Machine Controller MP900/MP2000 Series
USER'S MANUAL

For Linear Servomotors

YASKAWA

Using this Manual

This manual describes the system configuration, the startup procedure, and all of the parameters for every controller when combining the MP900 series or MP2000 series (hereinafter called the MP series) of machine controllers with linear servomotors.

Please read this manual to ensure correct usage of the Linear Servomotor System. Keep this manual in a safe place for future reference.

■ Basic Terms

Unless otherwise specified the following definitions are used.

• Controller	: MP2000/MP900 Series Machine Controllers
• MP2000	: MP2000 Series Machine Controllers such as MP2100, MP2200, and MP2300
• MP2300	: Machine Controller MP2300
• MP2200	: Machine Controller MP2200
• MP2100	: Machine Controller MP2100
• MP900	: MP900 Series Machine Controllers such as MP920, MP930, and MP940
• MP940	: Machine Controller MP940
• MP930	: Machine Controller MP930
• MP920	: Machine Controller MP920
• MPE720	: Software for Programming Device
• SGDS	: Σ-III Series SGDS SERVOPACK
• SGDH	: Σ-II Series SGDH SERVOPACK
• SGDH + NS100	: SGDH SERVOPACK with an Option Unit NS100 Connected
• Linear Servomotor or Motor	: Linear Σ Series Model SGLGW, SGLFW, and SGLTW servomotors
• Servo Drive	: Combination with a Linear Servomotor and servo amplifier
• Servo System	: A complete servo system combined with a Servo Drive, host computer, and peripheral devices
• Parameters	: Parameters set to SERVOPACK

■ Intended Audience

This manual is intended for the following users.

• Those responsible for designing systems of MP900/MP2000 series Machine Controllers

• Those responsible for programming motion programs of MP900/MP2000 series Machine Controller

• Those responsible for programming ladder programs of MP900/MP2000 series Machine Controller

■ 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.

■ Related Manuals

The following Machine Controllers are available for Linear Servomotor systems:

• MP900 Series: MP920, MP930, and MP940

• MP2000 Series: MP2100, MP2200, and MP2300

This manual is arranged on the base of Machine Controller model used in Linear Servomotor systems.

Refer to the following related manuals as required.

Category	Manual Name	Manual Number	Contents
Controller	Machine Controller MP920 User's Manual Design and Maintenance	SIEZ-C887-2.1	Describes the functions, specifications, and application methods, such as setup procedure of the MP920.
	Machine Controller MP930 User's Manual Design and Maintenance	SIEZ-C887-1.1	Describes the functions, specifications, and application methods, such as setup procedure of the MP930.
	Machine Controller MP940 User's Manual Design and Maintenance	SIEZ-C887-4.1	Describes the functions, specifications, and application methods, such as setup procedure of the MP940.
	Machine Controller MP2300 Basic Module User's Manual	SIEPC88070003	Describes the functions, specifications, and application methods, such as setup procedure of the MP2300.
	Machine Controller MP2200 User's Manual	SIEPC88070014	Describes the functions, specifications, and application methods, such as setup procedure of the MP2200.
	Machine Controller MP2100 User's Manual Design and Maintenance	SIEPC88070001	Describes the functions, specifications, and application methods, such as setup procedure of the MP2100.
	Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual	SIEPC88070005	Describes the installation and operation methods of the MP720 programming system in the MP900/MP2000 series.
Servo	Linear Σ Series SGL□□/SGDS User's Manual	SIEPS80000016	Describes the selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, trial operation, adjustment, maintenance and inspection of the SGDS SERVOPACKs and Linear Servomotors.
	Linear Σ Series SGL□□/SGDH User's Manual	SIEPS80000019	Describes the selection methods, ratings, characteristics, diagrams, cables, peripheral devices, wiring, trial operation, adjustment, maintenance and inspection of the SGDH SERVOPACKs and Linear Servomotors.
	Σ-II Series SGDH MECHATROLINK I/F Unit User's Manual	SIE-C718-4	Describes the functions, specifications, and application methods of the NS115.
	Σ-II Series SGDH MECHATROLINK-II Application Module User's Manual	SIEPC71080001	Describes the functions, specifications, and application methods of the NS100.

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

■ General Products

- 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 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 remove the cables while power is being supplied.

  There is a risk of electrical shock or an accident.
  - Do not touch inside and power terminal of the MP900/MP2000 and the SERVOPACKs.
  - Keep the front cover of the MP900/MP2000 and the SERVOPACK attached.
  - Do not remove the front cover, cables, connector, or options of the MP900/MP2000 and the SERVOPACKs.

- 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 operate switches with wet hands.

  There is a risk of electric shock.

- 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.

- Do not attempt to modify the MP900/MP2000 and the SERVOPACKs in any way.

  There is a risk of injury or device damage.

- 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 MP900/MP2000 and the SERVO-PACKs.

- Connect the ground terminal to electrical codes (ground resistance: 100 Ω or less).

  There is a risk of electric shock or fire.

⚠ WARNING

■ SERVOPACKs and Linear Servomotors

- If you have a pacemaker or any other electronic medical device, do not go near the magnetic way of the linear servomotor.

  There is a risk of malfunction of the medical device.

- Be sure to use nonmagnetic tools when installing or working close to the linear servomotor. (Example: a beryllium-copper alloy hexagonal wrench set, made by NGK Insulators, Ltd.)

- Never touch the linear servomotor or machinery during operation.

  There is a risk of injury.

- Before wiring, install the SERVOPACK and the linear servomotor.

  There is a risk of electric shock.

- Do not touch the power supply terminal for 5 minutes after turning OFF the power supply or performing a voltage resistance test. The SERVOPACK may remain electrically charged with a high voltage.

  There is a risk of electrical shock. Confirm that the CHARGE lamp on the SERVOPACK is unlit before starting inspection works.

- The SGDH SERVOPACK can use both AC and DC power. If the setting Pn001 ≠ n.□1□□ (DC Power Input), do not use a DC power supply.

  The internal components of the SERVOPACK will burn and there is a risk of accident, fire, or device damage. Be sure to confirm the setting of parameter Pn001 before using a DC power supply.

- Do not use a DC power supply for 100V-Input type SERVOPACK SGDS-□□F□□□.

  If a DC power is supplied, the SERVOPACK will be broken down and there is a risk of accident, fire, or device damage. Do not change the factory setting Pn001 = n.□1□□ (Not supported the DC power input).

- 200V-Input type SERVOPACK SGDS-□□A□□□ corresponds to both AC and DC power. If the setting Pn001 ≠ n.□1□□ (Supported the DC Power Input).

  The internal components of the SERVOPACK will burn and there is a risk of accident, fire, or device damage. Be sure to confirm the setting of parameter Pn001 before using a DC power supply.

■ Checking on Delivery

⚠ CAUTION

- Always use the linear servomotor and SERVOPACK in one of the specified combinations.

  There is a risk of fire or malfunction.

■ Storage and Transportation

⚠ CAUTION

■ General Products

- Do not store or install the product in the following places.

  - Locations subject to direct sunlight.
  - Locations subject to temperatures outside the range specified in the storage or installation temperature conditions.
  - Locations subject to humidity outside the range specified in the storage or installation humidity conditions.
  - Locations subject to condensation as the result of extreme changes in temperature.
  - Locations subject to corrosive or flammable gases.
  - Locations subject to dust, salts, or iron dust.
  - Locations subject to exposure to water, oil, or chemicals.
  - Locations subject to shock or vibration.

  There is a risk of fire, electric shock, or damage to the product.

- Do not place any load exceeding the limit specified on the packing box.

  There is a risk of injury or malfunction.

■ Linear Servomotors

- When storing a magnet way of Linear Servomotor, be sure to pack it in the same state as when delivered.

- Do not carry the linear servomotor by its cables.

  There is a risk of injury or malfunction.

■ Installation

⚠ CAUTION

■ General Products

- Never use the products in an environment subject to water, corrosive gases, inflammable gases, or combustibles.

  There is a risk of electric shock or fire.

- Do not step on or place a heavy object on the product.

  There is a risk of injury.

- Do not cover the inlet or outlet parts and prevent any foreign objects from entering the product.

  There is a risk of elements deterioration inside, malfunction, or fire.

- Be sure to install the product in the correct direction.

  There is a risk of malfunction.

- Do not apply any strong impact.

  There is a risk of malfunction.

- Connect and secure the mounting screws of Module and terminal box.

  There in a risk of malfunction.

- Always turn OFF the MP940 Module before installing or removing it.

 There is a risk of electrical shock or device damage.

- Insert the connectors of the cables to be connected to the MP900/MP2000, SERVOPACKs, or I/O Module and secure them well.

  There is a risk of malfunction of the MP900/MP2000, SERVOPACKs, or I/O Module.

⚠ CAUTION

■ MP2100

- The MP2100 is mounted in the PCI slot of a standard personal computer (IBM PC/AT or compatible).

PC/AT or compatible computer
PCI bus slot
MP2100 board
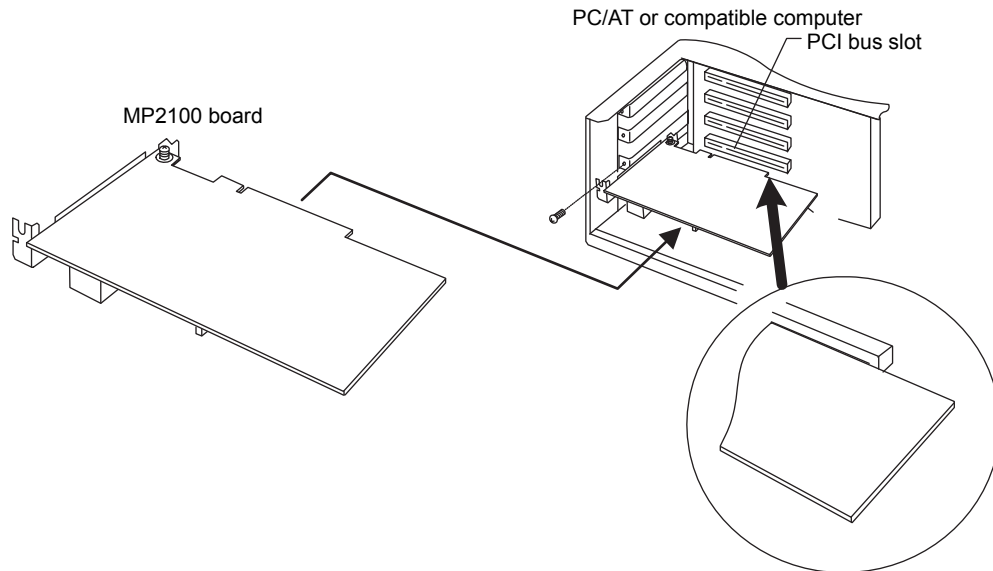
- To prevent the MP2100 from being damaged by static electricity, discharge any static electricity by touching a grounded metal object.

- Before installing or removing the MP2100, always turn OFF the host computer's power supply and unplug the computer's power cord.

- When installing the MP2100, always press the Board firmly until it is fully seated in the PCI slot. If the Board is not fully inserted, the MP2100 and/or host computer may be damaged or operate incorrectly. If the MP2100 cannot be inserted into the PCI slot with firm pressure, do not try to force it into the slot. Remove the Board, align it properly, and try inserting it again.

- When handling the MP2100, hold the Board by its edges and never touch the components or soldered connections. Touching the components or leads can cause cuts or damage the MP2100 or host computer.

- In some computers, it is necessary to secure the MP2100 in the PCI slot with a screw or a clip after inserting the Board into the slot. Refer to the host computer's user manual for details on securing PCI Boards. If the MP2100 is not secured, it may become loose and the MP2100 and/or host computer may be damaged or operate incorrectly.

⚠ CAUTION

■ MP940

• Always mount the MP940 Module securely using the Module mounting spring.

There is a risk of malfunction of the MP940.
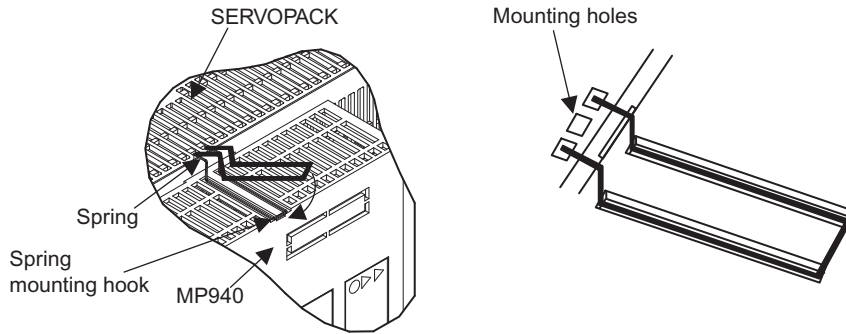
SERVOPACK   Mounting holes

Spring

Spring
mounting hook   MP940

• Always turn OFF the MP940 Module before installing or removing it.

There is a risk of electrical shock or device damage.

■ SERVOPACKs and Linear Servomotors

• When unpacking and installing magnetic way, check that no metal fragments or magnetized objects near the stator because they may be affected by the magnetic attraction of the magnetic way.

There is a risk of injury or damage to the magnetic way's magnets.

• Do not use the magnetic way near metal or other magnetized objects.

There is a risk of injury.

• Do not place clocks, magnetic cards, floppy disks, or measuring instruments close to the magnetic way.

There is a risk of malfunction or damage to these items by the magnetic force.

• Securely mount the linear servomotor on to the machine.

If the linear servomotor is not mounted securely, it may loosen during operation.

• Do not carry the magnetic way by its antimagnetic cover.

There is a risk of injury by the cover's edge or the distorted shape of the cover.

Cover
Magnetic way
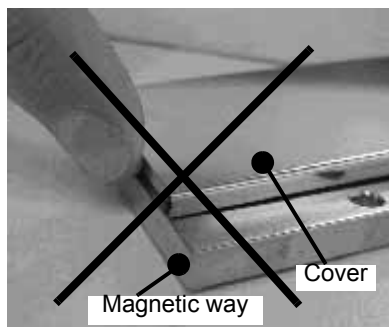
• Install SERVOPACKs, linear servomotors, and regenerative resistors on nonflammable objects.

There is a risk of fire.

• Provide the specified clearances between the SERVOPACK and the control panel or with other devices.

There is a risk of fire or malfunction.

■ Wiring

⚠ CAUTION

■ General Products

- 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 product in the following locations.

  There is a risk of device damage.
  - Noise, such as from static electricity
  - Strong electromagnetic or magnetic fields
  - Radiation
  - Near to power lines

- When connecting the battery, connect the polarity correctly.

  There is a risk of battery damage or explosion.

- Wiring must be performed by qualified personnel.

  There is a risk of fire, product failure, or malfunctions.

- Do not accidentally leave foreign matter such as wire chips inside the product when wiring.

  There is a risk of fire, failures, and malfunctions.

■ SERVOPACKs and Linear Servomotors

- Connect correctly the SERVOPACK main circuit and control cables and the Servomotor main circuit cable.

  Incorrect cable connection may result in the SERVOPACK failure.

- Securely tighten the cable connector screws and securing mechanism.

  There is a risk of looseness of the connector screws during operation.

- Use power lines and cables with a radius, heat resistance, and flexibility suitable for the system.

- If the SERVOPACK malfunctions, turn OFF the main circuit's power supply of the SERVOPACK.

  There is a risk of fire.

- Use a noise filter to minimize the effects of electromagnetic damage.

  There is a risk of electromagnetic damage to electronic devices used near the SERVOPACK.

- Do not connect a three-phase power supply to the U, V, or W output terminals.

  There is a risk of injury or fire.

- Securely connect the power supply terminals and motor output terminals.

  There is a risk of fire.

- Do not bundle or run power and signal lines together in the same duct. Keep power and signal lines separated by at least 30 cm (11.81 in).

⚠ CAUTION

- Use shielded twisted-pair wire or shielded multi-core twisted-pair wire for the signal lines and feed-back lines of the serial converter unit (SC).

  The maximum wiring length is 3 m for the reference input line and 20 m for the SC feedback line.

- Avoid frequently turning power ON and OFF. Do not turn power ON or OFF more than once per minute.

  Since the SERVOPACK has a capacitor in the power supply, a high charging current flows for 0.2 seconds when power is turned ON. Frequently turning power ON and OFF causes main power devices such as capacitors and fuses to deteriorate, resulting in unexpected problems.

- Observe the following precautions when wiring main circuit terminal blocks.

  - Remove the terminal block from the SERVOPACK prior to wiring.
  - Insert only one wire per terminal on the terminal block.
  - Make sure that the core wire is not electrically shorted to adjacent core wires.

- Do not connect the SERVOPACK for 100 V and 200 V directly to a voltage of 400 V.

  The SERVOPACK will be destroyed.

■ Selecting, Separating, and Laying External Cables

⚠ CAUTION

- Consider the following items when selecting the I/O signal lines (external cables) to connect the MP900/MP2000 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

  Steel separator

  Power circuit cables | General control circuit cables | Digital I/O signal cables
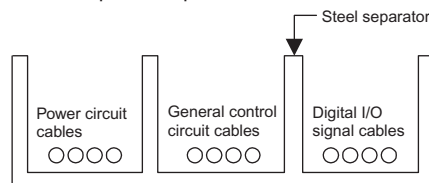
■ Operation

⚠ CAUTION

■ MP900/MP2000

- Do not change the MP2000/MP900 program or execute operations such as forced output, RUN, and STOP during operation.

  Doing so may result in the device damage or accident due to programming or operation error.

■ SERVOPACKs and Linear Servomotors

- Do not stand within the machine's range of motion during operation.

  There is a risk of injury.

- Before operation, install a limit switch or stopper on the end of the slider to prevent unexpected movement.

  There is a risk of injury.

- Before starting operation with a machine connected, change the settings to match the parameters of the machine.

  There is a risk of machine to run out of control or malfunction.

- Forward run prohibited (P-OT) and reverse run prohibited (N-OT) signals are not effective during zero point search mode using parameter Fn003.

- If using the linear servomotor on a vertical axis, install a safety device such as a counterbalance so that the workpiece does not fall if an alarm or overtravel occurs.

  There is a risk of fall of the workpiece during overtravel.

- When not using the normal autotuning, set to the correct mass ratio.

  There is a risk of vibration.

- Do not touch the SERVOPACK heatsinks, regenerative resistor, or servomotor while power is ON or soon after the power is turned OFF.

  There is a risk of burns due to high temperatures.

- Do not make any extreme adjustments or setting changes of parameters.

  There is a risk of injury due to unstable operation.

- Turn OFF the main circuit power supply if an alarm occurs.

  The regenerative resistor may overheat and cause a fire if the regenerative transistor fails.

- When an alarm occurs, remove the cause, reset the alarm after confirming safety, and then resume operation.

  There is a risk of injury.

■ Maintenance and Inspection Precautions

⚠ CAUTION

- Do not change wiring while power is being supplied.

  There is a risk of electrical shock or injury.
- When replacing the MP900/MP2000 and the SERVOPACKs, restart operation only after transferring the programs and parameters from the old MP900/MP2000 and the SERVOPACKs to the new MP900/MP2000 and the SERVOPACKs.

  There is a risk of device damage.

⊘ PROHIBITED

- The customer must not replace any built-in fuses.

  If the customer replaces a built-in fuse, the Module may malfunction or break down. The built-in fuse must always be replaced by Yaskawa service staff.

■ Disposal

⚠ CAUTION

- When disposing of the products, treat them as ordinary industrial waste.

■ General Precautions

Observe the following general precautions to ensure safe application.

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

Warranty

(1) Details of Warranty

■ Warranty Period

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

■ Warranty Scope

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

This warranty does not cover failures that result from any of the following causes.

1. Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications

2. Causes not attributable to the delivered product itself

3. Modifications or repairs not performed by Yaskawa

4. Abuse of the delivered product in a manner in which it was not originally intended

5. Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa

6. Events for which Yaskawa is not responsible, such as natural or human-made disasters

(2) Limitations of Liability

1. Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.

2. Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.

3. The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.

4. Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

(3) Suitability for Use

1. It is the customer's responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.

2. The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.

3. Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.

   • Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals

   • Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations

   • Systems, machines, and equipment that may present a risk to life or property

   • Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day

   • Other systems that require a similar high degree of safety

4. Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.

5. The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.

6. Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

(4) Specifications Change

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

CONTENTS

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System Configurations of Linear Servomotor

1.1 SERVOPACKs and Controllers for Linear Servomotors

The following SERVOPACKs and Controllers are applicable for linear servomotors.

SERVOPACK	Application Module	Controller
SGDH-□□□E [*1]	NS100 (For MECHATROLINK-I)	MP2100, MP2300, MP920[*3], MP930[*4]
	NS115 (For MECHATROLINK-II)	MP2100, MP2300
	–	MP940[*5]
SGDS-□□□15□[*2]	–	MP2100, MP2300

* 1. SGDH SERVOPACKs are applicable for Ver. A33 or later.
* 2. Software MPE720 Ver. 4.50 or later for programming devices can be used for linear servomotors. If using a SGDS SERVOPACK, MPE720 Ver. 4.51 or later is necessary.
* 3. SVB Modules are applicable for Ver. A10 or later.
* 4. MP930 is applicable for Ver. A29 or later.
* 5. MP940 is applicable for Ver. B02 or later.

1.2 Examples of Servo System Configurations

This section describes examples of basic servo system configuration.

1.2.1 Single-phase, 100 V and 200 V Main Circuit

(1) Combination with SGDS SERVOPACK
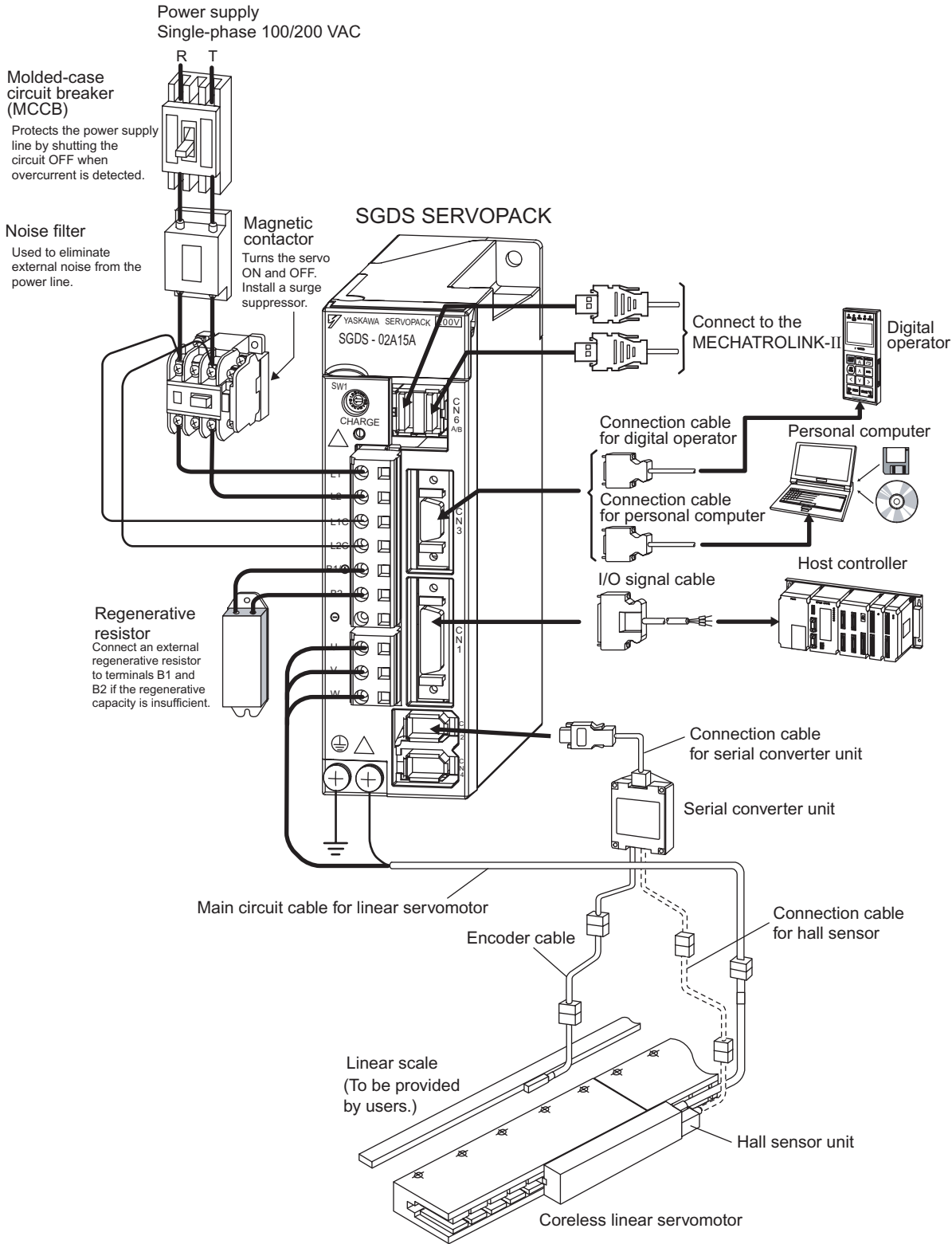
Fig. 1.1 Linear Servomotor System Configurations 1

(2) Combination with SGDH SERVOPACK + NS100 (or NS115)
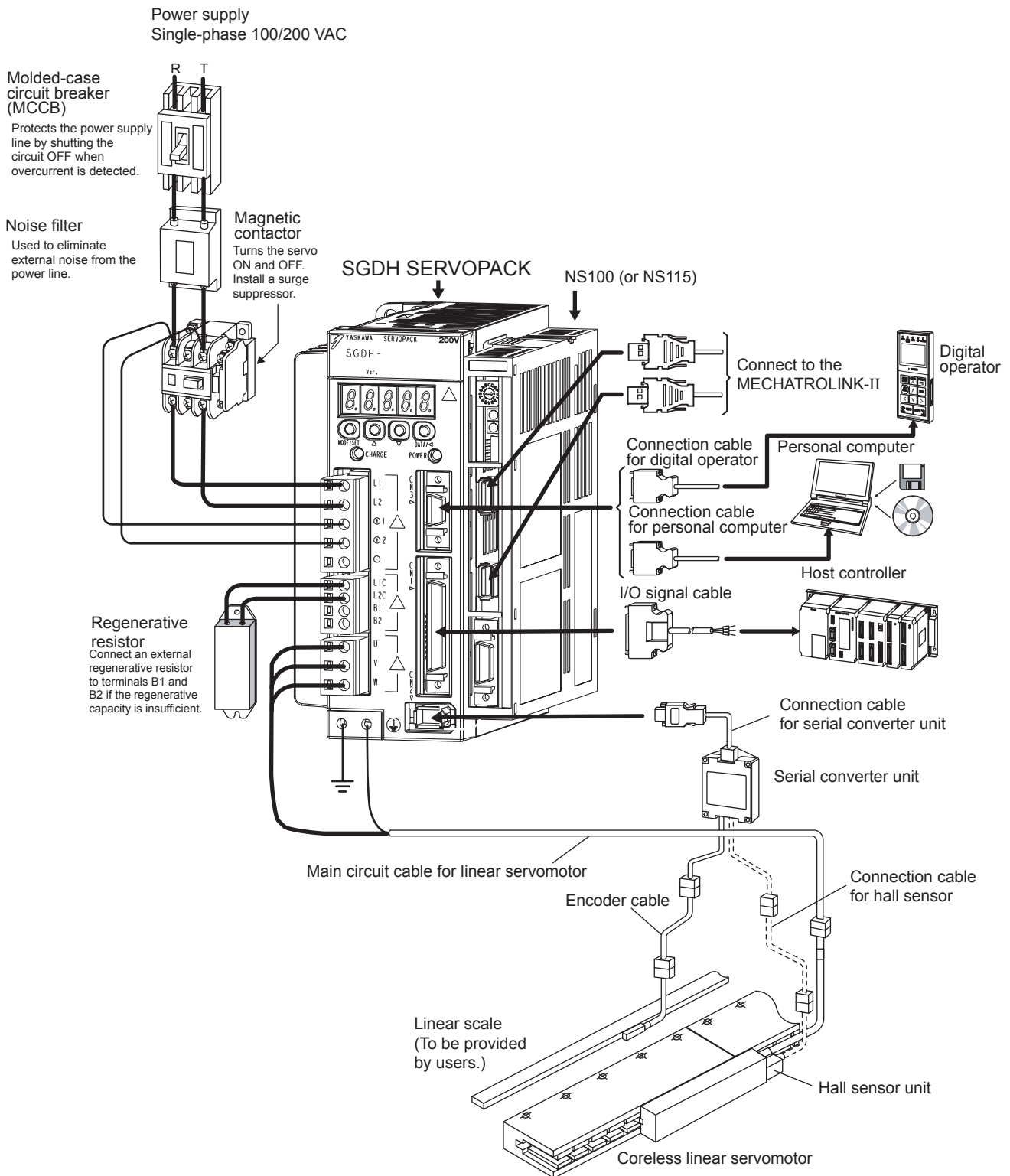
Fig. 1.2 Linear Servomotor System Configurations 2

1.2.2 Three-phase, 200 V Main Circuit

(1) Combination with SGDS SERVOPACK
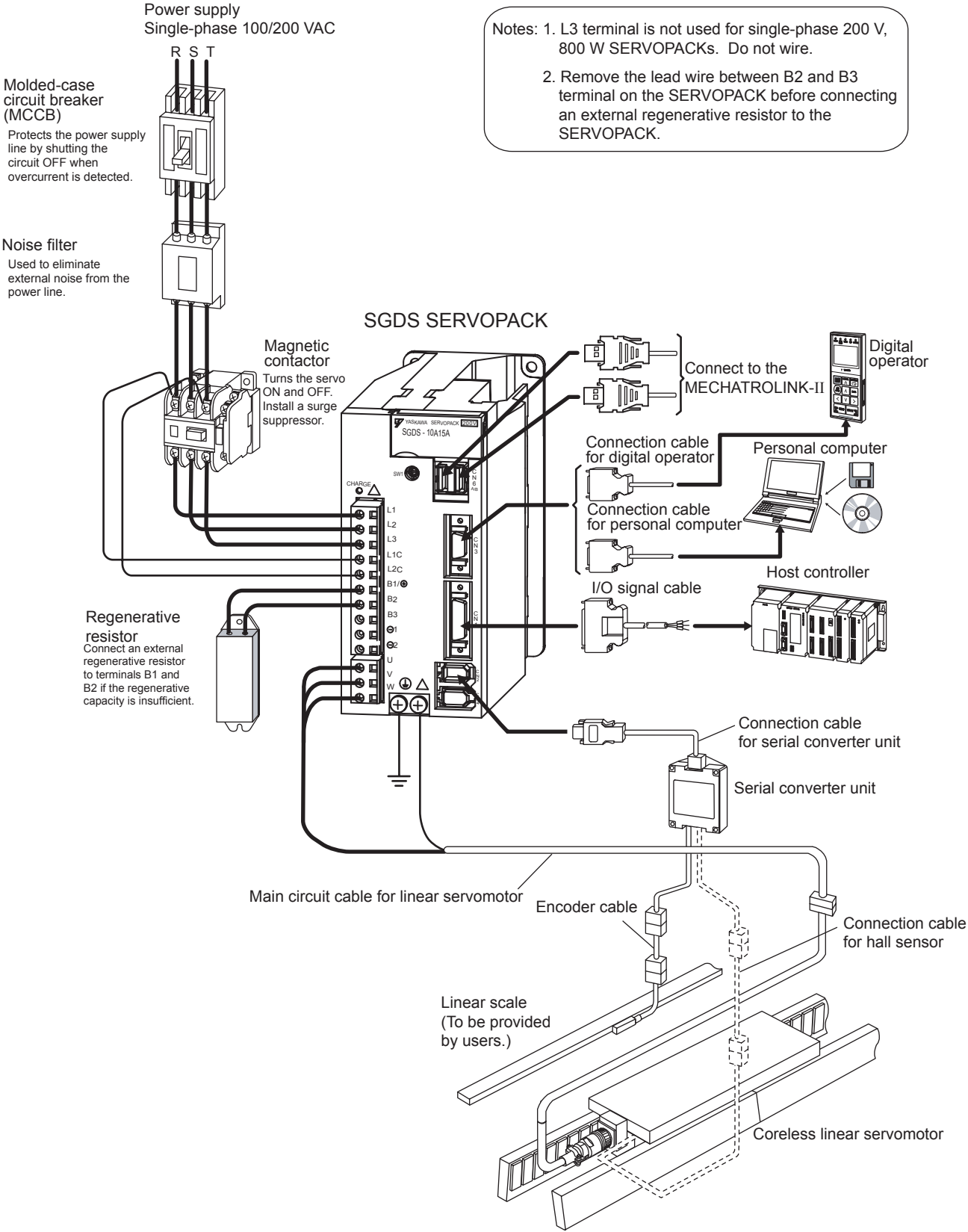
Fig. 1.3 Linear Servomotor System Configurations 3

(2) Combination with SGDH SERVOPACK + NS100 (or NS115)
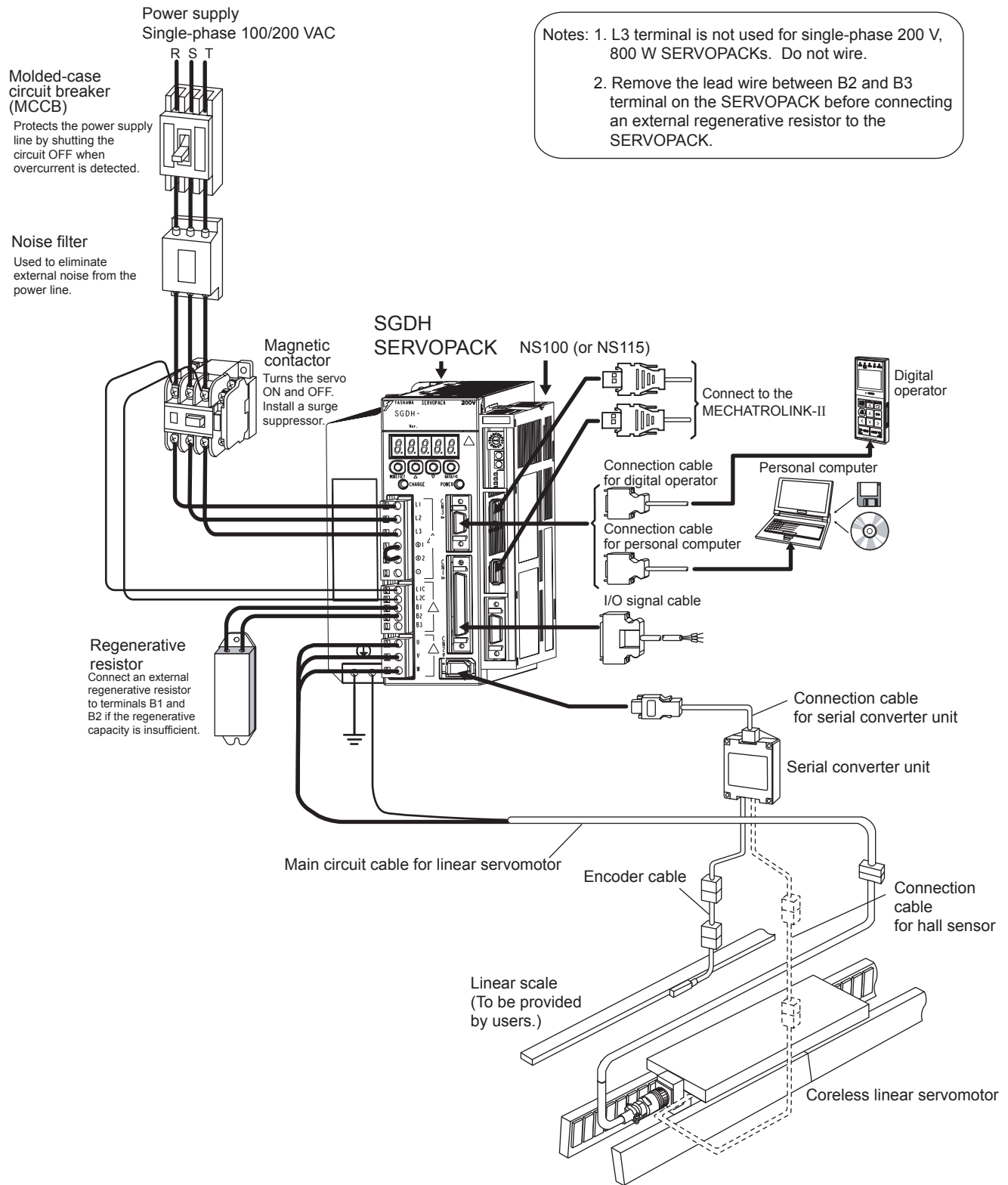
Fig. 1.4 Linear Servomotor System Configurations 4

2

System Startup (MP2100, MP2300)

This chapter explains the procedure to do a trial operation of a system with a linear servodrive and a a MP2000 machine controller and also introduces a sample program for a trial operation.

2.1 Trial Operation Flowchart

This section describes the procedure to do a trial operation of a system with a linear servomotor and a MP2100 or MP2300.

⚠ WARNING

• Before performing a trial operation using a controller, be sure to confirm that the motor will run out of control by performing a trial operation using SERVOPACK internal references.

