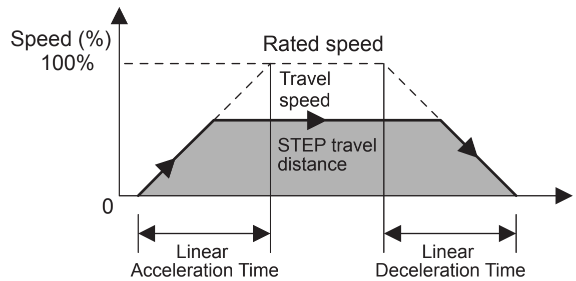
Position proximity reached.
- IB□□0C3 will turn ON.

⇩

Positioning completed.
- IB□□0C1 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- The travel speed can be changed during movement.
- An override of between 0% to 327.67% can be set for the travel speed.
- Set OB□□090 to 1 to hold the command.
- Set ON OB□□091 to 1 to abort execution.

(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 Command Pause (OB□□090) bit to 1.

1. Set the Command Pause bit (OB□□090) to 1. The axis will decelerate to a stop. When the axis has stopped, the Command Hold Completed bit (IB□□091) will turn ON.

2. Turn OFF the Command Pause bit (OB□□090). 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 cancelled by aborting execution of a command. A command is aborted by setting the Command Abort bit (OB□□091) to 1.
Set the Command Abort bit (OB□□091) to 1. The axis will decelerate to a stop. When the axis has stopped, the Positioning Completed bit (IB□□01C) 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
OB□□000	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.
OB□□013	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 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The STEP operation starts when this parameter is set to 8. The operation will be canceled if this parameter is set to 0 during STEP command execution.
OB□□090	Command Pause	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.
OB□□091	Command Abort	The axis will decelerate to a stop if this bit is set to 1 during a STEP operation. Operation after stopping depends on the setting of the Position Reference Type (OB□□095).
OB□□092	JOG/STEP Direction	Set the moving amount for STEP operation. 0: Positive direction, 1: Negative direction
OB□□095	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 8.
OL□□10	Speed Reference	Specify the speed for the positioning. This setting can be changed during operation. The unit depends on the setting of OW□□03.
OL□□18	Speed Override	This parameter allows the travel speed to be changed without changing the Speed Reference (OL□□10). Set the value as a percentage of the Speed Reference. 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	Positioning Completed Width	Set the width in which to turn ON the Positioning Completed bit (IB□□0C1).
OL□□20	Positioning Completed Width 2	Set the range in which the Position Proximity bit (IB□□0C3) will turn ON. The Position Proximity 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	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant for positioning.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).
OL□□44	Step Distance	Set the moving amount for STEP operation.

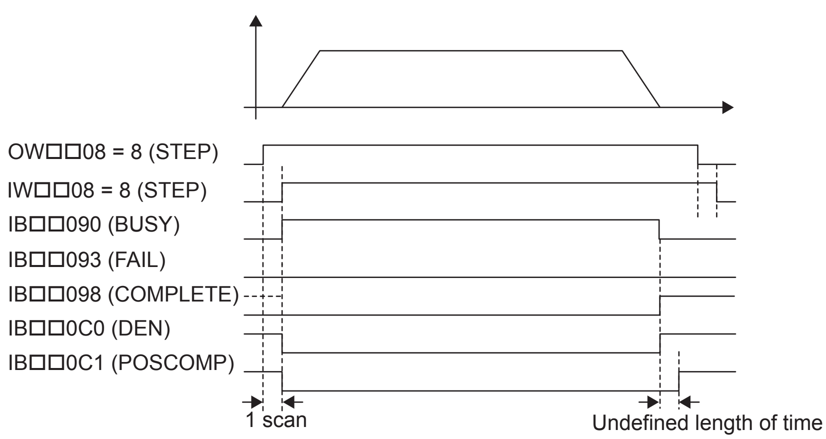
（Note） ▭: Parameters only for the SVB-01 Module.

[b] Monitoring Parameters

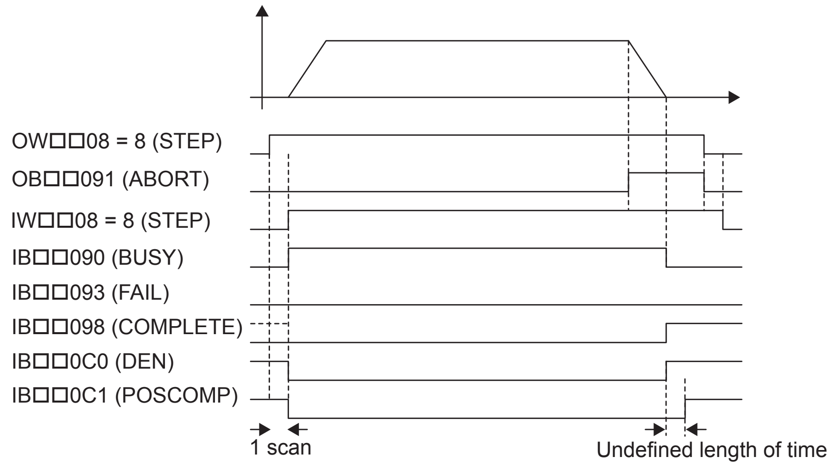
Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 8 during STEP command execution.
IB□□090	Command Executing	The Command Executing bit will turn ON during STEP command execution and then turn OFF when STEP command execution has been completed.
IB□□091	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of setting the Command Pause (OB□□090) bit to 1 during STEP command execution.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Turns ON when STEP command execution has been completed.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width. OFF in all other cases.
IB□□0C3	Position Proximity	The operation depends on the setting of the Positioning Completed Width 2 (setting parameter OL□□20). OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). OL□□20 ≠ 0: Turns ON when │MPOS - APOS│< Position Proximity Setting even if pulse distribution has not been completed. OFF in all other cases.

(5) Timing Charts

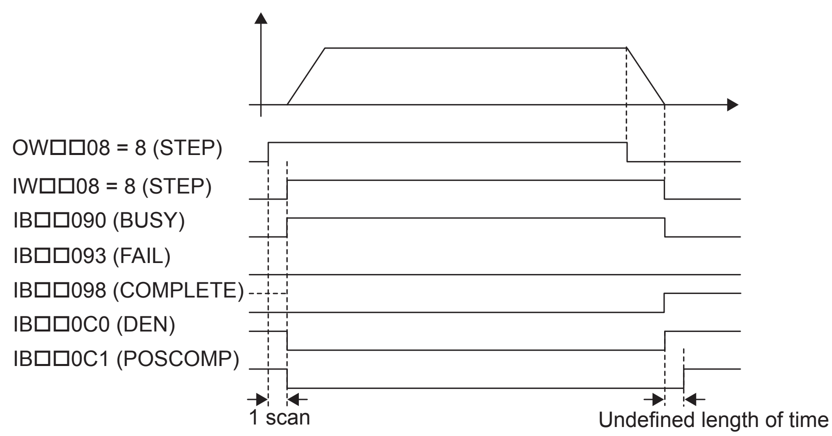
[a] Normal Execution



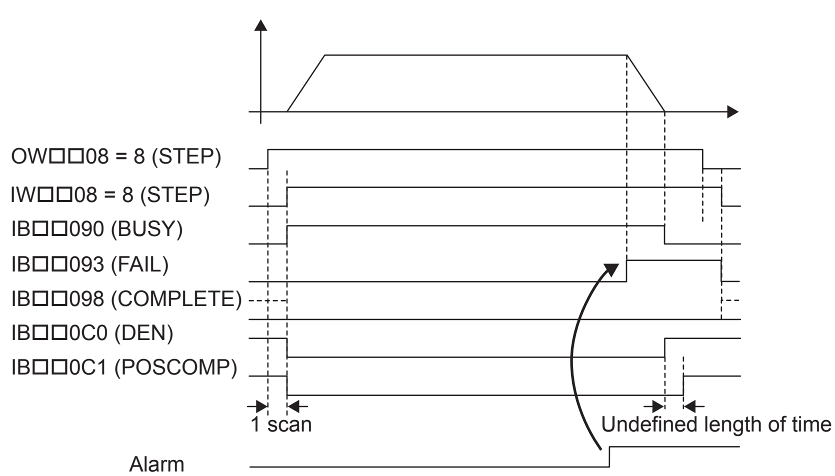
[b] Execution when Aborted



[c] Execution when Aborting by Changing the Command



[d] Execution when an Alarm Occurs



5.2.8 Zero Point Setting (ZSET)

The ZSET command sets the current position as the zero point of the machine coordinate system.
This enables establishing the zero point without performing a zero point return operation.
Either a zero point return or zero point setting must be performed to enable using the soft limits.

(1) Operating Procedure

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 IB□□090 is OFF.

Execute the zero point setting (ZSET) motion command.
- Set OW□□08 to 9.

⇩

A new machine coordinate system will be established with the current position as the zero point.
- IW□□08 will be 9 during command execution.

⇩

Zero point setting completed.
- IB□□0C5 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- The soft limits will be enabled after the Zero Point Setting command has been completed.
- The Execution Pause (OB□□090) cannot be used.
- The Execution Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

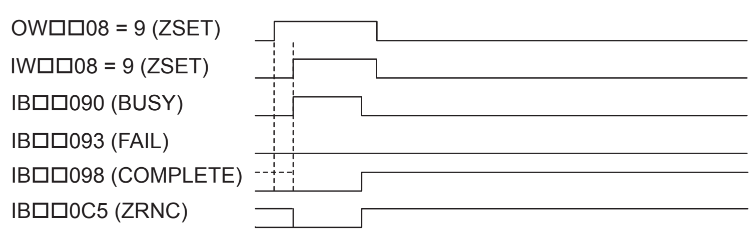
Parameter	Name	Setting
OW□□08	Motion Command	Set to 9 for ZSET command.
OB□□090	Command Pause	This parameter is ignored for ZSET command.
OB□□091	Command Abort	This parameter is ignored for ZSET command.
OL□□48	Zero Point Offset	Sets the offset from the zero point in the machine coordinate system after the zero point has been set.

[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	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 9 during ZSET command execution.
IB□□090	Command Executing	Turns ON during ZSET command execution and turns OFF when ZSET command execution has been completed.
IB□□091	Command Hold Completed	Always OFF for ZSET command.
IB□□093	Command Error End	Turns ON if an error occurs during ZSET command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when ZSET command execution has been completed.
IB□□0C5	Zero Point Return (Setting) Completed	Turns ON when the zero point has been established.

(4) Timing Charts

■ Normal Execution



5.2.9 Change Linear Acceleration Time Constant (ACC)

The ACC command transfers the setting of the Linear Acceleration Time (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.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Pulse distribution has been completed for the SERVOPACK.	IB□□0C0 is ON.
4	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Execute the ACC motion command.
- Set OW□□08 to 10.

⇩

The Linear Acceleration Time Constant is set in the SERVOPACK and enabled.
- IW□□08 will be 10 during command execution.
- IB□□090 will be ON during command execution.

⇩

Parameter change completed.
- IW□□08 will be 10 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- With the MECHATROLINK-II, there is the function that the change of setting parameter is automatically updated. If utilizing this function, there is no need to execute ACC command. For details, refer to bit A (User Constants Self-writing Function) in Fixed Parameter 1 (Function Selection 1).
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

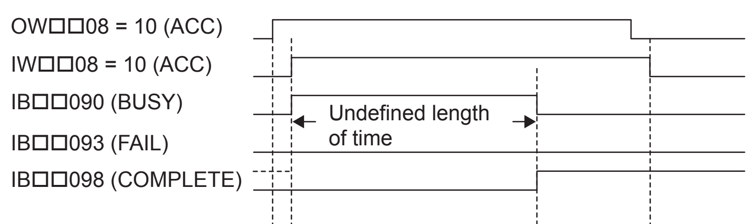
Parameter	Name	Setting
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The linear acceleration time constant is changed when this parameter is set to 10.
OB□□090	Command Pause	This parameter is ignored for ACC command.
OB□□091	Command Abort	This parameter is ignored for ACC command.
OL□□36	Linear Acceleration Time	Set the acceleration for feeding as the acceleration time.

[b] Monitoring Parameters

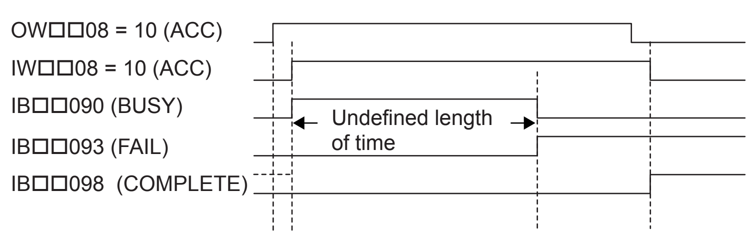
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 10 during ACC command execution.
IB□□090	Command Executing	Turns ON during ACC command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for ACC command.
IB□□093	Command Error End	Turns ON if an error occurs during ACC command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when ACC command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.10 Change Linear Deceleration Time Constant (DCC)

The DCC command transfers the setting of the Linear Deceleration Time (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-□□AN SERVOPACKs, this command is ignored.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Pulse distribution has been completed for the SERVOPACK.	IB□□0C0 is ON.
4	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Execute the DCC motion command.
- Set OW□□08 to 11.

⇩

The Linear Deceleration Time Constant is set in the SERVOPACK and enabled.
- IW□□08 will be 11 during command execution.
- IB□□090 will be ON during command execution.

⇩

Parameter change completed.
- IW□□08 will be 11 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- With the MECHATROLINK-II, there is the function that the change of setting parameter is automatically updated. If utilizing this function, there is no need to execute DCC command. For details, refer to bit A (User Constants Self-writing Function) in Fixed Parameter 1 (Function Selection 1).
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

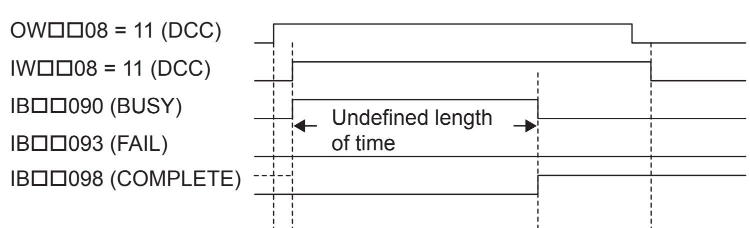
Parameter	Name	Setting
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The linear deceleration time constant is changed when this parameter is set to 11.
OB□□090	Command Pause	This parameter is ignored for DCC command.
OB□□091	Command Abort	This parameter is ignored for DCC command.
OL□□38	Linear Deceleration Time	Set the deceleration for feeding as the deceleration time.

[b] Monitoring Parameters

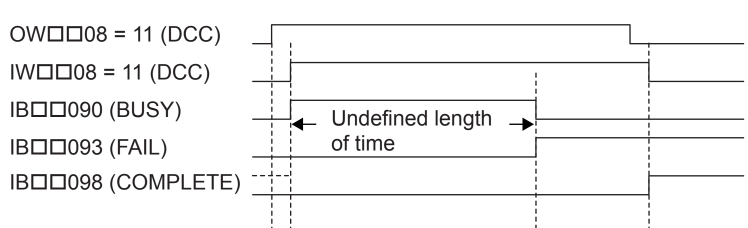
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 11 during DCC command execution.
IB□□090	Command Executing	Turns ON during DCC command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for DCC command.
IB□□093	Command Error End	Turns ON if an error occurs during DCC command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when DCC command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.11 Change Filter Time Constant (SCC)

The SCC command transfers the setting of the S-Curve Acceleration Time (motion setting parameter OW□□3A) to the Moving Average Time in the SERVOPACK and enables the setting.
Always execute the CHG_FILTER command before executing SCC command.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Pulse distribution has been completed for the SERVOPACK.	IB□□0C0 is ON.
4	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Execute the SCC motion command.
- Set OW□□08 to 12.

⇩

Filter Time Constant is set in the SERVOPACK and enabled.
- IW□□08 will be 12 during command execution.
- IB□□090 will be ON during command execution.

⇩

Parameter change completed.
- IW□□08 will be 12 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- With the MECHATROLINK-II, there is the function that the change of setting parameter is automatically updated. If utilizing this function , there is no need to execute SCC command. For details, refer to bit A (User Constants Self-writing Function) in Fixed Parameter 1 (Function Selection 1).
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

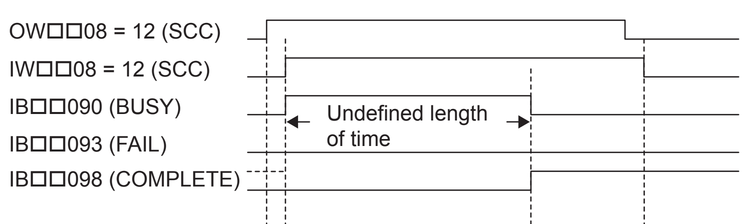
Parameter	Name	Setting
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The filter time constant is changed when this parameter is set to 12.
OB□□090	Command Pause	This parameter is ignored for SCC command.
OB□□091	Command Abort	This parameter is ignored for SCC command.
OW□□3A	S-Curve Acceleration Time	Set the filter time constant for acceleration/deceleration.

[b] Monitoring Parameters

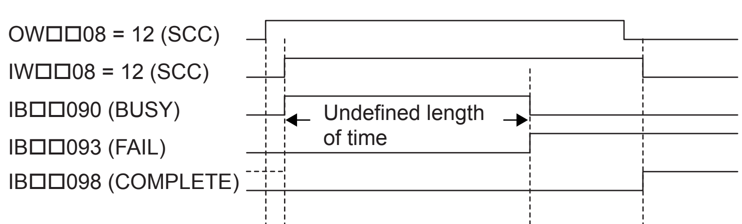
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 12 during SCC command execution.
IB□□090	Command Executing	Turns ON during SCC command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for SCC command.
IB□□093	Command Error End	Turns ON if an error occurs during SCC command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when SCC command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.12 Change Filter Type (CHG_FILTER)

The CHG_FILTER command enables the current setting of the Filter Type (motion setting parameter OW□□03) for execution of the following motion commands: POSING, EX_POSING, ZRET, INTERPOLATE, LATCH, FEED, and STEP.

IMPORTANT

Always execute CHG_FILTER command after changing the setting of OW□□03.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Pulse distribution has been completed for the SERVOPACK.	IB□□0C0 is ON.
4	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Execute the CHG_FILTER motion command.
- Set OW□□08 to 13.

⇩

The Acceleration/Deceleration Filter Type is enabled.
- IW□□08 will be 13 during command execution.
- IB□□090 will be ON during command execution.

⇩

Command Execution Completed.
- IW□□08 will be 13 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- Select one of the following filters:
  1.No filter
  2.Exponential acceleration/deceleration
  3.S-curve acceleration/deceleration (Moving average filter)
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

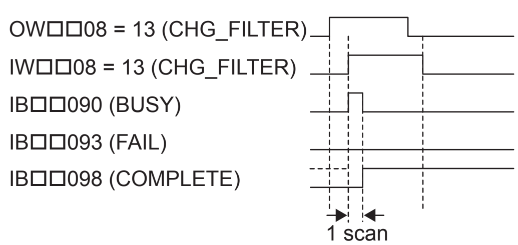
Parameter	Name	Setting
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The filter type is changed when this parameter is set to 13.
OB□□090	Command Pause	This parameter is ignored for CHG_FILTER command.
OB□□091	Command Abort	This parameter is ignored for CHG_FILTER command.

[b] Monitoring Parameters

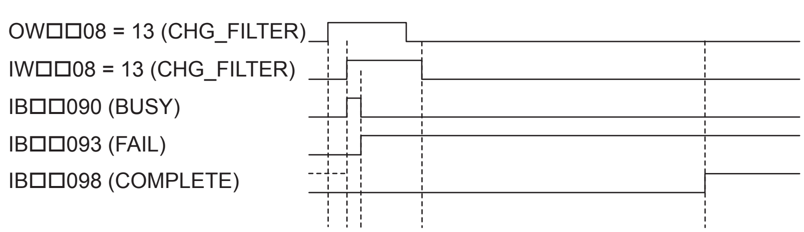
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 13 during CHG_FILTER command execution.
IB□□090	Command Executing	Turns ON during CHG_FILTER command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for CHG_FILTER command.
IB□□093	Command Error End	Turns ON if an error occurs during CHG_FILTER command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when CHG_FILTER command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.13 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.

(1) Operating Procedure

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 IB□□090 is OFF.

Execute the KVS motion command.
- Set OW□□08 to 14.

⇩

The Speed Loop Gain is set in the SERVOPACK and enabled.
- IW□□08 will be 14 during command execution.
- IB□□090 will be ON during command execution.

⇩

Parameter change completed.
- IW□□08 will be 14 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- With the MECHATROLINK-II, there is the function that the change of setting parameter is automatically updated. If utilizing this function, there is no need to execute KVS command. For details, refer to bit A (User Constants Self-Writing Function) in Fixed Parameter 1 (Function Selection 1).
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

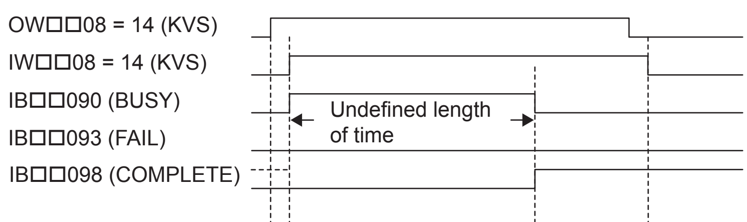
Parameter	Name	Setting
OW□□08	Motion Command	The speed loop gain is changed when this parameter is set to 14.
OB□□090	Command Pause	This parameter is ignored for KVS command.
OB□□091	Command Abort	This parameter is ignored for KVS command.
OW□□2F	Speed Loop Gain	Set the gain for the SERVOPACK speed control loop.

[b] Monitoring Parameters

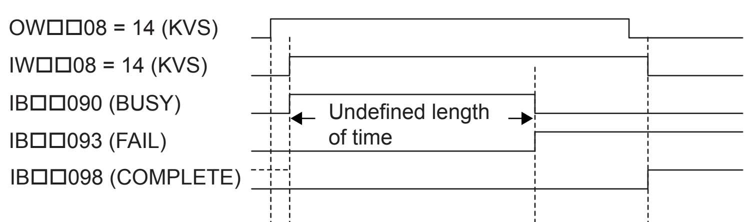
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 14 during KVS command execution.
IB□□090	Command Executing	Turns ON during KVS command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for KVS command.
IB□□093	Command Error End	Turns ON if an error occurs during KVS command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when KVS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.14 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.

(1) Operating Procedure

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 IB□□090 is OFF.

Execute the KPS motion command.
- Set OW□□08 to 15.

⇩

The Position Loop Gain is set in the Servopack and enabled.
- IW□□08 will be 15 during command execution.
- IB□□090 will be ON during command execution.

⇩

Parameter change completed.
- IW□□08 will be 15 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- With the MECHATROLINK-II, there is the function that the change of setting parameter is automatically updated. If utilizing this function, there is no need to execute KPS command. For details, refer to bit A (User Constants Self-Writing Function) in Fixed Parameter 1 (Function Selection 1).
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

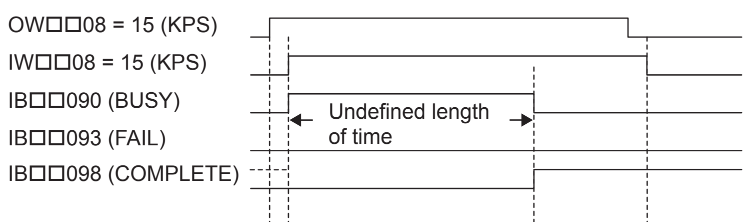
Parameter	Name	Setting
OW□□08	Motion Command	The position loop gain is changed when this parameter is set to 15.
OB□□090	Command Pause	This parameter is ignored for KPS command.
OB□□091	Command Abort	This parameter is ignored for KPS command.
OW□□2E	Position Loop Gain	Set the gain for the SERVOPACK position control loop.

[b] Monitoring Parameters

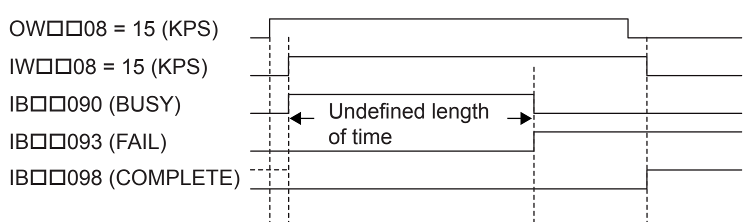
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 15 during KPS command execution.
IB□□090	Command Executing	Turns ON during KPS command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for KPS command.
IB□□093	Command Error End	Turns ON if an error occurs during KPS command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when KPS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.15 Change Feed Forward (KFS)

The KFS command transfers the setting of the Speed Feed Forward Compensation (motion setting parameter OW□□30) to the Feed Forward in the SERVOPACK and enables the setting.

(1) Operating Procedure

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 IB□□090 is OFF.

Execute the KFS motion command.
- Set OW□□08 to 16.

⇩

The Feed Forward is set in the SERVOPACK and enabled.
- IW□□08 will be 16 during command execution.
- IB□□090 will be ON during command execution.

⇩

Parameter change completed.
- IW□□08 will be 16 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- With the MECHATROLINK-II, there is the function that the change of setting parameter is automatically updated. If utilizing this function, there is no need to execute KFS command. For details, refer to bit A (User Constants Self-Writing Function) in Fixed Parameter 1 (Function Selection 1).
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

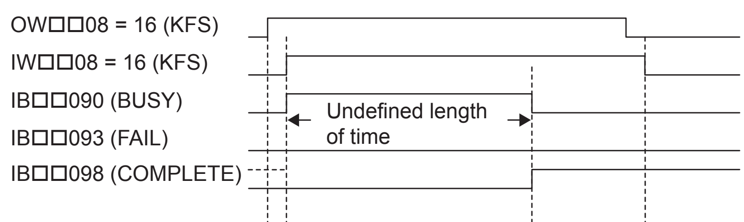
Parameter	Name	Setting
OW□□08	Motion Command	The feed forward value is changed when this parameter is set to 16.
OB□□090	Command Pause	This parameter is ignored for KFS command.
OB□□091	Command Abort	This parameter is ignored for KFS command.
OW□□30	Speed Feed Forward Compensation	Set the amount of Servo feed forward (%).

[b] Monitoring Parameters

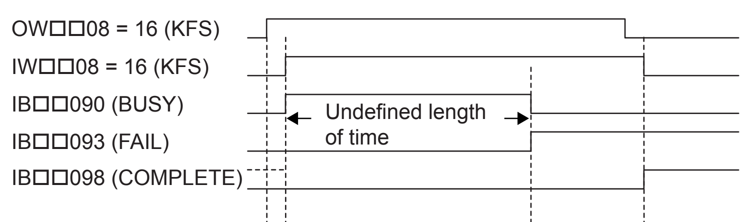
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 16 during KFS command execution.
IB□□090	Command Executing	Turns ON during KFS command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for KFS command.
IB□□093	Command Error End	Turns ON if an error occurs during KFS command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when KFS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.16 Read SERVOPACK Parameter (PRM_RD)

The PRM_RD command reads the setting of the SERVOPACK parameter with the specified parameter number and parameter size and stores the parameter number in Servo Constant Number (monitoring parameter IW□□36) and the setting in Servo User Constant (monitoring parameter IL□□38).

(1) Operating Procedure

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 IB□□090 is OFF.

Execute the PRM_RD motion command.
- Set OW□□08 to 17.

- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

⇩

The SERVOPACK parameter is read and written to the monitoring parameters.
- IW□□08 will be 17 during command execution.
- IB□□090 will be ON during command execution.

⇩

Reading completed.
- IW□□08 will be 17 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

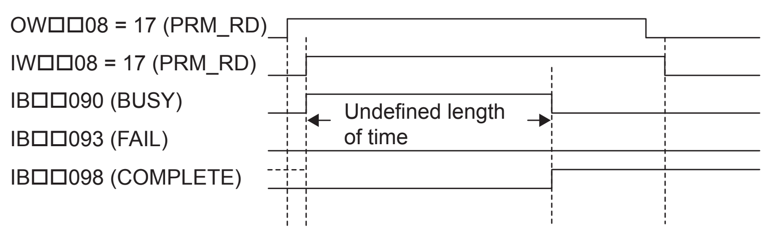
Parameter	Name	Setting
OW□□08	Motion Command	The SERVOPACK parameter is read when this parameter is set to 17.
OB□□090	Command Pause	This parameter is ignored for PRM_RD command.
OB□□091	Command Abort	This parameter is ignored for PRM_RD command.
OW□□50	Servo Constant Number	Set the number of the SERVOPACK parameter to be read.
OW□□51	Servo Constant Number 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

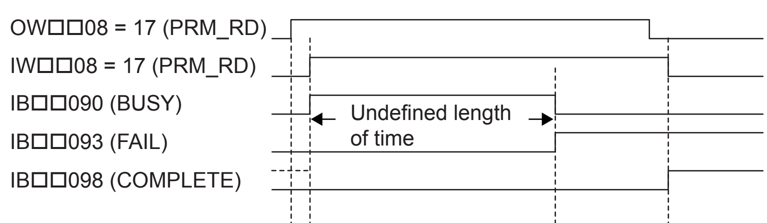
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 17 during PRM_RD command execution.
IB□□090	Command Executing	Turns ON during PRM_RD command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for PRM_RD command.
IB□□093	Command Error End	Turns ON if an error occurs during PRM_RD command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when PRM_RD command execution has been completed.
IW□□36	Servo Constant Number	Stores the number of the SERVOPACK parameter that was read.
IL□□38	Servo User Constant	Stores the data of the SERVOPACK parameter that was read.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.17 Write SERVOPACK Parameter (PRM_WR)

The PRM_WR command writes the SERVOPACK parameter using the specified parameter number, parameter size, and setting data.

(1) Operating Procedure

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 IB☐☐090 is OFF.

Execute the PRM_WR motion command.
- Set OW☐☐08 to 18.

⇩

The SERVOPACK parameter is written.
- IW☐☐08 will be 18 during command execution.
- IB☐☐090 will be ON during command execution.

⇩

Writing completed.
- IW☐☐08 will be 18 and IB☐☐090 will be OFF.

⇩

Execute NOP motion command.
- Set OW☐☐08 to 0.

- The Command Pause (OB☐☐090) cannot be used.
- The Command Abort (OB☐☐091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB☐☐090) and the Command Abort bit (OB☐☐091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

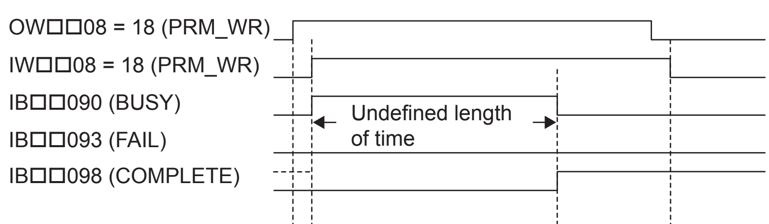
Parameter	Name	Setting
OW□□08	Motion Command	The SERVOPACK parameter is written when this parameter is set to 18.
OB□□090	Command Pause	This parameter is ignored for PRM_WR command.
OB□□091	Command Abort	This parameter is ignored for PRM_WR command.
OW□□50	Servo Constant Number	Set the number of the SERVOPACK parameter to be written.
OW□□51	Servo 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 User Constant	Set the data to be set to the SERVOPACK parameter to be written.

[b] Monitoring Parameters

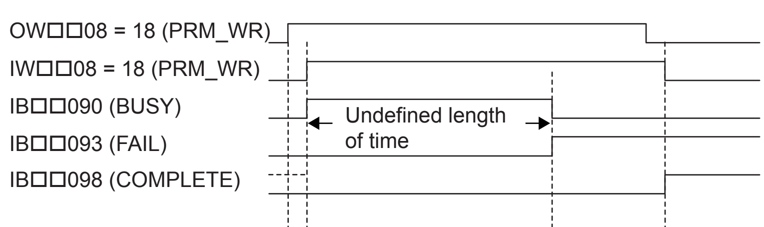
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 18 during PRM_WR command execution.
IB□□090	Command Executing	Turns ON during PRM_WR command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for PRM_WR command.
IB□□093	Command Error End	Turns ON if an error occurs during PRM_WR command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when PRM_WR command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.18 Monitor SERVOPACK Alarms (ALM_MON)

The ALM_MON command reads the alarm or warning that has occurred in the SERVOPACK and stores it in Servo Alarm Code (monitoring parameter IW□□2D).

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Execute the ALM_MON motion command.
- Set OW□□08 to 19.

⇩

Any alarms/warnings that have occurred in the SERVOPACK are stored in the monitoring parameter.
- IW□□08 will be 19 during command execution.
- IB□□090 will be ON during command execution.

⇩

Monitoring is completed.
- IW□□08 will be 19 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set IW□□08 to 0.

- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

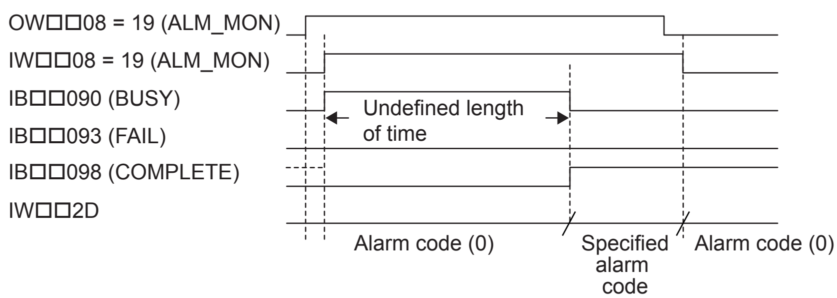
Parameter	Name	Setting
OW□□08	Motion Command	Alarms are monitored when this parameter is set to 19.
OB□□090	Command Pause	This parameter is ignored for ALM_MON command.
OB□□091	Command Abort	This parameter is ignored for ALM_MON command.
OW□□4F	Servo Alarm Monitor Number	Set the number of the alarm to be monitored.

[b] Monitoring Parameters

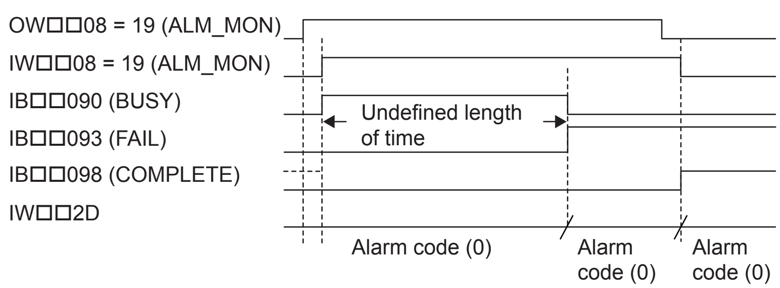
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 19 during ALM_MON command execution.
IB□□090	Command Executing	Turns ON during ALM_MON command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for ALM_MON command.
IB□□093	Command Error End	Turns ON if an error occurs during ALM_MON command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when ALM_MON command execution has been completed.
IW□□2D	Servo Alarm Code	Stores the SERVOPACK alarm or warning code that was read.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.19 Monitor SERVOPACK Alarm History (ALM_HIST)

The ALM_HIST command reads the alarm history that is stored in the SERVOPACK and stores it in Servo Alarm Code (monitoring parameter IW□□2D).

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Execute the ALM_HIST motion command.
- Set OW□□08 to 20.

⇩

The alarm history stored in the SERVOPACK is read and the codes are stored in the monitoring parameters.
- IW□□08 will be 20 during command execution.
- IB□□090 will be ON during command execution.

⇩

Execution completed.
- IW□□08 will be 20 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

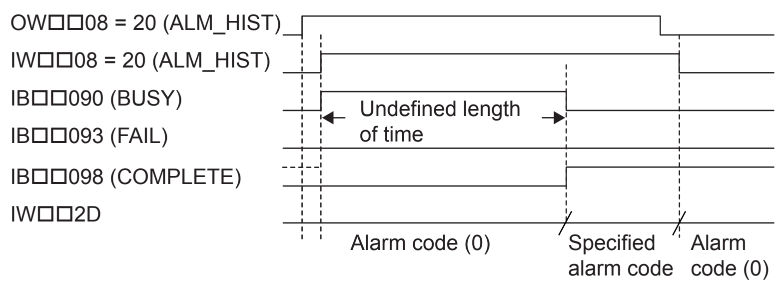
Parameter	Name	Setting
OW□□08	Motion Command	The alarm history is monitored when this parameter is set to 20.
OB□□090	Command Pause	This parameter is ignored for ALM_HIST command.
OB□□091	Command Abort	This parameter is ignored for ALM_HIST command.
OW□□4F	Servo Alarm Monitor Number	Set the number of the alarm to be monitored.

[b] Monitoring Parameters

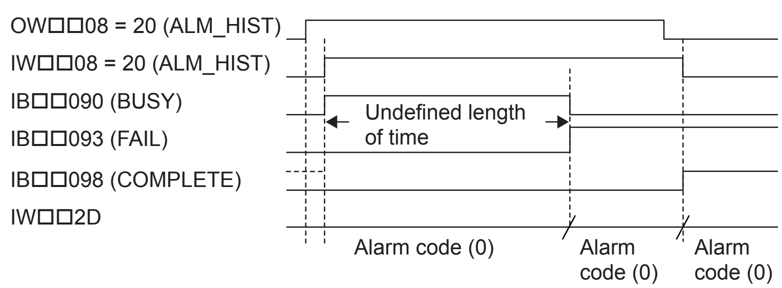
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 20 during ALM_HIST command execution.
IB□□090	Command Executing	Turns ON during ALM_HIST command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for ALM_HIST command.
IB□□093	Command Error End	Turns ON if an error occurs during ALM_HIST command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when ALM_HIST command execution has been completed.
IW□□2D	Servo Alarm Code	Stores the SERVOPACK alarm code that was read.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.20 Clear SERVOPACK Alarm History (ALMHIST_CLR)

The ALMHIST_CLR command clears the alarm history in the SERVOPACK.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Execute the ALMHIST_CLR motion command.
- Set OW□□08 to 21.

⇩

The alarm history stored in the SERVOPACK is cleared.
- IW□□08 will be 21 during command execution.
- IB□□090 will be ON during command execution.

⇩

Execution completed.
- IW□□08 will be 21 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

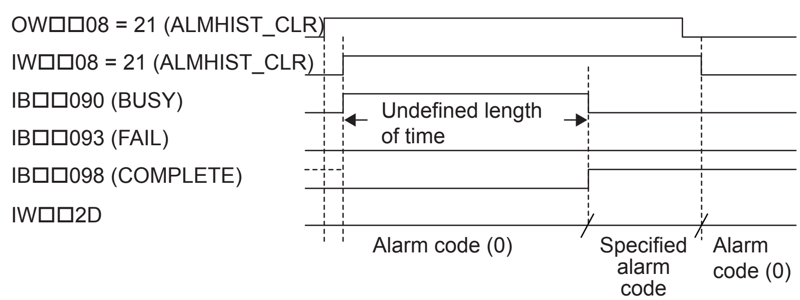
Parameter	Name	Setting
OW□□08	Motion Command	The alarm history is cleared when this parameter is set to 21.
OB□□090	Command Pause	This parameter is ignored for ALMHIST_CLR command.
OB□□091	Command Abort	This parameter is ignored for ALMHIST_CLR command.

[b] Monitoring Parameters

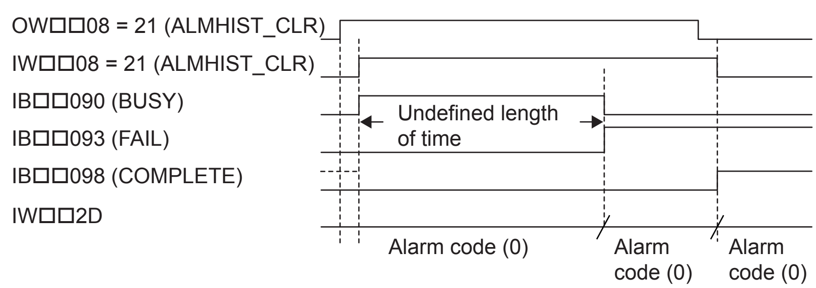
Parameter	Name	Monitor Contents
IL☐☐02	Warning	Stores the most current warning.
IL☐☐04	Alarm	Stores the most current alarm.
IW☐☐08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 21 during ALMHIST_CLR command execution.
IB☐☐090	Command Executing	Turns ON during ALMHIST_CLR command execution and turns OFF when execution has been completed.
IB☐☐091	Command Hold Completed	Always OFF for ALMHIST_CLR command.
IB☐☐093	Command Error End	Turns ON if an error occurs during ALMHIST_CLR command execution. Turns OFF when another command is executed.
IB☐☐098	Command Execution Completed	Turns ON when ALMHIST_CLR command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.21 Reset Absolute Encoder (ABS_RST)

The ABS_RST command resets the multiturn data in the absolute encoder to 0. If an Encoder Backup Alarm (A.810) or Encoder Checksum Alarm (A.820) occurs when the ABS_RST command is executed, the encoder will be reset. The ABS_RST command can be executed to reset the encoder's multiturn data to 0 when these alarms occur or when the machine is being used for the first time.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	Communication with the SERVOPACK must be synchronized.	IB☐☐000 is ON.
2	The Servo OFF condition.	IB☐☐001 is OFF.
3	Motion command execution has been completed.	OW☐☐08 is 0, IW☐☐08 is 0, and IB☐☐090 is OFF.

Execute the ABS_RST motion command.
- Set OW☐☐08 to 22.

⇩

Any alarms that have occurred will be cleared and the multiturn data in the absolute encoder will be set to 0.
- IW☐☐08 will be 22 during execution.
- IB☐☐090 will be ON during command processing.

⇩

Initializing the absolute encoder completed.
- IW☐☐08 will be 22 and IB☐☐090 will turn OFF.
- IB☐☐093 will turn OFF.
- IB☐☐097 will turn ON.
- IB☐☐000 will turn OFF.

⇩

Execute NOP motion command.
- Set OW☐☐08 to 0.

- If the ABS_RST command is executed while an A.81 alarm exists, the alarm clear operation will have to be performed twice before communication can be synchronized again.
- The ABS_RST command is valid for Σ-II and Σ-III Series SERVOPACKs. A command error will occur if the ABS_RST command is executed for a Σ 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).
- The Command Pause (OB☐☐090) cannot be used.
- The Command Abort (OB☐☐091) cannot be used.

IMPORTANT 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. Clear the alarm and re-establish communication, and then execute the ZRET or ZSET command.

(2) Holding and Aborting

The Command Pause bit (OB☐☐090) and the Command Abort bit (OB☐☐091) cannot be used. Processing will be canceled if a communication error occurs while the command is being executed and a command error end will occur.

(3) Related Parameters

[a] Setting Parameters

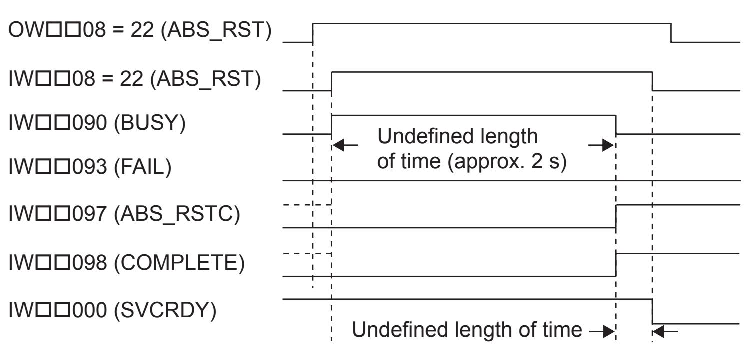
Parameter	Name	Setting
OB□□000	Servo ON	Turn the power to the Servomotor ON and OFF. 1: Power ON to Servomotor; 0: Power OFF to Servomotor Turn OFF the power before setting the Motion Command (OW□□08) to 22.
OW□□08	Motion Command	Starts resetting the absolute encoder when this parameter is set to 22. Even if this parameter is set to 0 during command execution, it will be ignored and execution will be continued.
OB□□090	Command Pause	This parameter is ignored for the ABS_RST command.
OB□□091	Command Abort	This parameter is ignored for the ABS_RST command.

[b] Monitoring Parameters

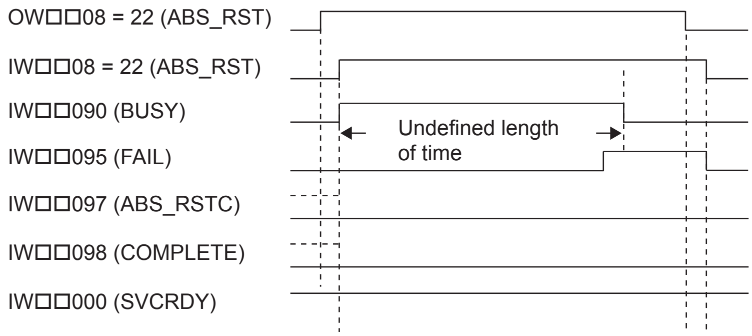
Parameter	Name	Monitor Contents
IB□□000	Motion Controller Operation Ready	Indicates the communication status between the Machine Controller and SERVOPACK. ON: Communication synchronized, OFF: Communication disconnected
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 22 during ABS_RST command execution.
IB□□090	Command Executing	Turns ON during ABS_RST command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for the ABS_RST command.
IB□□093	Command Error Occurrence	Turns ON if an error, such as a communication error, occurs during ABS_RST command execution. Command execution will be canceled.
IB□□097	Absolute Encoder Reset Completed	Turns ON when resetting the absolute encoder has been completed.
IB□□098	Command Execution Completed	Turns ON when ABS_RST command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.2.22 Speed Reference (VELO)

With the MECHATROLINK-II, the VELO command is used to operate the SERVOPACK under the speed control mode, enabling the same type of operation as is possible with the analog speed reference input of the SERVOPACK.
The VELO command is stipulated in MECHATROLINK-II command specifications and cannot be used for MECHATROLINK-I.

(1) Operating Procedure

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 IB□□090 is OFF.

Set the motion setting parameters.
- Speed Reference setting: OL□□10
- Torque Limit setting: OL□□14
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01

⇩

Execute the VELO motion command.
- Set OW□□08 to 23.

⇩

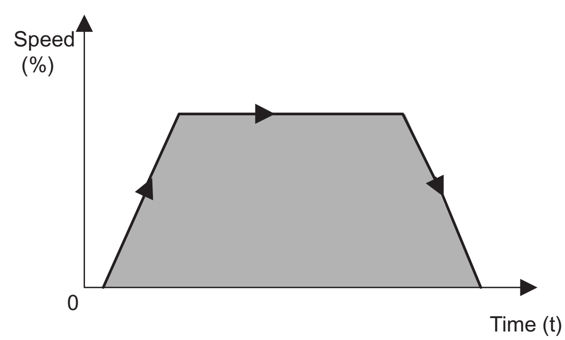
The control mode in the SERVOPACK is switched to speed control.
- IW□□08 will be 23 during execution.

⇩

Operation under speed control mode

⇩

Execute another motion command to cancel the speed control mode.



- Position management using the position feedback is possible during operation with speed control mode.
- The speed can be changed during operation.
- An override of between 0% to 327.67% can be set for the reference speed.
- This command can be executed even when the Servo is OFF.
- The Command Pause (OB□□090) cannot be used.
- Set OB□□091 to 1 to abort execution.

(2) Holding

Holding execution is not possible during VELO command operation. The Command Pause bit (OB□□090) is ignored.

(3) Aborting

The speed control mode can be cancelled by aborting execution of a command. A command is aborted by setting the Command Abort bit (OB□□091) to 1.

1. Set the Command Abort bit (OB□□091) to 1. The axis will decelerate to a stop when the Command Abort bit (OB□□091) is set to 1. The abort processing will be completed when the axis has decelerated to a stop.

2. The speed control mode operation will restart if the Command Abort bit (OB□□091) 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.

(4) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OB□□013	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 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The mode is changed to speed control mode when this parameter is set to 23.
OB□□090	Command Pause	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.
OB□□091	Command Abort	The axis will decelerate to a stop if this bit is set to 1 during operation.
OL□□10	Speed Reference	Specify the speed. This setting can be changed during operation. The unit depends on the setting of OW□□03.
OL□□14	Positive Side Limiting Torque 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.
OL□□18	Speed Override	This parameter allows the motor speed to be changed without changing the Speed Reference (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	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant for operation.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for operation.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

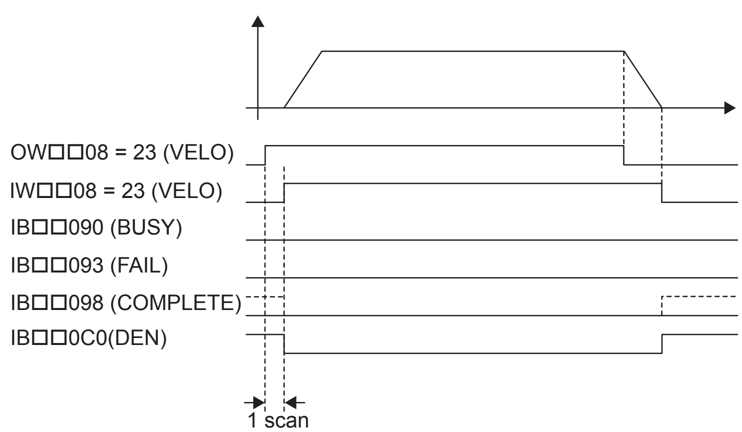
(Note) ▭: Parameters only for the SVB-01 Module.

[b] Monitoring Parameters

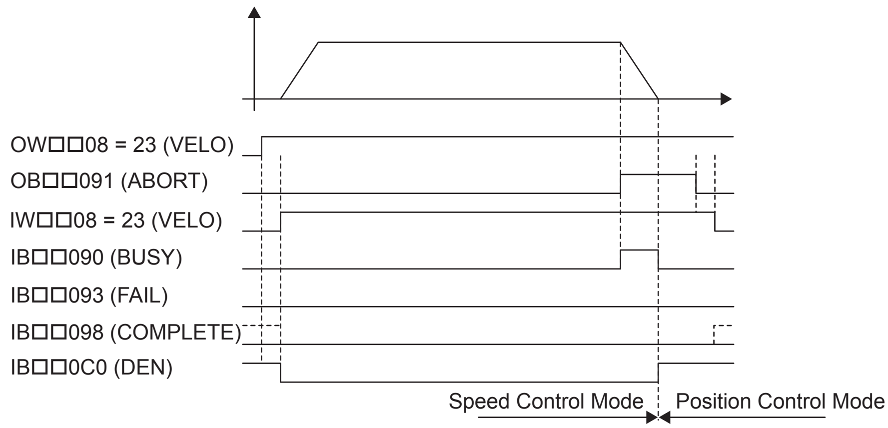
Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 23 during VELO command execution.
IB□□090	Command Executing	Turns ON when abort processing is being performed for VELO command. Turns OFF when abort processing has been completed.
IB□□091	Command Hold Completed	Always OFF for VELO command.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for VELO command.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the positioning completed range. OFF in all other cases.
IB□□0C3	Position Proximity	The operation of this bit depends on the setting of Positioning Completed Width 2 (setting parameter OL□□20). • OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). • OL□□20 ≠ 0: Turns ON when the absolute value of the difference between the Machine Coordinate Feedback Position (monitoring parameter IL□□16) and the Machine Coordinate System Position (monitoring parameter IL□□12) is less than the Position Completed Width 2, even if pulse distribution has not been completed. OFF in all other cases.

