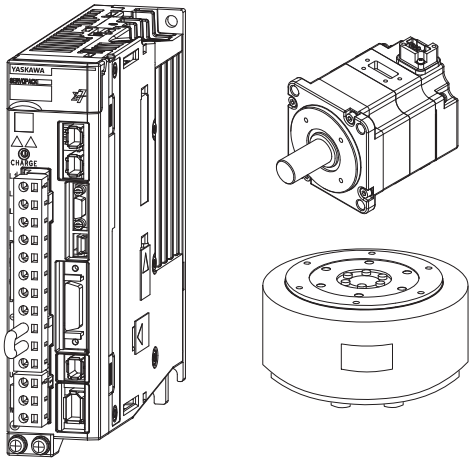
YASKAWA

Σ-7-Series AC Servo Drive

Σ-7S SERVOPACK with FT/EX Specification for Semi-/Fully-Closed Loop Control Online Switching for Conveyance Application

Product Manual

Model: SGD7S-□□□□00A000F63, -□□□□20A000F63



Basic Information on SERVOPACKs 1

Selecting a SERVOPACK 2

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Appendix 9

MANUAL NO. SIEP S800002 27L

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About this Manual

This manual describes the semi-/fully-closed loop control online switching of the Σ-7-Series AC Servo Drive Σ-7S SERVOPACKs for conveyance applications.

Read and understand this manual to ensure correct usage of the Σ-7-Series AC Servo Drives.

Keep this manual in a safe place so that it can be referred to whenever necessary.

Outline of Manual

The contents of the chapters of this manual are described in the following table.

When you use the SERVOPACK, read this manual and the product manual given in the following table.

Item		This Manual	Σ-7S SERVOPACK with Analog Voltage/ Pulse Train References Product Manual (Manual No.: SIEP S800001 26)	Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Basic Information on SERVOPACKs	The Σ-7 Series	–	1.1	
	Product Introduction	1.1	–	
	Interpreting the Nameplates	–	1.2	
	Part Names	–	1.3	
	Model Designations	1.2	–	
	Combinations of SERVOPACKs and Servomotors	1.3	–	
	Functions	1.4	–	
	Restrictions	1.5	–	
	SigmaWin+	1.6	–	
	Combining the SERVOPACKs with MP-Series Machine Controllers and the MPE720 Engineering Tool	1.7	–	
Selecting a SERVOPACK	Ratings	2.1	–	
	Overload Protection Characteristics	2.2	–	
	Specifications	2.3	–	
	Block Diagrams	–	2.2	
	External Dimensions	–	2.3	
	Examples of Standard Connections between SERVOPACKs and Peripheral Devices	–	2.4	
SERVOPACK Installation		–	Chapter 3	
Wiring and Connecting SERVOPACKs	Wiring Precautions	–	4.1	
	Basic Wiring Diagrams	3.1	–	
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	Wiring the Power Supply to the SERVOPACK	–	4.3	
	Wiring Servomotors	–	4.4	
	I/O Signal Connections	–	4.5	
	Connecting Safety Function Signals	–	4.6	
	Connecting MECHATROLINK Communications Cables	–	4.7	
	Connecting the Other Connectors	–	4.8	