The procedure to do a trial operation are shown below.
Refer to the section or manual specified in reference column for more information on the operation.

Procedure	Reference
1. Equipment Preparation 　Prepare the equipment required for the trial operation.	*2.3 Equipment Preparation*
2. Controller Preparation 　・MP2100 　　Mount a MP2100 in the PCI slot of the personal computer with MPE720 installed. 　・MP2300 　　Mount a 218IF-01 Module on the MP2300, and then connect the MP2300 to the personal computer with MPE720 installed.	Controller's manual [1]
3. Installation and Wiring 　Install the linear servomotor, and make necessary wirings.	Manual of the SERVOPACK for linear servomotors [2]
4. Trial Operation Using SERVOPACK Internal References 　Use the panel operator or digital operator to run the linear servomotor in JOG operation.	Manual of the SERVOPACK for linear servomotors [2]
5. Starting the MPE720 　Set the system definitions such as module configuration and scan time setting.	MPE720's manual [3]
6. Setting the Motion Parameters 　Set the motion parameters using the MPE720.	*2.4 Setting the Motion Parameters*
7. Creation and Saving of Programs 　Create the program for trial operation using the MPE720.	*2.7 Sample Programs* 　MPE720's manual for the operation method [3]
8. Transferring the Programs 　Create the program for trial operation using the MPE720.	MPE720's manual [3]
9. Trial Operation 　Execute the program to check the motion.	*2.7 Sample Programs*

[1]. Machine Controller MP2100 User's Manual for Design and Maintenance (Manual No. SIEPC88070001)
　　Machine Controller MP2300 Basic Module User's Manual (Manual No. SIEPC88070003)
[2]. Linear Σ Series SGL□□/SGDS User's Manual (Manual No. SIEPS80000016)
　　Linear Σ Series SGL□□/SGDH User's Manual (Manual No. SIEPS80000019)
[3]. Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (Manual No. SIEPC88070005)

2.2 System Configuration Examples

2.2.1 Example of Linear Servomotor System with a MP2100

The following diagram shows the example of simple system configuration to explain the trial operation of linear servomotor system with a MP2100.
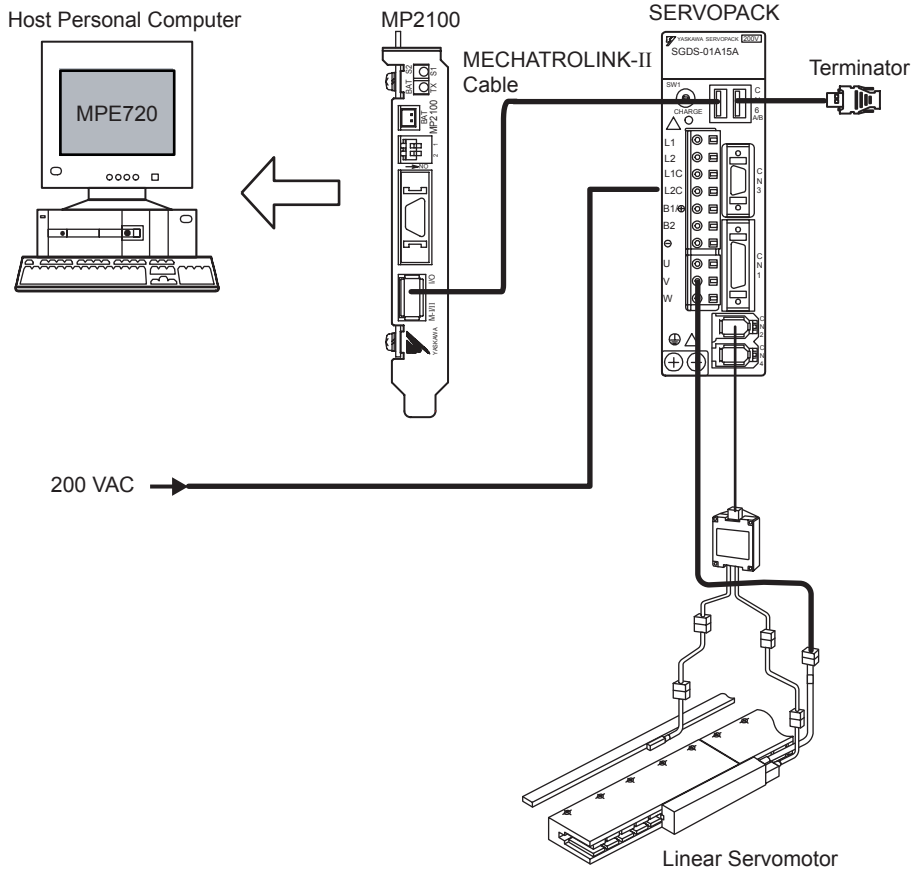
Fig. 2.1 System Configuration with a MP2100

2.2.2 Example of Linear Servomotor System with a MP2300

The following diagram shows the example of simple system configuration to explain the trial operation of Linear Servomotor system with a MP2300.
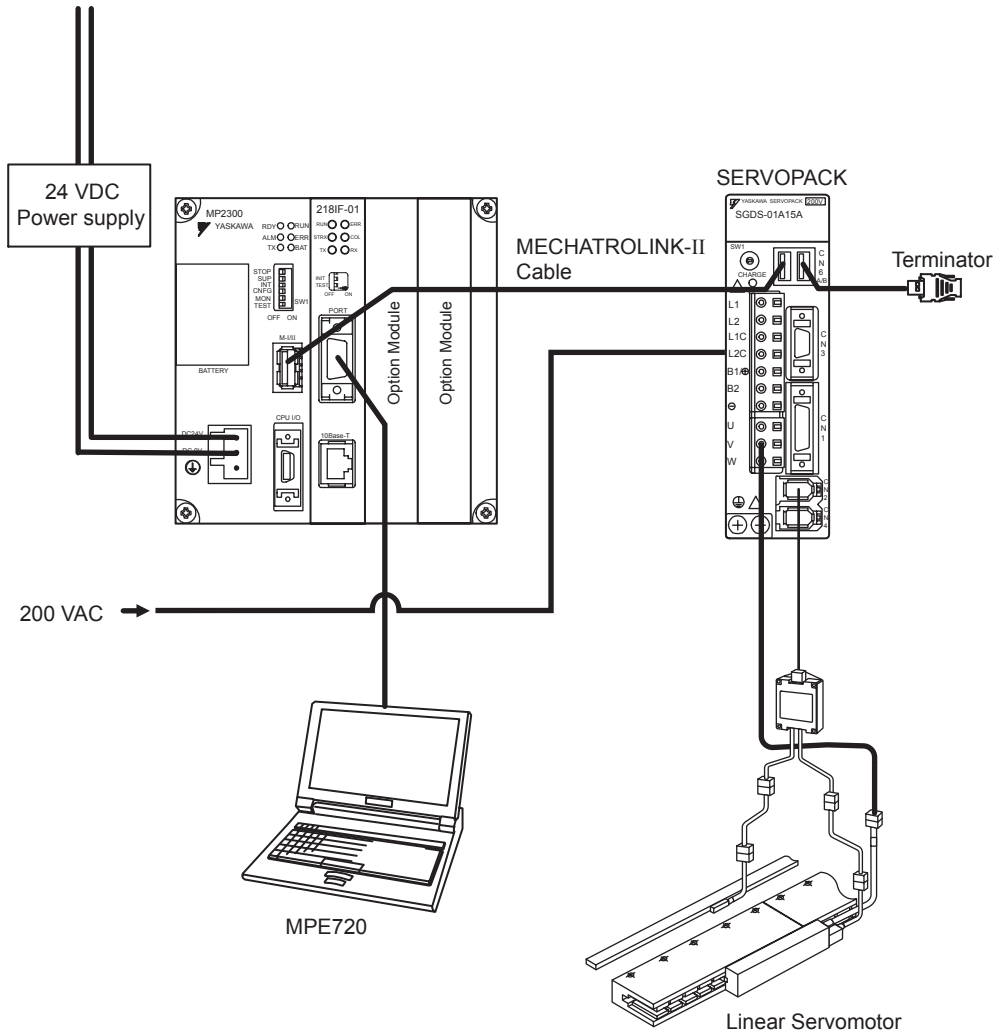
Fig. 2.2 System Configuration with a MP2300

2.3 Equipment Preparation

Prepare the following equipment for the trial operation. (The items shown below are the minimum requirements for a trial operation.)

(1) Controller-related Equipment

(a) Using a MP2100

Product Name	Product Model	Quantity
MP2100[*1]	JEPMC-MP2100	1
MECHATROLINK cables	JEPMC-W6002-□□	1
Terminator	JEPMC-W6022	1
Personal computer	A commercially-available personal computer with PCI slots	1
MPE720[*2]	CPMC-MPE720	1

* 1. Refer to *Machine Controller MP2100 User's Manual for Design and Maintenance (manual No. SIEPC88070001)* for more information on MP2100.
* 2. Refer to *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (manual No. SIEPC88070005)* for more information on MPE720.

(b) Using a MP2300

Product Name	Product Model	Quantity
MP2300[*1]	JEPMC-MP2300	1
218IF-01	JAPMC-CM2300	1
MECHATROLINK cables	JEPMC-W6002-□□	1
Terminator	JEPMC-W6022	1
Personal computer	A commercially-available personal computer	1
MPE720[*2]	CPMC-MPE720	1
MEMOBUS cables	JEPMC-W5311-□□	1

* 1. Refer to *Machine Controller MP2300 Basic Module User's Manual (manual No. SIEPC88070003)* for more information on MP2300.
* 2. Refer to *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (manual No. SIEPC88070005)* for more information on MPE720.

(2) Servodrive-related Equipment

Product Name	Product Model	Quantity
Σ-III SERVOPACK s*	SGDS-□□□15□	1
Linear servomotors*	SGL□W/SGL□M series	1
Serial converter unit *	JZDP-D00□-□□□	1
Linear servomotor main circuit cables *	JZSP-CLN□□-□□	1
Encoder cables *	JZSP-CLL00-□□	1
Serial converter unit connection cables *	JZSP-CLP70-□□	1
Hall sensor connection cables *	JZSP-CLL10-□□	1
Digital operator	JUSP-OP05A	1

* Refer to *Linear Σ Series SGL□□/SGDS User's Manual (manual No. SIEPS80000016)* for more information on linear servomotor and SERVOPACK.

2.4 Setting the Motion Parameters

This section explains the setting methods of motion parameters and the SERVOPACK parameters for the linear servomotor with a MP2100 or MP2300.

The other trial operation procedure is can be performed as well as a rotary servomotors. Refer to the user's manual of your controller for details.

2.4.1 Fixed Parameters

The following Table 2.1 shows the fixed parameters characteristic of linear servomotors. Set the parameters, referring to the Table 2.1.

Fig. 2.3 Fixed Parameters Window of the MP2100

Table 2.1 Fixed Parameters List (Linear servomotor-related only)

No.	Name	Setting Range	Meanings	Remarks
4	Command Unit	0 to 3	0: pulse	The setting value of 0 or 1 only is selectable using Linear Servomotors. If the setting value of 2 or 3 is selected, the setting is disabled and "1: mm" is set.
			1: mm	
			2: deg	
			3: inch	
5	Number of Decimal Places	0 to 5	1 = 1 digit	Set the minimum reference resolution. When "0: pulse" is selected for Command Unit, this setting is disabled.
6	Linear Scale Pitch	1 to 2^{31}-1	1 = 1μm	Set a value according to the specifications of linear scale pitch. For linear servomotors, always set the pitch even if the Command Unit is set to "0: pulse," because the reference unit must be converted to millimeters and then to pulses. When the reference unit is set to "0: pulse", set the linear scale pitch in units of μm.
8	Gear Ratio [MOTOR]	1 to 65535	1 = 1 rotation	Electronic gear ratio of 1:1.
9	Gear Ratio [LOAD]	1 to 65535	1 = 1 rotation	
30	Encoder Type	0 to 2	0: Incremental encoder	Recognized as Incremental encoder regardless of the setting value.
			1: Absolute encoder	
			2: Absolute encoder when used as an incremental encoder	
34	Rated Speed	1 to 32000	1 = 0.1m/s	Set the rated speed according to the specifications of the Linear Servomotor.
36	Serial Converter Resolution	1 to 2^{31}-1	pulse/ scale pitch	Set the resolution according to the specifications of the serial converter unit. When "0: pulse" is set for Command Unit, set the resolution of serial converter unit as it is. (Example: Set 2^8= 256 when the resolution is 8-bit.)

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2.4.2 SERVOPACK Parameters (Model SGDS)

Be sure to set the SERVOPACK parameters correctly.
(The parameters of SGDH SERVOPACK are different from those of SGDS SERVOPACK. Refer to the user's manual for details.)

No.	Name	Setting Range	Units	Factory Setting	Meaning
Pn000.3[*1]	Rotation Type/Linear Type Selection (When the encoder is not connected)	0	–	–	Rotary type
		1	–	–	Linear type
Pn282[*2,*3]	Linear Scale Pitch	0.00 to 65536.00 μm	0.01 μm	0.00	Set the pitch according to the specifications of the linear scale pitch. 1=1[μm]
Pn385	Motor Maximum Speed	100 to 10000 mm/s	100 mm/s	5000	Set the maximum speed of the Linear Servomotor. 1=1 mm/s

* 1. Set both the fixed parameter No. 29 (Motor Type) and the SERVOPACK parameter Pn000.3 (Rotation/Linear Type Selection (when the encoder is not connected) to "Linear Type". If the settings of these two parameters are different, an alarm occurs when the communications with the SERVOPACK starts. For details, refer to *2.5 Alarms at Setting of Linear Servomotors*.
* 2. The set value for Pn282 must be the same as the value of the linear scale pitch to be used. An incorrect setting may result in a position error.
* 3. The initial value is set to "0" in the Pn282. Therefore, the alarm A.080 (Linear Scale Pitch Setting Error) always occurs when the power is turned ON for the first time. If the set value of this parameter is set to a correct value, and the power is turned ON again, the alarm will not occur.
* 4. The initial value is set to "5000" in the Pn385. Therefore, the alarm A.550 (Speed Setting Error) may occur when the power is turned ON for the first time. If the alarm A.550 occurs, change the set value to the value of the Linear Servomotor to be used. If the set value of this parameter is set to a correct value, and the power is turned ON again, the alarm will not occur.
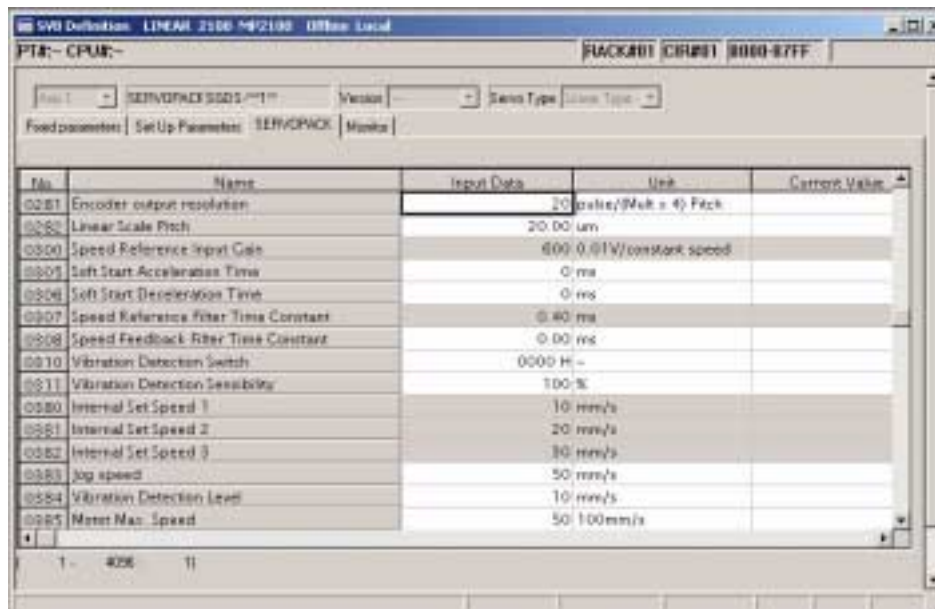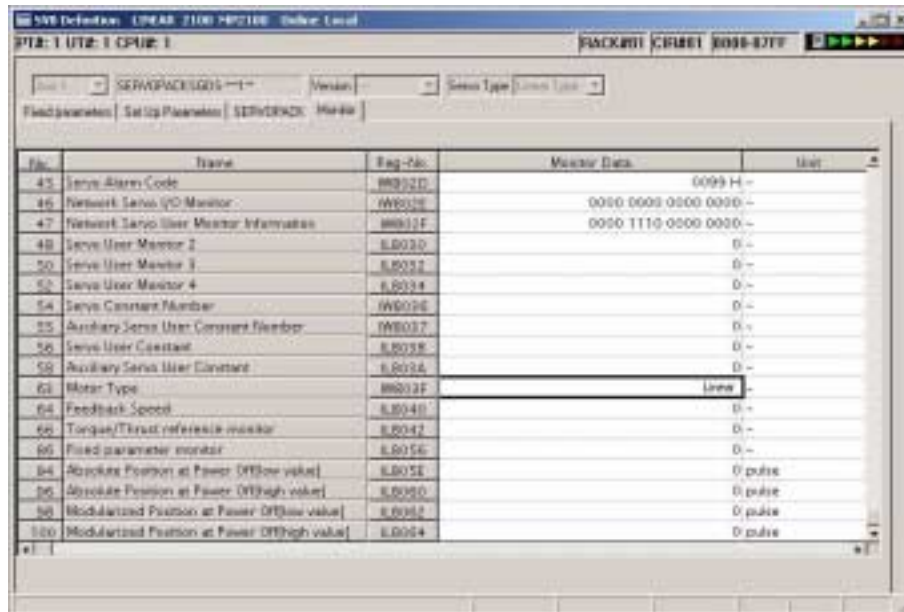
Fig. 2.4 SERVOPACK Window of the MP2100

2.4.3 Monitoring Parameters

Confirm that "Linear" is selected for IW□□3F (Motor Type) as shown in the figure below.

Fig. 2.5 Monitor Window of the MP2100

2

2.5 Alarms at Setting of Linear Servomotors

If all the settings of the fixed parameter No. 29 (Motor Type) and SERVOPACK parameter Pn000.3 (Rotation Type/Linear Type Selection (when the encoder is not connected) are different from the actually connected motor type, an alarm occurs as shown below.

Fixed Parameter No. 29 Motor Type	SERVOPACK Parameter Pn000.3 Rotation Type/Linear Type Selection		Monitoring Parameter IL□□04: Alarm
Rotary-type motor	1: as Linear Motor	→	Bit30: Mismatch SERVOPACK Motor Type
Linear-type motor	0: Rotating Motor	→	

Fixed Parameter No. 29 Motor Type	Actually Connected Motor		Monitoring Parameter ILxx04: Alarms
Rotary-type motor	Linear-type motor	→	Bit31: Mismatch SERVOPACK Encoder Type
Linear-type motor	Rotary-type motor	→	

The alarms is detected after the communications between the controller and SERVOPACK starts. These alarms cannot be cleared by turning ON the Clear Alarm bit. Clear these alarms as shown below.
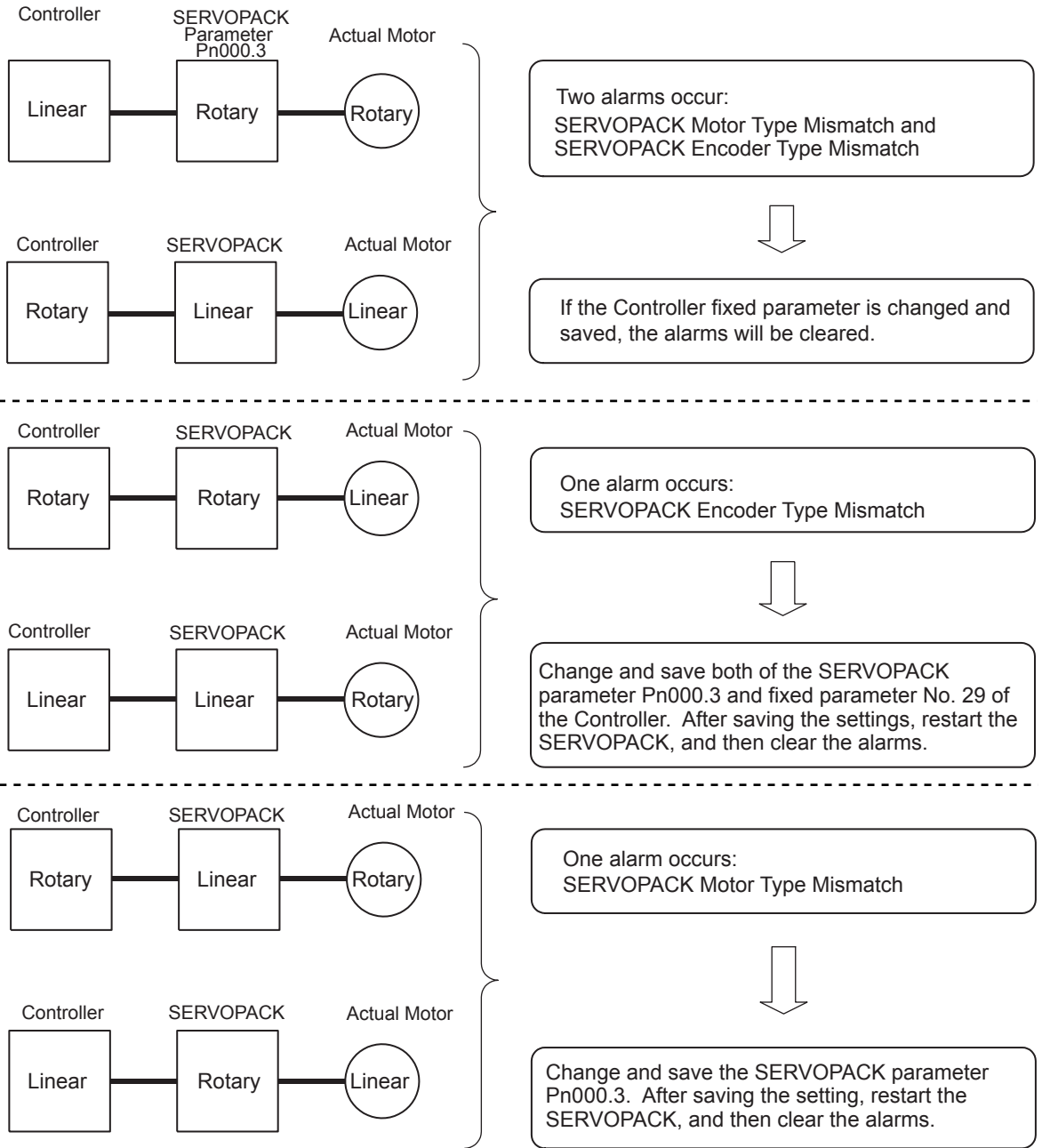
2.6 Self-configuration at Connecting a Linear Servomotor

The self-configuration function recognizes the option module configuration and the information of servodrive and I/Os connected to the MECHATROLINK-II automatically and set the configuration definition (default values) automatically. When connecting a linear servomotor, execute the self-configuration function so that the settings of the SERVOPACK parameters are reflected on the fixed parameters.

Table 2.2 Fixed Parameters (Linear servomotor-related only.)

No.	Name	Setting Range	Meanings	After the Self-configuration
4	Command Unit	0 to 3	0: pulse	0
			1: mm	Note: "0: pulse" is selected by the self-configuration.
			2: deg	
			3: inch	
5	Number of Decimal Places	0 to 5	1=1 digit	3
6	Linear Scale Pitch	1 to 2^{31}-1	1=1μm	The value of the linear scale pitch is reflected.
8	Gear Ratio [MOTOR]	1 to 65535	1=1 rotation	1
9	Gear Ratio [LOAD]	1 to 65535	1=1 rotation	1
30	Encoder Type	0 to 2	0: Incremental encoder	0
			1: Absolute encoder	
			2: Absolute encoder used as an incremental encoder	
34	Rated Speed	1 to 32000	1=0.1 m/s	The rated speed of the Linear Servomotor is reflected.
36	Serial Converter Resolution	1 to 2^{31}-1	pulse/scale pitch	The resolution of the serial converter unit is reflected.

2.7 Sample Program

This section explains the sample program that can be used for a trial operation of the linear servomotor system with the MP2100 or the MP2300.
Use the MPE720 to create sample program.

IMPORTANT	• The sample programs are solely for the purpose of trial operation. Care must be taken because actual applications will differ.
	• This system for the 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.

2.7.1 Ladder Program Configuration

- The H01 drawing turns ON the servo ON and resets alarms.
- The H02 drawing controls stepping (STEP).
- Refer to *2.7.4 H Drawing*, *2.7.5 H01 Drawing*, and *2.7.6 H02 Drawing* for the details of each drawing.
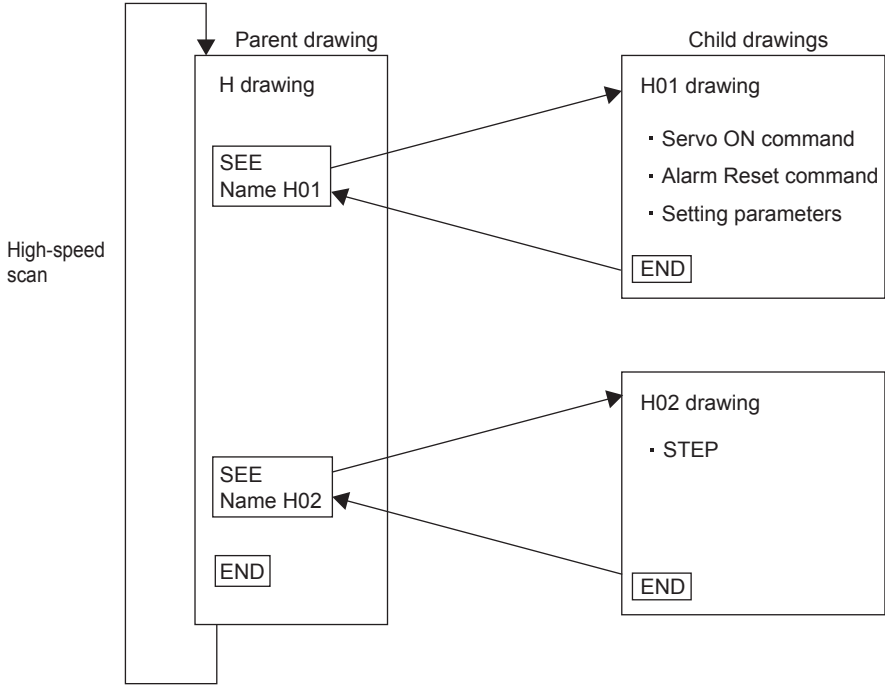
Fig. 2.6 Sample Program Configuration

2.7.2 Creation of Tuning Panel

The operation can be confirmed on the Tuning Panel window.

In this sample program, run, stop, and other operations can be checked from a Tuning Panel Window.

Create the tuning panel as shown below to check the trial operation.

Fig. 2.7 Tuning Panel Window of the MP2100

2.7.3 Confirming Operation

Use the following procedure to confirm operation.

```
Turn servo ON
      ↓
Start stepping operation
      ↓
Confirm the operation
on Tuning Panel window
```

The following table gives an outline of the operation displayed on the Tuning Panel window.

Data Name	Tuning Panel Display	Operation
Servo ON PB	Current value OFF → ON	The Servomotor is turned ON and the Servo clamped.
	Current value ON → OFF	The Servo turns OFF.
Forward STEP	Current value OFF → ON	Executes the STEP operation in the forward direction for the moving amount set in STEP Moving Amount.
	Current value ON → OFF	Stops the STEP operation. Input OFF after executing STEP operation.
Reverse STEP	Current value OFF → ON	Executes the STEP operation in the reverse direction for the moving amount set in STEP Moving Amount.
	Current value ON → OFF	Stops the STEP operation. Input OFF after executing STEP operation.
STEPMoving Amount	Input any value	Sets the STEP moving amount.

INFO

■ Actual Application Programs

In actual application programs, the programs to monitor and control registers that correspond to the signals and data listed above must be created.

The register numbers that correspond to the signals used in the sample program are displayed under REG-No. next to DWG at the right of the Tuning Panel Window.

2.7.4 H Drawing

The H parent drawing controls the overall sample program
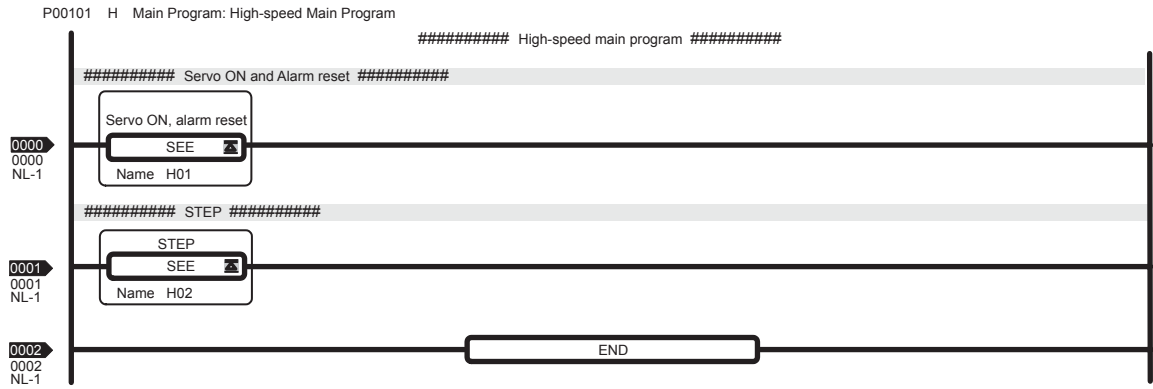
Fig. 2.8 H Drawing (Sample Program)

2.7.5 H01 Drawing

The H01 child drawing turns ON the Servo and resets alarms.

P00103 H01   Main Program: Axis Common Settings

Fig. 2.9 H01 Drawing (Sample Program)

2.7.6 H02 Drawing

The H02 child drawing controls JOG and STEP operation.

P00106 H02 Main Program: Manual operation Main Processing
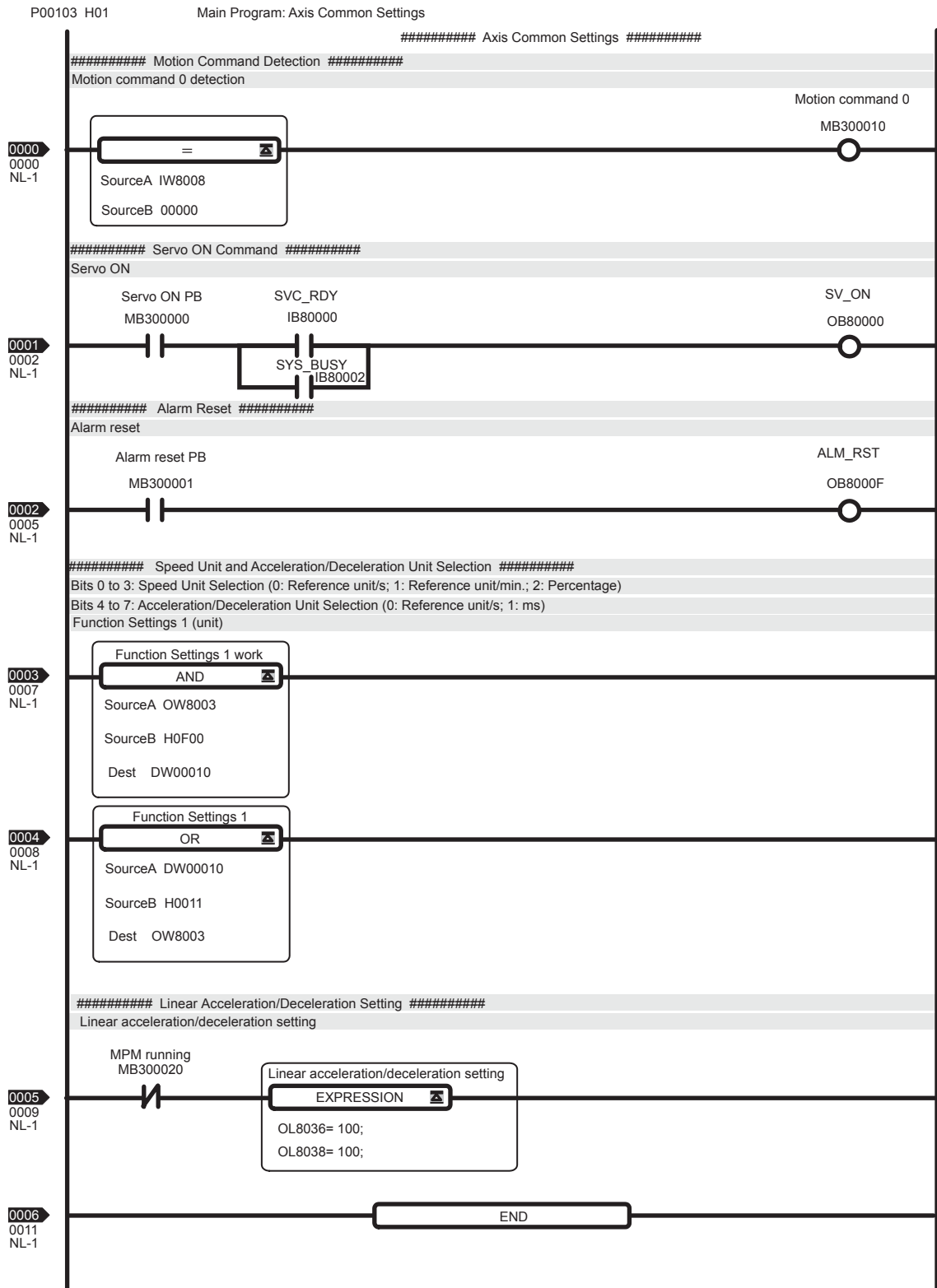
Fig. 2.10 H02 Drawing (Sample Program)

2.8 Motion Parameters Details

2.8.1 Motion Fixed Parameters

Table 2.3 Motion Fixed Parameter (MP2000 Series)

Type	Parameter No.	Name	Meaning	Description	Default	Setting Range	Size
Motion Function Selections	0	Run Mode	Specify the application method of the axis.		0	0 to 5	1 word
			0: Normal Running	Use this setting when actually using an axis. (Default)			
			1: Axis unused	No controls 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 SERVOPACK is not connected. This mode is used to virtually check the operation of the applications program.			
			3: Servo Driver Command	Servo Driver Command is used to directly control the command-response communication with the MECHATROLINK-compatible 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.			
			4, 5: Not used				
	1	Function Selection 1	Specify settings related to axis operation.		0	Bit settings	1 word
			Bit 0: Axis Type	Set whether or not there is a limit on controlled axis travel. 0: Linear (Finite length axis) The axis will have limited movement. The soft limit function is enabled. 1: Rotary (Infinite length axis) The axis will have unlimited movement. The soft limit function is disabled. Set "0" when using a linear servomotor.			
			Bit 1: Forward Soft Limit Enabled (Forward Software Limit Enabled)	Set whether or not to use the soft limit function in the positive direction. Set the soft limit as the Forward Software Limit (fixed parameter 12). The soft limit function is enabled after zero point return (setting) has been completed. 0: Disable 1: Enable			
			Bit 2: Reverse Soft Limit Enabled (Reverse Software Limit Enabled)	Set whether or not to use the soft limit function in the negative direction. Set the soft limit as the Reverse Software Limit (fixed parameter 14). The soft limit function is enabled after zero point return (setting) has been completed. 0: Disable 1: Enable			
			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. 0: Disable 1: Enable			

Table 2.3 Motion Fixed Parameter (MP2000 Series) (cont'd)

Type	Parame-ter No.	Name	Meaning	Description	Default	Setting Range	Size
Motion Function Selections	1	Function Selection 1	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. 0: Disable 1: Enable	0	Bit settings	1 word
			Bits 5 to 8: Not used				
			Bit 9: Simple ABS Infinite Axis	0: Disable 1: Enable Set "0" when using a linear servomotor.			
			Bit A: User Constants Self-Writing Function	Automatically writes MP controller setting parameters to the SERVOPACK parameters when a communication connection is established. Also the automatic writing is triggered by changing the setting parameters or starting execution of a motion command. 0: Disable 1: Enable			
			Bit B to F: Not used				
	2	Function Selection 2	This is a system debugging function that sets MECHATROLINK communication error masks. Do not set a mask during normal operation.		0	Bit settings	1 word
			Bit 0: Communica-tion Error Mask	Masks communication errors detected at the MP2200. 0: Disable 1: Enable			
			Bit 1: WDT Error Mask	Masks watchdog timeout errors detected at the MP2200. 0: Disable 1: Enable			
			Bit 2 to F: Not used				
	4	Command Unit	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). 0 : pulse 1 : mm 2 : deg 3 : inch Only "0" or "1" can be selected. If either "2" or "3" is selected, "1: mm" is set automatically.	0	0 to 3	1 word
	5	Number of Decimal Places	Set the number of digits 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 Reference Unit = mm and Number of Digits Below the Decimal Point = 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.	3	0 to 5	1 word
	6	Linear Scale Pitch	Set the linear scale pitch.	Set the value according to the specifications of the linear scale pitch. For rotary motors with the command unit set to "pulse", this setting is disabled. For linear servomotors, always set the Linear Scale Pitch even if the command unit is set to "pulse" as the conversion of reference unit → mm → pulse is required. When the reference unit is "pulse", set the linear scale pitch in units of μm.	10000	1 to $2^{31}-1$	2 words
	8	Gear Ratio [MOTOR]	This parameter is dis-abled.	Electronic gear ratio of 1:1.	1	1 to 65535	1 word
	9	Gear Ratio [LOAD]			1	1 to 65535	1 word

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Table 2.3 Motion Fixed Parameter (MP2000 Series) (cont'd)

Type	Parame-ter No.	Name	Meaning	Description	Default	Setting Range	Size
Motion Function Selections	10	Maximum Value of Rotary Counter (Reset Position of Infinite Length Axis) (POSMAX)	Set the reset position when an infinite length axis is set.	This parameter is not valid when a linear servomotor is set.	360000	1 to $2^{31}-1$	2 words
	12	Forward Software Limit	Set the position to be detected for the soft limit in the positive direction.	The soft limit function is enabled after zero point return (setting) has been completed. If an axis attempts to move in the positive direction past the position set here, a positive soft limit alarm will occur.	$2^{31}-1$	-2^{31} to $2^{31}-1$	2 words
	14	Reverse Software Limit	Set the position to be detected for the soft limit in the negative direction.	The soft limit function is enabled after zero point return (setting) has been completed. If an axis attempts to move in the negative direction past the position set here, a negative soft limit alarm will occur.	-2^{31}	-2^{31} to $2^{31}-1$	2 words
	16	Backlash Compensation	Set the backlash compensation in reference units.	Backlash compensation can be disabled by setting this parameter to 0. This function cannot be used for some models of SERVOPACK. Refer to *2.9 Functional Restrictions*.	0	-2^{31} to $2^{31}-1$	2 words
SERVOPACK Settings	30	Encoder Type	Set the type of encoder that is used.	This setting is ignored and recognized as an incremental encoder.	0	0 to 3	1 word
Encoder Settings	34	Rated Speed	Set rated motor speed [0.1 m/sec]	Set this parameter based on the specifications of the linear servomotor that is used.	3000	1 to 32000	1 word
	36	Serial Converter Resolution	Set the resolution of the serial converter unit.	Set the value according to the resolution of the serial converter unit. (For example, set $2^8 = 256$ for 8-bit resolution.)	65536	1 to $2^{31}-1$	2 words
	38	Max. Revolutions of Absolute Encoder	Set the maximum number of rotations for the absolute encoder when an absolute encoder is used.	This parameter is disabled when using a linear servomotor.	65534	0 to $2^{31}-1$	2 words

2.8.2 Motion Setting Parameters

Table 2.4 Motion Setting Parameter (MP2000 Series)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Motion Run Settings	OW□□00	RUN Commands	Set commands and requests for the axis.		0	Bit settings	1 word
			Bit 0: Servo ON	Set whether or not to turn ON (excite) the Servo. 0: OFF 1: ON			
			Bit 1: 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: OFF 1: ON			
			Bit 2 to Bit 3: Not used				
			Bit 4: Latch Request	Store the current position when the latch signal turns ON as the Machine Coordinate Latch Position (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). The latch signal that is used is set in the Latch Input Signal Type of Function 2 (setting parameter OW□□04, bits 0 to 3). 0: OFF 1: ON			
			Bit 5: Not used				
			Bit 6: POSMAX Preset (Request for the Preset Number of POSMAX Turns)	This parameter is disabled when using a linear servomotor. Set to "0".			
			Bit 7: (ABS System Infinite Length Position Control Data Load Request)				
			Bit 8: Forward External Torque/Thrust Limit Input	Turning ON this bit limits the torque/thrust to the set value of the SERVOPACK parameter. This function cannot be used for some models of SERVOPACK. Refer to *2.9 Functional Restrictions* for details.			
			Bit 9: Reverse External Torque/Thrust Limit Input				
			Bit A: Reserved for system	-			
			Bit B: Integration Reset	Turning ON this bit resets the integral term of the position loop. This function cannot be used for some models of SERVOPACK. Refer to *2.9 Functional Restrictions* for details.			
			Bit C to Bit E: Not used	-			
			Bit F: Clear Alarm	Turning ON this bit clears the alarm.			