(5) Timing Charts

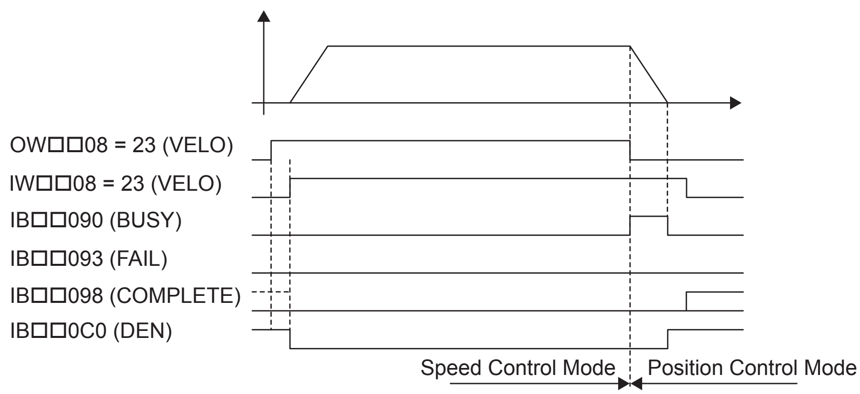
[a] Normal Execution



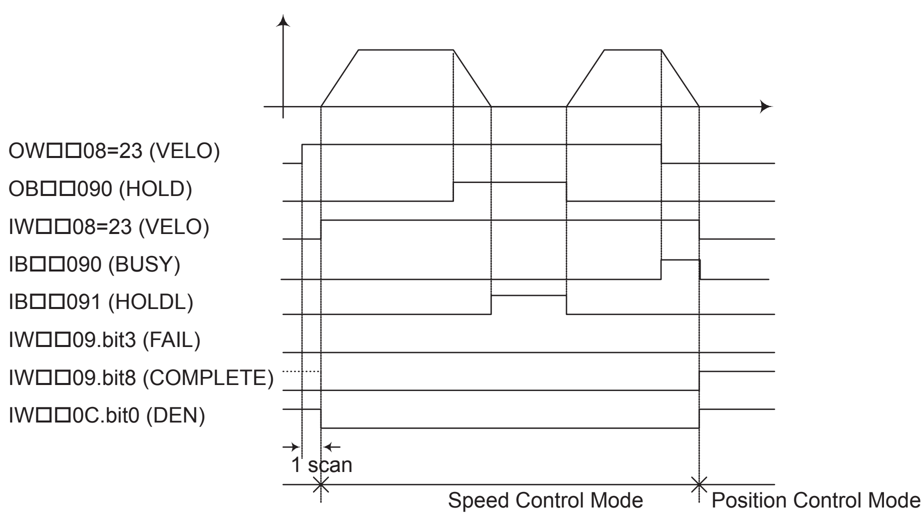
[b] Execution when Aborted



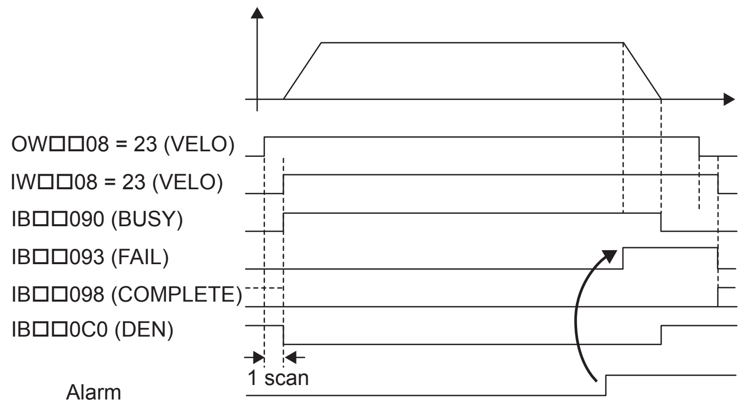
[c] Execution when Aborting by Changing the Command



[d] Execution for Pausing



[e] Execution when an Alarm Occurs



5.2.23 Torque Reference (TRQ)

With the MECHATROLINK-II, the TRQ command is used to operate the SERVOPACK under the torque control mode, enabling the same type of operation as is possible with the analog torque reference input of the SERVOPACK.
The TRQ command is stipulated in MECHATROLINK-II command specifications and cannot be used for MECHATROLINK-I.

(1) Operating Procedure

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 IB□□090 is OFF.

Set the motion setting parameters.
- Torque Reference Setting: OL□□0C
- Speed Limit Setting: OL□□0E
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01

⇩

Execute the TRQ motion command.
- Set OW□□08 to 24.

⇩

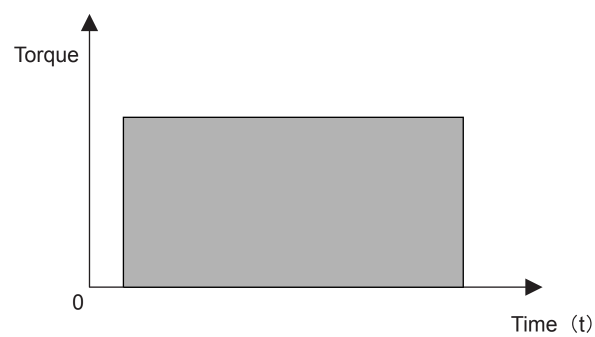
The control mode in the SERVOPACK is changed to torque control.
IW□□08 will be 24 during execution.

⇩

Operation in torque control mode

⇩

Execute another motion command to cancel the torque control mode.



- Position management using the position feedback is possible during operation with torque control mode.
- The torque can be changed during operation.
- This command can be executed even when the Servo is OFF.
- The Command Pause (OB□□090) cannot be used.
- Set OB□□091 to 1 to abort execution.

(2) Holding

Holding execution is not possible during TRQ command operation. The Command Pause bit (OB□□090) is ignored.

(3) Aborting

The torque control mode can be cancelled by aborting execution of a command. A command is aborted by setting the Command Abort bit (OB□□091) to 1.

1. Set the Command Abort bit (OB□□091) to 1. The axis will decelerate to a stop when the Command Abort bit (OB□□091) is set to 1. The abort processing will be completed when the axis has decelerated to a stop.

2. The torque control mode operation will restart if the Command Abort bit (OB□□091) 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
OB□□000	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 generate when the Servo is turned ON after switching to Torque Control Mode.
OB□□013	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 1	SVB-01: Sets the speed unit, acceleration/deceleration unit, and filter type. SVA-01: Sets the acceleration/deceleration unit and torque unit.
OW□□08	Motion Command	The mode is changed to torque control when this parameter is set to 24.
OB□□090	Command Pause	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.
OB□□091	Command Abort	A deceleration stop is performed when this bit set to 1 during operation.
OL□□0C	Torque Reference	Set the torque reference. This setting can be changed during operation. The unit is determined by OW□□03.
OL□□0E	Speed Limit at Torque Reference	Set the speed limit for torque references. The speed limit is set as a percentage of the rated speed.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
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. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

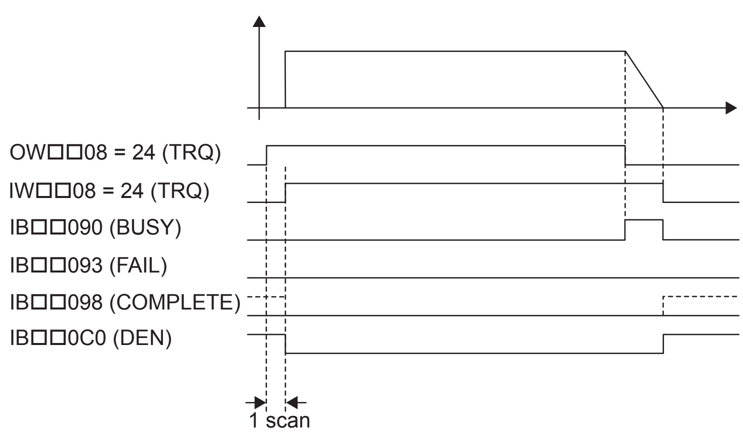
（Note） ▢ : Parameters only for the SVB-01 Module.

[b] Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 24 during TRQ command execution.
IB□□090	Command Executing	Turns ON when abort processing is being performed for TRQ command. Turns OFF when abort processing has been completed.
IB□□091	Command Hold Completed	Always OFF for TRQ command.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for TRQ command.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the positioning completed range. OFF in all other cases.
IB□□0C3	Position Proximity	The operation of this bit depends on the setting of Positioning Completed Width 2 (setting parameter OL□□20). • OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). • OL□□20 ≠ 0: Turns ON when the absolute value of the difference between the Machine Coordinate Feedback Position (monitoring parameter IL□□16) and the Machine Coordinate System Position (monitoring parameter IL□□12) is less than the Position Completed Width 2, even if pulse distribution has not been completed. OFF in all other cases.

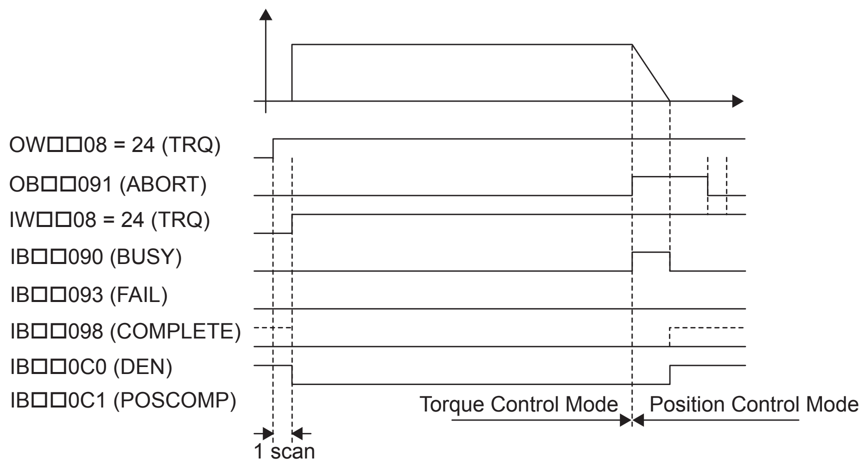
(5) Timing Charts

[a] Normal Execution

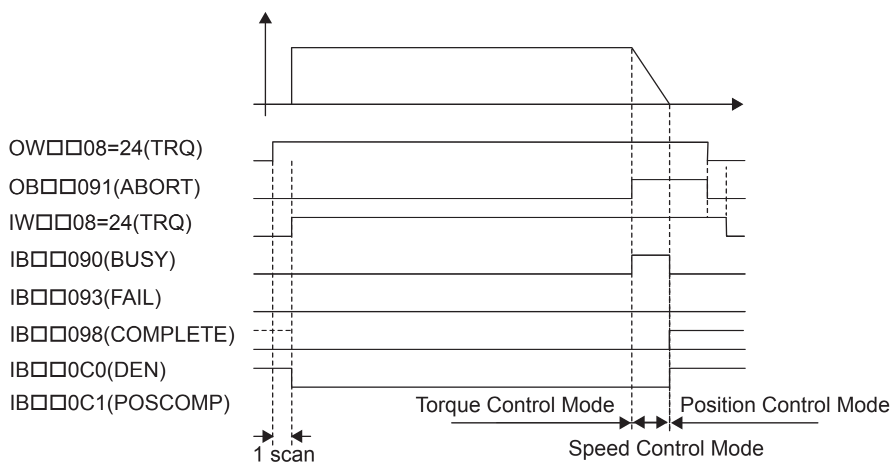


[b] Executed when Aborted

■ SVB-01

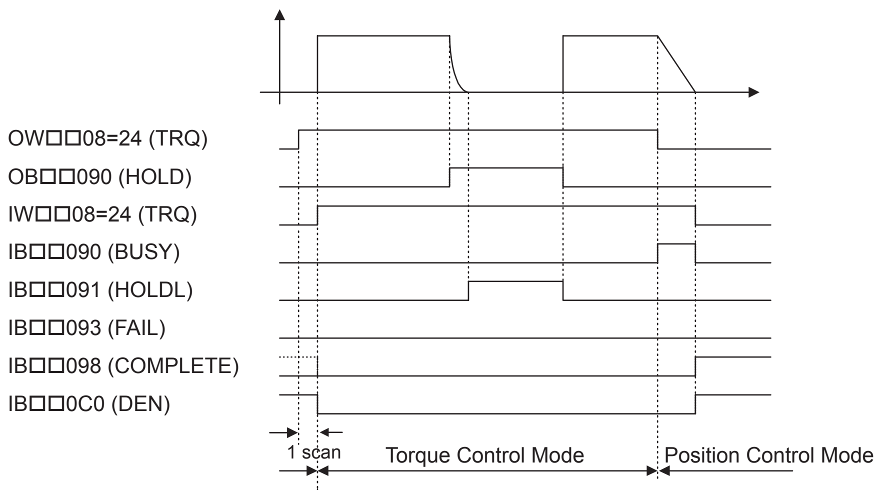


■ SVA-01

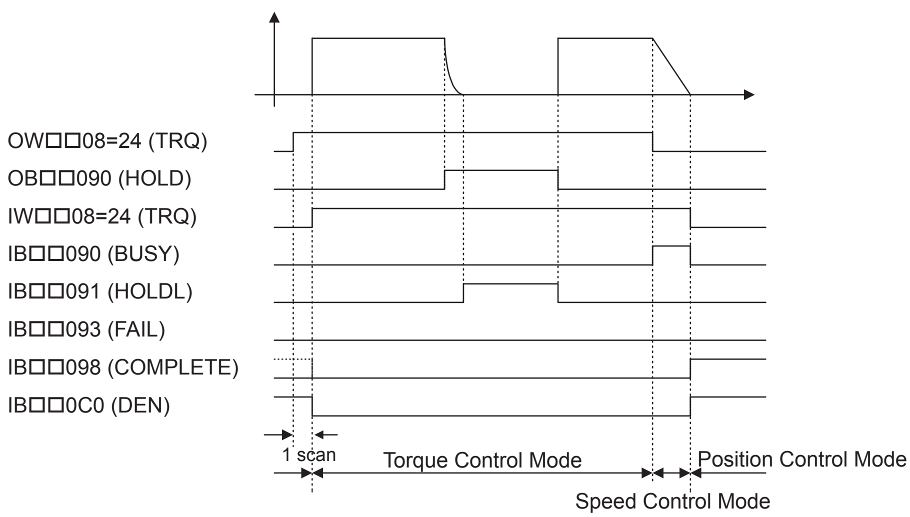


[c] Execution when Pausing

■ SVB-01

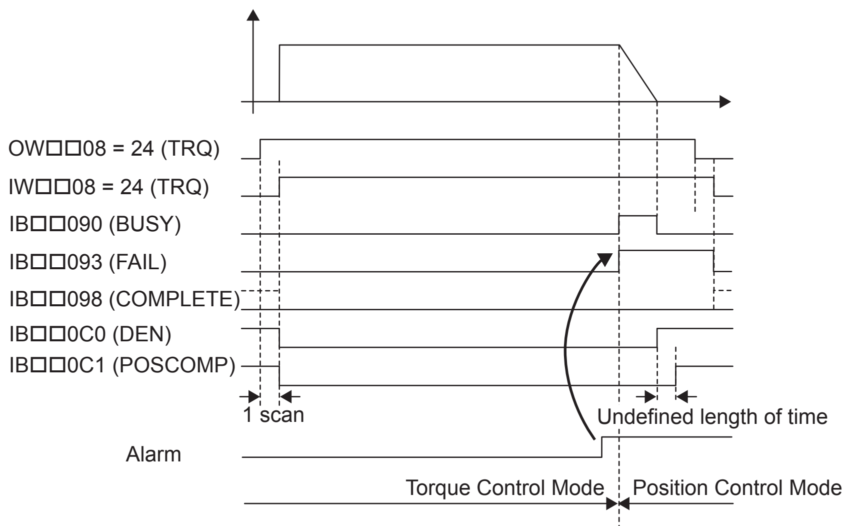


■ SVA-01

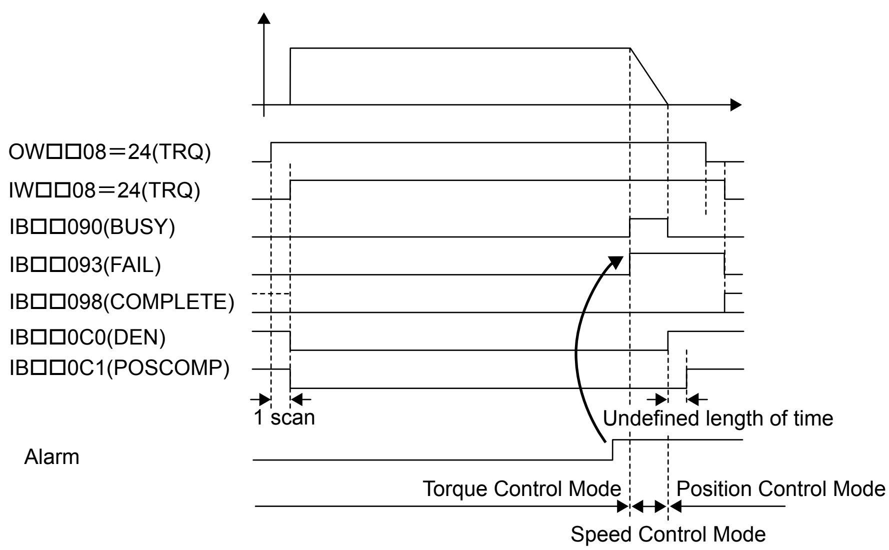


[d] Execution when an Alarm Occurs

■ SVB-01



■ SVA-01



5.2.24 Phase References (PHASE)

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.
Speed feed forward control cannot be used for the SGD-N or SGDB-N SERVOPACK, so the PHASE command cannot be used.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Speed Reference Setting: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Loop P/PI Switch: OW□□01
- Phase Bias Setting: OL□□28
- Speed Compensation: OW□□31

⇩

Execute the PHASE motion command.
- Set OW□□08 to 25.

⇩

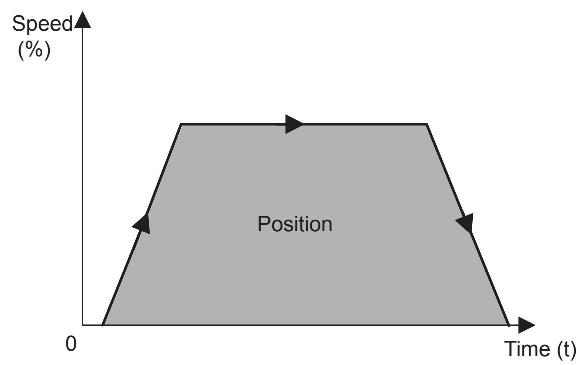
Sync operation using phase control starts.
- IW□□08 will be 25 during execution.

⇩

Operation in phase control mode

⇩

Execute another motion command to cancel the phase control mode.



- The speed can be changed during operation.
- Offset in the sync between the axes can be compensated.
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

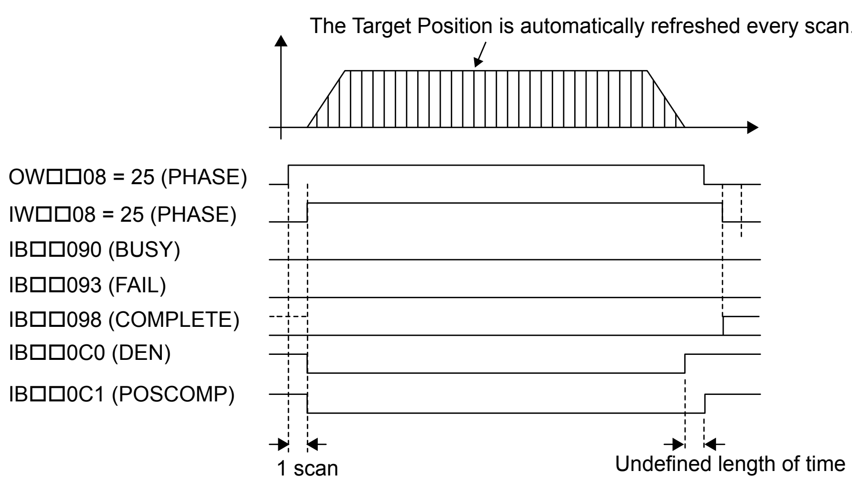
Parameter	Name	Setting	SVB-01	SVA-01
OB□□000	Servo ON	Turns the power to the Servomotor ON and OFF. 1: Power ON to Servomotor, 0: Power OFF to Servomotor Turn ON the power before setting the Motion Command Code (OW□□08) to 25.	Yes	Yes
OW□□03	Function 1	SVB-01: Sets the speed unit, acceleration/deceleration unit, and filter type.	Yes	
		SVA-01: Sets the acceleration/deceleration unit.		Yes
OB□□051	Disable Phase Reference Generation	Disables/enables phase reference generation processing when executing phase reference commands. Enable this processing when an electronic shaft is being used, and disable it when an electronic cam is being used.	Yes	
OW□□05	Disable Phase Reference Generation	Disables/enables adding a change in position equivalent to the reference speed to the target position. This parameter enables setting processing appropriate to an electronic shaft or electronic cam.		Yes
OW□□08	Motion Command	Phase control operation is started when this parameter is set to 25.	Yes	Yes
OL□□10	Speed Reference	Set the speed reference. The setting can be changed during operation. The unit depends on the setting of OW□□03.	Yes	Yes
OL□□16	Secondary Speed Compensation	Set the speed feed forward amount for the Phase Reference command (PHASE). The setting unit for Speed Amends (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.	Yes	
OL□□18	Speed Override	This parameter allows the moving speed to be changed without changing the Speed Reference (OL□□10). Set the override value as a percentage of the Speed Reference. 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		Yes
OL□□1E	Positioning Completed Width	Sets the range in which the Positioning Completed bit (IB□□0C1) will be ON.		Yes
OL□□20	Positioning Completed Width 2	Sets the range in which the Position Proximity bit (IB□□0C3) will be ON. The Position Proximity bit will be ON when the absolute value of the difference between the reference position and the feedback position is less than the value set here.		Yes
OL□□28	Phase Compensation	Set the number of bias pulses for phase compensation in pulses.	Yes	Yes
OW□□31	Speed Amends	Set the speed feed forward gain as a percentage of the rated speed.	Yes	
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.		Yes
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).	Yes	

[b] Monitoring Parameters

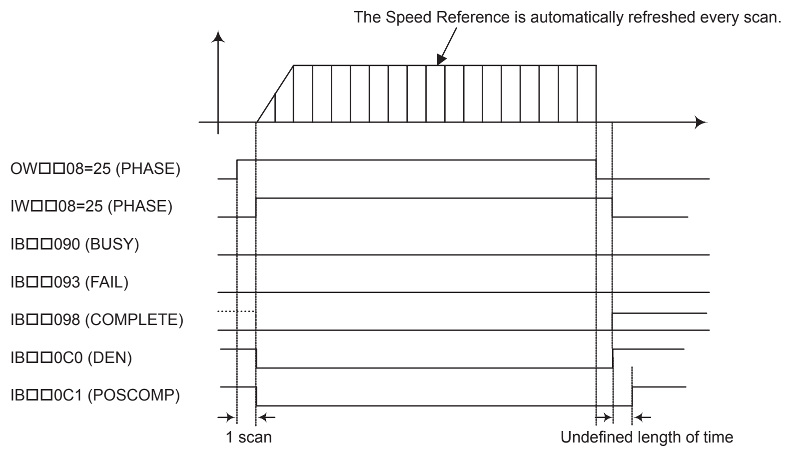
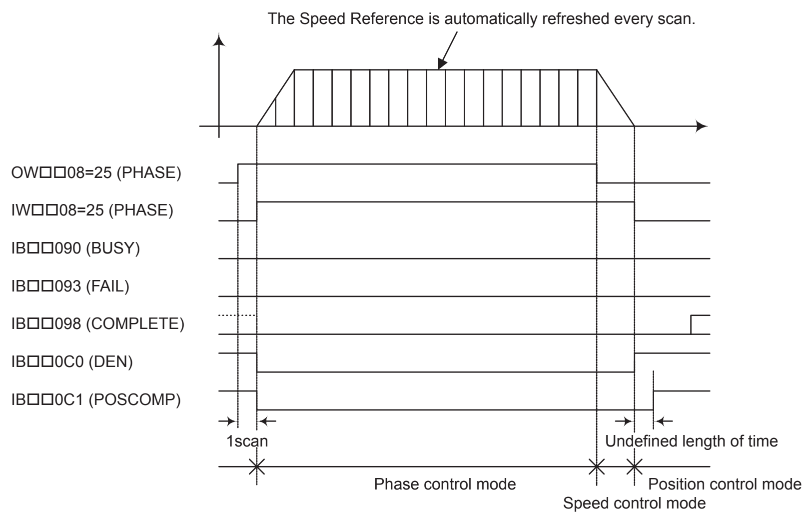
Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 25 during PHASE command execution.
IB□□090	Command Executing	Always OFF for PHASE command.
IB□□091	Command Hold Completed	Always OFF for PHASE command.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for PHASE command.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the positioning completed range. OFF in all other cases.
IB□□0C3	Position Proximity	The operation of this bit depends on the setting of Positioning Completed Width 2 (setting parameter OL□□20). • OL□□20 = 0: Turns ON when pulse distribution has been completed (DEN = ON). • OL□□20 ≠ 0: Turns ON when the absolute value of the difference between the Machine Coordinate Feedback Position (monitoring parameter IL□□16) and the Machine Coordinate System Position (monitoring parameter IL□□12) is less than the Position Completed Width 2, even if pulse distribution has not been completed. OFF in all other cases.

(4) Timing Charts

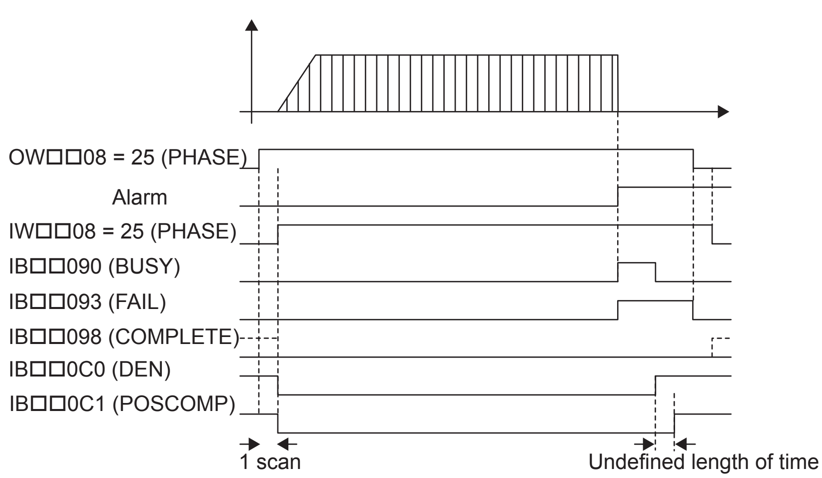
[a] Normal Execution



[b] Execution when Aborted

SVB-01	
SVA-01	

[c] Execution when an Alarm Occurs



5.2.25 Change Position Loop Integration Time Constant (KIS)

The KIS command transfers the setting of the Position Integration Time Constant (motion setting parameter OW□□32) to the Position Loop Integration Time Constant in the SERVOPACK and enables the setting.

(1) Operating Procedure

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 IB□□090 is OFF.

Execute the KIS motion command.
- Set OW□□08 to 26.

⇩

The Position Loop Integration Time Constant is set in the SERVOPACK and enabled.
- IW□□08 will be 26 during command execution.
- IB□□090 will be ON during command execution.

⇩

Parameter change completed.
- IW□□08 will be 26 and IB□□090 will be OFF.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

- With the MECHATROLINK-II, there is the function that the change of setting parameter is automatically updated. If utilizing this function, there is no need to execute KIS command. For details, refer to bit A (User Constants Self-Writing Function) in Fixed Parameter 1 (Function Selection 1).
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(2) Holding and Aborting

The Command Pause bit (OB□□090) and the Command Abort bit (OB□□091) cannot be used.

(3) Related Parameters

[a] Setting Parameters

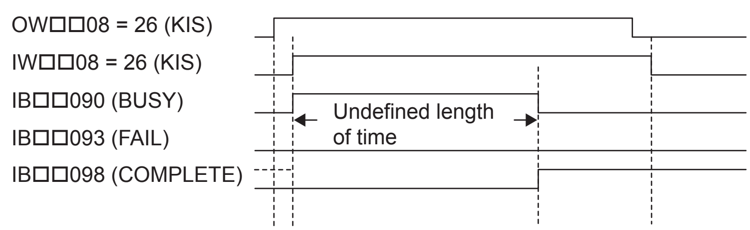
Parameter	Name	Setting
OW□□08	Motion Command	The integration time constant for the position loop is changed when this parameter is set to 26.
OB□□090	Command Pause	This parameter is ignored for KIS command.
OB□□091	Command Abort	This parameter is ignored for KIS command.
OW□□32	Position Integration Time Constant	Set the integration time constant for the position loop in milliseconds.

[b] Monitoring Parameters

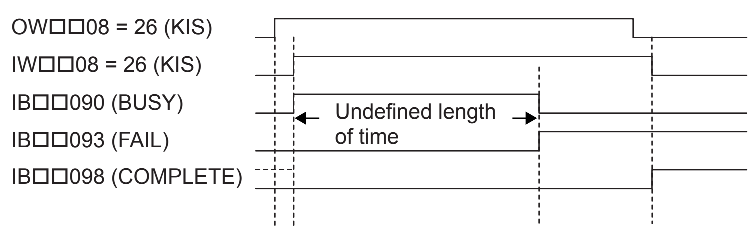
Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 26 during KIS command execution.
IB□□090	Command Executing	Turns ON during KIS command execution and turns OFF when execution has been completed.
IB□□091	Command Hold Completed	Always OFF for KIS command.
IB□□093	Command Error End	Turns ON if an error occurs during KIS command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when KIS command execution has been completed.

(4) Timing Charts

[a] Normal End



[b] Error End



5.3 Motion Subcommands

5.3.1 Motion Sub-command Table

Command Code	Name	Function
0	No Command (NOP)	This is a null command. When a subcommand is not being specified, set this “no command” code.
1	Read SERVOPACK Parameter (PRM_RD)	Reads the specified SERVOPACK parameter and stores it in the monitoring parameters.
2	Write SERVOPACK Parameter (PRM_WR)	Changes the specified SERVOPACK parameter's set value.
3	Reserved by system.	–
4	Monitor Status (SMON)	Stores the servo driver's status in the monitoring parameters.
5	Read Fixed Parameters (FIXPRM_RD)	Reads the specified fixed parameter's current value and stores it in the monitoring parameters.

5.3.2 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 *Appendix A.2 SVB-01 Module Motion Sub-command Execution Table* for details on which command combinations are allowed.
In addition, some motion commands can not be executed with the MECHATROLINK-I and MECHATROLINK-II communication. (See the following table.)

Subcommand	MECHATROLINK-I	MECHATROLINK-II (17-byte)	MECHATROLINK-II (32-byte)
No Command (NOP)	Executable	Executable	Executable
Read SERVOPACK Parameter (PRM_RD)	Not executable	Not executable	Executable
Write SERVOPACK Parameter (PRM_WR)	Not executable	Not executable	Executable
Monitor Status (SMON)	Not executable	Not executable	Executable
Read Fixed Parameters (FIXPRM_RD)	Executable	Executable	Executable

5.3.3 No Command (NOP)

Set this command when a subcommand is not being specified.
When the MECHATROLINK-II (32 byte) communications method is being used, User Monitor 4 can be used, just as with the Monitor Status (SMON) subcommand. Refer to *5.3.6 Monitor Status (SMON)* for details.

(1) Related Parameters

[a] Setting Parameters

Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	Set to 0 to specify no command (NOP).
OW□□4E	Servo User Monitor	Set the information to manage the servo driver that will 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 0 during NOP command execution.
IB□□0B0	Command Executing	Turns ON during NOP command execution and turns OFF when execution has been completed.
IB□□0B3	Command Error End	Turns ON if an error occurs during NOP command execution. Turns OFF when another command is executed.
IB□□0B8	Command Execution Completed *	Turns ON when NOP 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 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.

5.3.4 Read SERVOPACK Parameter (PRM_RD)

The PRM_RD command reads the setting of the SERVOPACK parameter with the specified parameter number and parameter size and stores the parameter number in Auxiliary Servo User Constant Number (monitoring parameter IW☐☐37) and the setting in the Auxiliary Servo User Constant (monitoring parameter IL☐☐3A).
The source read data is in the SERVOPACK's RAM.
This command will end with a Command Error End if it is executed with a communication method other than MECHATROLINK-II (32 byte).

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	Motion subcommand execution must be completed.	IW☐☐0A is 0 and IB☐☐0B0 is OFF.

Execute PRM_RD motion command.
- Set OW☐☐0A to 1.

⇩

The SERVOPACK parameter is read and stored in the monitoring parameters.
- IW☐☐0A will be 1 during command execution.
- IB☐☐0B0 will be ON during command processing.

⇩

Reading completed.
- IW☐☐0A is 1 and IB☐☐0B0 is OFF.

⇩

Execute NOP motion command.
- Set OW☐☐0A to 0.

(2) Related Parameters

[a] Setting Parameters

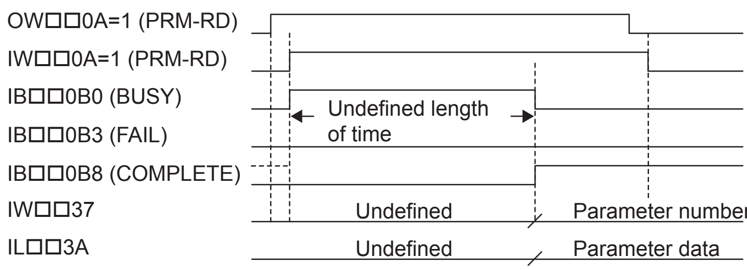
Parameter	Name	Setting Contents
OW☐☐0A	Motion Subcommand	The SERVOPACK parameter is read when this parameter is set to 1.
OW☐☐54	Auxiliary Servo User Constant Number	Set the parameter number of the SERVOPACK parameter to be read.
OW☐☐55	Auxiliary Servo Constant Number Size	Set the size of the SERVOPACK parameter to be read. Set the size in words. (Note) The SERVOPACK's user manual lists the size in bytes, so those values must be converted to words.

[b] Monitoring Parameters

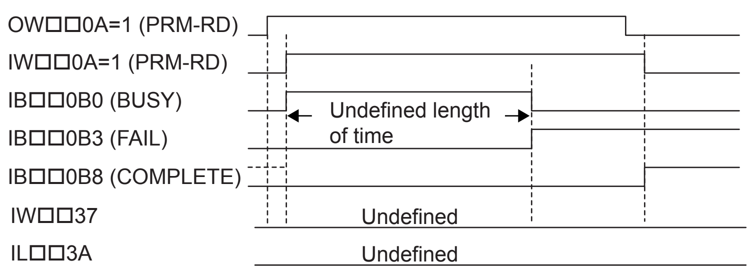
Parameter	Name	Monitoring Contents
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 1 during PRM_RD command execution.
IB□□0B0	Command Executing	Turns ON during PRM_RD command execution and turns OFF when execution has been completed.
IB□□0B3	Command Error End	Turns ON if an error occurs during PRM_RD command execution. Turns OFF when another command is executed.
IB□□0B8	Command Execution Completed	Turns ON when PRM_RD command execution has been completed.
IW□□37	Auxiliary Servo User Constant Number	Stores the parameter number of the SERVOPACK parameter being read.
IL□□3A	Auxiliary Servo User Constant	Stores the SERVOPACK parameter data that was read.

(3) Timing Charts

[a] Normal End



[b] Error End



5.3.5 Write SERVOPACK Parameter (PRM_WR)

The PRM_WR command writes 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 End if it is executed with a communication method other than MECHATROLINK-II (32 byte).

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	Motion subcommand execution must be completed.	IW□□0A is 0 and IB□□0B0 is OFF.

Execute PRM_WR motion subcommand.
- Set OW□□0A to 2.

⇩

Writes the SERVOPACK parameter.
- IW□□0A will be 2 during command execution.
- IB□□0B0 will be ON during command processing.

⇩

Write completed.
- IW□□0A is 2 and IB□□0B0 is OFF.

⇩

Execute NOP motion command.
- Set OW□□0A to 0.

(2) Related Parameters

[a] Setting Parameters

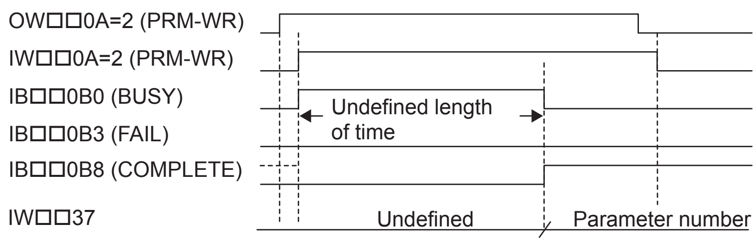
Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	The SERVOPACK parameter is written when this parameter is set to 2.
OW□□54	Auxiliary Servo User Constant Number	Set the number of the SERVOPACK parameter to write.
OW□□55	Auxiliary Servo Constant Number Size	Set the size of the SERVOPACK parameter to write. Set the size in words. (Note) The SERVOPACK's user manual lists the size in bytes, so those values must be converted to words.
OL□□57	Auxiliary Servo User Constant	Set the set value for the SERVOPACK parameter to write.

[b] Monitoring Parameters

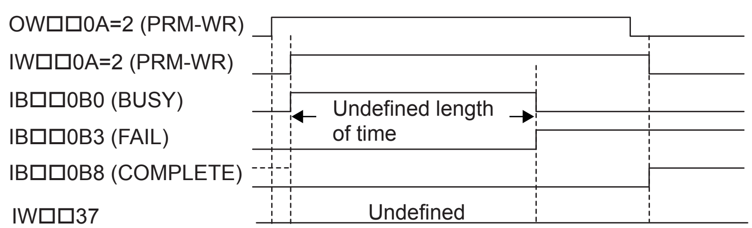
Parameter	Name	Monitoring Contents
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 2 during PRM_WR command execution.
IB□□0B0	Command Executing	Turns ON during PRM_WR command execution and turns OFF when execution has been completed.
IB□□0B3	Command Error End	Turns ON if an error occurs during PRM_WR command execution. Turns OFF when another command is executed.
IB□□0B8	Command Execution Completed	Turns ON when PRM_WR command execution has been completed.
IW□□37	Auxiliary Servo User Constant Number	Stores the parameter number of the SERVOPACK parameter that was written.

(3) Timing Charts

[a] Normal End



[b] Error End



5.3.6 Monitor Status (SMON)

When the SMON command is executed, the data specified in Monitor 4 of the Servo User Monitor is stored in Servo User Monitor 4 (monitoring parameter IL□□34).
The following table shows the data that can be specified in the User Monitor. Refer to your SERVOPACK manual for details on the monitored data.

Set Value	Name	Contents
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.)

This command will end with a Command Error End if it is executed with a communications method other than MECHATROLINK-II (32 byte).

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	Motion subcommand execution must be completed.	IW□□0A is 0 and IB□□0B0 is OFF.

Execute SMON motion subcommand.
- Set OW□□0A to 3.

⇩

Reads the information managed by the Servo Driver and stores the code in the monitoring parameter.
- IW□□0A will be 3 during command execution.
- IB□□0B0 will be ON during command processing.

⇩

Monitoring is completed.
- IW□□0A is 3 and IB□□0B0 is OFF.

⇩

Execute NOP motion command.
- Set OW□□0A to 0.

(2) Related Parameters

[a] Setting Parameters

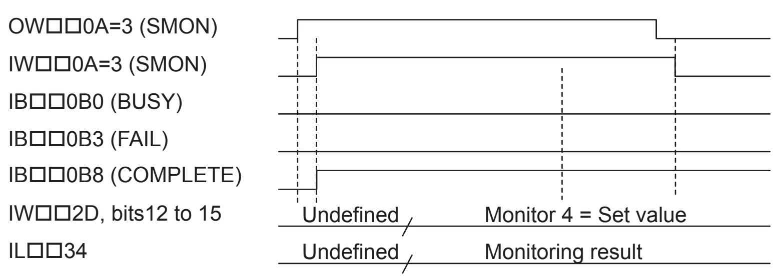
Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	The Monitor Status command is executed when this parameter is set to 3.
OW□□4E	Servo User Monitor	Set the information (managed by the Servo Driver) that you want to monitor.

[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 3 during SMON command execution.
IB□□0B0	Command Executing	Turns ON during SMON command execution and turns OFF when execution has been completed.
IB□□0B3	Command Error End	Turns ON if an error occurs during SMON command execution. Turns OFF when another command is executed.
IB□□0B8	Command Execution Completed	Turns ON when SMON command execution has been completed.
IW□□2F	Servo Driver User Monitor Information	Stores either the monitor selection or the data actually being monitored in the user monitor.
IL□□34	Servo User Monitor 4	Stores the result of the selected monitor operation.

(3) Timing Charts

[a] Normal End



5.3.7 Read Fixed Parameters (FIXPRM_RD)

Reads the current value of the specified fixed parameter and stores the value in the “Fixed Parameter Monitor” monitoring parameter.

(1) Operating Procedure

No.	Execution Conditions	Confirmation Method
1	Motion subcommand execution must be completed.	IW□□0A is 0 and IB□□0B0 is OFF.

Execute FIXPRM_RD motion subcommand.
- Set OW□□0A to 5.

⇩

Reads the specified fixed parameter's current value and stores the code in the monitoring parameter.
- IW□□0A will be 5 during command execution.
- IB□□0B0 will be ON during command processing.

⇩

Monitoring is completed.
- IW□□0A is 5 and IB□□0B0 is OFF.

⇩

Execute NOP motion command.
- Set IW□□0A to 0.

(2) Related Parameters

[a] Setting Parameters

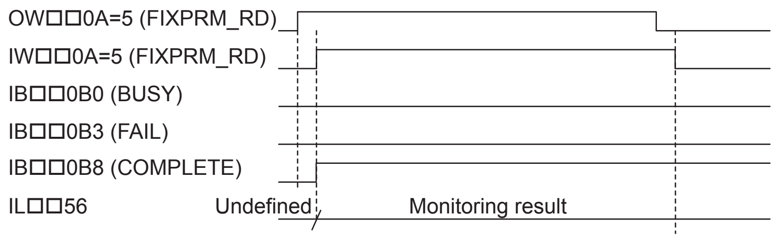
Parameter	Name	Setting Contents
OW□□0A	Motion Subcommand	The Read Fixed Parameter subcommand is executed when this parameter is set to 5.
OW□□5C	Fixed Parameter Number	Set the parameter number of the fixed parameter to be read.

[b] Monitoring Parameters

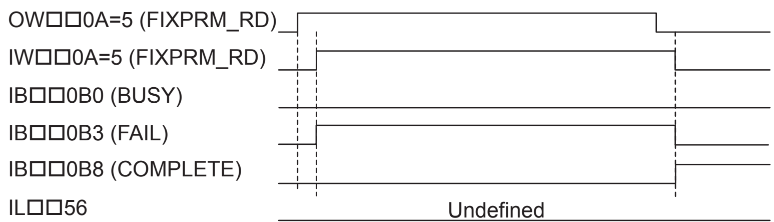
Parameter	Name	Monitoring Contents
IW□□0A	Motion Subcommand Response Code	Indicates the motion subcommand that is being executed. The response code is 5 during FIXPRM_RD command execution.
IB□□0B0	Command Executing	Turns ON during FIXPRM_RD command execution and turns OFF when execution has been completed.
IB□□0B3	Command Error End	Turns ON if an error occurs during FIXPRM_RD command execution. Turns OFF when another command is executed.
IB□□0B8	Command Execution Completed	Turns ON when FIXPRM_RD command execution has been completed.
IL□□56	Fixed Parameter Monitor	Stores the data of the specified fixed parameter number.

(3) Timing Charts

[a] Normal End



[b] Error End



6

Control Block Diagrams

This chapter explains the control block diagrams.

6.1 SVB-01 Module Control Block Diagrams

6.1.1 Position Control

(1) Motion Parameters for Position Control

[a] Fixed Parameters

No.	Name	Setting Unit	Default Value	Setting Range
0	Run Mode	–	1	0 to 5
1	Function Selection 1	–	0000h	Bit setting
2	Function Selection 2	–	0000h	Bit setting
4	Command Unit	–	0	0 to 3
5	Number of Decimal Places	–	3	0 to 5
6	Command Unit per Revolution	Reference unit	10000	1 to $2^{31}-1$
8	Gear Ratio (Motor)	–	1	1 to 65535
9	Gear Ratio (Load)	–	1	1 to 65535
10	Maximum Value of Rotary Counter (POSMAX)	Reference unit	360000	1 to $2^{31}-1$
12	Forward Software Limit	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
14	Reverse Software Limit	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
16	Backlash Compensation	Reference unit	0	-2^{31} to $2^{31}-1$
29	Motor Type	–	0	0, 1
30	Encoder Type	–	0	0 to 3
34	Rated Speed	min^{-1}	3000	1 to 32000
36	Encoder Resolution	pulse	65536	1 to $2^{31}-1$
38	Max. Revolution of Absolute Encoder	Rev	65534	0 to $2^{31}-1$
42	Feedback Speed Moving Average Time Constant	ms	10	0 to 32

[b] Setting Parameters

No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Commands	–	0000h	Bit setting
OW□□01	Mode 1	–	0000h	Bit setting
OW□□02	Mode 2	–	0000h	Bit setting
OW□□03	Function 1	–	0011h	Bit setting
OW□□04	Function 2	–	0033h	Bit setting
OW□□05	Function 3	–	0000h	Bit setting
OW□□08	Motion Command	–	0	0 to 26
OW□□09	Motion Command Options	–	0000h	Bit setting
OW□□0A	Motion Subcommand	–	0	0 to 65535
OL□□0C	Torque Reference	Depends on torque unit.	0	-2^{31} to $2^{31}-1$
OW□□0E	Speed Limit at Torque Reference	0.01%	15000	–32768 to 32767
OL□□10	Speed Reference	Depends on speed unit.	3000	-2^{31} to $2^{31}-1$
OL□□14	Positive Side Limiting Torque Setting at the Speed Reference	Depends on torque unit.	30000	-2^{31} to $2^{31}-1$
OL□□16	Secondary Speed Compensation	Depends on speed unit.	0	-2^{31} to $2^{31}-1$
OW□□18	Speed Override	0.01%	10000	0 to 32767
OL□□1C	Position Reference Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□1E	Positioning Completed Width	Reference unit	100	0 to 65535
OL□□20	Positioning Completed Width 2	Reference unit	0	0 to 65535
OL□□22	Deviation Abnormal Detection Value	Reference unit	$2^{31}-1$	0 to $2^{31}-1$
OW□□26	Position Complete Timeout	ms	0	0 to 65535
OL□□28	Phase Compensation	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□2A	Latch Zone Lower Limit (for External Positioning)	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
OL□□2C	Latch Zone Upper Limit (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 Compensation	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	Linear Acceleration Time	Depends on acceleration/ deceleration speed unit.	0	0 to $2^{31}-1$
OL□□38	Linear Deceleration Time	Depends on acceleration/ deceleration speed unit.	0	0 to $2^{31}-1$
OW□□3A	S-curve Acceleration Time	0.1 ms	0	0 to 65535
OW□□3C	Home Return Type	–	0	0 to 19
OW□□3D	Home Window	Reference unit	100	0 to 65535
OL□□3E	Approach Speed	Depends on speed unit.	1000	-2^{31} to $2^{31}-1$
OL□□40	Creep Speed	Depends on speed unit.	500	-2^{31} to $2^{31}-1$
OL□□42	Home Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□44	Step Distance	Reference unit	1000	0 to $2^{31}-1$

(cont'd)

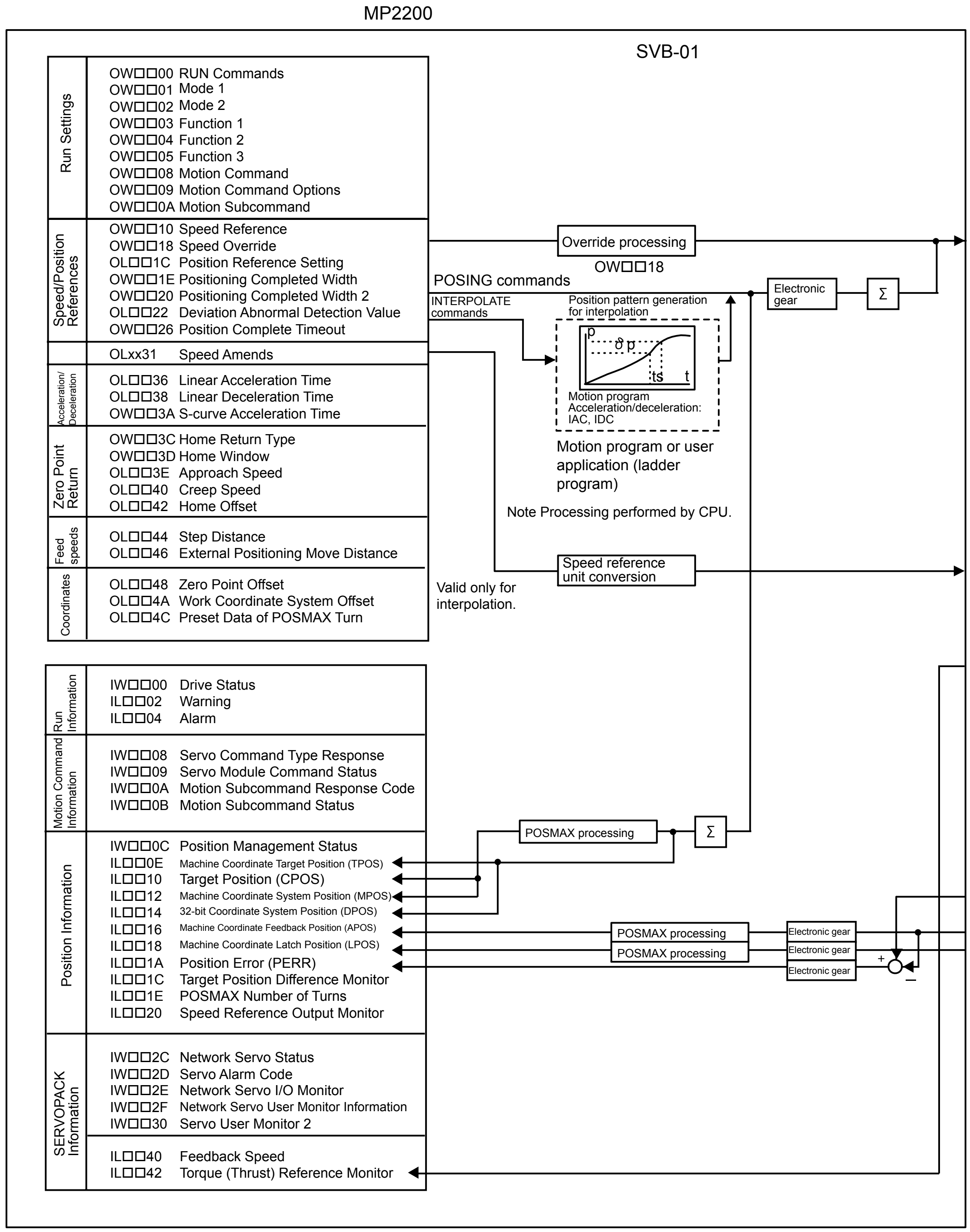
No.	Name	Setting Unit	Default Value	Setting Range
OL□□46	External Positioning Move Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□48	Zero Point Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□4A	Work Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□4C	Preset Data of POSMAX Turn	Rev	0	-2^{31} to $2^{31}-1$
OW□□4E	Servo User Monitor	–	0E00H	Bit setting
OW□□4F	Servo Alarm Monitor Number	–	0	0 to 10
OW□□50	Servo Constant Number	–	0	0 to 65535
OW□□51	Servo Constant Number Size	–	1	1, 2
OL□□52	Servo User Constant	–	0	-2^{31} to $2^{31}-1$
OW□□54	Auxiliary Servo User Constant Number	–	0	0 to 65535
OW□□55	Auxiliary Servo Constant Number Size	–	1	1, 2
OL□□56	Auxiliary Servo User Constant	–	0	-2^{31} to $2^{31}-1$
OW□□5C	Fixed Parameter Number	–	0	0 to 65535
OL□□5E	Absolute Position at Power OFF (Low Value)	pulse	0	-2^{31} to $2^{31}-1$
OL□□60	Absolute Position at Power OFF (High Value)	pulse	0	-2^{31} to $2^{31}-1$
OL□□62	Modularized Position at Power OFF (Low Value)	pulse	0	-2^{31} to $2^{31}-1$
OL□□64	Modularized Position at Power OFF (High Value)	pulse	0	-2^{31} to $2^{31}-1$

（Note） : These parameters are ignored.