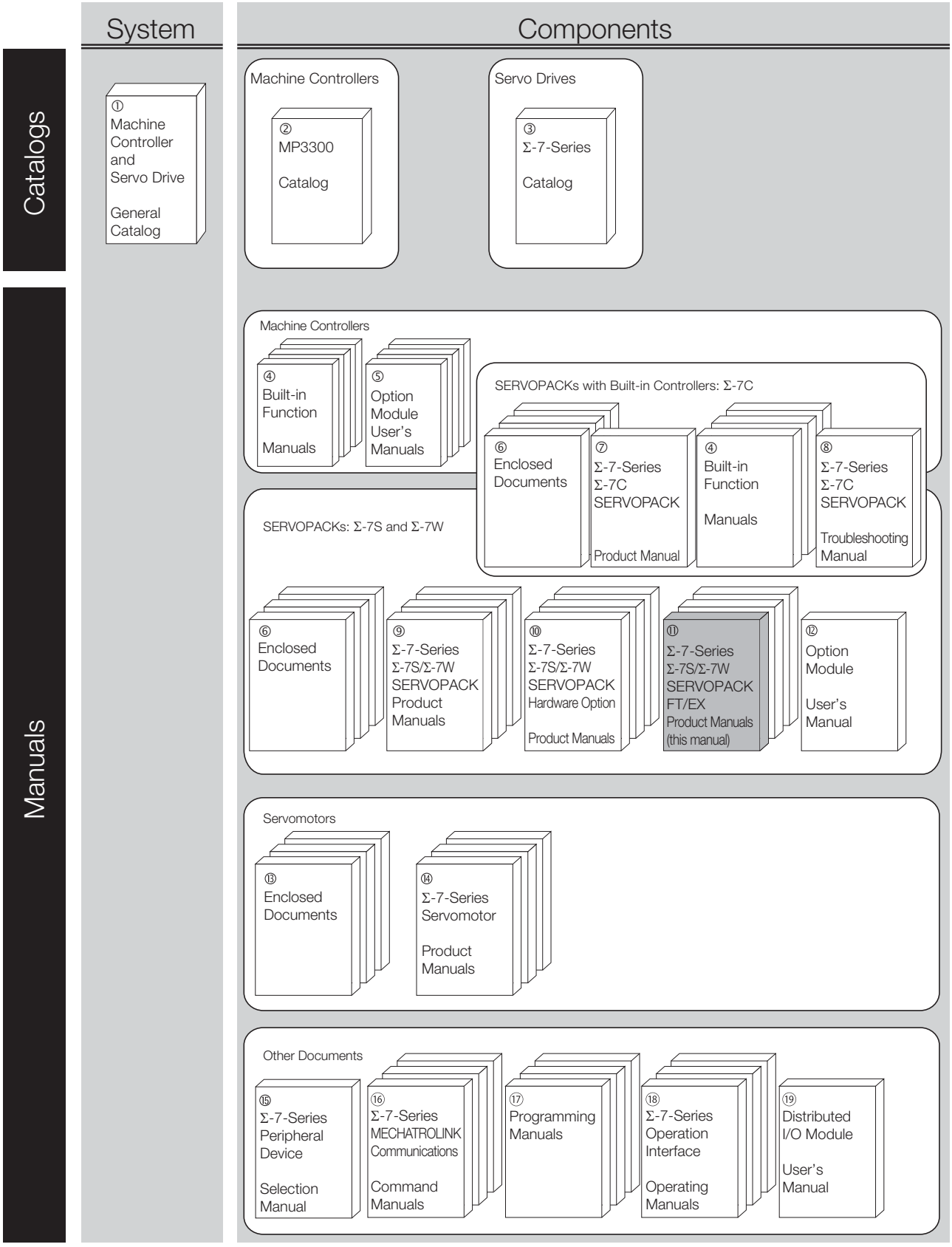
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Item		This Manual	Σ-7S SERVOPACK with Analog Voltage/ Pulse Train References Product Manual (Manual No.: SIEP S800001 26)	Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Basic Functions That Require Setting before Operation		–	Chapter 5	
Application Functions		–	Chapter 6	
Trial Operation and Actual Operation		–	Chapter 7	
Tuning		–	Chapter 8	
Fully-Closed Loop Control		Chapter 4	–	
Semi-/Fully-Closed Loop Control Online Switching		Chapter 4	–	
Monitoring		Chapter 5	Chapter 9	
Safety Functions		–	Chapter 11	
Maintenance	Inspections and Part Replacement	–	12.1	
	Alarm Displays	6.1.1, 6.2.1	–	
	List of Alarms	6.1.2, 6.2.2	–	
	Troubleshooting Alarms	6.1.3, 6.2.3	–	
	Resetting Alarms	–	12.2.3	
	Displaying Alarm History	–	12.2.4	
	Clearing the Alarm History	–	12.2.5	
	Resetting Alarms Detected in Option Modules	–	12.2.6	
	Resetting Motor Type Alarms	–	12.2.7	
	Warning Displays	6.1.4, 6.2.4	–	
	List of Warnings	6.1.5, 6.2.5	–	
	Troubleshooting Warnings	6.1.6, 6.2.6	–	
	Monitoring Communications Data during Alarms or Warnings	–	–	12.4
	Troubleshooting Based on the Operation and Conditions of the Servomotor	6.1.7, 6.2.7	–	
Panel Displays and Panel Operator Procedures		Chapter 7	Chapter 13	–
Parameter Lists		Chapter 8	–	
Appendices	Examples of Connections to Host Controllers	–	15.1	–
	Interpreting Panel Displays	–	–	14.1
	Corresponding SERVOPACK and SigmaWin+ Function Names	Chapter 9	15.2	14.2

Related Documents

The relationships between the documents that are related to the Servo Drives are shown in the following figure. The numbers in the figure correspond to the numbers in the table on the following pages. Refer to these documents as required.