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Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Motion Run Settings	OW□□01	Mode 1	Make settings for the operation mode.		0	Bit settings	1 word
			Bit 0: Deviation Abnormal Detection Error Level	Set whether excessively following errors are treated as warnings or as alarms. Axis operation will continue for a warning but will stop for an alarm. 0: Alarm 1: Warning			
			Bit 1 to Bit 2: Not used				
			Bit 3: Speed Loop P/ PI Switch	Switch the speed loop between PI control and P control. 0: PI 1: P			
			Bit 4: Gain Switch	Switch the gain to the Second Gain set in the SERVOPACK parameters. 0: OFF 1: ON This function is not supported by some models of SERVOPACK. Refer to *2.9 Functional Restrictions* for details.			
			Bit 5 to Bit F: Not used				
	OW□□02	Mode 2	Bit 0: Monitor 2 Enabled	Enable Monitor 2 in the Servo User Monitor (setting parameter OW□□4E, bits 4 to 7) 0: Disable 1: Enable 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.	0	Bit settings	1 word
			Bit 1 to Bit F: Not used				
	OW□□03	Function 1	Set the speed unit, acceleration/deceleration unit, and filter type.		0011H		1 word
			Bit 0 to Bit 3: Speed Units	Set the unit for speed references. This setting also determines the unit used for values related to speed references (e.g., speed compensation settings). 0: Reference unit/s 1: 10^n reference unit/min. 2: %	1	0 to 2	
			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		0 to 1	
			Bit 8 to Bit B: Filter Type	Set the acceleration/deceleration filter type. 0: No filter 1: Exponential adjust speed filter 2: Movement averaging filter	0	0 to 2	
			Bit C to Bit F: Not used				

Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Motion Run Settings	OW□□04	Function 2	Set the signals to use for latch and external positioning.		0033H		1 word
			Bit 0 to Bit 3: Latch Input Signal Type	Set the latch detection signal. 0: – 1: – 2: Phase-C pulse input signal 3: /EXT1 4: /EXT2 5: /EXT3 Note: The signal is input to the SERVOPACK. If a signal that is not supported is selected, the following warning will occur: Setting Parameter Error. (the Setting Parameter Error bit will be turned ON in the Warning (monitoring parameter IL□□02, bit1))	3	0 to 5	
			Bit 4 to Bit 7: External Positioning Signal	Set the external signal for external positioning. 0: – 1: – 2: Phase-C pulse input signal 3: /EXT1 4: /EXT2 5: /EXT3 Note: The signal is input to the SERVOPACK. If a signal that is not supported is selected, the following warning will occur: Setting Parameter Error. (the Setting Parameter Error bit will be turned ON in the Warning (monitoring parameter IL□□02, bit1))	3	0 to 5	
			Bit 8 to Bit F: Not used		0		
	OW□□05	Function 3	Bit 0: Not used		0	Bit settings	1 word
			Bit 1: Close Position Loop Using OL□□16 (Phase Reference Generation Operation Disable)	Disable phase reference generation processing. Enable this processing when an electronic shaft is being used, and disable it when a electronic cam is being used. 0: Enable 1: Disable			
			Bit 2 to Bit A: Not used				
			Bit B: INPUT Signal for Zero Point Return	Use this signal for "INPUT & C pulse" or "INPUT Only" method. 0: OFF 1: ON			
			Bit C to Bit F: Not used				
	OW□□06	–	Not used		0		
	OW□□07	–	Not used		0		

Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning		Description	Default	Setting Range	Size
Motion Run Settings	OW□□08	Motion Command	Set motion commands. Refer to *chapter of Parameters Related to Motion Commands* on the related manual for details on commands.			0	0 to 65535	1 word
			0: NOP	No command				
			1: POSING	Positioning				
			2: EX_POSING	External Positioning				
			3: ZRET	Zero Point Return: Zero point returns will be performed using the method set for the Home Return Type (setting parameter OW□□3C).				
			4: INTERPOLATE	Interpolation				
			5: Reserved	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				

Note: The motion commands "VELO (Speed Reference)" and "TRQ (Torque/Thrust Reference)" cannot be used for the MECHATROLINK-I communications.

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Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Motion Run Settings	OW□□09	Motion Command Options (Motion Command Control Flag)	Set motion command auxiliary functions.		0	Bit settings	1 word
			Bit 0: Command Pause	The axis will decelerate to a stop if this bit is turned ON while an axis is moving during positioning or STEP operation. 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). When this bit is turned OFF, the hold is canceled and positioning restarts. 0: OFF 1: ON			
			Bit 1: Command Abort	The axis will decelerate to a stop if this bit is turned ON while an axis is moving during positioning, zero point return, or STEP and the remaining movement will be canceled. 0: OFF 1: ON			
			Bit 2: JOG/STEP Direction	Set the movement direction for JOG or STEP. 0: Forward 1: Reverse			
			Bit 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 1: Forward			
			Bit 4: Latch Zone Enabled	Enable the area where the external signal is valid for external positioning (called the latch zone). This setting is valid each time a new external positioning command is executed. 0: Disable 1: Enable			
			Bit 5: Position Reference Type	Specify the value set for the Position Reference Type (setting parameter OL□□1C). 0: Incremental addition mode 1: Absolute mode	0	Bit settings	
			Bit 6 to Bit F: Not used				
	OW□□0A	Motion Subcommand	Set the motion subcommand to be used with the motion command. Not all of subcommands can be used depending on the type of MECHATROLINK. MECHATROLINK-I, -II (17-byte mode): NOP, FIXPRM-RD MECHATROLINK-II (32-byte mode): All subcommands Refer to *2.9 Functional Restrictions* for details.		0	0 to 65535	1 word
			0: NOP	No command			
			1: PRM_RD	Read SERVOPACK Parameters			
			2: PRM_WR	Write SERVOPACK Parameters			
			3: Reserved	Reserved			
			4: SMON	Monitor Status			
			5: FIXPRM_RD	Read Fixed Parameters			
Torque Reference	OL□□0C	Torque/Thrust Reference	Set the torque/thrust reference in units of 0.01%.	Set the ratio to the fixed parameter 24 "D/A Output Voltage at 100% Torque/Thrust Monitor."	0	-2^{31} to $2^{31}-1$	2 words
	OW□□0E	Speed Limit at Torque/Thrust Reference	Set the speed limit for torque references as a percentage of the rated speed and in units of 0.01%.		15000	−32768 to 32767	1 word

Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Speed Reference	OL□□10	Speed Reference	Set the speed reference.	The unit for this parameter is set in the Speed Units in Function 1 (setting parameter OW□□03, bits 0 to 3).	3000	-2^{31} to $2^{31}-1$ (-32768 to 32767)	2 words
	OL□□14	Positive Side Limiting Torque/Thrust Setting at the Speed Reference	Set the torque limit for speed references in units of 0.01%. The same value is used for both the positive and negative directions.		30000	-2^{31} to $2^{31}-1$	2 words
	OW□□18	Speed Override	Set the percentage of the feed speed to output in units of 0.01%.		10000	0 to 32767	1 word
Position Reference	OL□□1C	Position Reference Type	Set the position reference. 1 = 1 reference unit	There are two modes that can be used to specify the position reference: Incremental mode and absolute mode. Incremental mode is specified by the Position Reference Type in the Motion Command Options (setting parameter OW□□09, bit5).	0	-2^{31} to $2^{31}-1$	2 words
	OL□□1E	Positioning Completed Width	This parameter is used in position control. 1 = 1 reference unit	Set the range in which to turn ON the Positioning Completed in the Position Management Status (monitoring parameter IW□□0C, bit 1).	100	0 to 65535	2 words
	OL□□20	Positioning Completed Width 2	Set the range in which to turn ON Position Proximity in the Position Management Status (monitoring parameter IW□□0C,bit3). 1 = 1 reference unit	The Position Proximity 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 detection width is set to 0, the Position Proximity will be turned ON when the reference pulses have been distributed.	0	0 to 65535	2 words
	OL□□22	Deviation Abnormal Detection Value	Set the value to detect an excessively following error. 1 = 1 reference unit	If the following error is exceeded the value set here, the excessively following error bit will turn ON. Position control will be executed for the set value. An excessively following error will not be detected if this value is set to 0. 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 OW□□01, bit 0).	$2^{31}-1$	0 to $2^{31}-1$	2 words
	OW□□26	Position Complete Timeout	Set the time to detect a positioning timeout error. 1 = 1 ms	If the Positioning Completed bit does not turn ON within the time set here after reference pulses have been distributed, an alarm (positioning timeout error) will occur. The completion of positioning will not be checked if this parameter is set to 0.	0	0 to 65535	1 word
	OW□□27	–	Not used				
Position Control	OL□□28	Phase Compensation	Set the bias for phase control in reference units. 1 = 1 reference unit	Use this parameter to compensate for reference pulses in control systems with lower rigidity or gain.	0	-2^{31} to $2^{31}-1$	2 words
Latch	OL□□2A	Latch Zone Lower Limit	Set the range in which the latch signal is valid for external positioning.	The range set here is valid each time a new external positioning command is executed as long as the latch zone is enabled in the Latch Zone Enabled in Motion Command Options (setting parameter OW□□09, bit 4). This function is cannot be used for some models of SERVOPACK. Refer to *2.9 Functional Restrictions* for details.	-2^{31}	-2^{31} to $2^{31}-1$	2 words
	OL□□2C	Latch Zone Upper Limit			$2^{31}-1$	-2^{31} to $2^{31}-1$	2 words

Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Gain and Bias Settings	OW□□2E	Position Loop Gain	Set the position loop gain for the servo system. 1 = 0.1/s	Set the optimum value for the machine rigidity, mass, and type of servomotor.	300	0 to 32767	1 word
	OW□□2F	Speed Loop Gain	Set the speed loop gain for the servo system. 1 = 1 Hz		40	1 to 2000	1 word
	OW□□30	Speed Feed Forward Compensation	Reduces positioning time by applying feed forward gain. 1 = 0.01%	This setting is effective for positioning and interpolation commands. Always set this parameter to 0 for phase control.	0	0 to 32767	1 word
	OW□□31	Speed Amends	This parameter sets speed feed forward control for interpolation commands when using the MECHATROLINK-compatible SERVOPACK. 1 = 0.01%	Speed feed forward gain is calculated as a percentage of the rated speed.	0	−32768 to 32767	1 word
	OW□□32	Position Integration Time Constant	Set the integration time for the position loop. 1 = 1 ms	An integration reset will be executed if 0 is set.	0	0 to 32767	1 word
	OW□□34	Speed Integration Time Constant	Set the integration time constant for the speed loop. 1 = 0.1 ms		2000	15 to 65535	1 word
	OW□□35	Not used					
Acceleration/ Deceleration and Filters	OL□□36	Linear Acceleration Time	Set the rate or the time constant for one-step linear acceleration.	The unit for this parameter is set in the Acceleration/Deceleration Units in Function 1 (setting parameter OW□□03, bits 4 to 7).	0	0 to $2^{31}-1$	2 words
	OL□□38	Linear Deceleration Time	Set the rate or the time constant for one-step linear deceleration.	The unit for this parameter is set in the Acceleration/Deceleration Units in Function 1 (setting parameter OW□□03, bits 4 to 7).	0	0 to $2^{31}-1$	2 words
	OW□□3A	S-Curve Acceleration Time (Filter Time Constant)	Set the filter time constant. 1 = 0.1 ms	This setting is valid regardless of the filter type.	0	0 to 65535	1 word
	OW□□3B	Speed Filter Bias (Bias Speed for Exponential Acceleration/ Deceleration Filter)	Set the bias speed for the exponantial acceleration/ deceleration with bias.	The unit for the reference value is set in Speed Units the Function 1 (setting parameter OW□□03, bits 0 to 3).	0	0 to 32767	1 word

Note: The gain setting parameters OW□□2E, OW□□2F, OW□□30, and OW□□32 are used only for the MECHATROLINK-II (32-byte mode) communications.

Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Zero Point Return	OW□□3C	Home Return Type	Set the zero point return method when the Zero Point Return motion command is executed.		0	0 to 19	1 word
			0: DEC1 + C-Phase				
			1: ZERO signal				
			2: DEC 1 + ZERO signal				
			3: C-Phase				
			4 to 10: Reserved				
			11: C pulse only				
			12: POT & C pulse				
			13: POT Only				
			14: Home LS & C pulse				
			15: Home Only				
			16: NOT & C pulse				
			17: NOT Only				
			18: INPUT & C pulse				
			19: INPUT Only				
	OW□□3D	Home Width (Zero Point Position Output Width)	Set the width to turn ON the Zero Point Position bit in the Position Management Status (monitoring parameter IW□□0C, bit 4.) 1 = 1 reference unit	For an absolute system, the Zero Point Position bit (bit 4) will turn ON when the feedback position in machine coordinate system is within the value set here. For an incremental system, the Zero Point Position bit will turn ON when the feedback position in machine coordinate system is within the value set here after a zero point return (setting) has been completed.	100	0 to 65535	1 word
	OL□□3E	Approach Speed	Set the approach speed for a zero point return operation.	The operation depends on the Zero Point Return Method. The unit for this parameter is set in the Speed Units in Function 1 (setting parameter OW□□03, bits 0 to 3).	1000	-2^{31} to $2^{31}-1$	2 words
	OL□□40	Creep Speed	Set the creep speed for a zero point return operation.	The operation depends on the Zero Point Return Method. The unit for this parameter is set in the Speed Units in Function 1 (setting parameter OW□□03, bits 0 to 3).	500	-2^{31} to $2^{31}-1$	2 words
	OL□□42	Home Offset (Zero Point Return Final Travel Distance)	Set the distance from where the signal is detected to the zero point position. 1 = 1 reference unit	The operation depends on the Zero Point Return Method.	0	-2^{31} to $2^{31}-1$	2 words
Feed Speeds	OL□□44	Step Distance	Set the moving amount for STEP commands. 1 = 1 reference unit		1000	0 to $2^{31}-1$	2 words
	OL□□46	External Positioning Move Distance	Set the distance from the time the external signal is input for external positioning commands. 1 = 1 reference unit		0	-2^{31} to $2^{31}-1$	2 words
Coordinate System Settings	OL□□48	Zero Point Offset	Set the offset to shift the machine coordinate system. 1 = 1 reference unit		0	-2^{31} to $2^{31}-1$	2 words
	OL□□4A	Work Coordinate System Offset	Set the offset to shift the work coordinate system. 1 = 1 reference unit		0	-2^{31} to $2^{31}-1$	2 words
	OL□□4C	Preset Data of POSMAX Turn	The POSMAX Number of Turns (monitoring parameter IL□□1E) will be preset with the value set here.	This parameter is disabled when using a linear servomotor.	0	-2^{31} to $2^{31}-1$	2 words

Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Servo Driver Commands	OW□□4E	Servo User Monitor	Set user monitor information for the MECHATROLINK-compatible SERVOPACK. The Monitor 2 and Monitor 4 parameters are valid only for a MECHATROLINK-II-compatible SERVOPACK, and the Monitor 1 and Monitor 3 parameters cannot be set by the user. The user can set only the Monitor 2 and Monitor 4 parameters. The monitor information is stored in monitor parameter IW□□2F (Network Servo User Monitor Information) and monitor results are stored in monitor parameters IL□□30 (Servo User Monitor 2) and IL□□34 (Servo User Monitor 4).		0E00H	Bit settings	1 word
			Bit 0 to Bit 3: Monitor 1 (Cannot be set.)	Monitor 1 and Monitor 3 are used by the system and cannot be set by the user. Note: Monitor 2 is used with the MECHATROLINK-I and the MECHATROLINK-II in17-byte Mode and when bit 0 of OW□□02 is 1. Monitor 4 is used only with the MECHATROLINK-II in 32-byte Mode.			
			Bit 4 to Bit 7: Monitor 2	0: Position in command coordinate system (POS)			
				1: Position in machine coordinate system (MPOS)			
			Bit 8 to Bit B: Monitor 3 (Cannot be set.)	2: Position error (PERR)			
				3: Absolute position (APOS)			
			Bit C to Bit F: Monitor 4	4: Counter latch position (LPOS)			
				5: Internal position in command coordinate system (IPOS)			
				6: Final target position for positioning (TPOS)			
				7: Reversed			
				8: Feedback speed (FSPD)			
				9: Command speed (CSPD)			
				A: Final target speed (TSPQ)			
				B: Torque reference (TRQ)			
				C: Reversed			
				D: Reversed			
				E: Option Monitor 1 (OMN1)			
				F: Option Monitor 2 (OMN2)			
	OW□□4F	Servo Alarm Monitor Number	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).	0	0 to 10	1 word
	OW□□50	Servo Constant Number	Set the number of the Servo driver parameter.	Set the number of the SERVOPACK parameter to be processed for the PRM_RD or PRM_WR motion command.	0	0 to 65535	1 word
	OW□□51	Servo Constant Number Size	Set the number of words in the Servo driver parameter.	Set the number of words in the SERVOPACK parameter to be processed for the PRM_RD or PRM_WR motion command.	1	1 to 2	1 word
	OL□□52	Servo User Constant	Set the setting for the Servo driver parameter.	Set the setting value to be written to the SERVOPACK parameter with the PRM_WR motion command.	0	-2^{31} to $2^{31}-1$	2 words
	OW□□54	Auxiliary Servo User Constant Number	Set the number of a Servo driver parameter.	Set the number of the SERVOPACK parameter to be processed for the PRM_RD or PRM_WR motion subcommand.	0	0 to 65535	1 word
Servo Driver Commands	OW□□55	Auxiliary Servo Constant Number Size	Set the number of words in the Servo driver parameter.	Set the number of words in the SERVOPACK parameter to be processed for the PRM_RD or PRM_WR motion subcommand.	1	1 to 2	1 word
	OL□□56	Auxiliary Servo User Constant	Set the setting for the Servo driver parameter.	Set the setting value to be written to the SERVOPACK parameter with the PRM_WR motion subcommand.	0	-2^{31} to $2^{31}-1$	2 words
Supplemental Settings	OW□□5C	Fixed Parameter Number	Set the number of the fixed parameter to read with the motion subcommand FIXPRM_RD.	The results of reading the fixed parameter will be stored in the Fixed Parameter Monitor (monitor parameter IL□□56).	0	0 to 65535	1 word

Table 2.4 Motion Setting Parameter (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Default	Setting Range	Size
Absolute Infinite Length Axis Position Control Information	OL□□5E	Absolute Position at Power OFF [Low value]	This information is for infinite length axis position control when an absolute encoder is used.	Do not set these parameters when using a linear servomotor.	0	-2^{31} to $2^{31}-1$	2 words
	OL□□60	Absolute Position at Power OFF [High value]			0	-2^{31} to $2^{31}-1$	2 words
	OL□□62	Modularized Position at Power OFF [Low value]	This information is for infinite length axis position control when an absolute encoder is used.		0	-2^{31} to $2^{31}-1$	2 words
	OL□□64	Modularized Position at Power OFF [High value]			0	-2^{31} to $2^{31}-1$	2 words
Used by system	OL□□6E	System reservation (stop distance)	Not used		0	-2^{31} to $2^{31}-1$	2 words
Transparent Command Mode	OW□□70 to OW□□7E	Command Buffer for Transparent Command Mode	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	0		

2.8.3 Motion Monitoring Parameters

Table 2.5 Motion Monitoring Parameters (MP2000 Series)

Type	Address	Name	Meaning	Description	Setting Range	Size
Run Information	IW□□00	Drive Status	The axis run status is stored.		Bit data	1 word
			Bit 0: Motion Controller Operation Ready	This bit turns ON when RUN preparations for the motion control function 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 are not synchronized. • SERVOPACK parameters are being accessed by a command from a MPE720.		
			Bit 1: Running (Servo ON)	This bit is ON during the Servo ON condition for the axis.		
			Bit 2: System Busy	This bit is ON when the system is processing and cannot execute a motion command. • Fixed parameters are being changed. • SERVOPACK parameters are being read by a command from a MPE720. • SERVOPACK parameters are being written by a command from a MPE720.		
			Bit 3: Servo Ready	This bit is ON when all of the following conditions are satisfied. • Communication are synchronized. • The main power supply for the SERVOPACK is ON • There are no alarms in the SERVOPACK.		
			Bit 4 to Bit F: Not used			
	IW□□01	Over Range Parameter Number	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	0 to 65535	1 word

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Table 2.5 Motion Monitoring Parameters (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Setting Range	Size
Run Information	IL□□02	Warning	These bits store information on the current warnings. The axis will not stop moving when a warning occurs. Warnings that are not cleared automatically will be cleared when alarms clear operation is performed after their cause has been eliminated. Normally, however, most of warnings are cleared automatically when their cause has been eliminated.		Bit data	2 words
			Bit 0: Excessively Following Error	This bit turns ON if the following error exceeds the value set for setting parameter OL□□22 (Deviation Abnormal Detection Value) 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).		
			Bit 1: Setting Parameter Error	This bit turns ON when one or more of the motion setting parameters value is set outside the setting range. The number of the parameter that value is out of range is stored as the Over Range Parameter Number (monitoring parameter IW□□01).		
			Bit 2: Fixed Parameter Error	This bit turns ON when one or more of the motion fixed parameters value is set outside the setting range. The number of the parameter that value is out of range is stored as the Over Range Parameter Number (monitoring parameter IW□□01).		
			Bit 3: Servo Driver Error	This bit turns ON when there is a warning in the SERVOPACK for a MECHATROLINK-compatible SERVOPACK. The content of the warning can be confirmed using the Servo Alarm Code (monitoring parameter IW□□2D).		
			Bit 4: Motion Command Setting Error	This bit turns ON when a motion command that cannot be used is set.		
			Bit 5: Not used			
			Bit 6: Positive Overtravel	This bit turns ON when positive overtravel is disabled in the fixed parameter settings and the positive overtravel signal is input.		
			Bit 7: Negative Overtravel	This bit turns ON when negative overtravel is disabled in the fixed parameter settings and the negative overtravel signal is input.		
			Bit 8: Servo Not ON	This bit turns ON when the Servo ON bit in the Run Commands (setting parameter OW□□00, bit 0) is ON but the SERVOPACK is not Servo ON condition.	Bit data	
			Bit 9: Servo Driver Communication Warning	This bit turns ON if a communication error is detected in communication with the MECHATROLINK-compatible SERVOPACK. This bit is cleared automatically when communication are performed normally.		
			Bit 10 to Bit 31: Not used			
	IL□□04	Alarm	These bits store information on the current alarms. The axis will stop moving when an alarm occurs. Alarms are cleared when the alarm clear operation is performed after their cause has been eliminated.		Bit data	2 words
			Bit 0: Servo Driver Error	This bit turns ON when there is an alarm in the SERVOPACK for a MECHATROLINK-compatible SERVOPACK. The content of the alarm can be confirmed using the Servo Alarm Code (monitoring parameter IW□□2D).		
			Bit 1: Positive Overtravel	This bit turns ON when the positive overtravel signal is input and a move command is executed in the positive direction.		
			Bit 2: Negative Overtravel	This bit turns ON when the negative overtravel signal is input and a move command is executed in the negative direction.		
			Bit 3: Positive Soft Limit	This bit turns ON if a move command that exceeds the positive soft limit is executed with the followinging condtions: • Zero point return has been complited • The positive soft limit function is enabled • An infinite length axis is selected.		
			Bit 4: Negative Soft Limit	This bit turns ON if a move command that exceeds the negative soft limit is executed with the followinging condtions: • Zero point return has been complited • The negative soft limit function is enabled • An infinite length axis is selected.		

Table 2.5 Motion Monitoring Parameters (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Setting Range	Size
Run Information	IL□□04	Alarm	Bit 5: Servo OFF	This bit turns ON when a move command is executed with the Servo OFF status.	Bit data	2 words
			Bit 6: Positioning Time Over	This bit turns ON when positioning is not completed within the specified time after the pulse distribution end. The time is set for the Position Complete Timeout (setting parameter OW□□26).		
			Bit 7: Excessive Positioning Moving Amount	This bit turns ON when a moving amount is specified that exceeds the setting range for the positioning moving amount.		
			Bit 8: Excessive Speed	This bit turns ON when a speed is set that exceeds the setting range for the speed reference.		
			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 alarm by setting the Deviation Abnormal Detection Error Level to 0 in Mode 1 (setting parameter OW□□01, bit 0).		
			Bit 10: Filter Type Change Error	This bit turns ON if the filter type is changed when the pulses are still distributing.		
			Bit 11: Filter Time Constant Change Error	This bit turns ON if the filter time constant is changed when the pulses are still distributing.		
			Bit 12: Not used			
			Bit 13: Zero Point Not Set	This parameter is disabled when using a linear servomotor.		
			Bit 14: Zero Point Set during Travel	This bit turns ON if the zero point is set during axis moving.		
			Bit 15: Servo Driver Parameter Setting Error	This bit turns ON if a failure occurs while changing MECHATROLINK-compatible SERVOPACK parameter settings.		
			Bit 16: Servo Driver Synchronization Communication Error	This bit turns ON if a synchronization communication error is detected with the MECHATROLINK-compatible SERVOPACK.		
			Bit 17: Servo Driver Communication Error	This bit turns ON if two communication errors are detected consecutively in communication with the MECHATROLINK-compatible SERVOPACK.		
			Bit 18: Servo Driver Command Timeout Error	This bit turns ON if a command sent to the MECHATROLINK-compatible SERVOPACK is not completed within a specific amount of time.		
			Bit 19: ABS Encoder Count Exceeded	This parameter is disabled when using a linear servomotor.		
			Bit 20 to Bit 29: Not used			
			Bit 30: SERVOPACK Motor Type Mismatch	This bit turns ON if the setting of SERVOPACK parameter Pn000.3 constant (Rotation Type/Linear Type Selection) disagrees with the actually connected motor type.		
			Bit 31: SERVOPACK Encoder Type Mismatch	This bit turns ON if the actually connected motor type disagrees with the parameter setting.		

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Table 2.5 Motion Monitoring Parameters (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Setting Range	Size
Motion Command Information	IW□□08	Servo Command Type Response	Stores the motion command code that is being executing.	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).	0 to 65535	1 word
	IW□□09	Servo Module Command Status	The status of motion command processing is indicated.		Bit data	1 word
			Bit 0: Command Executing (BUSY)	This bit indicates the motion command status. 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 a command hold processing has been completed.		
			Bit 2: Not used			
			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.		
			Bit 4 to Bit 7: Not used			
			Bit 8: Command Execution Completed (COMPLETE)	This bit turns ON when motion command processing complete normally.		
	IW□□0A	Motion Subcommand Response Code	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).	0 to 65535	1 word
	IW□□0B	Motion Subcommand Status	The status of motion subcommand processing is indicated.		Bit data	1 word
			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 1 to Bit 2: Not used			
			Bit 3: Command Error Occurrence (FAIL)	This bit turns ON if motion subcommand processing does not complete normally.		
			Bit 4 to Bit 7: Not used			
			Bit 8: Command Execution Completed (COMPLETE)	This bit turns ON when motion subcommand processing complete normally.		
Position Information	IW□□0C	Position Management Status	The status of position control is indicated.		Bit data	1 word
			Bit 0: Distribution Completed (DEN)	This bit turns ON when pulse distribution has been completed for a move command.		
			Bit 1: Positioning Completed (POSCOMP)	This bit turns ON when pulse distribution has been completed and the current position is within the Positioning Completed Width.		
			Bit 2: 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).		
			Bit 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. • OL□□20 ≠ 0: This bit turns ON when |MPOS - APOS| < | Position Proximity Setting even if pulse distribution has not been completed.		
			Bit 4: Zero Point Position (ZERO)	This bit turns ON when the current position is within the Home Window (setting parameter OW□□3D) after a zero point return (setting) has been completed.		

Table 2.5 Motion Monitoring Parameters (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Setting Range	Size
Position Information	IW□□0C	Position Management Status	Bit 5: 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.	Bit data	1 word
			Bit 6: Machine Lock ON (MLKL)	This bit turns ON when the Machine Lock bit is turned ON in the Run Commands (setting parameter OW□□00, bit 0) and the axis has actually been machine lock mode.		
			Bit 7: Not used			
			Bit 8: ABS System Infinite Length Position Control Information LOAD Completed (ABSLDE)	This parameter is disabled when using a linear servomotor.		
			Bit 9: POSMAX Turn Number Presetting Completed (TPRSE)			
			Bit A to Bit F: Not used			
	IL□□0E	Machine Coordinate Target Position (TPOS)	Stores the target position in the machine coordinate system managed by the MP2000. 1 = 1 reference unit		-2^{31} to $2^{31}-1$	2 words
	IL□□10	Target Position (Machine Coordinate Calculation Position) (CPOS)	Stores the calculated position in the machine coordinate system managed by the MP2000. 1 = 1 reference unit		-2^{31} to $2^{31}-1$	2 words
	IL□□12	Machine Coordinate System Position (MPOS)	Stores the reference position in the machine coordinate system managed by the MP2000. 1 = 1 reference unit	This parameter is not updated while the machine is lock mode.	-2^{31} to $2^{31}-1$	2 words
	IL□□14	System Reserved			-2^{31} to $2^{31}-1$	2 words
	IL□□16	Machine Coordinate Feedback Position (APOS)	Stores the current feedback position. 1 = 1 reference unit		-2^{31} to $2^{31}-1$	2 words
	IL□□18	Machine Coordinate Latch Position (LPOS)	Stores the latch position when the latch has been completed. 1 = 1 reference unit		-2^{31} to $2^{31}-1$	2 words
	IL□□1A	Position Error (PERR)	Stores the following error managed by the MP2000. 1 = 1 reference unit		-2^{31} to $2^{31}-1$	2 words
	IL□□1C	Incremental Target Position (Target Position Difference Monitor)	Stores the number of pulses distributed each scan. 1 = 1 reference unit		-2^{31} to $2^{31}-1$	2 words
	IL□□1E	POSMAX Number of Turns	This parameter is valid for an infinite length axis.	This parameter is disabled when using a linear servomotors.	-2^{31} to $2^{31}-1$	2 words

2

Table 2.5 Motion Monitoring Parameters (MP2000 Series) (cont'd)

Type	Address	Name	Meaning		Description	Setting Range	Size
Used by system = Command Monitor	IL□□20	Speed Directive Output Worthy Monitor	Stores the speed reference that is being output.		Unit: pulse/s This parameter monitors the speed being output to the MECHATROLINK. This parameter will be 0 for interpolation or phase control.	−32768 to 32767 (-2^{31} to $2^{31}-1$)	2 words
SERVOPACK Information	IW□□2C	Network Servo Status	Stores the SERVOPACK status. The SERVOPACK status stored here is monitored through the MECHATROLINK. Refer to the manual for the SERVOPACK for details.			Bit data	1 word
			Bit 0: Alarm Occurred (ALM)		OFF: No alarm occurred. ON: Alarm occurred.		
			Bit 1: Warning Occurred (WARNING)		OFF: No warning occurred. ON: Warning occurred.		
			Bit 2: Command Ready (CMDRDY)		OFF: Command cannot be received. ON: Command can be received.		
			Bit 3: Servo ON (SVON)		OFF: Servo OFF. ON: Servo ON.		
			Bit 4: Main Power ON (PON)		OFF: Main power OFF. ON: Main power ON.		
			Bit 5: Machine Lock (MLOCK)		OFF: Machine lock mode released. ON: Machine lock mode.		
			Bit 6: Zero Point Position (ZPOINT)		OFF: Not in Zero Point Position Range ON: In Zero Point Position Range		
			Bit 7	Positioning Completed (PSET)	OFF: Not in Positioning Completed Width. ON: In Positioning Completed Width (for position control).		
				Speed Coincidence (V-CMP)	OFF: Speed does not agree. ON: Speed agrees (for speed control).		
			Bit 8	Distribution Completed (DEN)	OFF: Distributing pulses. ON: Distribution completed (for position control).		
				Zero Speed (ZSPD)	OFF: Speed does not agree. ON: Speed agrees (for speed control).		
			Bit 9: Torque Being Limited (T_LIM)		OFF: Torque not being limited. ON: Torque being limited.		
			Bit A: Latch Completed (L_CMP)		OFF: Latch not completed. ON: Latch completed.		
			Bit B	Position Proximity (NEAR)	OFF: Outside Position Proximity Range. ON: Inside Position Proximity Range.		
				Speed Limit (V_LIM)	OFF: Speed limit not detected. ON: Speed limit detected.		
			Bit C: Positive Soft Limit (P_SOT)		OFF: Not in Positive Soft Limit Range. ON: In Positive Soft Limit Range.		
			Bit D: Negative Soft Limit (N_SOT)		OFF: Not in Negative Soft Limit Range. ON: In Negative Soft Limit Range.		
			Bit E: Not used				
			Bit F: Not used				
	IW□□2D	Servo Alarm Code	Stores the alarm code from the SERVOPACK.		Refer to the manual for the SERVOPACK for details on alarms.	−32768 to 32767	1 word

Table 2.5 Motion Monitoring Parameters (MP2000 Series) (cont'd)

Type	Address	Name	Meaning		Description	Setting Range	Size
SERVOPACK Information	IW□□2E	Network Servo I/O Monitor	Stores I/O information of the SERVOPACK.			Bit data	1 word
			Bit 0: Positive Drive Prohibited Input (P_OT)	Indicates the status of the forward run prohibited input. 0: OFF 1: ON			
			Bit 1: Negative Drive Prohibited Input (N_OT)	Indicates the status of the reverse run prohibited input. 0: OFF 1: ON			
			Bit 2: Zero Point Return Deceleration Limit Switch Input (DEC)	Indicates the status of the zero point return deceleration limit switch. 0: OFF 1: ON			
			Bit 3: Encoder Phase-A Input (PA)	Indicates the status of the encoder phase-A input. 0: OFF 1: ON			
			Bit 4: Encoder Phase-B Input (PB)	Indicates the status of the encoder phase-B input. 0: OFF 1: ON			
			Bit 5: Encoder Phase-C Input (PC)	Indicates the status of the encoder phase-C input. 0: OFF 1: ON			
			Bit 6: First External Latch Input (EXT1)	Indicates the status of the first external latch signal input. 0: OFF 1: ON			
			Bit 7: Second External Latch Input (EXT2)	Indicates the status of the second external latch signal input. 0: OFF 1: ON			
			Bit 8: Third External LatchInput (EXT3)	Indicates the status of the third external latch signal input. 0: OFF 1: ON			
			Bit 9: Brake Output (BRK)	Indicates the status of the brake output. 0: OFF 1: ON			
			Bit A: Not used				
			Bit B: Not used				
			Bit C: CN1 Input Signal (1012)	Indicates the status of the CN1 input signal selected in parameter Pn81E.0. 0: OFF 1: ON			
			Bit D: CN1 Input Signal (1013)	Indicates the status of the CN1 input signal selected in parameter Pn81E.1. 0: OFF 1: ON			
			Bit E: CN1 Input Signal (1014)	Indicates the status of the CN1 input signal selected in parameter Pn81E.2. 0: OFF 1: ON			
			Bit F: CN1 Input Signal (1015)	Indicates the status of the CN1 input signal selected in parameter Pn81E.3. 0: OFF 1: ON			

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Table 2.5 Motion Monitoring Parameters (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Setting Range	Size
SERVOPACK Information	IW□□2F	Network Servo User Monitor Information	Stores the monitor selections showing what data will be monitored. 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	The Monitor Selection made by the user when using a MECHATROLINK-compatible SERVOPACK is stored in this parameter. Monitor information enable to use for user is the only Monitor 4.	Bit data	1 word
	IL□□30	Servo User Monitor 2	Stores the result of the selected monitor.	This parameter stores the result of the monitor selected for Monitor 2 in the Servo User Monitor (setting 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.	-2^{31} to $2^{31}-1$	2 words
	IL□□32	Servo User Monitor 3	Stores the result of the selected monitor.	For system	-2^{31} to $2^{31}-1$	2 words
	IL□□34	Servo User Monitor 4	Stores the result of the selected monitor.	This parameter stores the result of the monitor selected for Monitor 4 of the Servo User Monitor (setting parameter OW□□4E, bits C to F).	-2^{31} to $2^{31}-1$	2 words
	IL□□36	Servo Constant Number	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.	0 to 65535	1 word
	IL□□37	Auxiliary Servo User Constant Number	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.	0 to 65535	1 word
	IL□□38	Servo User Constant	Stores the data of the parameter being read.	This parameter stores the data of the SERVOPACK parameter read using the MECHATROLINK command area.	-2^{31} to $2^{31}-1$	2 words
	IL□□3A	Auxiliary Servo User Constant	Stores the data of the parameter being read.	This parameter stores the data of the SERVOPACK parameter read using the MECHATROLINK subcommand area.	-2^{31} to $2^{31}-1$	2 words
	IW□□3F	Motor Type	Stores the motor type that is actually connected. 0: Rotary motor 1: Linear motor	Make sure that this parameter is set to 1:Linear Motor.	0 to 1	1 word
	IL□□40	Feedback Speed	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).	-2^{31} to $2^{31}-1$	2 words
	IL□□42	Torque/Thrust Reference Monitor	Stores the value of the torque reference. 1 = 0.01 %	This parameter can be used only when using the MECHATROLINK-II (32-byte Mode) communications.	-2^{31} to $2^{31}-1$	2 words
Supplemental Information	IL□□56	Fixed Parameter Monitor	Stores the data of the specified fixed parameter number.	This parameter stores the data of the fixed parameter when FIXPRM-RD is selected in the Motion Subcommand (setting parameter OW□□0A).	-2^{31} to $2^{31}-1$	2 words
Absolute Infinite Axis Position Control Information	IL□□5E	Absolute Position at Power OFF [Low value]	Store information used for infinite length position control when an absolute encoder is used.	These parameters store the encoder position in 4 words.	-2^{31} to $2^{31}-1$	2 words
	IL□□60	Absolute Position at Power OFF [High value]			-2^{31} to $2^{31}-1$	2 words
	IL□□62	Modularized Position at Power OFF [Low value]	Store information used for infinite length position control when an absolute encoder is used.	These parameters store the axis position managed by the MP2300 in pulses in 4 words.	-2^{31} to $2^{31}-1$	2 words
	IL□□64	Modularized Position at Power OFF [High value]			-2^{31} to $2^{31}-1$	2 words

Table 2.5 Motion Monitoring Parameters (MP2000 Series) (cont'd)

Type	Address	Name	Meaning	Description	Setting Range	Size
Transparent Command Mode	IW□□70 to IW□□7E	Response Buffer for Transparent Command Mode	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		

2

2.9 Functional Restrictions

Some functions cannot be used depending on MECHATROLINK communications method, number of send bytes, and SERVOPACK model.