[c] Monitoring Parameters

No.	Name	Unit	Default Value	Range
IW□□00	Drive Status	–	–	Bit setting
IW□□01	Over Range Parameter Number	–	–	0 to 65535
IL□□02	Warning	–	–	Bit setting
IL□□04	Alarm	–	–	Bit setting
IW□□08	Servo Command Type Response	–	–	0 to 65535
IW□□09	Servo Module Command Status	–	–	Bit setting
IW□□0A	Motion Subcommand Response Code	–	–	0 to 65535
IW□□0B	Motion Subcommand Status	–	–	Bit setting
IW□□0C	Position Management Status	–	–	Bit setting
IL□□0E	Machine Coordinate Target Position (TPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□10	Target Position (CPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□12	Machine Coordinate System Position (MPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□16	Machine Coordinate Feedback Position (APOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□18	Machine Coordinate 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	POSMAX Number of 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	Network Servo Status	–	–	Bit setting
IW□□2D	Servo Alarm Code	–	–	–32768 to 32767
IW□□2E	Network Servo I/O Monitor	–	–	Bit setting
IW□□2F	Network Servo User Monitor Information	–	–	Bit setting
IL□□30	Servo User Monitor 2	–	–	-2^{31} to $2^{31}-1$
IL□□34	Servo User Monitor 4	–	–	-2^{31} to $2^{31}-1$
IW□□36	Servo Constant Number	–	–	0 to 65535
IW□□37	Auxiliary Servo User Constant Number	–	–	0 to 65535
IL□□38	Servo User Constant	–	–	-2^{31} to $2^{31}-1$
IL□□3A	Auxiliary Servo User Constant	–	–	-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	Torque (Thrust) Reference Monitor	Depends on torque unit.	–	-2^{31} to $2^{31}-1$
IL□□56	Fixed Parameter Monitor	–	–	-2^{31} to $2^{31}-1$
IL□□5E	Absolute Position at Power OFF (Low Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□60	Absolute Position at Power OFF (High Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□62	Modularized Position at Power OFF (Low Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□64	Modularized Position at Power OFF (High Value)	pulse	–	-2^{31} to $2^{31}-1$

(2) Control Block Diagram for Position Control



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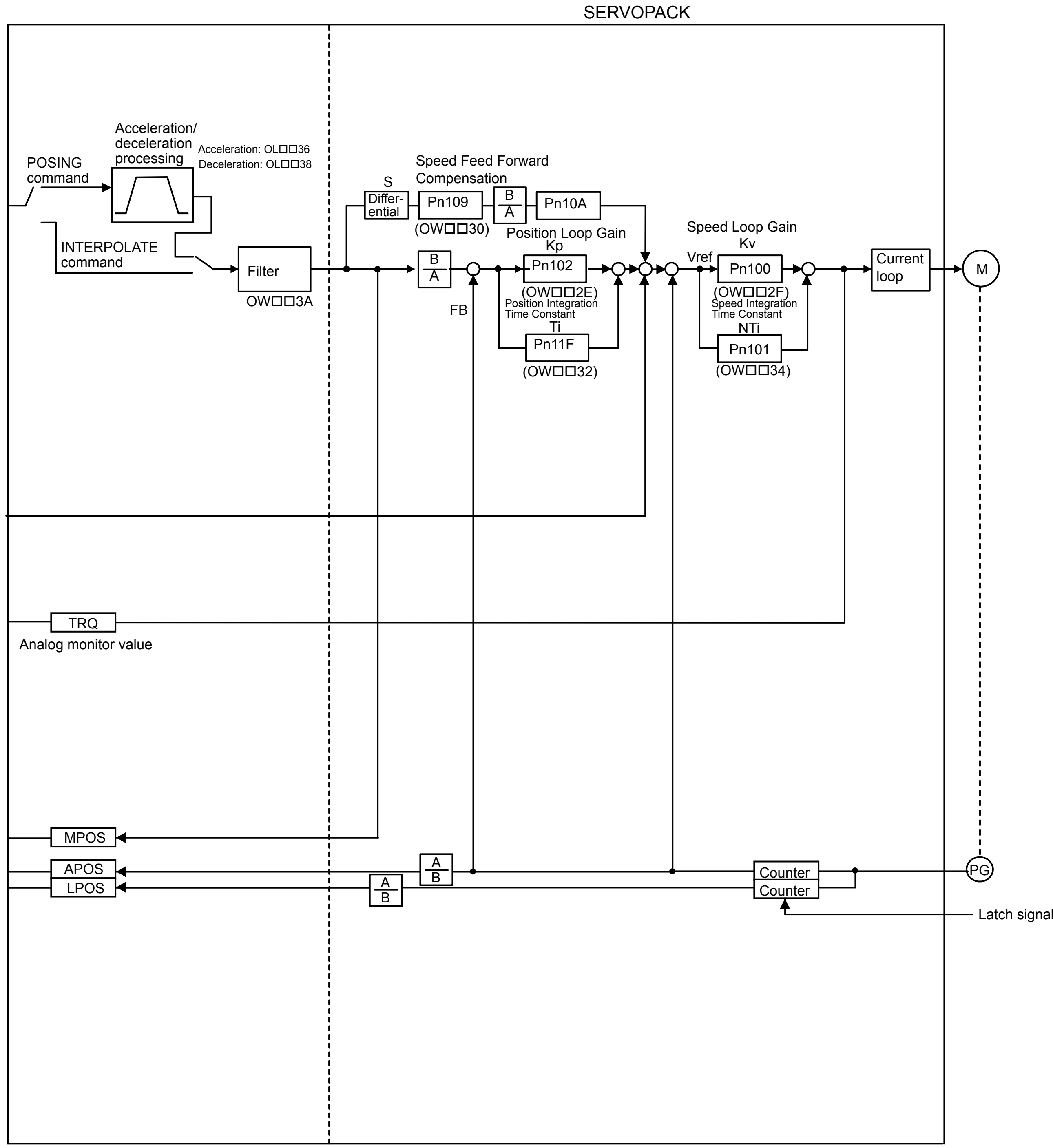

SERVOPACK
Acceleration/
deceleration
processing
Acceleration: OL□□36
Deceleration: OL□□38
POSING
command
INTERPOLATE
command
Filter
OW□□3A
S
Differ-
ential
Speed Feed Forward
Compensation
Pn109
(OW□□30)
B/A
Pn10A
Position Loop Gain
Kp
Pn102
(OW□□2E)
Position Integration
Time Constant
Ti
Pn11F
(OW□□32)
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

6.1.2 Phase Control

(1) Motion Parameters for Phase Control

[a] Fixed Parameters

No.	Name	Setting Unit	Default Value	Setting Range
0	Run Mode	–	1	0 to 5
1	Function Selection 1	–	0000h	Bit setting
2	Function Selection 2	–	0000h	Bit setting
4	Command Unit	–	0	0 to 3
5	Number of Decimal Places	–	3	0 to 5
6	Command Unit per Revolution	Reference unit	10000	1 to 2^{31}–1
8	Gear Ratio (Motor)	–	1	1 to 65535
9	Gear Ratio (Load)	–	1	1 to 65535
10	Maximum Value of Rotary Counter (POSMAX)	Reference unit	360000	1 to 2^{31}–1
12	Forward Software Limit	Reference unit	2^{31}–1	-2^{31} to 2^{31}–1
14	Reverse Software Limit	Reference unit	-2^{31}	-2^{31} to 2^{31}–1
16	Backlash Compensation	Reference unit	0	-2^{31} to 2^{31}–1
29	Motor Type	–	0	0, 1
30	Encoder Type	–	0	0 to 3
34	Rated Speed	min^{-1}	3000	1 to 32000
36	Encoder Resolution	pulse	65536	1 to 2^{31}–1
38	Max. Revolution of Absolute Encoder	Rev	65534	0 to 2^{31}–1
42	Feedback Speed Moving Average Time Constant	ms	10	0 to 32

[b] Setting Parameters

No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Commands	–	0000h	Bit setting
OW□□01	Mode 1	–	0000h	Bit setting
OW□□02	Mode 2	–	0000h	Bit setting
OW□□03	Function 1	–	0011h	Bit setting
OW□□04	Function 2	–	0033h	Bit setting
OW□□05	Function 3	–	0000h	Bit setting
OW□□08	Motion Command	–	0	0 to 26
OW□□09	Motion Command Options	–	0000h	Bit setting
OW□□0A	Motion Subcommand	–	0	0 to 65535
OL□□0C	Torque Reference	Depends on torque unit.	0	-2^{31} to $2^{31}-1$
OW□□0E	Speed Limit at Torque Reference	0.01%	15000	–32768 to 32767
OL□□10	Speed Reference	Depends on speed unit.	3000	-2^{31} to $2^{31}-1$
OL□□14	Positive Side Limiting Torque Setting at the Speed Reference	Depends on torque unit.	30000	-2^{31} to $2^{31}-1$
OL□□16	Secondary Speed Compensation	Depends on speed unit.	0	-2^{31} to $2^{31}-1$
OW□□18	Speed Override	0.01%	10000	0 to 32767
OL□□1C	Position Reference Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□1E	Positioning Completed Width	Reference unit	100	0 to 65535
OL□□20	Positioning Completed Width 2	Reference unit	0	0 to 65535
OL□□22	Deviation Abnormal Detection Value	Reference unit	$2^{31}-1$	0 to $2^{31}-1$
OW□□26	Position Complete Timeout	ms	0	0 to 65535
OL□□28	Phase Compensation	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□2A	Latch Zone Lower Limit	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
OL□□2C	Latch Zone Upper Limit	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 Compensation	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	Linear Acceleration Time	Depends on acceleration/ deceleration speed unit.	0	0 to $2^{31}-1$
OL□□38	Linear Deceleration Time	Depends on acceleration/ deceleration speed unit.	0	0 to $2^{31}-1$
OW□□3A	S-curve Acceleration Time	0.1 ms	0	0 to 65535
OW□□3C	Home Return Type	–	0	0 to 19
OW□□3D	Home Window	Reference unit	100	0 to 65535
OL□□3E	Approach Speed	Depends on speed unit.	1000	-2^{31} to $2^{31}-1$
OL□□40	Creep Speed	Depends on speed unit.	500	-2^{31} to $2^{31}-1$
OL□□42	Home Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□44	Step Distance	Reference unit	1000	0 to $2^{31}-1$
OL□□46	External Positioning Move Distance	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□48	Zero Point Offset	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□4A	Work Coordinate System Offset	Reference unit	0	-2^{31} to $2^{31}-1$

(cont'd)

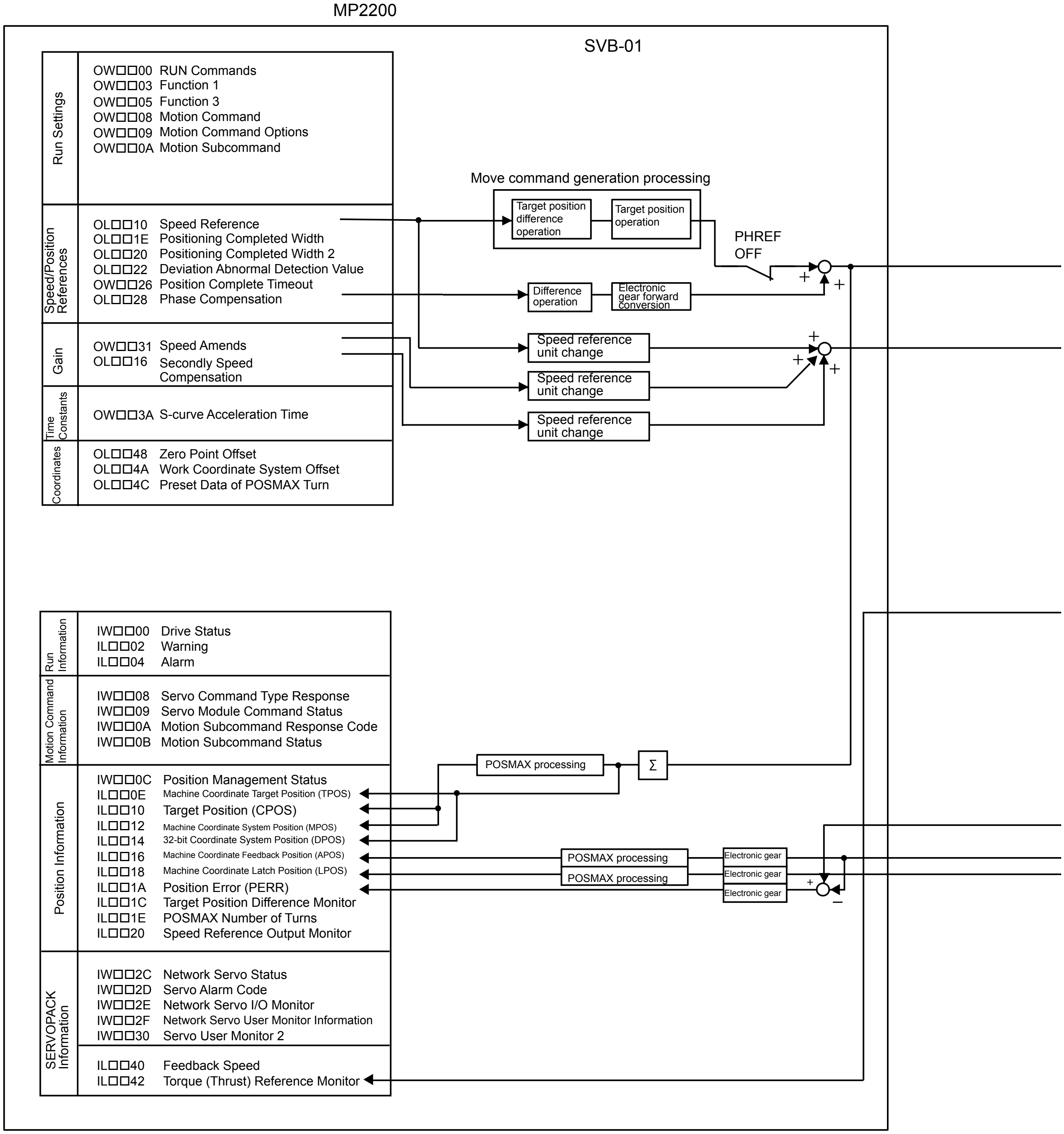
No.	Name	Setting Unit	Default Value	Setting Range
OL□□4C	Preset Data of POSMAX Turn	Rev	0	-2^{31} to $2^{31}-1$
OW□□4E	Servo User Monitor	–	0E00H	Bit setting
OW□□4F	Servo Alarm Monitor Number	–	0	0 to 10
OW□□50	Servo Constant Number	–	0	0 to 65535
OW□□51	Servo Constant Number Size	–	1	1, 2
OL□□52	Servo User Constant	–	0	-2^{31} to $2^{31}-1$
OW□□54	Auxiliary Servo User Constant Number	–	0	0 to 65535
OW□□55	Auxiliary Servo Constant Number Size	–	1	1, 2
OL□□56	Auxiliary Servo User Constant	–	0	-2^{31} to $2^{31}-1$
OW□□5C	Fixed Parameter Number	–	0	0 to 65535
OL□□5E	Absolute Position at Power OFF (Low Value)	pulse	0	-2^{31} to $2^{31}-1$
OL□□60	Absolute Position at Power OFF (High Value)	pulse	0	-2^{31} to $2^{31}-1$
OL□□62	Modularized Position at Power OFF (Low Value)	pulse	0	-2^{31} to $2^{31}-1$
OL□□64	Modularized Position at Power OFF (High Value)	pulse	0	-2^{31} to $2^{31}-1$

(Note) : These parameters are ignored.

[c] Monitoring Parameters

No.	Name	Unit	Default Value	Range
IW□□00	Drive Status	–	–	Bit setting
IW□□01	Over Range Parameter Number	–	–	0 to 65535
IL□□02	Warning	–	–	Bit setting
IL□□04	Alarm	–	–	Bit setting
IW□□08	Servo Command Type Response	–	–	0 to 65535
IW□□09	Servo Module Command Status	–	–	Bit setting
IW□□0A	Motion Subcommand Response Code	–	–	0 to 65535
IW□□0B	Motion Subcommand Status	–	–	Bit setting
IW□□0C	Position Management Status	–	–	Bit setting
IL□□0E	Machine Coordinate Target Position (TPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□10	Target Position (CPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□12	Machine Coordinate System Position (MPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□16	Machine Coordinate Feedback Position (APOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□18	Machine Coordinate 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	POSMAX Number of 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	Network Servo Status	–	–	Bit setting
IW□□2D	Servo Alarm Code	–	–	–32768 to 32767
IW□□2E	Network Servo I/O Monitor	–	–	Bit setting
IW□□2F	Network Servo User Monitor Information	–	–	Bit setting
IL□□30	Servo User Monitor 2	–	–	-2^{31} to $2^{31}-1$
IL□□34	Servo User Monitor 4	–	–	-2^{31} to $2^{31}-1$
IW□□36	Servo Constant Number	–	–	0 to 65535
IW□□37	Auxiliary Servo User Constant Number	–	–	0 to 65535
IL□□38	Servo User Constant	–	–	-2^{31} to $2^{31}-1$
IL□□3A	Auxiliary Servo User Constant	–	–	-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	Torque (Thrust) Reference Monitor	Depends on torque unit.	–	-2^{31} to $2^{31}-1$
IL□□56	Fixed Parameter Monitor	—	–	-2^{31} to $2^{31}-1$
IL□□5E	Absolute Position at Power OFF (Low Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□60	Absolute Position at Power OFF (High Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□62	Modularized Position at Power OFF (Low Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□64	Modularized Position at Power OFF (High Value)	pulse	–	-2^{31} to $2^{31}-1$

(2) Control Block Diagram for Phase Control



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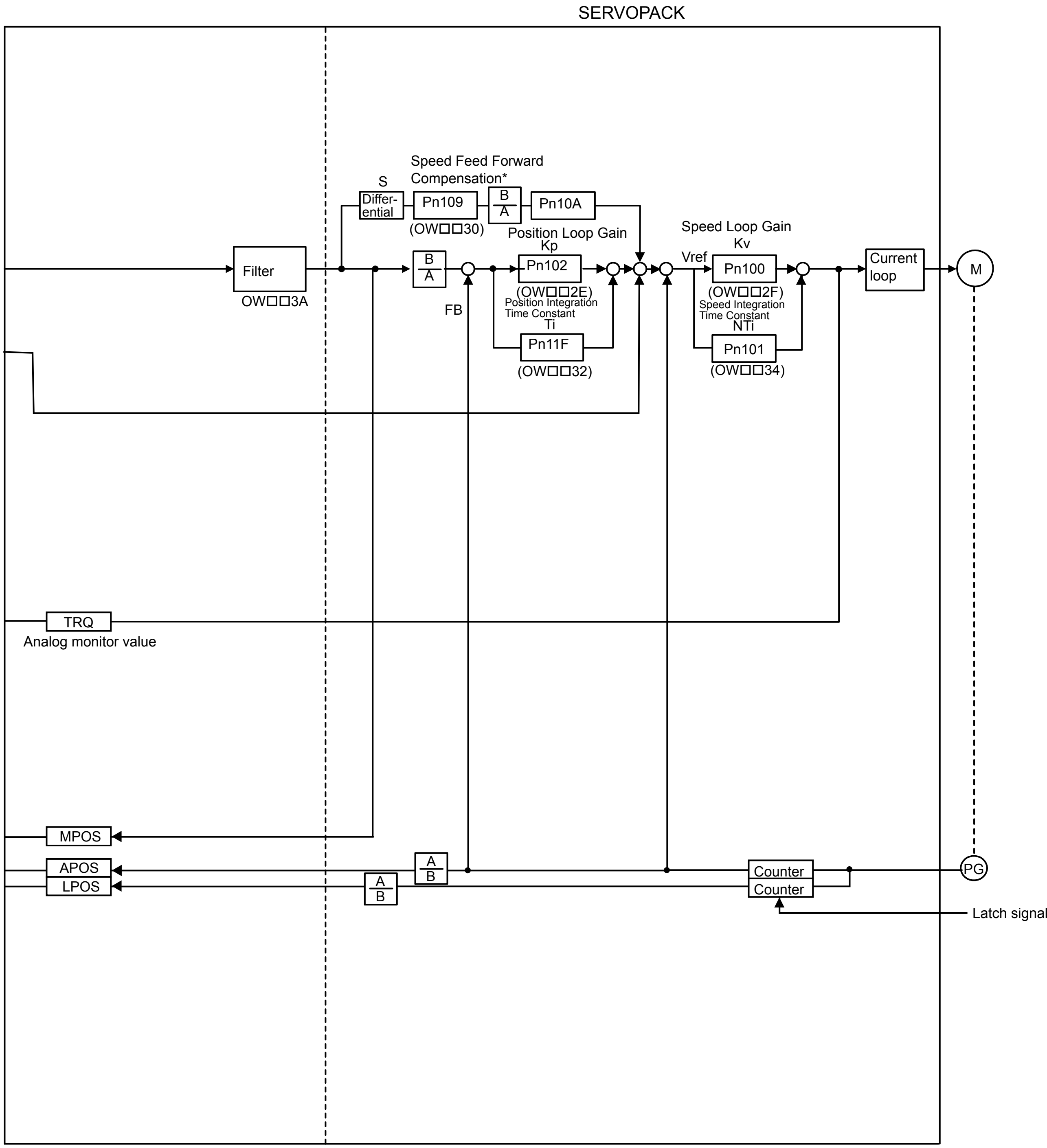


* The speed feedback gain is 0 for phase references.

6.1.3 Torque Control

(1) Motion Parameters for Torque Control

[a] Fixed Parameters

No.	Name	Setting Unit	Default Value	Setting Range
0	Run Mode	–	1	0 to 5
1	Function Selection 1	–	0000h	Bit setting
2	Function Selection 2	–	0000h	Bit setting
4	Command Unit	–	0	0 to 3
5	Number of Decimal Places	–	3	0 to 5
6	Command Unit per Revolution	Reference unit	10000	1 to $2^{31}-1$
8	Gear Ratio (Motor)	–	1	1 to 65535
9	Gear Ratio (Load)	–	1	1 to 65535
10	Maximum Value of Rotary Counter (POSMAX)	Reference unit	360000	1 to $2^{31}-1$
12	Forward Software Limit	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$
14	Reverse Software Limit	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
16	Backlash Compensation	Reference unit	0	-2^{31} to $2^{31}-1$
29	Motor Type	–	0	0, 1
30	Encoder Type	–	0	0 to 3
34	Rated Speed	min^{-1}	3000	1 to 32000
36	Encoder Resolution	pulse	65536	1 to $2^{31}-1$
38	Max. Revolution of Absolute Encoder	Rev	65534	0 to $2^{31}-1$
42	Feedback Speed Moving Average Time Constant	ms	10	0 to 32

[b] Setting Parameters

No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Commands	–	0000h	Bit setting
OW□□01	Mode 1	–	0000h	Bit setting
OW□□02	Mode 2	–	0000h	Bit setting
OW□□03	Function 1	–	0011h	Bit setting
OW□□04	Function 2	–	0033h	Bit setting
OW□□05	Function 3	–	0000h	Bit setting
OW□□08	Motion Command	–	0	0 to 26
OW□□09	Motion Command Options	–	0000h	Bit setting
OW□□0A	Motion Subcommand	–	0	0 to 65535
OL□□0C	Torque Reference	Depends on torque unit.	0	-2^{31} to $2^{31}-1$
OW□□0E	Speed Limit at Torque Reference	0.01%	15000	−32768 to 32767
OL□□10	Speed Reference	Depends on speed unit.	3000	-2^{31} to $2^{31}-1$
OL□□14	Positive Side Limiting Torque Setting at the Speed Reference	Depends on torque unit.	30000	-2^{31} to $2^{31}-1$
OL□□16	Secondary Speed Compensation	Depends on speed unit.	0	-2^{31} to $2^{31}-1$
OW□□18	Speed Override	0.01%	10000	0 to 32767
OL□□1C	Position Reference Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□1E	Positioning Completed Width	Reference unit	100	0 to 65535
OL□□20	Positioning Completed Width 2	Reference unit	0	0 to 65535
OL□□22	Deviation Abnormal Detection Value	Reference unit	$2^{31}-1$	0 to $2^{31}-1$
OW□□26	Position Complete Timeout	ms	0	0 to 65535
OL□□28	Phase Compensation	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□2A	Latch Zone Lower Limit	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
OL□□2C	Latch Zone Upper Limit	Reference unit	$2^{31}-1$	-2^{31} to $2^{31}-1$

(cont'd)

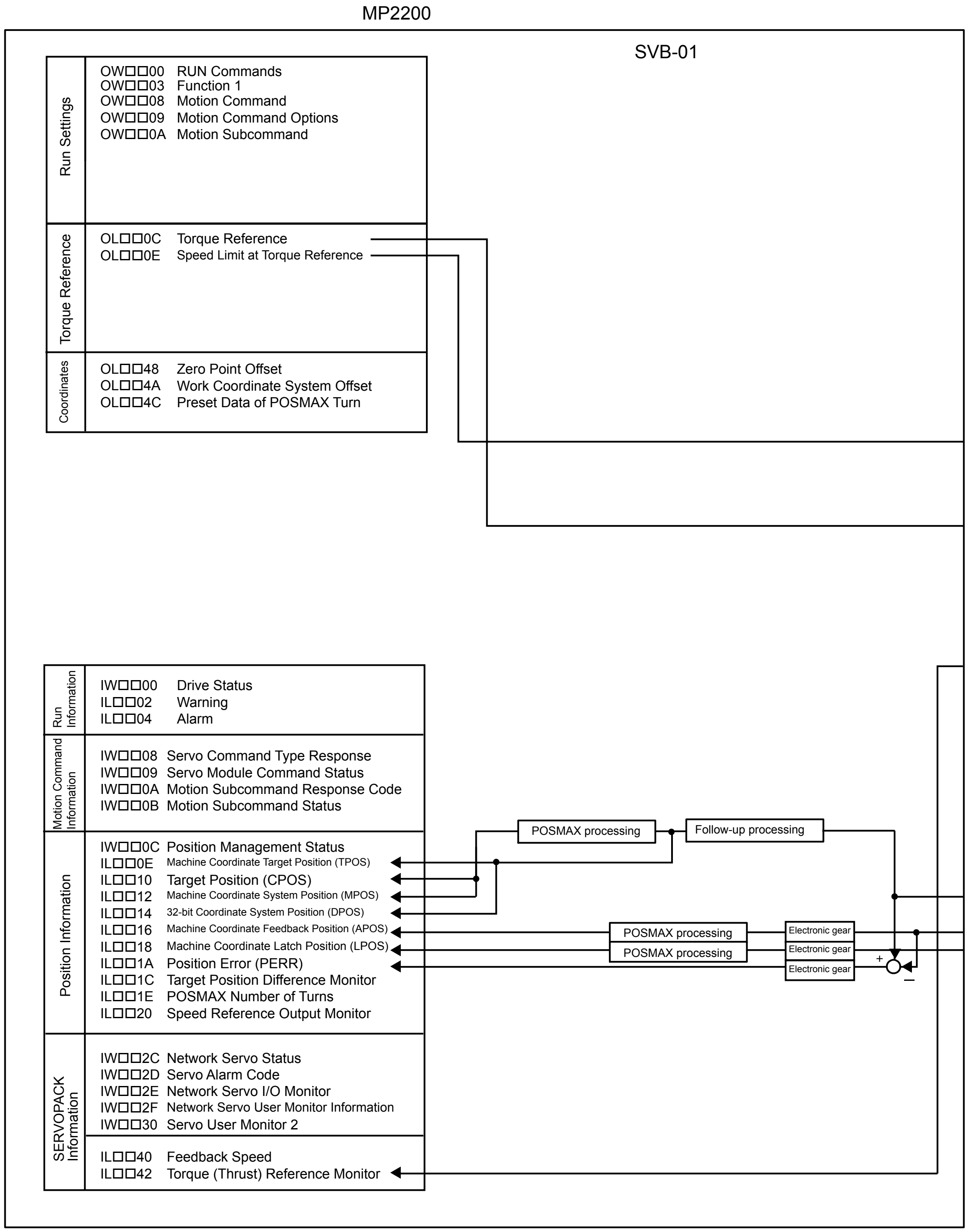
No.	Name	Setting Unit	Default Value	Setting Range
OW□□2E	Position Loop Gain	0.1 /s	300	0 to 32767
OW□□2F	Speed Loop Gain	Hz	40	1 to 2000
OW□□30	Speed Feed Forward Compensation	0.01%	0	0 to 32767
OW□□31	Speed Amends	0.01%	0	-32768 to 32767
OW□□32	Position Integration Time Constant	ms	0	0 to 32767
OW□□34	Speed Integration Time Constant	0.01 ms	2000	15 to 65535
OL□□36	Linear Acceleration Time	Depends on acceleration/ deceleration speed unit.	0	0 to 2^{31}–1
OL□□38	Linear Deceleration Time	Depends on acceleration/ deceleration speed unit.	0	0 to 2^{31}–1
OW□□3A	S-curve Acceleration Time	0.1 ms	0	0 to 65535
OW□□3C	Home Return Type	–	0	0 to 19
OW□□3D	Home Window	Reference unit	100	0 to 65535
OL□□3E	Approach Speed	Depends on speed unit.	1000	-2^{31} to 2^{31}–1
OL□□40	Creep Speed	Depends on speed unit.	500	-2^{31} to 2^{31}–1
OL□□42	Home Offset	Reference unit	0	-2^{31} to 2^{31}–1
OL□□44	Step Distance	Reference unit	1000	0 to 2^{31}–1
OL□□46	External Positioning Move Distance	Reference unit	0	-2^{31} to 2^{31}–1
OL□□48	Zero Point 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
OL□□4C	Preset Data of POSMAX Turn	Rev	0	-2^{31} to 2^{31}–1
OW□□4E	Servo User Monitor	–	0E00H	Bit setting
OW□□4F	Servo Alarm Monitor Number	–	0	0 to 10
OW□□50	Servo Constant Number	–	0	0 to 65535
OW□□51	Servo Constant Number Size	–	1	1, 2
OL□□52	Servo User Constant	–	0	-2^{31} to 2^{31}–1
OW□□54	Auxiliary Servo User Constant Number	–	0	0 to 65535
OW□□55	Auxiliary Servo Constant Number Size	–	1	1, 2
OL□□56	Auxiliary Servo User Constant	–	0	-2^{31} to 2^{31}–1
OW□□5C	Fixed Parameter Number	–	0	0 to 65535
OL□□5E	Absolute Position at Power OFF (Low Value)	pulse	0	-2^{31} to 2^{31}–1
OL□□60	Absolute Position at Power OFF (High Value)	pulse	0	-2^{31} to 2^{31}–1
OL□□62	Modularized Position at Power OFF (Low Value)	pulse	0	-2^{31} to 2^{31}–1
OL□□64	Modularized Position at Power OFF (High Value)	pulse	0	-2^{31} to 2^{31}–1

(Note) ▭ : These parameters are ignored.

[c] Monitoring Parameters

No.	Name	Unit	Default Value	Range
IW□□00	Drive Status	–	–	Bit setting
IW□□01	Over Range Parameter Number	–	–	0 to 65535
IL□□02	Warning	–	–	Bit setting
IL□□04	Alarm	–	–	Bit setting
IW□□08	Servo Command Type Response	–	–	0 to 65535
IW□□09	Servo Module Command Status	–	–	Bit setting
IW□□0A	Motion Subcommand Response Code	–	–	0 to 65535
IW□□0B	Motion Subcommand Status	–	–	Bit setting
IW□□0C	Position Management Status	–	–	Bit setting
IL□□0E	Machine Coordinate Target Position (TPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□10	Target Position (CPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□12	Machine Coordinate System Position (MPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□16	Machine Coordinate Feedback Position (APOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL□□18	Machine Coordinate 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	POSMAX Number of 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	Network Servo Status	–	–	Bit setting
IW□□2D	Servo Alarm Code	–	–	–32768 to 32767
IW□□2E	Network Servo I/O Monitor	–	–	Bit setting
IW□□2F	Network Servo User Monitor Information	–	–	Bit setting
IL□□30	Servo User Monitor 2	–	–	-2^{31} to $2^{31}-1$
IL□□34	Servo User Monitor 4	–	–	-2^{31} to $2^{31}-1$
IW□□36	Servo Constant Number	–	–	0 to 65535
IW□□37	Auxiliary Servo User Constant Number	–	–	0 to 65535
IL□□38	Servo User Constant	–	–	-2^{31} to $2^{31}-1$
IL□□3A	Auxiliary Servo User Constant	–	–	-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	Torque (Thrust) Reference Monitor	Depends on torque unit.	–	-2^{31} to $2^{31}-1$
IL□□56	Fixed Parameter Monitor	–	–	-2^{31} to $2^{31}-1$
IL□□5E	Absolute Position at Power OFF (Low Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□60	Absolute Position at Power OFF (High Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□62	Modularized Position at Power OFF (Low Value)	pulse	–	-2^{31} to $2^{31}-1$
IL□□64	Modularized Position at Power OFF (High Value)	pulse	–	-2^{31} to $2^{31}-1$

(2) Control Block Diagram for Torque Control



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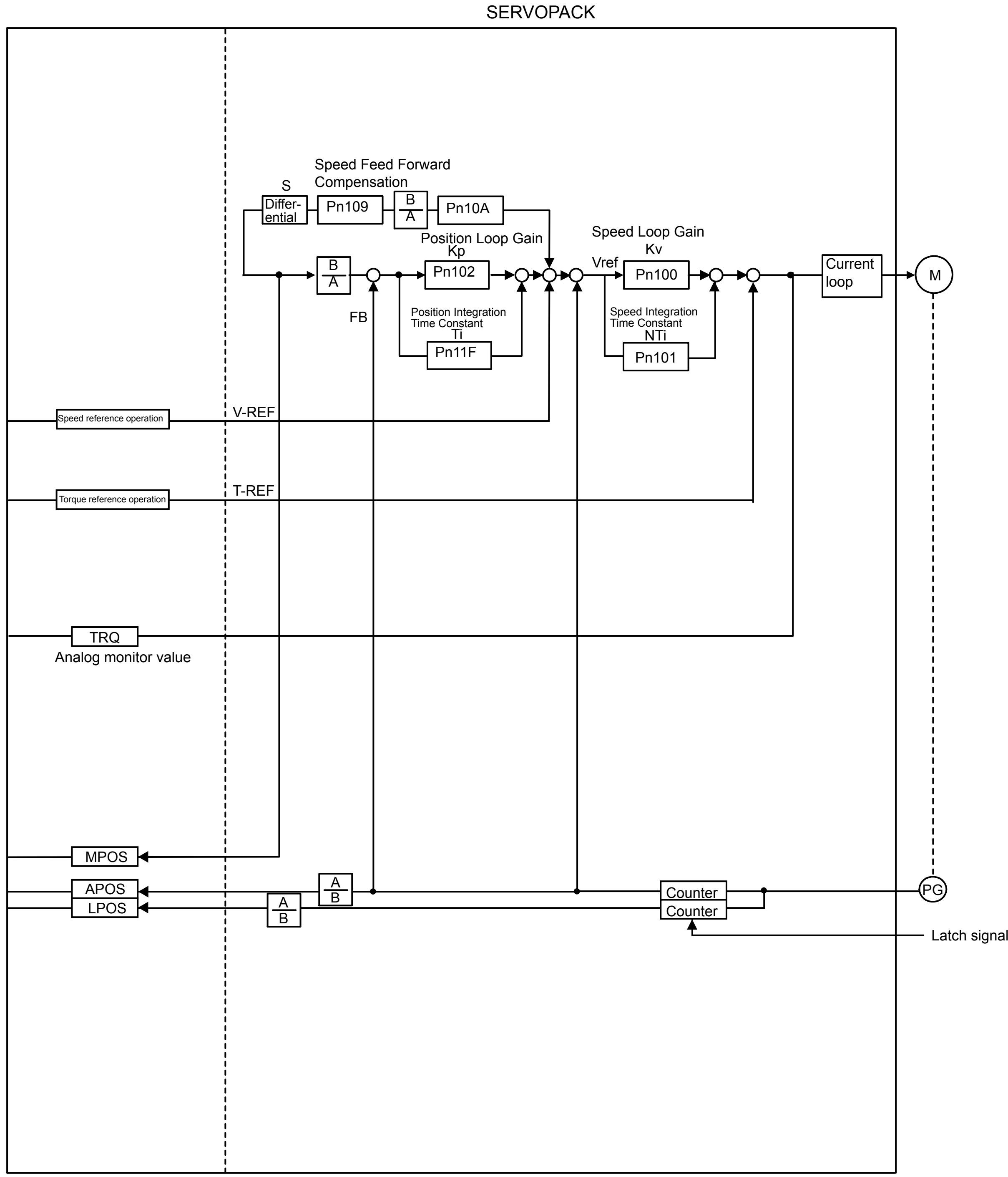

SERVOPACK
S
Differ-
ential
Speed Feed Forward
Compensation
Pn109
B
A
Pn10A
Position Loop Gain
Kp
Pn102
Speed Loop Gain
Kv
Vref
Pn100
Current
loop
M
FB
Position Integration
Time Constant
Ti
Pn11F
Speed Integration
Time Constant
NTi
Pn101
Speed reference operation
V-REF
Torque reference operation
T-REF
TRQ
Analog monitor value
MPOS
APOS
LPOS
Counter
Counter
PG
Latch signal

6.1.4 Speed Control

(1) Motion Parameters for Speed Control

[a] Fixed Parameters

No.	Name	Setting Unit	Default Value	Setting Range
0	Run Mode	–	1	0 to 5
1	Function Selection 1	–	0000h	Bit setting
2	Function Selection 2	–	0000h	Bit setting
4	Command Unit	–	0	0 to 3
5	Number of Decimal Places	–	3	0 to 5
6	Command Unit per Revolution	Reference unit	10000	1 to 2^{31}–1
8	Gear Ratio (Motor)	–	1	1 to 65535
9	Gear Ratio (Load)	–	1	1 to 65535
10	Maximum Value of Rotary Counter (POSMAX)	Reference unit	360000	1 to 2^{31}–1
12	Forward Software Limit	Reference unit	2^{31}–1	–2^{31} to 2^{31}–1
14	Reverse Software Limit	Reference unit	–2^{31}	–2^{31} to 2^{31}–1
16	Backlash Compensation	Reference unit	0	–2^{31} to 2^{31}–1
29	Motor Type	–	0	0, 1
30	Encoder Type	–	0	0 to 3
34	Rated Speed	min^{-1}	3000	1 to 32000
36	Encoder Resolution	pulse	65536	1 to 2^{31}–1
38	Max. Revolution of Absolute Encoder	Rev	65534	0 to 2^{31}–1
42	Feedback Speed Moving Average Time Constant	ms	10	0 to 32

[b] Setting Parameters

No.	Name	Setting Unit	Default Value	Setting Range
OW□□00	RUN Commands	–	0000h	Bit setting
OW□□01	Mode 1	–	0000h	Bit setting
OW□□02	Mode 2	–	0000h	Bit setting
OW□□03	Function 1	–	0011h	Bit setting
OW□□04	Function 2	–	0033h	Bit setting
OW□□05	Function 3	–	0000h	Bit setting
OW□□08	Motion Command	–	0	0 to 26
OW□□09	Motion Command Options	–	0000h	Bit setting
OW□□0A	Motion Subcommand	–	0	0 to 65535
OL□□0C	Torque Reference	Depends on torque unit.	0	-2^{31} to $2^{31}-1$
OW□□0E	Speed Limit at Torque Reference	0.01%	15000	–32768 to 32767
OL□□10	Speed Reference	Depends on speed unit.	3000	-2^{31} to $2^{31}-1$
OL□□14	Positive Side Limiting Torque Setting at the Speed Reference	Depends on torque unit.	30000	-2^{31} to $2^{31}-1$
OL□□16	Secondary Speed Compensation	Depends on speed unit.	0	-2^{31} to $2^{31}-1$
OW□□18	Speed Override	0.01%	10000	0 to 32767
OL□□1C	Position Reference Setting	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□1E	Positioning Completed Width	Reference unit	100	0 to 65535
OL□□20	Positioning Completed Width 2	Reference unit	0	0 to 65535
OL□□22	Deviation Abnormal Detection Value	Reference unit	$2^{31}-1$	0 to $2^{31}-1$
OW□□26	Position Complete Timeout	ms	0	0 to 65535
OL□□28	Phase Compensation	Reference unit	0	-2^{31} to $2^{31}-1$
OL□□2A	Latch Zone Lower Limit	Reference unit	-2^{31}	-2^{31} to $2^{31}-1$
OL□□2C	Latch Zone Upper Limit	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 Compensation	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

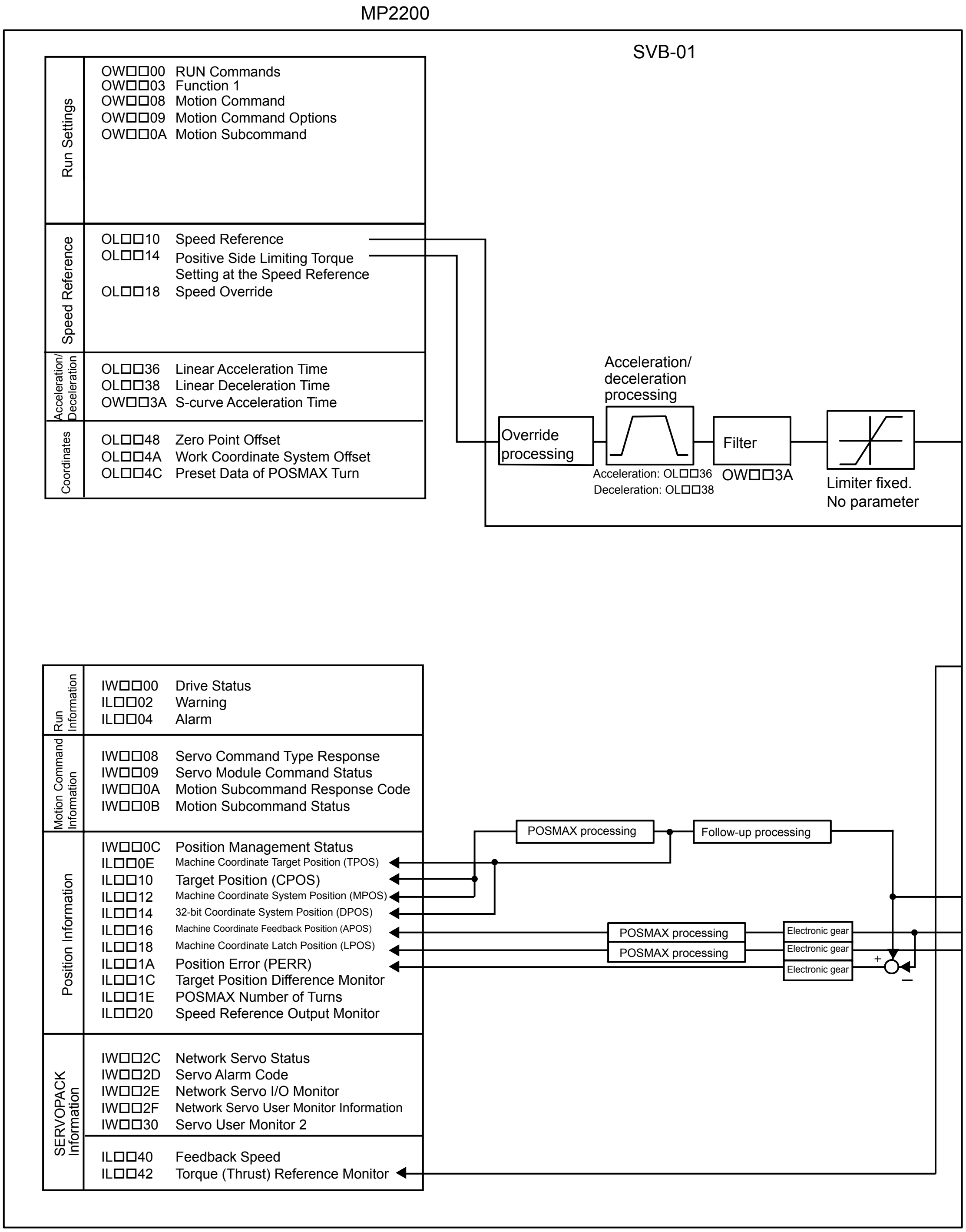
OW□□34	Speed Integration Time Constant	0.01 ms	2000	15 to 65535
OL□□36	Linear Acceleration Time	Depends on acceleration/ deceleration speed unit.	0	0 to 2^{31}–1
OL□□38	Linear Deceleration Time	Depends on acceleration/ deceleration speed unit.	0	0 to 2^{31}–1
OW□□3A	S-curve Acceleration Time	0.1 ms	0	0 to 65535
OW□□3C	Home Return Type	–	0	0 to 19
OW□□3D	Home Window	Reference unit	100	0 to 65535
OL□□3E	Approach Speed	Depends on speed unit.	1000	-2^{31} to 2^{31}–1
OL□□40	Creep Speed	Depends on speed unit.	500	-2^{31} to 2^{31}–1
OL□□42	Home Offset	Reference unit	0	-2^{31} to 2^{31}–1
OL□□44	Step Distance	Reference unit	1000	0 to 2^{31}–1
OL□□46	External Positioning Move Distance	Reference unit	0	-2^{31} to 2^{31}–1
OL□□48	Zero Point 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
OL□□4C	Preset Data of POSMAX Turn	Rev	0	-2^{31} to 2^{31}–1
OW□□4E	Servo User Monitor	–	0E00H	Bit setting
OW□□4F	Servo Alarm Monitor Number	–	0	0 to 10
OW□□50	Servo Constant Number	–	0	0 to 65535
OW□□51	Servo Constant Number Size	–	1	1, 2
OL□□52	Servo User Constant	–	0	-2^{31} to 2^{31}–1
OW□□54	Auxiliary Servo User Constant Number	–	0	0 to 65535
OW□□55	Auxiliary Servo Constant Number Size	–	1	1, 2
OL□□56	Auxiliary Servo User Constant	–	0	-2^{31} to 2^{31}–1
OW□□5C	Fixed Parameter Number	–	0	0 to 65535
OL□□5E	Absolute Position at Power OFF (Low Value)	pulse	0	-2^{31} to 2^{31}–1
OL□□60	Absolute Position at Power OFF (High Value)	pulse	0	-2^{31} to 2^{31}–1
OL□□62	Modularized Position at Power OFF (Low Value)	pulse	0	-2^{31} to 2^{31}–1
OL□□64	Modularized Position at Power OFF (High Value)	pulse	0	-2^{31} to 2^{31}–1

（Note） ▭ : These parameters are ignored.

[c] Monitoring Parameters

No.	Name	Unit	Default Value	Range
IW☐☐00	Drive Status	–	–	Bit setting
IW☐☐01	Over Range Parameter Number	–	–	0 to 65535
IL☐☐02	Warning	–	–	Bit setting
IL☐☐04	Alarm	–	–	Bit setting
IW☐☐08	Servo Command Type Response	–	–	0 to 65535
IW☐☐09	Servo Module Command Status	–	–	Bit setting
IW☐☐0A	Motion Subcommand Response Code	–	–	0 to 65535
IW☐☐0B	Motion Subcommand Status	–	–	Bit setting
IW☐☐0C	Position Management Status	–	–	Bit setting
IL☐☐0E	Machine Coordinate Target Position (TPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL☐☐10	Target Position (CPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL☐☐12	Machine Coordinate System Position (MPOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL☐☐16	Machine Coordinate Feedback Position (APOS)	Reference unit	–	-2^{31} to $2^{31}-1$
IL☐☐18	Machine Coordinate 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	POSMAX Number of 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	Network Servo Status	–	–	Bit setting
IW☐☐2D	Servo Alarm Code	–	–	–32768 to 32767
IW☐☐2E	Network Servo I/O Monitor	–	–	Bit setting
IW☐☐2F	Network Servo User Monitor Information	–	–	Bit setting
IL☐☐30	Servo User Monitor 2	–	–	-2^{31} to $2^{31}-1$
IL☐☐34	Servo User Monitor 4	–	–	-2^{31} to $2^{31}-1$
IW☐☐36	Servo Constant Number	–	–	0 to 65535
IW☐☐37	Auxiliary Servo User Constant Number	–	–	0 to 65535
IL☐☐38	Servo User Constant	–	–	-2^{31} to $2^{31}-1$
IL☐☐3A	Auxiliary Servo User Constant	–	–	-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	Torque (Thrust) Reference Monitor	Depends on torque unit.	–	-2^{31} to $2^{31}-1$
IL☐☐56	Fixed Parameter Monitor	–	–	-2^{31} to $2^{31}-1$
IL☐☐5E	Absolute Position at Power OFF (Low Value)	pulse	–	-2^{31} to $2^{31}-1$
IL☐☐60	Absolute Position at Power OFF (High Value)	pulse	–	-2^{31} to $2^{31}-1$
IL☐☐62	Modularized Position at Power OFF (Low Value)	pulse	–	-2^{31} to $2^{31}-1$
IL☐☐64	Modularized Position at Power OFF (High Value)	pulse	–	-2^{31} to $2^{31}-1$

(2) Control Block Diagram for Speed Control



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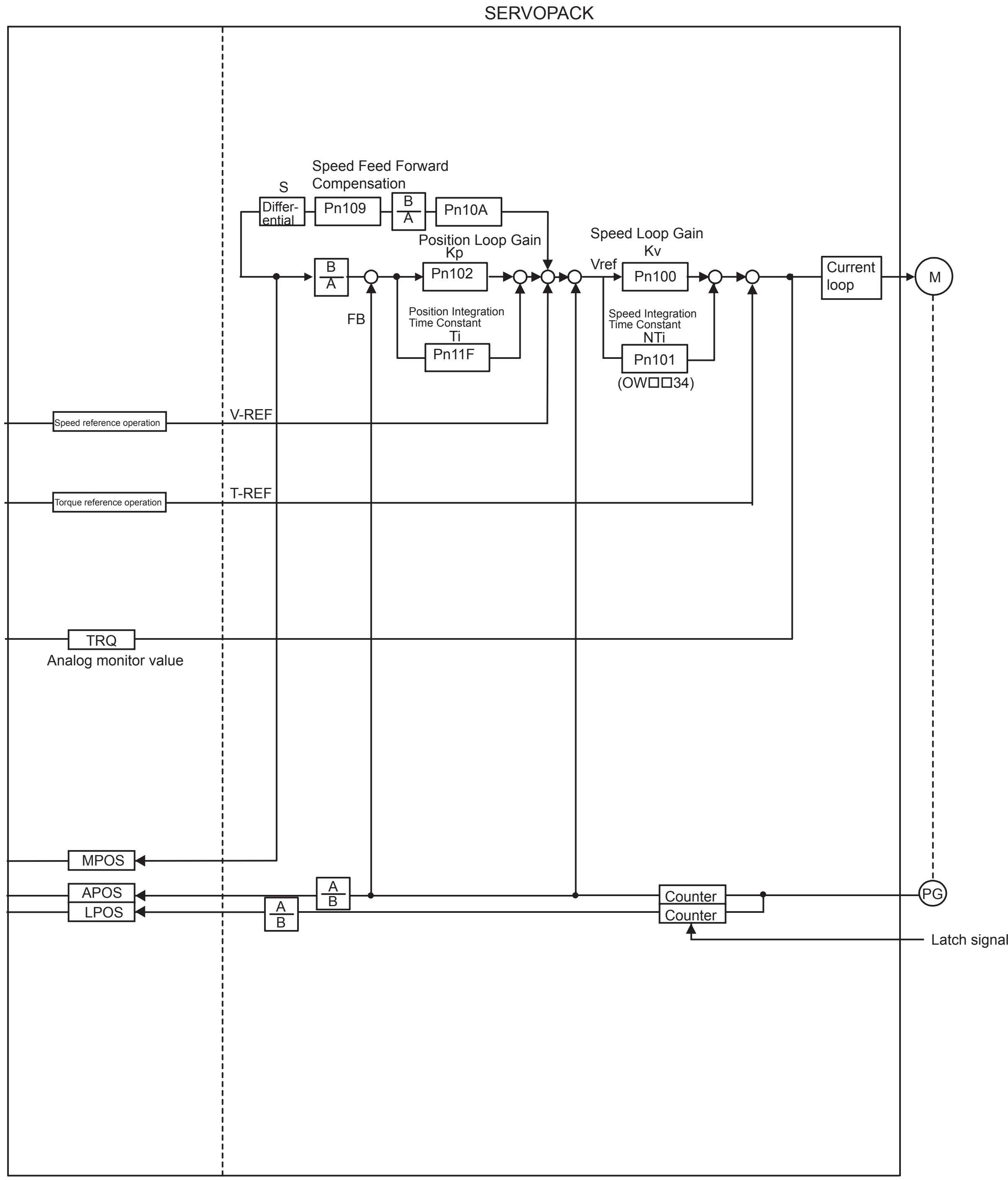
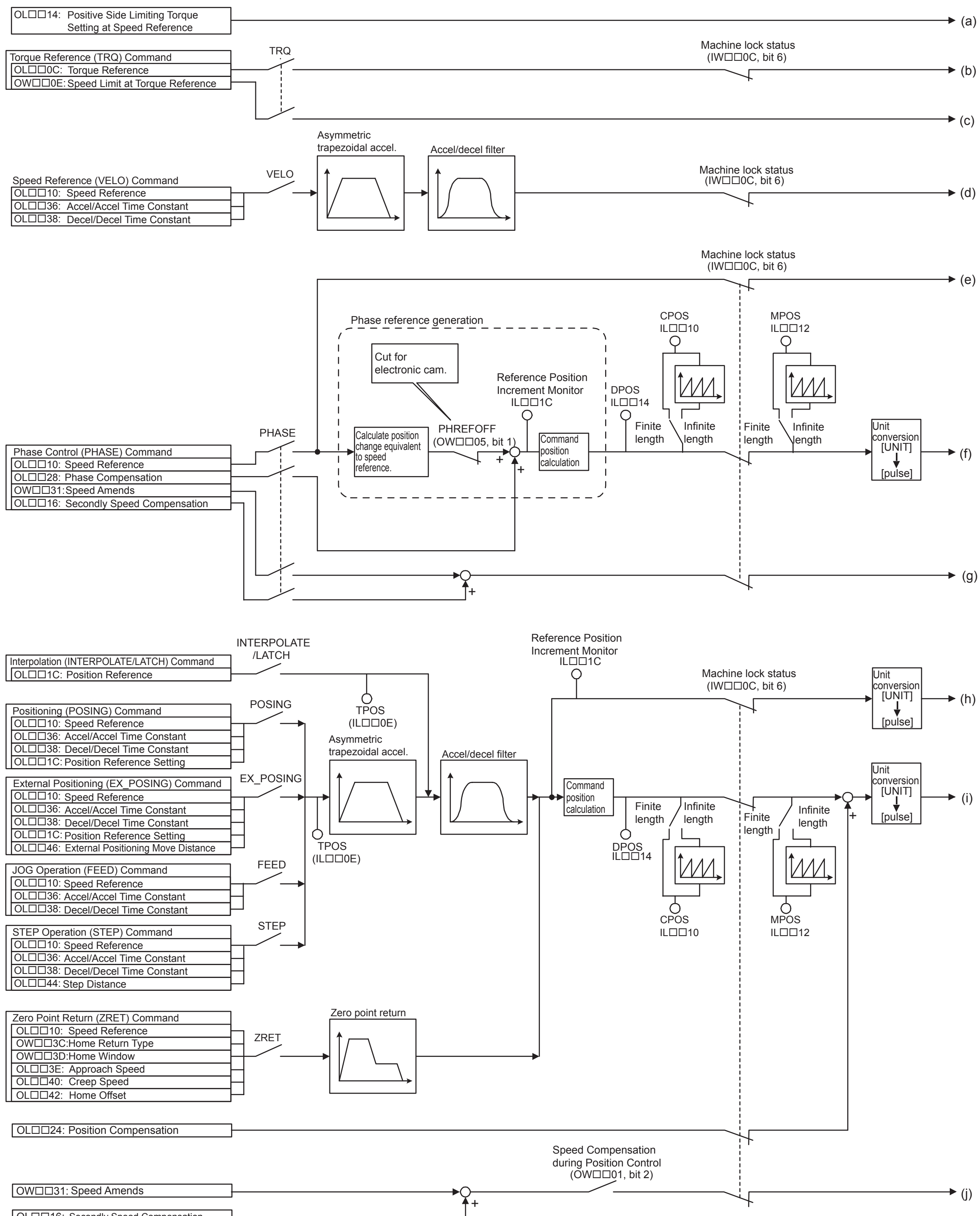