Classification	Document Name	Document No.	Description
① Machine Controller and Servo Drive General Catalog	Machine Controller and AC Servo Drive Solutions Catalog	KAEP S800001 22	Describes the features and application examples for combinations of MP3000-Series Machine Controllers and Σ-7-Series AC Servo Drives.
② MP3300 Catalog	Machine Controller MP3300	KAEP C880725 03	Provides detailed information on MP3300 Machine Controllers, including features and specifications.
③ Σ-7-Series Catalog	AC Servo Drives Σ-7 Series	KAEP S800001 23	Provides detailed information on Σ-7-Series AC Servo Drives, including features and specifications.
④ Built-in Function Manuals	Σ-7-Series AC Servo Drive Σ-7C SERVOPACK Motion Control User's Manual	SIEP S800002 03	Provides detailed information on the specifications, system configuration, and application methods of the Motion Control Function Modules (SVD, SVC4, and SVR4) for Σ-7-Series Σ-7C SERVOPACKs.
	Machine Controller MP3000 Series Communications User's Manual	SIEP C880725 12	Provides detailed information on the specifications, system configuration, and communications connection methods for the Ethernet communications that are used with MP3000-Series Machine Controllers and Σ-7-Series Σ-7C SERVOPACKs.
⑤ Option Module User's Manuals	Machine Controller MP2000 Series Communication Module User's Manual	SIEP C880700 04	Provide detailed information on the specifications and communications methods for the Communications Modules that can be mounted to MP3000-Series Machine Controllers and Σ-7-Series Σ-7C SERVOPACKs.
	Machine Controller MP2000 Series 262IF-01 FL-net Communication Module User's Manual	SIEP C880700 36	
	Machine Controller MP2000 Series 263IF-01 EtherNet/IP Communication Module User's Manual	SIEP C880700 39	
	Machine Controller MP2000 Series I/O Module User's Manual	SIEP C880700 34	Provide detailed information on the specifications and communications methods for the I/O Modules that can be mounted to MP3000-Series Machine Controllers and Σ-7-Series Σ-7C SERVOPACKs.
	Machine Controller MP2000 Series Analog Input/Analog Output Module AI-01/AO-01 User's Manual	SIEP C880700 26	
	Machine Controller MP2000 Series Counter Module CNTR-01 User's Manual	SIEP C880700 27	

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Classification	Document Name	Document No.	Description
⑥ Enclosed Documents	Σ-7-Series AC Servo Drive Σ-7S, Σ-7W, and Σ-7C SERVOPACK Safety Precautions	TOMP C710828 00	Provides detailed information for the safe usage of Σ-7-Series SERVOPACKs.
	Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Safety Precautions Option Module	TOBP C720829 00	Provides detailed information for the safe usage of Option Modules.
	Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide Command Option Module	TOBP C720829 01	Provides detailed procedures for installing the Command Option Module in a SERVOPACK.
	Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide Fully-closed Module	TOBP C720829 03	Provides detailed procedures for installing the Fully-closed Module in a SERVOPACK.
	Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide Safety Module	TOBP C720829 06	Provides detailed procedures for installing the Safety Module in a SERVOPACK.
	Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide INDEXER Module	TOBP C720829 02	Provides detailed procedures for installing the INDEXER Module in a SERVOPACK.
	Σ-V-Series/Σ-V-Series for Large-Capacity Models/ Σ-7-Series Installation Guide DeviceNet Module	TOBP C720829 07	Provides detailed procedures for installing the DeviceNet Module in a SERVOPACK.
⑦ Σ-7-Series Σ-7C SERVOPACK Product Manual	Σ-7-Series AC Servo Drive Σ-7C SERVOPACK Product Manual	SIEP S800002 04	Provides detailed information on selecting Σ-7-Series Σ-7C SERVOPACKs; installing, connecting, setting, testing in trial operation, and tuning Servo Drives; writing, monitoring, and maintaining programs; and other information.
⑧ Σ-7-Series Σ-7C SERVOPACK Troubleshooting Manual	Σ-7-Series AC Servo Drive Σ-7C SERVOPACK Troubleshooting Manual	SIEP S800002 07	Provides detailed troubleshooting information for Σ-7-Series Σ-7C SERVOPACKs.

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Classification	Document Name	Document No.	Description
⑨ Σ-7-Series Σ-7S/Σ-7W SERVOPACK Product Manuals	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-4 Communications References Product Manual	SIEP S800002 31	Provide detailed information on selecting Σ-7-Series SERVOPACKs and information on installing, connecting, setting, performing trial operation for, tuning, monitoring, and maintaining the Servo Drives.
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual	SIEP S800001 28	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-II Communications References Product Manual	SIEP S800001 27	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual	SIEP S800001 26	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK Command Option Attachable Type with INDEXER Module Product Manual	SIEP S800001 64	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK Command Option Attachable Type with DeviceNet Module Product Manual	SIEP S800001 70	
	Σ-7-Series AC Servo Drive Σ-7W SERVOPACK with MECHATROLINK-III Communications References Product Manual	SIEP S800001 29	
⑩ Σ-7-Series Σ-7S/Σ-7W SERVOPACK with Hardware Option Specifications Product Manuals	Σ-7-Series AC Servo Drive Σ-7S/Σ-7W SERVOPACK with Hardware Option Specifications Dynamic Brake Product Manual	SIEP S800001 73	Provide detailed information on Hardware Options for Σ-7-Series SERVOPACKs.
	Σ-7-Series AC Servo Drive Σ-7W/Σ-7C SERVOPACK with Hardware Option Specifications HWBB Function Product Manual	SIEP S800001 72	