2.9.1 Restrictions Based on Communication Method and Number of Send Bytes

All functions can be used with MECHATROLINK-II, 32-byte Mode. The following restrictions apply to MECHATROLINK-I and to MECHATROLINK-II, 17-byte Mode.

Item	Related Parameters	MECHATROLINK-I	MECHATROLINK-II	
			17-byte Mode	32-byte Mode
Speed Reference	OW□□08=23	N/A	Available	Available
Torque Reference	OW□□08=24	N/A	Available	Available
Motion Subcommand	OW□□0A	N/A	N/A	Available
Automatic Updating of Gain Setting Parameters	OW□□2E, OW□□2F, OW□□30, OW□□32	N/A	N/A	Available
Servo User Monitor	OW□□4E. bit 4 to 7	Available*	Available*	N/A
	OW□□4E. bit C to F	N/A	N/A	Available
Torque/Thrust Reference Monitor	IL□□42	N/A	N/A	Available

* Available only when OW□□02. bit 0 = 1.

(1) Motion Commands: Speed References

Motion commands using speed references are stipulated in MECHATROLINK-II command specifications and cannot be used for MECHATROLINK-I.

(2) Motion Commands: Torque References

Motion commands using torque references are stipulated in MECHATROLINK-II command specifications and cannot be used for MECHATROLINK-I.

(3) Motion Subcommands

Motion subcommands except for the Read Fixed Parameter can be executed only with the MECHATROLINK-II, 32-byte Mode communication method.
The motion subcommands for the Read Fixed Parameter can be used even with the MECHATROLINK-I communication method.

(4) Automatic Updating of Gain Setting Parameters

Corresponding SERVOPACK parameters are automatically updated when gain setting parameters are changed (including the Position Loop Gain, Speed Loop Gain, Feed Forward Gain, and the Position Loop Integration Time Constant).

This function is achieved using the Servo command expansion area and can be executed on with the MECHATROLINK-II, 32-byte Mode communication method. To make changes, parameters must be changed using one of the following motion commands: KPS, KVS, KFS, or KIS.

(5) Servo User Monitor

Bits 4 to 7 (Monitor 2) of the Servo User Monitor can be used for a system with MECHATROLINK-I or MECHATROLINK-II, 17-byte Mode communication method when OW□□02. bit 0 = 1.

Bits C to F (Monitor 4) can be used for a system with MECHATROLINK-II, 32-byte Mode communication method.

(6) Torque/Thrust Reference Monitor

The Torque/Thrust Reference Monitor is achieved using the Servo command expansion area and can be executed on with MECHATROLINK-II, 32-byte Mode communication method.

2.9.2 Restrictions Based on the SERVOPACK Model

Functions have the following restrictions based on the SERVOPACK that is used.

Item	Parameter	SERVOPACK Model		
		SGDH + NS100	SGDH + NS115	SGDS
Backlash Compensation	Fixed parameter 16	N/A	Available	Available
Change Deceleration Time Constant Command	OW□□08=11	Available	Available	Available
Phase Reference	OW□□08=25	Available	Available	Available
Speed Feed Forward for Interpolation Commands	OW□□31	Available	Available	Available
Gain Switch	OW□□01, bit 4	N/A	Available	Available
External Torque/Thrust Limit Input	OW□□00, bit 8 and 9	N/A	Available	Available
Latch Signal Settings (/EXT2, /EXT3)	OW□□04, bit 0 to 3, and bit 4 to 7	Available	Available	Available
Latch Zone Setting	OL□□2A, OL□□2C	N/A	Available	Available
Position Loop Integration Time Constant Setting	OW□□32	Available	Available	Available
Position Loop Integration Reset	OW□□00, bit B	N/A	N/A	Available

(1) Backlash Compensation

The backlash compensation cannot be used for SGDH + NS100 because it does not have the parameter to set the backlash compensation.

(2) Gain Switch

There is no gain switch parameter in the Servo command option area in SGDH + NS100, so the Gain Switch cannot be used.

(3) External Torque/Thrust Limit Input

There is no torque limit switch parameter in the Servo command option area in SGDH + NS100, so the External Torque/Thrust Limit Input cannot be used.

(4) Latch Zone Setting

There is no parameter to set the latch zone in SGDH + NS100, so the Latch Zone Setting cannot be set.

(5) Position Loop Integration Reset

The Position Loop Integration Reset function is available only in SGDS SERVOPACKs and cannot be used for other SGDS SERVOPACK.

3

System Startup (MP920, MP930)

This chapter explains the procedure to do a trial operation of a system with a linear servodrive and a MP920 or MP930 machine controller and also introduces a sample program for a trial operation.

3.1 Trial Operation Flowchart

This section describes the procedure to do a trial operation of a system with a linear servomotor and a MP920 or MP930.

> ⚠ **WARNING**
>
> • Before performing a trial operation using a controller, be sure to confirm that the motor will run out of control by performing a trial operation using SERVOPACK internal references.

The procedure to do a trial operation are shown below.
Refer to the section or manual specified in reference column for more information on the operation

Procedure	Reference
1. Equipment Preparation 　Prepare the equipment required for the trial operation.	*3.3 Equipment Preparation*
2. Controller Preparation 　・MP920 　　Mount a Power Suppply Module, CPU-02 Module, and SVB Module on the mounting base. 　・MP930 　　Prepare a MC Unit.	Controller's manual [*1]
3. Installation and Wiring 　Install the linear servomotor, and make necessary wirings.	Manual of the SERVOPACK for linear servomotors [*2]
4. Trial Operation Using SERVOPACK Internal References 　Use the panel operator or digital operator to run the linear servomotor in JOG operation.	Manual of the SERVOPACK for linear servomotors [*2]
5. Starting the MPE720 　Set the system definitions such as module configuration and scan time setting.	MPE720's manual [*3]
6. Setting the Motion Parameters 　Set the motion parameters using the MPE720.	*3.4 Setting the Motion Parameters*
7. Creation and Saving of Programs 　Create the program for trial operation using the MPE720.	*3.5 Sample Program* MPE720's manual for the operation method [*3]
8. Transferring the Programs 　Create the program for trial operation using the MPE720.	MPE720's manual [*3]
9. Trial Operation 　Execute the program to check the operation.	*3.5 Sample Program*

∗1.　Machine Controller MP920 User's Manual for Design and Maintenance (Manual No. SIEZ-C887-2.1)
　　　Machine Controller MP930 User's Manual for Design and Maintenance (Manual No. SIEZ-C887-1.1）
∗2.　Linear Σ Series SGL□□/SGDH User's Manual (Manual No. SIEPS80000019）
∗3.　Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual
　　　(Manual No. SIEPC88070005）

3.2 System Configuration Examples

3.2.1 Example of Linear Servomotor System with a MP920

The following diagram shows the example of simple system configuration to explain the trial operation Linear Servomotor system with a MP920.

Fig. 3.1 System Configuration with a MP920

IMPORTANT	1. The MECHATROLINK port is provided for only one channel although two connectors are provided on a SVB-01 Module. The MECHATROLINK cable connector can be inserted in either of these two connectors. The number of connectable stations is 14.
	2. Use the following MP920 when using a linear servomotor. MP920 Ver. A10 or later with a SVB-01 Module.

3.2.2 Example of Linear Servomotor System with a MP930

The following diagram shows the example of simple system configuration to explain the trial operation of linear servomotor system with a MP930.
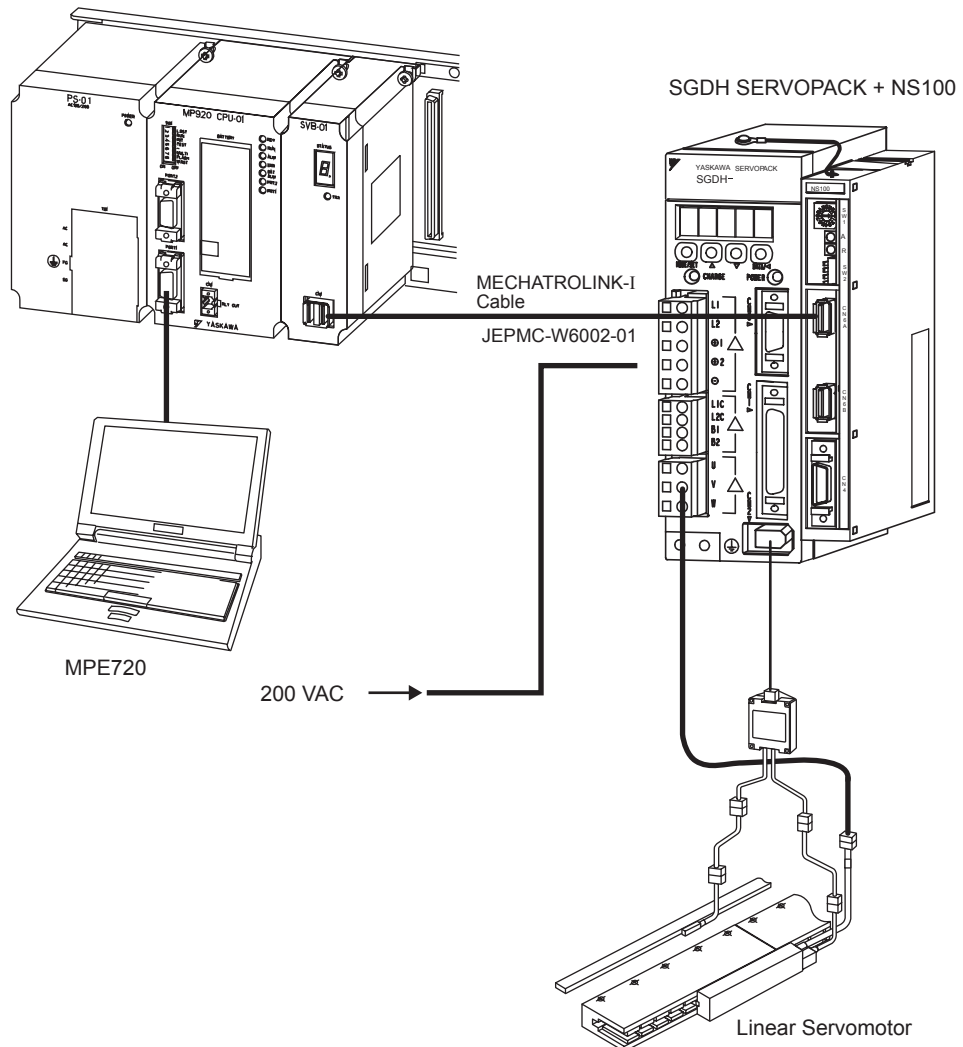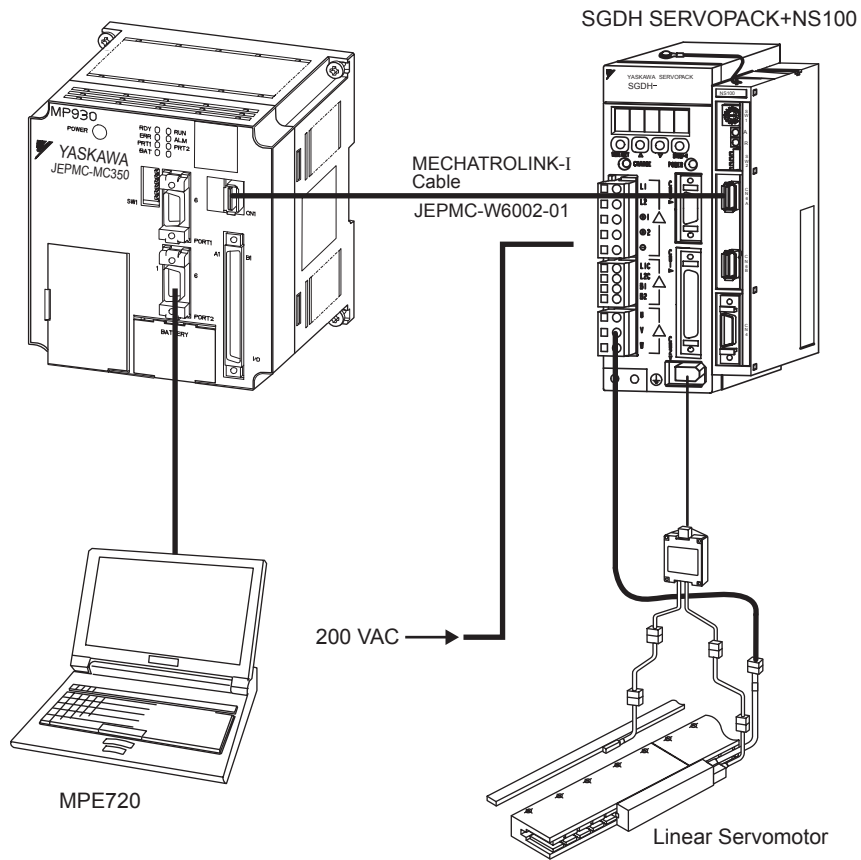

Fig. 3.2 System Configuration with a MP930

IMPORTANT	Use a MP930 Ver. A.29 or later when using a linear servomotor.

3.3 Equipment Preparation

Prepare the following equipment for the trial operation. (The items shown below are the minimum requirements for a trial operation.)

(1) Controller-related Equipment

(a) Using a MP920

Product Name	Product Model	Quantity
Power supply module [*1]	JEPMC-PS200	1
CPU-02 module [*1]	JEPMC-CP210	1
SVB-01 module [*1]	JEPMC-MC210	1
MECHATROLINK cables	JEPMC-W6002-□□	1
Terminator	JEPMC-W6022	1
Personal computer	A commercially-available personal computer	1
MPE720 [*2] (Ver. 4.50 or later)	CPMC-MPE720	1
MEMOBUS cables	JEPMC-W5311-□□	1

* 1. Refer to *Machine Controller MP920 User's Manual for Design and Maintenance (manual No. SIEZ-C887-2.1)* and *Machine Controller MP920 User's Manual for Motion Modules (manual No. SIEZ-C887-2.5)* for more information on MP920.
* 2. Refer to *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (manual No. SIEPC88070005)* for more information on MPE720.

(b) Using a MP930

Product Name	Product Model	Quantity
MC unit [*1]	JEPMC-MC350	1
MECHATROLINK cables	JEPMC-W6002-□□	1
Terminator	JEPMC-W6022	1
Personal computer	A commercially-available personal computer	1
MPE720 [*2] (Ver. 4.50 or later)	CPMC-MPE720	1
MEMOBUS cables	JEPMC-W5311-□□	1

* 1. Refer to *Machine Controller MP930 User's Manual for Design and Maintenance (manual No. SIEZ-C887-1.1)* and *Machine Controller MP920 User's Manual for Motion Modules (manual No. SIEZ-C887-2.5)* for more information on MP930.
* 2. Refer to *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (manual No. SIEPC88070005)* for more information on MPE720.

(2) Servodrive-related Equipment

Product Name	Product Model	Quantity
Σ-II SERVOPACKs [*1]	SGDH-□□□E	1
Option unit NS100 [*2]	JUSP-NS100	1
Linear servomotors [*1]	SGL□W/SGL□M series	1
Serial converter unit [*1]	JZDP-A00□-□□□	1
Linear servomotor main circuit cables [*1]	JZSP-CLN□□-□□	1
Encoder cables [*1]	JZSP-CLL00-□□	1
Serial converter unit connection cables [*1]	JZSP-CLP70-□□	1
Hall sensor connection cables [*1]	JZSP-CLL10-□□	1
Digital operator	JUSP-OP02A	1

* 1. Refer to *Linear Σ Series SGL□□/SGDH User's Manual (manual No. SIEPS80000019)* for more information on Linear Servomotor and SERVOPACK.
* 2. Refer to *Σ-II Series SGDH MECHATROLINK Interface Unit User's Manual (manual No. SIE-C718-4)* for more information on the operation unit NS100.

3.4 Setting the Motion Parameters

This section explains the setting method of motion parameters and SERVOPACK parameters for the Linear Servomotor with a MP920 or MP930.

The other trial operation procedure can be performed as well as a rotary servomotors. Refer to the user's manual of your controller for details.

3.4.1 Fixed Parameters

Select **Linear Type** for the motor type in the **Fixed Parameters** Tab and save the new settings.

After setting the motor type to **Linear Motor**, confirm that bit B of the fixed parameter No.14 Functions is set to "1."

The bit B is set to "1"
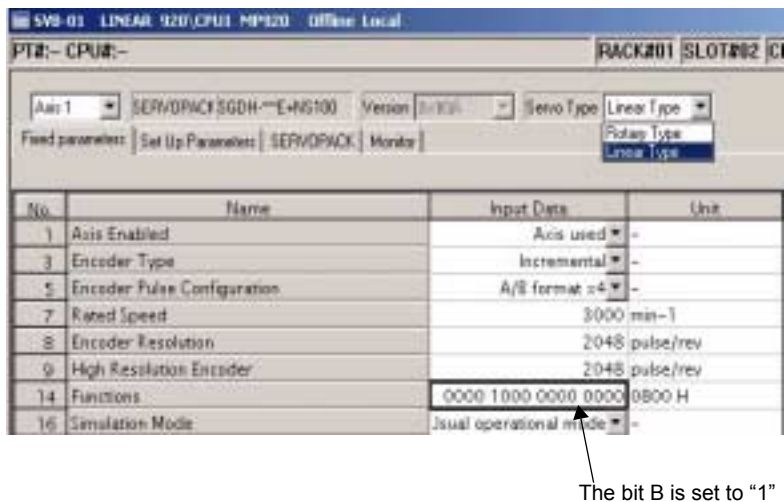
Fig. 3.3 Fixed Parameter Setting Window of the MP920

The bit B is set to "1"
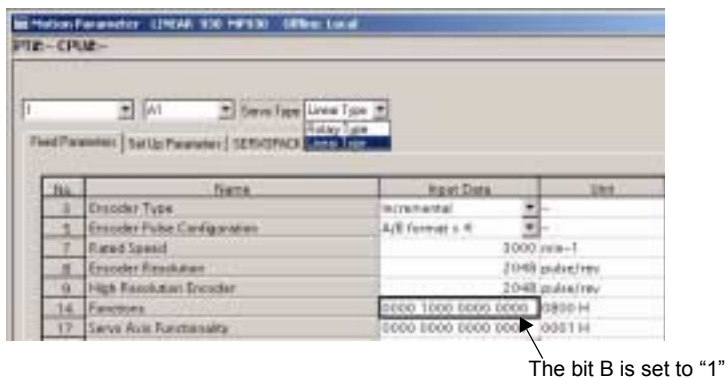
Fig. 3.4 Fixed Parameter Setting Window of the MP930

Table 3.1 shows the fixed parameters characteristic of linear servomotors.
Set the parameters, referring to Table 3.1.
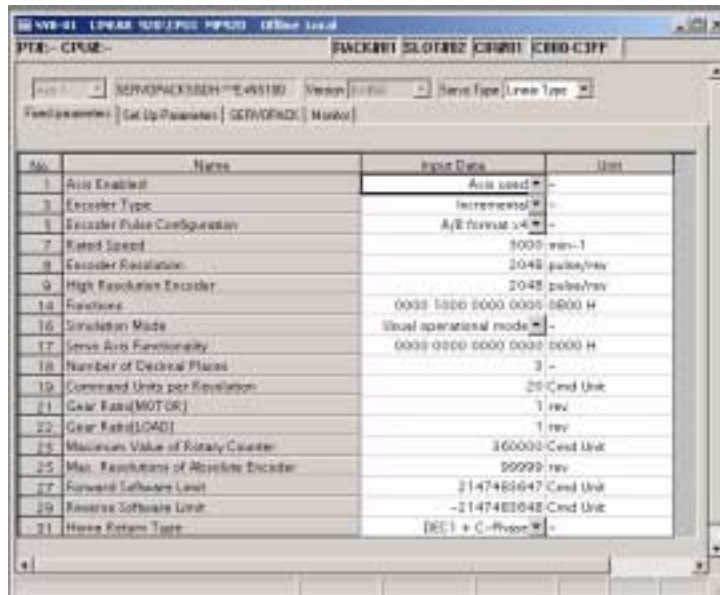
Fig. 3.5 Fixed Parameter Setting Window of the MP920 SVB-01 Module
(When Linear motor is selected for the motor type)
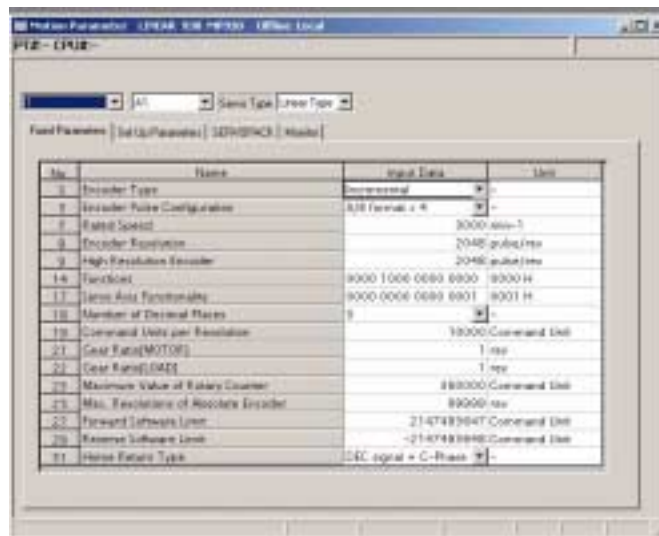
Fig. 3.6 Fixed Parameter Setting Window of the MP930
(When Linear motor is selected for the motor type.)

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Table 3.1 Fixed Parameters List (Linear servomotor-related only)

No.	Name	Meanings	Remarks
3	Encoder Type	Set the type of encoder to be used.	This setting is ignored, and fixed to "Incremental" encoder.
5	Encoder Pulse Configuration	–	This setting is ignored.
7	Rated Speed	–	Refer to *Setting Method* below.
8	Encoder Resolution (Numbers of Feedback Pulses per Servomotor Rotation)	–	This parameter cannot be used. Use the fixed parameter No. 9.
9	High Resolution Encoder (Numbers of Feedback Pulses per Servomotor Rotation) (For high resolution)	–	Refer to *Setting Method* below.
16	Simulation Mode	–	This parameter cannot be used.
14	Functions (Additional Function Selections)	Bit9: Selection of Number of Feedback Pulses for High Resolution	0: Disabled 1: Enabled Select "1".
		BitB: Linear Motor/Rotary Motor	0: Rotary motor 1: Linear motor Select "1".
17	Servo Axis Functionality (Motion Controller Function Selection Flags)	Bit0 to 3: Command Unit Select the reference unit that is input.	Either "0: pulse" or "1: mm" can be selected. If either "2: deg." or "3: inch" is selected, a Fixed Parameter Error will occur.
		Bit5: Axis selection	Only "0; Finite length" can be set.
19	Command Units per Revolution (Moving Amount per Servomotor Rotation)	"0; Finite length"	Refer to *Setting Method* below.
21	Gear Ratio [MOTOR]	–	Always set to "1" when using a linear servomotor.
22	Gear Ratio [LOAD]	–	Always set to "1" when using a linear servomotor.

- Setting Method

When using a linear servomotor, set the values that satisfy the following equations for the fixed parameter No. 7 Rated Speed, No. 9 High Resolution Encoder, and No. 19 Command Units per Revolution. Setting an incorrect value may cause malfunctions.

- Rated Speed : Rated speed $[m/s] \times 60 \times 1000000$ / (Linear scale pitch $[\mu m] \times \alpha$)
- High Resolution Encoder : Serial converter unit resolution [pulse/ scale pitch] $\times \alpha$
- Command Units per Revolution : Linear scale pitch $[\mu m] \times \alpha$

The coefficient α is a optional value that satisfies the following equation.

$$\frac{\text{Rated speed } [m/s] \times 60 \times 1000000}{\text{Linear scale pitch} [\mu m] \times \alpha} \leq 32000$$

［Setting Example］

The setting example is given with the following specifications.
Rated speed = 2.0 [m/s]
Linear scale pitch = 20 [μm]
Serial converter unit resolution = 256 [pulse/scale pitch]

Calculate the coefficient α :

$$\frac{\text{Rated speed [m/s]} \times 60 \times 1000000}{\text{Linear scale pitch [μm]} \times \alpha} \leq 32000$$

$$\alpha \geq \text{Rated speed} \times 60 \times 1000000 / （\text{Linear scale pitch} \times 32000）$$

$$\alpha \geq 2 \times 60 \times 1000000 / （20 \times 32000）$$

Therefore, α ≥ 187.5

α must be a optional value that satisfies the above equation.

In this example, the set values for the fixed parameters are calculated with α = 200

The following results can be calculated and set for the fixed parameters.

- Rated Speed   : 30000
- High Resolution Encoder   : 51200
- Command Units per Revolution   : 4000

3.4.2 SERVOPACK Parameters (Model SGDH)

The following SGDH SERVOPACK parameters need to be set carefully for the linear servomotor system.

Parameter No.	Name	Setting Range	Units	Factory Setting
Pn000.3	Rotation Type/Linear Type Selection	0	–	Rotary motor (Factory setting)
		1		Linear motor
Pn280[*1]	Linear Scale Pitch	0 to 65535	μm	0
Pn384[*2]	Motor Maximum Speed	1 to 100	0.1 m/s	50

* 1. The initial value is set to "0" in Pn280. Therefore, the alarm A.08 (Linear Scale Pitch Setting Error) will occur if the power is turned ON for the first time. If setting a correct value, and then turn ON the power again, the alarm will not occur.

* 2. The initial value is set to "50" in Pn384. Therefore, the alarm A.55 (Linear Servomotor Peak Speed Setting Error) may occur if the power is turned ON for the first time. If the alarm A.55 occurs, change the set value to the value of the linear servomotor to be used, and then turn ON the power again. The alarm will not occur.

Refer to the SERVOPACK manual for the details of SGDH SERVOPACK parameters.
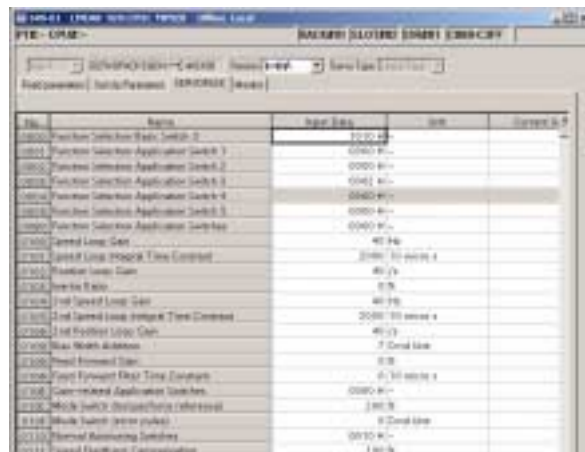
Fig. 3.7 SERVOPACK Setting Window

3.4.3 Monitoring Parameters

Table 3.2 shows the monitoring parameters characteristic of linear servomotors.
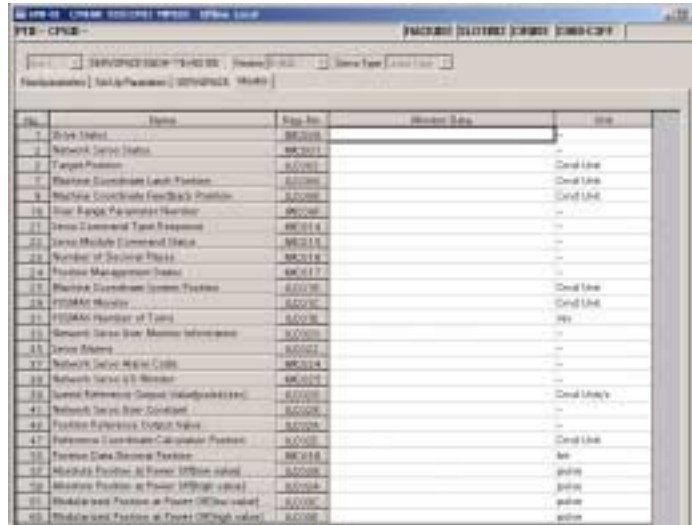
Fig. 3.8 Monitoring Setting Window of the MP920 SVB Module
(When Linear motor is selected as the motor type.)
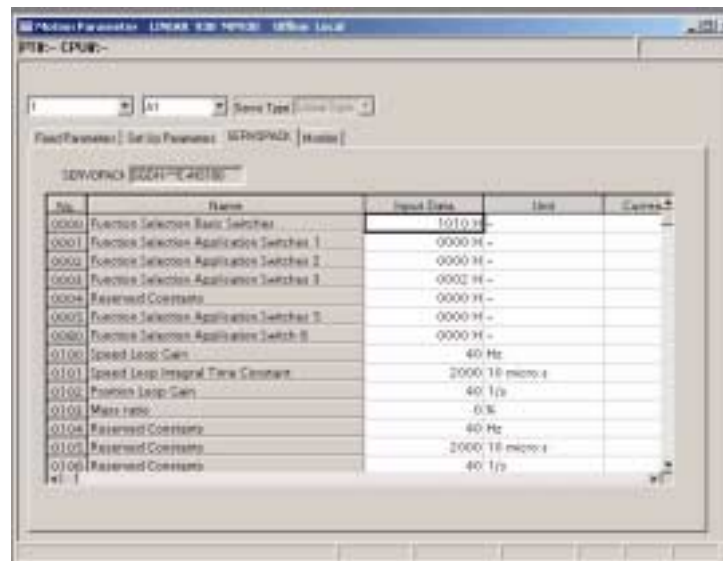
Fig. 3.9 Monitoring Setting Window of the MP930 SVB Module
(When Linear motor is selected as the motor type.)

Table 3.2 Motion Monitoring Parameters List (Linear servomotor-related only)

Address	Name	Contents
IWxx00	Drive Status	Bit E: Linear SERVOPACK
ILxx22	Servo Alarms	Bit 30: SERVOPACK Motor Type Mismatch
		Bit 31: SERVOPACK Encoder Type Mismatch
IWxx36	Position Data Decimal Position (Number of Scale Pitch Partitions)	Reports the number of scale pitch partitions.

3.5 Sample Program

This section explains the sample program that can be used for a trial operation of the linear servomotor system with the MP920 or the MP930.
Use the MPE720 to create sample programs.

IMPORTANT	• The sample programs are solely for the purpose of trial operation. Care must be taken because actual applications will differ.
	• This system for the 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.

3.5.1 Ladder Program Configuration

• The H01 drawing turns ON the servo ON and resets alarms.
• The H02 drawing controls stepping (STEP).
• Refer to *3.5.4 H Drawing*, *3.5.5 H01 Drawing*, and *3.5.6 H02 Drawing* for the details of each drawing.

3
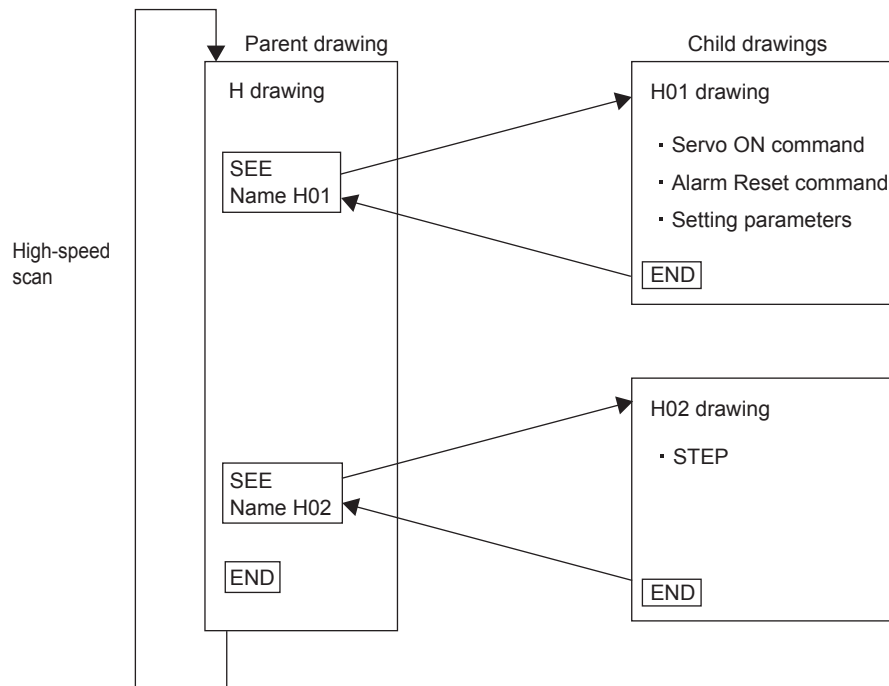
Fig. 3.10 Sample Program Configuration

3.5.2 Creation of Tuning Panel

The operation can be confirmed on the Tuning Panel window.