SERVOPACK
Speed Feed Forward
Compensation
S
Differ-
ential
Pn109
B
A
Pn10A
Position Loop Gain
Kp
B
A
Pn102
FB
Position Integration
Time Constant
Ti
Pn11F
Speed Loop Gain
Kv
Vref
Pn100
Speed Integration
Time Constant
NTi
Pn101
(OW□□34)
Current
loop
M
Speed reference operation
V-REF
Torque reference operation
T-REF
TRQ
Analog monitor value
MPOS
APOS
LPOS
A
B
A
B
Counter
Counter
PG
Latch signal

6.2 SVA-01 Module Control Block Diagram



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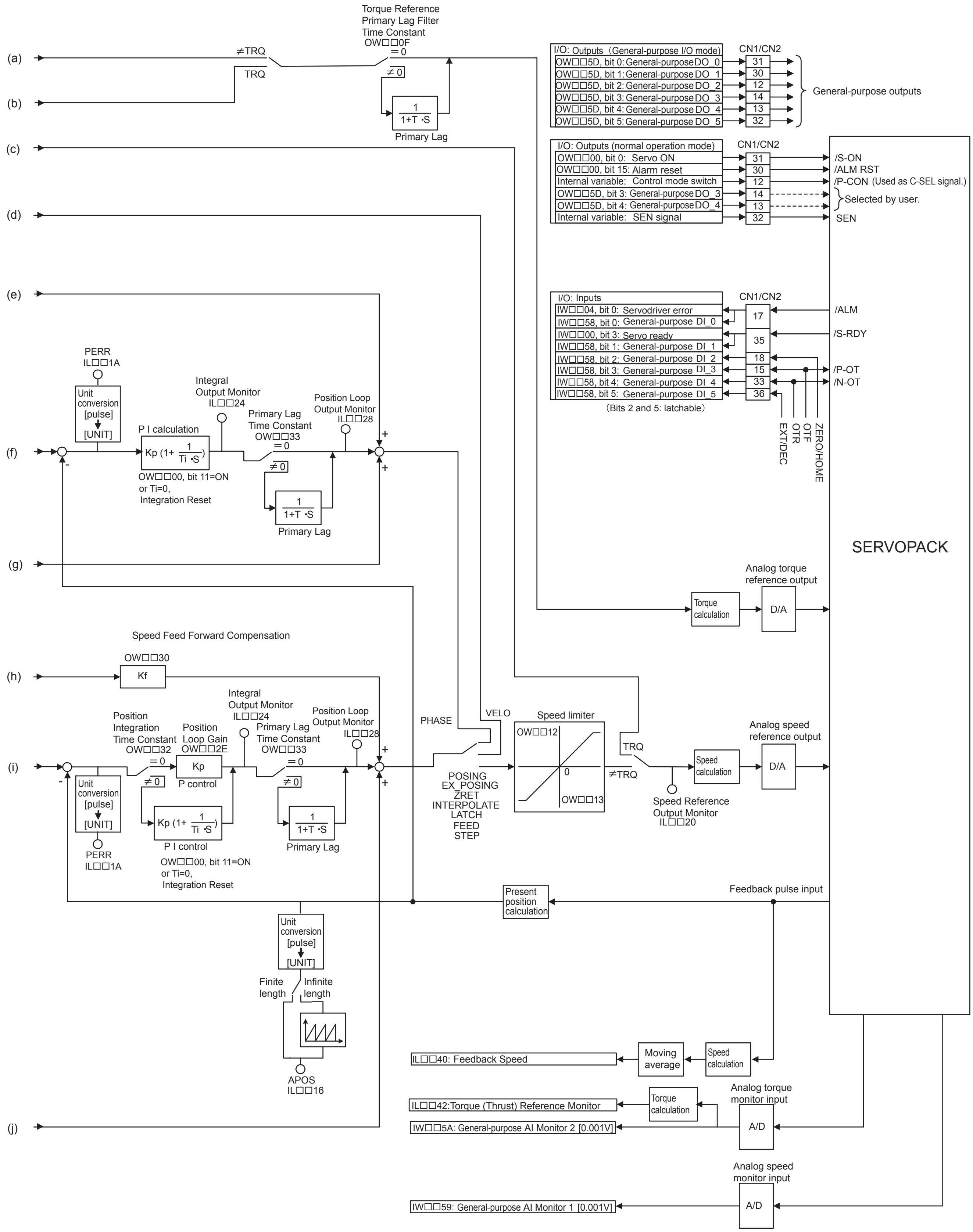


Torque Reference Primary Lag Filter Time Constant OW□□0F
≠TRQ
TRQ
=0
≠0
1/(1+T·S)
Primary Lag
(a)
(b)
(c)
(d)
(e)
(f)
(g)
(h)
(i)
(j)
I/O: Outputs (General-purpose I/O mode)
OW□□5D, bit 0: General-purpose DO_0
OW□□5D, bit 1: General-purpose DO_1
OW□□5D, bit 2: General-purpose DO_2
OW□□5D, bit 3: General-purpose DO_3
OW□□5D, bit 4: General-purpose DO_4
OW□□5D, bit 5: General-purpose DO_5
CN1/CN2
31
30
12
14
13
32
General-purpose outputs
I/O: Outputs (normal operation mode)
OW□□00, bit 0: Servo ON
OW□□00, bit 15: Alarm reset
Internal variable: Control mode switch
OW□□5D, bit 3: General-purpose DO_3
OW□□5D, bit 4: General-purpose DO_4
Internal variable: SEN signal
/S-ON
/ALM RST
/P-CON (Used as C-SEL signal.)
Selected by user.
SEN
I/O: Inputs
IW□□04, bit 0: Servodriver error
IW□□58, bit 0: General-purpose DI_0
IW□□00, bit 3: Servo ready
IW□□58, bit 1: General-purpose DI_1
IW□□58, bit 2: General-purpose DI_2
IW□□58, bit 3: General-purpose DI_3
IW□□58, bit 4: General-purpose DI_4
IW□□58, bit 5: General-purpose DI_5
(Bits 2 and 5: latchable)
17
35
18
15
33
36
/ALM
/S-RDY
/P-OT
/N-OT
EXT/DEC
OTR
OTF
ZERO/HOME
SERVOPACK
PERR
IL□□1A
Unit conversion
[pulse]
[UNIT]
Integral Output Monitor
IL□□24
P I calculation
Kp (1+ 1/(Ti·S))
Primary Lag Time Constant
OW□□33
Position Loop Output Monitor
IL□□28
OW□□00, bit 11=ON or Ti=0, Integration Reset
Primary Lag
Analog torque reference output
Torque calculation
D/A
Speed Feed Forward Compensation
OW□□30
Kf
Position Integration Time Constant
OW□□32
Position Loop Gain
OW□□2E
Kp
P control
P I control
PHASE
VELO
Speed limiter
OW□□12
OW□□13
POSING
EX_POSING
ZRET
INTERPOLATE
LATCH
FEED
STEP
≠TRQ
Speed Reference Output Monitor
IL□□20
Analog speed reference output
Speed calculation
Present position calculation
Feedback pulse input
Finite length
Infinite length
APOS
IL□□16
IL□□40: Feedback Speed
Moving average
IL□□42: Torque (Thrust) Reference Monitor
IW□□5A: General-purpose AI Monitor 2 [0.001V]
Analog torque monitor input
A/D
Analog speed monitor input
IW□□59: General-purpose AI Monitor 1 [0.001V]

7

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.

7.1 Absolute Position Detection Function

This section explains the Absolute Position Detection Function in the MP2200/MP2300.

7.1.1 Outline of the Function

The Absolute Position Detection Function detects the position of the machine even if 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.

The following are features of the absolute position detection system.

- Eliminates the need to execute the zero point return after power is turned ON.
- Eliminates the need for a zero point dog and overtravel limit switch.

7.1.2 Basic Terminology

The following explanation for basic terminology used in this chapter is provided to ensure basic understanding.

(1) Absolute Encoder

Absolute position detection is generally performed in a semi-closed loop using an absolute encoder built into a Servomotor. The 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.

(2) Absolute Data

Absolute data that is stored in an absolute encoder is comprised of the number of rotations (N) from the absolute reference position and position (PO) in a one Servomotor rotation. This absolute data is read as serial data when the power is turned ON.

All other operations are the same as that for ordinary incremental encoders.

In other words, we can determine the absolute value P from the following equation.

- Absolute value (P) = N × RP + PO
- Number of rotations from the absolute reference position: N
- Number of pulses per one Servomotor rotation: RP
- Position in one Servomotor rotation: PO

(3) Holding Absolute Data

An 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 data if there is a change.

(4) Reading Absolute Data

When power is turned ON, absolute data is read to the SERVOPACK as well as to the MP2200/MP2300, where it is used to automatically calculate the absolute position and set the machine coordinate system. This way the absolute machine position can be detected and automatic operation can begin immediately after power is turned ON.

7.2 Startup the Absolute Position Detection Function

This section explains the procedure that is used to start the Absolute Position Detection Function.

7.2.1 System Startup Procedure

Start up the system using the following procedure.

Check Devices · · · Check to see if the SERVOPACK, Servomoto and cables are the right products and models for the absolute encoder.

↓

Setting Parameters Related to the MP2200/MP2300 · · · Set all parameters related to the Absolute Position Detection Function.

↓

Initialize the Absolute Encoder · · · Follow the setup procedure to set the absolut encoder to default values.

↓

Zero Point Setting · · · Set the zero point as well as the absolute zerc point, that is, the machine coordinate zero poi

After the steps 1 to 4 are successfully completed, the absolute position detection system will be ready for operation.

Perform the absolute position detection system startup procedure 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

7.2.2 Setting Related Parameters

⚠ CAUTION
• The parameters for which IMPORTANT precautions are provided must be set. If they are not set correctly, the current position after turning ON the power supply may not be correct. Machine damage may occur. Set these parameters carefully.

This section explains absolute position detection parameters in the MP2200/MP2300 parameters. Set the following MP2200/MP2300 parameters and SERVOPACK parameters prior to startup the absolute position detection system.

(1) MP2200/MP2300 Parameters

Table 7.1 MP2200/MP2300 Parameters

Parameter No.	Name	Setting Range	Units
Fixed Parameter 1, bit 0	Axis Type	0: Finite length axis, 1: Infinite length axis	–
Fixed Parameter 1, bit 9	Simple ABS Infinite Axis	0: Disable, 1: Enable	–
Fixed Parameter 10	Maximum Value of Rotary Counter	1 to $2^{31}–1$	1 = 1 reference unit
Fixed Parameter 30	Encoder Type	• Incremental encoder • Absolute encoder • Absolute encoder (used as incremental encoder)	–
Fixed Parameter 36	Encoder Resolution	1 to $2^{31}–1$ Set the value after multiplication. (For a 16-bit encoder, set 2^{16} = 65536.)	pulse
Fixed Parameter 38	Max. Revolutions of Absolute Encoder	0 to $2^{31}–1$	1 = 1 rotation

(2) SERVOPACK Parameters

SERVOPACK Model	Parameter	Name	Setting Range	Units
Σ Series*	Cn-0001, bit E	Encoder Selection	0: Incremental encoder 1: Absolute encoder	–
	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).	–
	Cn-0011	Number of Encoder Pulses	513 to 32767	P/R
Σ-II Series*	Pn000.0	Direction Selection	0: Sets counterclockwise (CCW) rotation as forward direction. 1: Sets clockwise (CW) rotation as forward direction (reverse rotation mode).	–
	Pn205	Multiturn Limit Setting	0 to 65535	Rev
	Pn002.2	Absolute Encoder Usage	0: Uses absolute encoder as an absolute encoder. 1: Uses absolute encoder as an incremental encoder.	–

Σ-III Series*	Pn000.0	Direction Selection	0: Sets counterclockwise (CCW) rotation as forward direction. 1: Sets clockwise (CW) rotation as forward direction (reverse rotation mode).	–
	Pn205	Multiturn Limit Setting	0 to 65535	Rev
	Pn002.2	Absolute Encoder Usage	0: Uses absolute encoder as an absolute encoder. 1: Uses absolute encoder as an incremental encoder.	–

* SERVOPACK Models

	SERVOPACKs Applicable to the SVB-01	SERVOPACKs Applicable to the SVA-01
Σ Series	SGD-□□□N, SGDB-□□AN	SGDA-□□□S, SGDB-□□AD□-□, -□□DD
Σ-II Series	SGDH-□□□E + NS100/NS115	SGDM-□□□DA, -□□AD□, SGDH-□□DE, -□□AE, -□□□E
Σ-III Series	SGDS-□□□1□□	SGDS-□□□-01□, -□□□-02□, -□□□05, -□□A□□□, -□□F□□□

(3) Detailed Descriptions

[a] Encoder Selection

- MP2200/MP2300 fixed parameter 30
- SERVOPACK parameter Cn-0001, bit E or Pn002.2

For an axis performing absolute position detection, set MP2300 fixed parameter 30 and SERVOPACK parameter Cn-0001, bit E, or parameter Pn002.2 as shown in the following table.

Parameter	Setting
MP2200/MP2300 fixed parameter 30	Absolute encoder
Σ Series Cn-0001, bit E	1: Absolute encoder
Σ-II, Σ-III Series Pn002.2	0: Uses absolute encoder as an absolute encoder.

Both the MP2200/MP2300 and SERVOPACK parameters are valid, so be sure to set both of them.

IMPORTANT

If the above settings are not used, correct motion control will not be performed. Set the parameters carefully.

[b] Number of Encoder Pulses

- MP2200/MP2300 fixed parameter 36

  Set MP2200/MP2300 fixed parameter 36 to the number of pulses used by the absolute encoder as shown in the following table.

Number of Bits	MP2200/MP2300 Fixed Parameter 36	SERVOPACK Parameter		
		Σ Series Cn-0011	Σ-II Series Pn201	Σ-III Series Pn212
12	4096	1024	1024	1024
13	8192	2048	2048	2048
14	16384	4096	4096	4096
15	32768	8192	8192	8192
16	65536	–	16384	16384
17	131092 *	–	16384	32768

* Set 16384 for the Σ-II.

IMPORTANT: If the above settings are not used, correct motion control will not be performed. Set the parameters carefully.

[c] Axis Selection

- MP2200/MP2300 fixed parameter 1, bit 0

  This setting is used to set either an infinite or finite length axis for controlled axis movement. Refer to *7.3 Using an Absolute Encoder* for position management methods for finite and infinite length axes.

[d] Infinite Length Axis Reset Position

- MP2200/MP2300 fixed parameter 10

The Infinite Length Axis Reset Position is used to set the reset position of infinite length axis per rotation in reference units. This parameter is enabled when an axis type is set to a infinite length axis.

[e] Maximum Number of Absolute Encoder Turns/Multiturn Limit Setting

- MP2200/MP2300 fixed parameter 38
- Σ-II and Σ-III Series SERVOPACK parameter Pn205

These parameters determine the maximum value of the number of encoder turns managed by the SERVOPACK and MP2200/MP2300. The setting is determined by the SERVOPACK that is used and the type of axis, as shown in the following table.

	Fixed Parameter 38	SERVOPACK Parameter Pn205
Finite length axis for Σ Series	99999	–
Infinite length axis for Σ Series	99999	–
Finite length axis for Σ-II or Σ-III Series	65535	65535
Infinite length axis for Σ-II or Σ-III Series	Set to the same value as Pn205*	65534 max.*

* A fixed parameter setting error will occur if fixed parameter 38 is set to 65535 for the Σ-II Series with an infinite length axis.

IMPORTANT: If the above settings are not used, the position may be offset. Set the parameters carefully.

7.2.3 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 the multiturn data needs to be initialized to 0
- When a Servomotor has been left alone with no battery connected to the absolute encoder
- When an alarm which is related the absolute position detection system occurs

(1) Σ Series

[a] Initializing a 12-bit Absolute Encoder

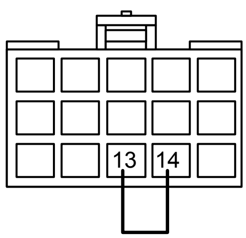
Use the following procedure to initialize a 12-bit absolute encoder.

1. Properly connect the SERVOPACK, Servomotor, and MP2200/MP2300.

2. Reset Absolute Position Data in the encoder.

   a) Disconnect the connector on the encoder end.

   b) Short-circuit pins 13 and 14 on the encoder end connector for 2 seconds or more.



   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, otherwise the system has been successfully initialized.

[b] Initializing a 15-bit Absolute Encoder

Use the following procedure to initialize a 15 bit-type absolute encoder.

1. Turn OFF the SERVOPACK and MP2200/MP2300.

2. Discharge the large-capacity capacitor in the encoder using one of the following methods.

   a) At the SERVOPACK end connector

      i) Disconnect the connector on the SERVOPACK end.

      ii) Use a short piece to short-circuit together connector pins 10 and 13 on the encoder end.

      iii) Leave the pins short-circuited for at least 2 minutes.

      iv) Remove the short piece and insert the connector securely in its original position.

b) At the encoder end connector

i) Disconnect the connector on the encoder end.

ii) Use a short piece to short-circuit together connector pins R and S on the encoder end.

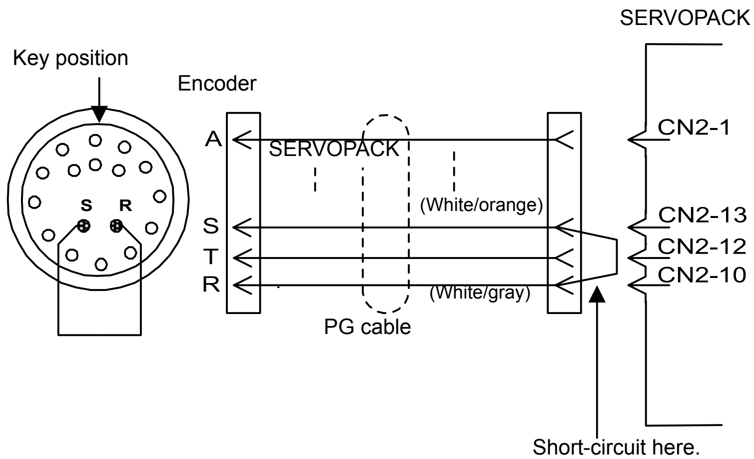


Fig. 7.1 Setup procedure using a PG cable

iii) Leave the pins short-circuited for at least 2 minutes.

iv) 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.

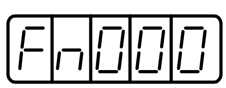
4. Turn ON the system.

   Repeat the procedure starting from step 1 if an Absolute Encoder Alarm occurs, otherwise the system has been successfully initialized.

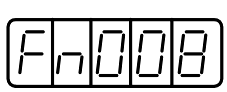
(2) Σ-II Series

[a] Setup Using a Hand-held Digital Operator

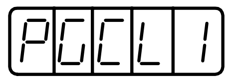
1. Press the DSPL/SET Key to select the Auxiliary Function Mode.



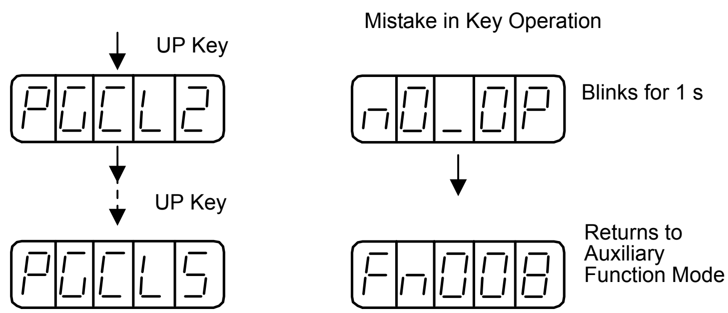
2. Select parameter Fn008 by pressing the LEFT (<) and RIGHT (>) Keys to select the digit to be changed and then using the UP and DOWN Keys to change the value of the digit.



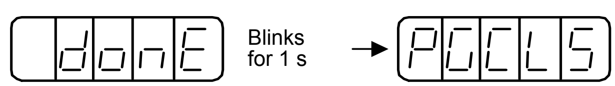
3. Press the DATA/ENTER Key. The following display will appear.



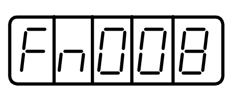
4. Press the UP Key. The display will change as shown below. Then press the UP Key until “PGCL5” is displayed. If a mistake is made in the key operation, “nO_OP” will blink on the display for 1 second and then the display will return to the Auxiliary Function Mode. If this happens, return to step 3, above, and repeat the operation.



5. Press the DSPL/SET Key when “PGCL5” is displayed. The display will change as shown below and the clear operation will be performed for multiturn data for the absolute encoder.



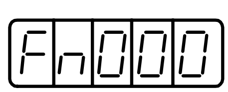
6. Press the DATA/ENTER Key. The display will return to the Auxiliary Function Mode.



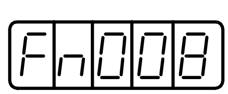
This completes setting up the absolute encoder. Turn the power supply OFF and then back ON.

[b] Setup Using the Built-in Panel Operator

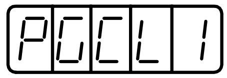
1. Press the MODE/SET Key to select the Auxiliary Function Mode.



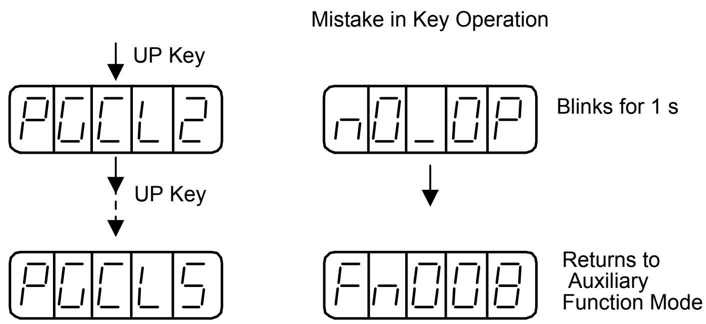
2. Press the UP and DOWN Keys to select parameter Fn008.



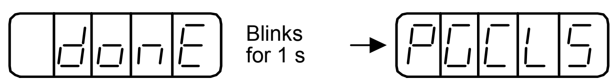
3. Press the DATA/SHIFT Key for 1 second or longer. The following display will appear.



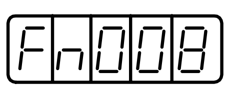
4. Press the UP Key. The display will change as shown below. Then press the UP Key until “PGCL5” is displayed. If a mistake is made in the key operation, “nO_OP” will blink on the display for 1 second and then the display will return to the Auxiliary Function Mode. If this happens, return to step 3, above, and repeat the operation.



5. Press the MODE/SET Key when “PGCL5” is displayed. The display will change as shown below and the clear operation will be performed for multiturn data for the absolute encoder.



6. Press the DATA/SHIFT Key for 1 second or longer. The display will return to the Auxiliary Function Mode.



This completes setting up the absolute encoder. Turn the power supply OFF and then back ON.

(3) Σ-III Series

Use a digital operator to initialize the absolute encoder.

Step	Operation Key	Display Example	Description
1	MODE/SET ∧ ∨	B B –F U N C T I O N– F n 0 0 7 F n 0 0 8 F n 0 0 9 F n 0 0 A	Open the Utility Function Mode main menu and select Fn008.
2	DATA	B B M u l t i t u r n C l e a r P G C L 1	Press the DATA Key. The display is switched to the execution display of Fn008 (Absolute encoder multi-turn reset and encoder alarm reset). (Note) 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.
3	∧ DATA	B B M u l t i t u r n C l e a r P G C L 1	Keep pressing the ∧ Key until "PGCL1" is changed to "PGCL5."
4	DATA	D o n e M u l t i t u r n C l e a r P G C L 5	Press the DATA Key. "BB" in the status display changes to "Done."
5	MODE/SET	B B –F U N C T I O N– F n 0 0 7 F n 0 0 8 F n 0 0 9 F n 0 0 A	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.
6	Turn the power supply OFF and then back ON to enable the setting.		

7.3 Using an Absolute Encoder

This section explains precautions regarding use as well as the procedure for setting the zero point when using an absolute encoder.

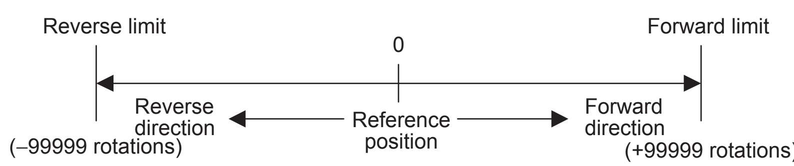
7.3.1 Finite Length Axis

⚠ CAUTION
• Do not change the Zero Point Offset (OL□□48) while operating a machine with a finite length axis. Otherwise the machine may be damaged or an accident may occur.

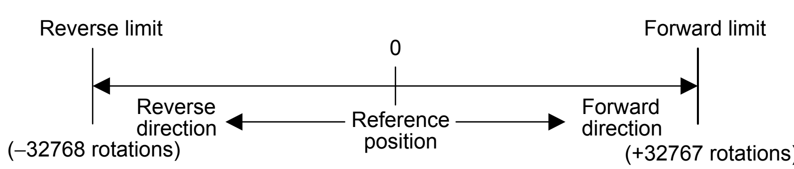
(1) Overview

An absolute encoder stores the multiturn data in internal memory backed up by battery. This way the zero point of the coordinate system can be determined without the zero point return operation when the system is started up. Once the system is started, the encoder functions just like an incremental encoder.
Unfortunately, the maximum multiturn data is ±99999 for the Σ Series and -32768 to 32767 for the Σ-II /III Series. If system power is turned ON when the multiturn data exceeds these limits, the MP2200/MP2300 position will not be the same before and after power is turned ON.
The multiturn data for the encoder functions as illustrated below.

[a] Σ Series



[b] Σ-II or Σ-III Series



Therefore, be sure to observe the following precautions when using an absolute encoder for a finite length axis.

- Be sure to initialize the encoder prior to setting the zero point.
- Use the absolute encoder within the range of the multiturn data.

INFO: The actual machine operating range may vary depending on parameters like the gear ratio.

(2) Position Management with a Finite Length Axis

Initialize the axis position as described next when power is turned ON if an absolute encoder is used for a finite length axis.

- Current position for the machine coordinate system = Encoder position when servo power is turned ON*
  + Zero Point Offset (setting parameter OL□□48)

  * 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.

The Zero Point Offset (setting parameter OL□□48) is always valid for a finite length axis. If the machine coordinate system zero point is changed during machine operation, the current position may become inaccurate.

The meaning of setting parameter OL□□48 will differ for a finite length axis and infinite length axis.

- Finite Length Axis

  Set OL□□48 to the difference between IL□□48 and OL□□10 (IL□□48 – OL□□10) to make the current position of the machine coordinate system the zero position.

◀ EXAMPLE ▶

IL□□10 = 10,000 and OL□□48 = 100

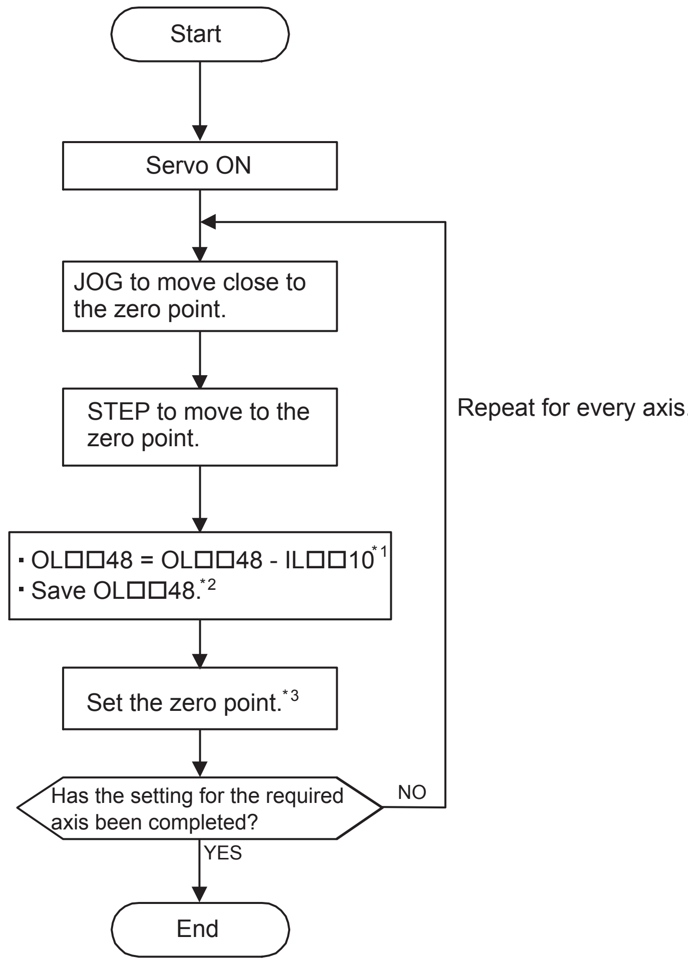
Setting the current position of the machine coordinate system to 0.

100 – 10000 = –9900 Set OL□□48 to –9,900

IL□□10: Target Position (CPOS)

(3) Setting the Zero Point for a Finite Length Axis

Set the zero point after initializing the absolute encoder to set the zero point of the machine coordinate system and to establish the machine coordinate system.
The following illustration shows the procedure for setting the zero point for a finite length axis.



* 1. The OL□□48 value must be saved when it is set.
* 2. See the information on the next page for more details on saving the OL□□48 value.
* 3. Execute with the ZSET command.

(4) Turning ON the Power for a Finite Length Axis

The Zero Point Return (Setting) Completed bit (IB□□0C5) will turn OFF when the power supply to the MP2300 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 MP2300 (or clear alarms to restart communication).
2. Confirm that communication have been synchronized by checking to see if the Motion Controller RUN Ready bit (SVCRDY) (IB□□000) is ON.
3. Set the Zero Point Offset (OL□□48) to the same value as it was the last time the zero point was set. This will establish a machine coordinate system for the MP2300.
4. Execute the Zero Point Setting (ZSET) motion command by setting OW□□08 to 9. This is done only to turn ON the Zero Point Return (Setting) Completed bit (IB□□0C5). It will not cause the coordinate system to be reset by executing the ZSET command.

INFO

■ The following methods are used to save the Zero Point Offset (OL□□48).

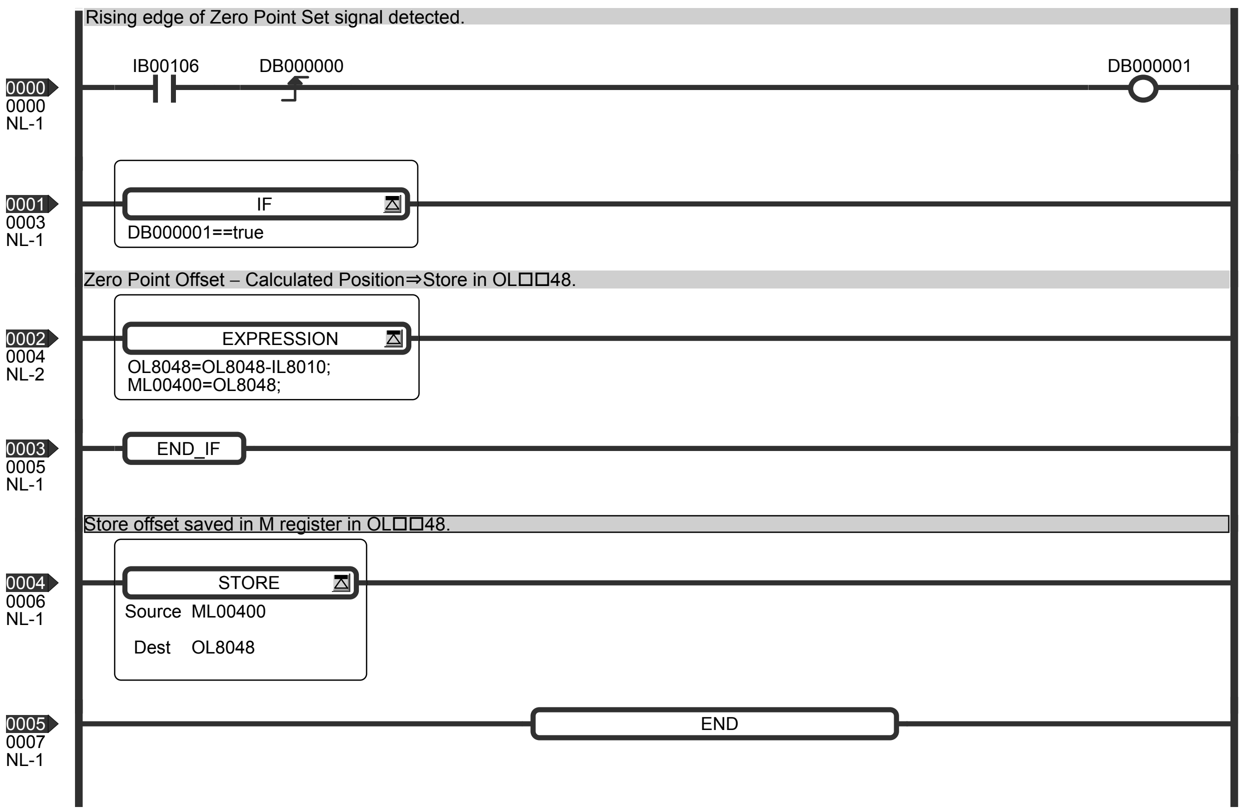
Method 1: Saving in a M Register with Ladder Program

Subtract the Calculated Position in Machine Coordinate System from the Machine Coordinate System Zero Point Offset and save the result in an M register when it is stored in setting parameter OL□□48.

Store the contents saved in the M register in Zero Point Offset (setting parameter OL□□48) when system or servo power is turned back ON.

Ladder Program Example Required for a Finite Length Axis (Axis 1)

P00001 H09 Main Program



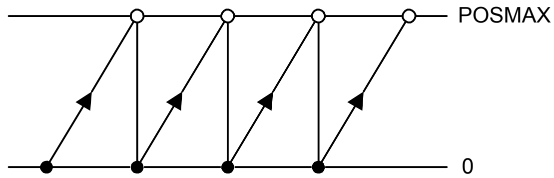
Method 2: Saving the Zero Point Offset (OL□□48) from the MPE720 Parameter Window

After the Zero Point Offset (OL□□48) is set after setting the zero point, use ***Save*** to save the settings to the MP2300. When power is turned back ON, the value that was saved for Zero Point Offset (OL□□48) will be stored automatically.

7.3.2 Infinite Length Axis

(1) Overview

Infinite length 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 Maximum Value of Rotary Counter (POSMAX) (fixed parameter 10). The function can be used for repeated positioning in one direction.



Unfortunately, the maximum multiturn data is as follows, at which point the multiturn data is reset to 0.

- Σ Series: ±99999
- Σ-II/III Series infinite length axis: 0 to 65534 (Set with Pn205)

When system power is turned ON therefore, the MP2200/MP2300 position may not be the same before and after power is turned ON. This problem can be resolved using one of the following two methods.

[a] Simple Absolute Infinite Length Position Control

With this method, ladder program to manage the absolute infinite length axis position is not required. The coordinate system is established simply by setting the Zero Point Offset (OL□□48) when setting the zero point after turning ON the power supply or restarting communication.

[b] Absolute Infinite Length Position Control

With this method, ladder program to manage the absolute infinite length axis position is required. The coordinate system is established by turning ON the Infinite Length Axis Position Information LOAD bit (OB□□007).

(2) Managing Positioning with the Simple Absolute Infinite Length Position Control Function

The simple absolute infinite length position control is used to manage the position of an infinite length axes based on the assumption that the number of possible turns from the encoder is an integral multiple of the number of encoder turns corresponding to the reset frequency in reference units. With this method, ladder program to manage the infinite length position is not required.
This function can be used when the following conditions are met.

- The Σ-II or Σ-III Series is used.
- The following equation is satisfied:
  (Maximum number of absolute encoder turns +1) / Reset number of turns = An integer (remainder = 0)

[a] Setting the Zero Point

Set the desired position in OL□□48 and execute the Zero Point Setting (ZSET) motion command. The position will be set as the current position of the machine coordinate system.

INFO

■ To set the present position of the machine coordinate system to 0 when the Zero Point Setting (ZSET) motion command is executed

Set OL□□48 to 0.

■ Calculating the Reset Value for the Number of Turns

- Reset Value When the Reference Unit is Pulses

Reset value = Infinite length axis reset position / Number of pulses per motor rotation

- Reset Value for All Other Reference Units

Reset value = (Infinite length axis reset position × Servomotor gear ratio) / (Moving amount per machine rotation × Machine gear ratio)

[b] Parameters Used for a Simple Absolute Infinite Axis

The fixed parameters listed in the following table must be set to use a simple absolute infinite axis.

No.	Name	Setting Range	Meaning	Details	Setting
1	Function 1	Bit setting	Bit 0: Axis Type	0: Finite length axis 1: Infinite length axis	1: Infinite length axis
			Bit 9: Simple ABS Infinite Axis	0: Disable, 1: Enable	1: Enable
30	Encoder Type	0 to 3	0: Incremental encoder 1: Absolute encoder 2: Absolute encoder (used as incremental encoder)		1: Absolute encoder

The Simple ABS Infinite Axis bit will not be valid if both an infinite length axis and an absolute encoder are not set.

The following parameters set the conditions for the number of turns for resetting the encoder.

No.	Name	Setting Range	Meaning	Details
4	Command Unit	0 to 3	0: pulse 1: mm 2: deg 3: inch	The electronic gear is not relevant if the unit is pulses.
6	Command Unit per Revolution	1 to $2^{31}-1$	1 = 1 reference unit	
8	Gear Ratio [MOTOR]	1 to 65535	1 = 1 rotation	
9	Gear Ratio [LOAD]	1 to 65535	1 = 1 rotation	
10	Maximum Value of Rotary Counter	1 to $2^{31}-1$	1 = 1 reference unit	
36	Encoder Resolution	1 to $2^{31}-1$	1 = 1 pulse/rev	This setting must match the encoder.
38	Max. Revolution of Absolute Encoder	0 to $2^{31}-1$	1 = 1 rotation	This setting must match the setting in the SERVOPACK. Pn205 must be 65534 or less.

A fixed parameter error will occur and information will be provided in the following monitoring parameters if a simple absolute infinite axis is selected and the combination of the above fixed parameters do not satisfy the equation given on the previous page, i.e., (Maximum number of absolute encoder turns +1) / Reset number of turns = An integer (i.e., remainder = 0).

Register	Name	Meaning	Details
IW□□01	Over Range Parameter Number	Stores the parameter number with a setting error.	Fixed parameter: 1000 + fixed parameter number
IL□□02	Warning	Bit 2: Fixed Parameter Error	0: OFF, 1: ON

[c] Application Example of Simple Absolute Infinite Length Position Control Function

◀ EXAMPLE ▶ An example of using the simple absolute infinite length position control function is given below.

No.	Name	Setting
4	Command Unit	2
6	Command Unit per Revolution	360000
8	Gear Ratio [MOTOR]	6
9	Gear Ratio [LOAD]	5
10	Maximum Value of Rotary Counter	360000
36	Encoder Resolution	16384
38	Max. Revolution of Absolute Encoder	59705

■ Calculation of the Number to Turns to Reset

$360000 \times 6 / 360000 \times 5 = 6/5$ (number of turns to reset)

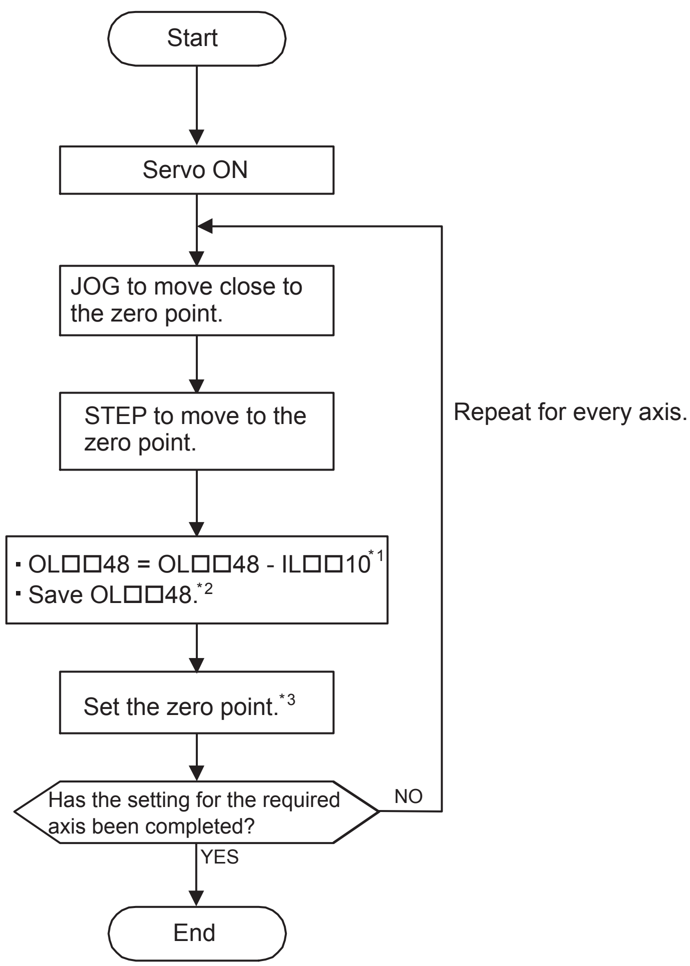
■ Conditions

$(59705+1) / (6/5) = 49755$

The result is an integer, i.e., the remainder is 0, so the simple absolute infinite length position control function can be used.

[d] Setting the Zero Point for a Simple Absolute Infinite Axis

Set the zero point as described here after initializing the absolute encoder to set the zero point of the machine coordinate system and establish the machine coordinate system.
The procedure to set the zero point for a simple absolute infinite axis is shown below.



* 1. The OL□□48 value must be saved when it is set.
* 2. See the information on the *7-17 page* for more details on saving the OL□□48 value.

* 3. Execute with the ZSET command.

(3) Turning ON the Power for a Simple Absolute Infinite Axis

The Zero Point Return (Setting) Completed bit (IB□□0C5) will turn OFF when the power supply to the MP2300 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 MP2300 (or clear alarms to restart communication).
2. Confirm that communication have been synchronized by checking to see if the Motion Controller RUN Ready bit (SVCRDY) (IB□□000) is ON.
3. Set the Zero Point Offset (OL□□48) to the same value as it was the last time the zero point was set. This will establish a machine coordinate system for the MP2300.
4. Execute the Zero Point Setting (ZSET) motion command by setting OW□□08 to 9. This is done only to turn ON the Zero Point Return (Setting) Completed bit (IB□□0C5). It will not cause the coordinate system to be reset by executing the ZSET command.

(4) Managing Positions when the Simple Absolute Infinite Length Position Control Function Is Not Used

When power is turned ON to the system, the position managed by the MP2200/MP2300 is calculated from the relative absolute position in pulse units using the following equation.
The modularized position[1] and absolute position[2] are always stored as paired information in backup memory. This information is used the next time power is turned ON as the modularized position and the absolute position at shutdown to find the relative encoder position in pulses.

- Modularized position = Modularized position at power OFF
  + (Absolute position – Absolute position at power OFF)*

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

TERMS

1 Modularized position

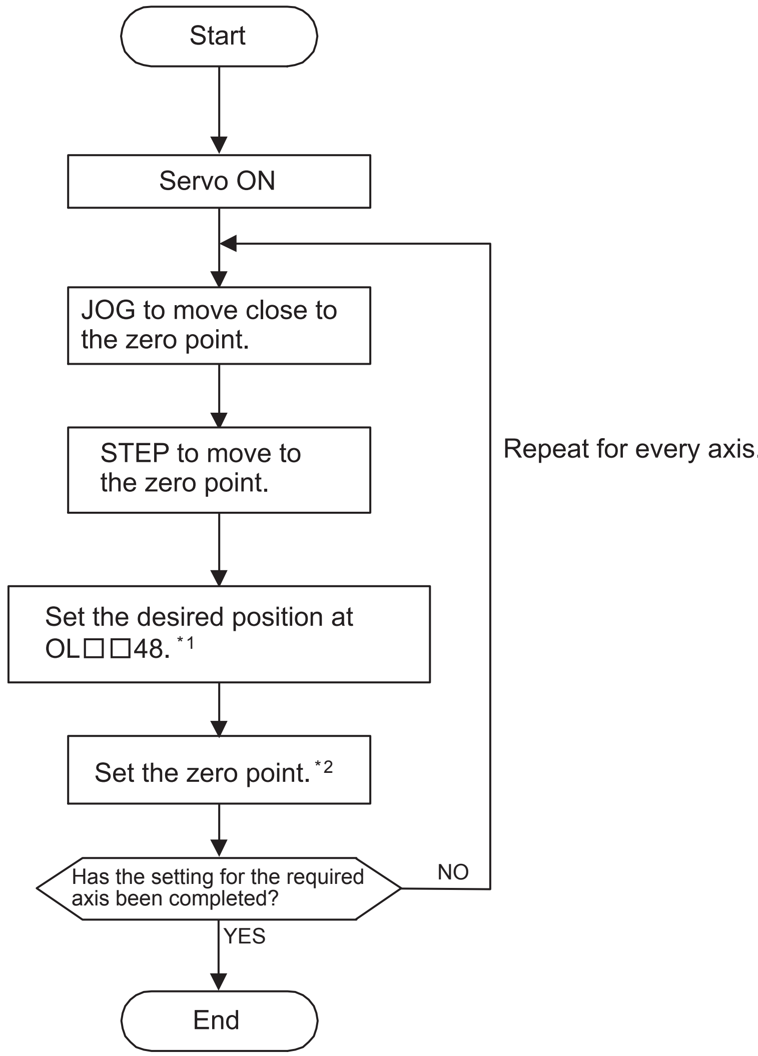
The position information from the MP2200/MP2300 converted to pulses

2 Absolute position

Absolute encoder position information (Multiturn data x Number of encoder pulses + Initial increment pulses)

(5) Setting the Zero Point for an Infinite Length Axis

Execute the ZSET motion command (zero point setting).
The system will settle pulse position at power OFF, encoder position at power OFF, and all position data when the zero point is set.
The following illustration shows the procedure for setting the zero point for an infinite length axis.



* 1. For an infinite length axis, the Zero Point Offset (setting parameter OL□□48) is valid only when the ZSET command is executed.
Therefore, the OL□□48 value doesn't have to be memorized in a M register.
Set the desired coordinate value in the Zero Point Offset (OL□□48) when using an infinite length axis.
Example:
When setting the current stop position to 0 (zero point position for the machine coordinate system), set OL□□48 to 0.

* 2. Execute with the ZSET command.

(6) Ladder Program for Infinite Length Axis Position Control

Ladder program for normal operation and for restarting the system is needed for absolute infinite length axis position control when the simple absolute infinite length position control function is not used.

[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 (zero point setting) 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.

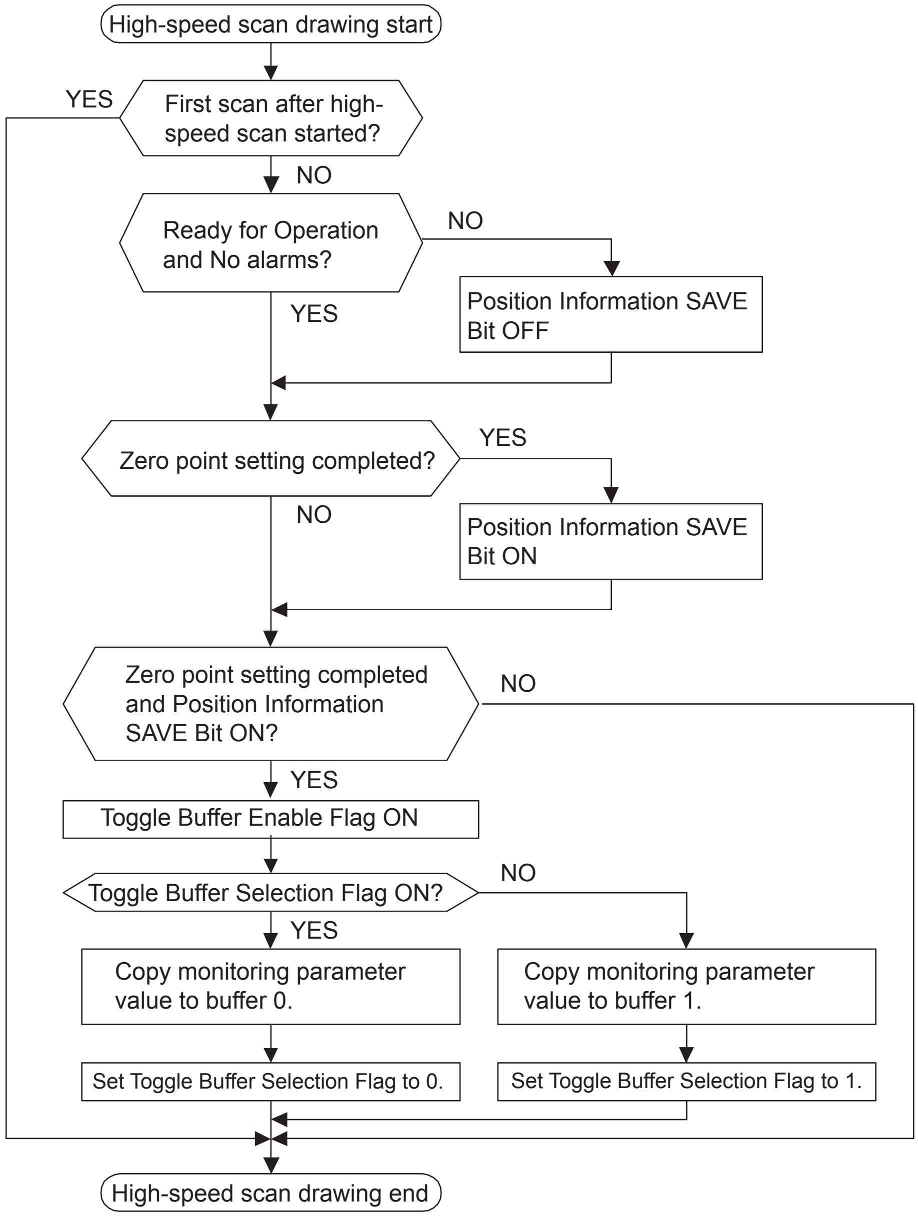
   - Monitoring Parameter: Absolute Position at Power OFF (All four words at IL□□5E to IL□□60)
   - Monitoring Parameter: Modularized Position at Power OFF (All four words at IL□□62 to IL□□64)

   The M register that is used to save the above monitoring parameters is structured as shown below.