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Classification	Document Name	Document No.	Description
⑪ Σ-7-Series Σ-7S/Σ-7W SERVOPACK FT/EX Product Manuals	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Indexing Application Product Manual	SIEP S800001 84	Provide detailed information on the FT/EX Option for Σ-7-Series SERVOPACKs.
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Tracking Application Product Manual	SIEP S800001 89	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Application with Special Motor, SGM7D Motor Product Manual	SIEP S800001 91	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Press and Injection Molding Application Product Manual	SIEP S800001 94	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Transfer and Alignment Application Product Manual	SIEP S800001 95	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Torque/Force Assistance for Conveyance Application Product Manual	SIEP S800002 09	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Cutting Application Feed Shaft Motor Product Manual	SIEP S800002 10	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Three-Point Latching for Conveyance Application Product Manual	SIEP S800002 17	
	Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with FT/EX Specification for Semi-/Fully-Closed Loop Control Online Switching for Conveyance Application Product Manual	This manual (SIEP S800002 27)	
	Σ-7-Series AC Servo Drive Σ-7W SERVOPACK with FT/EX Specification for Gantry Applications Product Manual	SIEP S800002 29	
⑫ Option Module User's Manual	AC Servo Drives Σ-V Series/Σ-V Series for Large-Capacity Models/ Σ-7 Series User's Manual Safety Module	SIEP C720829 06	Provides details information required for the design and maintenance of a Safety Module.

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Classification	Document Name	Document No.	Description
⑬ Enclosed Documents	AC Servo Drive Rotary Servomotor Safety Precautions	TOBP C230260 00	Provides detailed information for the safe usage of Rotary Servomotors and Direct Drive Servomotors.
	AC Servomotor Linear Σ Series Safety Precautions	TOBP C230800 00	Provides detailed information for the safe usage of Linear Servomotors.
⑭ Σ-7-Series Servomotor Product Manuals	Σ-7-Series AC Servo Drive Rotary Servomotor Product Manual	SIEP S800001 36	Provide detailed information on selecting, installing, and connecting the Σ-7-Series Servomotors.
	Σ-7-Series AC Servo Drive Linear Servomotor Product Manual	SIEP S800001 37	
	Σ-7-Series AC Servo Drive Direct Drive Servomotor Product Manual	SIEP S800001 38	
⑮ Σ-7-Series Peripheral Device Selection Manual	Σ-7-Series AC Servo Drive Peripheral Device Selection Manual	SIEP S800001 32	Provides the following information in detail for Σ-7-Series Servo Systems. • Cables: Models, dimensions, wiring materials, connector models, and connection specifications • Peripheral devices: Models, specifications, diagrams, and selection (calculation) methods
⑯ Σ-7-Series MECHATROLINK Communications Command Manuals	Σ-7-Series AC Servo Drive MECHATROLINK-II Communications Command Manual	SIEP S800001 30	Provides detailed information on the MECHATROLINK-II communications commands that are used for a Σ-7-Series Servo System.
	Σ-7-Series AC Servo Drive MECHATROLINK-III Communications Standard Servo Profile Command Manual	SIEP S800001 31	Provides detailed information on the MECHATROLINK-III communications standard servo profile commands that are used for a Σ-7-Series Servo System.
	Σ-7-Series AC Servo Drive MECHATROLINK-4 Communications Standard Servo Profile Command Manual	SIEP S800002 32	Provides detailed information on the MECHATROLINK-4 communications standard servo profile commands that are used for a Σ-7- Series Servo System.
⑰ Programming Manuals	Machine Controller MP3000 Series Ladder Programming Manual	SIEP C880725 13	Provides detailed information on the ladder programming specifications and instructions for MP3000-Series Machine Controllers and Σ-7-Series Σ-7C SERVOPACKs.
	Machine Controller MP3000 Series Motion Programming Manual	SIEP C880725 14	Provides detailed information on the motion programming and sequence programming specifications and instructions for MP3000-Series Machine Controllers and Σ-7-Series Σ-7C SERVOPACKs.
⑱ Σ-7-Series Operation Interface Operating Manuals	System Integrated Engineering Tool MPE720 Version 7 USER'S MANUAL	SIEP C880761 03	Describes in detail how to operate MPE720 version 7.
	Σ-7-Series AC Servo Drive Digital Operator Operating Manual	SIEP S800001 33	Describes the operating procedures for a Digital Operator for a Σ-7-Series Servo System.
	AC Servo Drive Engineering Tool SigmaWin+ Operation Manual	SIET S800001 34	Provides detailed operating procedures for the SigmaWin+ Engineering Tool for a Σ-7-Series Servo System.

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Classification	Document Name	Document No.	Description
⑲ Distributed I/O Module User's Manual	MECHATROLINK-III Compatible I/O Module User's Manual	SIEP C880781 04	Describes the functions, specifications, operating methods, and MECHATROLINK-III communications for the Remote I/O Modules for MP2000/MP3000-Series Machine Controllers.
	MECHATROLINK-4 Compatible I/O Module User's Manual	SIEP C880782 01	Describes the functions, specifications, operating methods, and MECHATROLINK-4 communications for the Remote I/O Modules for MP3000-Series Machine Controllers.

Using This Manual

◆ Technical Terms Used in This Manual

The following terms are used in this manual.