In this sample program, run, stop, and other operations can be checked from a Tuning Panel Window.

Create the tuning panel as shown below to check the trial operation.
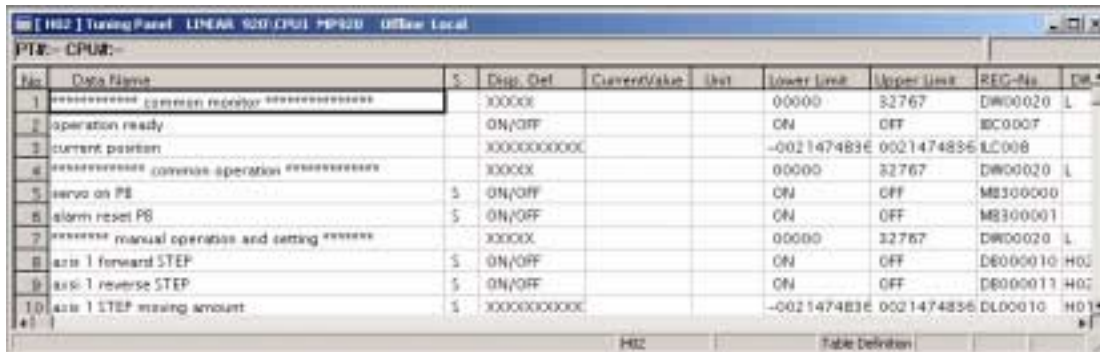
Fig. 3.11 Turning Panel Window of the MP920

3.5.3 Confirming Operation

Use the following procedure to confirm operation.

```
┌─────────────────────┐
│   Turn servo ON     │
└─────────────────────┘
          ↓
┌─────────────────────┐
│ Start stepping operation │
└─────────────────────┘
          ↓
┌─────────────────────┐
│  Confirm the operation  │
│  on Tuning Panel window │
└─────────────────────┘
```

The following table gives an outline of the operation displayed on the Tuning Panel window.

Data Name	Tuning Panel Display	Operation
Servo ON PB	Current value OFF → ON	The Servomotor is turned ON and the Servo clamped.
	Current value ON → OFF	The Servo turns OFF.
Forward STEP	Current value OFF → ON	Executes the STEP operation in the forward direction for the moving amount set in STEP Moving Amount.
	Current value ON → OFF	Stops the STEP operation. Input OFF after executing STEP operation.
Reverse STEP	Current value OFF → ON	Executes the STEP operation in the reverse direction for the moving amount set in STEP Moving Amount.
	Current value ON → OFF	Stops the STEP operation. Input OFF after executing STEP operation.
STEPMoving Amount	Input any value	Sets the STEP moving amount.

INFO ■ Actual Application Programs

In actual application programs, the programs to monitor and control registers that correspond to the signals and data listed must be created.

The register numbers that correspond to the signals used in the sample program are displayed under REG-No. next to DWG at the right of the Tuning Panel Window.

3.5.4 H Drawing

The H parent drawing controls the overall sample program
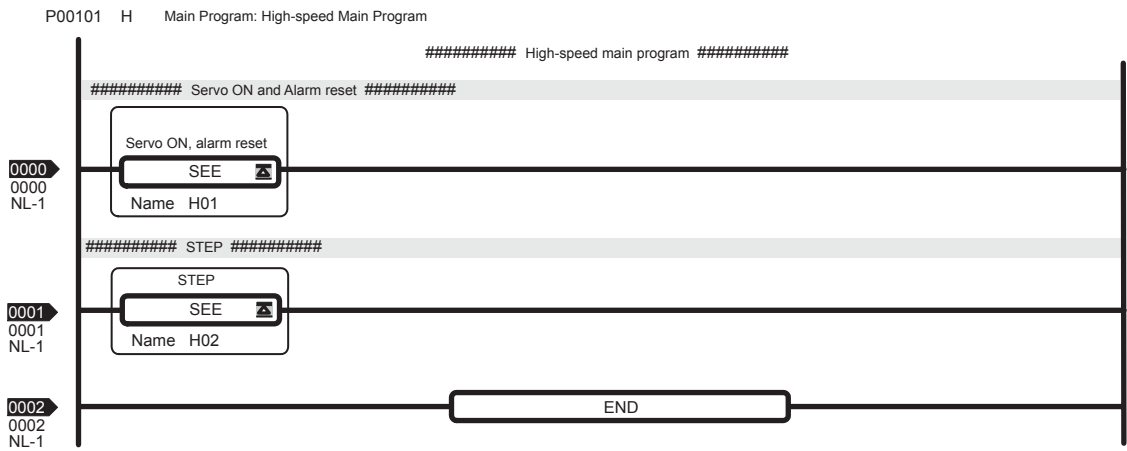
Fig. 3.12 H Drawing (Sample Program)

3.5.5 H01 Drawing

The H01 child drawing turns ON the Servo and resets alarms.
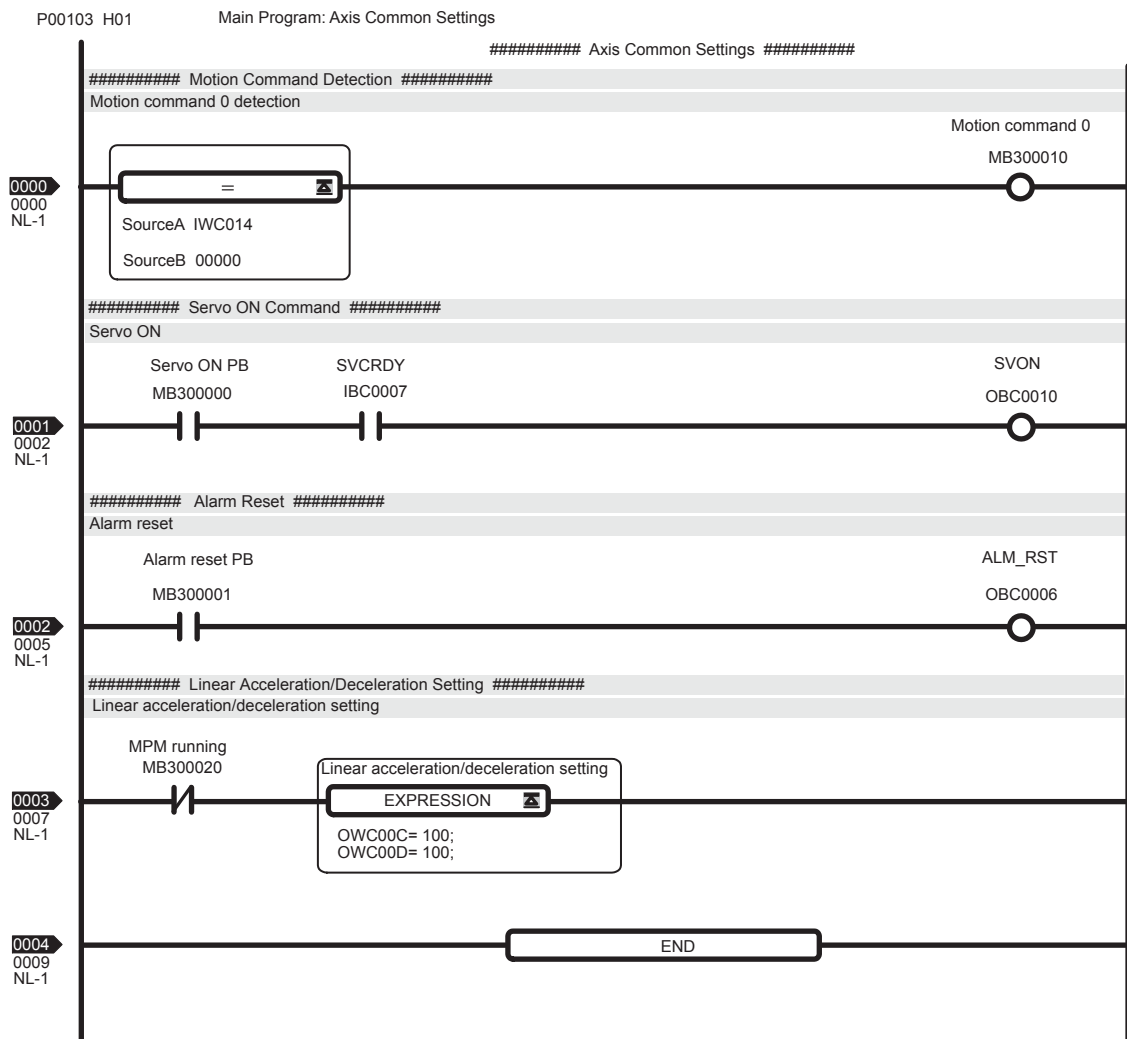
Fig. 3.13 H01 Drawing (Sample Program)

3.5.6 H02 Drawing

The H02 child drawing controls STEP operation.
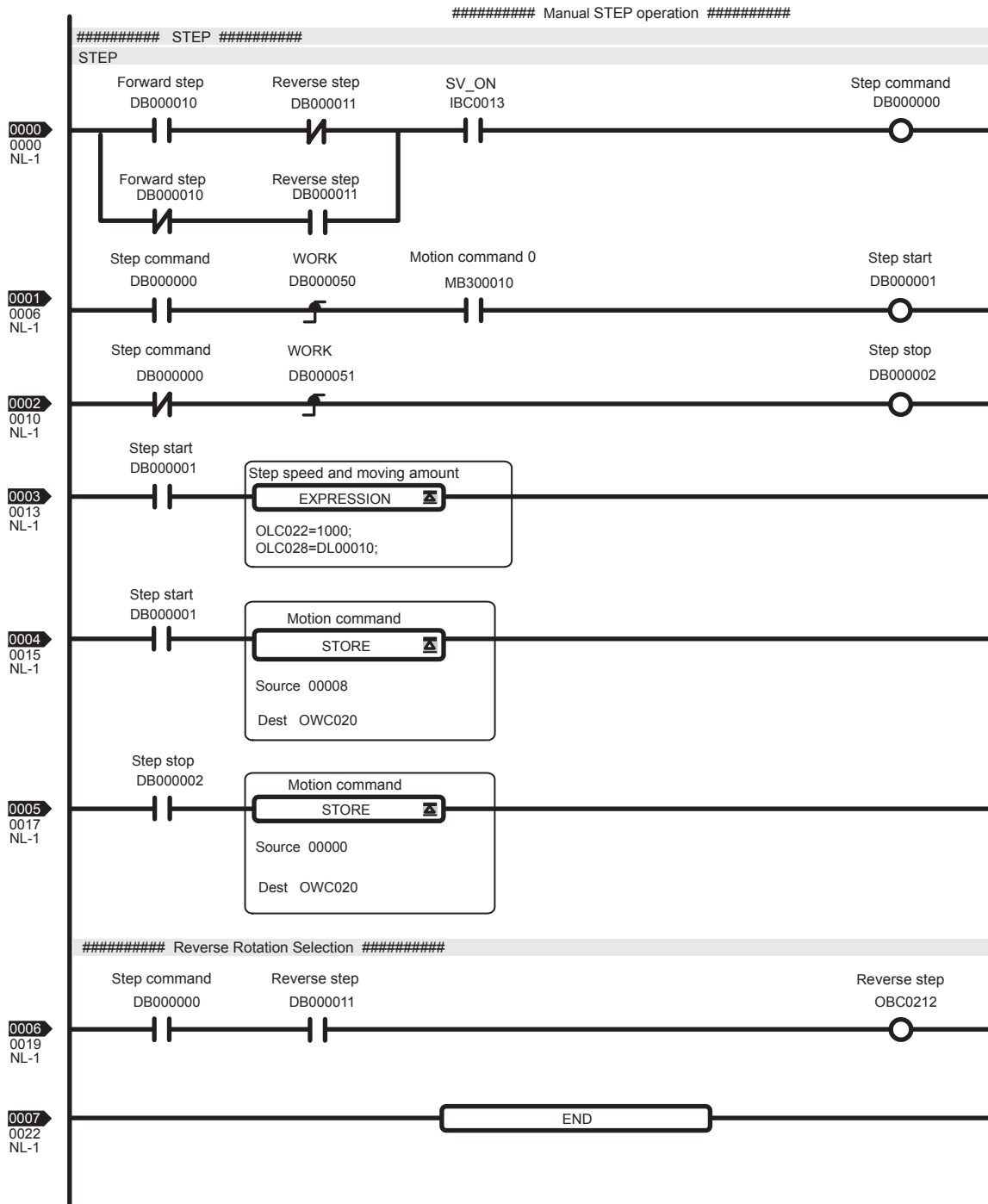
Fig. 3.14 H02 Drawing (Sample Program)

3.6 Motion Parameters List

3.6.1 Motion Fixed Parameters

IMPORTANT	Motion fixed parameters cannot be changed if the current value of bit 0 is ON (Servo ON) in motion setup parameter OW□□01, RUN Command Settings. Positions and other data are initialized when a motion fixed parameter is changed.
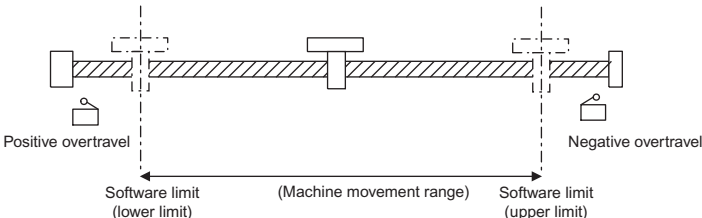
Table 3.3 Motion Fixed Parameters (MP920 and MP930)

No.	Name	Description	Default
1	Axis Enabled (USESEL)	Set whether an axis is used or not. 0: Not used. 1: Used. If an axis is set to be not used, then that axis will not be controlled and IW□□00 to IW□□3F monitoring parameters will not be refreshed. "0" will stored at Drive Status (monitoring parameter IW□□00). This parameter is not used in MP930.	0 (Not used)
2	Not used.	–	–
3	Encoder Type (ENCSEL)	This setting is ignored, and the encoder is recognized as an incremental encoder.	0 (Incremental encoder)
4	Not used.	–	–
5	Encoder Pulse Configuration (PULMODE)	This setting is ignored.	6 (A/B pulses mode, × 4)
6	Not used.	–	–
7	Rated Speed (NR)	Refer to *3.4.1 Fixed Parameters*.	3000
8	Encoder Resolution (Numbers of Feedback Pulses per Servomotor Rotation) (FBppr)	This parameter is disabled. Use the motion fixed parameter No.9.	2048
9	High Resolution Encoder (Numbers of Feedback Pulses per Servomotor Rotation) (For high resolution)	Refer to *3.4.1 Fixed Parameters*.	2048
10 to 13	Not used.	–	–
14	Functions (Additional Function Selections)	Select "1" for both bit 9 and B. Bit9: Parameter for Number of Encoder Pulses 0: Enabled fixed parameter No.8, 1: Enabled fixed parameter No. 9 Bit.B: Rotary Motor/Linear Motor 0: Rotary Motor, 1: Linear Motor	–
15	Not used.	–	–
16	Simulation Mode (SIMULATE)	The simulation mode cannot be used. If the simulation mode is set, the alarms "SERVOPACK Motor Type Mismatch" and "SERVOPACK Encoder Type Mismatch" occur.	0

3

Table 3.3 Motion Fixed Parameters (MP920 and MP930) (cont'd)

No.	Name		Description	Default
17	Servo Axis Functionality (Motion Controller Function Selection Flags) (SVFUNCSEL)		Set whether a function is enabled or disabled when a motion command is used.	–
		Bits 0 to 3	Command Unit (CMD_UNIT)	Set the reference unit that is input. 0: pulse 1: mm (Only this unit can be selected) 2: deg 3: inch (A fixed Parameter Error will occur if this unit is selected.) When a unit is selected, the minimum unit that can be used as reference is determined by the Number of Decimal Places (fixed parameter 18).	0 (Pulse)
		Bit 4	Command Unit and Electronic Gear (USE_GEAR)	Set whether or not to use the electronic gear function. 0: Disabled 1: Enabled The electronic gear is disabled even if this flag is enabled when pulse is selected as the Reference Unit Selection.	0 (Disabled)
		Bit 5	Axis Type (PMOD_SEL)	Finite length/infinite length axis selection. Set whether or not there is a limit on controlled axis movement. 0: Finite length axis 1: Infinite length axis Only "0: Infinite length axis" can be selected. The axis will have limited movement. The software limit function is enabled.	0 (Finite length axis)
		Bit 6	Not used.	–	–
		Bit 7	Forward Soft Limit (USE_SLIMP)	Set whether or not to use the software limit function in the positive direction when the Motion Command Code (setting parameter OW☐☐20) is used. 0: Disabled 1: Enabled Set the software limit at the Forward Software Limit (fixed parameter 27). • Software Limit Function Enable Timing Valid after the Zero Point Return Completed (monitoring parameter IW☐☐15, bit6) turns ON.	0 (Disabled)
		Bit 8	Reverse Soft Limit (USE_SLIMN)	Set whether or not to use the software limit function in the negative direction when the Motion Command Code (setting parameter OW☐☐20) is used. 0: Disabled 1: Enabled Set the software limit at the Reverse Software Limit (fixed parameter 29). • Software Limit Function Enable Timing Valid after the Zero Point Return Completed (monitoring parameter IW☐☐15, bit6) turns ON.	0 (Disabled)
		Bit 9	Override (USE-OV)	Set whether or not to use the speed override function. 0: Disabled 1: Enabled The Speed Override (setting parameter OW☐☐2C) is used when this parameter is set to Enabled. The speed override is fixed at 100 if this parameter is disabled. Note: The speed override function always the feed speed setting to be modified in an application.	0 (Disabled)
		Bits 10 to 11	Not used.	–	–

Table 3.3 Motion Fixed Parameters (MP920 and MP930) (cont'd)

No.	Name		Description		Default
17	Bit 12	Servo Driver Command (THROUMOD)	In this mode, the user can directly issue MECHATROLINK servo commands. 0: Disabled 1: Enabled For MECHATROLINK servo commands, setting parameters OL□□30 to OL□□36 (16 bytes) are used to send command data, and motion monitoring parameters IW□□30 to IW□□37 (16 bytes) are used to receive response data.		0 (Normal)
	Bits 13 to 14	Not used.	–		–
	Bit 15	Interpolation SEG Distribution (SEGBUF)	Always set this bit to 0 (enabled) when using interpolation-related motion commands (interpolation or interpolation with position detection).		0 (Enabled)
18	Number of Decimal Places (DECNUM)		Set the number of digits to the right of the decimal point in input reference units. The minimum reference unit is determined by this parameter and Command Unit in the Motion Controller Function Selection Flags (fixed parameter 17, bits 0 to bit 3).		3
19	Command Units per Revolution (Moving Amount per Servomotor Rotation) (PITCH)		Refer to *3.4 Setting the Motion Parameters*.		10000
21	Gear Ratio [MOTOR] (GEAR_MOTOR)		Set the following values when using a linear servomotor. • Motor Gear Ratio = 1		1
22	Gear Ratio [LOAD] (GEAR_MACHINE)		• Machine Gear Ratio = 1		1
23	Maximum Value of Rotary Counter (Reset Position of Infinite Axis) (POSMAX)		This parameter is ignored when using a linear servomotor.		360000
25	Max. Revolutions of Absolute Encoder (MAXTURN)		This parameter is ignored when using a linear servomotor.		99999
27	Forward Software Limit (SLIMP)		Set the positions at which the software limit function is to operate on the machine coordinate system. • Setting range: 1 to 2^{31}-1 [reference units]		2147483647
29	Reverse Software Limit (SLIMN)		Whether or not the software limits are used is set in bit 7 and bit 8 of the Servo Controller Function Selection Flags (fixed parameter 17). With the software limits, the upper and lower limits of the movement range for the machine system are set in fixed parameters and the operating range is constantly monitored by the controller. Positive overtravel Negative overtravel Software limit (lower limit) (Machine movement range) Software limit (upper limit)		-2147483648
31	Home Return Type (ZRETSEL)		Set the zero point return method when returning to the zero point (ZRET) using the Motion Command Code (setting parameter OW□□20). Refer to *3.6.2 Zero Point Return Method* on the next page for details. • 0: DEC1 + Phase-C pulse • 1: Zero signal • 2: DEC1 + Zero signal • 3: Phase-C pulse		0 (DEC1 + Phase-C pulse)
32 to 48	Not used.		–		–

3

3.6.2 Zero Point Return Method

Four types of zero-point return methods are available.

(1) 0: DEC 1 + Phase-C Pulse

This method has three speed levels.
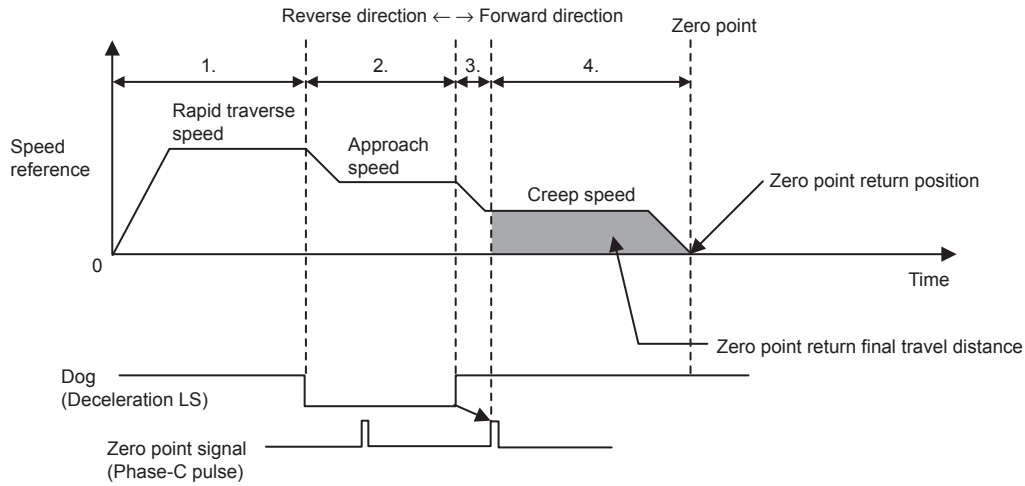
(2) 1: Zero Signal

In place of the Phase-C pulse of the Phase-C pulse method, this method uses the zero signal to return to the zero point.

This method uses just the zero signal to return to the zero point in machines that are not equipped with deceleration LS and other capabilities.
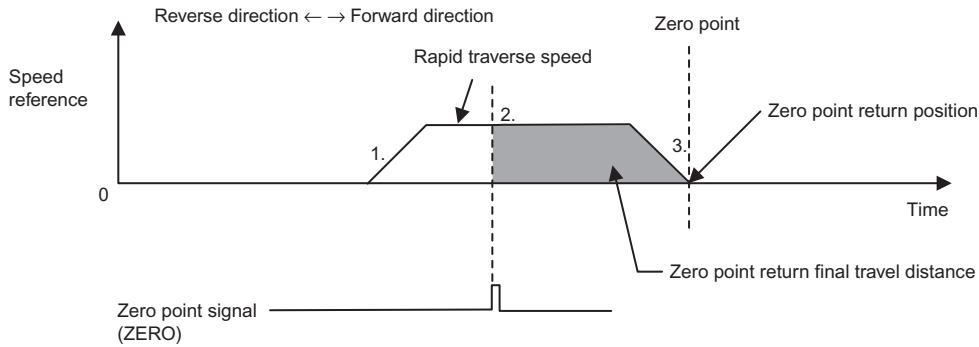
(3) 2: DEC 1 + Zero Signal

In place of the Phase-C pulse of the DEC 1 + Phase-C pulse method, this method uses the zero signal to return to the zero point.

(4) 3: Phase-C Pulse

This method uses just the Phase-C pulse of the Servomotor to return to the zero point in machines that are not equipped with deceleration LS and other capabilities.

3

3.6.3 Motion Setting Parameters

```
┌─────────────────────────────────────────────────────────────────────────┐
│                        ⚠ WARNING                                          │
├─────────────────────────────────────────────────────────────────────────┤
│ • Zero Point Offset (ABSOFF)                                              │
│   This register contains data used by a SVB Module for position control   │
│   and the following movements are                                         │
│   affected if this register is set incorrectly.  Check to see if the data │
│   is set correctly prior to starting operation.                           │
│   Obstructions may damage tools and lead to personal injury if this check │
│   is not performed.                                                       │
└─────────────────────────────────────────────────────────────────────────┘
```

Table 3.4 Motion Setting Parameters (MP920 and MP930)

No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
1	RUN Mode (RUNMOD)	OW□□00		Set the RUN mode, such as Control Mode and Alarm Reset. The bit configuration is shown below. (See *Important.*)	
			Bit 0	Not used.	Set to "0."	0
			Bit 1	Not used.	Set to "0."	0
			Bit 2	Position Control (PCON)	Used to set Position Control Mode. 0: OFF 1: ON Not used when using the MP930.	1
			Bit 3	Not used.	Set to "0."	0
			Bit 4	Not used.	Set to "0."	0
			Bit 5	Not used.	Set to "0."	0
			Bit 6	Clear Alarm (ACR)	The following monitor parameters will be cleared when this bit turns ON. • Error Counter Over (bit 0) and Motion Setup Parameter Setting Error (bit 1) of the Drive Status (monitoring parameter IW□□00). • Servo Alarms (monitoring parameter IL□□22)	0
			Bit 7	Not used.	Set to "0."	0
			Bit 8	Motion Command Code (MCDSEL)	Set whether the Motion Command Code (setting parameter OW□□20) is used or not. 0: Disable 1: Enable Always set this bit to 1 ("Valid").	1
			Bit 9	Home Direction (ZRNDIR)	Set the direction for returning to the zero point. 0: Reverse direction (position pulse in the deceleration direction) 1: Forward direction (position pulse in the acceleration direction)	0
			Bits 10 to 15	Not used.	Set to "0."	0

IMPORTANT	The SVB-01 Module of the MP920 allows position control mode only. Therefore, do not set this parameter to another mode.

Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)

No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
2	RUN Commands (SVRUNCMD)	OW□□01		Set the output signal from Motion Modules to the SERVOPACK as well as the RUN mode required for motion control. The bit configuration is described below.	
			Bit 0 / Servo	Used as the servo ON signal for the SERVOPACK. The servo command is sent to the SERVOPACK when the Motion Controller Operation Ready (IB□□00, bit 7) is set to ON and this bit is set to 1.	0
			Bits 1 to 9 / Not used.	Set to "0."	0
			Bit A / (PFNMODE) MP930 only	Select the operation mode for PFN command. (Supported by the Ver. S0A19 or later). 0: When the Second In-position Width is 0, the execution of PFN command ends at completion of SERVOPACK pulse distribution. 1: When the Second In-position Width is 0, the execution of PFN command ends at completion of SERVOPACK positioning.	0
			Bit B / Not used.	Set to "0."	0
			Bit C / Position Reference (USE_BUF) MP920 only	Set the reference method that is used for position reference data. It is valid only the Motion Command Code (setting parameter OW□□20) is used in Position Control Mode. 0: Use OL□□12 as directly as position reference data. 1: Use OL□□12 indirectly as the position buffer number. OL□□12 Directly specified [Position reference] Indirectly specified [Position buffer pointer]—100 Position buffer Position reference data 1 2 Position reference data 100 256 • The position buffer is located in the SVB Modules and must be written in the initial drawing at startup. • Refer to the Position Buffer Write (BUF_W) (setting parameter OW□□21, bit E), the Position Buffer Read (BUF_R) (setting parameter OW□□21, bit F), and Absolute Position at Power OFF (High value) (setting parameter OL□□3A) for details on writing to the position buffer.	

⚠ WARNING

• Zero Point Offset (ABSOFF)
  The OL□□06 register contains data used by a SVB Module for position control and the following movements are affected if this register is set incorrectly. Check to see if the data is set correctly prior to starting operation.
  Obstructions may damage tools and lead to personal injury if this check is not performed.
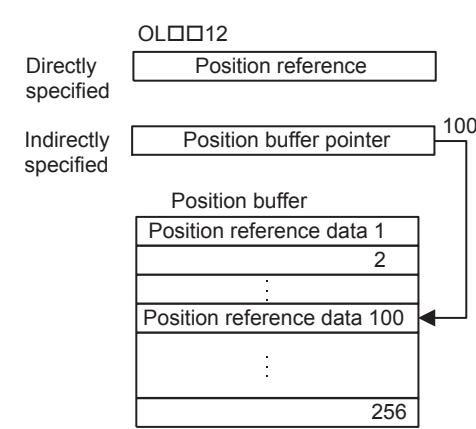
Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)
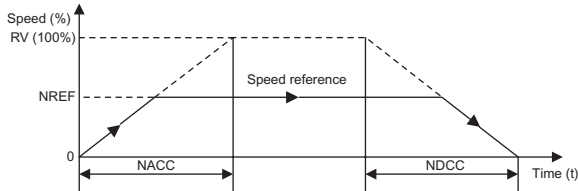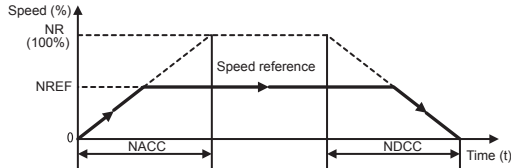
No.	Name	Register Number		Setting Range/ Bit Name	Description	Default
2	RUN Commands (SVRUNCMD) (cont'd)		Bit D	Speed Reference (SPDTYPE) MP920 only	Select a feed speed setting method. Enabled only when using the Motion Command Code (setting parameter OW□□20) in position control mode. 0: Specify the speed in reference units in OL□□22, and set the feed speed in OL□□22. Setting units: $1 = 10^n$ reference units/min 1: Specify the speed in % in OW□□15, and set the feed speed in OW□□15. Setting units: $1 = 0.01\%$	0
			Bit E	Position Reference Type (XREFTYPE) MP920 only	Set the type of data for the Position Reference Type (setting parameter OL□□12) when the Motion Command Code (setting parameter OW□□20) is used in Position Control Mode. 0: Absolute position method Sets the absolute position at OL□□12. 1: Add difference method Adds the current movement value to the previous value at OL□□12 and then sets that data at OL□□12. Note: 1. This is an absolute position method if the position reference selection is indirectly specified. 2. Set to "Add difference method" when moving axes using a motion program.	1
			Bit F	Not used.	Set to "0."	0
3 to 6	Not used.	OW□□02 to OW□□05		–	Set to "0."	0
7	Zero Point Offset (ABSOFF)	OL□□06		-2^{31} to 2^{31}-1	Position data can be shifted by the value set in this register. The parameter is valid during RUN operation, but set it while the system is OFF.	0
8 to 12	Not used.	OL□□08 to OL□□0B		–	Set to "0."	0
13	Linear Acceleration Time (NACC)	OW□□0C		0 to 32767	Set the linear acceleration time for Speed, Position Control, and Zero Point Return Modes. Unit: ms Set acceleration time from 0% to 100% (rated motor speed).	0
14	Linear Deceleration Time (NDCC)	OW□□0D		0 to 32767	Enabled when using the SGDH SERVOPACK only. Set the linear deceleration time for Speed, Position Control, and Zero Point Return Modes. Unit: ms Set deceleration time from 0% to 100% (rated motor speed).	0
15 to 16	Not used.	OW□□0E to OW□□0F		–	Set to "0."	0

Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)
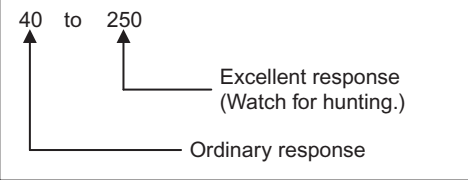
No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
17	Position Loop Gain (Kp)	OW□□10	1 to 5000	Set the position loop gain in the servo system. Position loop gain is needed to set response performance for the servo system. The following are setting guidelines. Set an appropriate value for the machine rigidity, inertia, and type of linear servomotor. • Setting range: 1 to 32767 [0.1/S]	30.0
18	Feed-forward Gain (Kf)	OW□□11	0 to 200	Reduces positioning time by applying feed forward control. • Setting range: 0 to 200 [%] Reference position and actual position error decrease with higher settings. The machine may start to vibrate if the setting is too high.	0
19	Position Reference Type (XREF)	OL□□12	-2^{31} to 2^{31}-1	Set the position reference. The meaning of the setting data depends on the Position Reference (setting parameter OW□□01, bit C) and Position Reference Type (setting parameter OB□□01, bit E). Explanation 1. Using OL□□12 as Position Reference for Absolute Position Reference Method OW□□01, bit C = 0: Directly specified OW□□01, bit E = 0: Absolute position reference 2. Using OL□□12 as Position Reference for Add Difference Method OW□□01, bit C = 0: Directly specified OW□□01, bit E = 1: Add difference 3. Using OL□□12 as Position Reference for Add Difference Method OW□□01, bit C = 1: Indirectly specified OW□□01, bit E = 0: Absolute position reference Setting 1 causes setting parameter error.	0
21	S-Curve Acceleration Time (Filter Time Constant) (NNUM)	OW□□14	• Average move filter 0 to 5100 • Exponential acceleration speed 0 to 5100	Set the time constant used for a moving average filter or exponential acceleration/deceleration filter. When the Motion Command Code (setting parameter OW□□20) is set to 12, the value set in this parameter is reflected as follows: 1. Reflected in the SERVOPACK Pn812 constant (Average Move Time) when the Filter Type (setting parameter OW□□21, bits 4 to 7) are set to 2 (Average Movement Filter). 2. Reflected in the SERVOPACK Pn811 constant (Exponential Acceleration Time Constant) when the Filter Type (setting parameter OW□□21, bits 4 to 7) are set to 1 (Exponential Filter).	0.0
22	Speed Reference (NREF) MP920 only	OW□□15	-32768 to 32767	Set the rapid traverse speed in 0.01% units (percentage of the rated speed) when the Speed Reference (setting parameter OW□□01, bit D) is set to 1.	0.00

Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)

No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
23 to 29	Not used.	OL□□16 to OW□□1C	–	Set to "0."	0
30	Speed Loop Gain (Kv)	OW□□1D	1 to 20000	Set the speed loop gain for MECHATROLINK-compatible SERVOPACKs. The value set in this parameter is reflected in the SERVOPACK Pn100 constant (Speed Loop Gain) when Motion Command Code (setting parameter OW□□20) is set to 14.	40.0
33	Motion Command Code (MCMDCODE)	OW□□20	0 to 65535	Set the motion command code to the SVB Modules. This parameter can be used under the following conditions. • Position Control (OB□□00, bit 2) • Motion Command Code (setting parameter OW□□00, bit 8) Motion Commands 0: NOP (no command) 1: Positioning (POSING) 2: External positioning (EX-POSING) 3: Zero point return (ZRET) 4: Interpolation (INTERPOLATE) 5: Reserved for system use 6: Interpolation with position detection (LATCH) 7: Feed (FEED) 8: Step (STEP) 9: Zero point setting (ZSET) 10: Change 1-step linear acceleration/deceleration time constant (ACC) 11: Not used. 12: Change moving average time constant (SCC) 13: Change filter type (CHG_FILTER) 14: Change speed loop gain Kv (KVS) 15: Change position loop gain Kp (KPS) 16: Change feed forward Kf (KFS) 17: Read servo driver Cn constant (CN_RD) 18: Change servo driver Cn constant (CN_WR) 19: Monitor current servo driver alarm (ALM_MON) 20: Monitor servo driver alarm history (ALMHIST_MON) 21: Clear servo driver alarm history (ALMHIST_CLR) 22 to 65535: Not used.	0

Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)

No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
		OW☐☐21		Set motion command auxiliary functions.	
34	Motion Command Options (Motion Command Control Flag) (MCMDCTRL)		Bit 0	HOLD	The machine decelerates to a stop if this bit turns ON while an axis is moving during positioning or step execution using the Motion Command Code (setting parameter OW☐☐20). The Command Hold Completed (HOLDL) (monitoring parameter IW☐☐15, bit 1) turns ON when the HOLD has been completed. If this bit goes back OFF at this point, the hold is canceled and positioning restarts. 0: OFF 1: ON	0
			Bit 1	ABORT	The machine decelerates to a stop if this bit turns ON while an axis is moving during positioning (code 1), zero point return (code 3), or STEP (code 8) using the Motion Command Code (setting parameter OW☐☐20). The command Executing (BUSY) (monitoring parameter IW☐☐15, bit 0) turns ON if processing has been aborted. Step execution can be aborted by setting the motion command to NOP. 0: OFF 1: ON	0
			Bit 2	DIRECTION	Set the movement direction. This bit is enabled when the Motion Command Code (setting parameter OW☐☐20) is set to constant-speed feed (code 7) or inching (code 8). 0: Forward direction 1: Reverse direction	0 (Forward direction)
			Bit 3	Speed Loop P/PI Switch (P-PI)	0: PI control 1: P control	0 (PI)
			Bits 4 to 7	Filter Type (FILTERTYPE)	Set the type of acceleration filter. 0: No filter 1: Exponential acceleration and deceleration filter (exponential acceleration and deceleration) 2: Average movement filter (simple S-shaped acceleration and deceleration) The S-Curve Acceleration Time (setting parameter OW☐☐14) is valid if this parameter is set to "1" or "2."	0 (No filter)
			Bits 8 to D	Not used.	Set to "0."	0
			Bit E	Position Buffer Write (BUF_W)	Data set in the Position Buffer Write Data (setting parameter OL☐☐3A) is stored as absolute position data in the position buffer that is set at the Position Buffer Access Number (setting parameter OL☐☐38). 0: OFF 1: ON	0
			Bit F	Position Buffer Read (BUF_R)	Data from the position buffer that is specified at the Position Buffer Access Number (setting parameter OL☐☐38) is stored as absolute position data in the position buffer that is set at the Position Buffer Read Data (setting parameter IL☐☐28). This parameter is used to check position data that is stored in the position buffer. It takes two scans from the time the Position Buffer Read command is issued until the data is stored at the Position Buffer Read Data (setting parameter IL☐☐28).	0