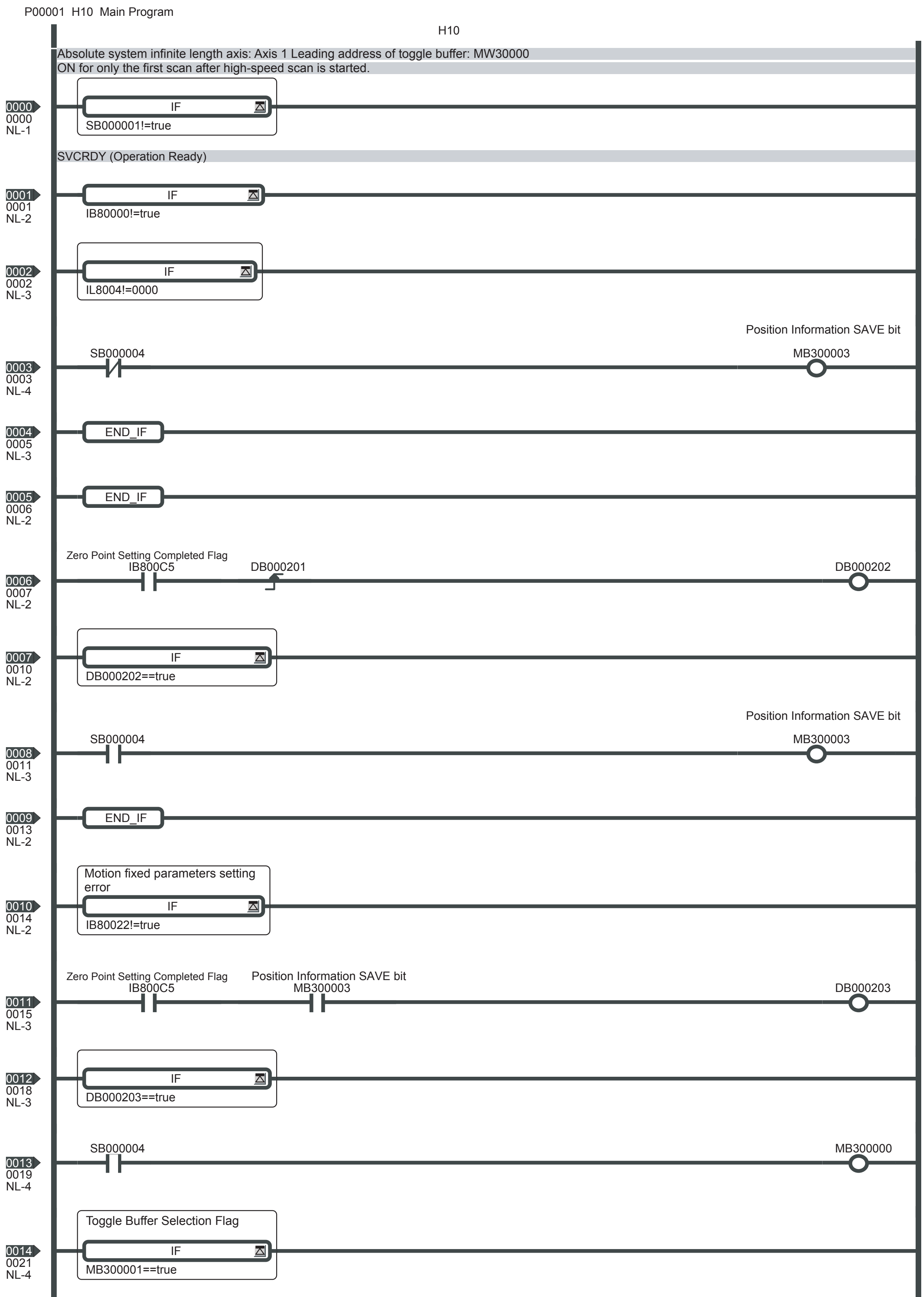
<table>
<tr><td rowspan="3">MW□□□□□</td><td>Bit 0</td><td colspan="2">Toggle Buffer Enabled Flag (OFF: Disabled, ON: Enabled)</td></tr>
<tr><td>Bit 1</td><td colspan="2">Toggle Buffer Selection Flag (OFF: Buffer 0, ON: Buffer 1)</td></tr>
<tr><td>Bit 2</td><td colspan="2">Position Data Re-setup Request Flag (OFF: Complete, ON: 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:
Absolute Position at Power 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:
Modularized Position at Power 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:
Absolute Position at Power 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:
Modularized Position at Power OFF</td><td>Lower-place two words (IL□□62)</td></tr>
<tr><td>Upper-place two words (IL□□64)</td></tr>
</table>

(Note) Two buffers are needed to save the absolute position and the modularized 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.

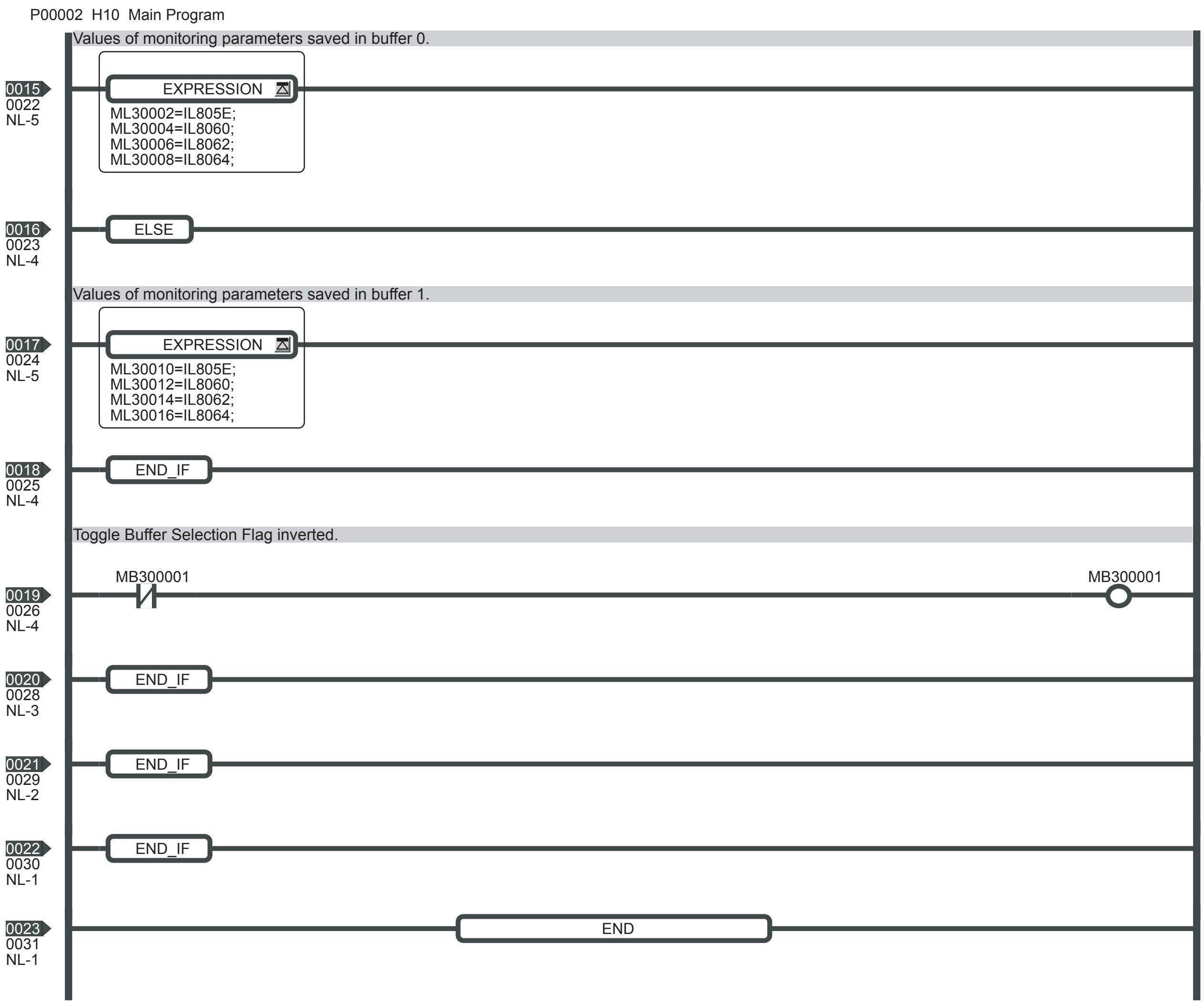
Use the following flowchart to store values in buffers.



◀ EXAMPLE ▶ 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.



(continued on next page)


P00002 H10 Main Program
Values of monitoring parameters saved in buffer 0.
0015
0022
NL-5
EXPRESSION
ML30002=IL805E;
ML30004=IL8060;
ML30006=IL8062;
ML30008=IL8064;
0016
0023
NL-4
ELSE
Values of monitoring parameters saved in buffer 1.
0017
0024
NL-5
EXPRESSION
ML30010=IL805E;
ML30012=IL8060;
ML30014=IL8062;
ML30016=IL8064;
0018
0025
NL-4
END_IF
Toggle Buffer Selection Flag inverted.
0019
0026
NL-4
MB300001
MB300001
0020
0028
NL-3
END_IF
0021
0029
NL-2
END_IF
0022
0030
NL-1
END_IF
0023
0031
NL-1
END

[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 system power or servo power is turned back ON.

1. Store Modularized Position at Power OFF and Absolute Position at Power OFF to setting parameters.

   Store the Modularized Position at Power OFF and Absolute Position at Power OFF values saved in M register to the following setting parameters.

   • Setting parameter: Absolute Position at Power OFF (All four words at OL☐☐5E to OL☐☐60)

   • Setting parameter: Modularized Position at Power OFF (All four words at OL☐☐62 to OL☐☐64)

   Store the contents of the buffer selected by the Toggle Buffer Selection Flag.

2. Load Request for Absolute System Infinite Length Position Control Information

   Reset the Infinite Length Axis Position Information 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: Absolute Position at Power OFF (All four words at IL☐☐5E to IL☐☐60)

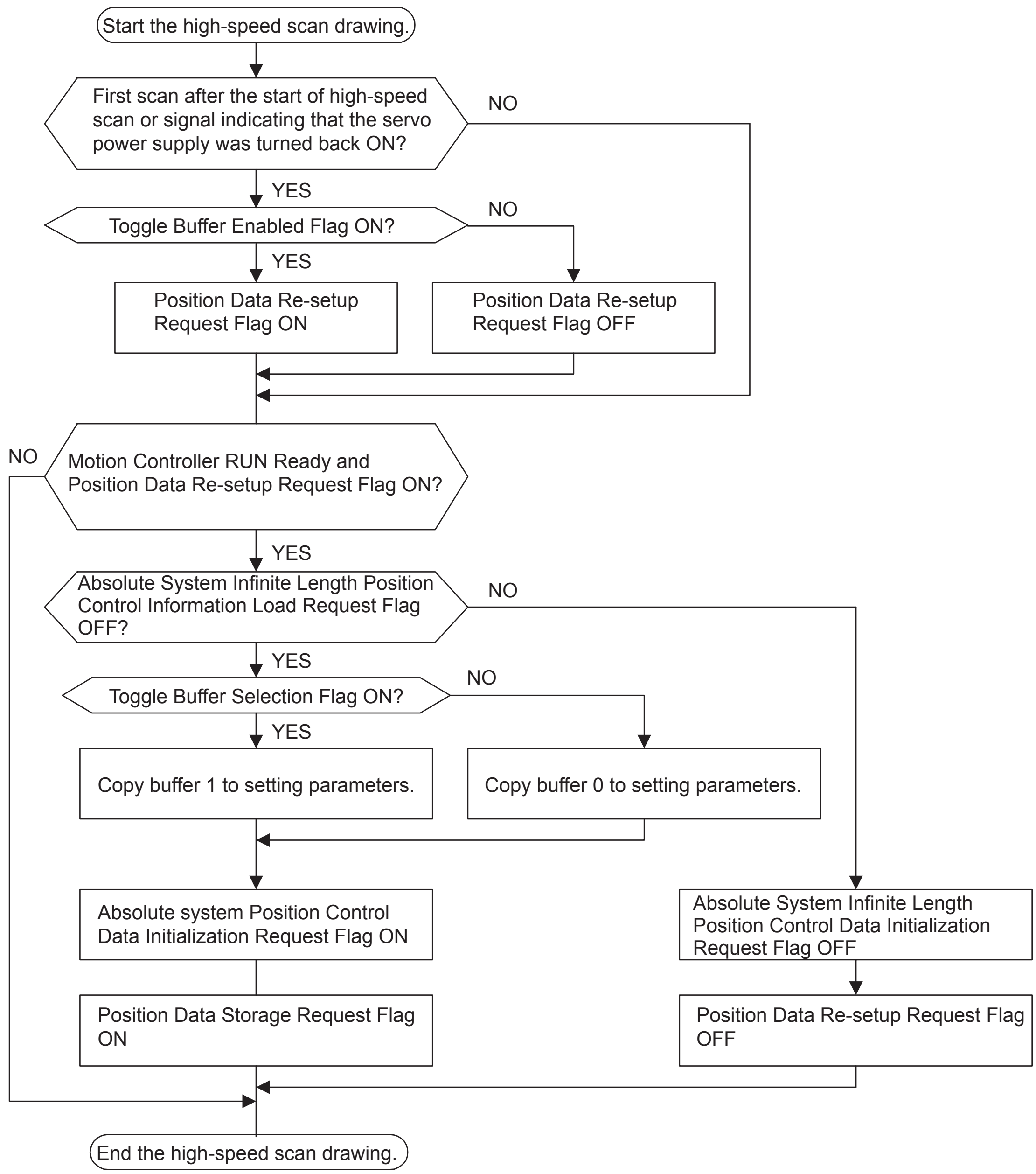
   • Monitoring Parameter: Modularized Position at Power OFF (All four words at IL☐☐62 to IL☐☐64)

   The system will create position data using the following equation when Infinite Length Axis Position Information LOAD is requested.

   • Modularized position = modularized position at power OFF + (absolute position – absolute position at power OFF)*

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

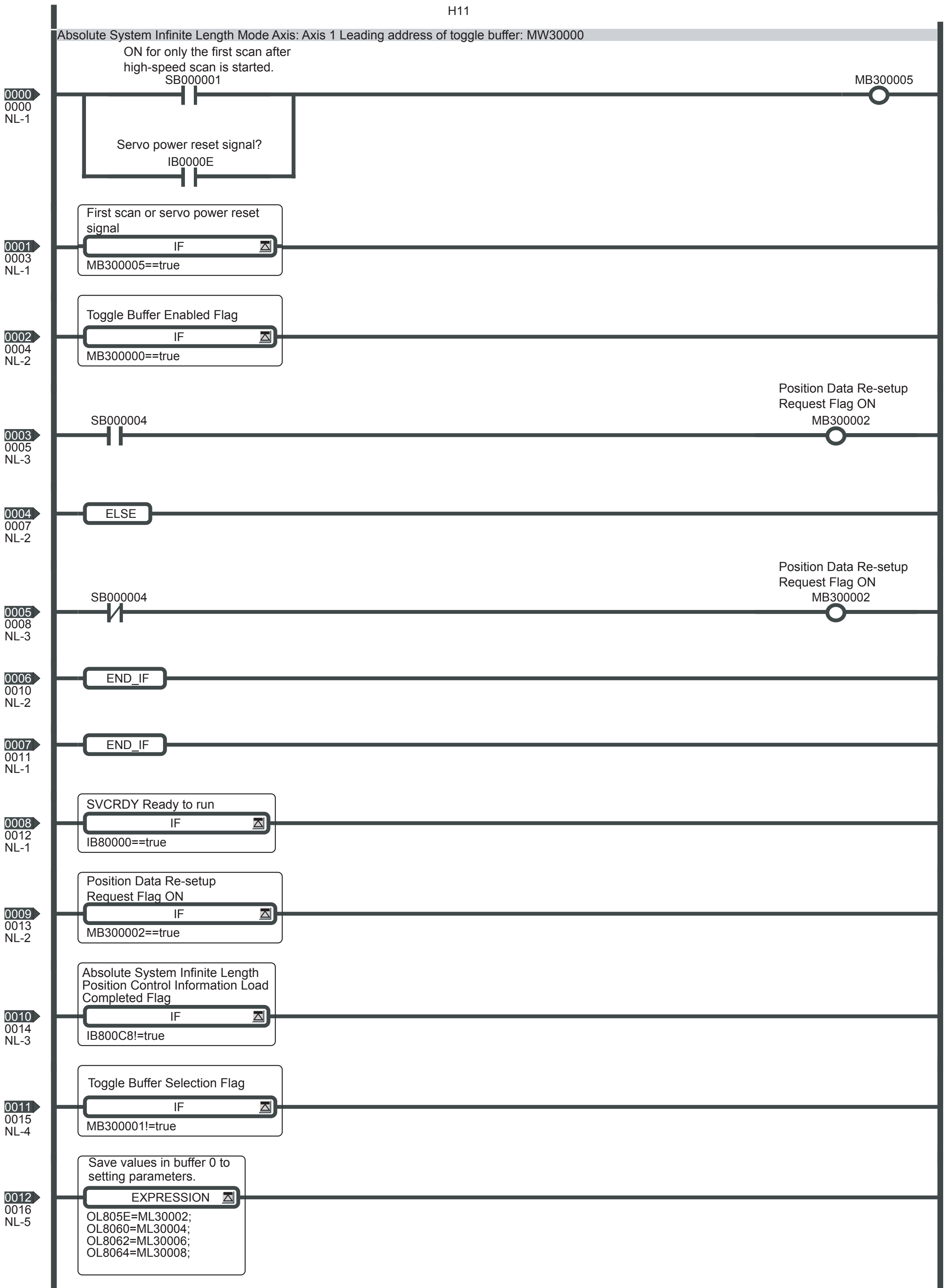
Use the following flowchart to set up position data again.



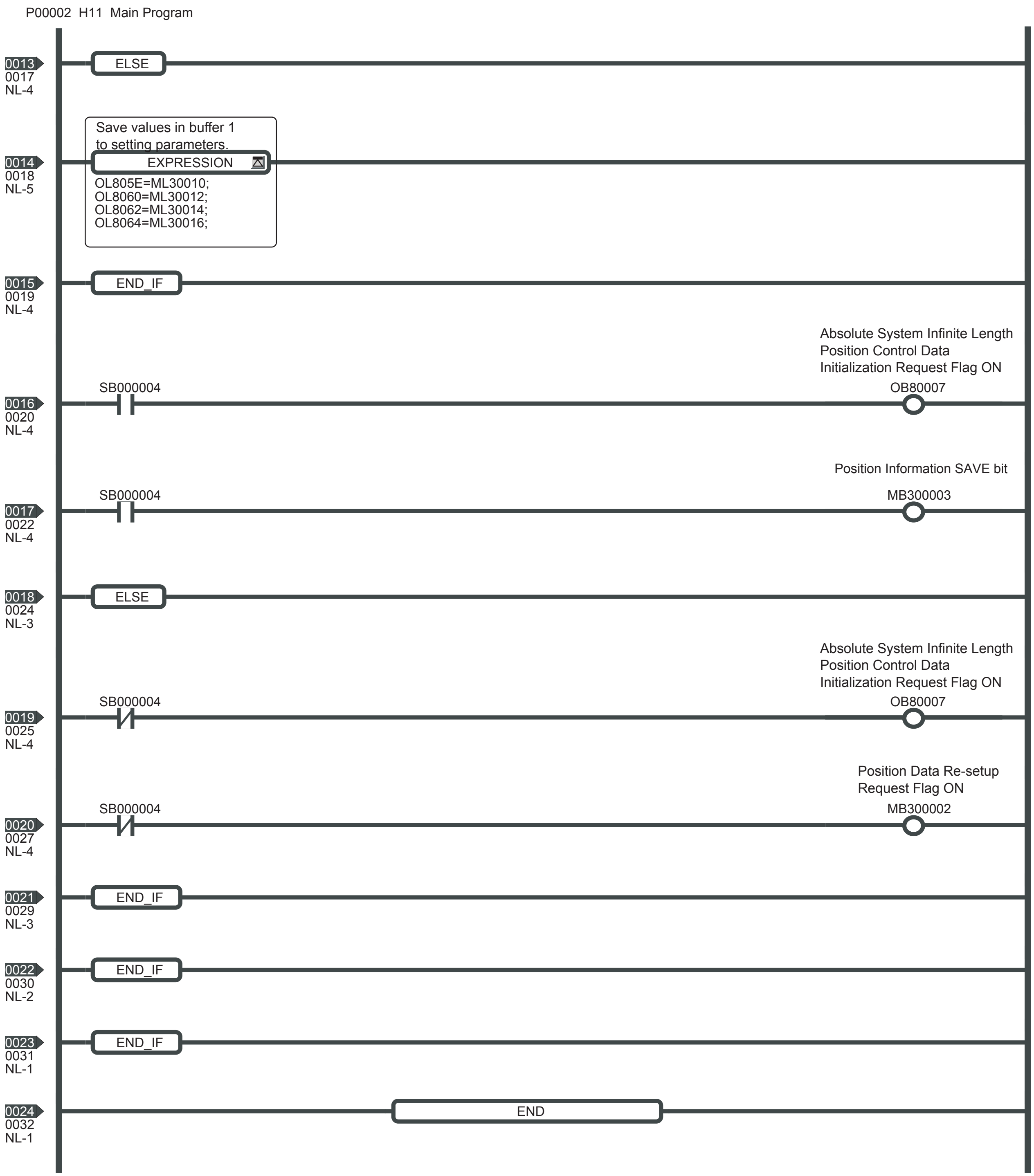
◀ EXAMPLE ▶

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



(continued on next page)



INFO

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.

8

SVR Virtual Motion Module

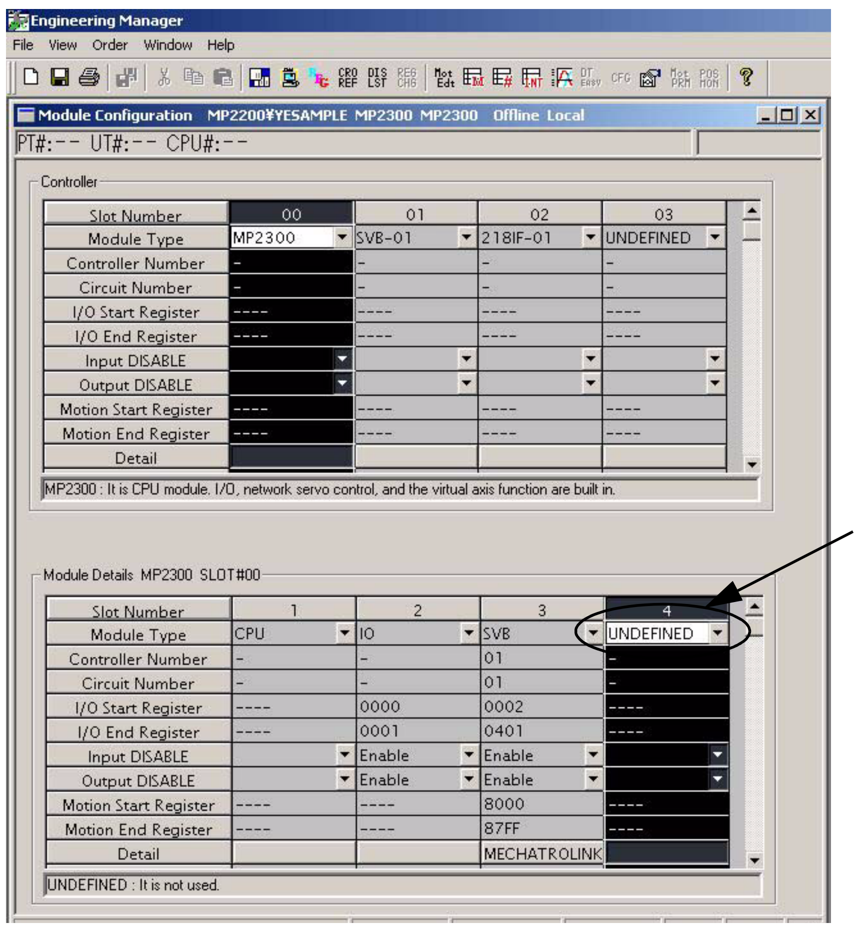
This chapter gives an overview of the SVR Virtual Motion Module and describes the system configuration, applicable motion parameters, motion commands, and sample programs.

8.1 SVR Virtual Motion Module

This section gives an overview of the SVR Virtual Motion Module and describes the system configuration.

8.1.1 Overview

The Virtual Motion Module (SVR) is a Software Module that provides an interface for virtual axes that are not actually connected to Servomotors. The SVR is configured in the same way as the SVB-01 or SVA-01 Motion Module with fixed parameters, setting parameters, and monitoring parameters, and can be accessed from application programs using I/O registers. The SVR can be used to control up to 16 virtual axes in the high-speed scan control cycle.
If the SVR is not used, MP2200/MP2300 processing time can be reduced by setting the *Module Type* for SVR to ***UNDEFINED*** in the Module Configuration Window.



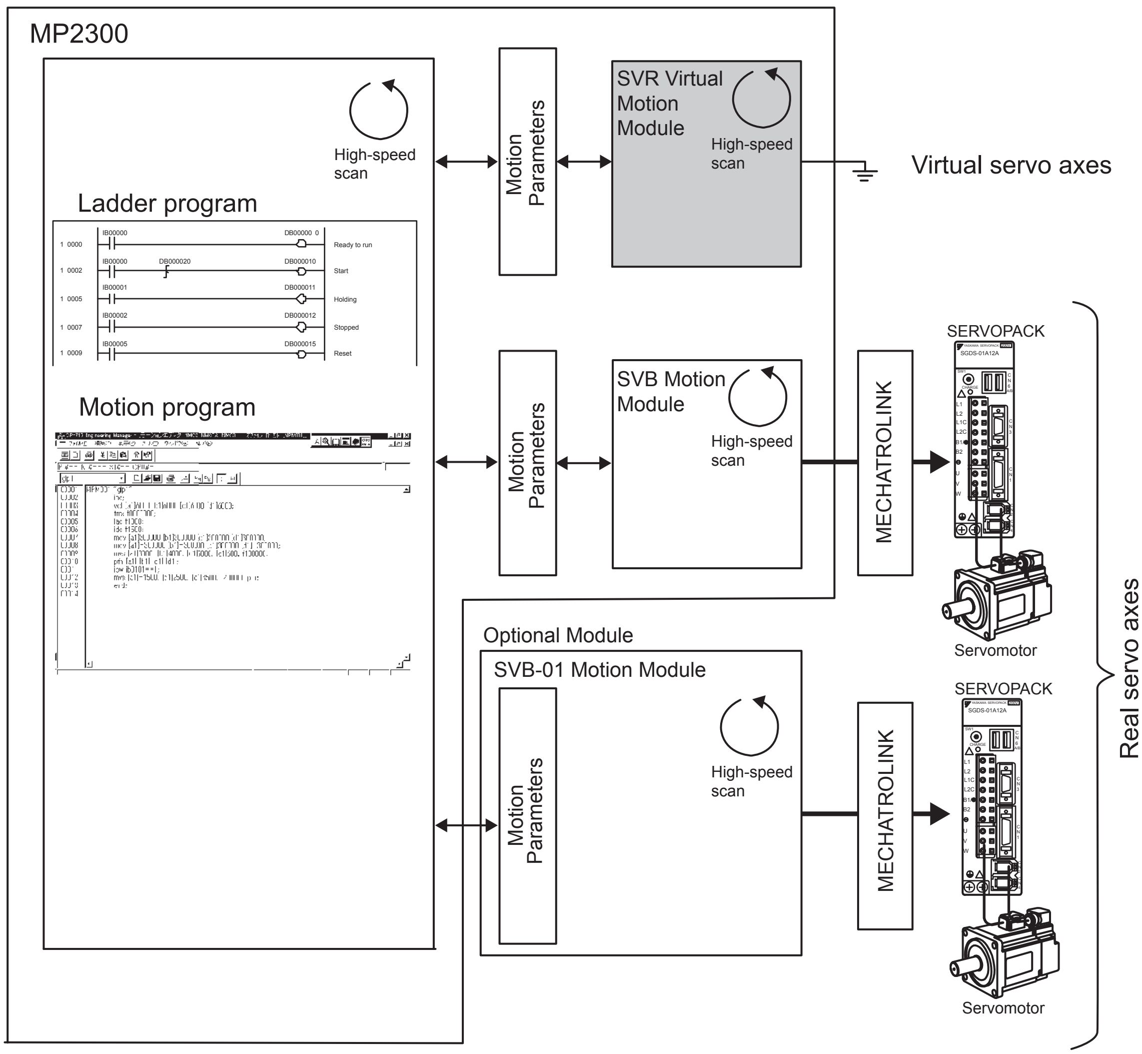
The software limit function, follow-up function, and machine lock function cannot be used with the SVR. The position error will always be 0.

The following table lists application examples of the SVR.

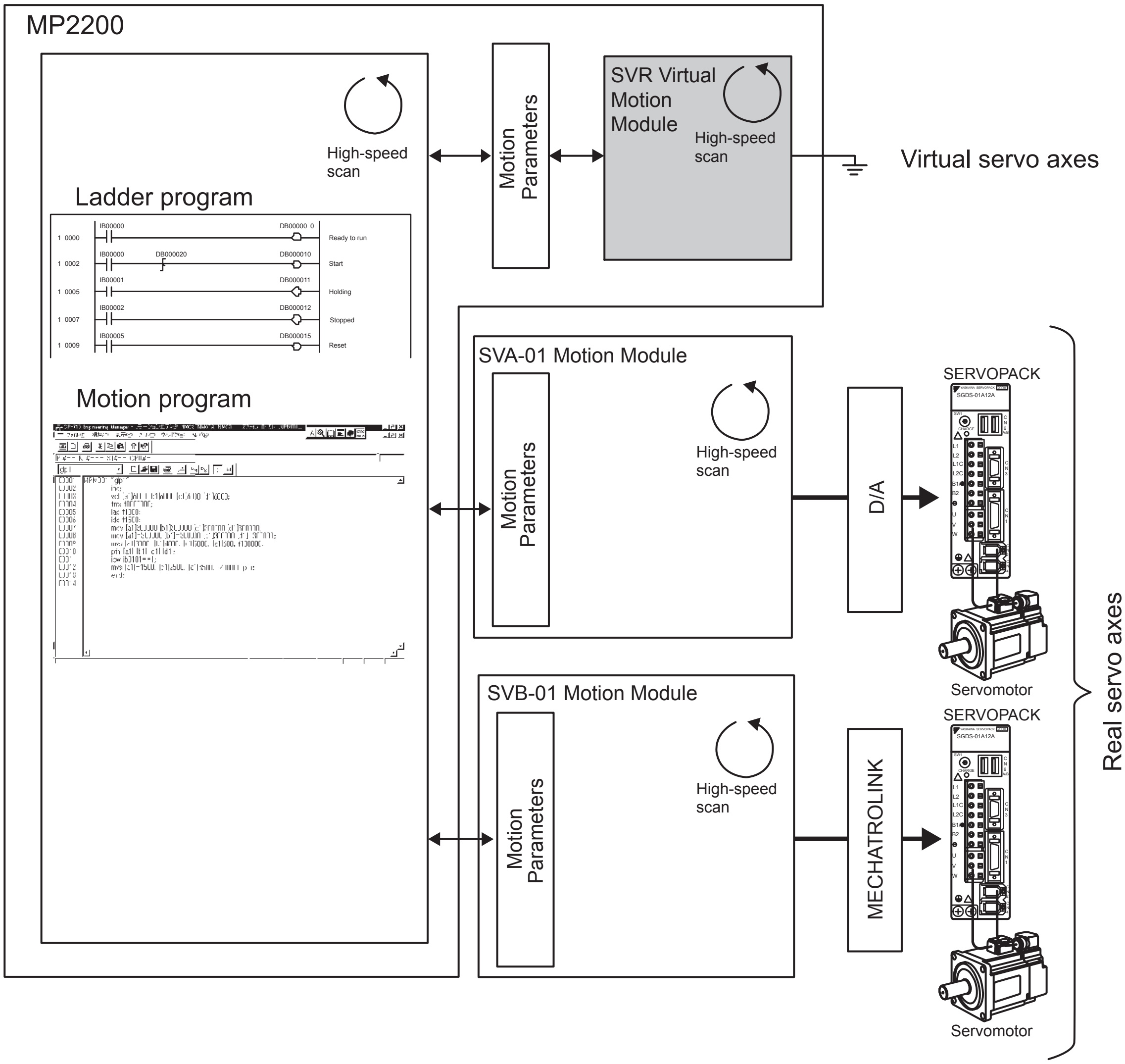
Application Example	Application Method
Master axis for phase control	Electronic cam or shaft operation can be achieved by using the SVR for the virtual master axis.
Multi-axis synchronous control	Multi-axis synchronous control can be achieved by controlling the SVR from a motion program and then using the ladder program to copy position commands of the SVR to other axes.
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.

8.1.2 System Configuration

(1) Using the MP2300



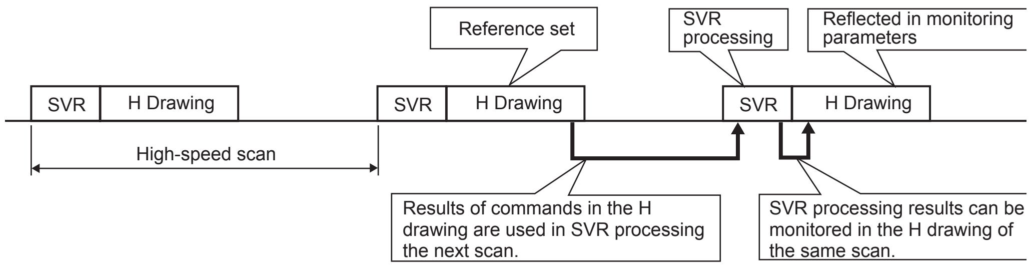
(2) Using the MP2200



8.1.3 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 specification and the processing results are reflected in the monitoring parameters.



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

Command	MP2300	MP2200
NOP	35 + 14 × Number of axes (μs)	24 + 10 × Number of axes (μs)
POSING	35 + 36 × Number of axes (μs)	24 + 24 × Number of axes (μs)

（Note）Number of axes: 1 to 16 in normal running mode
The above formula does not apply when the number of axes is 0.

Servicing all 16 virtual axes of the SVR Module is started by axis according to the following condition.

- When fixed parameter 0 (Run Mode) is set to 0 (Normal Running)
  (default: 1 (not used))

INFO

■ Comparison with SVB-01/SVA-01 Simulation Mode

In the simulation mode, positioning functions are not supported, so the position data is updated to the final target position for 1 scan. The SVR uses its positioning function to perform distribution and refreshes the position data for every scan up to the final target position.

8.2 Motion Parameters

The following table gives motion parameters used by the SVR and the default values of the parameters.

8.2.1 Motion Parameter Details

Type	No.	Name	Default Value
Fixed Parameters	0	Run Mode	1
	1	Function Selection 1	0000h
	4	Command Unit	0
	5	Number of Decimal Places	3
	6	Command Unit per Revolution	10000
	8	Gear Ratio (Motor)	1
	9	Gear Ratio (Load)	1
	10	Maximum Value of Rotary Counter (POSMAX)	360000
	34	Rated Speed	3000
	36	Encoder Resolution	65536
	42	Feedback Speed Moving Average Time Constant	10
Setting Parameters	OW□□00	RUN Commands	0000h
	OW□□03	Function 1	0011h
	OW□□08	Motion Command	0
	OW□□09	Motion Command Options	0000h
	OW□□0A	Motion Subcommand	0
	OL□□0C	Torque Reference	0
	OL□□10	Speed Reference	3000
	OL□□16	Secondary Speed Compensation	0
	OL□□1C	Position Reference Setting	0
	OW□□31	Speed Amends	0
	OL□□36	Linear Acceleration Time	0
	OL□□38	Linear Deceleration Time	0
	OW□□3A	S-curve Acceleration Time	0
	OW□□3B	Bias Speed for Exponential Acceleration/ Deceleration Filter	0
	OW□□3D	Home Window	100
	OL□□44	Step Distance	1000
	OL□□48	Zero Point Offset	0
	OL□□4A	Work Coordinate System Offset	0
	OL□□4C	Preset Data of POSMAX Turn	0
	OW□□5C	Fixed Parameter Number	0

(cont'd)

Type	No.	Name	Default Value
Monitoring Parameters	IW☐☐00	Drive Status	–
	IW☐☐01	Over Range Parameter Number	–
	IL☐☐02	Warning	–
	IL☐☐04	Alarm	–
	IW☐☐08	Servo Command Type Response	–
	IW☐☐09	Servo Module Command Status	–
	IW☐☐0A	Motion Subcommand Response Code	–
	IW☐☐0B	Motion Subcommand Status	–
	IW☐☐0C	Position Management Status	–
	IL☐☐0E	Machine Coordinate Target Position (TPOS)	–
	IL☐☐10	Target Position (CPOS)	–
	IL☐☐12	Machine Coordinate System Position (MPOS)	–
	IL☐☐14	Reserved (DPOS)	–
	IL☐☐16	Machine Coordinate Feedback Position (APOS)	–
	IL☐☐1C	Target Position Difference Monitor	–
	IL☐☐1E	POSMAX Number of Turns	–
	IL☐☐40	Feedback Speed	–
	IL☐☐42	Torque (Thrust) Reference Monitor	–
	IL☐☐56	Fixed Parameter Monitor	–

8.2.2 Motion Parameter Settings

This section describes the motion parameters used by the SVR.

(1) Motion Fixed Parameters

[a] Run Mode

No. 0	Run Mode		
	Setting Range	Setting Unit	Default Value
	0, 1	–	1
Specify the application method of the axis. 0: Normal Running, 1: Axis unused (default)			

[b] Function Selection 1

No. 1		Function Selection 1		
		Setting Range	Setting Unit	Default Value
		–	–	0000H
No. 1	Bit 0	Axis Type 0: Linear (Finite length axis) (default), 1: Rotating (Infinite length axis)		

[c] Reference Unit Setting

No. 4	Command Unit		
	Setting Range	Setting Unit	Default Value
	0 to 3	–	0
Set the unit for the reference that is input. 0: pulse (electronic gear disabled) 1: mm 2: deg 3: inch			

[d] Number of Decimal Places

No. 5	Number of Decimal Places		
	Setting Range	Setting Unit	Default Value
	0 to 5	–	3
Set the number of digits to the right of the decimal point in input references. Example: If Command Unit = mm and Number of Decimal Places = 3 Then, a reference unit of 1 = 0.001 mm			

[e] Command Unit per Revolution

No. 6	Command Unit per Revolution		
	Setting Range	Setting Unit	Default Value
	1 to $2^{31}-1$	Reference unit	10000
Specify the amount of travel in the load as the number of reference units for each turn of the load shaft.			

[f] Gear Ratio

No. 8	Gear Ratio [MOTOR]		
	Setting Range	Setting Unit	Default Value
	1 to 65535	rev (revolutions)	1
No. 9	Gear Ratio [LOAD]		
	Setting Range	Setting Unit	Default Value
	1 to 65535	rev (revolutions)	1
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. • Gear ratio at Servomotor: m • Gear ratio at load: n The setting of this parameter is disabled if the Command Unit (Reference Unit) is set to pulse in fixed parameter 4.			

[g] Infinite Axis Reset Position

No. 10	Maximum Value of Rotary Counter (POSMAX)		
	Setting Range	Setting Unit	Default Value
	1 to $2^{31}-1$	Reference Unit	360000
Set the reset position when an infinite length axis is set. Enabled when bit 0 of the Function Selection 1 (fixed parameter 1) is set to infinite axis.			

[h] Encoder Settings

No. 34	Rated Speed		
	Setting Range	Setting Unit	Default Value
	1 to 32000	$\min^{-1}$	3000
Set the rated motor speed in 1 $\min^{-1}$ units.			
No. 36	Encoder Resolution		
	Setting Range	Setting Unit	Default Value
	1 to $2^{31}-1$	pulse	65536
Set the number of feedback pulses per motor rotation.			
No. 42	Feedback Speed Moving Average Time Constant		
	Setting Range	Setting Unit	Default Value
	0 to 32	ms	10
The Feedback Speed (monitoring parameter IL□□40) is the value obtained by calculating the moving average for the time constant from the feedback position for every scan.			

(2) Motion Setting Parameters

(Note) Position : The labels shown in reverse type indicate that the parameter is enabled during the corresponding control mode (position control shown here).

[a] RUN Commands

<table>
<tr><td colspan="2" rowspan="3">OW□□00</td><td colspan="3">Run Commands　Position　Phase　Speed　Torque</td></tr>
<tr><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="3">OW□□00</td><td>Bit 0</td><td colspan="3">Servo ON
0: Servo OFF (default), 1: Servo ON</td></tr>
<tr><td>Bit 6</td><td colspan="3">POSMAX Preset
0: POSMAX Preset OFF (default)
1: POSMAX Preset ON</td></tr>
<tr><td>Bit F</td><td colspan="3">Clear Alarm
This setting is valid when the Motion Command (motion setting parameter OW□□08) is 0 (NOP).
0: Clear alarm OFF (default), 1: Clear alarm ON</td></tr>
</table>

[b] Function 1

<table>
<tr><td colspan="2" rowspan="3">OW□□03</td><td colspan="3">Function 1　Position　Phase　Speed　Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>–</td><td>–</td><td>0011H</td></tr>
<tr><td rowspan="4">OW□□03</td><td>Bit 0 to Bit 3</td><td colspan="3">Speed Units
0: Reference units/s, 1: 10^n reference units/min (default)
2: 0.01%, 3: 0.0001%</td></tr>
<tr><td>Bit 4 to Bit 7</td><td colspan="3">Acceleration/Deceleration Units
0: Reference units/s^2, 1: ms (default)</td></tr>
<tr><td>Bit 8 to Bit B</td><td colspan="3">Filter Type
0: No filter (default), 1: Exponential acceleration/deceleration filter
2: Moving average filter</td></tr>
<tr><td>Bit C to Bit F</td><td colspan="3">Torque Unit Selection
0: 0.01% (default), 1: 0.0001%</td></tr>
</table>

[c] Motion Command

<table>
<tr><td rowspan="3">OW□□08</td><td colspan="3">Motion Command　Position　Phase　Speed　Torque</td></tr>
<tr><td>Setting Range</td><td>Setting Unit</td><td>Default Value</td></tr>
<tr><td>0 to 26</td><td>–</td><td>0</td></tr>
<tr><td colspan="4">Set motion commands.</td></tr>
</table>

[d] Motion Command Control Flags

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

OW□□09	Bit 0	Command Pause 0: Command Pause OFF (default), 1: Command Pause ON
	Bit 1	Command Abort 0: Command Abort OFF (default), 1: Command Abort ON
	Bit 2	JOG/STEP Direction 0: Forward (default), 1: Reverse
	Bit 5	Position Reference Type 0: Incremental addition mode (default), 1: Absolute position reference mode

[e] Motion Subcommands

OW□□0A	Motion Subcommand	Position Phase	Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to 5	–	0
Set the motion subcommand to be used with the motion command. Only 0: NOP and 5: FIXPRM_RD can be used.			

[f] Torque Reference

OL□□0C	Torque Reference	Position Phase	Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Depends on the torque unit set in Function 1 (setting parameter OW□□03 bits C to F).	0
Set the torque reference for torque reference commands.			

[g] Speed Reference

OL□□10	Speed Reference	Position Phase	Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Depends on the speed unit set in Function 1 (setting parameter OW□□03 bits 0 to 3).	3000
Set the speed reference.			

[h] Secondary Speed Compensation

OL□□16	Secondary 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 1 (setting parameter OW□□03 bits 0 to 3).	0
Set the speed feed forward amount for the Phase Reference command (PHASE). When used at the same time as Speed Amends (OW□□31), speed compensation can be performed twice.			

[i] Position Reference Type

OL□□1C	Position Reference Setting	**Position** Phase	Speed Torque
	Setting Range	Setting Unit	Default Value
	-2^{31} to $2^{31}-1$	Reference Unit	0
Set the position reference.			

[j] Speed Amends

OW□□31	Speed Amends	**Position** **Phase**	Speed Torque
	Setting Range	Setting Unit	Default Value
	–32768 to 32767	0.01%	0
Set the speed feed forward gain as a percentage of the rated speed.			

[k] Acceleration/Deceleration Settings

OL□□36	Linear Acceleration Time	**Position** Phase	Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Depends on Acceleration/ Deceleration Units (OW□□03 bits 4 to 7).	0
Set the rate or the time constant for linear acceleration.			
OL□□38	Linear Deceleration Time	**Position** Phase	Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to $2^{31}-1$	Depends on Acceleration/ Deceleration Units (OW□□03 bits 4 to 7).	0
Set the rate or the time constant for linear deceleration.			

[l] Filters

OW□□3A	S-curve Acceleration Time	**Position** **Phase**	Speed Torque
	Setting Range	Setting Unit	Default Value
	0 to 65535	0.1 ms	0
Set the acceleration/deceleration filter time constant. Always make sure that pulse distribution has been completed (i.e., that monitoring parameter IB□□0C0 is ON) before changing the time constant.			

OW□□3B	Bias Speed for Exponential Acceleration/Deceleration Filter — **Position** **Phase** Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 32767	Depends on speed unit (OW□□03 bits 0 to 3).	0
Set the bias speed for the exponential acceleration/deceleration filter.			

[m] Zero Point Return

OW□□3D	Home Window — **Position** Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 65535	Reference Unit	100
Set the width to turn ON the Zero Point Position bit in the Position Management Status (monitoring parameter IB□□0C4).			

[n] Step Distance

OL□□44	Step Distance — **Position** Phase Speed Torque		
	Setting Range	Setting Unit	Default Value
	0 to 2^{31}–1	Reference Unit	1000
Set the moving amount for STEP commands.			

[o] Coordinate System Settings

OL□□48	Zero Point Offset — **Position** **Phase** Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to 2^{31}–1	Reference Unit	0
Set the offset to shift the machine coordinate system.			
OL□□4A	Work Coordinate System Offset — **Position** **Phase** Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to 2^{31}–1	Reference Unit	0
Set the offset to shift the work coordinate system.			
OL□□4C	Preset Data of POSMAX Turn — **Position** **Phase** Speed Torque		
	Setting Range	Setting Unit	Default Value
	-2^{31} to 2^{31}–1	Rev	0
When the POSMAX Preset bit (setting parameter OW□□00 bit 6) is set to 1, the value set here will be preset as the POSMAX Number of Turns (monitoring parameter IL□□1E).			

[p] Supplemental Settings

OW□□5C	Fixed Parameter Number — **Position** **Phase** **Speed** **Torque**		
	Setting Range	Setting Unit	Default Value
	0 to 65535	–	0
Set the number of the fixed parameter to read with the FIXPRM_RD motion subcommand.			

(3) Motion Monitoring Parameters

[a] Drive Status

IW□□00		Drive Status		
		Range	Unit	
		–	–	
IW□□00	Bit 0	Motion Controller Operation Ready Turns ON when the Run Mode (fixed parameter 0) is set to 0 (Normal Running). OFF: Operation not ready, ON: Operation ready		
	Bit 1	Running (Servo ON) OFF: Stopped, ON: Running (Servo ON)		

[b] Over Range Parameter Number

IW□□01	Over Range Parameter Number		
	Range	Unit	
	0 to 65535	–	
Stores the number of a parameter set outside the Range . • Setting parameters: 0 to 999 • Fixed parameters: 1000 or higher			

[c] Warning

IL□□02		Warning		
		Range	Unit	
		–	–	
IL□□02	Bit 1	Setting Parameter Error OFF: In Range , ON: Outside Range		
	Bit 2	Fixed Parameter Error OFF: In Range , ON: Outside Range		
	Bit 4	Motion Command Setting Error OFF: Command setting normal, ON: Command setting error		

[d] Alarm

IL□□04		Alarm		
		Range	Unit	
		–	–	
IL□□04	Bit 5	Servo OFF OFF: Servo ON, ON: Servo OFF		

[e] Motion Command Response Code

IW□□08	Servo Command Type Response		
	Range	Unit	
	0 to 65535	–	
Stores the motion command code for the command that is being executed.			

[f] Motion Command Status

IW□□09		Servo Module Command Status		
		Range	Unit	
		–	–	
IW□□09	Bit 0	Command Executing (BUSY) OFF: READY (completed), ON: BUSY (processing)		
	Bit 1	Command Hold Completed (HOLDL) OFF: Command hold processing not completed, ON: Command hold processing completed		
	Bit 3	Command Error Occurrence (FAIL) OFF: Normal completion, ON: Abnormal completion		
	Bit 8	Command Execution Completed (COMPLETE) OFF: Normal execution not completed, ON: Normal execution completed		

[g] Motion Subcommand Response Code

IW□□0A	Motion Subcommand Response Code		
	Range	Unit	
	0 to 65535	–	
Stores the motion subcommand code that is being executed.			

[h] Motion Subcommand Status

IW□□0B		Motion Subcommand Status		
		Range	Unit	
		–	–	
IW□□0B	Bit 0	Command Executing (BUSY) OFF: READY (completed), ON: BUSY (processing)		
	Bit 3	Command Error Occurrence (FAIL) OFF: Normal completion, ON: Abnormal completion		
	Bit 8	Command Execution Completed (COMPLETE) OFF: Normal execution not completed, ON: Normal execution completed		

[i] Position Management Status

IW□□0C		Position Management Status		
		Range	Unit	
		–	–	
IW□□0C	Bit 0	Distribution Completed (DEN) OFF: Distributing pulses, ON: Distribution completed		
	Bit 1	Positioning Completed (POSCOMP) OFF: Outside Positioning Completed Width, ON: In Positioning Completed Width		
	Bit 3	Position Proximity (NEAR) OFF: Outside position proximity range, ON: In position proximity range		
	Bit 4	Zero Point Position (ZERO) OFF: Outside zero point position range, ON: In zero point position range		
	Bit 5	Zero Point Return (Setting) Completed (ZRNC) OFF: Zero point return (setting) not completed, ON: Zero point return (setting) completed		
	Bit 9	POSMAX Turn Number Presetting Completed (TPRSE) OFF: Preset not completed, ON: Preset completed		

[j] Position Information

IL□□0E	Machine Coordinate Target Position (TPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the target position in the machine coordinate system managed by the Motion Module.			
IL□□10	Target Position (CPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the calculated position in the machine coordinate system managed by the Motion Module.			
IL□□12	Machine Coordinate System Position (MPOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the reference position in the machine coordinate system managed by the Motion Module. MPOS is always equal to CPOS.			
IL□□16	Machine Coordinate Feedback Position (APOS)		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
APOS is always equal to CPOS.			
IL□□1C	Target Position Difference Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Reference unit	
Stores the target position difference managed by the Motion Module.			
IW□□1E	POSMAX Number of Turns		
	Range	Unit	
	-2^{31} to $2^{31}-1$	rev	
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 Maximum Value of Rotary Counter (POSMAX) (fixed parameter 10).			

[k] SERVOPACK Information 2

IL□□40	Feedback Speed		
	Range	Unit	
	-2^{31} to $2^{31}-1$	Depends on speed unit (OW□□03 bits 0 to 3).	
Stores the feedback speed.			
IL□□42	Torque (Thrust) Reference Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	0.01%, 0.001%	
Stores the value of the torque reference.			

[l] Supplemental Information

IL□□56	Fixed Parameter Monitor		
	Range	Unit	
	-2^{31} to $2^{31}-1$	–	
Stores the data of the specified fixed parameter number.			

8.3 Motion Commands

The SVR reads and writes motion parameters and executes commands at the beginning of the high-speed scan.

8.3.1 Motion Commands List

The following table lists the motion commands that can be used with the SVR.

Command Code	Command	Name	Overview
0	NOP	No command	–
1	POSING	Positioning	Positions to the specified position using the specified acceleration/deceleration times and the specified speed.
2	EX_POSING	External Positioning	Performs the same operation as the POSING command.
3	ZRET	Zero Point Return	Returns to the zero point in the machine coordinate system.
4	INTERPOLATE	Interpolation	Performs interpolation feeding using positioning data distributed consecutively from the Basic Module.
5	–	Reserved by system.	–
6	LATCH	Latch	Performs the same operation as the INTERPOLATE command.
7	FEED	JOG Operation	Moves the axis at the specified speed in the specified direction until the command is cancelled.
8	STEP	STEP Operation	Positions the specified travel distance in the specified direction at the specified speed.
9	ZSET	Zero Point Setting	Sets the zero point in the machine coordinate system.
23	VELO	Speed Reference	The SVR does not support a speed control function.
24	TRQ	Torque Reference	The SVR does not support a torque control function.
25	PHASE	Phase References	Performs the same operation as the JOG operation. An acceleration/deceleration function, however, is not supported.

8.3.2 Motion Command Details

Basically, the SVR provides functions to loop from a Motion Command (OW□□08) to the Motion Command Type Response (IW□□08).
For positioning-related motion commands, the SVR updates position information toward the final target position using a positioning function.

(1) Positioning (POSING)

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.
The speed and 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.

[a] Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Positioning Speed: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03

⇩

Execute the positioning (POSING) motion command.
- Set OW□□08 to 1.

⇩

Set the target position.
- Target Position Setting: OL□□1C*

⇩

Positioning starts.
- IW□□08 will be 1 during positioning.

⇩

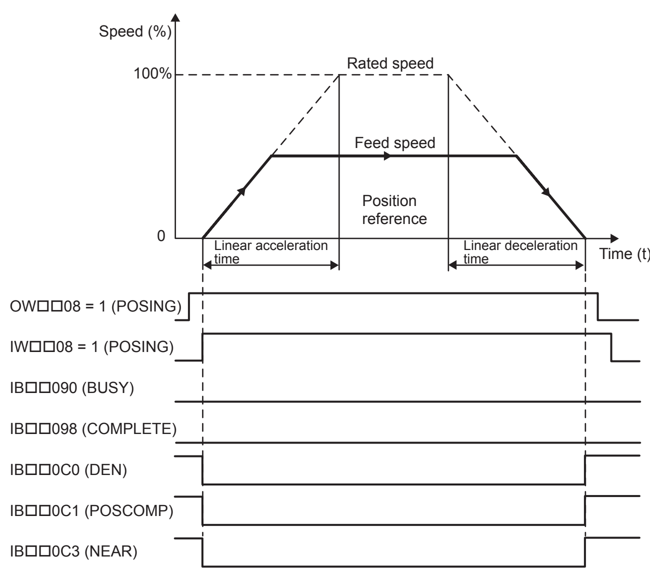
Position proximity reached.
- IB□□0C3 will turn ON.

⇩

Positioning completed.
- IB□□0C1 will turn ON.

⇩

Executed NOP motion command.
- Set OW□□08 to 0.



- The target position can be changed while the axis is moving.
- The positioning speed can be changed while the axis is moving.
- Set OB□□090 to 1 to hold the command.
- Set OB□□091 to 1 or execute the NOP motion command to abort the command.

* If the Position Reference Type (OB□□095) is set for an absolute mode, the target position can be set before executing the command.

(Note) The following position information is updated during command execution.

- Machine Coordinate Target Position (TPOS) (IL□□0E)

- Target Position (CPOS) (IL□□10)
- Machine Coordinate System Position (MPOS) (IL□□12): MPOS is always equal to CPOS.
- Machine Coordinate Feedback Position (APOS) (IL□□16): APOS is always equal to CPOS.