Term	Meaning
Servomotor, Rotary Servomotor	A generic term used for a Σ-7-Series Rotary Servomotor (SGM7M, SGM7J, SGM7A, SGM7P, SGM7G, or SGMMV) or a Direct Drive Servomotor (SGM7E, SGM7F, SGMCV, or SGMCS). The descriptions will specify when Direct Drive Servomotors are excluded.
SERVOPACK	A Σ-7-Series Σ-7S Servo Amplifier with MECHATROLINK-III Communications References.
Servo Drive	The combination of a Servomotor and SERVOPACK.
Servo System	A servo control system that includes the combination of a Servo Drive with a host controller and peripheral devices.
servo ON	Supplying power to the motor.
servo OFF	Not supplying power to the motor.
base block (BB)	Shutting OFF the power supply to the motor by shutting OFF the base current to the power transistor in the SERVOPACK.
servo lock	A state in which the motor is stopped and is in a position loop with a position reference of 0.
Main Circuit Cable	One of the cables that connect to the main circuit terminals, including the Main Circuit Power Supply Cable, Control Power Supply Cable, and Servomotor Main Circuit Cable.
SigmaWin+	The Engineering Tool for setting up and tuning Servo Drives or a computer in which the Engineering Tool is installed.
MDevice	An abbreviation for a Main Device.
SDevice	An abbreviation for a Subordinate Device.

◆ Notation Used in this Manual

■ Notation for Reverse Signals

The names of reverse signals (i.e., ones that are valid when low) are written with a forward slash (/) before the signal abbreviation.

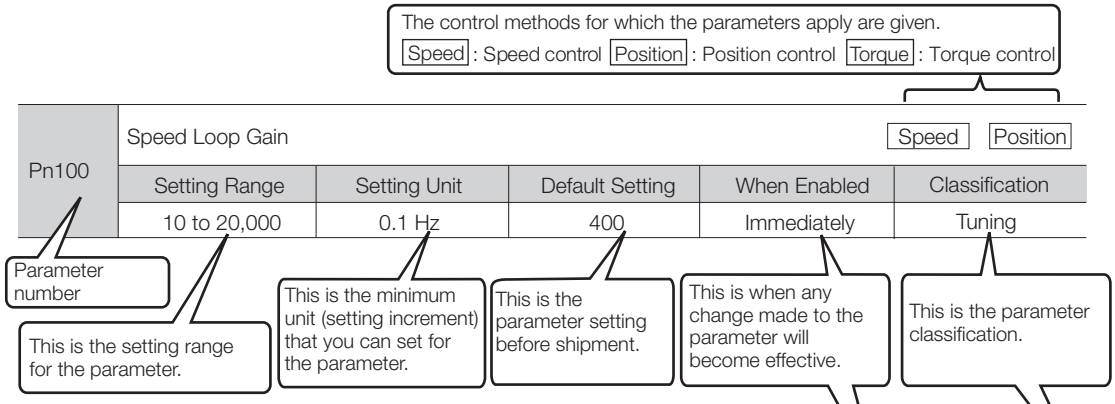
Notation Example

$\overline{BK}$ is written as /BK.

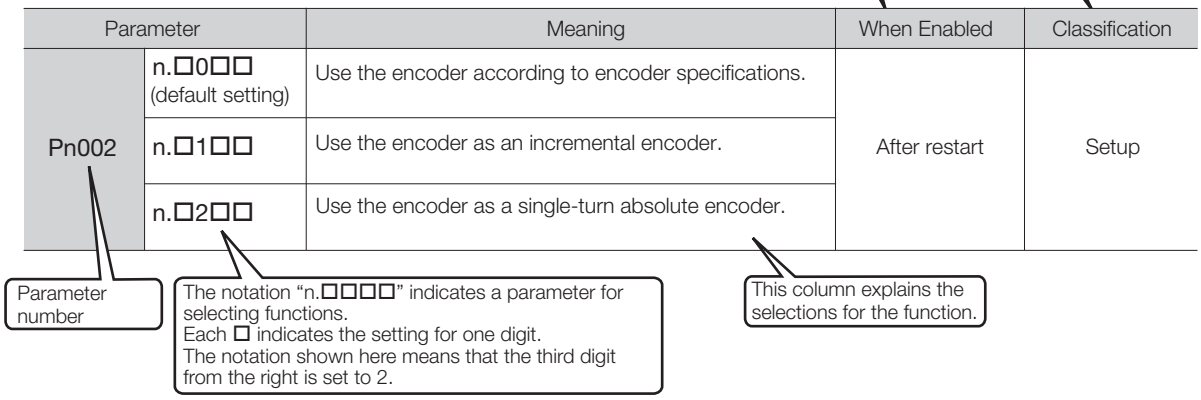
■ Notation for Parameters

The notation depends on whether the parameter requires a numeric setting (parameter for numeric setting) or requires the selection of a function (parameter for selecting functions).