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Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)

No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
35	Feed Speed (RV)	OL□□22	0 to 2^{31}-1	Set the rapid traverse speed in 10n reference units/min (n: Number of digits below decimal point) if the Speed Reference (setting parameter OW□□01, bit D) is set to "0." Other setting units are expressed as follows: Pulse unit: 1 = 1000 pulses/min mm unit: 1 = 1 mm/min deg unit: 1 = 1 deg/min Inch unit: 1 = 1 inch/min	3000
37	External Positioning Move Distance (EXMDIST)	OL□□24	-2^{31} to 2^{31}-1	Set the distance the axis moves from the time a latch signal (external positioning signal) is input until the axis comes to a stop when Motion Command Code (setting parameter OW□□20) is set to 2 (External Positioning). Use the same unit as for the SERVOPACK.	0
39	Stopping Distance (STOPDIST)	OL□□26	-2^{31} to 2^{31}-1	This parameter is used by the system. Do not use it.	0
41	Step Distance (STEP)	OL□□28	0 to 2^{31}-1	Set the travel distance in reference units for Step (code 8) execution for the Motion Command Code (setting parameter OW□□20). • Unit: Reference unit	0
43 to 44	Not used.	OL□□2A	–	Set to "0."	0
45	Speed Override (OV)	OW□□2C	0 to 32767	Set the speed override for the output speed as a percentage of the Feed Speed (setting parameter OL□□22) in 0.01% units. Rapid Traverse Speed Output: Feed Speed × Override = Output speed (OL□□22) (OW□□2C) This parameter is valid when fixed parameter No. 17: Override Selection (bit 9 of Motion Controller Function Selection Flags) is set to Enabled.	100.0

Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)

No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
46	Position Control Management (POSCTRL)	OW□□2D		Set the functions related to position data managed by SVB Modules. The bit configuration is described below.	
			Bit 0	Machine Lock (MLK)	The axis does not actually move, but rather the Target Position (monitoring parameter IL□□02) is refreshed in Machine Lock Mode. This parameter is valid when the Distribution Completed (monitoring parameter IW□□15, bit 2) is ON if the bit is changed.	0
			Bit 1	POSMAX Preset (TPRSREQ)	Set to "0" when using a linear servomotor.	0
			Bit 2	Retain ABS. Rotary Position Data (ABS System Infinite Length Position Control Data Load Request) (ABSLDREQ)	Set to "0" when using a linear servomotor.	0
			Bits 3 to B	Not used.	Set to "0."	0
			Bits C to F	Servo Monitor Data (USRMONSEL)	These bits are used to monitor the following position information in MECHATROLINK-compatible SERVOPACK. The monitor information is stored in IL□□20. 0: Reference position in the reference coordinate system 1: Machine reference position in the machine coordinate system 2: Position error 3: Feedback position in the machine coordinate system 4: Counter latch position in the machine coordinate system 5: Internal reference position in the reference coordinate system 6: Internal reference position in the reference coordinate system 7: Not used. 8: Feedback speed 9: Reference speed A: End target reference position B: Torque reference C: Not used. D: Not used. E: Option monitor 1 F: Option monitor 2	0
47	Work Coordinate Offset (OFFSET)	OL□□2E	-2^{31} to $2^{31}-1$	Always set this parameter to "0." It is used by the system.	0
49	Preset Data of POSMAX Turn (TURNPRS)	OL□□30	-2^{31} to $2^{31}-1$	The POSMAX Number of Turns (monitoring parameter IL□□1E) can be preset with preset data by turning ON the Request for POSMAX Preset (setting parameter OW□□2D, bit 1). It is used in situations such as when resetting the number of turns to "0."	0

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Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)

No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
51	2nd In Position Width (INPWIDTH)	OW□□32	0 to 65535	Set the range where the Second In-position Completed (monitoring parameter IW□□17, bit 2) will turn ON. This bit turns ON if the difference between the reference position and the feed-back position is within the specified range when the Distribution Completed (monitoring parameter IW□□15, bit 2) turns ON.	0
52	Home Window (Zero Point Position Output Width) (PSETWIDTH)	OW□□33	0 to 65535	Set the zero point position range. The Zero Point Position (monitoring parameter IW□□17, bit 1) will turn ON if $0 \leq$ |Machine Coordinate System Position (monitoring parameter IL□□18)| $\leq$ Zero Point Position Output Width when the Zero Point Return Completed (monitoring parameter IW□□15, bit 6) turns ON.	10
53	Position Complete Timeout (PSETTIME)	OW□□34	0 to 65535	Set limits for detecting the Positioning Time Over (monitoring parameter IL□□22, bit 2) in 1 = 1 ms. A positioning time over alarm will be generated if the Positioning Completed (monitoring parameter IW□□00, bit D) does not turn ON when this range is exceeded after bit 2 of the Distribution Completed (monitoring parameter IW□□15, bit 2) turns ON. The completion of positioning will not be checked if this parameter is set to "0."	0
54	Servo Constant Number (Cn_No.)	OL□□35	–	This parameter can be used in the following three ways. ■ Servo Driver Pn Constant No. (Pn_No.): Valid when Motion Command Code (setting parameter OW□□20) is set to 17 (CN_RD) or 18 (CN_WR). Bits 0 to 11: Cn constant No. Bits 12 to 15: Number of words ■ Current Servo Driver Alarm Monitor No.: Valid when Motion Command Code (setting parameter OW□□20) is set to 19 (ALM_MON). Specify a number between 0 and 5. The alarm code corresponding to the specified monitor number is stored in IW□□24. ■ Servo Driver Alarm History Monitor No.: Valid when Motion Command Code (setting parameter OW□□20) is set to 20 (ALMHIST_MON). Specify a number between 0 and 9. The alarm code corresponding to the specified monitor number is stored in IW□□24.	0
55	Servo Constant Setting (Cn-DAT)	OL□□36	-2^{31} to 2^{31}-1	Valid when Motion Command Code (setting parameter OW□□20) is set to 18 (CN_WR).	0

Table 3.4 Motion Setting Parameters (MP920 and MP930) (cont'd)

No.	Name	Register Number	Setting Range/ Bit Name	Description	Default
57	Absolute Position at Power OFF [Low Value] or Position Buffer Access Number	OL□□38	-2^{31} to 2^{31}-1		0
59	Absolute Position at Power OFF [High Value] or Position Buffer Write Data	OL□□3A	-2^{31} to 2^{31}-1	This parameter is disabled when using a linear servomotor.	0
61	Modularized Position at Power OFF [Low Value] (aposL)	OL□□3C	-2^{31} to 2^{31}-1		0
63	Modularized Position at Power OFF [High Value] (aposH)	OL□□3E	-2^{31} to 2^{31}-1		0

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3.6.4 Motion Monitoring Parameters

Table 3.5 Motion Monitoring Parameters (MP920 and MP930)

No.	Name	Register No.	Setting Range/ Bit Name	Description
1	Drive Status (RUNSTS)	IW□□00		Monitors SVB Modules operating status. The bit configuration is described below.
			Bit 0	Not used.	–
			Bit 1	Motion Setup Parameter Setting Error (PRMERR)	Turns ON when one or more of the motion setting parameters (OW□□00 to OW□□3F) is set outside the setting range. In this case, the most recent motion setting parameter number that caused the setting range alarm will be indicated at the Over Range Parameter Number (monitoring parameter IW□□0F).
			Bit 2	Motion Fixed Parameter Setting Error (FPRMERR)	Turns ON when a motion fixed parameter is set outside the setting range. In this case, the most recent motion setting parameter number that caused the setting range alarm plus 100 will be indicated at the Over Range Parameter Number (monitoring parameter IW□□0F). Turns OFF automatically if an ordinary motion fixed parameter is set from the MPE720.
			Bits 3 to 6	Not used.	–
			Bit 7	Motion Controller Operation Ready (SVCRDY)	Turns ON when RUN preparations for SVB Modules have been completed. The following may be reason why RUN preparations are not completed. 1. Major fault has occurred. 2. Axis Enabled (fixed parameter 1) is set to "Not used." The following may be reason why RUN preparations are not completed. 3. Motion fixed parameter setting error occurred. 4. Motion fixed parameters are being changed.
			Bit 8	Motion Controller RUN (SVCRUN)	Turns ON under the following conditions. • The Motion Controller Operation Ready (monitoring parameter IB□□00, bit 7) turns ON. • The Control Mode Flags (setting parameter OW□□00, bit 2) turns ON. • The Servo (setting parameter OB□□01, bit 0) turns ON. If an alarm is generated even though this bit is ON in Position Control Mode when the Motion Command Code (setting parameter OW□□20) is used, the axis will not move even if a motion command is issued. After clearing the alarm, set the motion command to "NOP" for at least one scan and then set the motion command again.
			Bits 9 to C	Not used.	–
			Bit D	Positioning Completed Signal (POSCOMP)	Turns ON when MECHATROLINK-compatible SERVOPACK status is "positioning completed" (PSET = ON).
			Bit E	Linear SERVOPACK	Turns ON when using a SERVOPACK for linear servomotors.
			Bit F	Not used.	–

Table 3.5 Motion Monitoring Parameters (MP920 and MP930) (cont'd)

No.	Name	Register No.		Setting Range/ Bit Name	Description
2	Network Servo Status (SVSTS)	IW☐☐01			Monitors the MECHATROLINK-compatible SERVOPACK status.
			Bit 0	ALARM	Turns ON when an alarm is detected in the SERVOPACK. An alarm can be cleared by turning ON the Clear Alarm. Related parameter: • Clear Alarm (setting parameter OW☐☐00, bit 6)
			Bit 1	WARNG	Turns ON when a warning is detected in the SERVOPACK. A warning can be cleared by turning ON the Alarm Clear. Related Parameter: • Clear Alarm (setting parameter OW☐☐00, bit 6)
			Bit 2	CMDRDY	Turns ON when the system is ready to receive MECHATROLINK commands.
			Bit 3	SVON	Turns ON when the Servo turns ON.
			Bit 4	PON	Turns ON while the main power supply is ON.
			Bit 5	MLOCK	Turns ON in machine lock state. The machine lock mode can be set in the Machine Lock (setting parameter OW☐☐2D, bit 0).
			Bit 6	ZPOINT	Turns ON when the Machine Coordinate Feedback Position is within the zero point position range that is set. The zero point position range can be set in the parameter Pn803. Related parameter: • Machine Coordinate Feedback Position (APOS) (monitoring parameter IL☐☐08)
			Bit 7	PSET	Turns ON if the position monitor or hardware counter current value is within the positioning completion width of the target position at the completion of pulse distribution. The positioning completed width can be set in the parameter Pn500. Related parameters: • Distribution Completed (monitoring parameter IW☐☐01, bit 8) • Machine Coordinate Feedback Position (APOS) (monitoring parameter IL☐☐08)
			Bit 8	DEN	Turns ON when the command position is at the final target position (position reference distribution completed).
			Bit 9	T_LIM	Turns ON when the force reference is limited to the force limit value. The force limits can be set in the parameter Pn483 (Forward Force Limit) and Pn484 (Reverse Force Limit)
			Bit A	L_CMP	The Latch Mode enters during execution of a latch command. Turns ON at completion of creating the latched position data after receiving a latch signal. The Latch Mode is reset and turns OFF when receiving a command other than latch command.*

* Latch commands: Motion command EX_POSING (OW☐☐20 = 2) and ZRET (OW☐☐20 = 3)

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Table 3.5 Motion Monitoring Parameters (MP920 and MP930) (cont'd)

No.	Name	Register No.	Setting Range/ Bit Name	Description
2	Network Servo Status (SVSTS) (cont'd)	Bit B	NEAR	Turns ON if the position monitor or hardware counter current value is within the positioning proximity detection width of the target position. The positioning proximity detection width can be set in the parameter Cn-0007.[1] Related Parameter: • Machine Coordinate Feedback Position (APOS) (monitoring parameter IL□□08)
		Bit C	P-SOT (Not used)	Not used because the SERVOPACK P-SOT mask is set.[2]
		Bit D	N-SOT (Not used)	Not used because the SERVOPACK N-SOT mask is set.[3]
		Bit E and F	RESERVED	Area for system reserved
3	Target Position (Machine Coordinate Calculation Position) (CPOS)	IL□□02	-2^{31} to $2^{31}-1$	Indicates the calculated position in a machine coordinate system controlled by SVB Modules. Normally the position data indicated at this register is the target position for each scan.
5	Not used.	IL□□04	–	–
7	Machine Coordinate Latch Position (LPOS)	IL□□06	-2^{31} to $2^{31}-1$	Indicates the latch position in a machine coordinate system controlled by SVB-01 Modules. It is refreshed when the Motion Command Code (setting parameter OW□□20) is set to 1 (External Positioning) or 6 (Interpolation with Position Detection Function) and latching is completed. 1 = 1 reference unit (when specified as pulse units: 1 = 1 pulse)
9	Machine Coordinate Feedback Position (APOS)	IL□□08	-2^{31} to $2^{31}-1$	Indicates the feedback position in a machine coordinate system controlled by SVB-01 Modules. 1 = 1 reference unit (when specified as pulse units: 1 = 1 pulse) Note: The parameter value is not updated during machine lock.
11 to 15	Not used.	IL□□0A to IW□□0E	–	–
16	Over Range Parameter Number (ERNO)	IW□□0F	• Motion setting parameter 1 to 64 • Motion fixed parameter 101 to 148	Indicates the most recent setup parameter number that exceeded the range in OW□□00 to OW□□3F motion setting parameter or motion fixed parameter settings. • Motion setting parameters: 1 to 64 • Motion fixed parameters: 101 to 148
17 to 20	Not used.	IW□□10 to IW□□13	–	–
21	Servo Command Type Response (MCM-DRCODE)	IW□□14	0 to 65535	Indicates the Motion Command Code (setting parameter OW□□20) that is currently executing. Refer to OW□□20 for details on motion commands.

* 1. The completion of pulse distribution does not affect the NEAR (monitoring parameter IW□□01, bit B).

* 2. The bit 0 of SERVOPACK constant Pn801 (P-SOT Mask) must be set to "1".

* 3. The bit 1 of SERVOPACK constant Pn801 (N-SOT Mask) must be set to "1".

Table 3.5 Motion Monitoring Parameters (MP920 and MP930) (cont'd)

No.	Name	Register No.		Setting Range/ Bit Name	Description
22	Servo Module Command Status (MCMDSTS)	IW□□15			Monitors the executing status of the Motion Command Code (setting parameter OW□□20). The bit configuration is described below.
			Bit 0	Command Executing (BUSY)	Indicates the motion command status. 0: READY (completed) 1: BUSY (processing) This bit is used for abort status.
			Bit 1	Command Hold Completed (HOLDL)	Turns ON when a HOLD is completed. Refer to individual motion functions for details on the HOLD function.
			Bit 2	Distribution Completed (DEN)	Turns ON when the amount of movement cleared is completed.
			Bit 3	Zero Point Setting Completed (ZSET)	Turns ON when the zero point setting (ZSET) has been executed by Motion Command Code (setting parameter OW□□20).
			Bit 4	External Positioning Signal Latched (EX_LATCH)	Turns ON when an external positioning signal is input during external positioning (EX_POSING) or interpolation with position detection functions (LATCH).
			Bit 5	Command Error Occurrence (FAIL)	Turns ON if an alarm occurs while a move (positioning, fixed speed feed, etc.) command is being executed. Operation cannot be continued once this bit turns ON. Set the Motion Command Code (setting parameter OW□□20) to "NOP" for at least one scan. The SVA Modules LED indicates (¦) when this bit turns ON.
			Bit 6	Zero Point Return Completed (ZRNC)	Turns ON when zero point return or zero point setting has been completed. Turns OFF when zero point return begins.
			Bits 7 to F	Not used.	–
23	Number of Decimal Places (DECNUMM)	IW□□16		0 to 5	Indicates the Number of Decimal Places (fixed parameter 18).

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Table 3.5 Motion Monitoring Parameters (MP920 and MP930) (cont'd)

No.	Name	Register No.		Setting Range/ Bit Name	Description
24	Position Management Status (POSSTS)	IW□□17			Monitors status related to position controlled by SVB Modules. It is valid in Position Control Mode when the Motion Command Code (setting parameter OW□□20) is used. The bit configuration is described below.
			Bit 0	Machine Lock ON (MLKL)	Turns ON when machine lock is ON. When this bit is ON, the controlled axis is locked and remains stopped.
			Bit 1	Zero Point Position (ZERO)	Turns ON when the Zero Point Return Completed (monitoring parameter IW□□15, bit 6) has been completed and when $0 \leq$ |Machine Coordinate System Position (monitoring parameter IL□□18| $\leq$ Home Window (setting parameter OW□□33).
			Bit 2	Second In-position Completed (PSET2)	Turns ON when the Distribution Completed (monitoring parameter IW□□15, bit 2) is ON and when |Machine Coordinate Feedback Position (monitoring parameter IL□□08) - Machine Coordinate System Position (monitoring parameter IL□□18)| $\leq$ 2nd In Position Width (setting parameter OW□□32).
			Bit 3	ABS System Infinite Length Position Control Information LOAD Completed (ABSLDE)	Disabled when using a linear servomotor.
			Bit 4	POSMAX Turn Number Presetting Completed (TPRSE)	Disabled when using a linear servomotor.
			Bit 5	Electronic Gear Enabled Selection (GEARM)	Disabled when using a linear servomotor.
			Bit 6	Axis Selection (MODSELM)	Indicates the Axis Type (fixed parameter 17, bit 5).
			Bits 7 to B	Not used.	–
			Bits C to F	Servo Driver User Monitor Information Selection Response (USRMON-SELR)	Contain the type of monitor information that is applicable to the value stored in the Network Servo User Monitor Information (monitoring parameter IL□□20). 0 to F
25	Machine Coordinate System Position (MPOS)	IL□□18		-2^{31} to $2^{31}-1$	This parameter is the reference position in the machine coordinate system and is basically the same value at the Target Position (monitoring parameter IL□□02). This position data cannot be refreshed if the Machine Locked (monitoring parameter IW□□17, bit 0) is ON. It is valid in Position Control Mode when the Motion Command Code (setting parameter OW□□20) is used.
27	Not used.	IL□□1A		–	–
29	POSMAX Monitor (PMAX-TURN)	IL□□1C		1 to $2^{31}-1$	This parameter is disabled when using a linear servomotor.
31	POSMAX Number of Turns (PMAX-TURN)	IL□□1E		-2^{31} to $2^{31}-1$	This parameter is disabled when using a linear servomotor.

Table 3.5 Motion Monitoring Parameters (MP920 and MP930) (cont'd)

No.	Name	Register No.	Setting Range/ Bit Name	Description
33	Network Servo User Monitor Information (USRMON)	IL□□20	-2^{31} to $2^{31}-1$	Indicates the user monitor information of the MECHATROLINK servodriver specified in bits 12 to 15 of OW□□2D.
35	Servo Alarms (ALARM)	IL□□22		This parameter is valid in Position Control Mode when the Motion Command Code (setting parameter OW□□20) is used. Alarm data and a halt to operation are indicated if this register shows anything other than "0." The register can be cleared by starting up the Clear Alarm (setting parameter OW□□00, bit 6). If an alarm occurs, the SVB Modules indicators will indicate (¸¡). The bit configuration is described below.
			Bit 0 / SERVOPACK Error (SVERROR)	Detects SERVOPACK alarm. For alarm details, refer to IW□□24.
			Bit 1 / Positive Overtravel (OTF)	Turns ON when the positive overtravel signal is input and a move command is executed in the positive direction.
			Bit 2 / Negative Overtravel (OTR)	Turns ON when the negative overtravel signal is input and a move command is executed in the negative direction.
			Bit 3 / Positive Soft Limit (SOTF)	Valid if the Zero Point Return Completed (monitoring parameter IW□□15, bit 6) turns ON when the positive software limit is enabled and an infinite length axis is selected. 1. Motion Command Code (setting parameter OL□□20) Interpolation (code 4) This bit turns ON when the Machine Coordinate System Position (monitoring parameter IL□□18) + Stopping Distance (setting parameter OL□□26) ≥ Forward Software Limit (fixed parameter 27). 2. Motion Command (setting parameter OL□□20) Positioning (code 1), Feed (code 7), or Step (code 8) This bit turns ON when the Machine Coordinate System Position (monitoring parameter IL□□18) ≥ Forward Software Limit (fixed parameter 27).
			Bit 4 / Negative Soft Limit (SOTR)	Valid if the Zero Point Return Completed (monitoring parameter IW□□15, bit 6) turns ON when the negative software limit is enabled and an infinite length axis is selected. 1. Motion Command Code (setting parameter OL□□20) Interpolation (code 4) This bit turns ON when the Machine Coordinate System Position (monitoring parameter IL□□18) + Stopping Distance (setting parameter OL□□26) ≤ Reverse Software Limit (fixed parameter 29). 2. Motion Command Code (setting parameter OL□□20) Positioning (code 1), Feed (code 7), or Step (code 8) This bit turns ON when the Machine Coordinate System Position (monitoring parameter IL□□18) ≤ Reverse Software Limit (fixed parameter 29).
			Bit 5 / Servo OFF (SVOFF)	Turns ON if Motion Command Code (setting parameter OW□□20) is set to a movement command such as Positioning or Step when the Servo (setting parameter OW□□01, bit 0) is set to OFF.
			Bit 6 / Positioning Time Over (TIMEOVER)	Turns ON if positioning is not completed within the time specified in the Position Complete Timeout (setting parameter OW□□34) after command distribution is completed.
			Bit 7 / Positioning Travel Distance Over (DISTOVER)	Turns ON when a move command exceeding the maximum positioning travel distance was executed.

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Table 3.5 Motion Monitoring Parameters (MP920 and MP930) (cont'd)

No.	Name	Register No.	Setting Range/ Bit Name	Description
35	Servo Alarms (ALARM) (cont'd)		Bit 8	Filter Type Change Error (FIRTYPERR)	Turns ON if the filter type is changed before command distribution is completed.
			Bit 9	Filter Time Constant Change Error (FILTIMERR)	Turns ON if the filter time constant is changed before command distribution is completed.
			Bit A	Control Mode Error (MODERR)	Turns ON when the Motion Command Code (setting parameter OW□□20) is set to a move command (such as positioning and JOG operation) except when in Position Control (setting parameter OW□□00, bit 2).
			Bit B	Zero Point Not Set (ZSET_NRDT)	Turns ON if a movement command is executed before the zero point is set.
			Bit C	Not used.	–
			Bit D	Not used.	–
			Bit E	Servo Driver Synchronization Communication Error (WDT_NRDY)	Turns ON when a MECHATROLINK-compatible SERVOPACK synchronous communications error is detected.
			Bit F	Servo Driver Communication Error (COM_ERR)	Turns ON when two consecutive MECHATROLINK-compatible SERVOPACK communications errors are detected.
			Bit 16	Servo Driver Command Timeout Error (SVTIMOUT)	Turns ON if a MECHATROLINK-compatible SERVOPACK command is not completed within the specified time.
			Bit 17	ABS Encoder Count Exceeded (ABSOVER)	Turns ON when the absolute encoder count exceeds the maximum limit for the SVB Modules.
			Bits 18 to 29	Not used.	–
			Bit 30	SERVOPACK Motor Type Mismatch	Turns ON when the motor type set in the Motor Type (fixed parameter 14, bit B) disagrees with the motor type set in the SERVOPACK constant Pn000.3 Rotary/Linear Motor Selection.
			Bit 31	SERVOPACK/ Encoder Type Mismatch	Turns ON when the motor type set in the Motor Type (fixed parameter 14, bit B) disagrees with the actually connected motor type.
37	Network Servo Alarm Code (SVALARM)	IW□□24	-32768 to 32767	Used to monitor alarm codes that are generated in MECHATROLINK-compatible SERVOPACK. Code 99H is displayed during normal operation.

Table 3.5 Motion Monitoring Parameters (MP920 and MP930) (cont'd)

No.	Name	Register No.		Setting Range/ Bit Name	Description
38	Network Servo I/O Monitor	IW□□25			Used to monitor I/O monitor information for the MECHATROLINK-compatible SERVOPACK.
			Bit 0	Forward OT Input (P-OT)	Forward rotation OT input signal
			Bit 1	Reverse OT Input (N-OT)	Reverse rotation OT input signal
			Bit 2	Deceleration LS Input (DEC)	Deceleration LS input signal
			Bit 3	Encoder Phase-A Input (PA)	Encoder Phase-A input signal
			Bit 4	Encoder Phase-B Input (PB)	Encoder Phase-B input signal
			Bit 5	Encoder Phase-C Input (PC)	Encoder Phase-C input signal
			Bits 6 to 8	Not used.	–
			Bit 9	Brake status input (BRK)	Brake status input signal
			Bits A to F	Not used.	
39	Speed Reference Output Value (RVMON)	IL□□26		-2^{31} to $2^{31}-1$	Used to debug the system.
41	Network Servo User Constant (CNMON)	IL□□28		-2^{31} to $2^{31}-1$	When the Motion Command Code (setting parameter OW□□20) is set to 17, the SERVOPACK Pn constant data specified in OW□□35 is stored.
	Position Buffer Read Data (CNMON)				Position data from the position buffer specified at the Position Buffer Access Number (setting parameter OL□□38) is read and stored at this parameter when the Position Buffer Read (setting parameter OW□□21, bit F) turns ON. It takes about 2 scans from the time that the Position Buffer Read (setting parameter OW□□21, bit F) turns ON until data is stored at this register.
43	Position Reference Output Value (XREFMON)	IL□□2A		-2^{31} to $2^{31}-1$	Used to debug the system. 1 = 1 pulse
45	Not used.	IL□□2C		–	–
47	Reference Coordinate Calculation Position (POS)	IL□□2E		-2^{31} to $2^{31}-1$	This parameter is disabled when using a linear servomotor.
49 to 56	Not used.	IL□□30 to IW□□37		–	–

3

Table 3.5 Motion Monitoring Parameters (MP920 and MP930) (cont'd)

No.	Name	Register No.	Setting Range/ Bit Name	Description
57	Absolute Position at Power OFF [Low Value]	IL□□38	-2^{31} to $2^{31}-1$	These parameters are used for ABS system infinite length position control. Encoder Position at Shutdown and Pulse Unit Position at Shutdown are paired data that together are called ABS System Infinite Length Position Control Information. ABS System Infinite Length Position Control Information must be saved periodically to M registers using a low-speed drawing (DWG.L).
59	Absolute Position at Power OFF [High Value]	IL□□3A	-2^{31} to $2^{31}-1$	
61	Modularized Position at Power OFF [Low Value]	IL□□3C	-2^{31} to $2^{31}-1$	
63	Modularized Position at Power OFF [High Value]	IL□□3E	-2^{31} to $2^{31}-1$	

4

System Startup (MP940)

This chapter explains the trial operation procedure to do a trial operation of a system with a linear servodrive and a MP940 machine controller.

4

4.1 Trial Operation Flowchart

This section describes the procedure to do a trial operation of a system with a linear servomotor and a MP940.

⚠ WARNING

• Before performing a trial operation using a controller, be sure to confirm that the motor will run out of control by performing a trial operation using SERVOPACK internal references.

The procedure to do a trial operation are shown below.
Refer to the section or manual specified in reference column for more information on the operation.

Procedure	Reference
1. Equipment Preparation Prepare the equipment required for the trial operation.	*4.3 Equipment Preparation*
2. Controller Preparation Mount a MP940 on the SGDH SERVOPACK.	MP940's manual [1]
3. Initialization of MP940 and SGDH SERVOPACK Initialize the MP940 and SGDH SERVOPACK.	MP940's manual [1] Manual of SERVOPACK for linear servomotors [2]
4. Installation and Wiring Install the Linear Servomotor, and make necessary wirings.	Manual of SERVOPACK for linear servomotors [2]
5. Trial Operation Using SERVOPACK internal References Use the panel operator or digital operator to run the linear servomotor in JOG operation.	Manual of SERVOPACK for linear servomotors [2]
6. Starting of MPE720 Set the system definitions such as module configuration and scan time setting.	MPE720's manual [3]
7. Setting the Motion Parameters Set the motion parameters using a MPE720.	*4.4 Setting the Motion Parameters*
8. Creation and Saving of Programs Create the program for trial operation using the MPE720.	*3.5 Sample Programs* MPE720's manual for the operation method [3]
9. Transferring the Programs Create the program for trial operation using the MPE720.	MPE720's manual [3]
10. Trial Operation Execute the program to check the operation.	*3.5 Sample Programs*

[1]. Machine Controller MP940 User's Manual for Design and Maintenance (Manual No. SIEZ-C887-4.1)
[2]. Linear Σ Series SGL□□/SGDH User's Manual (Manual No. SIEPS80000019)
[3]. Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (Manual No. SIEPC88070005)

4.2 System Configuration Example

The following diagram shows the example of simple system configuration to explain the trial operation of linear servomotor system with a MP940.

SGDH SERVOPACK + MP940

MPE720

200 VAC →
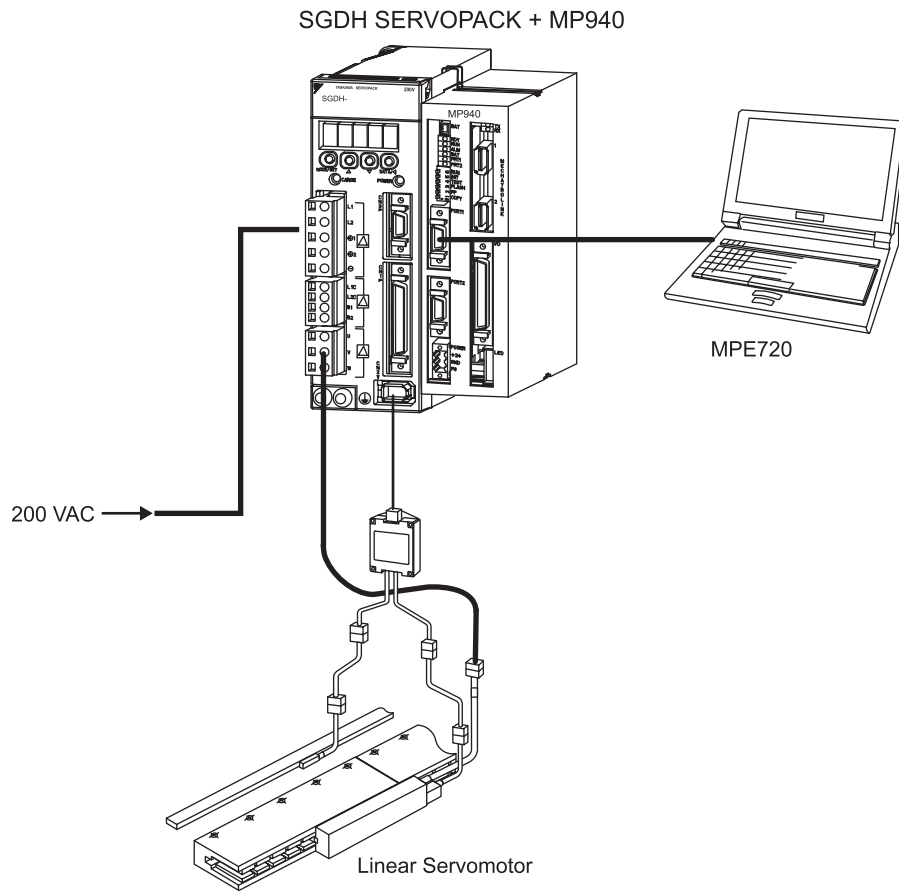
Linear Servomotor

Fig. 4.1 Linear Servomotor System with a MP940

| IMPORTANT | Use a MP940 Ver. B02 or later when using a linear servomotor. |

4

4.3 Equipment Preparation

Prepare the following equipment for the trial operation. (The items shown below are the minimum requirements for a trial operation.)

(1) Controller-related Equipment

Product Name	Product Model	Quantity
MP940[*1]	JEPMC-MC400	1
Personal computer	A commercially-available personal computer	1
MPE720[*2]	CPMC-MPE720 (Ver. 4.50 or later)	1
MEMOBUS cables	JEPMC-W5314-03	1

* 1. Refer to *Machine Controller MP940 User's Manual for Design and Maintenance (manual No. SIEZ--C887-4.1)* for more information on MP940.

* 2. Refer to *Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual (manual No. SIEPC88070005)* for more information on MPE720.

(2) Servodrive-related Equipment

Product Name	Product Model	Quantity
Σ-II SERVOPACKs *	SGDH-□□□E	1
Linear servomotors *	SGL□W/SGL□M series	1
Serial converter unit *	JZDP-A00□-□□□	1
Linear servomotor main circuit cables *	JZSP-CLN□□-□□	1
Encoder cables *	JZSP-CLL00-□□	1
Serial converter unit connection cables *	JZSP-CLP70-□□	1
Hall sensor connection cables *	JZSP-CLL10-□□	1
Digital operator	JUSP-OP02A	1

* Refer to *Linear Σ Series SGL□□/SGDH User's Manual (manual No. SIEPS80000019)* for more information on linear servomotor and SERVOPACK.

4.4 Setting the Motion Parameters

This section explains the setting method of motion parameters and SERVOPACK parameters for the Linear Servomotor system with a MP940.

The other trial operation procedure can be performed as well as a rotary servomotors. Refer to MP940's User's Manual.

4.4.1 Fixed Parameters

Select *Linear Type* for the motor type in the *Fixed Parameters* Tab and save the new settings.

After setting the motor type to *Linear Motor*, confirm that bit B of the fixed parameter No. 14 Functions is set to "1".

The bit B is set to "1"

Fig. 4.2 Fixed Parameter Setting Window of the MP940

Table 4.1 shows the fixed parameters characteristic of linear servomotors.
Set the parameters, referring to Table 4.1.
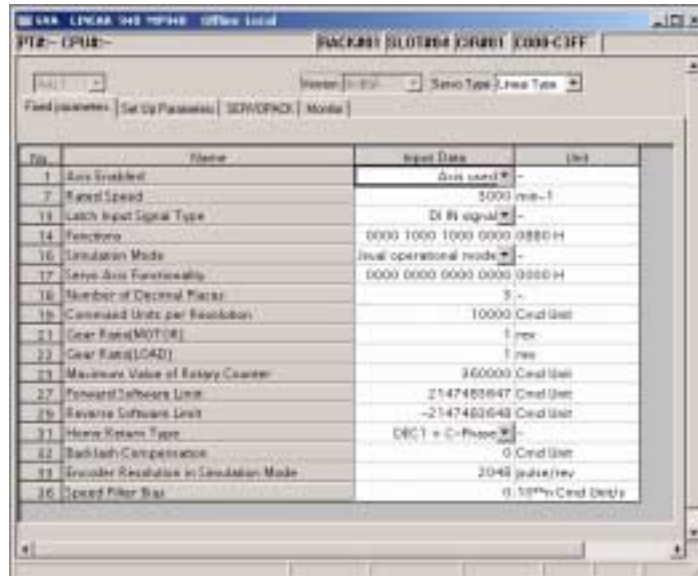
Fig. 4.3 Fixed Parameter Setting Window of the MP940
(When linear motor is selected for the motor type)

Table 4.1 Fixed Parameters List (Linear servomotor-related only)

No.	Name	Setting Range	Meanings	Remarks
7	Rated Speed	1 to 32000	–	This parameter is disabled.
14	Functions (Additional Function Selections)	Bit7: Motion command code selection *	0: Rotary motor 1: Linear motor	Newly added
16	Simulation Mode	0 to 2	–	This parameter is disabled for linear servomotor.
17	Servo Axis Functionality (Motion Controller Function Selection Flags)	Bit0 to Bit3: Command Unit	Select the reference unit that is input.	For linear servomotor, only "0: pulse" and "1: mm" are enabled. If "2: deg" or "3: inch" is selected, the Motion Fixed Parameter Setting Error occurs.
		Bit5: Axis Type	0: Finite length 1: Infinite length	Always set to "0: Finite length" for linear servomotor.
		Bit6: Backlash Compensation Enabled Selection		
19	Command Units per Revolution (Moving Amount per Servomotor Rotation)	1 to 2^{31}-1	–	Always disabled for linear servomotor system
21	Gear Ratio [MOTOR]	–		
22	Gear Ratio [LOAD]	–		
32	Backlash Compensation	0 to 32767		
33	Encoder Resolution in Simulation Mode (Number of Feedback Pulses per Servomotor Rotation)	4 to 2147483647		

IMPORTANT

1. The parameters listed above can be edited or set on the MPE720. However, the MP940 judges the linear or rotary motor type when the bit 11 of fixed parameter No. 14 is set to "1: Linear motor".
   When the bit 11 of fixed parameter No. 14 is changed to 1 (Linear Motor), the SERVOPACK type on the SERVOPACK Parameter Setting Window of MPE720 will be changed to SERVOPACK for linear servomotor.