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
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.
OB□□090	Command Pause	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 set to 0 when a command is being held.
OB□□091	Command Abort	The axis will decelerate to a stop if this bit is set to 1 during POSING command execution. When this bit is set to 0 after stopping, the operation depends on the setting of the Position Reference Type (OB□□095).
OB□□095	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.
OL□□10	Speed Reference	Specify the speed for the positioning. This setting can be changed during operation. The unit depends on the setting of OW□□03.
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 OB□□095.
OL□□36	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant for positioning.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 1 during POSING command execution.
IB□□090	Command Executing	Turns ON when abort processing is being performed for POSING command. Turns OFF when abort processing has been completed.
IB□□091	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of set the Command Pause bit (OB□□090) to 1 during POSING command execution.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for POSING command. Use the Positioning Completed bit (IB□□0C1) to confirm completion of this command.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a pulse distribution.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width. OFF in all other cases.
IB□□0C3	Position Proximity	Turns ON when Distribution Completed (DEN) turns ON.

(2) External Positioning (EX_POSING)

The latch function cannot be used for the SVR. EX_POSING thus performs the same operation as the POSING command.

[a] Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Positioning Speed: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03

⇩

Execute the External Positioning (EX_POSING) motion command.
- Set OW□□08 to 2.

⇩

Set the target position.
- Target Position Setting: OL□□1C*

⇩

Positioning starts.
- IW□□08 will be 2 during positioning.

⇩

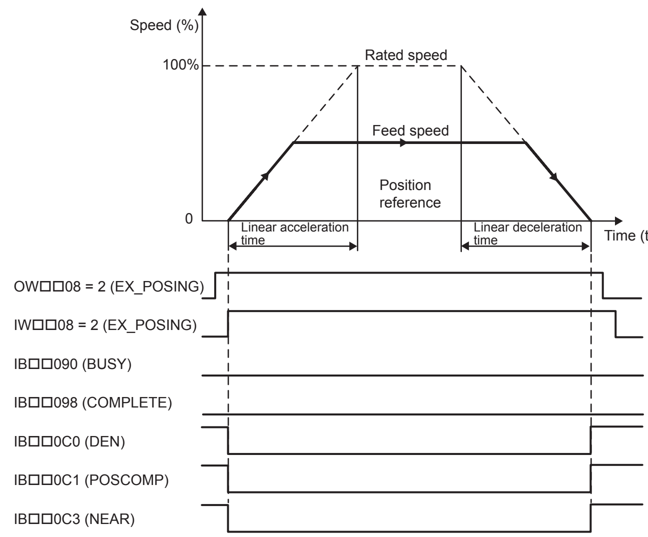
Position proximity reached.
- IB□□0C3 will turn ON.

⇩

Positioning completed.
- IB□□C1 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- The target position can be changed while the axis is moving.
- The positioning speed can be changed while the axis is moving.
- Set OB□□090 to 1 to hold the command.
- Set OB□□091 to 1 or execute the NOP motion command to abort the command.

* If the Position Reference Type (OB□□095) is set for an absolute mode, the target position can be set before executing the command.

(Note) The following position information is updated during command execution.

- Machine Coordinate Target Position (TPOS) (IL□□0E)
- Target Position (CPOS) (IL□□10)
- Machine Coordinate System Position (MPOS) (IL□□12): MPOS is always equal to CPOS.
- Machine Coordinate Feedback Position (APOS) (IL□□16): APOS is always equal to CPOS.

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
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.
OB□□090	Command Pause	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 turned OFF when a command is being held.
OB□□091	Command Abort	The axis will decelerate to a stop if this bit is set to 1 during EX_POSING command execution.
OB□□095	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.
OL□□10	Speed Reference	Specify the speed for the positioning. This setting can be changed during operation. The unit depends on the setting of OW□□03.
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 OB□□095.
OL□□36	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant for positioning.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 2 during EX_POSING command execution.
IB□□090	Command Executing	The Command Executing bit will turn ON during EX_POSING command execution and then turn OFF when command execution has been completed.
IB□□091	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of setting the Command Pause bit (OB□□090) to 1 during EX_POSING command execution.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Turns ON when EX_POSING command execution has been completed.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width. OFF in all other cases.
IB□□0C3	Position Proximity	Turns ON when Distribution Completed (DEN) turns ON.

(3) Zero Point Return (ZRET)

When a ZRET command is executed, the zero point return will be completed immediately. Position information will not be updated.

[a] Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Execute the zero point return (ZRET) motion command.
- Set OW□□08 to 3.

⇩

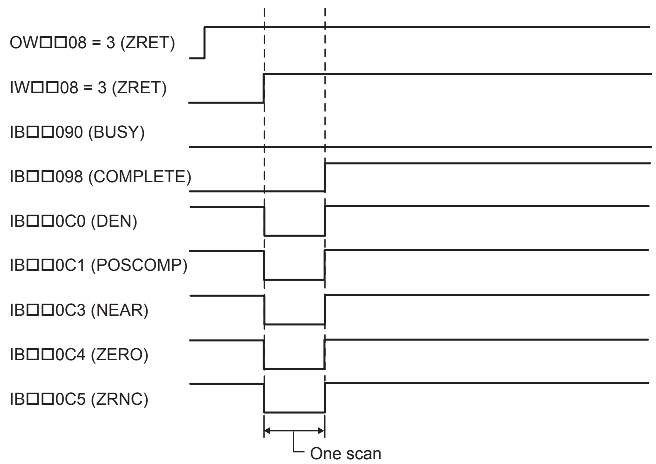
Zero point return operation starts.
- IW□□08 will be 3 during execution.

⇩

Zero point return operation completed.
- IB□□0C5 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



(Note) The following position information is updated when command execution is completed.

- Machine Coordinate Target Position (TPOS) (IL□□0E) = Zero Point Offset (ABSOFF) (OL□□48)
- Target Position (CPOS) (IL□□10) = Zero Point Offset (ABSOFF) (OL□□48)
- Machine Coordinate System Position (MPOS) (IL□□12) = Zero Point Offset (ABSOFF) (OL□□48)
- Machine Coordinate Feedback Position (APOS) (IL□□16) = Zero Point Offset (ABSOFF) (OL□□48)

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OB□□000	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 Code (OW□□08) to 3.
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The zero point return operation starts when this parameter is set to 3. The operation will be canceled if this parameter is set to 0 during ZRET command execution.
OB□□091	Command Abort	The zero point return operation will be canceled if this bit is set to 1 during zero point return operation.
OB□□095	Position Reference Type	Switch the type of position reference. 0: Incremental addition mode, 1: Absolute mode Set this parameter before setting the Motion Command Code (OW□□08) to 3.
OW□□3D	Home Window	Set the width in which the Zero Point Position bit (IB□□0C4) will turn ON.

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 3 during ZRET command execution.
IB□□090	Command Executing	Turns ON during zero point return operation. Turns OFF when ZRET command execution has been completed.
IB□□091	Command Hold Completed	Always OFF for ZRET command.
IB□□093	Command Error End	Turns ON if an error occurs during ZRET command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when ZRET command execution has been completed.
IB□□0C0	Distribution Completed	Turns OFF for 1 scan.
IB□□0C3	Position Proximity	Turns OFF for 1 scan.
IB□□0C4	Zero Point Position	Turns ON if the current position after the zero point return operation has been completed is within the Zero Point Position Output Wide from the zero point position. Turns OFF is the current position is not within this width.
IB□□0C5	Zero Point Return Completed	Turns ON when the zero point return has been completed.

(4) Interpolation (INTERPOLATE)

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.

[a] Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Target Position: OL□□1C
- Acceleration/Deceleration Filter Type: OW□□03

⇩

Execute the interpolation (INTERPOLATE) motion command.
- Set OW□□08 to 4.

⇩

Positioning starts.
- IW□□08 will be 4 during positioning.

⇩

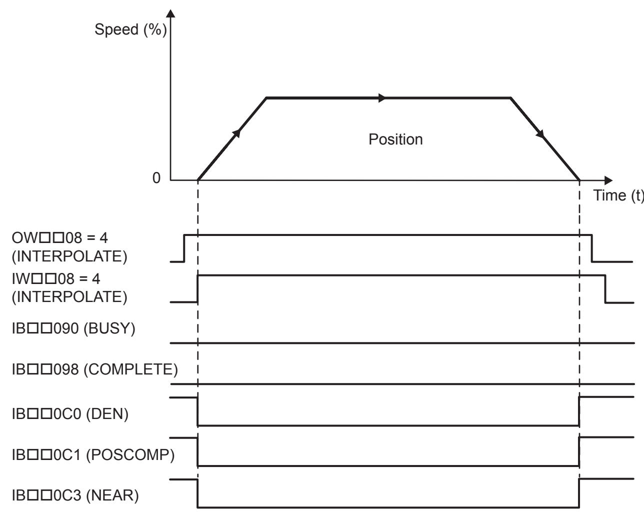
Change the Target Position (OL□□1C) every high-speed scan.

⇩

Positioning Completed
- IB□□0C1 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- Speed feed forward compensation can be applied.
- Generate the positioning data each high-speed scan from the ladder logic program.
- The travel speed is calculated automatically.
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.
- Change a motion command to stop interpolation execution.

(Note) The following position information is updated during command execution.

- Machine Coordinate Target Position (TPOS) (IL□□0E)
- Target Position (CPOS) (IL□□10)
- Machine Coordinate System Position (MPOS) (IL□□12): MPOS is always equal to CPOS.
- Machine Coordinate Feedback Position (APOS) (IL□□16): APOS is always equal to CPOS.

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The positioning starts when this parameter is set to 4.
OB□□095	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.
OL□□1C	Position Reference Setting	Set the target position for positioning. The setting can be changed every high-speed scan.
OL□□20	Positioning Completed Width 2	Set the range in which the Position Proximity bit (IB□□0C3) will turn ON. The Position Proximity 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□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 4 during INTERPOLATE command execution.
IB□□090	Command Executing	Always OFF for INTERPOLATE command.
IB□□091	Command Hold Completed	Always OFF for INTERPOLATE command.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for INTERPOLATE command.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed. OFF in all other cases.
IB□□0C3	Position Proximity	Turns ON when Distribution Completed (DEN) turns ON.

(5) Latch (LATCH)

The latch function cannot be used for the SVR. The LATCH command will thus perform the same operation as the INTERPOLATE command.

[a] Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Target Position: OL□□1C
- Acceleration/Deceleration Filter Type: OW□□03

⇩

Execute the LATCH motion command.
- Set OW□□08 to 6.

⇩

Positioning starts.
- IW□□08 will be 6 during execution.

⇩

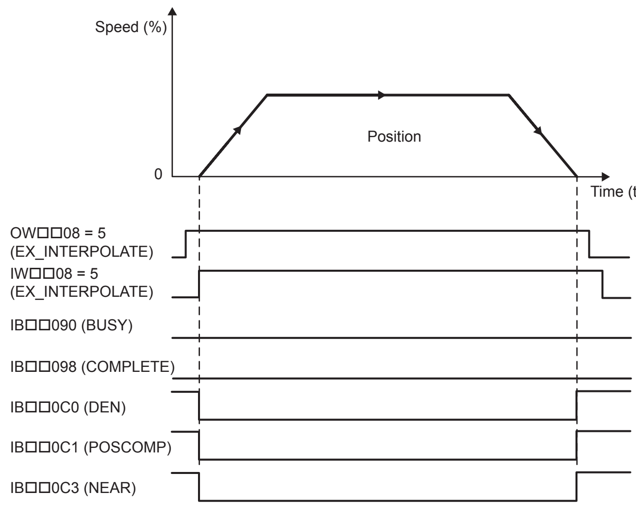
Change the Target Position (OL□□1C) every high-speed scan.

⇩

Positioning Completed
- IB□□0C1 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- Speed feed forward compensation can be applied.
- Generate the target position data each high-speed scan from the ladder program.
- The travel speed is calculated automatically.
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.
- Change a motion command to stop interpolation execution.

(Note) The following position information is updated during command execution.

- Machine Coordinate Target Position (TPOS) (IL□□0E)
- Target Position (CPOS) (IL□□10)
- Machine Coordinate System Position (MPOS) (IL□□12): MPOS is always equal to CPOS.
- Machine Coordinate Feedback Position (APOS) (IL□□16): APOS is always equal to CPOS.

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The positioning starts when this parameter is set to 6.
OB□□095	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.
OL□□1C	Position Reference Setting	Set the target position for positioning. The setting can be changed every high-speed scan.
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. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates motion commands during execution. The response code is 6 during LATCH operation.
IB□□090	Command Executing	Always OFF for LATCH operation.
IB□□091	Command Hold Completed	Always OFF for LATCH operation.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for LATCH operation.
IB□□0C0	Distribution Completed	Turns ON when distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed. OFF in all other cases.
IB□□0C3	Position Proximity	Turns ON when Distribution Completed (DEN) turns ON.

(6) JOG Operation (FEED)

The FEED command starts movement in the specified travel direction at the specified travel speed. To stop the operation, execute the NOP motion command. The axis will decelerate to a stop when the NOP motion command is executed.
Parameters related to acceleration and deceleration are set in advance. The speed can be changed during axis movement.

[a] Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Direction of Movement: OB□□092
- Speed Reference: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03

⇩

Execute the JOG operation (FEED) motion command.
- Set OW□□08 to 7.

⇩

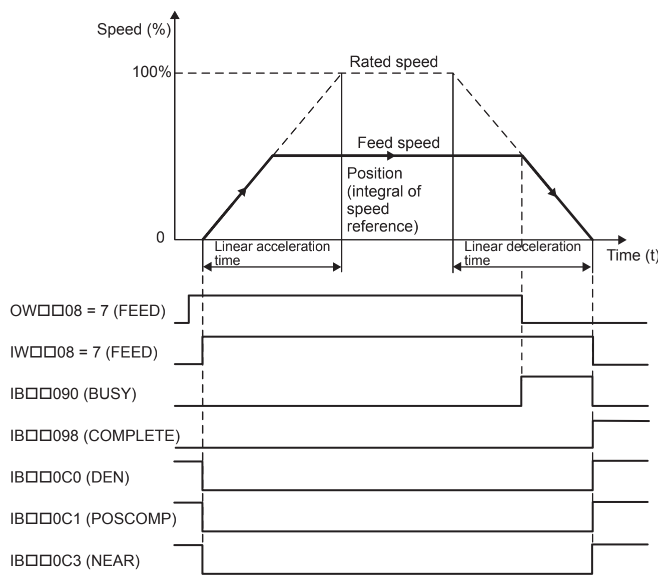
JOG operation starts.
- IW□□08 will be 7 during execution.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.

⇩

Positioning completed.
- IB□□0C1 will turn ON.



- The travel speed can be changed during movement.
- The Command Pause (OB□□090) cannot be used.
- The axis will decelerate to a stop if the Command Abort bit (OB□□091) is set to 1 during execution.

(Note) The following position information is updated during command execution.

- Machine Coordinate Target Position (TPOS) (IL□□0E)
- Target Position (CPOS) (IL□□10)
- Machine Coordinate System Position (MPOS) (IL□□12): MPOS is always equal to CPOS.
- Machine Coordinate Feedback Position (APOS) (IL□□16): APOS is always equal to CPOS.

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The JOG operation starts when this parameter is set to 7. The operation will be canceled if this parameter is set to 0 during FEED command execution.
OB□□090	Command Pause	This parameter is ignored for FEED command.
OB□□091	Command Abort	The axis is decelerated to a stop if this bit is set to 1 during JOG operation.
OB□□092	JOG/STEP Direction	Set the travel direction for JOG operation. 0: Positive direction, 1: Negative direction
OL□□10	Speed Reference	Specify the speed for the JOG operation. This setting can be changed during operation. The unit depends on the setting of OW□□03.
OL□□36	Linear Acceleration Time	Set the rate of acceleration of the acceleration time constant for fixed-speed feeding.
OL□□38	Linear Deceleration Time	Set the rate of deceleration of the deceleration time constant for fixed-speed feeding.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 7 during FEED command execution.
IB□□090	Command Executing	Turns ON when abort processing is being performed for FEED command. Turns OFF when abort processing has been completed.
IB□□091	Command Hold Completed	Always OFF for FEED command.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Always OFF for FEED command.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed. OFF in all other cases.
IB□□0C3	Position Proximity	Turns ON when Distribution Completed (DEN) turns ON.

(7) STEP Operation (STEP)

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. The speed can be changed during axis movement.

[a] Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Step Distance: OL□□44
- Direction of Movement: OB□□092
- Travel Speed: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03

⇩

Execute the STEP operation command.
- Set OW□□08 to 8.

⇩

STEP operation starts.
- IW□□08 will be 8 during execution.

⇩

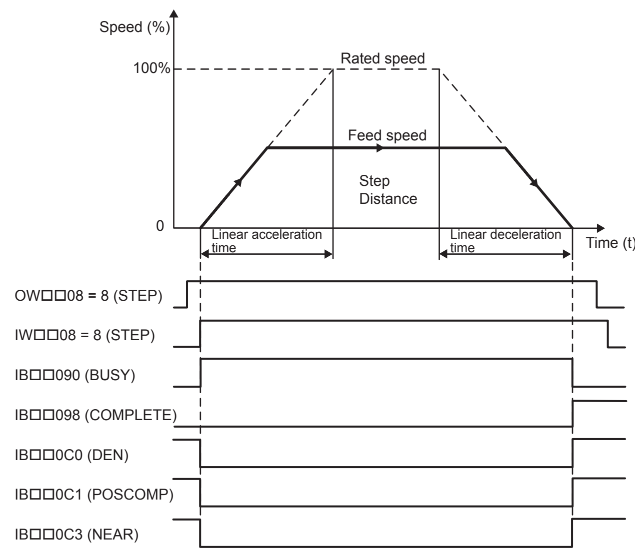
Position proximity reached.
- IB□□0C3 will turn ON.

⇩

Positioning completed.
- IB□□0C1 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- The travel speed can be changed during movement.
- Set OB□□090 to 1 to hold the command.
- Set OB□□091 to 1 to abort the execution.

(Note) The following position information is updated during command execution.
- Machine Coordinate Target Position (TPOS) (IL□□0E)
- Target Position (CPOS) (IL□□10)
- Machine Coordinate System Position (MPOS) (IL□□12): MPOS is always equal to CPOS.
- Machine Coordinate Feedback Position (APOS) (IL□□16): APOS is always equal to CPOS.

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OB□□000	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.
OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW□□08	Motion Command	The STEP operation starts when this parameter is set to 8. The operation will be canceled if this parameter is set to 0 during STEP command execution.
OB□□090	Command Pause	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.
OB□□091	Command Abort	The axis will decelerate to a stop if this bit is set to 1 during a STEP operation. Operation after stopping depends on the setting of the Position Reference Type (OB□□095).
OB□□092	JOG/STEP Direction	Set the moving amount for STEP operation. 0: Positive direction, 1: Negative direction
OB□□095	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 8.
OL□□10	Speed Reference	Specify the speed for the positioning. This setting can be changed during operation. The unit depends on the setting of OW□□03.
OL□□36	Linear Acceleration Time	Set the rate of acceleration or acceleration time constant for positioning.
OL□□38	Linear Deceleration Time	Set the rate of deceleration or deceleration time constant for positioning.
OW□□3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/deceleration or a moving average filter can be selected in OW□□03. Change the setting only after pulse distribution has been completed for the command (IB□□0C0 is ON).
OL□□44	Step Distance	Set the moving amount for STEP operation.

■ Monitoring Parameters

Parameter	Name	Setting
IB□□001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code is 8 during STEP command execution.
IB□□090	Command Executing	The Command Executing bit will turn ON during STEP command execution and then turn OFF when STEP command execution has been completed.
IB□□091	Command Hold Completed	Turns ON when a deceleration to a stop has been completed as the result of setting the Command Pause bit (OB□□090) to 1 during STEP command execution.
IB□□093	Command Error End	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.
IB□□098	Command Execution Completed	Turns ON when STEP command execution has been completed.
IB□□0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB□□0C1	Positioning Completed	Turns ON when pulse distribution has been completed. OFF in all other cases.
IB□□0C3	Position Proximity	Turns ON when Distribution Completed (DEN) turns ON.

(8) Zero Point Setting (ZSET)

The ZSET command sets the current position as the zero point of the machine coordinate system.

[a] Operating Procedure

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 IB□□090 is OFF.

Execute the zero point setting (ZSET) motion command.
- Set OW□□08 to 9.

⇩

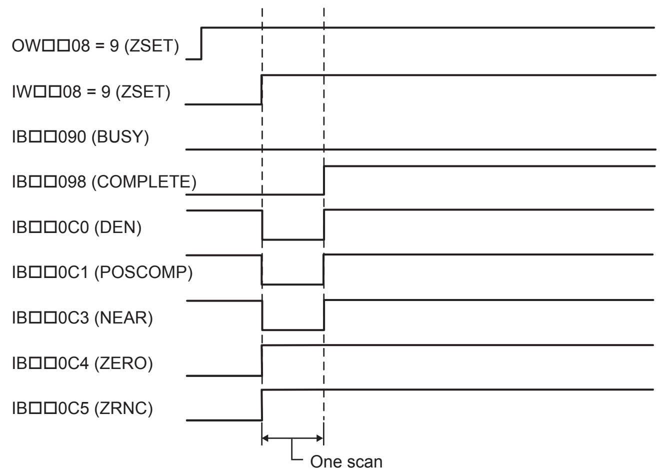
A new machine coordinate system will be established with the current position as the zero point.
- IW□□08 will be 9 during command execution.

⇩

Zero point setting completed.
- IB□□0C5 will turn ON.

⇩

Execute NOP motion command.
- Set OW□□08 to 0.



- The Execution Pause (OB□□090) cannot be used.
- The Execution Abort (OB□□091) cannot be used.

(Note) The following position information is updated when command execution is completed.

- Machine Coordinate Target Position (TPOS) (IL□□0E) = Zero Point Offset (ABSOFF) (OL□□48)
- Target Position (CPOS) (IL□□10) = Zero Point Offset (ABSOFF) (OL□□48)
- Machine Coordinate System Position (MPOS) (IL□□12) = Zero Point Offset (ABSOFF) (OL□□48)
- Machine Coordinate Feedback Position (APOS) (IL□□16) = Zero Point Offset (ABSOFF) (OL□□48)

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OW□□08	Motion Command	Set to 9 for ZSET command.
OB□□090	Command Pause	This parameter is ignored for ZSET command.
OB□□091	Command Abort	This parameter is ignored for ZSET command.

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IL□□02	Warning	Stores the most current warning.
IL□□04	Alarm	Stores the most current alarm.
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 9 during ZSET command execution.
IB□□090	Command Executing	Turns ON during ZSET command execution and turns OFF when ZSET command execution has been completed.
IB□□091	Command Hold Completed	Always OFF for ZSET command.
IB□□093	Command Error End	Turns ON if an error occurs during ZSET command execution. Turns OFF when another command is executed.
IB□□098	Command Execution Completed	Turns ON when ZSET command execution has been completed.
IB□□0C5	Zero Point Return (Setting) Completed	Turns ON when the zero point has been established.

(9) Speed Reference (VELO)

The SVR does not support a speed control function.

[a] Operating Procedure

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 IB□□090 is OFF.

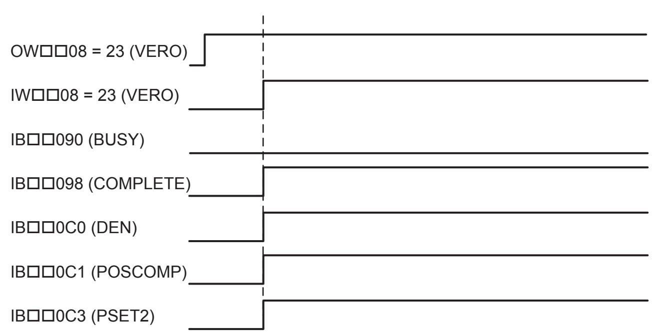
Execute the VELO motion command.
• Set OW□□08 to 23.

⇩

The value 23 is returned to IW□□08.

⇩

Execute another motion command to cancel the speed control mode.



[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OW□□08	Motion Command	The mode is changed to speed control mode when this parameter is set to 23.

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 23 during VELO command execution.

(10) Torque Reference (TRQ)

The SVR does not support a torque control function.

[a] Operating Procedure

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 IB□□090 is OFF.

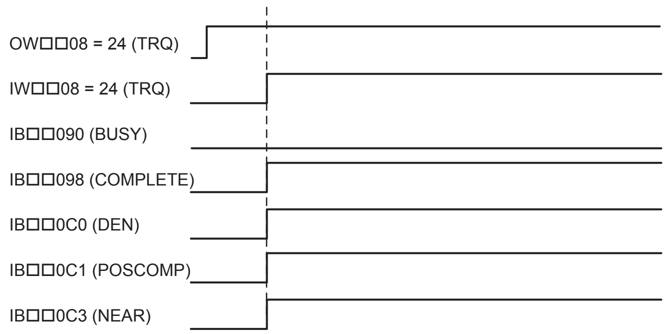
Execute the TRQ motion command.
• Set OW□□08 to 24.

⇩

The value 24 is returned to IW□□08.

⇩

Execute another motion command to cancel the torque control mode.



[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OW□□08	Motion Command	The mode is changed to torque control when this parameter is set to 24.

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IW□□08	Servo Command Type Response	Indicates the motion command that is being executed. The response code will be 24 during TRQ command execution.

(11) Phase References (PHASE)

PHASE performs the same operation as the FEED Command.

[a] Operating Procedure

No.	Execution Conditions	Confirmation Method
1	There are no alarms.	Both IL□□02 and IL□□04 are 0.
2	The Servo ON condition.	IB□□001 is ON.
3	Motion command execution has been completed.	IW□□08 is 0 and IB□□090 is OFF.

Set the motion setting parameters.
- Speed Reference Setting: OL□□10
- Acceleration/Deceleration Filter Type: OW□□03
- Speed Compensation: OW□□31

⇩

Execute the PHASE motion command.
- Set OW□□08 to 25.

⇩

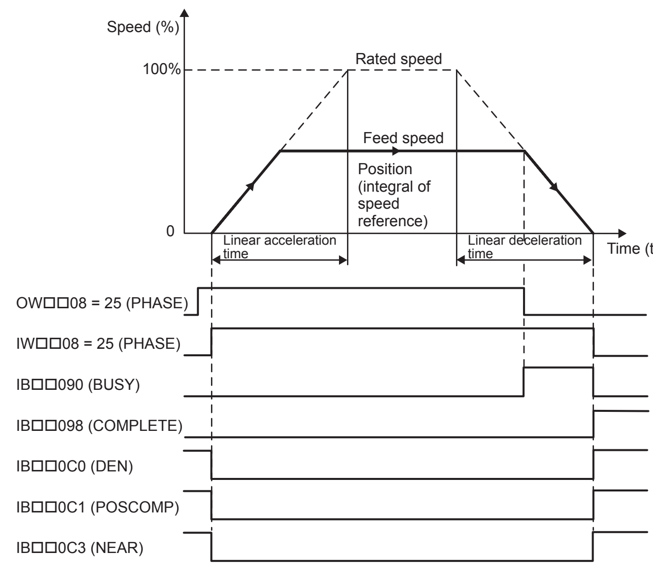
Sync operation using phase control starts.
- IW□□08 will be 25 during execution.

⇩

Operation in phase control mode

⇩

Execute another motion command to cancel the phase control mode.



- The speed can be changed during operation.
- The Command Pause (OB□□090) cannot be used.
- The Command Abort (OB□□091) cannot be used.

(Note) The following position information is updated during command execution depending on the settings of the Speed Reference (NREFF) (OL□□10), Speed Amends (+NCOM) (OW□□31), and Secondary Speed Compensation (+NCOM2) (OL□□16).

- Machine Coordinate Target Position (TPOS) (IL□□0E)
- Target Position (CPOS) (IL□□10)
- Machine Coordinate System Position (MPOS) (IL□□12): MPOS is always equal to CPOS.
- Machine Coordinate Feedback Position (APOS) (IL□□16): APOS is always equal to CPOS.

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OB☐☐000	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 Code (OW☐☐08) to 25.
OW☐☐03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.
OW☐☐08	Motion Command	Phase control operation is started when this parameter is set to 25.
OL☐☐10	Speed Reference	Set the speed reference. The setting can be changed during operation. The unit depends on the setting of OW☐☐03.
OL☐☐16	Secondary Speed Compensation	Set the speed feed forward amount.
OW☐☐31	Speed Amends	Set the speed feed forward gain as a percentage of the rated speed.
OW☐☐3A	S-Curve Acceleration Time	Set the acceleration/deceleration filter time constant. Exponential acceleration/ deceleration or a moving average filter can be selected in OW☐☐03. Change the setting only after pulse distribution has been completed for the command (IB☐☐0C0 is ON).

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IB☐☐001	Servo ON	Indicates the Servo ON status. ON: Power supplied to Servomotor, OFF: Power not supplied to Servomotor
IL☐☐02	Warning	Stores the most current warning.
IL☐☐04	Alarm	Stores the most current alarm.
IW☐☐08	Servo Command Type Response	Indicates the motion command that is being executed. The response is 7 during FEED command execution.
IB☐☐090	Command Executing	Turns ON when abort processing is being performed for FEED command. Turns OFF when abort processing has been completed.
IB☐☐091	Command Hold Completed	Always OFF for the FEED command.
IB☐☐093	Command Error Occurrence	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.
IB☐☐098	Command Execution Completed	Always OFF for the FEED command.
IB☐☐0C0	Distribution Completed	Turns ON when pulse distribution has been completed for the move command. Turns OFF during execution of a move command.
IB☐☐0C1	Positioning Completed	Turns ON when pulse distribution has been completed. OFF in all other cases.
IB☐☐0C3	Position Proximity	Turns ON when Distribution Completed (DEN) turns ON.

(12) Other Commands

Other commands do not have functions for the SVR. The Motion Command (OW□□08) is returned to the Motion Command Response Code (IW□□08).

[a] Operating Procedure

■ ALM_MON, ALM_HIST, or ALMHIST_CLR

No.	Execution Conditions	Confirmation Method
1	Motion command execution must be completed.	IW□□08 must be 0 and IB□□090 must be OFF.

■ Other Commands

No.	Execution Conditions	Confirmation Method
1	There must be no alarms.	Both IL□□02 and IL□□04 must be 0.
2	Motion command execution must be completed.	IW□□08 must be 0 and IB□□090 must be OFF.

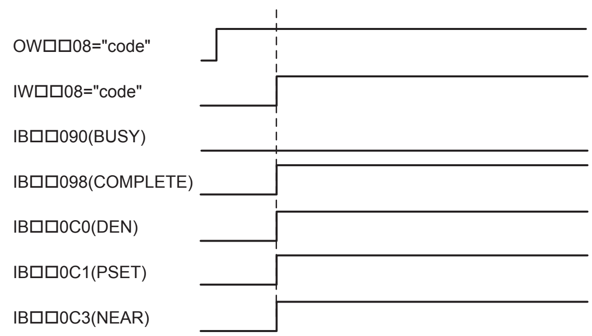
Execute cmd motion command.
• Set OW□□08 to code.

⇩

The code is returned to IW□□08.

⇩

Execute another motion command to cancel the current command.



* Motion Command Codes for Each Command

Command (cmd)	Code (code)	Command (cmd)	Code (code)	Command (cmd)	Code (code)
ACC	10	KPS	15	ALM_HIST	20
DCC	11	KFS	16	ALMHIST_CLR	21
SCC	12	PRM_RD	17	KIS	26
CHG_FILTER	13	PRM_WR	18		
KVS	14	ALM_MON	19		

[b] Related Parameters

■ Setting Parameters

Parameter	Name	Setting
OW□□08	Motion Command	Executes a command when the command code is set.

■ Monitoring Parameters

Parameter	Name	Monitor Contents
IW□□08	Motion Command Type Response	Indicates the motion command that is being executed.

8.4 Sample Programming

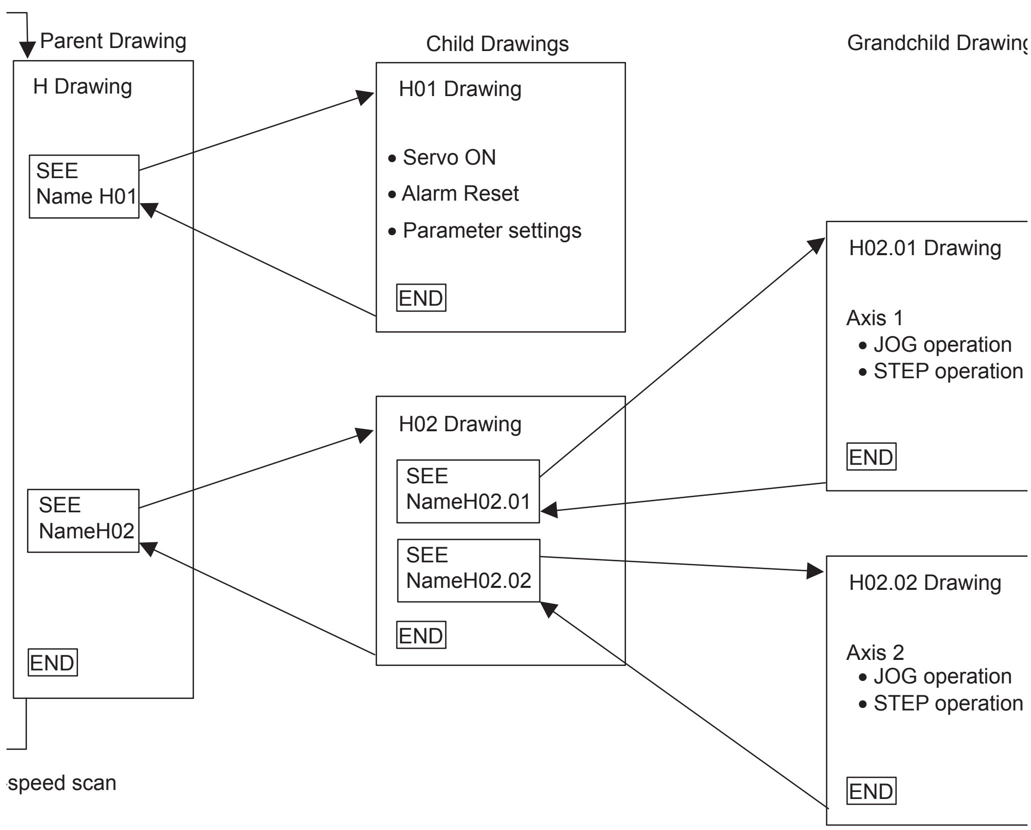
The motion parameters used by the SVR have the same meanings as those used by the SVB-01 or SVA-01. Basically speaking, sample programming used by the SVB-01 or SVA-01 can thus be used with the SVR. There are some parameters, however, that are not implemented for the SVR, so some program changes will be required.

◀ EXAMPLE ▶ The following sample program shows using JOG and STEP operation as an example.

8.4.1 Description of the Sample Program

(1) Program Overview

- The H01 drawing (ladder program) turns ON the servo, resets alarms, and sets parameters.
- The H02.01 drawing (ladder program) controls JOG operation and STEP operation for axis 1.
- The H02.02 drawing (ladder program) controls JOG operation and STEP operation for axis 2.
- Refer to *8.4.3 Sample Program Details* for details on the sample program.



IMPORTANT

This sample program has no power OFF circuit for the SERVOPACK in the event of emergency stops or overtravel. Include a proper emergency stop circuit in actual applications.

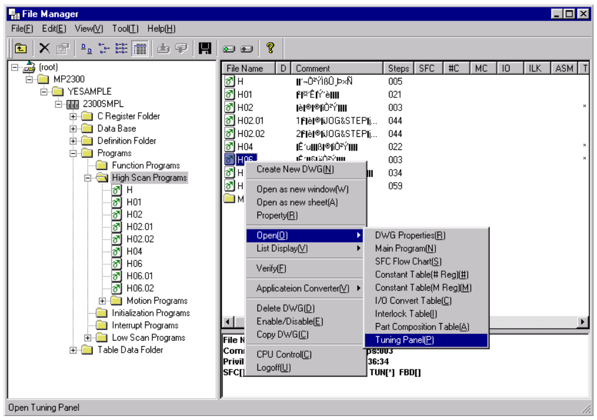
8.4.2 Checking Operation

(1) Checking Operation with the Tuning Panel Window

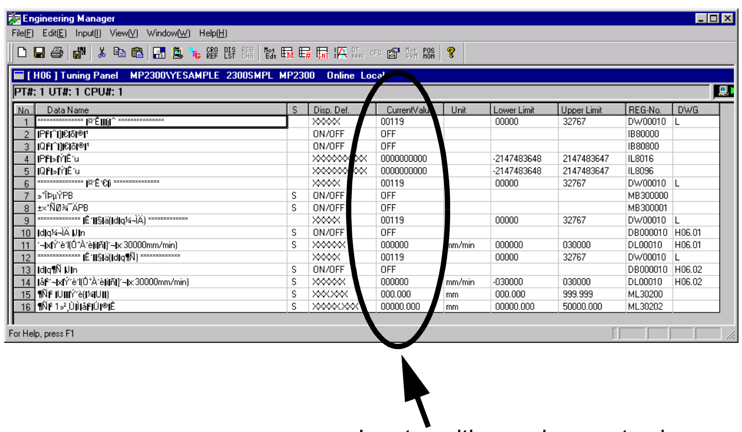
In this sample program, run, stop, and other operations can be checked from a Tuning Panel Window. Use the following procedure to display the Tuning Panel Window.

1. Log on online, open the **2200SMPL** Controller Folder in the MPE720's *File Manager* Window, open the **Programs** folder, and then the **High Scan Programs** folder.

2. Right-click the **H02** Drawing in the **High Scan Programs** Folder and select ***Open - Tuning Panel***.



3. The *Tuning Panel* Window for the **H02** Drawing will be displayed.



Input position and current value

The details on the Tuning Panel Window display are shown in the following table.

No.	Data Name	S	Display Definition	Current Value	Unit	Lower Limit	Upper Limit	REG-No.	DWG
1	***************Common monitor***************		XXXXX	00000		00000	32767	DW00010	L
2	Axis 1 operation ready		ON/OFF	OFF				IB80000	
3	Axis 2 operation ready		ON/OFF	OFF				IB80000	
4	Axis 1 current position		XXXXXXXXXX	0000000000		–0214783648	2147483647	IL8016	
5	Axis 2 current position		XXXXXXXXXX	0000000000		–0214783648	2147483647	IL8096	
6	***************Common operation***************		XXXXX	00000		00000	32767	DW00010	L
7	Servo ON PB	S	ON/OFF	OFF				MB300000	
8	Alarm reset PB	S	ON/OFF	OFF				MB300001	
9	************Manual operation and setting************		XXXXX	00000		00000	32767	DW00010	L
10	Axis 1 forward JOG	S	ON/OFF	OFF				DB000010	H02.01
11	Axis 1 reverse JOG	S	ON/OFF	OFF				DB000011	H02.01

12	Axis 2 forward JOG	S	ON/OFF	OFF				DB000010	H02.02
13	Axis 2 reverse JOG	S	ON/OFF	OFF				DB000011	H02.02
14	Axis 1 forward STEP	S	ON/OFF	OFF				DB000012	H02.01
15	Axis 1 reverse STEP	S	ON/OFF	OFF				DB000013	H02.01
16	Axis 2 forward STEP	S	ON/OFF	OFF				DB000012	H02.02
17	Axis 2 reverse STEP	S	ON/OFF	OFF				DB000013	H02.02
18	Axis 1 STEP Moving Amount	S	XXXXXXXXXX	0000000000		–0214783648	2147483647	DL00010	H02.01
19	Axis 2 STEP Moving Amount	S	XXXXXXXXXX	0000000000		–0214783648	2147483647	DL00010	H02.02

(2) Procedure

Use the following procedure to confirm operation.

Servo ON

↓

Start JOG or STEP operation.

↓

Confirm operation.

The following table gives an outline of the operation when the Tuning Panel window is used.

Data Name	Tuning Panel Operation	Operation Outline
Servo ON PB	Current value OFF → ON	The Servomotor will turn ON and the Servo will be clamped.
	Current value ON → OFF	Servo turned OFF.
Axis 1 forward JOG	Current value OFF → ON	Axis 1 rotates forward.
	Current value ON → OFF	Axis 1 stops.
Axis 1 reverse JOG	Current value OFF → ON	Axis 1 rotates in reverse.
	Current value ON → OFF	Axis 1 stops.
Axis 2 forward JOG	Current value OFF → ON	Axis 2 rotates forward.
	Current value ON → OFF	Axis 2 stops.
Axis 2 reverse JOG	Current value OFF → ON	Axis 2 rotates in reverse.
	Current value ON → OFF	Axis 2 stops.
Axis 1 forward STEP	Current value OFF → ON	Axis 1 starts rotating forward for the moving amount set under Axis 1 STEP moving amount.
	Current value ON → OFF	Axis 1 STEP operation stops. Input "OFF" after executing stepping.
Axis 1 reverse STEP	Current value OFF → ON	Axis 1 starts rotating in reverse for the moving amount set under Axis 1 STEP moving amount.
	Current value ON → OFF	Axis 1 STEP operation stops. Input "OFF" after executing stepping.
Axis 2 forward STEP	Current value OFF → ON	Axis 2 starts rotating forward for the moving amount set under Axis 2 STEP moving amount.
	Current value ON → OFF	Axis 2 STEP operation stops. Input "OFF" after executing stepping.
Axis 2 reverse STEP	Current value OFF → ON	Axis 2 starts rotating in reverse for the moving amount set under Axis 2 STEP moving amount.
	Current value ON → OFF	Axis 2 STEP operation stops. Input "OFF" after executing stepping.
Axis 1 STEP Moving Amount	Enter any value.	Sets the STEP moving amount for axis 1.
Axis 2 STEP Moving Amount	Enter any value.	Sets the STEP moving amount for axis 2.

INFO

■ Actual Application Programs

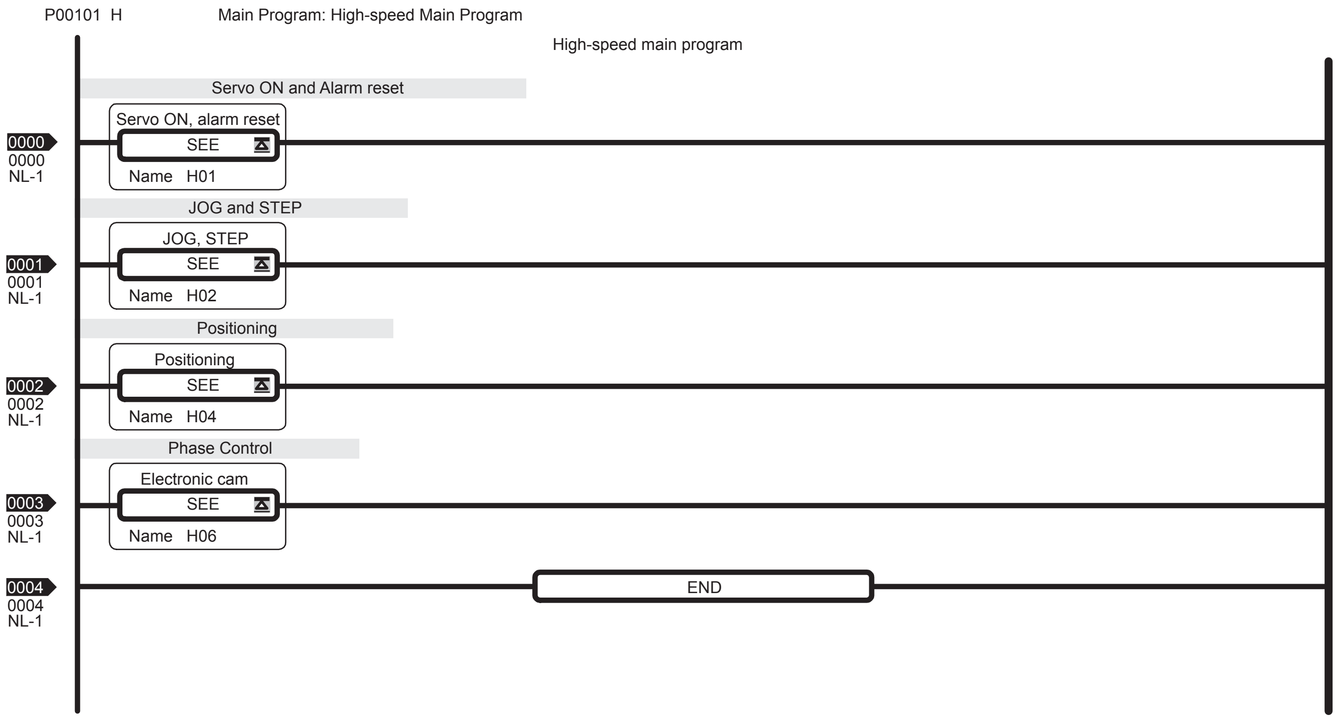
It is necessary to create routines within the actual application program in order to monitor and control the registers corresponding to the signals and data listed in the table above.

The register numbers that correspond to the signals used in this sample program will be the register numbers displayed under REG-No. next to DWG at the right of the Tuning Panel window.

8.4.3 Sample Program Details

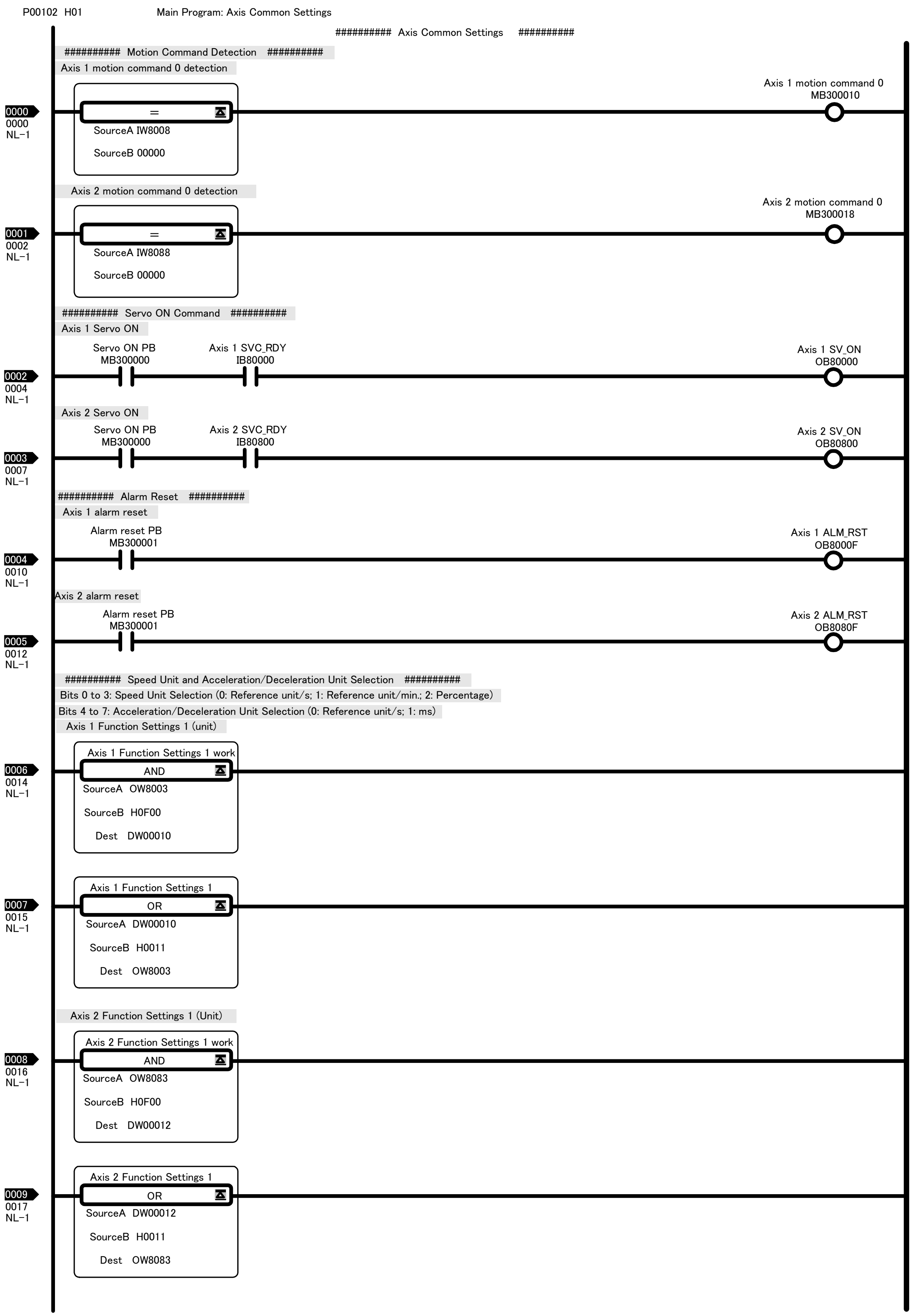
(1) H Drawing

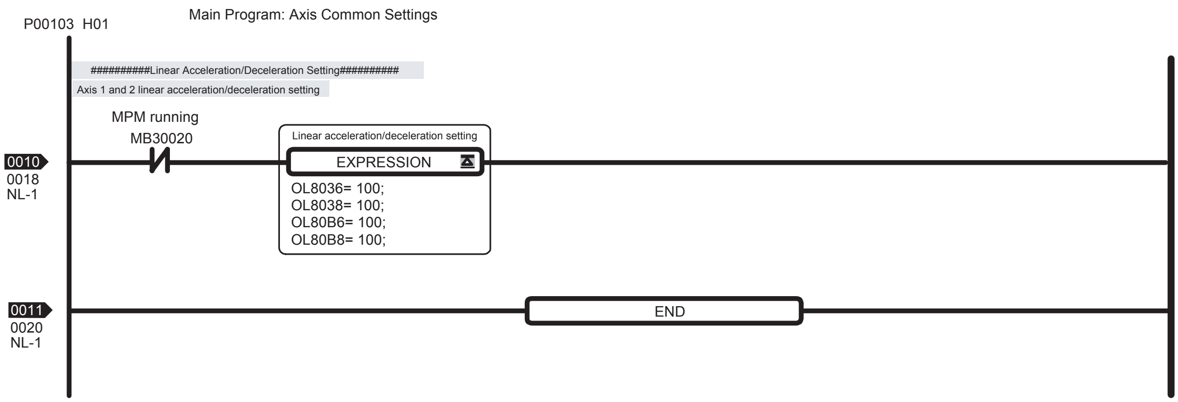
The H parent drawing controls the overall sample program.



(2) H01 Drawing

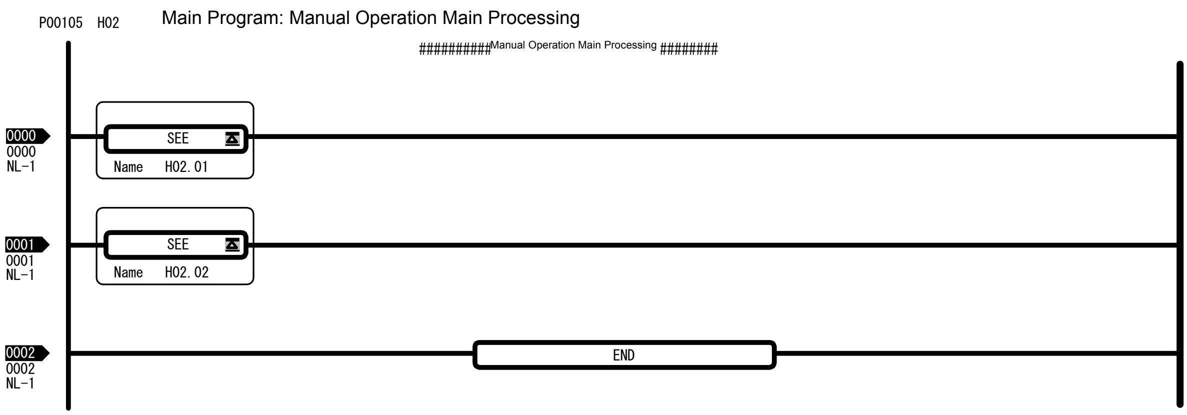
The H01 child drawing turns ON the Servo, resets alarms, and sets common parameters.