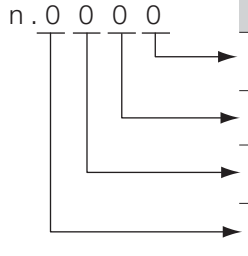
- Parameters for Numeric Settings



- Parameters for Selecting Functions



Notation Example



Notation Examples for Pn002

Digit Notation		Numeric Value Notation	
Notation	Meaning	Notation	Meaning
Pn002 = n.☐☐☐X	Indicates the first digit from the right in Pn002.	Pn002 = n.☐☐☐1	Indicates that the first digit from the right in Pn002 is set to 1.
Pn002 = n.☐☐X☐	Indicates the second digit from the right in Pn002.	Pn002 = n.☐☐1☐	Indicates that the second digit from the right in Pn002 is set to 1.
Pn002 = n.☐X☐☐	Indicates the third digit from the right in Pn002.	Pn002 = n.☐1☐☐	Indicates that the third digit from the right in Pn002 is set to 1.
Pn002 = n.X☐☐☐	Indicates the fourth digit from the right in Pn002.	Pn002 = n.1☐☐☐	Indicates that the fourth digit from the right in Pn002 is set to 1.

◆ Engineering Tools Used in This Manual

This manual uses the interfaces of the SigmaWin+ for descriptions.

◆ Trademarks

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

◆ Visual Aids

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



Indicates precautions or restrictions that must be observed.
Also indicates alarm displays and other precautions that will not result in machine damage.



Indicates definitions of difficult terms or terms that have not been previously explained in this manual.

Example Indicates operating or setting examples.

Information Indicates supplemental information to deepen understanding or useful information.

Safety Precautions

◆ Safety Information

To prevent personal injury and equipment damage in advance, the following signal words are used to indicate safety precautions in this document. The signal words are used to classify the hazards and the degree of damage or injury that may occur if a product is used incorrectly. Information marked as shown below is important for safety. Always read this information and heed the precautions that are provided.

⚠ DANGER

- Indicates precautions that, if not heeded, are likely to result in loss of life, serious injury, or fire.

⚠ WARNING

- Indicates precautions that, if not heeded, could result in loss of life, serious injury, or fire.

⚠ CAUTION

- Indicates precautions that, if not heeded, could result in relatively serious or minor injury, or in fire.

NOTICE

- Indicates precautions that, if not heeded, could result in property damage.

◆ Safety Precautions That Must Always Be Observed

■ General Precautions

⚠ DANGER

- Read and understand this manual to ensure the safe usage of the product.
- Keep this manual in a safe, convenient place so that it can be referred to whenever necessary. Make sure that it is delivered to the final user of the product.
- Do not remove covers, cables, connectors, or optional devices while power is being supplied to the SERVOPACK.
  There is a risk of electric shock, operational failure of the product, or burning.

⚠ WARNING

- Use a power supply with specifications (number of phases, voltage, frequency, and AC/DC type) that are appropriate for the product.
  There is a risk of burning, electric shock, or fire.
- Connect the ground terminals on the SERVOPACK and Servomotor to ground poles according to local electrical codes (100 Ω or less for a SERVOPACK with a 100-VAC or 200-VAC power supply, and 10 Ω or less for a SERVOPACK with a 400-VAC power supply).
  There is a risk of electric shock or fire.
- Do not attempt to disassemble, repair, or modify the product.
  There is a risk of fire or failure.
  The warranty is void for the product if you disassemble, repair, or modify it.

⚠ CAUTION

- The SERVOPACK heat sinks, regenerative resistors, External Dynamic Brake Resistors, Servomotors, and other components can be very hot while power is ON or soon after the power is turned OFF. Implement safety measures, such as installing covers, so that hands and parts such as cables do not come into contact with hot components.
  There is a risk of burn injury.
- For a 24-VDC power supply, use a power supply device with double insulation or reinforced insulation.
  There is a risk of electric shock.
- Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.
  There is a risk of failure, damage, or electric shock.
- The person who designs the system that uses the hard wire base block safety function must have a complete knowledge of the related safety standards and a complete understanding of the instructions in this document.
  There is a risk of injury, product damage, or machine damage.
- Do not use the product in an environment that is subject to water, corrosive gases, or flammable gases, or near flammable materials.
  There is a risk of electric shock or fire.

NOTICE

- Do not attempt to use a SERVOPACK or Servomotor that is damaged or that has missing parts.
- Install external emergency stop circuits that shut OFF the power supply and stops operation immediately when an error occurs.
- In locations with poor power supply conditions, install the necessary protective devices (such as AC reactors) to ensure that the input power is supplied within the specified voltage range.
  There is a risk of damage to the SERVOPACK.
- Use a Noise Filter to minimize the effects of electromagnetic interference.
  Electronic devices used near the SERVOPACK may be affected by electromagnetic interference.
- Always use a Servomotor and SERVOPACK in one of the specified combinations.
- Do not touch a SERVOPACK or Servomotor with wet hands.
  There is a risk of product failure.

■ Storage Precautions

⚠ CAUTION

- Do not place an excessive load on the product during storage. (Follow all instructions on the packages.)
  There is a risk of injury or damage.