2. When the bit 8 of the setting parameter OWC000 is set to 0: Motion Command Code Enable/Disable, an application program can be created without using motion commands even if the bit 7 of the fixed parameter No. 14 is set to "1."

4.4.2 Setting Parameters

Table 4.2 shows the setting parameters characteristic of linear servomotors.

Table 4.2 Setting Parameters List (Linear servomotor-related only)

No.	Name	Setting Range	Meanings	Remarks
2	Magnetic Pole Detection Directive OWC001, bit 11	–	0: Without polarity detection 1: Polarity detection command	This parameter is ignored when "With hall sensor" is set for SERVOPACK.
11	Approach Speed Setting OWC00A	0 to 32767	–	For linear servomotor, the selectable setting units are limited to mm/min, pulse/min, and percentage (%) to the rated speed.
12	Creep Speed Setting OWC00B	0 to 32767	–	For linear servomotor, the selectable setting units are limited to mm/min, pulse/min, and percentage (%) to the rated speed.
35	Feed Speed OLC022	0 to 2^{31}-1	–	For linear servomotor, the selectable setting units are limited to mm/min and pulse/min.

Note: To execute the polarity detection from the MP940, set the SERVOPACK constant Pn50D.3 as follows.
Pn50D.3 = 8 (Sets the signal /P-DET OFF (disabled))
The polarity detection request can be output even at occurrence of alarms (except for ILC033, bit 30 and 31.)

4

4.4.3 Monitoring Parameters

Table 4.3 shows the monitoring parameters characteristic of linear servomotors.
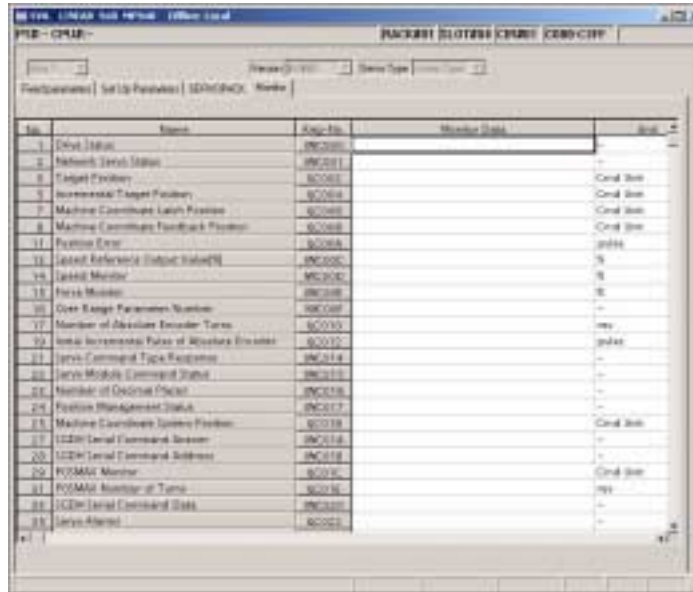
Fig. 4.4 Monitoring Setting Window of the MP940

Table 4.3 Monitoring Parameters List (Linear servomotor-related only)

No.	Name		Meanings	Remarks
1	Drive Status (Motor Type) IWC000, bit 14		0: Rotary Motor 1: Linear Motor	Reflected according to the setting of Pn000.3.
2	Servodrive Status (Magnetic Pole Detection) IWC001. bit15		0: Polarity not detected 1: Polarity detection completed	The output to the SGDH SERVOPACK shared memory is directly reflected. Always ON when "With Hall Sensor" is selected.
35	Servo Alarms ILC022	Bit30	The fixed parameter setting is different from the setting of SGDH SERVOPACK parameter Pn000.3.	Enabled only for linear servomotor. The alarm is cleared by turning OFF the power and then ON.
		Bit31	The motor type of the fixed parameter is different from the actually connected motor type.	Enabled only for linear servomotor. The alarm is cleared by turning OFF the power and then ON.

The bit 30 or 31 of the monitoring parameter ILC022 are output under the following conditions.

■Bit30

①MP940 Fixed Parameter No. 14, bit 11 = 1: Linear Motor

SGDH SERVOPACK Parameter Pn000.3 = 0: Rotary Motor

With the above settings, the MP940 is connected to a SGDH SERVOPACK without serial encoder, and the power is turned ON.

②MP940 Fixed Parameter No14, bit11 = 0: Rotary Motor

SGDH SERVOPACK Parameter Pn000.3 = 1: Linear Motor

With the above settings, the MP940 is connected to a SGDH SERVOPACK without serial encoder, and the power is turned ON.

■Bit31

①MP940 Fixed Parameter No14, bit11 = 1: Linear Motor

With the above setting, the MP940 is connected to a SGDH SERVOPACK connected to a rotary motor, and the power is turned ON.

②MP940 Fixed Parameter No14, bit 11 = 0: Rotary Motor

With the above setting, the MP940 is connected to a SGDH SERVOPACK connected to a linear motor, and the power is turned ON.

INFO
> When the Magnetic Pole Detection (monitoring parameter IWC001, bit F) is completed, the Servo ON command (OWC001, bit 0 = ON) is ignored and the servo will not be turned ON because of the user settings of the SGDH SERVOPACK.

4.4.4 SERVOPACK Parameters (Model SGDH)

The following SGDH SERVOPACK parameters need to be carefully set for the linear servomotor system.

Parameter No.	Name	Setting Range	Units	Factory Setting
Pn000.3	Rotation Type/Linear Type Selection	0	–	Rotation type (Factory Setting)
		1		Linear type
Pn280[*1]	Linear Scale Pitch	0 to 65535	μm	0
Pn384[*2]	Motor Maximum Speed	1 to 100	0.1 m/s	50

* 1. The initial value is set to "0" in Pn280. Therefore, the alarm A.08 (Linear Scale Pitch Setting Error) will occur when the power is turned ON for the first time. If setting a correct value, and then turn ON the power again, the alarm will not occur.

* 2. The initial values is set to "50" in Pn384. Therefore, the alarm A.55 (Linear Servomotor Peak Speed Setting Error) may occur if the power is turned ON for the first time. If the alarm A.55 occurs, change the set value to the value of the linear servomotor to be used, and then turn ON the power again. The alarm will not occur.

Refer to the SGDH SERVOPACK manual for the details of SGDH SERVOPACK parameters.
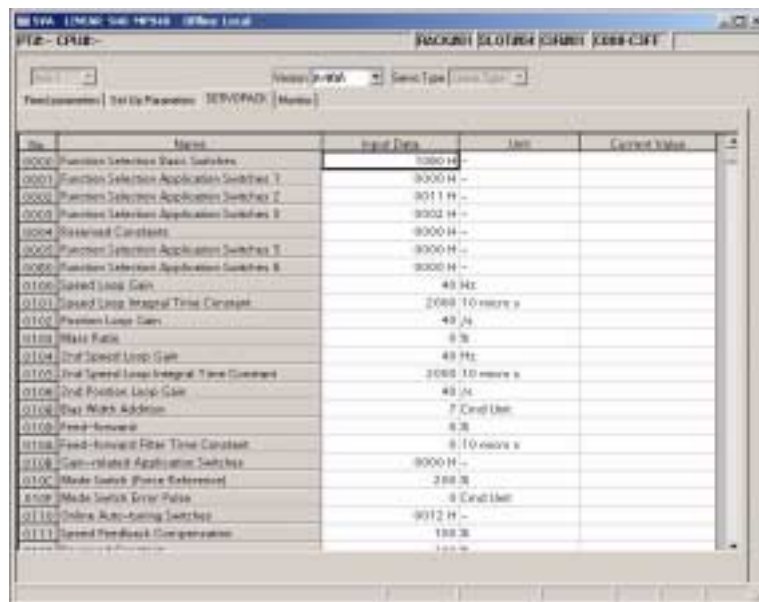
Fig. 4.5 SERVOPACK Setting Window

4.5 Sample Program

The sample program for a linear servomotor system with a MP940 is the same as that for a linear servomotor system with a MP920 or MP930.
Refer to *3.5 Sample Program*.

4.6 Motion Parameters List

4.6.1 Motion Fixed Parameters

IMPORTANT	Motion fixed parameters cannot be changed if the current value of bit 0 is ON (Servo ON) in motion setting parameter OWC001, RUN Command Settings. Positions and other data are initialized when a motion fixed parameter is changed.

Table 4.4 Motion Fixed Parameters (MP940)

No.	Name	Description			Default
1	Axis Enabled (USESEL)	Set whether an axis is used or not. 0: Not used. 1: Used. If an axis is set to be not used, then that axis will not be controlled and IWC000 to IWC03F monitor parameters will not be updated. Error information, however, will be stored in the Drive Status (IWC000) and alarm information will be stored in Servo Alarms (ILC022).			1
7	Rated Speed (NR)	This parameter is disabled.			3000
12	Not used.	–			

13	Latch Input Signal Type (DIINTSEL)	Set the external signal that is used to latch DI.
		0: DI input signal
		  Use the DI signal (the EXT3 Signal of the SERVOPACK) as a latch signal.
		1: Phase-C pulse input signal
		  Use the phase-C pulse as the latch signal.
		You can also use this parameter to select the latch signal during the EX_POSING (external positioning) and LATCH (interpolation with position detection function) motion commands.
					0

14	Functions (Additional Function Selections) (AFUNCSEL)	Set additional functions, such as the signal type used and signal functions.			
		Bit 0 to 1	Not used.	–	
		Bit 2	Home Switch (LIMITSEL)	Set whether to use the Zero Point Return Deceleration Point Limit Signal (monitoring parameter OWC001, bit F) or DI signal (DEC signal of the SERVOPACK) as the limit switch signal when returning to the zero point. 0: Use the bit F of the OWC001. 1: Use the DI signal DEC signal of the SERVOPACK (CN1-41) When using the bit F of the OWC001, the external signal in the user program must be connected (i.e., programmed) to the bit F of the OWC001.	0
		Bit 3 to 6	Not used.	–	
		Bit 7	Motion Command Code (MCMDSEL)	Set whether or not to use the Motion Command Code (setting parameter OWC020) when the Position Control (setting parameter OWC000, bit 2) is selected. 0: Not used. 1: Used. **Always set to "1" when using a linear servomotor.**	1 (Used)
		Bit 8 to 11	Not used.	–	
		Bit 12 to 15	Following Error Scaling (EOV_MULTI)	The deviation error is detected using the value of $\times 2^{EOV\_MULTI}$ of the Following Error Limit (setting parameter OWC00F). • Setting range: 0 to 15	0
15	Not used.	–			

4
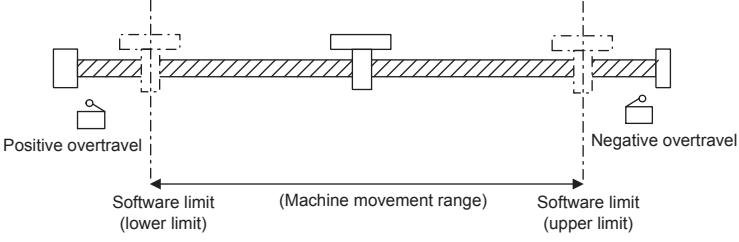
Table 4.4 Motion Fixed Parameters (MP940) (cont'd)

No.	Name			Description	Default
16	Simulation Mode (SIMULATE)		–	The simulation mode is disabled when using a linear servomotor. If "1: Simulation mode" is selected, the setting is ignored and recognized as "0: Normal operation mode".	0 (Normal operation)
17	Servo Axis Functionality (Motion Controller Function Selection Flags) (SVFUNCSEL)			Set whether a function is enabled or disabled when a motion command is used.	
		Bit 0 to 3	Command Unit (CMD_UNIT)	Set the reference unit that is input. 0: pulse (electronic gear disabled) 1: mm 2: deg 3: inch Set 0 to 3. When a unit is selected, the minimum unit that can be used as reference is determined by the Number of Decimal Places (fixed parameter 18).	0 (pulse)
		Bit 4	Command Unit and Electronic Gear (USE_GEAR)	Set whether or not to use the electronic gear function. 0: Disabled 1: Enabled The electronic gear is disabled even if this flag is enabled when pulse is selected as the command unit.	0 (Disabled)
		Bit 5	Axis Type (PMOD_SEL)	Disabled when using a linear servomotor.	0 (Finite length axis)
		Bit 6	Backlash (USE_BKRSH)	Disabled when using a linear servomotor.	0 (Disabled)
		Bit 7	Positive Soft Limit (USE_SLIMP)	Set whether or not to use the software limit function in the positive direction when the Motion Command Code (setting parameter OWC020) is used (Set the override of interpolation system command to the register set by the group definition). 0: Disabled 1: Enabled Set the software limit at fixed parameter 27. Software Limit Function Enable Timing Valid after the Zero Point Return Completed (monitoring parameter IWC015, bit 6) turns ON.	0 (Disabled)
		Bit 8	Negative Soft Limit (USE_SLIMN)	Set whether or not to use the software limit function in the negative direction when the Motion Command Code (setting parameter OWC020) is used. 0: Disabled 1: Enabled Set the software limit at fixed parameter 29. Software Limit Function Enable Timing Valid after the Zero Point Return Completed (monitoring parameter IWC015, bit 6) turns ON.	0 (Disabled)

Table 4.4 Motion Fixed Parameters (MP940) (cont'd)

No.	Name		Description	Default
17		Bit 9	Override (USE_OV)	Set whether or not to use the override function. 0: Disabled 1: Enabled The Speed Override (setting parameter OWC02C) is used when this parameter is set to Enabled. The override is fixed at 100 if this parameter is disabled. • The override function allows the feed speed setting to be modified in an application.	0 (Disabled)
		Bit A	DI Latch Signal Type Function Selection (Deceleration LS Inversion Selection) (INV_DEC)	Set whether or not to invert and use the limit switch signal (speed limit switch) when returning to the zero point. 0: Do not invert 1: Invert	0 (Not inverted)
		Bit B to C	Not used.	–	
		Bit D	Positive Over Travel (OVT1-SEL)	Set whether or not to use the overtravel function in the positive direction. 0: Disabled 1: Enabled	0 (Disabled)
		Bit E	Negative Over Travel (OVT2-SEL)	Set whether or not to use the overtravel function in the negative direction. 0: Disabled 1: Enabled	0 (Disabled)
		Bit F	Not used.	–	0
18	Number of Decimal Places (DECNUM)		Set the number of digits to the right of the decimal point in input reference units. The minimum reference unit is determined by this parameter and the Command Unit (bits 0 to bit 3 of the Servo Axis Functionality).	3
19	Command Units per Revolution (Moving Amount per Servomotor Rotation) (PITCH)		This parameter is disabled when using a linear servomotor.	10000
21	Gear Ratio [MOTOR] (GEAR_MOTOR)			1
22	Gear Ratio [LOAD] (GEAR_MACHINE)			1
23	Maximum Value of Rotary Counter (Reset Position of Infinite Axis) (POSMAX)		This parameter is disabled when using a linear servomotor.	360000

4

Table 4.4 Motion Fixed Parameters (MP940) (cont'd)

No.	Name	Description	Default
27	Forward Software Limit (SLIMP)	Set the positions at which the software limit function is to operate on the machine coordinate system. Setting range: 1 to 2^{31}-1 [reference units]	2^{31}-1
29	Reverse Software Limit (SLIMN)	Whether or not the software limits are used is set in bit 7 and bit 8 of the Servo Axis Functionality (fixed parameter 17). Positive overtravel Negative overtravel Software limit (lower limit) (Machine movement range) Software limit (upper limit)	-2^{31}
31	Home Return Type (ZRETSEL)	Set the zero point return method when returning to the zero point (ZRET) using the Motion Command Code (setting parameter OWC020). Refer to Zero Point Return Method on the next page for details.	0 (DEC1 + Phase-C pulse)
32	Backlash Compensation	This parameter is disabled when using a linear servomotor.	0
33	Encoder Resolution in Simulation Mode (Numbers of Feedback Pulses per Servomotor Rotation)	This parameter is disabled when using a linear servomotor.	2048
36	Speed Filter Bias (Bias Speed for Exponential Acceleration/ Deceleration Filter) (EXPBIAS)	Set the bias speed for exponential acceleration/deceleration with bias.	0
37 to 48	Not used.	–	

4.6.2 Zero Point Return Method

Eight types of zero-point return methods are available.

(1) 0: DEC 1 + Phase-C pulse

This method has three speed levels.
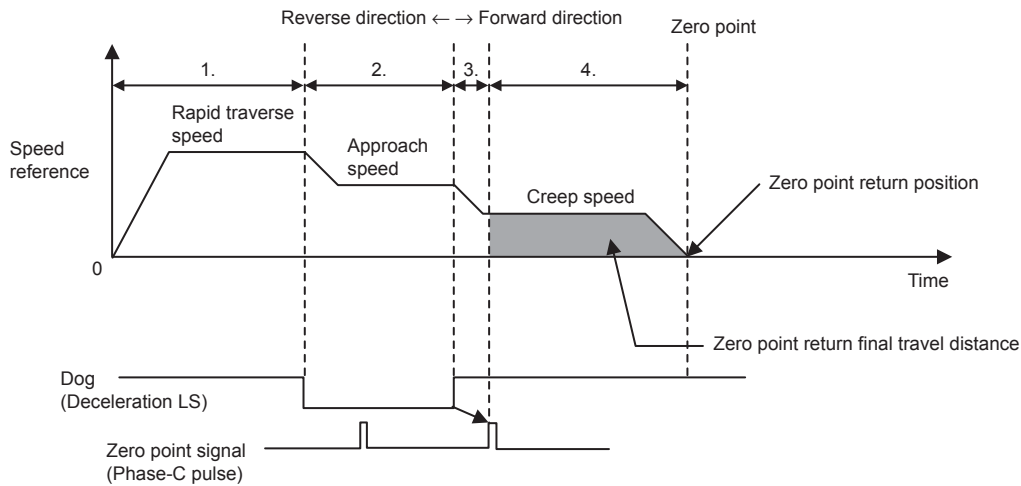
(2) 1: ZERO Signal

This method uses the ZERO signal instead of the phase-C pulse in the phase-C pulse method to return to the zero point.

(3) 2: DEC1 + ZERO Signal

This method uses the ZERO signal instead of the phase-C pulse in the DEC1 + phase-C pulse method to return to the zero point.

(4) 3: Phase-C Pulse

This method uses just the phase-C pulse of the servomotor to return to the zero point in machines that are not equipped with deceleration LS and other capabilities.
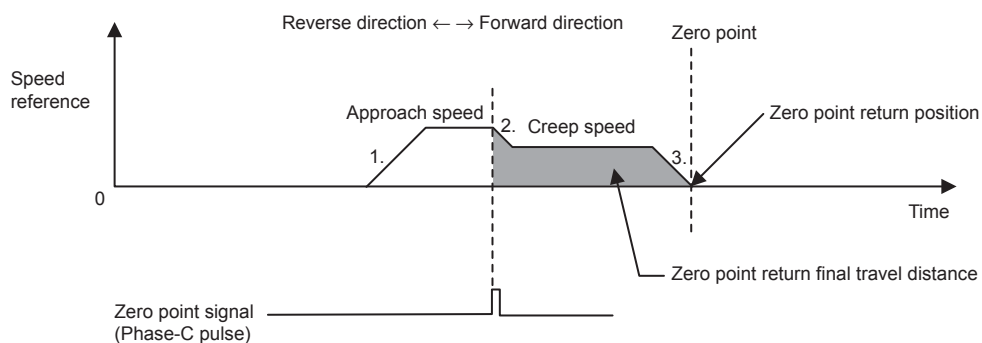
IMPORTANT   Connect the ZERO signal to EXT2 on the SERVOPACK.

4

(5) 4: DEC2 + ZERO Signal

This method uses the ZERO signal instead of the phase-C pulse in the DEC2 + phase-C pulse method to return to the zero point.

(6) 5: DEC1 + LMT + ZERO Signal

This method uses the ZERO signal instead of the phase-C pulse in the DEC1 + LMT + phase-C pulse method to return to the zero point.

(7) 6: DEC 2 + Phase-C pulse

This method searches for the zero point at creep speed after going in reverse at approach speed.

It is used for machine which requires excellent repeatability accuracy.
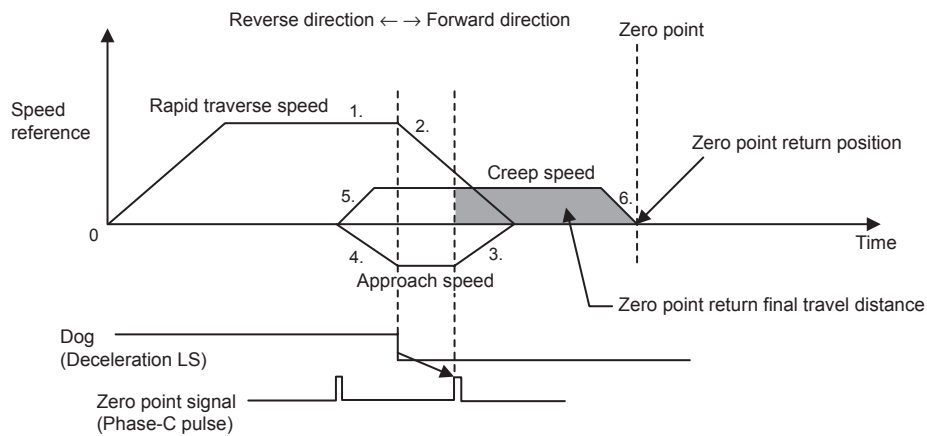
(8) 7: DEC 1 + LMT + Phase-C pulse

This method gets the current position from the forward/reverse LMT signal and escapes automatically. It can return to the zero point from any position.

4.6.3 Motion Setting Parameters

```
⚠ WARNING
```

• Zero Point Offset (ABSOFF)
This register contains data used by MP940 for position control and the following movements are affected if this register is set incorrectly. Check to see if the data is set correctly prior to starting operation.

Obstructions may damage tools and lead to personal injury if this check is not performed.

• Control Mode Priority

The priority of the RUN Mode Settings (setting parameter OWC000) and the RUN Commands (setting parameter OWC001) is as follows:

The highest priority control mode will be executed if both turned ON at the same time.

```
High                    Priority                    Low
←——————————————————————————————————————————→
RUN > ZRN > NCON > TCON > PCON > PHCON
```

• Operation When Turning OFF the RUN Signal While the Motor is Running

If the Servo ON (setting parameter OWC 001, bit 0) turns OFF during operation, operation will depend on the Control Mode.

1. Position Control, Speed Reference Output, Phase Control, or Zero Point Return Mode
The RUN signal will remain ON from the current speed reference until the machine decelerates to a stop in accordance with the Linear Deceleration Time Constant (setting parameter OWC00D) that was set.

2. Torque/Thrust Reference Output Mode
If the RUN signal turns OFF, 0 is output immediately as the speed reference, and the servo ON signal is turned OFF.

Table 4.5 Motion Setting Parameters

No.	Name	Register Number	Bit Name	Description	Default
1	RUN Mode (RUNMOD)	OWC000		Set the RUN mode, such as Control Mode and Alarm Reset. The bit configuration is shown below.	
			Bit 0	Speed Control (NCON)	Used to set Speed Reference Output Mode.	0
			Bit 1	Force Control (TCON)	Used to set Torque Reference Output Mode.	0
			Bit 2	Position Control (PCON)	Used to set Position Control Mode.	1
			Bit 3	Phase Control (PHCON)	Used to set Phase Control Mode	0
			Bit 4	Home Control (ZRN)	Used to set Zero Point Return Mode.	0
			Bit 5	Phase Control Test (PHTEST)	Set whether the results of phase reference calculations and PI control calculations are valid or not in Phase Control Mode. 0: Not valid 1: Valid When Not Valid is selected, this parameter functions much like the Speed Reference Output Mode with the Filter Time Constant and Acceleration/Deceleration Time Constant.	0
			Bit 6	Clear Alarm (ACR)	The following monitor parameters will be cleared when this bit turns ON. • Error Counter Over (monitoring parameter IWC000, bit 0) and Motion Setting Parameter Setting Error (monitoring parameter IWC000, bit 1) • Servo Alarms (ILC022)	0

Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
1	RUN Mode (RUNMOD) (cont'd)	Bit 7	Close Position Loop Using OL□□16 (Phase Reference Generation Operation Disable) (PHREFOFF)	Set whether to use phase control for the electronic shaft or electronic gear. 0: Electronic shaft 1: Electronic gear Phase Control Loop (Electronic Shaft) 1. Integrates the standard speed reference and calculates the corresponding position (pulse). 2. Generates a speed reference from the difference between the target position (CPOS) and the current position (APOS). This is position (phase) correction. 3. When shifting phase, the amount of shift (the moving amount of the servomotor axis converted to pulses) is added as the phase correction setting. • Electronic Cam Control Loop Phase reference generation calculation disabled The integration circuit is cut off when (bit 7 of OWC000) turns ON. The electronic cam control loop cuts off the integration circuit for the standard speed reference and provides a position reference based on the phase compensation setting.	0
		Bit 8	Motion Command Mode (MCDSEL)	Set whether the Motion Command Code (setting parameter OWC020) is used or not. 0: Not valid 1: Valid Valid when use (= 1) is set for the Motion Command Selection (fixed parameter 14, bit 7)	1
		Bit 9	Home Direction (ZRNDIR)	Set the direction for returning to the zero point. 0: Reverse direction (position pulse in the deceleration direction) 1: Forward direction (position pulse in the acceleration direction)	0
		Bit 10	Read ABS. Position at Power-up (ABSRD)	The absolute position data will be read from the absolute encoder when this bit turns ON. The Absolute Position Read Completed Signal (setting parameter IWC000, bit B) will turn ON when the data has been read. This parameter is used if the SERVOPACK is turned OFF while the MP940 is ON.	0
		Bit 11	Feed-forward Compensation	When the Feed-forward Gain (setting parameter OWC011) is set to other than 0, the speed reference value output is increased momentary by the feed forward value when switching to control mode even when using the same speed command (e.g., speed to position). 0: Feed forward compensation OFF 1: Feed forward compensation ON	0
		Bit 12	Not used.	Set to "0."	0

Table 4.5 Motion Setting Parameters (cont'd)

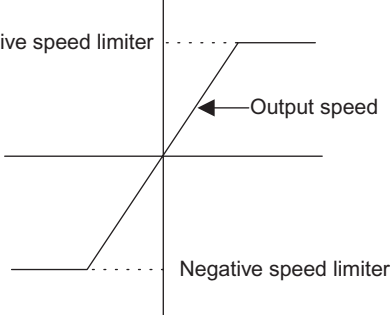| No.	Name	Register Number		Bit Name	Description	Default
1	RUN Mode (RUNMOD) (cont'd)		Bit 13	Latch Detection (DINTREQ)	The current position the instant the DI latch signal turns ON is indicated in the Machine Coordinate Latch Position (monitoring parameter ILC006) when this bit is ON. The DI Latch Completed Signal (setting parameter IWC000, bit B) will turn ON when DI latch has been completed.	0
			Bit 14	Not used.	–	0
			Bit 15	Phase Control Integral Reset (IRESET)	The PI control integration is reset if this bit turns ON in Phase Control Mode.	0
2	RUN Commands (SVRUNC-MD)		OWC001		Set the output signal from Motion Module to the SERVOPACK as well as the RUN mode required for motion control. The bit configuration is described below.	
			Bit 0	Servo (DO0)	This parameter is used as the servo ON signal for the driver. "1" is output from DO0 if this bit is set to "1" when the Motion Controller Operation Ready (IWC000, bit 7) is ON. 0: OFF 1: ON	0
			Bit 1	Force Control (P-CON)	Speed loop P/PI switching 0: OFF 1: ON	0
			Bit 2	G-SEL	Gain switching 0: OFF 1: ON	0
			Bit 3	P-CL	Positive external torque control input 0: OFF 1: ON	0
			Bit 4	N-CL	Negative external torque control input 0: OFF 1: ON	0
			Bit 5	ZCLAMP	Zero clamp input 0: OFF 1: ON	0
			Bit 6	Phase Control Sync-scan (PHSCANSEL)	Phase control mode synchronous scan selection 0: H scan 1: S scan	0
			Bit 7	Position Control Sync-scan (PSCANSEL)	Position control mode Control loop synchronous scan selection 0: H scan 1: S scan	1
			Bit 8	Position Control Accel/Decel (ACCSEL)	Position control mode Select whether to use acceleration and deceleration function during simple positioning 0: ON; 1: OFF	0
			Bit 9	Position Control Segment Division (SEGSEL)	Select whether to use position control mode. 0: ON; 1: OFF	0
			Bit A	Not used.	–	
			Bit B	Magnetic Pole Detection Directive	0: Without magnetic pole detection 1: Magnetic pole detection reference This setting is ignored when "With hall sensor" is selected in the SERVOPACK.	

• Latch Signal

   The latch selection signal will be either of the following depending on the Latch Detection Input Signal Type (fixed parameter 13).

   • DI Latch Detection Signal Selection = 0: EXT3 (SERVOPACK external input signal 3).

   • DI Latch Detection Signal Selection = 1: Phase C (encoder phase C).

Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
2	RUN Commands (SVRUNC-MD) (cont'd)		Bit C	Position Reference (USE_BUF)	Set the reference method that is used for position reference data. It is valid only when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode. 0: Use OLC012 as directly as position reference data. 1: Use OLC012 indirectly as the position buffer number. Directly specified — OLxx12 — Position reference Indirectly specified — Position buffer pointer — 100 Position buffer Position reference data 1 2 Position reference data 100 256 • The position buffer is located in the MP940 Module and must be written in the initial drawing at startup. • Refer to the Position Buffer Write (setting parameter OWC021, bit E), the Position Buffer Read (setting parameter OWC021, bit F) and the Absolute Position at Power OFF (Low Value) or Position Buffer Write Data (setting parameter OLC03A) for details on writing to the position buffer.	0
			Bit D	Speed Reference (SPDTYPE)	Set speed reference method for feed speed, approach speed, and creep speed. It is valid only when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode. 0: Set speed in reference units and sets rapid traverse speed at OLC022. The setting unit for the Approach Speed Setting (setting parameter OWC00A) and the Creep Speed Setting (setting parameter OWC00B) are also $1 = 10^n$ reference units/min. 1: Set speed using a percentage and sets rapid traverse speed at OLC015. The setting unit for the Approach Speed Setting (setting parameter OWC00A) and the Creep Speed Setting (setting parameter OWC00B) are also $1 = 0.01\%$.	0
			Bit E	Position Reference Type (XREFTYPE)	Set the type of data for the Position Reference Setting (setting parameter OLC012) when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode. 0: Absolute position method Sets the absolute position at OLC012. 1: Add difference method Adds the current movement value to the previous value at OLC012 and then sets that data at OLC012. Note: This is an absolute position mode if the position reference selection is indirectly specified. If using a motion program, be sure to set to 1: Add difference method.	1
			Bit F	Origin Return Speed Reduction Limit (LSDEC)	This signal functions as a limit switch signal (deceleration LS) when returning to the zero point. It is valid when the Home Switch (fixed parameter 14, bit 2) is OFF. The external signal (DI signal input by the LIO-01 or other Module) in the user program must be connected (i.e., programmed) to the Origin Return Speed Reduction Limit (setting parameter OWC001, bit F).	0

Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
3	Forward Force Limit (TLIMP)	OWC002	-32768 to 32767	This parameter is used to set torque limit referenced by the SERVOPACK and inverter. Unit: 0.01%	-300.00 (-300.00%)
4	Not used.	OWC003		Set to "0."	0
5	Forward Speed Limit (NLIMP)	OWC004	0 to 32767	Set the speed limiter value for the positive and negative directions as a percentage of the rated speed. The limiter speed will be output if the compensation speeds added to the specified speed exceeds this limiter value.	150.00 (150.00%)
6	Reverse Speed Limit (NLIMN)	OWC005	0 to 32767		150.00 (150.00%)
7	Zero Point Offset (ABSOFF)	OLC006	-2^{31} to $2^{31}-1$	Position data can be shifted by the value set in this register. The parameter is valid during RUN operation, but set it while the system is OFF.	0
9	Not used.	OLC008		Set to "0."	0
11	Home Approach Speed (Napr)	OWC00A	0 to 32767	Set the approach and creep speed when returning to the zero point (ZRET). The setting unit depends on the Speed Reference (setting parameter OWC001, bit D).	0
12	Home Creep Speed (Nclp)	OWC00B	0 to 32767	1. When OWC001, bit D = 0 (specified in reference units) $1 = 10^n$ reference units/min (n = number of digits below the decimal point) Pulse unit: 1 = 1000 pulses/min mm unit: 1 = 1 mm/min 2. When OWC001, bit D = 1 (% specified), then 1 = 0.01% (percentage of the rated rotation speed). Note: A percentage is specified regardless of the setting at OWC001, bit D in Zero Point Return Mode. 	0 0

⚠ WARNING

- Zero Point Offset (ABSOFF)
  This register contains data used by MP940 for position control and the following movements are affected if this register is set incorrectly. Check to see if the data is set correctly prior to starting operation.
  Obstructions may damage tools and lead to personal injury if this check is not performed.