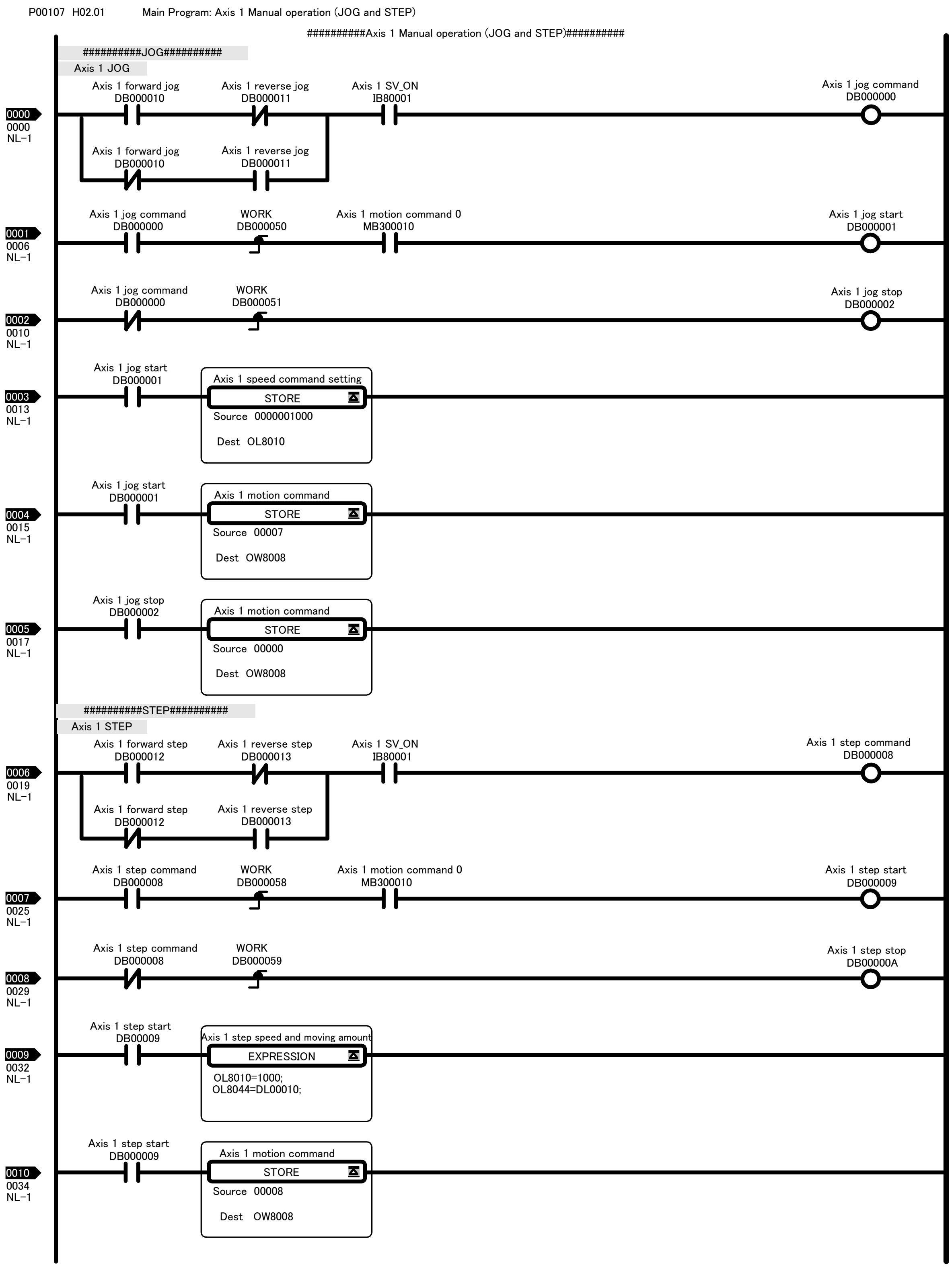
(3) H02 Drawing

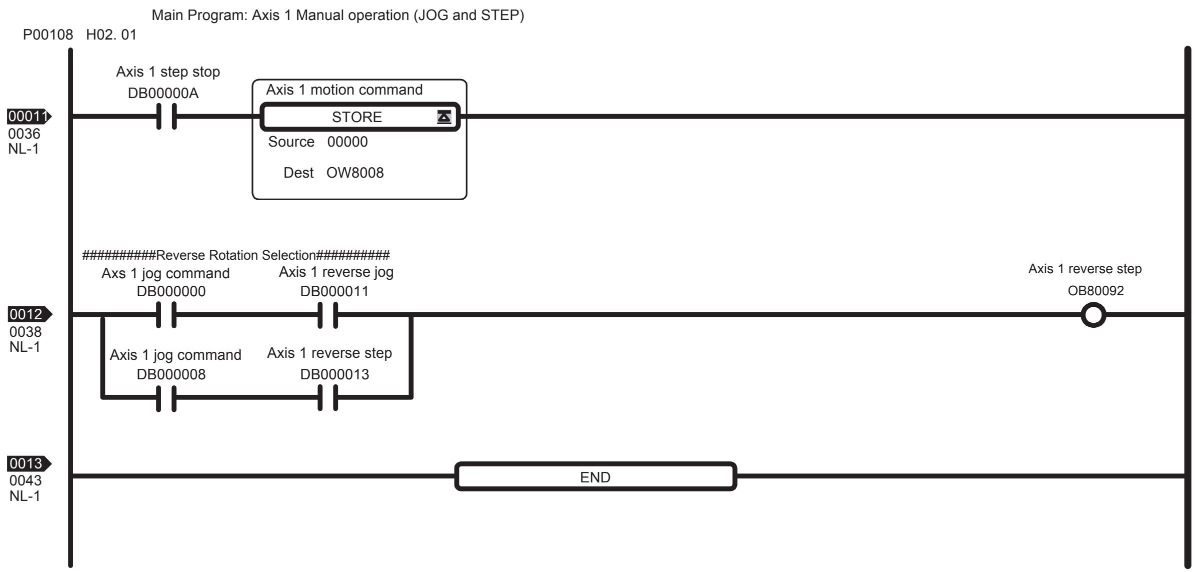
The H02 child drawing controls JOG and STEP operation.



(4) H02.01 Drawing

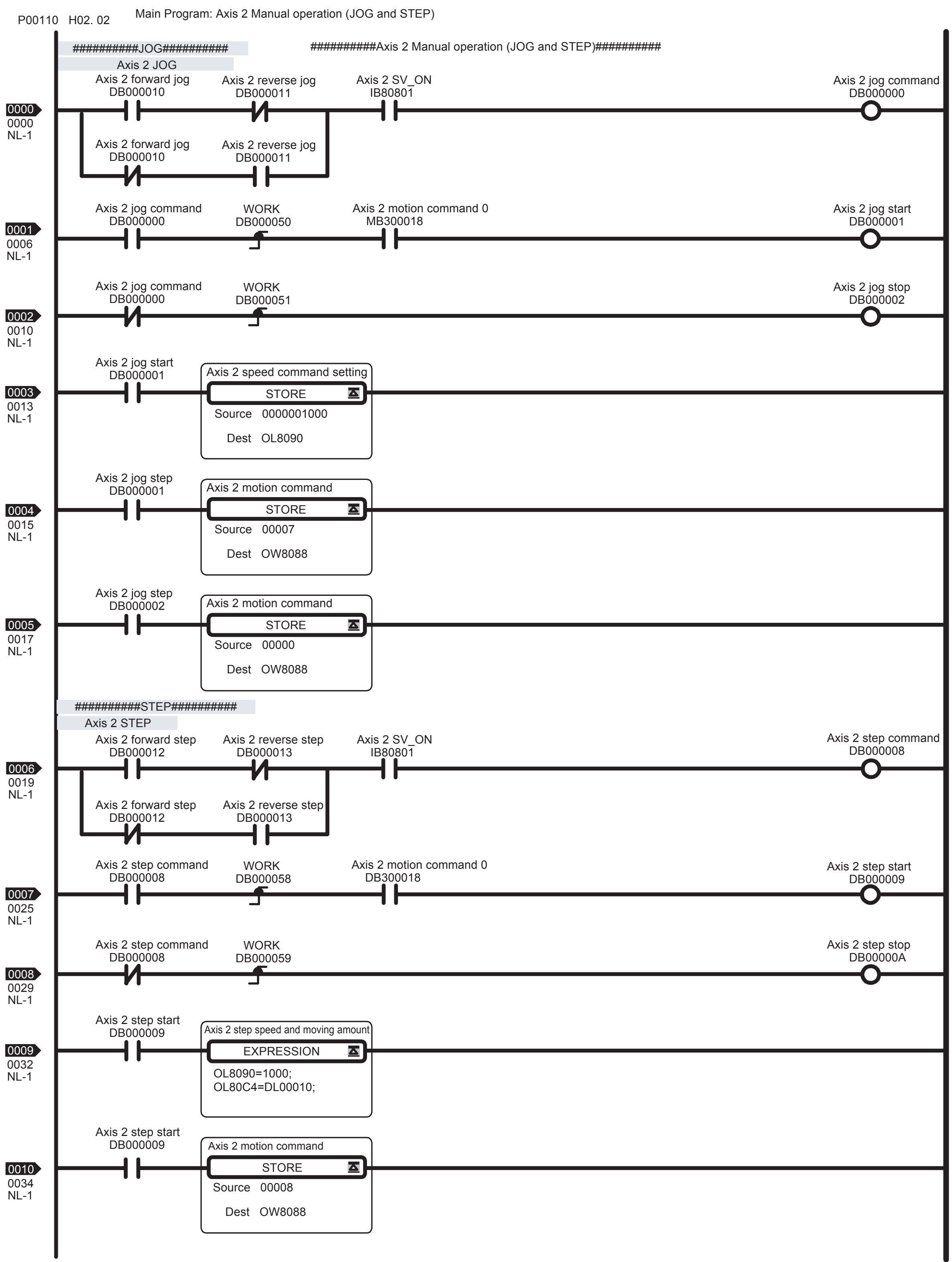
The H02.01 grandchild drawing controls JOG and STEP operation for axis 1.

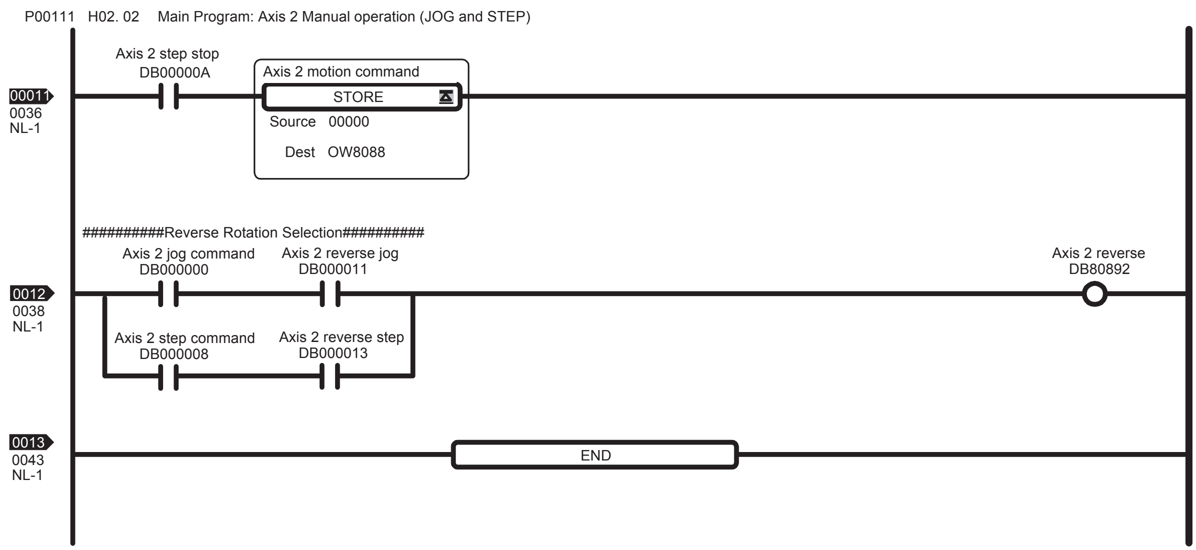



Main Program: Axis 1 Manual operation (JOG and STEP)
P00108 H02. 01
Axis 1 step stop
DB00000A
Axis 1 motion command
STORE
Source 00000
Dest OW8008
00011
0036
NL-1
##########Reverse Rotation Selection##########
Axs 1 jog command
DB000000
Axis 1 reverse jog
DB000011
Axis 1 reverse step
OB80092
0012
0038
NL-1
Axis 1 jog command
DB000008
Axis 1 reverse step
DB000013
0013
0043
NL-1
END

(5) H02.02 Drawing

The H02.02 grandchild drawing controls JOG and STEP operation for axis 2.




P00111 H02. 02 Main Program: Axis 2 Manual operation (JOG and STEP)
0011
0036
NL-1
Axis 2 step stop
DB00000A
Axis 2 motion command
STORE
Source 00000
Dest OW8088
##########Reverse Rotation Selection##########
0012
0038
NL-1
Axis 2 jog command
DB000000
Axis 2 reverse jog
DB000011
Axis 2 step command
DB000008
Axis 2 reverse step
DB000013
Axis 2 reverse
DB80892
0013
0043
NL-1
END

9

Utility Functions

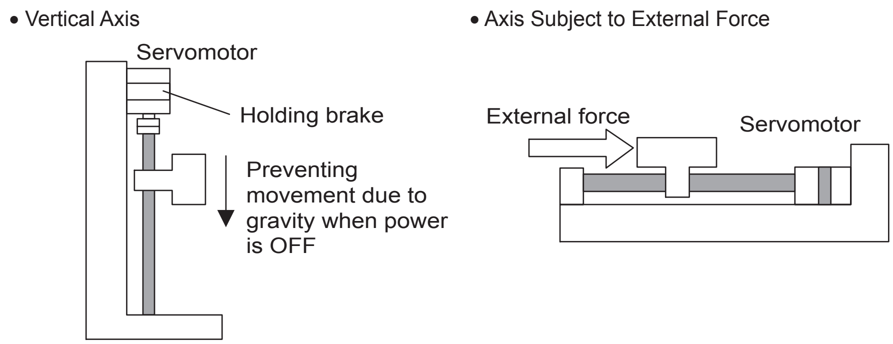
This chapter explains the utility functions of the MP2200/MP2300.

9.1 Controlling Vertical Axes

This section explains connection methods and parameter settings required to use the SERVOPACK to control a vertical axis.

9.1.1 Overview

When the system power is turned OFF 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. 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 MP2200/MP2300. Use the holding brake function of the SERVOPACK.

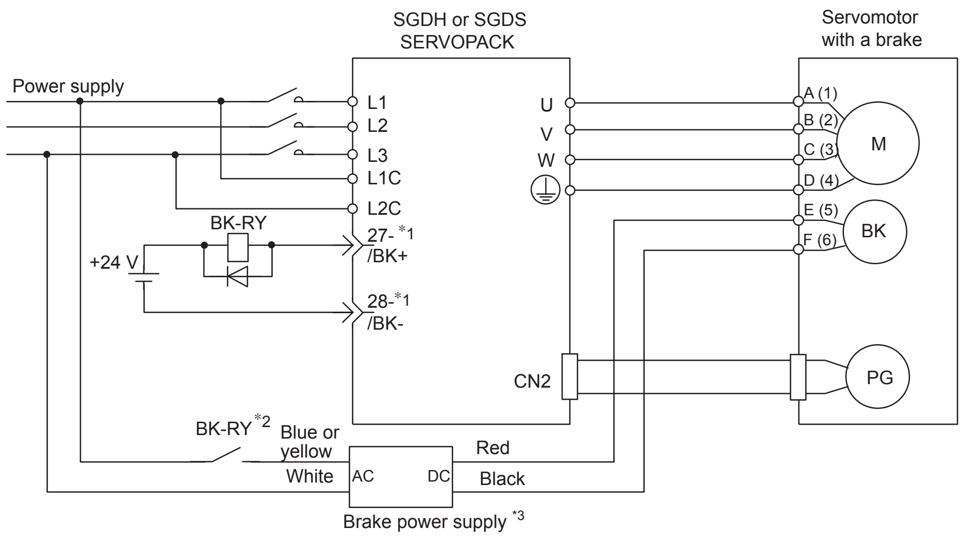


IMPORTANT	The brake built into a Servomotor with a brake uses non-excitation operation and is for use as a holding brake only. It cannot be used to control or stop axis movement. Use the holding brake only to hold the axis in a stopped state after the motor has stopped. The torque of the brake is 100% or higher of the rated torque of the motor.

9.1.2 Connections to Σ-II and Σ-III SERVOPACK

(1) Connection 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.



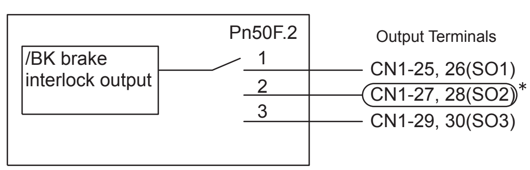
* 1. The output terminal is allocated using parameter Pn50F.2.
* 2. Brake control relay contact
* 3. There are 200-V and 100-V brake power supplies.

(2) Parameter Settings

[a] PN50F.2 (Output Signal Selection 2)

The following parameter determines which pin of CN1 will be used to output the /BK signal.

Parameter	Name	Unit	Setting Range	Default	Control Mode
Pn50F.2	Output Signal Selection 2	–	0 to 3	0	Speed, torque, position control



* Select which terminal is used to output /BK. (Set to 2 in this example.)

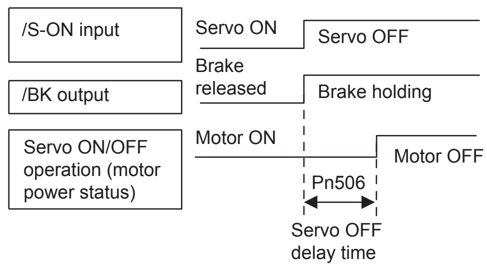
Parameter	Setting	Output Terminal (CN1)	
Pn50F.2	0	–	–
	1	25	26
	2	27	28
	3	29	30

[b] Pn506 (Brake ON Timing after Motor Stops)

Adjust brake timing with the following parameter if the machine moves slightly due to gravity or other factors.

Parameter	Name	Unit	Setting Range	Default	Control Mode
Pn506	Delay Time from BK Signal Output until Servo OFF	10 ms	0 to 50	0	Speed, torque, position control

When using a Servomotor with a brake, set the timing of turning OFF the Servo (i.e., stopping the motor output) in reference to the output signal that controls the brake (/BK).



INFO

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.

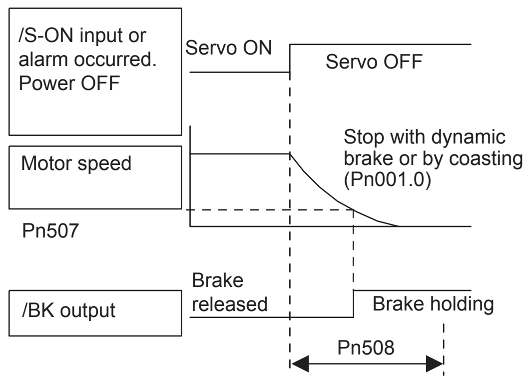
For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this time due to machine configuration or brake characteristics, turning OFF the Servo can be delayed to make sure there is no movement.

[c] Pn507 and Pn508 (Brake ON Timing when Motor Running)

Adjust the timing of the holding brake when the motor is running with the following parameters so that the brake is applied after the Servomotor stops.

Parameter	Name	Unit	Setting Range	Default	Control Mode
Pn507	Speed Level for BK Signal Output when Motor Running	min^{-1}	0 to 10000	100	Speed, torque, position control
Pn508	Output Timing of BK Signal when Motor Running	10 ms	0 to 100	50	Speed, torque, position control

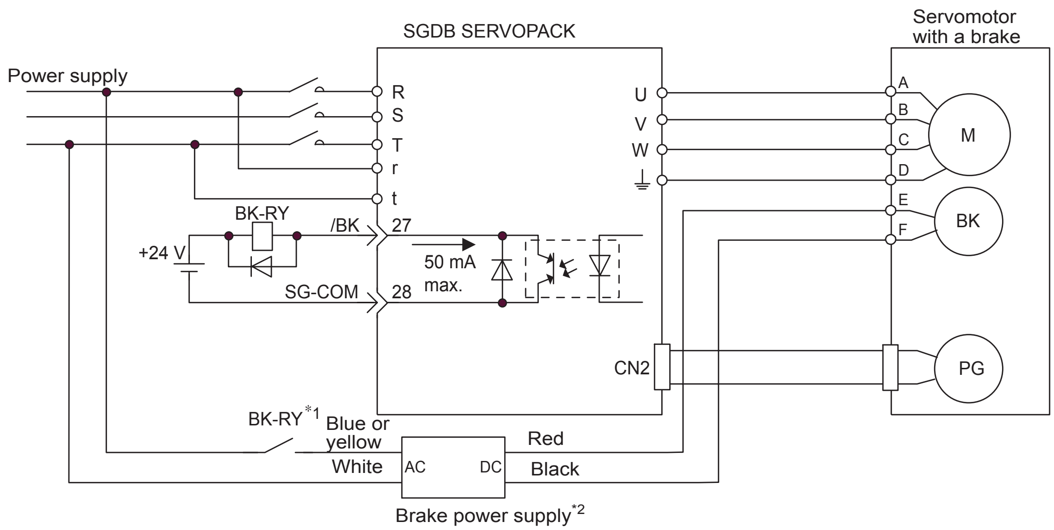
When using a Servomotor with a brake, set the timing of applying the brake when the Servo turns OFF during motor running due to an /S-ON input signal or alarm.



INFO 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.

9.1.3 Connections to Σ Series SGDB SERVOPACK

(1) Connection Example



* 1. Brake control relay contact

* 2. There are 200-V and 100-V brake power supplies.

(2) Parameter Settings

[a] Cn-2D (OUTSEL Output Signal Selection)

The following parameter determines which pin of 1CN will be used to output the BK signal.

Parameter	Name	Setting Range	Default	Control Mode
Cn-2D	OUTSEL Output Signal Selection	110 to 666	210	Speed, torque, position control

Select which signal is output for each of the 1CN output signals. (Set □4□.)

1s digit	Sets function of 1CN-25 and 1CN-26 (/COIN and /V-CMP).
10s digit	Sets function of 1CN-27 and 1CN-28 (/TGON).
100s digit	Sets function of 1CN-29 and 1CN-30 (/S-RDY).

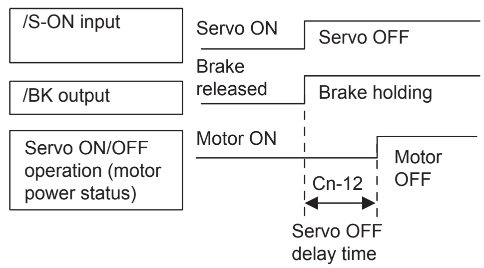
Set Value	Function
0	/COIN and /V-CMP Can be allocated only to 1CN-25 and 1CN-26.
1	/TGON
2	/S-RDY
3	/CLT
4	/BK
5	OL warning
6	OL alarm

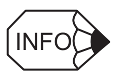
[b] Cn-12 (Brake ON Timing after Motor Stops)

Adjust brake timing with the following parameter if the machine moves slightly due to gravity or other factors.

Parameter	Name	Unit	Setting Range	Default	Control Mode
Cn-12	Delay Time from BK Signal Output until Servo OFF	10 ms	0 to 50	0	Speed, torque, position control

When using a Servomotor with a brake, set the timing of turning OFF the Servo (i.e., stopping the motor output) in reference to the output signal that controls the brake (/BK).





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.

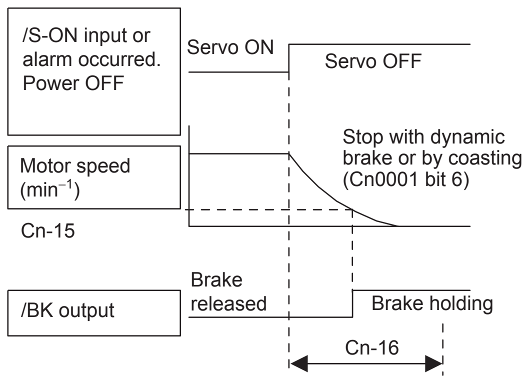
For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this time due to machine configuration or brake characteristics, turning OFF the Servo can be delayed to make sure there is no movement.

[c] Cn-15 and Cn-16 (Brake ON Timing when Motor Running)

Adjust the timing of the holding brake when the motor is running with the following parameters so that the brake is applied after the Servomotor stops.

Parameter	Name	Unit	Setting Range	Default	Control Mode
Cn-15	Speed Level for BK Signal Output when Motor Running	min^{-1}	0 to max. speed	100	Speed, torque, position control
Cn-16	Output Timing of BK Signal when Motor Running	10 ms	0 to 100	50	Speed, torque, position control

When using a Servomotor with a brake, set the timing of applying the brake when the Servo turns OFF during motor running due to an /S-ON input signal or alarm.

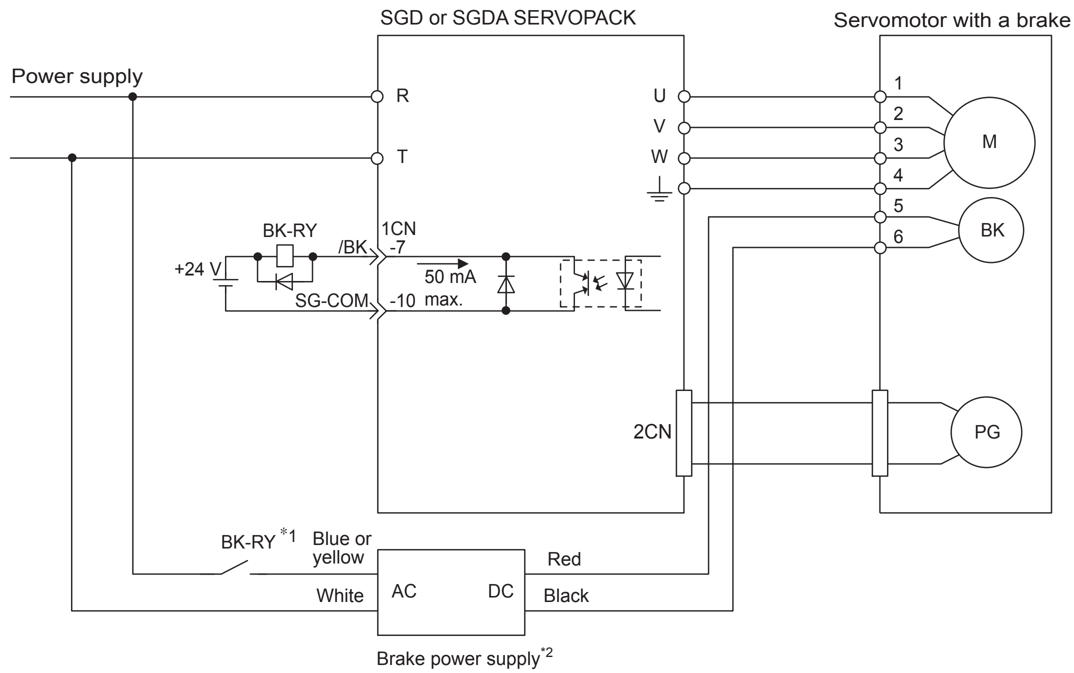


INFO

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.

9.1.4 Connections to Σ Series SGD or SGDA SERVOPACK

(1) Connection Example



* 1. Brake control relay contact
* 2. There are 200-V and 100-V brake power supplies.

(2) Parameter Settings

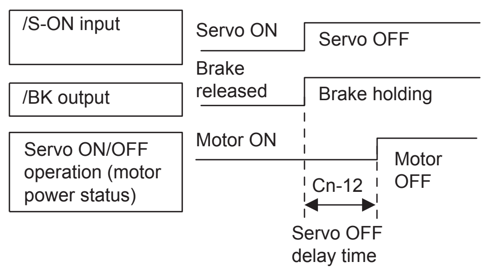
The SERVOPACK parameters related to controlling the brake are described below.

[a] Cn-12 (Brake ON Timing after Motor Stops)

Adjust brake timing with the following parameter if the machine moves slightly due to gravity or other factors.

Parameter	Name	Unit	Setting Range	Default	Control Mode
Cn-12	Delay Time from BK Signal Output until Servo OFF	10 ms	0 to 50	0	Speed, torque, position control

When using a Servomotor with a brake, set the timing of turning OFF the Servo (i.e., stopping the motor output) in reference to the output signal that controls the brake (/BK).



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.

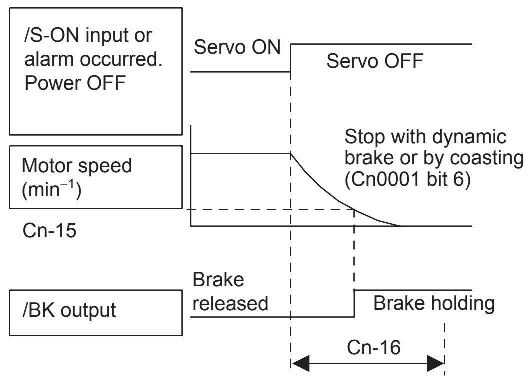
For the standard settings, the Servo will turn OFF simultaneously with the /BK output (Brake Operation). If gravity causes the machine to move slightly at this time due to machine configuration or brake characteristics, turning OFF the Servo can be delayed to make sure there is no movement.

[b] Cn-15 and Cn-16 (Brake ON Timing when Motor Running)

Adjust the timing of the holding brake when the motor is running with the following parameters so that the brake is applied after the Servomotor stops.

Parameter	Name	Unit	Setting Range	Default	Control Mode
Cn-15	Speed Level for BK Signal Output when Motor Running	min^{-1}	0 to max. speed	100	Speed, torque, position control
Cn-16	Output Timing of BK Signal when Motor Running	10 ms	0 to 100	50	Speed, torque, position control

When using a Servomotor with a brake, set the timing of applying the brake when the Servo turns OFF during motor running due to an /S-ON input signal or alarm.



INFO

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.

9.2 Overtravel Function

This section explains the overtravel function.

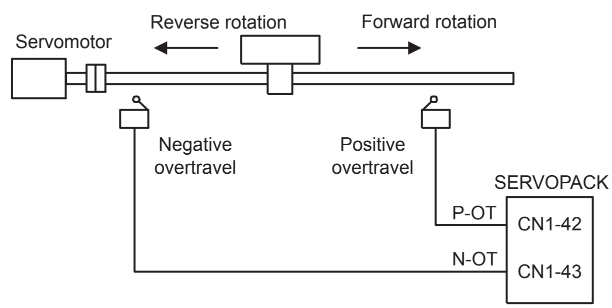
9.2.1 Overview

The overtravel function forces the machine to stop when the moving part of the machine exceeds the range of movement. With the MP2200/MP2300, 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.

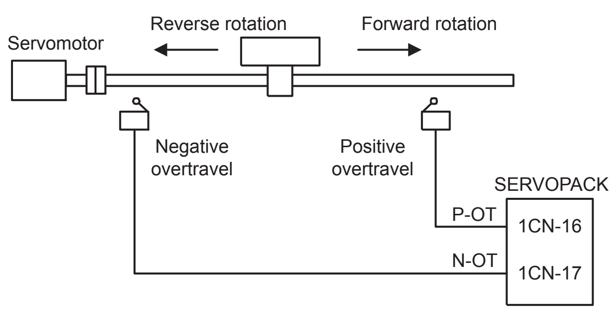
9.2.2 Overtravel Input Signal Connections

When using the overtravel function, correctly connect the input signals for the overtravel limit switches shown below to the corresponding pins on the SERVOPACK CN1 or 1CN connector.

(1) Connections to SGDB, SGDH, SGDM or SGDS SERVOPACK



(2) Connections to SGD or SGDA SERVOPACK



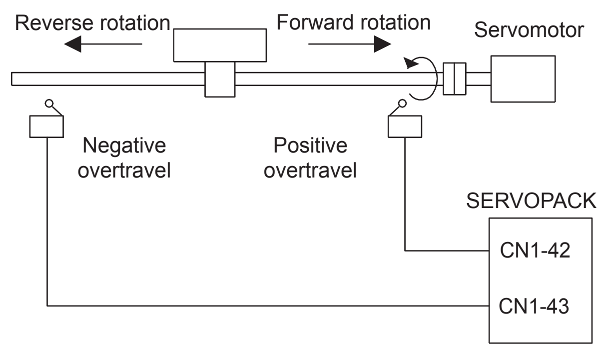
P-OT	When ON CN1-42 (1CN-16) is low.	Forward drive enabled. Normal operating condition
	When OFF CN1-42 (1CN-16) is high.	Forward drive disabled. (Reverse movement possible.)
N-OT	When ON CN1-43 (1CN-17) is low.	Reverse drive enabled. Normal operating condition
	When OFF CN1-43 (1CN-17) is high.	Reverse drive disabled. (Forward movement possible.)

INFO

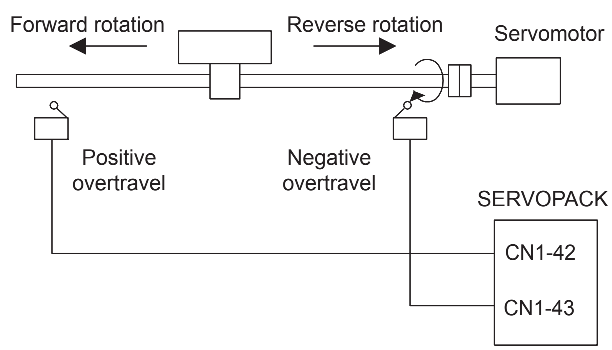
■ Rotation Direction Selection

The SVA Module provides a rotation direction selection that can be used to reverse the direction of rotation of the servomotor without changing the motor wiring at the SERVOPACK. The rotation direction selection only reverses the direction of rotation of the servomotor. The direction (-, +) of axis travel will change. Nothing else will changed.

■ Operation Example for Standard Setting



■ Operation Example for Reverse Direction



The following parameters must be set to perform control in reverse mode due to the structure of the machine or other reason.

- Rotation Direction Selection SERVOPACK Parameter

Parameter		Name	Setting	Meaning	Default
SGDA, SGDB	SGDH,SGDM, SGDS				
Cn-02 bit 0	Pn000.0	Direction Selection	0	CCW is forward when viewing the motor from the load side (standard setting).	0
			1	CW is forward when viewing the motor from the load side (reverse mode setting).	

- SVA-01 Module Fixed Parameter Setting

Parameter No.	Name	Meaning	Default
No. 31	Direction Selection	Select the rotational direction when using an absolute encoder. 0: Forward rotation selection 1: Reverse rotation selection	0

9.2.3 Parameter Settings

(1) Use/Not Use Overtravel Input Signals

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

[a] Σ-II or Σ-III SERVOPACK

Parameter	Name	Set Value	Meaning	Default
Pn50A.3	P-OT Signal Mapping	2	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	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.	

（Note） : Recommended setting. Applies to the rest of this section.

[b] Σ SERVOPACK

Parameter	Name	Set Value	Meaning	Default
Cn-01	Bit 2: Use/Not Use P-OT Input Signal	0	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.)	
	Bit 3: Use/Not Use N-OT Input Signal	0	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.)	

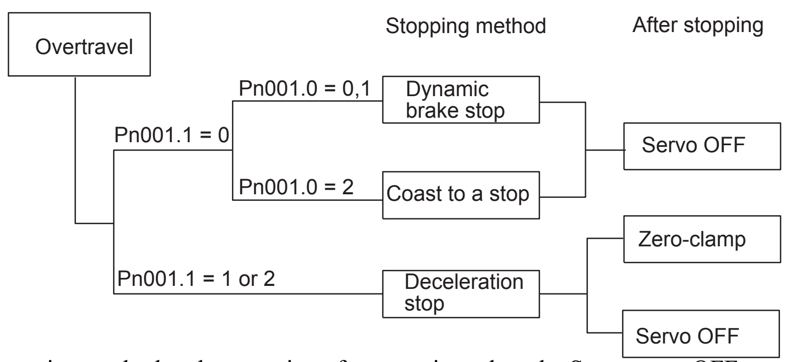
(2) Selecting Motor Stopping Methods for Overtravel

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.

[a] Σ-II or Σ-III SERVOPACK

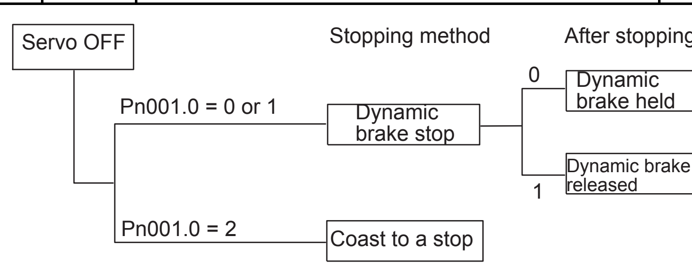
Select the stopping method and processing after stopping when an overtravel signal is input during motor running.

Parameter	Name	Set Value	Meaning	Default
Pn001.1	Overtravel Stop Mode	0	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.	



Select the stopping method and processing after stopping when the Servo turns OFF.

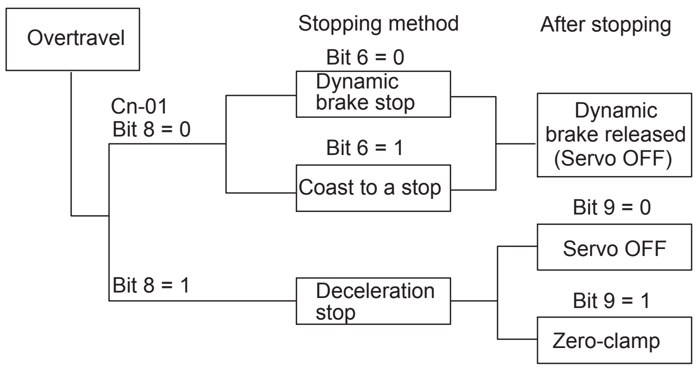
Parameter	Name	Set Value	Meaning	Default
Pn001.0	Servo OFF Stop Mode	0	Stops the motor by applying dynamic brake (DB) and then holds the DB.	0
		1	Stops the motor by applying dynamic brake (DB) and then releases the DB.	
		2	Makes the motor coast to a stop. Current is not supplied to the motor and the machine stops due to friction.	



[b] Σ SERVOPACK

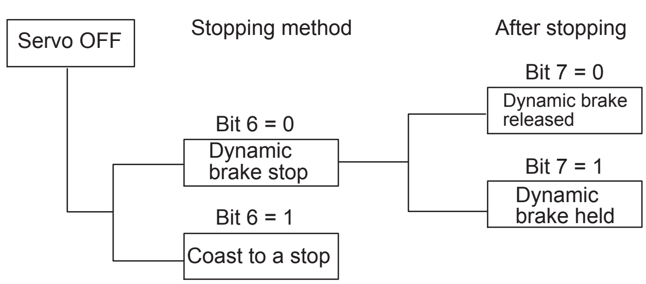
Select the stopping method and processing after stopping when an overtravel signal is input during motor running.

Parameter	Name	Set Value	Meaning	Default
Cn-01	Bit 8: Selection of stopping method for overtravel	0	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.	
	Bit 9: Selection of processing after stopping for overtravel	0	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.	



Select the stopping method and processing after stopping when the Servo turns OFF.

Parameter	Name	Set Value	Meaning	Default
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.	
	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.	

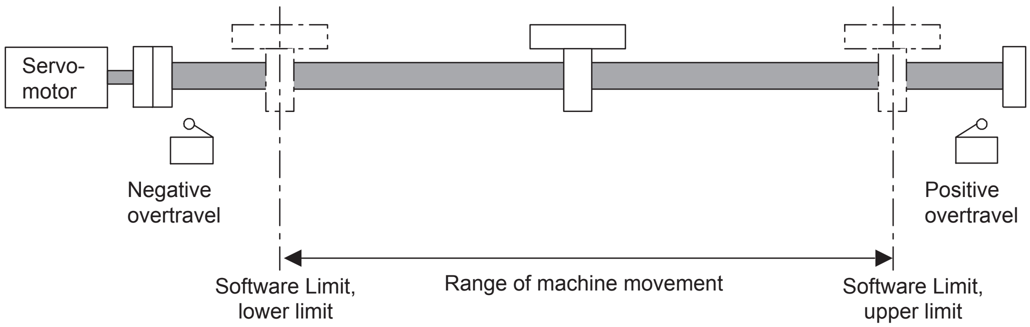


9.3 Software Limit Function

This section explains the software limit function.

9.3.1 Overview

The software limit function is used to set upper and lower limits for the range of machine movement in fixed parameters so the MP2200/MP2300 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.



9.3.2 Fixed Parameter Settings

The following fixed parameters must be set in order to use the software limit function.

Fixed Parameter Number	Name	Contents	Unit	Setting Range
1	Function Selection 1	Bit 1: Forward Soft Limit Enabled (Forward Software Limit Enabled) 0: Disable, 1: Enable Bit 2: Reverse Soft Limit Enabled (Reverse Software Limit Enabled) 0: Disable, 1: Enable	–	–
12	Forward Software Limit	–	1 = 1 reference unit	-2^{31} to $2^{31}-1$
14	Reverse Software Limit	–	1 = 1 reference unit	-2^{31} to $2^{31}-1$

Set the positive and negative software limits for the machine coordinate system. The machine coordinate system is established by executing the zero point return operation. The software limit function is enabled after the zero point return operation. Be sure to execute the zero point return after power is turned ON.

The effects of the software limit in each operating mode are listed in the following table.

Type of Axis Movement	Check	Contents
Interpolation	Yes	The software limit range is constantly checked during an interpolation move, and the axis will decelerate to a stop at the software limit position.
JOG operation	Yes	If the software limit function is enabled, a move command is executed to the software limit position. After an error is cleared, the axis can be moved to inside the stroke range.
Positioning/STEP operation	Yes	If a positioning command is given for a position beyond the software limit, the axis will be positioned on the software limit position and an alarm will occur.

IMPORTANT

- 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, the Zero Point Return or Zero Point Setting operation must be performed again.
- Disable the software limits in the SERVOPACK.
- Σ SERVOPACK: Cn-0014, bits 2 and 3
- Σ-II or Σ-III S-ERVOPACK: Pn801.0 = 3 (default value)

9.3.3 Processing after an Alarm Occurs

(1) Alarm Information

If a software limit is exceeded, a Positive/Negative Soft Limit (Positive/Negative Software Limit) alarm will occur. This alarm can be monitored in the Alarm monitoring parameter (IL☐☐04).

Register Number	Name	Contents
IL☐☐04	Alarm	Bit 3: Positive Software Limit
		Bit 4: Negative Software Limit

(2) Clearing Software Limit Alarms

Clear software limit alarms using the procedure below.

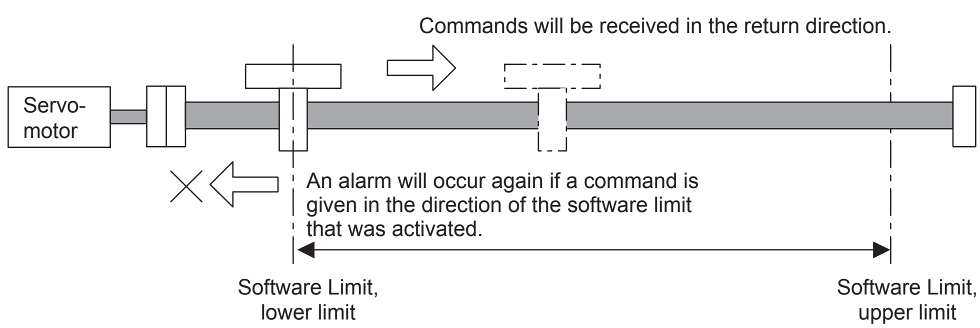
1. Resetting Alarms

   Set the Alarm Clear bit to 1 in the RUN Commands (OW☐☐00 bit F) to clear the alarm.

Register Number	Name	Contents
OW☐☐00	RUN Commands	Bit F: Clear Alarm

2. Returning

   Use the FEED or STEP command to return past the software limit.



9.4 Parameters That Are Automatically Updated

The function described in this section is supported by the SVB-01 Module. It cannot be used with the SVA-01 Module.

9.4.1 Parameters Updated when a Connection Is Established (MP2200/MP2300 to SERVOPACK)

MP2200/MP2300				SERVOPACK				Remarks
				SGD-N, SGDB-N	NS100	NS115	SGDS	
Fixed Parameters	Backlash Compensation	No.16		–	–	Pn81B	Pn214	
Setting Parameters	Position Completed Width*	OL□□1E	→	–	–	Pn500	Pn522	For MECHATROLINK-II at 10 Mbps in 32-byte mode only
	Position Loop Gain*	OW□□2E	→	–	–	Pn102		
	Speed Loop Gain*	OW□□2F	→	–	–	Pn100		
	Speed Feed Forward Compensation*	OW□□30	→	–	–	Pn109		
	Position Loop Integration Time Constant*	OW□□32	→	–	–	Pn11F		
	Speed Loop Integration Time Constant*	OW□□34	→	–	–	Pn101		
	Linear Acceleration Time*	OL□□36	→	Cn-0020	Pn80B			
	Linear Deceleration Time*	OL□□38	→	–	Pn80E			
	S-curve Acceleration Time*	OW□□3A	→	Cn-0026	Pn812			
Fixed values	65535		→	Cn-001E	–			Excessive Following Error Area
	32767		→	–	Pn505		–	Overtravel Level
	2^{30} -1		→	–	–		Pn520	Excessive Following Error Alarm Detection Level
	100		→	–	Pn51E			Excessive Following Error Warning Detection Level
	Pn820 and Pn822 are set to the same values.			–	–	Pn820→Pn822		Processing to disable the latch zone.

* Only when bit A of fixed parameter 1 is set to enable automatic updating of parameters.

9.4.2 Parameters Updated when a Setting Parameter Is Changed (MP2200/MP2300 to SERVOPACK)

When using the MECHATROLINK-II at 10 Mbps in 32-byte mode, the following parameters are updated when a setting parameter is changed as along as bit A of fixed parameter 1 is set to enable automatic updating of parameters.

MP2200/MP2300				SERVOPACK			
				SGD-N, SGDB-N	NS100	NS115	SGDS
Setting Parameters	Position Completed Width	OL□□1E	→	–	–	Pn500	Pn522
	Position Loop Gain	OW□□2E	→	–	–	Pn102	
	Speed Loop Gain	OW□□2F	→	–	–	Pn100	
	Speed Feed Forward Compensation	OW□□30	→	–	–	Pn109	
	Position Loop Integration Time Constant	OW□□32	→	–	–	Pn11F	
	Speed Loop Integration Time Constant	OW□□34	→	–	–	Pn101	
	Linear Acceleration Time*	OL□□36	→	–	–	Pn80B	
	Linear Deceleration Time*	OL□□38	→	–	–	Pn80E	

* Also updated when bits 4 to 7 of OW□□03 (Acceleration/Deceleration Unit) are changed.

9.4.3 Parameters Updated when a Motion Command Is Started (MP2200/MP2300 to SERVOPACK)

MP2200/MP2300				SERVOPACK				Remarks
				SGD-N, SGDB-N	NS100	NS115	SGDS	
Setting Parameters	Latch Zone Lower Limit	OL□□2A	→	–	–	–	Pn822	Updated when EX_POSING command execution is started.
	Latch Zone Upper Limit	OL□□2C	→	–	–	–	Pn820	Updated when EX_POSING command execution is started.
	Linear Acceleration Time*	OL□□36	→	Cn-0020	Pn80B			Updated when POSING, EX_POSING, ZRET, FEED, or STEP command execution is started.
	Linear Deceleration Time*	OL□□38	→	–	Pn80E			
	S-curve Acceleration Time	OW□□3A	→	Cn-0026	Pn812			Updated when POSING, EX_POSING, ZRET, FEED, or STEP command execution is started, but only when DEN = ON (i.e., when pulse distribution has been completed).
	Approach Speed	OL□□3E	→	Cn-0022	Pn817			Updated when ZRET command execution is started.
	Creep Speed	OL□□40	→	Cn-0023	Pn818			Updated when ZRET command execution is started.
	Home Offset	OL□□42	→	Cn-0028	Pn819			Updated when ZRET command execution is started.
	External Positioning Move Distance	OL□□46	→	Cn-002B	Pn814			Updated when EX_POSING or ZRET command execution is started.

* Only when bit A of fixed parameter 1 is set to enable automatic updating of parameters.

9.4.4 Parameters Updated at Self-configuration (SERVOPACK to MP2200/MP2300)

<table>
<tr><th colspan="3" rowspan="2">MP2200/MP2300</th><th rowspan="2"></th><th colspan="4">SERVOPACK</th></tr>
<tr><th>SGD-N, SGDB-N</th><th>NS100</th><th>NS115</th><th>SGDS</th></tr>
<tr><td rowspan="6">Setting Parameters</td><td>Position Loop Gain</td><td>OW□□2E</td><td>←</td><td>Cn-001A</td><td colspan="3">Pn102</td></tr>
<tr><td>Speed Loop Gain</td><td>OW□□2F</td><td>←</td><td>Cn-0004</td><td colspan="3">Pn100</td></tr>
<tr><td>Speed Feed Forward Compensation</td><td>OW□□30</td><td>←</td><td>Cn-001D</td><td colspan="3">Pn109</td></tr>
<tr><td>Position Loop Integration Time Constant</td><td>OW□□32</td><td>←</td><td>–</td><td colspan="3">Pn11F</td></tr>
<tr><td>Speed Loop Integration Time Constant</td><td>OW□□34</td><td>←</td><td>Cn-0005</td><td colspan="3">Pn101</td></tr>
<tr><td>S-curve Acceleration Time</td><td>OW□□3A</td><td>←</td><td>Cn-0026</td><td colspan="3">Pn812</td></tr>
</table>

9.4.5 Parameters Updated at Self-configuration (MP2200/MP2300 to SERVOPACK)

The following parameters are updated automatically for any communication method and regardless of the setting of bit A of fixed parameter 1.

<table>
<tr><th colspan="3" rowspan="2">MP2200/MP2300</th><th rowspan="2"></th><th colspan="4">SERVOPACK</th></tr>
<tr><th>SGD-N, SGDB-N</th><th>NS100</th><th>NS115</th><th>SGDS</th></tr>
<tr><td rowspan="12">SERVO-PACK Parameters</td><td>P-OT</td><td>Not valid.</td><td>→</td><td>Cn-0001 Bit 2</td><td colspan="3">Pn50A.3</td></tr>
<tr><td>N-OT</td><td>Not valid.</td><td>→</td><td>Cn-0001 Bit 3</td><td colspan="3">Pn50B.0</td></tr>
<tr><td>Positive Software Limit via Servo</td><td>Not valid.</td><td>→</td><td>Cn-0014 Bit 2</td><td colspan="3" rowspan="2">Pn801.0</td></tr>
<tr><td>Negative Software Limit via Servo</td><td>Not valid.</td><td>→</td><td>Cn-0014 Bit 3</td></tr>
<tr><td>Electronic Gear Ratio B (Numerator)</td><td>1</td><td>→</td><td>Cn-0024</td><td colspan="2">Pn202</td><td>Pn20E</td></tr>
<tr><td>Electronic Gear Ratio A (Denominator)</td><td>1</td><td>→</td><td>Cn-0025</td><td colspan="2">Pn203</td><td>Pn210</td></tr>
<tr><td>Online Autotuning</td><td>Not valid.</td><td>→</td><td>–</td><td colspan="3">Pn110</td></tr>
<tr><td>DEC Signal Mapping</td><td>Allocated.</td><td>→</td><td>–</td><td colspan="3">Pn511.0</td></tr>
<tr><td>EXT1 Signal Mapping</td><td>Allocated.</td><td>→</td><td>–</td><td colspan="3">Pn511.1</td></tr>
<tr><td>EXT2 Signal Mapping</td><td>Allocated.</td><td>→</td><td>–</td><td colspan="3">Pn511.2</td></tr>
<tr><td>EXT3 Signal Mapping</td><td>Allocated.</td><td>→</td><td>–</td><td colspan="3">Pn511.3</td></tr>
<tr><td>Speed Control Option</td><td>*1</td><td>→</td><td>–</td><td colspan="3">Pn002.0</td></tr>
<tr><td></td><td>Torque Control Option</td><td>*2</td><td>→</td><td>–</td><td colspan="3">Pn002.1</td></tr>
</table>

* 1. Use T-REF as external torque limit input.
* 2. Use V-REF as external speed limit input.

10

Troubleshooting

This chapter explains the details and remedies for errors that occur in the Motion Module.

10.1 Motion Errors

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

10.1.1 Description of Motion Errors

Motion errors in the MP2200/MP2300 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.

(1) Motion Error Type 1

Alarms for the MP2200/MP2300 (including the MECHATROLINK-I or MECHATROLINK-II functionality in the SVB-01 Module) are classified as follows:

[a] Warning (IL□□02)

This parameter stores the contents of any warning that has occurred for the axis.
If the setting of a motion fixed or setting parameter is not within the setting range, the Fixed Parameter or Setting Parameter Error Bit will turn ON.
Also, if the Deviation Abnormal Detection Error Level (OW□□01 bit 0) is set to treat excessive following errors as warnings, the Warning Bit will turn ON when an excessive following error occurs.
Movement commands will continue when a warning has occurred. When the cause of the warning has been removed, the Following Error and Servo Driver Error will be cleared.
For Setting Parameter Errors that occur while executing motion commands, correct the parameter setting and then either execute the motion command again or recover operation by clearing the alarm.