NOTICE

- Do not install or store the product in any of the following locations.
  - Locations that are subject to direct sunlight
  - Locations that are subject to ambient temperatures that exceed product specifications
  - Locations that are subject to relative humidities that exceed product specifications
  - Locations that are subject to condensation as the result of extreme changes in temperature
  - Locations that are subject to corrosive or flammable gases
  - Locations that are near flammable materials
  - Locations that are subject to dust, salts, or iron powder
  - Locations that are subject to water, oil, or chemicals
  - Locations that are subject to vibration or shock that exceeds product specifications
  - Locations that are subject to radiation

  If you store or install the product in any of the above locations, the product may fail or be damaged.

■ Transportation Precautions

⚠ CAUTION

- Transport the product in a way that is suitable to the mass of the product.
- Do not use the eyebolts on a SERVOPACK or Servomotor to move the machine.
  There is a risk of damage or injury.
- When you handle a SERVOPACK or Servomotor, be careful of sharp parts, such as the corners.
  There is a risk of injury.
- Do not place an excessive load on the product during transportation. (Follow all instructions on the packages.)
  There is a risk of injury or damage.

NOTICE

- Do not hold onto the front cover or connectors when you move a SERVOPACK.
  There is a risk of the SERVOPACK falling.
- A SERVOPACK or Servomotor is a precision device. Do not drop it or subject it to strong shock.
  There is a risk of failure or damage.
- Do not subject connectors to shock.
  There is a risk of faulty connections or damage.
- If disinfectants or insecticides must be used to treat packing materials such as wooden frames, plywood, or pallets, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.
  Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.
  If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.
- Do not overtighten the eyebolts on a SERVOPACK or Servomotor.
  If you use a tool to overtighten the eyebolts, the tapped holes may be damaged.

■ Installation Precautions

⚠ CAUTION

- Install the Servomotor or SERVOPACK in a way that will support the mass given in technical documents.
- Install SERVOPACKs, Servomotors, regenerative resistors, and External Dynamic Brake Resistors on nonflammable materials.
  Installation directly onto or near flammable materials may result in fire.
- Provide the specified clearances between the SERVOPACK and the control panel as well as with other devices.
  There is a risk of fire or failure.
- Install the SERVOPACK in the specified orientation.
  There is a risk of fire or failure.
- Do not step on or place a heavy object on the product.
  There is a risk of failure, damage, or injury.
- Do not allow any foreign matter to enter the SERVOPACK or Servomotor.
  There is a risk of failure or fire.

NOTICE

- Do not install or store the product in any of the following locations.
  - Locations that are subject to direct sunlight
  - Locations that are subject to ambient temperatures that exceed product specifications
  - Locations that are subject to relative humidities that exceed product specifications
  - Locations that are subject to condensation as the result of extreme changes in temperature
  - Locations that are subject to corrosive or flammable gases
  - Locations that are near flammable materials
  - Locations that are subject to dust, salts, or iron powder
  - Locations that are subject to water, oil, or chemicals
  - Locations that are subject to vibration or shock that exceeds product specifications
  - Locations that are subject to radiation

  If you store or install the product in any of the above locations, the product may fail or be damaged.
- Use the product in an environment that is appropriate for the product specifications.
  If you use the product in an environment that exceeds product specifications, the product may fail or be damaged.
- A SERVOPACK or Servomotor is a precision device. Do not drop it or subject it to strong shock.
  There is a risk of failure or damage.
- Always install a SERVOPACK in a control panel.
- Do not allow any foreign matter to enter a SERVOPACK or a Servomotor with a Cooling Fan and do not cover the outlet from the Servomotor's cooling fan.
  There is a risk of failure.

■ Wiring Precautions

⚠ DANGER

- Do not change any wiring while power is being supplied.
  There is a risk of electric shock or injury.

⚠ WARNING

- Wiring and inspections must be performed only by qualified engineers.
  There is a risk of electric shock or product failure.
- Check all wiring and power supplies carefully.
  Incorrect wiring or incorrect voltage application to the output circuits may cause short-circuit failures. If a short-circuit failure occurs as a result of any of these causes, the holding brake will not work. This could damage the machine or cause an accident that may result in death or injury.
- Connect the AC and DC power supplies to the specified SERVOPACK terminals.
  - Connect an AC power supply to the L1, L2, and L3 terminals and the L1C and L2C terminals on the SERVOPACK.
  - Connect a DC power supply to the B1/⊕ and ⊖2 terminals and the L1C and L2C terminals on the SERVOPACK.

  There is a risk of failure or fire.
- If you use a SERVOPACK with the Dynamic Brake Hardware Option, connect an External Dynamic Brake Resistor that is suitable for the machine and equipment specifications to the specified terminals.
  There is a risk of unexpected operation, machine damage, burning, or injury when an emergency stop is performed.