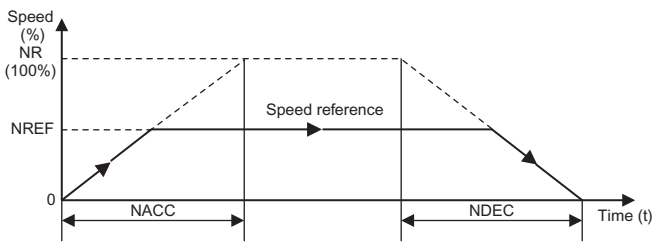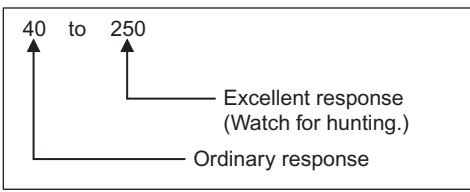Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
13	Linear Acceleration Time (NACC)	OWC00C	0 to 32767	Set the linear acceleration/deceleration time for Speed, Position Control, and Zero Point Return Modes. Unit: ms Set acceleration time from 0% to 100% (rated speed).	0
14	Linear Decelera-tion Time (NDEC)	OWC00D	0 to 32767		0
15	Positioning Completed Range (PEXT)	OWC00E	0 to 65535	Used in Position Control and Zero Point Return Modes. Set the range before the Positioning Completed Signal (monitoring parameter IWC000, bit D) or the Zero Point Return Completed Signal (monitoring parameter IWC000, bit F) turns ON. Unit: Reference unit Refer to the explanation on IWC000D.	10
16	Following Error Limit (EOV)	OWC00F	0 to 65535	This parameter is used in Position, Phase Control, and Zero Point Return Modes. Set the limit for outputting the Error Counter Over (monitoring parameter IWC000, bit 0). Outside this range, the Error Counter Over will turn ON and this value will be used as the error count in position control. Error Counter Over will not be detected if this parameter is set to "0." The deviation error is detected using the value of $\times 2^{EOV\_MULTI}$ of the Following Error Limit (setting parameter OWC00F) using the Following Error Scaling Value Coefficient (EOV_MULTI) (fixed parameter 14, bits C to F).	65535
17	Position Loop Gain (Kp)	OWC010	0 to 32767	Set the position loop gain in the servo system. Position loop gain is needed to set response performance for the servo system. The following are setting guidelines. 40 to 250 Excellent response (Watch for hunting.) Ordinary response Set an appropriate value for the machine rigidity, mass, and type of linear servomotor. • Setting range: 1 to 32767 [0.1/S]	300 (30.0)
18	Feed-forward Gain (Kf)	OWC011	0 to 200	Reduces positioning time by applying feed forward control. Setting range: 0 to 200 [%] Reference position and actual position error decrease with higher settings. The machine may start to vibrate if the setting is too high.	0

Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
19	Position Reference Type (XREF) or Position Buffer Number	OLC012	-2^{31} to $2^{31}-1$	Set the position reference. The meaning of the setting data depends on the Position Reference (setting parameter OWC001, bit C) and the Position Reference Type (setting parameter OWC001, bit E). Explanation 1. Using OLC012 as Position Reference for Absolute Position Reference Method • OWC001, bit C = 0: Directly specified • OWC001, bit E = 0: Absolute position reference 2. Using OLC012 as Position Reference for Add Difference Method • OWC001, bit C = 0: Directly specified • OWC001, bit E = 1: Add difference 3. Using OLC012 as Position Reference for Add Difference Method • OWC001, bit C = 1: Indirectly specified • OWC001, bit E = 0: Absolute position reference Note: Setting 1 causes setting parameter error.	0

21	S-Curve Acceleration Time (Filter Time Constant) (NNUM)	OWC014	Average move filter 0 to 255 (0 = 1 = no filter) Exponential acceleration/ deceleration 0 to 32767	Set this parameter when performing simple S-curved acceleration/deceleration in speed reference output or position control mode.
				Speed Reference Output Mode
				  Calculates the average move for the speed reference (Vr) and makes that value the speed reference.
				Position Control Mode
				  Calculates the average move for the clear pulse (p) every scan and makes that value the position reference. Averaging will not be calculated in the following situations.
				• When switching during operation to Speed Reference Output or Position Control Mode
				• When the average number is changed during operation
				Motion Command Code (setting parameter OWC020) Used in Position Control Mode
				  The setting range for the filter time constant will vary with the Filter Type (setting parameter OWC021, bits 4 to 7).
				• Filter type 1 = Exponential filter 0 to 32767
				• Filter type 2 = Average move filter 0 to 255
				Note: This parameter will be valid when the Distribution Completed (monitoring parameter IWC015, bit 2) turns ON if the filter time constant is changed.
					0

22	Speed Reference (NREF)	OWC015	-32768 to 32767	Speed Reference Output Mode
				  Set the speed reference in 0.01% units.
				Position Control Mode
				  Set the speed reference in a steady state in 0.01% units.
				Motion Command Code (setting parameter OWC020) Used in Position Control Mode
				Set the rapid traverse speed in 0.01% units (percentage of the rated speed) when the Speed Reference (OWC001, bit D) is set to 1.
				Phase Control Mode
				Set the standard speed reference in 0.01% units.
					0

23	Phase Compensation (PHBIAS)	OLC016	-2^{31} to $2^{31}-1$	Set the number of compensation pulses in Phase Control Mode. Use this parameter to compensate for reference pulses in control systems with no rigidity or gain.	0

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Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
25	Speed Compensation (NCOM)	OWC018	-32768 to 32767	Set the speed compensation in 0.01% units in Phase Control Mode. The Speed Compensation (setting parameter OWC018) is valid even in Phase Control Mode if the Speed Compensation (setting parameter OWC021, bit 10) is ON.	0
26	Proportional Gain (PGAIN)	OWC019	0 to 32767	Set proportional gain for PI control in 0.1 units in Phase Control Mode.	300 (30.0)
27	Integral Time (Ti)	OWC01A	0 to 32767	Set the integral time for PI control in 1 ms units in Phase Control Mode. Integration will be reset if the integral time is set to 0.	300 (300ms)
28	Force Reference (TREF)	OWC01B	-32768 to 32767	Set the torque reference in 0.01% units in Torque Reference Output Mode.	0
29	Speed Limit (NLIM)	OWC01C	-32768 to 32767	Set the speed limit in 0.01% units in Torque Reference Output Mode.	15000(150.00%)
31	Pulse Compensation (PULBIAS)	OLC01E	-2^{31} to 2^{31}-1	This parameter is used in Position Control Mode. Position Control Mode Set the number of compensation pulses. Motion Command Code (setting parameter OWC020) Used in Position Control Mode This parameter is set in 1 pulse units when compensating reference pulses such as with backlash compensation. Compensation will not be performed however if the Machine Lock (monitoring parameter IWC017, bit 0) is ON.	0
33	Motion Command Code (MCMD-CODE)	OWC020	0 to 65535	Set the motion command code to the MP940 Module. This parameter can be used under the following conditions. • Motion Command Code (fixed parameter 14, bit 7) • Position Control (setting parameter OWC000, bit 2) • Motion Command Mode (setting parameter OWC000, bit 8) Motion Commands 0: NOP (no command) 1: Positioning (POSING) 2: External positioning (EX-POSING) 3: Zero point return (ZRET) 4: Interpolation (INTERPOLATE) 5: Do not use. Reserved for system use. 6: Interpolation with position detection (LATCH) 7: Feed (FEED) 8: Step (STEP) 9: Zero point setting (ZSET) 10 to 65535: Not used	0
34	Motion Command Options (Motion Command Control Flag) (MCMDC-TRL)	OWC021		Set motion command auxiliary functions.	
			Bit 0	HOLD	The machine decelerates to a stop if this bit turns ON while an axis is moving during positioning or step execution using the Motion Command Code (setting parameter OWC020). The Command Hold Completed (monitoring parameter IWC015, bit 1) turns ON when the HOLD has been completed. If this bit goes back OFF at this point, the hold is canceled and positioning restarts.	0
			Bit 1	Force Control (ABORT)	The machine decelerates to a stop if this bit turns ON while an axis is moving during positioning, zero point return, or STEP using the Motion Command Code (setting parameter OWC020). The Command Executing (monitoring parameter IWC015, bit 1) turns ON if processing has been aborted. Step execution can be aborted by setting the motion command to NOP.	0

Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
34	Motion Command Options (Motion Command Control Flag) (MCMDC-TRL) (cont'd)		Bit 2	DIRECTION	Set the movement direction. This bit is enabled when a Motion Command Code (setting parameter OWC020) is set to constant-speed feed or inching. 0: Forward direction 1: Reverse direction	0 (Forward direction)
			Bit 3	First Order Lag Reset (LAGRST)	The primary lag is reset if this bit turns ON in a position loop. It functions the same as when the First Order Lag Constant (setting parameter OWC037) is set to "0" and it is used in Phase Control Mode or Zero Point Return Control Mode.	0
			Bit 4 to 7	Filter Type (FILTERTYPE)	Set the type of acceleration filter. 0: No filter 1: Exponential filter 2: Average movement filter The S-Curve Acceleration Time (setting parameter OWC014) is valid if this parameter is set to "1" or "2."	0 (No filter)
			Bit 8	Position Loop P/PI (POS_PPI)	Set whether to use P or PI control for position control. 0: P control 1: PI control This parameter is used in Phase Control Mode or Zero Point Return Mode.	0 (P control)
			Bit 9	Integration Reset for Position Control (POS_IRST)	PI control integration resets if this bit turns ON when using a position loop in PI control (bit 8 of OWC021 = 1.). The parameter is used in Phase Control Mode or Zero Point Return Mode. This parameter is used in Phase Control Mode or Zero Point Return Mode.	0
			Bit A	Speed Compensation Enable (NCOMSEL)	When this bit turns ON, data set at the Speed Compensation Setting (setting parameter OWC018) is added as a speed compensation (1 = 0.01 %) to the position loop calculation. This parameter is used in Phase Control Mode or Zero Point Return Mode.	0
			Bit B	SGDH Serial Command Enable (SCMD)	Serial Command Enable Flag of the SGDH SERVOPACK 0: ON; 1: OFF	0
			Bit C	Negative Home Limit (LMT_L)	This bit functions as a reverse limit signal when returning to the zero point (ZRET). The external signal (DI signal input by the LIO_01 or other Module) in the user program must be connected (i.e., programmed) to the Negative Home Limit (setting parameter OWC021, bit C).	0
			Bit D	Positive Home Limit (LMT_R)	This bit functions as a forward limit signal when returning to the zero point (ZRET). The external signal (DI signal input by the LIO_01 or other Module) in the user program must be connected (i.e., programmed) to the Positive Home Limit (setting parameter OWC021, bit D).	0
			Bit E	Position Buffer Write (BUF_W)	Data set in the Position Buffer Write Data (setting parameter OLC03A) is stored as absolute position data in the position buffer that is set at the Position Buffer Access Number (setting parameter OLC038).	0
			Bit F	Position Buffer Read (BUF_R)	Data from the position buffer that is specified at the Position Buffer Access Number (setting parameter OLC038) is stored as absolute position data in the position buffer that is set at the Position Buffer Data (monitoring parameter ILC028). This parameter is used to check position data that is stored in the position buffer. It takes two scans from the time the Position Buffer Read command is issued until the data is stored at the Position Buffer Data (monitoring parameter ILC028).	0

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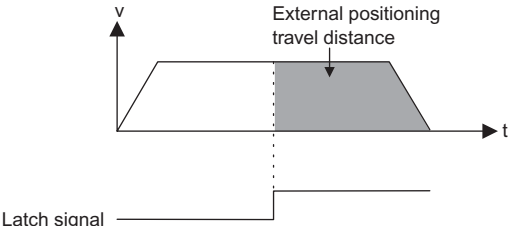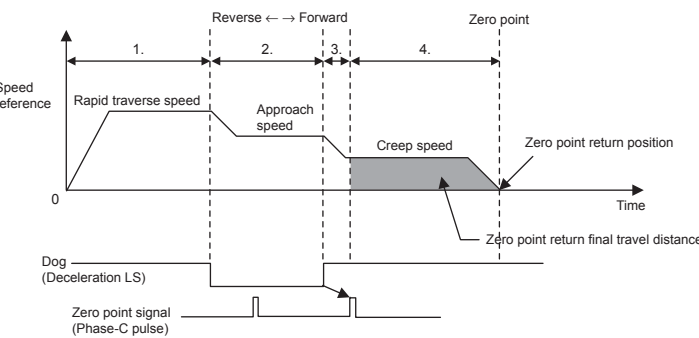Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
35	Feed Speed (RV)	OLC022	0 to 2^{31}-1	Set the rapid traverse speed in 10^n reference units/min (n: Number of digits below decimal point) if the Speed Reference (setting parameter OWC001, bit D) is set to "0." Other setting units are expressed as follows: Pulse unit: 1 = 1000 pulses/min Inch unit: 1 = 1 inch/min This parameter is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	0
37	External Positioning Move Distance (EXMDIST)	OLC024	-2^{31} to 2^{31}-1	Set the distance from the time the latch signal (external positioning signal) is input until the machine stops during external positioning (EX_POSING). This parameter is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode. Select either of the following latch signals using the Latch Input Signal Type (fixed parameter 13). Latch selection = DI input signal (EXT3) or C-pulse input signal.	0
39	Stopping Distance (STOPDIST)	OLC026	-2^{31} to 2^{31}-1	This parameter is used by the system. Do not use it.	0
41	Step Distance (STEP)	OLC028	0 to 2^{31}-1	Set the travel distance in reference units for Step execution for the Motion Command Code (setting parameter OWC020). • Unit: Reference unit	0
43	Home Offset (Zero Point Return Final Travel Distance) (ZRNDIST)	OLC02A	2^{31} to 2^{31}-1	The machine is moved the distance set for this parameter after a valid zero point pulse is detected and then stops when returning to the zero point using the Motion Command Code (setting parameter OWC020). The final point is set as the zero point of the coordinate system. Unit: Reference unit 	0

Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
45	Speed Override (OV)	OWC02C	0 to 32767	Set the override for the output speed as a percentage of OWC015 or OLC022 (Feed Speed) in 0.01% units. Feed Speed Output Feed Speed (OLC022) x Speed Override (OWC02C) = Output speed This parameter is valid when the Override (bit 9 of Servo Axis Functionality) is set to Enabled.	10000
46	Position Management Control (POSCTRL)	OWC02D		Set the functions related to position data managed by Motion Modules. The bit configuration is described below.	
			Bit 0	Machine Lock (MLK)	The axis does not actually move, but rather the Target Position (monitoring parameter IWC002) is updated in Machine Lock Mode. This parameter is valid when the Distribution Completed (monitoring parameter IWC015, bit 2) is ON if the parameter is changed and it is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	0
			Bit 1	POSMAX Preset (TPRSREQ)	Disabled when using a linear servomotor.	0
			Bit 2	ABS System Infinite Length Position Control Data Load Request (ABSLDREQ)		0
			Bit 3	Position Monitor 2 (ILC034) Unit Selection	Set the data unit to be indicated at Position Monitor 2 (monitoring parameter ILC034). 0: Reference unit Indicated as 1 = 1 reference unit. 1: Pulse unit Indicated as 1 = 1 pulse unit. This parameter is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	0
			Bit 4 to 15	Not used.	Set to "0."	0
47	Work Coordinate Offset (OFFSET)	OLC02E	-2^{31} to 2^{31}-1	Always set this parameter to "0." It is used by the system.	0
49	Preset Data of POSMAX Turn (TURN-PRS)	OLC030	-2^{31} to 2^{31}-1	The POSMAX Number of Turns (monitoring parameter ILC01E) can be preset with preset data by turning ON the POSMAX Preset (setting parameter OWC02D, bit 1). It is used in situations such as when resetting the number of turns to "0." The parameter is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	0

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Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
51	2nd In Position Width (INPWIDTH)	OWC032	0 to 65535	Set the range where the Second In-position Completed (monitoring parameter IWC017, bit 2) will turn ON. The Second In-position Completed (monitoring parameter IWC017, bit 2) will turn ON when the Distribution Completed (monitoring parameter IWC015, bit 2) is ON and the difference between the command position and the feedback position is less than the value set here. This parameter is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	0
52	Home Window (Zero Point Position Output Width) (PSETWIDTH)	OWC033	0 to 65535	Set the zero point position range. The Zero Point Position (monitoring parameter IWC017, bit 1) will turn ON if $0 \leq$ |Machine Coordinate System Position (monitoring parameter ILC018)| $\leq$ Home Window (setting parameter OWC033) when the Zero Point Return Completed (monitoring parameter IWC015, bit 6) turns ON. The parameter is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	10
53	Position Complete Timeout (PSETTIME)	OWC034	0 to 65535	Set limits for detecting the Positioning Time Over (monitoring parameter ILC022, bit 6) in 1 = 1 ms. A positioning time over alarm will be generated if the Positioning Completed Signal (monitoring parameter IWC000, bit D) does not turn ON when this range is exceeded after the Distribution Completed (monitoring parameter IWC015, bit 2) turns ON. The completion of positioning will not be checked if this parameter is set to "0." It is valid only when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	0
54	Position Control Integral Time (PTI)	OWC035	0 to 32767	Set integral time in 1 = 1 ms when using position loop and PI control (bit 8 of OWC021 = 1). Integration will not be performed if this parameter is set to "0." The parameter is used in Position Control Mode or Zero Point Return Mode.	300
55	Integral Upper/Lower Limit for Position Control (ILIMIT)	OWC036	0 to 32767	Set the upper and lower integration limits when using position loop and PI control (bit 8 of OWC021 = 1.) Integral output will be limited within the range set here when the integral output value exceeds this range.	32767
56	First Order Lag Constant (LAGTI)	OWC037	0 to 32767	Set the primary lag time constant in the position loop in 1 = 1 ms. The primary lag will not be calculated if this parameter is set to "0." The parameter is used in Position Control Mode or Zero Point Return Mode.	0

Table 4.5 Motion Setting Parameters (cont'd)

No.	Name	Register Number	Bit Name	Description	Default
57	Absolute Position at Power OFF [Low Value] or Position Buffer Access Number	OLC038	-2^{31} to $2^{31}-1$	■ Position Buffer Access Number When the Position Buffer Write (setting parameter OWC021, bit E) or the Position Buffer Read (setting parameter OWC021, bit F) turns ON, the data set at this parameter will be treated as the buffer number of the position buffer. The setting range for this parameter is 1 to 256 and it is not valid if set to "0." It is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	0
	SGDH Serial Command Command Settings	OWC038	(Reserved for system use)	Motion Command Control Flag SGDH SERVOPACK parameters are read/written when (OWC021, bit B)=1 1: Read data; 2: Write data Can be used only when motion command code is enabled. SGDH serial command cannot be used with the following settings. • The SERVOPACK Parameters Window is opened using the MPE720. • A Digital Operator is connected to the SERVOPACK.	0
	SGDH Serial Command Address Setting	OWC039	(Reserved for system use)	Motion Command Control Flag Sets the SGDH parameter read/write address when the SGDH Serial Command Enable (setting parameter OWC021, bit B)=1. Note: Can be used only when motion command code is enabled.	0
59	Absolute Position at Power OFF [High Value] or Position Buffer Write Data	OLC03A	-2^{31} to $2^{31}-1$	■ Position Buffer Write Data When the Position Buffer Write (setting parameter OWC021, bit E) turns ON, the data set at this parameter will be written as absolute position data to the position buffer specified at OLC038. It is used when the Motion Command Code (setting parameter OWC020) is used in Position Control Mode.	0
	SGDH Serial Command Data Setting	OWC03A	-32768 to 32767 (Reserved for system use)	Motion Command Control Flag Sets the command data sent to the SGDH SERVOPACK when SCMD (OWC021, bit B)=1 and Data Write Command (OWC038)=2.	0
61	Modularized Position at Power OFF [Low Value] (aposL)	OLC03C	-2^{31} to $2^{31}-1$	This parameter is disabled when using a linear servomotor.	0
63	Modularized Position at Power OFF [High Value] (aposH)	OLC03E	-2^{31} to $2^{31}-1$		0

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4.6.4 Motion Monitoring Parameters

Table 4.6 Motion Monitoring Parameters

No.	Name	Register No.	Bit Name	Description
		IWC000		Indicate MP940 Module operating status. The bit configuration is described below.
1	Drive Status (RUNSTS)		Bit 0	Error Counter Over (EOVER)	This bit turns ON when the Position Error (monitoring parameter ILC00A) exceeds the Following Error Limit (setting parameter OWC00F). Note: Because control will not be interrupted, create a user program that will monitor this bit and perform other processing if application-specific processing, such as emergency stop, is required. The following items are potential causes for error alarms. • Following Error Limit (setting parameter OWC00F) is set too low. • The axis of linear servomotor is not moving. • Operation according to set references failed because the load in the machine system is too heavy. This parameter is valid in Position Control Mode, Zero Point Return Mode, and Phase Control Mode.
			Bit 1	Motion Setting Parameter Setting Error (PRMERR)	This bit turns ON when one or more of the motion setting parameters (OWC000 to OLC03E) is set outside the setting range. In this case, the most recent motion setting parameter number that caused the setting range alarm will be indicated at the Over Range Parameter Number (monitoring parameter IWC00F).
			Bit 2	Motion Fixed Parameter Setting Error (FPRMERR)	This bit turns ON when a motion fixed parameter is set outside the setting range. In this case, the most recent motion setting parameter number that caused the setting range alarm plus 100 will be indicated at the Over Range Parameter Number (monitoring parameter IWC00F). This parameter will turn OFF automatically if an ordinary motion fixed parameter is set from the MPE720.
			Bit 3	Not used.	–
			Bit 4	ABS Received Error (PGER)	The absolute position is sent and received over serial lines when the power supply is turned ON and the Read ABS. Position at Power-up (setting parameter OWC000, bit 10) turns ON when an absolute encoder is used. This Parameter turns ON if a receive error occurs.
			Bit 5	Not used	–
			Bit 6	Not used	–
			Bit 7	Motion Controller Operation Ready (SVCRDY)	This parameter turns ON when RUN preparations for the Motion Module have been completed. The following may be reason why RUN preparations are not completed. • Major damage has occurred. • Axis that is not used was selected (motion fixed parameter setting). • Motion fixed parameter setting error. • ABS data received error. • Motion fixed parameters are being changed. • Absolute position is being read from the absolute encoder.
			Bit 8	Motion Controller RUN (SVCRUN)	This bit turns ON under the following conditions. • The Motion Controller Operation Ready (monitoring parameter IWC000, bit 7) turns ON. • OWC000, bit 0 to OWC000, bit 4: One of the Control Mode Flags turns ON. • The Servo (setting parameter OWC001, bit 0) turns ON. If an alarm is generated even though this bit is ON in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used, the axis will not move even if a motion command is issued. Clear the alarm, set the motion command to "NOP" for 1 scan or more, and then set the motion command again.

Table 4.6 Motion Monitoring Parameters (cont'd)

No.	Name	Register No.		Bit Name	Description
1	Drive status (RUNSTS) (cont'd)		Bit 9	Report of Moving Direction when Absolute Encoder is Used (DIRINV)	Moving direction when using an absolute encoder. Monitors the moving direction selected for motion fixed parameters. 0: Forward 1: Reverse
			Bit A	Absolute Position Read Completed Signal (ABSRDC)	This parameter turns ON when the Read ABS. Position at Power-up (setting parameter OWC000, bit 10) turns ON and absolute position data from the absolute encoder is read. If an error occurs, the ABS Received Error (monitoring parameter IWC000, bit 4) will turn ON.
			Bit B	DI Latch Completed Signal (DIINT)	This parameter turns ON when the Latch Detection (setting parameter OWC000, bit 13) turns ON and the DI latch signal is input. The current position at this time will be indicated at the Machine Coordinate Latch Position (monitoring parameter ILC006).
			Bit C	Feedback Pulse 0 (FBP0)	This parameter indicates that there is no feedback pulse and is normally ON if the servomotor is not operating. If this bit remains ON even though a reference is output, the feedback signal line from PG is very likely broken.
			Bit D	Positioning Completed Signal (POSCOMP)	This parameter turns ON when positioning is completed in Position Control Mode. Motion Commands Not Used This parameter turns ON when Machine Coordinate Feedback Position (monitoring parameter ILC008) – Position Reference Type (setting parameter OLC012)$\vert$ $\leq$ Positioning Completed Range (setting parameter OWC00E). Motion Command Used This parameter turns ON when the Distribution Completed (monitoring parameter IWC015, bit 2) turns ON and when Machine Coordinate Feedback Position (monitoring parameter ILC008) – Machine Coordinate System Position (monitoring parameter ILC018)$\vert$ $\leq$ Positioning Completed Range (setting parameter OWC00E).
			Bit E	Motor Type	0: Rotary Motor, 1: Linear Motor
			Bit F	Zero Point Return Completed Signal (ZRNC)	This parameter turns ON when a return to zero point is completed in Zero Point Return Mode. It turns ON when $\vert$Machine Coordinate Feedback Position (monitoring parameter ILC008) – Zero Point Position$\vert$ $\leq$ Positioning Completed Range (setting parameter OWC00E).
2	Network Servo Status (SYSTS)	IWC001			Reports the SERVOPACK status information. This status information is not used to control the Motion Module. Use to control the user program as necessary. The bit configurations are shown below.
			Bit 0	ALM	Servo alarm
			Bit 1	WARN	Warning
			Bit 2	V-CMP	Speed coincidence
			Bit 3	TGON	Detection while motor is running.
			Bit 4	S-RDY	Servo ready
			Bit 5	CLT	Torque control detection
			Bit 6	VLT	Speed control detection
			Bit 7	BK	Brake interlock
			Bit 8	SVON	Servo ON completed
			Bit 9	PON	Main circuit power ON
			Bit A to E		Not used.
			Bit F		Magnetic pole detection

INFO: If the Motion Command Code (fixed parameter 14, bit 7) has been set to enable the use of motion command codes (1: Used) and the Motion Command Mode (setting parameter OWC000, bit 8) has been set to 1 (enabled), the number of reference units will be set. The number of pulses will be set at all other times.

Table 4.6 Motion Monitoring Parameters (cont'd)

No.	Name	Register No.	Bit Name	Description
3	Target Position (Machine Coordinate Calculation Position) (CPOS)	ILC002	-2^{31} to 2^{31}-1	This parameter indicates the calculated position in a machine coordinate system controlled by MP940 Modules. Normally the position data indicated at this register is the target position for each scan. Refer to the additional information on previous page.
5	Incremental Target Position (PTGDIF)	ILC004	-2^{31} to 2^{31}-1	This parameter indicates the amount cleared every scan.
7	Machine Coordinate Latch Position (LPOS)	ILC006	-2^{31} to 2^{31}-1	This parameter indicates the current position the instant the DI latch signal turned ON. Refer to the additional information on previous page.
9	Machine Coordinate Feedback Position	ILC008	-2^{31} to 2^{31}-1	This parameter indicates the current monitor position. Note: It is not valid when an A Drawing is executed. It is valid when an H or L Drawing is executed.
11	Position Error (PERR)	ILC00A	-2^{31} to 2^{31}-1	This parameter indicates the position error (number of pulses held). (Position error = target position - current position for each scan). It is valid in Zero Point Return Mode, Position Control Mode, and Phase Control Mode.
13	Speed Reference Output Value [%] (SPDREF)	IWC00C	-32768 to 32767	This parameter indicates the value output at the SERVOPACK as the speed reference output value.
14	Speed Monitor (NFB)	IWC00D	-32768 to 32767	Reports the Actual Motor Speed (mm/s) (SGDH SERVOPACK parameter Un000) as %/number of rated speed. 1=1%
15	Force Monitor (TFB)	IWC00E	-32768 to 32767	Reports the Internal Force Reference (%) (SGDH SERVOPACK parameter Un002). 1=0.01%
16	Over Range Parameter Number (ERNO)	IWC00F	Motion setting parameter 1 to 65 Motion fixed parameter 101 to 148	This parameter indicates the most recent setting parameter number that exceeded the range in OWC000 to OLC03E motion setting parameter or motion fixed parameter settings. Motion setting parameters: 1 to 65 Motion fixed parameters: 101 to 148 When motion fixed parameters are used, the parameter indicates the parameter number plus 100.
17	Number of Absolute Encoder Turns (Cumulative Rotations from Absolute Encoder) (ABSREV)	ILC010	-2^{31} to 2^{31}-1	This parameter indicates the ABS data received from the absolute encoder. It is valid only when using an absolute encoder.
19	Initial Incremental Pulse of Absolute Encoder (IPULSE)	ILC012	-2^{31} to 2^{31}-1	This parameter indicates the initial number of incremental pulses received from the absolute encoder. It is valid only when using an absolute encoder.
21	Servo Command Type Response (MCMDRCODE)	IWC014	0 to 65535	This parameter indicates the Motion Command Code (setting parameter OWC020) that is currently executing. Refer to OWC020 for details on motion commands. The parameter is valid in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used.

Table 4.6 Motion Monitoring Parameters (cont'd)

No.	Name	Register No.		Bit Name	Description
22	Servo Module Command Status (MCMDSTS)	IWC015			These parameters indicate the executing status of an OWC020: Motion Command Code. They are valid in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used. The bit configuration is described below.
			Bit 0	Command Executing (BUSY)	This parameter indicates the motion command code. 0: READY (completed) 1: BUSY (processing) This bit is used for abort status.
			Bit 1	Command Hold Completed (HOLDL)	This parameter turns ON when a HOLD is completed. Refer to individual motion functions for details on the HOLD function.
			Bit 2	Distribution Completed (DEN)	This parameter turns ON when the amount of movement cleared is completed.
			Bit 3	Zero Point Setting Completed (ZSET)	This parameter turns ON when the zero point setting (ZSET) has been executed by the Motion Command Code (setting parameter OWC020). It also turns ON when the ABS System Infinite Length Position Control Information LOAD Completed (monitoring parameter IWC017, bit 3) has finished execution.
			Bit 4	External Positioning Signal Latched (EX_LATCH)	This parameter turns ON when the external positioning signal is input during external positioning (EX_POSING).
			Bit 5	Command Error Occurrence (FAIL)	This parameter turns ON if an alarm occurs while a move (positioning, feed, etc.) command is being executed. Operation cannot continue once this bit turns ON. Set the Motion Command Code (setting parameter OWC020) to "NOP = 0" more than 1 scan.
			Bit 6	Zero Point Return Completed (ZRNC)	This parameter turns ON when zero point return or zero point setting has been completed. It turns OFF when zero point return begins.
			Bit 7 to 15	Not used.	–
23	Number of Decimal Places (DECNUMM)	IWC016		0 to 5	This parameter indicates the Number of Decimal Places (fixed paramter18) and is valid in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used.

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Table 4.6 Motion Monitoring Parameters (cont'd)

No.	Name	Register No.	Bit Name	Description
24	Position Management Status (POSSTS)	IWC017		This parameter indicates status related to position controlled by MP940 Modules. It is valid in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used. The following shows the bit configuration.
			Bit 0	Machine Lock ON (MLKL)	This parameter turns ON when machine lock is ON. Outputs will not be made to the SGDH SERVOPACK when this bit is ON. The axis that is being controlled will be locked and will remain stopped.
			Bit 1	Zero Point Position (ZERO)	This parameter turns ON when Zero Point Return (IWC015, bit 6) has been completed and when $0 \leq$ |Machine Coordinate System Position (monitoring parameter ILC018)| $\leq$ Home Window (setting parameter OWC033)
			Bit 2	Second In-position Completed (PSET2)	This parameter turns ON when the Distribution Completed (IWC015, bit 2) is ON and when |Machine Coordinate Feedback Position (monitoring parameter ILC008)-Machine Coordinate System Position (monitoring parameter ILC018)| $\leq$ 2nd In Position Width (setting parameter OWC032).
			Bit 3	ABS System Infinite Length Position Control Information LOAD Completed (ABSLDE)	Disabled when using a linear servomotor.
			Bit 4	POSMAX Turn Number Presetting Completed (TPRSE)	
			Bit 5	Electronic Gear Enabled Selection (GEARM)	This parameter indicates the Command Unit and Electronic Gear (fixed parameter 17, bit 4).
			Bit 6	Axis Selection (MODSELM)	This parameter indicates the Axis Type (fixed parameter 17, bit 5).
			Bit 7 to F	Not used.	–
25	Machine Coordinate System Position (MPOS)	ILC018	-2^{31} to 2^{31}-1	This parameter is the reference position in the machine coordinate system and is basically the same value at the Target Position (CPOS) (monitoring parameter ILC002). This position data cannot be updated if the Machine Locked (monitoring parameter IWC017, bit 0) is ON. It is valid in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used.
27	SGDH Serial Command Answer	ILC01A	(Reserved for system use)	Answer monitor during SGDH SERVOPACK serial command execution 1. Reading data 01H: Normal 41H: Data error 81H: Address error 2. Writing data 02H: Normal 42H: Data error 82H: Address error C2H: Answer timed out
28	SGDH Serial Command Address	IWC01B	(Reserved for system use)	Data monitor during SGDH SERVOPACK serial command execution
29	POSMAX Monitor (PMAXMON)	ILC01C	1 to 2^{31}-1	This parameter is disabled when using a linear servomotor.
31	POSMAX Number of Turns (PMAXTURN)	ILC01E	-2^{31} to 2^{31}-1	
33	SGDH Serial Command Data	ILC020	(Reserved for system use)	Data monitor during SGDH SERVOPACK serial command execution

Table 4.6 Motion Monitoring Parameters (cont'd)

No.	Name	Register No.		Bit Name	Description
35	Servo Alarms (ALARM)	ILC022			The following bits are valid in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used. Alarm data and a halt to operation are indicated if this register shows anything other than "0." The register can be cleared by starting up Clear Alarm (setting parameter OWC000, bit 6). The following shows the bit configuration.
			Bit 0	Servo Amp Error (SVERROR)	This bit turns ON when the Servo Alarm (monitoring parameter IWC001), bit 0) is ON, or when there is a synchronous access error between the MP940 and SGDH SERVOPACK.
			Bit 1	Positive Overtravel (OTF)	This parameter turns ON when the positive overtravel signal is input and a move command is executed in the positive direction. It is valid if Enabled is selected at the Positive Over Travel (fixed parameter 17, bit D) is enabled.
			Bit 2	Negative Overtravel (OTR)	This parameter turns ON when the negative overtravel signal is input and a move command is executed in the negative direction. It is valid if the Negative Over Travel (fixed parameter 17, bit E) is enabled.
			Bit 3	Positive Soft Limit (SOTF)	This parameter is valid if the Zero Point Return Completed (monitoring parameter IWC015, bit 6) turns ON when the Forward software limit is enabled. 1. Motion Command Code Interpolation This bit turns ON when Machine Coordinate System Position (monitoring parameter ILC018) + Stopping Distance (setting parameter OLC026) $\geq$ Forward Software Limit (fixed parameter 27). 2. Motion Command Code (setting parameter OWC020) Positioning, Feed, or Step This bit turns ON when Machine Coordinate System Position (monitoring parameter ILC018) $\geq$ Forward Software Limit (fixed parameter 27).
			Bit 4	Negative Soft Limit (SOTR)	This parameter is valid if the Zero Point Return Completed (monitoring parameter IWC015, bit 6) turns ON when the Reverse software limit is enabled. 1. This bit turns ON when Machine Coordinate System Position (monitoring parameter ILC018) + Stopping Distance (setting parameter OLC026) $\leq$ Reverse Software Limit (fixed parameter 29). 2. Motion Command Codes (setting parameter OWC020) Positioning, Feed, or Step This bit turns ON when Machine Coordinate System Position (monitoring parameter ILC018) $\leq$ Reverse Software Limit (fixed parameter 29).
			Bit 5	Not used.	–
			Bit 6	Positioning Time Over (TIMEOVER)	This bit turns ON if the Positioning Completed Signal (monitoring parameter IWC000, bit D) does not turn ON when the Position Complete Timeout (setting parameter OWC034) is exceeded after the Distribution Completed (monitoring parameter IWC015, bit 2) is turned ON.
			Bit 7	Excessive speed	This bit turns ON when the electronic gear's limit is exceeded.
			Bit 8 to 9	Not used.	–
			Bit 10	Control Mode Error (MODERR)	This parameter turns ON when a move command is set at the Motion Command Code (setting parameter OWC020) in a mode other than Position Control (OWC000, bit 2 is OFF).

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Table 4.6 Motion Monitoring Parameters (cont'd)

No.	Name	Register No.	Bit Name	Description
35	Servo Alarms (ALARM)	Bit 11 to 13	Not used.	–
		Bit 14	Servo Driver Synchronization Communication Error	An error has occurred in the synchronous access between the MP940 and SGDH SERVOPACK.
		Bit 15 to 29	Not used.	–
		Bit 30	SERVOPACK Motor Type Mismatch	Turns ON if the motor type set in the Motor Type (fixed parameter 14, bit 11) disagrees with the motor type set in the SERVOPACK constant Pn000.3 Rotary/Linear Motor Selection.
		Bit 31	SERVOPACK Encoder Type Mismatch	Turns ON if the motor type set in the Motor Type (fixed parameter 14, bit 11) disagrees with the actually connected motor type.
37	Network Servo Alarm Code (SVALARM)	IWC024	-32768 to 32767	Reports the SERVOPACK alarm code currently being generated.
38	Network Servo I/O Monitor (SVIOMON)	IWC025		
		Bit 0	SIO	General input signal
		Bit 1	DEC	Deceleration dog switch
		Bit 2	P-OT	Positive limit switch input
		Bit 3	N-OT	Negative limit switch input
		Bit 4	EXT1	External input signal 1
		Bit 5	EXT2	External input signal 2
		Bit 6	EXT3	External input signal 3
		Bit 7 to F	–	Not used.
39	Speed Reference Output Value [pulse/sec] (RVMON)	ILC026	-2^{31} to $2^{31}-1$	This parameter indicates the travel distance every scan and is "0" when the Machine Locked (monitoring parameter IWC017, bit 0) is ON. It is valid in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used.
41	Position Buffer Data (CNMON)	ILC028	-2^{31} to $2^{31}-1$	Position data from the position buffer specified at the Position Buffer Access Number (setting parameter OLC038) is read and stored at this parameter when the Position Buffer Read (setting parameter OWC021, bit F) turns ON. It takes about 2 scans from the time that the Position Buffer Read (setting parameter OWC021, bit F) turns ON until data is stored at this register. It is valid in Position Control Mode when the Motion Command Code (setting parameter OWC020) is used.
43	Not used.	ILC02A	–	–
45	Integral Output Value (YIMON)	ILC02C	-2^{31} to $2^{31}-1$	This parameter indicates the integral output value when position loop is used with PI control. (bit 8 of OWC021 = 1.) It is valid in Position Control Mode or Zero Point Return Mode.
47	Not used.	ILC02E	–	–
49	First Order Lag (LAGMON)	ILC030	-2^{31} to $2^{31}-1$	This parameter indicates (PI output - Primary lag output) and is valid in Position Control Mode or Zero Point Return Mode.
51	Position Loop Output Value (PIMON)	ILC032	-2^{31} to $2^{31}-1$	This parameter indicates the position loop output value (prior to adding the calculated feed forward value). It is valid in Position Control Mode or Zero Point Return Mode.

Table 4.6 Motion Monitoring Parameters (cont'd)

No.	Name	Register No.	Bit Name	Description
53	Position Monitor 2 (APOS2)	ILC034	-2^{31} to 2^{31}-1	This parameter is valid when the Motion Command Code (fixed parameter 14, bit 7) has been set to enable using motion command codes (1: Used). The value does not include the Zero Point Offset (setting parameter OLC006). When using this parameter, add the zero point offset converted to the current unit (reference unit or pulse). The setting of the Position Monitor 2 Unit Selection (setting parameter OWC02D, bit 3) affects the data stored for this parameter. 1. OWC02D, bit 3 = 0 Indicates the current monitored position in reference units. 2. OWC02D, bit 3 = 1 Indicates the Machine Coordinate Feedback Position (monitoring parameter ILC008) converted to pulses.
55	Position Data Decimal Position (Number of Scale Pitch Partitions)	IWC036	–	Reports the number of scale pitch partitions when using a linear servomotor.
56	Not used.	IWC037	–	–
57	Absolute Position at Power OFF [Low Value]	ILC038	-2^{31} to 2^{31}-1	This parameter is disabled when using a linear servomotor.
59	Absolute Position at Power OFF [High Value]	ILC03A	-2^{31} to 2^{31}-1	
61	Modularized Position at Power OFF [Low Value]	ILC03C	-2^{31} to 2^{31}-1	
63	Modularized Position at Power OFF [High Value]	ILC03E	-2^{31} to 2^{31}-1	

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Revision History

The revision dates and numbers of the revised manuals are given on the bottom of the back cover.

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Machine Controller MP900/MP2000 Series
USER'S MANUAL

For Linear Servomotors

YASKAWA ELECTRIC CORPORATION

YASKAWA