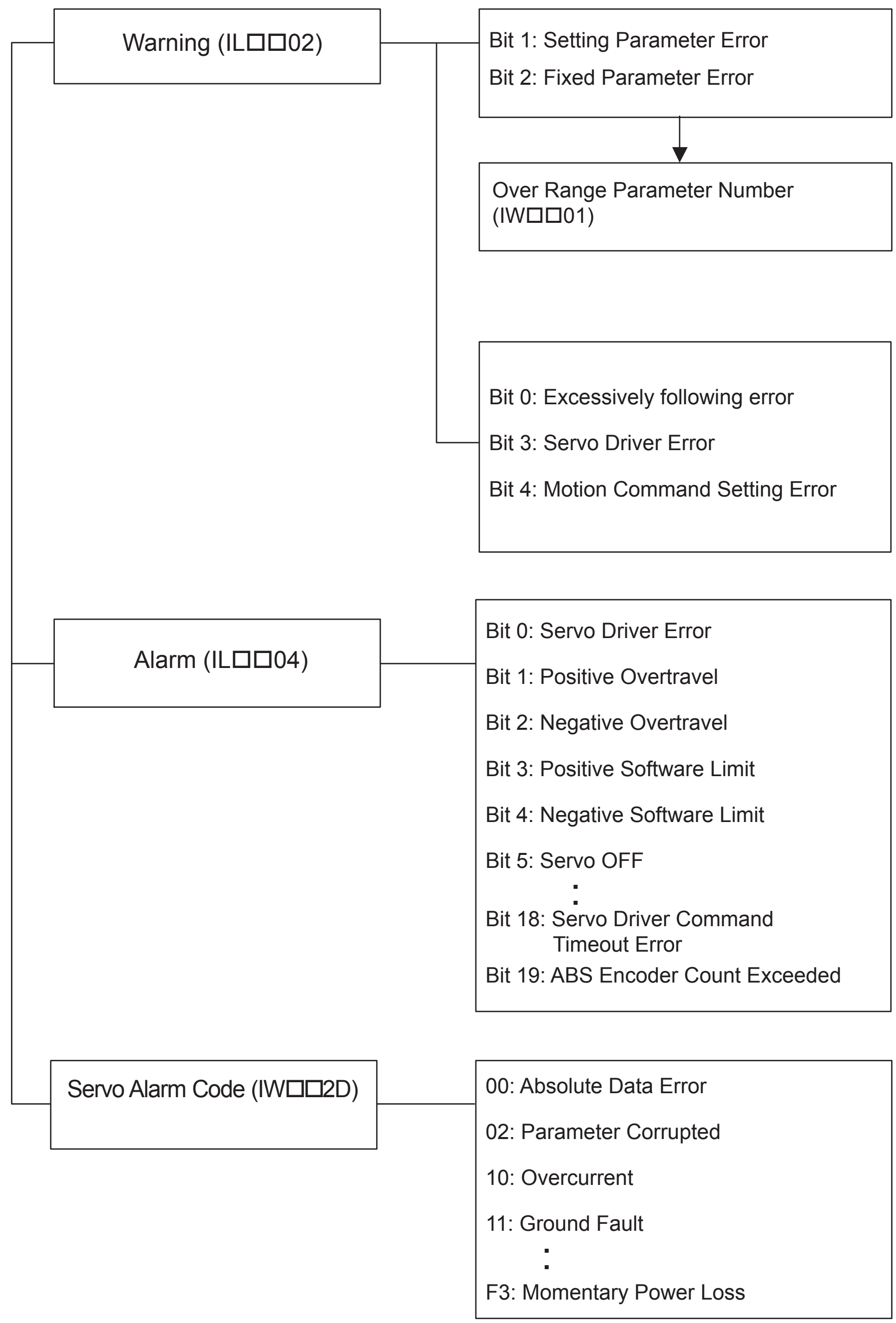
[b] Alarm (IL□□04)

This parameter stores the contents of any alarm that has occurred for the axis.

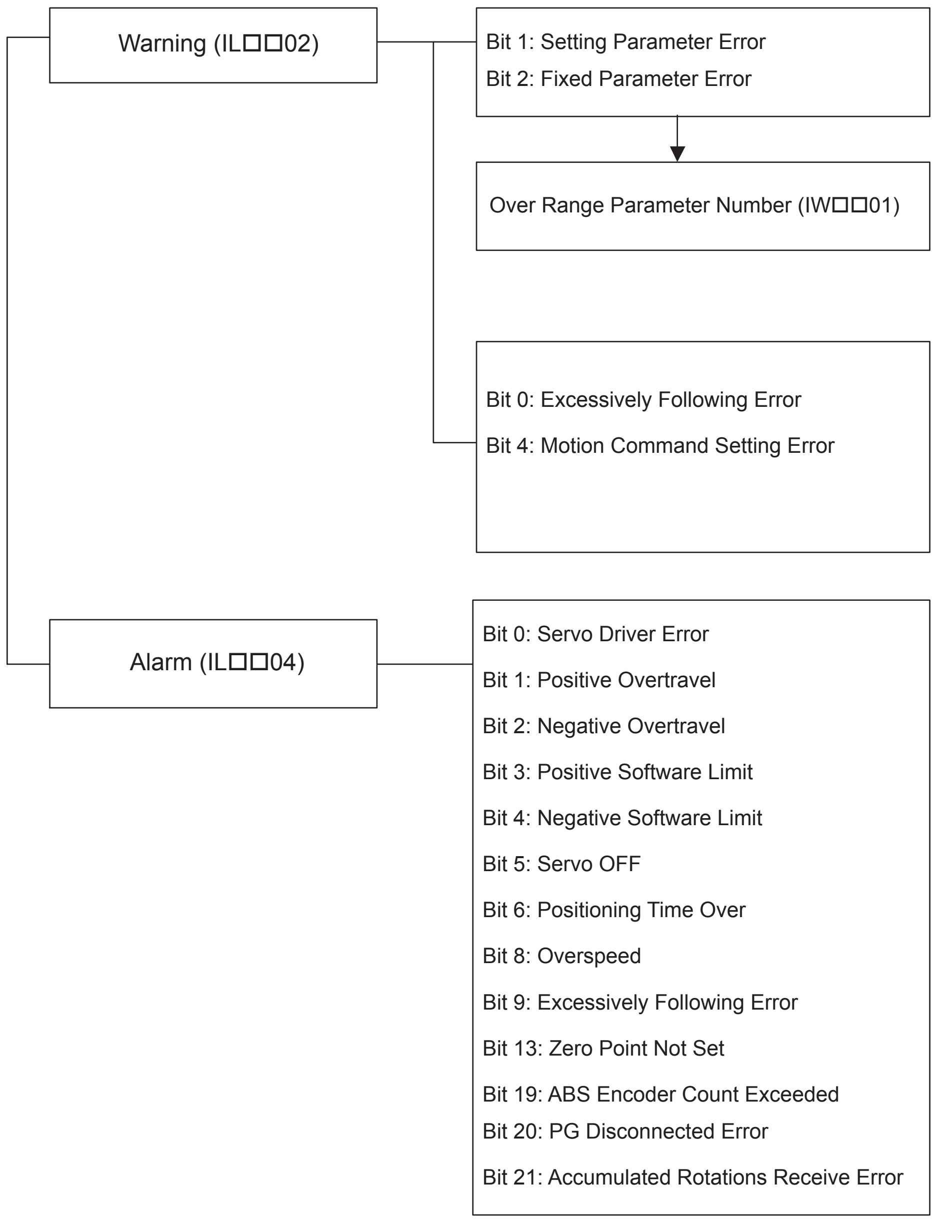
(2) Motion Error Type 2

The specific motion alarms for the SVB-01 Module's MECHATROLINK-I or MECHATROLINK-II and SVA-01 Module functionality are shown below.

■ SVB-01 Module



■ SVA-01 Module



10.1.2 Motion Error Details and Corrections

(1) Alarm IL□□04 Details

The following table shows the contents of the axis alarms (IL□□04).

IL□□04	Alarm Contents	SVB-01	SVA-01
Bit 0	Servo Driver Error	Yes	Yes
Bit 1	Positive Overtravel	Yes	Yes
Bit 2	Negative Overtravel	Yes	Yes
Bit 3	Positive Soft Limit (Positive Software Limit)	Yes	Yes
Bit 4	Negative Soft Limit (Negative Software Limit)	Yes	Yes
Bit 5	Servo OFF	Yes	Yes
Bit 6	Positioning Time Over	Yes	Yes
Bit 7	Excessive Positioning Moving Amount	Yes	
Bit 8	Excessive Speed	Yes	Yes
Bit 9	Excessively Following Error	Yes	Yes
Bit 10	Filter Type Change Error	Yes	
Bit 11	Filter Time Constant Change Error	Yes	
Bit 12	Not used	–	–
Bit 13	Zero Point Not Set	Yes	Yes
Bit 14	Not used	–	–
Bit 15	Not used	–	–
Bit 16	Servo Driver Synchronization Communication Error	Yes	
Bit 17	Servo Driver Communication Error	Yes	
Bit 18	Servo Driver Command Timeout Error	Yes	
Bit 19	ABS Encoder Count Exceeded	Yes	Yes
Bit 20	PG Disconnection Error		Yes
Bit 21	Receiving Error of Accumulated Number of Rotations		Yes
Bits 22 to 31	Not used	–	–

(2) Servo Driver Error (IL□□04, Bit 0)

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 Occurrence in the Servo Module 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 on the next page for details.

Correction

- Confirm the SERVOPACK alarm and remove the cause.
- Reset the alarm.

INFO

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

(3) MECHATROLINK Servo 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 Alarm Code (monitoring parameter IW□□2D). The Servo alarm codes are listed in the following tables.

[a] Σ Series

Name	Register Number	Code	Contents
Servo 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	Overspeed
		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 Overspeed
		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 Broken
		C4	Encoder Phase-C Broken
		C5	Incremental Encoder Initial Pulses Error
		D0	Position Error Exceeded
		E5	MECHATROLINK Sync Error
		E6	MECHATROLINK Communication Error
		F1	Broken Phase in Power Line
		F3	Momentary Power Loss

[b] Σ-II Series

Name	Register Number	Code	Contents
Servo Alarm Code	IW□□2D	99	Normal
		91	Overload Warning
		92	Regeneration Overload Warning
		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
		10	Overcurrent or Heat Sink Overheat
		30	Regeneration Error
		32	Regeneration Overload
		40	Overvoltage
		41	Undervoltage
		51	Overspeed
		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 Overspeed
		86	Encoder Overheat
		B1	Speed Reference A/D Error
		B2	Torque Reference A/D Error
		B6	Gate Array Error
		BF	System Alarm
		C1	Servo Run-away
		C6	Full-closed Loop Phase-A or -B Broken
		C7	Full-closed Loop Phase-C Broken
		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
		E0	No Option
		E1	Option Timeout
		E2	Option WDC Error
		E5	WDT Error
		E6	Communication Error
		EA	SERVOPACK Failure
		EB	SERVOPACK Initial Access Error
		EC	SERVOPACK WDC Error
		ED	Command Execution Not Completed
		F1	Broken Phase in Power Line

[c] Σ-III Series

Name	Register Number	Code*	Contents
Servo 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
		941	Parameter Change Requiring Power Recycling
		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
		100	Overcurrent or Heat Sink Overheat
		300	Regeneration Error
		320	Regeneration Overload
		330	Main Circuit Wiring Error
		400	Overvoltage
		410	Undervoltage
		510	Overspeed
		511	Divided Pulse Output Overspeed
		520	Vibration Alarm
		710	Overload (Instantaneous Maximum Load)
		720	Overload (Continuous Maximum Load)
		730	DB Overload
		740	Inrush Resistance Overload
		7A0	Heat Sink Overheat
		810	Encoder Backup Alarm
		820	Encoder Checksum Alarm

(cont'd)

Name	Register Number	Code*	Contents
Servo alarm code (cont'd)	IW□□2D (cont'd)	830	Encoder Battery Alarm
		840	Encoder Data Alarm
		850	Encoder Over Speed
		860	Encoder Overheat
		870	Full-closed Serial Encoder Checksum Alarm
		880	Full-closed Serial Encoder Data Alarm
		8A0	Full-closed Serial Encoder Scale Error
		8A1	Full-closed Serial Encoder Module Error
		8A2	Full-closed Serial Encoder Sensor Error (Incremental Value)
		8A3	Full-closed Serial Encoder Position Error (Absolute Value)
		B31	Current Detection Error 1
		B32	Current Detection Error 2
		B33	Current Detection Error 3
		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	Full-closed Serial Conversion Unit Communication Error (Reception Failure)
		CF2	Full-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 Load and Position
		E00	COM Alarm 0
		E01	COM Alarm 1
		E02	COM Alarm 2
		E07	COM Alarm 7
		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
		ED0	Internal Command Error
		F10	Phase Open on Power Line

* Although SERVOPACK alarm codes have three digits, only the upper two digits are stored in IW□□2D.

(4) Analog Servo Alarm List

The Servo Driver Error Flag (IL☐☐04, bit 0) turns ON when an alarm has occurred in a SERVOPACK connected to the SVA-01 Module.
The content of the alarm can be confirmed by connecting a Digital Operator to the SERVOPACK.
The following tables show the alarms that can occur in the SGDA, SGDB, SGDM, SGDH, and SGDS SERVOPACKs.

[a] Alarm List for the SGDA, SGDB, SGDM, and SGDH SERVOPACKs

Table 10.1 Analog Servo Alarm List (A)

Code	Alarm Name	Alarm Content	SGDA	SGDB	SGDM	SGDH
A.00	Absolute Value Data Error	Absolute data cannot be received or the received absolute data is invalid.	○	○	×	×
A.02	Parameter Corrupted	A parameter checksum error was detected.	○	○	○	○
A.03	Main Circuit Detector Error	There was an error in the power circuit's detection data.	×	×	○	○
A.04	Parameter Setting Error	A parameter value setting exceeded the allowed setting range.	○	○	○	○
A.05	Combination Error	The motor and SERVOPACK capacity settings are incompatible.	×	×	○	○
A.09	Divider Setting Error	An invalid Divider Setting (Pn212) was set (between increments) or the setting exceeds the connected Encoder's resolution.	×	×	○	×
		When a linear motor is connected, the setting exceeds the maximum dividing ration (Pn281), which was calculated from the linear motor's maximum speed.	×	×	○	×
A.0A	Encoder Type Mismatch	A serial encoder has been mounted that is not supported by the Σ-II.	×	×	○	×
A.10	Overcurrent or Heat Sink Overheat	There was an overcurrent in the power transistor. The heat sink overheated (SGDM).	○	○	○	○
A.30	Regeneration Error	An error occurred in the regeneration processing circuit.	○	○	○	○
A.31	Position Error Pulse Overflow	The position error pulses exceeded the “Overflow” limit set in the parameters.	○	○	×	×
A.32	Regeneration Overload	The regenerative energy exceeds the regenerative resistor's capacity.	×	×	○	○
A.33	Main Circuit Wiring Error	The power supply method used to supply the main circuit does not match the setting in parameter Pn001.	×	×	○	○
A.40	Overvoltage	The power supply voltage to the main circuit is excessively high.	○	○	○	○
A.41	Undervoltage	The power supply voltage to the main circuit is too low.	×	×	○	○
A.51	Overspeed	The motor's speed is too high.	○	○	○	○
A.70	Overload	The torque exceeded the rated torque (high or low load).	○	×	×	×
A.71	Overload (High Load)	The torque significantly exceeded the rated torque for several seconds to several dozen seconds.	×	○	○	○
A.72	Overload (Low Load)	The motor is operating continuously at a torque exceeding the rated torque.	×	○	○	○

Table 10.1 Analog Servo Alarm List (A) (cont'd)

Code	Alarm Name	Alarm Content	SGDA	SGDB	SGDM	SGDH
A.73	DB Overload	During dynamic braking operation, the rotating energy exceeds the DB resistor's capacity.	×	×	○	○
A.74	Inrush Resistance Overload	The main circuit power supply was turned OFF and ON repeatedly.	×	×	○	○
A.7A	Heat Sink Overheat	The SERVOPACK's heat sink overheated.	×	×	○	○
A.80	Absolute Encoder Error	The "Number of Pulses per Absolute Encoder Rotation" value is incorrect.	○	○	×	×
A.81	Absolute Encoder Backup Error	The encoder power supplies are all down and the position data was cleared.	○	○	○	○
A.82	Absolute Encoder Checksum Error	A checksum error was detected in the encoder's memory.	○	○	○	○
A.83	Absolute Encoder Battery Error	The voltage is too low in the absolute encoder's backup battery.	○	○	○	○
A.84	Absolute Encoder Data Error	The received absolute data is invalid.	○	○	○	○
A.85	Absolute Encoder Overspeed	The encoder was rotating at high-speed when the power was turned ON.	○	○	○	○
A.86	Encoder Overheat	The encoder's internal temperature is too high.	×	×	○	○
A.A1	Heat Sink Overheat	The SERVOPACK's heat sink overheated.	×	○	×	×
A.b1	Speed Reference A/D Error (Reference mechanism read error)	There is an error in the speed reference input's A/D converter.	○	○	○	○
A.b2	Torque Reference A/D Error	There is an error in the torque reference input's A/D converter.	×	×	○	○
A.b3	Current Sensor Error	There is an error in the current sensor system or a motor power line is disconnected.	×	×	○	○
A.bF	System Alarm	A SERVOPACK system alarm occurred.	×	×	○	○
A.c1	Servo Run-away	The Servomotor was overrunning.	○	○	○	○
A.c2	Encoder Phase Error Detected	An error occurred in the phase of the encoder's phase-A, phase-B, or phase-C output.	○	○	×	×
A.c3	Encoder Phase-A or -B Broken	The encoder's phase-A or phase-B is disconnected.	○	○	×	×
A.c4	Encoder Phase-C Broken	The encoder's phase-C is disconnected.	○	○	×	×
A.c8	Encoder Clear Error Multiturn Limit Setting Error	The absolute encoder's multiturn count could not be cleared or it could not be set properly.	×	×	○	○
A.c9	Encoder Communication Error	Communication could not be established between the Encoder and SERVOPACK.	×	×	○	○
A.cA	Encoder Parameter Error	The Encoder's parameters are corrupted.	×	×	○	○
A.cb	Encoder Echoback Error	The contents of communication with the encoder are incorrect.	×	×	○	○
A.cc	Multiturn Limit Mismatch	The Encoder and SERVOPACK Multiturn Limit Values do not agree.	×	×	○	○
A.do	Excessive Position Error	The position error pulses exceeded the setting in parameter Pn505.	×	×	○	○

Table 10.1 Analog Servo Alarm List (A) (cont’d)

Code	Alarm Name	Alarm Content	SGDA	SGDB	SGDM	SGDH
A.E7	Application Module Detection Failure	Detection of the Application Module failed.	×	×	×	○
A.F1	Broken Phase in Power Line	One phase is open in the main power supply.	×	○	○	○
A.F3	Power Loss Alarm	There was a power interruption of more than 1 cycle in the AC power supply.	○	○	×	×
A.F5 A.F6	Motor Wire Disconnection	Power is not being applied to the Servomotor even though the SERVOPACK received the Servo ON reference.	×	×	○	×
CPF00	Digital Operator Communication Error	Communication could not be established between the JUSP-OP02A-2 Digital Operator and SERVOPACK due to a CPU Error or other problem.	×	×	○	○
CPF01			×	×	○	○
A99	No error display	Indicates normal operating status.	○	○	×	×
A.– –	No error display	Indicates normal operating status.	×	×	○	○

(Note) ○: Alarm displayed, ×: No alarm displayed

[b] Alarm List for the SGDS SERVOPACK

Table 10.2 Analog Servo Alarm List (B)

Code	Alarm Name	Alarm Content
A.020	Parameter Checksum Error	The SERVOPACK's internal parameter data is incorrect.
A.021	Parameter Format Error	The SERVOPACK's internal parameter data is incorrect.
A.022	System Checksum Error	The SERVOPACK's internal parameter data is incorrect.
A.023	Parameter Password Error	The SERVOPACK's internal parameter data is incorrect.
A.030	Main Circuit Detector Error	There was an error in the power circuit's detection data.
A.040	Parameter Setting Error	A parameter setting exceeds the allowed setting range.
A.041	Divided Pulse Output Setting Error	The PG Dividing Ratio (Pn212) setting violates the allowed setting range or setting conditions.
A.042	Parameter Combination Error	The combination of several parameter settings exceeds the allowed setting range.
A.050	Combination Error	The Servomotor and SERVOPACK capacity settings are incompatible.
A.051	Unsupported Product Alarm	An incompatible Serial Converter Unit is connected.
A.0b0	Servo ON Reference Invalid Alarm	After using the Operator to perform an operation that turns the Servo ON, a Servo ON reference was attempted by a host command.
A.100	Overcurrent or Heat Sink Overheat	An overcurrent flowed through the IGBT or the SERVOPACK's heat sink overheated.
A.300	Regeneration Error	The Regenerative Resistor is disconnected or the Regenerative Transistor failed.
A.320	Regeneration Overload	The regenerative energy exceeds the Regenerative Resistor's capacity.
A.330	Main Circuit Wiring Error	The power supply method used to supply the main circuit does not match the setting in parameter Pn001.
A.400	Overvoltage	The main circuit's DC voltage is excessively high.
A.410	Undervoltage	The main circuit's DC voltage is too low.
A.510	Overspeed	The Servomotor's speed is too high.
A.511	Divided Pulse Output Overspeed	The motor speed calculated from the PG Dividing Ratio (Pn212) exceed the motor's upper limit speed.
A.520	Oscillation Alarm	Excessive oscillation was detected in the motor speed.
A.521	Autotuning Alarm	There was an error in the moment of inertia ratio calculation during autotuning.

Table 10.2 Analog Servo Alarm List (B) (cont'd)

Code	Alarm Name	Alarm Content
A.710	Overload (Instantaneous Maximum Load)	The motor operated with a torque that significantly exceeds the rated torque for several seconds to several dozen seconds.
A.720	Overload (Continuous Maximum Load)	The motor is operating continuously at a torque exceeding the rated torque.
A.730	DB Overload	During DB (Dynamic Braking) operation, the rotating energy exceeds the DB resistor's capacity.
A.740	Inrush Resistance Overload	The main circuit power supply was turned OFF and ON repeatedly.
A.7A0	Heat Sink Overheat	The SERVOPACK's heat sink overheated.
A.810	Encoder Backup Alarm	The encoder power supplies are all down and the position data was cleared.
A.820	Encoder Checksum Alarm	A checksum error was detected in the encoder's memory.
A.830	Encoder Battery Alarm	The voltage is too low in the absolute encoder's backup battery.
A.840	Encoder Data Alarm	The encoder's internal data is incorrect.
A.850	Encoder Over Speed	The encoder was rotating at high-speed when the power was turned ON.
A.860	Encoder Overheat	The encoder's internal temperature is too high.
A.b10	Speed Reference A/D Error	There is an error in the speed reference input's A/D converter.
A.b11	Speed Reference A/D Data Error	There is an error in the speed reference's A/D converter data.
A.b20	Torque Reference A/D Error	There is an error in the torque reference input's A/D converter.
A.b31	Current Detection Error 1	There is an error in the phase-U current sensor.
A.b32	Current Detection Error 2	There is an error in the phase-V current sensor.
A.b33	Current Detection Error 3	There is an error in the current sensor.
A.bF0	System Alarm 0 (Internal program processing error)	A SERVOPACK program error (internal program error 0) occurred.
A.bF1	System Alarm 1 (Internal program operating error)	A SERVOPACK program error (internal program error 1) occurred.
A.bF2	System Alarm 2 (Program error in current control processor)	A SERVOPACK program error (internal program error 2) occurred.
A.bF3	System Alarm 3 (Error in Encoder interface processor)	A SERVOPACK program error (internal program error 3) occurred.
A.bF4	System Alarm 4 (CPU WDT error)	A SERVOPACK program error (internal program error 4) occurred.
A.C10	Servo Run-away	The Servomotor was overrunning.
A.C80	Encoder Clear Error Multiturn Limit Setting Error	The absolute encoder's multiturn count was cleared or it could not be set properly.
A.C90	Encoder Communication Error	Communications could not be established between the Encoder and SERVOPACK.
A.C91	Encoder Communication Position Data Acceleration Error	An error occurred in the encoder's position data calculation.
A.C92	Encoder Communication Timer Error	An error occurred in the timer used for communications between the Encoder and SERVOPACK.
A.CA0	Encoder Parameter Error	The Encoder's parameters are corrupted.
A.Cb0	Encoder Echoback Error	The contents of communications with the encoder are incorrect.
A.CC0	Multiturn Limit Mismatch	The Encoder and SERVOPACK Multiturn Limit Values do not agree.
A.d00	Excessive Position Error	The position error pulses exceeded the setting in parameter Pn520.
A.d01	Excessive Position Error Alarm at Servo ON	When the Servo went ON, the position error pulse count exceeded the value set in parameter Pn 526.

Table 10.2 Analog Servo Alarm List (B) (cont'd)

Code	Alarm Name	Alarm Content
A.d02	Excessive Position Error Alarm for Speed Limit at Servo ON	The speed limit in parameter Pn529 is applied if the Servo goes ON and the position error pulse count was excessive. Reference pulses were input in that condition and the value set in parameter Pn520 was exceeded without clearing the speed limit.
A.F10	Broken Phase in Power Line	One phase of the three-phase main power supply is not connected.
CPF00	Digital Operator Communications Error	Communications could not be established between the JUSP-OP05A Digital Operator and SERVOPACK due to a CPU Error or other problem.
CPF01		
A.– –	No error display	Indicates normal operating status.

(5) Positive and Negative Overtravel (IL□□04 Bit 1 and Bit 2)

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 Occurrence in the Servo Module Command Status (IW□□09 bit 3) will turn ON.
- MP2200/MP2300 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

- A move command was executed that exceeded the travel limit of the machine as follows:
  A user program command exceeded the travel limit.
  The software limit was exceeded in manual operation.
- Overtravel signal malfunction.

Correction

- Check the overtravel signal.
- Check the program or manual operation.
- 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 attempted.)

IMPORTANT

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

(6) Positive and Negative Soft Limit (Positive and Negative Software Limit) (IL□□04 Bit 3 and Bit 4)

Detection Timing

- The software limits are detected by the position management section during execution of a motion command.
- 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 Occurrence in the Servo Module Command Status (IW□□09 bit 3) will turn ON.

Error and Cause

- A move command was executed that exceeded a software limit of the machine 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.
- 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 attempted.)

(7) Servo OFF (IL□□04 Bit 5)

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 Occurrence in the Servo Module 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.

(8) Positioning Time Over (IL□□04 Bit 6)

Detection Timing

- Positioning was not completed after completing pulse distribution within the Positioning Completed Check Time (OW□□26).

Processing when Alarm Occurs

- The current command was force-ended.
- The Command Error Occurrence in the Servo Module Command Status (IW□□09 bit 3) will turn ON.

Error and Cause

- The position loop gain and speed loop gain are not set suitably, creating poor response.
- The Position Complete Timeout (OW□□26) is too short.
- The capacity of the motor is insufficient for the machine load.
- Connections are not correct between the SERVOPACK and motor.

Correction

- Check the SERVOPACK gain parameters.
- Check connections between the SERVOPACK and motor.
- Check the motor capacity.
- Check the Position Complete Timeout (OW□□26).

INFO The above check is not performed if the Position Complete Timeout (OW□□26) is set to 0.

(9) Excessive Positioning Moving Amount (IL□□04 Bit 7)

Detection Timing

- Enabled when the electronic gear is used and detected when positioning is executed.

Processing when Alarm Occurs

- The move command is not executed.
- The Command Error Occurrence in the Servo Module 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.

(10) Excessive Speed (IL□□04 Bit 8)

Detection Timing

- Detected when a movement command is executed.

Processing when Alarm Occurs

- The move command is not executed.
- The Command Error Occurrence in the Servo Module Command Status (IW□□09 bit 3) will turn ON.

Error and Cause

- The limit to the moving amount that can be distributed each scan has been exceeded, or the limit to the speed that can be used in a command for a SERVOPACK for MECHATROLINK communication has been exceeded.

Correction

- Check the speed reference and moving amount for the axis that is being controlled.

(11) Excessively Following Error (IL☐☐04 Bit 9)

Detection Timing
- Detected during positioning (commands for positioning, external positioning, STEP operation, JOG operation, etc.).
- Detected during phase control commands.

Processing when Alarm Occurs
- The move command is not executed.
- The Command Error Occurrence in the Servo Module Command Status (IW☐☐09 bit 3) will turn ON.

Error and Cause
- The position loop gain and speed loop gain are not set suitably, creating poor response.
- The Deviation Abnormal Detection Value (OL☐☐22) is too small.
- The capacity of the motor is insufficient for the machine load.
- SERVOPACK failure

Correction
- Check the SERVOPACK gain parameters.
- Check the Deviation Abnormal Detection Value (OL☐☐22).
- Check the motor capacity.
- Contact the maintenance department.

INFO The above check is not performed if the Deviation Abnormal Detection Value (OL☐☐22) is set to 0.

(12) Filter Type Change Error (IL☐☐04 Bit 10)

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 Execution End with Error in the Motion Command Status (IW☐☐09 bit 3) will turn ON.

Error and Cause
- The Change Filter Type command was executed before pulse distribution could be completed (i.e., when IB☐☐0C0 was OFF).

Correction
- Correct the program to detect Distribution Completed status (i.e., that IB☐☐0C0 is ON) before executing the Change Filter Type command.

INFO The command will not stop even if the above error occurs. Perform stop processing from the user program to stop commands when necessary.

(13) Filter Time Constant Change Error (IL□□04 Bit 11)

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 Occurrence in the Servo Module Command Status (IW□□09 bit 3) will turn ON.

Error and Cause

- The SCC command was executed before pulse distribution could be completed (i.e., when IB□□0C0 was OFF).

Correction

- Correct the program to detect Distribution Completed status (i.e., that IB□□0C0 is ON) before executing the SCC command.

INFO

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

(14) Zero Point Not Set (IL□□04 Bit 13)

Detection Timing

- Detected when an absolute encoder is used for an infinite length axis and a command is set in the Motion Command (OW□□08). Commands: Positioning, External Positioning, Interpolation, or Latch

Processing when Alarm Occurs

- The set command will not be executed.
- The Command Error Occurrence in the Servo Module 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.

(15) Servo Driver Synchronization Communication Error (IL□□04 Bit 16)

Detection Timing

- Detected by the communication control section when communication are synchronized between the MP2200/MP2300 and SERVOPACK.

Processing when Alarm Occurs

- The current command will be aborted.

Error and Cause

- An error occurred in MECHATROLINK communication (e.g., cable disconnect or noise on communication line).

Correction

- Check the MECHATROLINK cable and reset the alarm.

(16) Servo Driver Communication Error (IL□□04 Bit 17)

Detection Timing

- Detected by the communication control section when communication is synchronized between the MP2200/MP2300 and SERVOPACK.

Processing when Alarm Occurs

- The current command will be aborted.
- The SERVOPACK will be Servo OFF status.

Error and Cause

- MECHATROLINK communication has stopped (the cable is disconnected or the power supply to the SERVOPACK is OFF).

Correction

- Check the MECHATROLINK cable and reset the alarm.

(17) Servo Driver Command Timeout Error (IL□□04 Bit 18)

Detection Timing

- Detected during execution of motion commands.
- Detected at the MECHATROLINK communication control section when 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 the connections between the MP2200/MP2300 and SERVOPACK for MECHATROLINK communication.
- Check for alarms in the SERVOPACK for MECHATROLINK communication.

INFO

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

(18) ABS Encoder Count Exceeded (IL□□04 Bit 19)

Detection Timing

- Detected by the position management section when power is turned ON, but only when an absolute encoder is used, a finite length axis is set, and the electronic gear used.

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, and other motion fixed parameters.

(19) PG Disconnected Error (IL□□04 Bit 20)

Detection Timing

- This error is valid only in position control, phase control, or zero point return mode and only when the pulse count method (A/B) is selected. A PG disconnection detection signal is monitored in the scan cycle using software.

（Note） The PG disconnection detection signal is detected using a hardware circuit.

Processing when Alarm Occurs

- Position loop processing is stopped and deceleration stop processing is performed using an open-loop speed reference.
- A servo OFF command is sent after the deceleration stop.
- To stop immediately, create a user application that sets the acceleration/deceleration time to 0 when a PG disconnection is detected.

Error and Cause

- Faulty encoder wiring or broken wire
- Encoder or SERVOPACK fault
- SVA-01 Module fault

Correction

- Check the encoder wiring.
- Contact the maintenance department.

(20) Accumulated Rotations Receive Error (IL□□04 Bit 21)

Detection Timing

- When using an absolute encoder, the error is detected when an absolute position is received when the power supply is turned ON or when the Absolute Read Request bit (OW□□00, bit 5) is set to 1.

Processing when Alarm Occurs

- Axis control will be cut off when this bit turns ON.

Error and Cause

- Absolute encoder is not initialized.
- Cable fault
- Hardware fault in servodriver, absolute encoder, or Motion Module

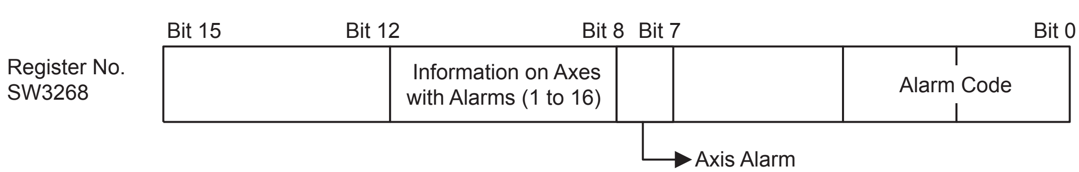
Correction

- Remove the causes of the above errors.

10.1.3 Motion Program Alarms

(1) Motion Program Alarms

Motion program alarms stored in the alarm output register are displayed as follows.



(2) Motion Program Alarm List

The motion program alarm codes are listed in the following tables. When displaying these on the register list, set the display mode to hexadecimal (H).

	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	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	Reference unit conversion overflow	
Axis alarms*	80h	Logical axis used prohibited	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.
	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 end status	

* The axis number is stored in bits 8 to 11 for axis alarms.

10.1.4 Causes of the “Command Error End” Status (SVB-01 Only)

The “Command Error End” status occurs when the specified motion command could not be executed or could not be completed properly for some reason.
The possible reasons for the Command Error End status depend on the executed motion command.

Motion Command Code		Cause of Command Error End Status	Simultaneously Occurring Warnings or Alarms
1	Positioning (POSING)	The positioning travel distance exceeded the allowed value.	“Excessive Positioning Moving Amount” alarm
		The axis is an absolute infinite length axis and the Zero Point Return (Setting) has not been completed.	“Zero Point Not Set” alarm
		Servo OFF status	“Servo OFF” alarm
		Alarm occurred.	–
		Communication is not synchronized.	“Servo Driver Synchronization Communication Error” alarm
2	External Positioning (EX_POSING)	The positioning travel distance exceeded the allowed value.	“Excessive Positioning Moving Amount” alarm
		The axis is an absolute infinite length axis and the Zero Point Return (Setting) has not been completed.	“Zero Point Not Set” alarm
		Servo OFF status	“Servo OFF” alarm
		Alarm occurred.	–
		Communications are not synchronized.	“Servo Driver Synchronization Communication Error” alarm
		A Servo parameter write operation was not completed within the required time.	“Servo Driver Command Timeout Error” alarm
		An A.94 or A.95 warning occurred in the Servo.	“Servo Driver Error” warning
		An external signal selection was not within the allowed range.	“Setting Parameter Error” warning
3	Zero Point Return (ZRET)	Machine Lock	No alarm or warning
		Servo OFF status	“Servo OFF” alarm
		Alarm occurred.	–
		Communication is not synchronized.	“Servo Driver Synchronization Communication Error” alarm
		A Servo parameter read or write operation was not completed within the required time.	“Servo Driver Command Timeout Error” alarm
		An A.94 or A.95 warning occurred in the Servo.	“Servo Driver Error” warning
		The Zero Point Return method (Home Return Type) setting is not within the allowed range.	“Setting Parameter Error” warning
		The Zero Point Return method (Home Return Type) is set to POT method and the Approach Speed is set to reverse.	“Setting Parameter Error” warning
		The Zero Point Return method (Home Return Type) is set to NOT method and the Approach Speed is set to forward.	“Setting Parameter Error” warning
		The Home Return Type is set to DEC1 + Phase-C, ZERO Signal, DEC1 + ZERO, or Phase-C Pulse, and the OT Signal was ON in the Home Direction.	An OT alarm or OT warning occurred in the Home Direction.

(cont'd)

Motion Command Code		Cause of Command Error End Status	Simultaneously Occurring Warnings or Alarms
4 5	Interpolation (INTERPOLATE) Interpolate End Segment (ENDOF_INTERPOLATE)	The travel distance specified for one scan exceeds the segment that can be specified in the MECHATROLINK Servo or the speed feed forward value exceeds the maximum speed that can be specified.	"Excessive Speed" alarm
		The axis is an absolute infinite length axis and the Zero Point Return (Setting) has not been completed.	"Zero Point Not Set" alarm
		Servo OFF status	"Servo OFF" alarm
		Alarm occurred.	–
		Communication is not synchronized.	"Servo Driver Synchronization Communication Error" alarm
6	Latch (LATCH)	The travel distance specified for one scan exceeds the segment that can be specified in the MECHATROLINK Servo or the speed feed forward value exceeds the maximum speed that can be specified.	"Excessive Speed" alarm
		The axis is an absolute infinite length axis and the Zero Point Return (Setting) has not been completed.	"Zero Point Not Set" alarm
		Servo OFF status	"Servo OFF" alarm
		Alarm occurred.	–
		Communications are not synchronized.	"Servo Driver Synchronization Communication Error" alarm
		The latch signal setting is not within the allowed setting range.	"Setting Parameter Error" warning
7	JOG Operation (FEED)	Machine Lock	No alarm or warning
		Servo OFF status	"Servo OFF" alarm
		Alarm occurred.	–
		Communication is not synchronized.	"Servo Driver Synchronization Communication Error" alarm
8	STEP Operation (STEP)	The positioning travel distance exceeded the allowed value.	"Excessive Positioning Moving Amount" alarm
		Servo OFF status	"Servo OFF" alarm
		Alarm occurred.	–
		Communication is not synchronized.	"Servo Driver Synchronization Communication Error" alarm
9	Zero Point Setting (ZSET)	Alarm occurred.	–
		Communication is not synchronized.	"Servo Driver Synchronization Communication Error" alarm
10 11	Change Acceleration Time (ACC) Change Deceleration Time (DCC)	Alarm occurred.	–
		Communication is not synchronized.	"Servo Driver Synchronization Communication Error" alarm
		Command when pulse distribution has not been completed (DEN = OFF).	No alarm or error
		A Servo parameter write operation was not completed within the required time.	"Servo Driver Command Timeout Error" alarm
		An A.94 or A.95 warning occurred in the Servo.	"Servo Driver Error" warning

(cont’d)

<table>
<tr><th colspan="2">Motion Command Code</th><th>Cause of Command Error End Status</th><th>Simultaneously Occurring Warnings or Alarms</th></tr>
<tr><td rowspan="5">12</td><td rowspan="5">Change Filter Time Constant (SCC)</td><td>Alarm occurred.</td><td>–</td></tr>
<tr><td>Communication is not synchronized.</td><td>“Servo Driver Synchronization Communication Error” alarm</td></tr>
<tr><td>Command when pulse distribution has not been completed (DEN = OFF).</td><td>“Filter Time Constant Change Error” alarm</td></tr>
<tr><td>A Servo parameter write operation was not completed within the required time.</td><td>“Servo Driver Command Timeout Error” alarm</td></tr>
<tr><td>An A.94 or A.95 warning occurred in the Servo.</td><td>“Servo Driver Error” warning</td></tr>
<tr><td rowspan="4">13</td><td rowspan="4">Change Filter Type (CHG_FILTER)</td><td>Alarm occurred.</td><td>–</td></tr>
<tr><td>Communication is not synchronized.</td><td>“Servo Driver Synchronization Communication Error” alarm</td></tr>
<tr><td>Command when pulse distribution has not been completed (DEN = OFF).</td><td>“Filter Type Change Error” alarm</td></tr>
<tr><td>The filter type setting is not within the allowed setting range.</td><td>“Setting Parameter Error” warning</td></tr>
<tr><td rowspan="4">14
15
16</td><td rowspan="4">Change Speed Loop Gain (KVS)
Change Position Loop Gain (KPS)
Change Speed Feed Forward (KFS)</td><td>Alarm occurred.</td><td>–</td></tr>
<tr><td>Communication is not synchronized.</td><td>“Servo Driver Synchronization Communication Error” alarm</td></tr>
<tr><td>A Servo parameter write operation was not completed within the required time.</td><td>“Servo Driver Command Timeout Error” alarm</td></tr>
<tr><td>An A.94 or A.95 warning occurred in the Servo.</td><td>“Servo Driver Error” warning</td></tr>
<tr><td rowspan="5">17
18</td><td rowspan="5">Read SERVOPACK Parameter (PRM_RD)
Write SERVOPACK Parameter (PRM_WR)</td><td>Alarm occurred.</td><td>–</td></tr>
<tr><td>Communications are not synchronized.</td><td>“Servo Driver Synchronization Communication Error” alarm</td></tr>
<tr><td>A Servo parameter read operation was not completed within the required time.</td><td>“Servo Driver Command Timeout Error” alarm</td></tr>
<tr><td>An A.94 or A.95 warning occurred in the Servo.</td><td>“Servo Driver Error” warning</td></tr>
<tr><td>The parameter number or size setting is not within the allowed setting range.</td><td>“Setting Parameter Error” warning</td></tr>
<tr><td rowspan="2">19
20</td><td rowspan="2">Monitor SERVOPACK Alarms (ALM_MON)
Monitor SERVOPACK Alarm History (ALM_HIST)</td><td>A command to the SERVOPACK was not completed within the required time.</td><td>“Servo Driver Command Timeout Error” alarm</td></tr>
<tr><td>The Servo Alarm Monitor Number setting is not within the allowed setting range.</td><td>“Setting Parameter Error” warning</td></tr>
<tr><td>21</td><td>Clear SERVOPACK Alarm History (ALMHIST_CLR)</td><td>A command to the SERVOPACK was not completed within the required time.</td><td>“Servo Driver Command Timeout Error” alarm</td></tr>
<tr><td rowspan="4">22</td><td rowspan="4">Reset Absolute Encoder (ABS_RST)</td><td>Command sent to Σ Series SERVOPACK.</td><td>No alarm or warning</td></tr>
<tr><td>Command sent while Servo ON.</td><td>No alarm or warning</td></tr>
<tr><td>Communication is not synchronized.</td><td>“Servo Driver Synchronization Communication Error” alarm</td></tr>
<tr><td>A command to the SERVOPACK was not completed within the required time.</td><td>“Servo Driver Command Timeout Error” alarm</td></tr>
<tr><td rowspan="3">23</td><td rowspan="3">Speed Reference (VELO)</td><td>Command was sent while connected through MECHATROLINK-I.</td><td>No alarm or warning</td></tr>
<tr><td>Alarm occurred.</td><td>–</td></tr>
<tr><td>Communication is not synchronized.</td><td>“Servo Driver Synchronization Communication Error” alarm</td></tr>
</table>

(cont'd)

Motion Command Code		Cause of Command Error End Status	Simultaneously Occurring Warnings or Alarms
24	Torque Reference (TRQ)	Command was sent while connected through MECHATROLINK-I.	No alarm or warning
		Alarm occurred.	–
		Communications are not synchronized.	"Servo Driver Synchronization Communication Error" alarm
25	Phase Reference (PHASE)	The axis is an absolute infinite length axis and the Zero Point Return (Setting) has not been completed.	"Zero Point Not Set" alarm
		Servo OFF status	"Servo OFF" alarm
		Alarm occurred.	–
		Communication is not synchronized.	"Servo Driver Synchronization Communication Error" alarm
26	Change Position Integration Time Constant (KIS)	Alarm occurred.	–
		Communication is not synchronized.	"Servo Driver Synchronization Communication Error" alarm
		A Servo parameter write operation was not completed within the required time.	"Servo Driver Command Timeout Error" alarm
		An A.94 or A.95 warning occurred in the Servo.	"Servo Driver Error" warning
Other Commands • Automatically reflected in parameter when move command starts.		Alarm occurred.	–
		Communication is not synchronized.	"Servo Driver Synchronization Communication Error" alarm
		A Servo parameter write operation was not completed within the required time.	"Servo Driver Command Timeout Error" alarm
		An A.94 or A.95 warning occurred in the Servo.	"Servo Driver Error" warning
		Pulse distribution was not completed (DEN = OFF).	No alarm or warning

* Automatically reflected when the User Constants Self-Writing Function is enabled in the fixed parameters and the setting for the S-curve Acceleration Time, Acceleration Time Constant, or Deceleration Time Constant is changed at the same time that the move command is set.

10.2 Error Detection

10.2.1 SVB-01 Module LED Indicators

The following table shows how to use the LED indicators to determine the operating status of the SVB-01 Module, as well as relevant error information when the LED indicator status indicates an error.

Classification	LED Indicator			Indicator Details	Meaning
	RUN	ERR	TX		
Initialization	Lit	Not lit	Lit	Status when power is turned ON	This is the status just after the Module's power supply is turned ON. The ERR Indicator is turned OFF during initialization. A boot error occurred if this LED status does not change. The SVB-01 firmware must be overwritten if a boot error occurs.
Normal operation	Lit	Lit	Lit	Undefined status	This status indicates that the Module has not been registered in the Module Definitions. When the Module will be used, it must be registered in the Module Definitions, the definitions must be transferred, and I/O must be allocated.
	Not lit	Lit	Not lit	Normal operation	The Module is operating normally and MECHATROLINK communication is established.
	Not lit	Lit	Lit	Normal operation (waiting for connection)	When the Module is set as a Slave, this LED status indicates that communication has not been established with the Master.
	Blinking	Lit	Not lit	CPU STOP	Indicates that the CPU is stopped. The LED status will return to normal operating status when the CPU starts to run.
Errors	Not lit	Not lit	Not lit	■ Master Mode: Servo axis error • Warning occurred. (See IL□□02.) • Alarm occurred. (See IL□□04.) • Command Error End status (IB□□093 ON and IB□□0B3 ON) Note: The LED Indicators will be OFF when these conditions occur in any axis. ■ Slave Mode: MECHATROLINK Communication Error	The meaning of this LED status is different in Master Mode and Slave Mode. ■ Master Mode This LED status indicates that one of the listed errors occurred in any Servo axis. Check the corresponding parameters to determine which error occurred. • Any kind of warning may cause this condition. The bits in IL□□02 indicate the cause of the warning, so it is necessary to identify the cause of the warning, eliminate the cause, and perform an Alarm Reset. • Any kind of alarm may cause this condition.The bits in IL□□04 indicate the cause of the alarm, so it is necessary to identify the cause of the alarm, eliminate the cause, and perform an Alarm Reset. • If the Module is in Command Error End status, an error occurred during execution of a motion command or motion subcommand. For example, a command will end in an error if an out-of-range command is applied. Clear the command in OW□□08 or OW□□0A. ■ Slave Mode This LED status indicates that an error occurred in MECHATROLINK communication. Check the MECHATROLINK cable connections.
	Not lit	Not lit	Lit	Master Communication Interrupted	In Slave Mode, this LED status indicates that communication from the Master have stopped. Check the Master's status and the MECHATROLINK cable connections.

(cont'd)

Classification	LED Indicator			Indicator Details	Meaning
	RUN	ERR	TX		
Errors (cont'd)	Blinking	Blinking	–	Hardware Error (Number of LED blinks indicates error type.) 1: – 2: ROM diagnostic error 3: RAM diagnostic error 4: CPU diagnostic error 5: FPU diagnostic error 6: Shared memory diagnostic error 7: JL-080 diagnostic error	Hardware failure in the Module The Module must be replaced.
	Lit	Blinking	–	Software Error (Number of LED blinks indicates error type.) 1: – 2: Watchdog timer over error 3: Address error (read) exception 4: Address error (write) exception 5: FPU exception error 6: Illegal general command 7: Illegal slot command 8: General FPU inhibited error 9: Slot FPU inhibited error 10: Watchdog timer over error	If a watchdog timer over error occurs, it is possible that the user program's processing time is longer than the scan time setting. Check the user program and the scan time setting.
Writing Flash Memory	Not lit	Lit	–	Erasing Flash Memory Writing Flash Memory	This LED status indicates that the flash memory is being erased or written when a flash memory writing tool was connected before turning the power ON.
	Lit	Lit	–	Flash Memory Write Completed Normally	This LED status indicates that the flash memory was written successfully when a flash memory writing tool was connected before turning the power ON.
	Lit	Blinking	–	Flash Memory Write Error	This LED status indicates that the flash memory write operation failed (error end) when a flash memory writing tool was connected before turning the power ON. Either check the Module's ROM or turn the power OFF and then ON to try writing again.

10.2.2 SVA-01 Module LED Indicators

The following table shows how to use the LED indicators to determine the operating status of the SVA-01 Module, as well as relevant error information when the LED indicator status indicates an error.

Classification	Indicator Name		Indicator Details	Meaning
	RUN	ERR		
Normal operation	Lit	Lit	Hardware reset status	Indicates hardware reset.
	Lit	Not lit	Initialization	• The LEDs are normally this status for about 1 to 6 seconds after turning ON the power or resetting the Module. When an Absolute Encoder is selected in fixed parameter 30, this status will continue for 30 seconds per axis if there is an error in the interface with the Absolute Encoder. • This status will also continue indefinitely if there is an infinite loop in Drawing A.
	Not lit	Lit	Normal operating condition	This status is entered when STOP operation is performed from a switch or the MPE720.
Errors	Not lit	Blinking	A CPU data transmission error has been detected. 2: Watchdog timer over error 3: Synchronization error Note: The number indicates how many times the ERR LED will flash.	When a CPU Module error is detected, the RUN LED will be lit and the ERR LED will blink.
	Blinking	Blinking	Hardware error (Number of LED blinks indicates error type.) 2: ROM diagnostic error 3: RAM diagnostic error 4: CPU function diagnostic error 5: CPU function diagnostic error 6: Shared memory diagnostic error 7: JL-045 diagnostic error	The RUN and ERR LEDs will blink when there is a self-diagnosis failure.
	Lit	Blinking	Hardware error (Number of LED blinks indicates error type.) 3: Address error (read) exception 4: Address error (write) exception 5: FPU exception error 6: Illegal general command 7: Illegal slot command 8: General FPU inhibited error 9: Slot FPU inhibited error	The ERR indicator will blink when an exception error has occurred.
Warning	Blinking	Lit	CPU stopped	The RUN LED will blink.
	Lit	Lit	Undefined status	–
	Not lit	Not lit	Alarm or warning occurred.	Check the contents of the following monitoring parameters. IL□□02: Warning IL□□04: Alarm IW□□09, bit3: Motion Command Error End IW□□0B, bit3: Motion Subcommand Error End

(cont'd)

Classification	Indicator Name: RUN	Indicator Name: ERR	Indicator Details	Meaning
Writing Flash Memory	Lit	Not lit	Status after power is turned ON.	Status when a flash memory writing tool is connected and the power is turned ON.
	Not lit	Lit	Writing Flash Memory	Status when flash memory is being written.
	Lit	Lit	Normal End	Status when flash memory write operation was completed normally.
	Lit	Blinking	Error End 2: Flash memory erase error 4: Flash memory write error 6: Checksum error	Status when flash memory write operation failed.

Appendix A

Appendix A Switching Motion Commands

Appendix A.1 SVB-01 Module Motion Command Execution Tables

The following tables show which commands can be executed during execution of another motion command for the SVB-01 Module.

Code	Command Being Executed	New 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	INTERPOLATE	○	○	○	○	–	○	○	○	○	○	○	○	○	○	○	○
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	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
29	SV_ON	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
30	SV_OFF	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
31	ALM_CLR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

(cont'd)

Code	Command Being Executed	New Command 16 KFS	17 PRM_ RD	18 PRM_ WR	19 ALM_ MON	20 ALM_ HIST	21 ALMH	22 ABS_	23 VELO	24 TRQ	25 PHAS	26 KIS	29 SV_ON	30 SV_OF	31 ALM
0	NOP	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1	POSING	○	○	○	○	○	○	×	○	○	○	○	–	○	×
2	EX_POSING	Δ	Δ	Δ	Δ	Δ	Δ	×	×	×	×	Δ	–	Δ	×
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	●	●	●	●	●	●	●	●	●	●	–	×	○	●
29	SV_ON	●	●	●	●	●	●	●	●	●	●	●	–	○	●
30	SV_OFF	●	●	●	●	●	●	●	●	●	●	●	×	–	●
31	ALM_CLR	●	●	●	●	●	●	●	●	●	●	●	×	○	–

(Note) 1. ○:Execution possible.
Δ:Execution possible if position reference type is set for absolute position reference mode.
×:Command aborted (deceleration stop)
●:The new command is ignored and the current command is continued.
2. Although the table shows that changing to ACC, DCC, SCC, or CHG_FILTER is possible from INTERPOLATE, ENDOF_INTERPOLATE, LATCH, or PHASE, a command error will occur if pulse distribution has not been completed.

Appendix A.2 SVB-01 Module Motion Subcommand Execution Table

The following table shows which subcommands can be executed during execution of another motion command in an SVB-01 Module.

Code	Command Being Executed	New 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	○	×	×	○	○

(Note) ○: Execution possible.
×: Execution not possible.

Appendix A.3 SVA-01 Module Motion Command Execution Table

The following table shows which commands can be executed during execution of another motion command in an SVA-01 Module.

Code	Command Being Executed	New Command												
		0	1	2	3	4	5	6	7	8	9	23	24	25
		NOP	POS	EX_P	ZRET	INTE	ENDO	LATC	FEED	STEP	ZSET	VELO	TRQ	PHAS
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	×	○	○	×	×	×	×	○	○	×	○	○	–

(Note) ○: Execution possible.
×: Command aborted (deceleration stop)

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Revision History

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