⚠ CAUTION

- Wait for at least six minutes after turning OFF the power supply (with a SERVOPACK for a 100-VAC power supply input, wait for at least nine minutes) and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the power supply terminals while the CHARGE lamp is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power supply.
  There is a risk of electric shock.
- Observe the precautions and instructions for wiring and trial operation precisely as described in this document.
  Failures caused by incorrect wiring or incorrect voltage application in the brake circuit may cause the SERVOPACK to fail, damage the equipment, or cause an accident resulting in death or injury.
- Check the wiring to be sure it has been performed correctly.
  Connectors and pin layouts are sometimes different for different models. Always confirm the pin layouts in technical documents for your model before operation.
  There is a risk of failure or malfunction.
- Connect wires to power supply terminals and motor connection terminals securely with the specified methods and tightening torque.
  Insufficient tightening may cause wires and terminal blocks to generate heat due to faulty contact, possibly resulting in fire.
- Use shielded twisted-pair cables or screened unshielded multi-twisted-pair cables for I/O Signal Cables and Encoder Cables.
- The maximum wiring length is 3 m for I/O Signal Cables, and 50 m for Encoder Cables or Servomotor Main Circuit Cables.
- Observe the following precautions when wiring the SERVOPACK's main circuit terminals.
  - Turn ON the power supply to the SERVOPACK only after all wiring, including the main circuit terminals, has been completed.
  - If a connector is used for the main circuit terminals, remove the main circuit connector from the SERVOPACK before you wire it.
  - Insert only one wire per insertion hole in the main circuit terminals.
  - When you insert a wire, make sure that the conductor wire (e.g., whiskers) does not come into contact with adjacent wires and cause a short-circuit.
- Install molded-case circuit breakers and other safety measures to provide protection against short circuits in external wiring.
  There is a risk of fire or failure.

NOTICE

- Whenever possible, use the Cables specified by Yaskawa.
  If you use any other cables, confirm the rated current and application environment of your model and use the wiring materials specified by Yaskawa or equivalent materials.
- Securely tighten connector screws and lock mechanisms.
  Insufficient tightening may result in connectors falling off during operation.
- Do not bundle power lines (e.g., the Main Circuit Cable) and low-current lines (e.g., the I/O Signal Cables or Encoder Cables) together or run them through the same duct. If you do not place power lines and low-current lines in separate ducts, separate them by at least 30 cm.
  If the cables are too close to each other, malfunctions may occur due to noise affecting the low-current lines.
- Install a battery at either the host controller or on the Encoder Cable.
  If you install batteries both at the host controller and on the Encoder Cable at the same time, you will create a loop circuit between the batteries, resulting in a risk of damage or burning.
- When connecting a battery, connect the polarity correctly.
  There is a risk of battery rupture or encoder failure.

■ Operation Precautions

⚠ WARNING

- Before starting operation with a machine connected, change the settings of the switches and parameters to match the machine.
  Unexpected machine operation, failure, or personal injury may occur if operation is started before appropriate settings are made.
- Do not radically change the settings of the parameters.
  There is a risk of unstable operation, machine damage, or injury.
- Install limit switches or stoppers at the ends of the moving parts of the machine to prevent unexpected accidents.
  There is a risk of machine damage or injury.
- For trial operation, securely mount the Servomotor and disconnect it from the machine.
  There is a risk of injury.
- Forcing the motor to stop for overtravel is disabled when the Jog, Origin Search, or Easy FFT utility function is executed. Take necessary precautions.
  There is a risk of machine damage or injury.
- When an alarm occurs, the Servomotor will coast to a stop or stop with the dynamic brake according to the SERVOPACK Option and settings. The coasting distance will change with the moment of inertia of the load and the resistance of the External Dynamic Brake Resistor. Check the coasting distance during trial operation and implement suitable safety measures on the machine.
- Do not enter the machine's range of motion during operation.
  There is a risk of injury.
- Do not touch the moving parts of the Servomotor or machine during operation.
  There is a risk of injury.

⚠ CAUTION

- Do not switch between semi-closed loop control and fully-closed loop control while a latch function (phase-C latch or external latch) is being executed.
  Unexpected machine operation, failure, or personal injury may occur.
- Design the system to ensure safety even when problems, such as broken signal lines, occur. For example, the P-OT and N-OT signals are set in the default settings to operate on the safe side if a signal line breaks. Do not change the polarity of this type of signal.
- When overtravel occurs, the power supply to the motor is turned OFF and the brake is released. If you use the Servomotor to drive a vertical load, set the Servomotor to enter a zero-clamped state after the Servomotor stops. Also, install safety devices (such as an external brake or counterweight) to prevent the moving parts of the machine from falling.
- Always turn OFF the servo before you turn OFF the power supply. If you turn OFF the main circuit power supply or control power supply during operation before you turn OFF the servo, the Servomotor will stop as follows:
  - If you turn OFF the main circuit power supply during operation without turning OFF the servo, the Servomotor will stop abruptly with the dynamic brake.
  - If you turn OFF the control power supply without turning OFF the servo, the stopping method that is used by the Servomotor depends on the model of the SERVOPACK. For details, refer to the manual for the SERVOPACK.
  - If you use a SERVOPACK with the Dynamic Brake Hardware Option, the Servomotor stopping methods will be different from the stopping methods used without the Option or with other Hardware Options. For details, refer to the following manual.
    📖 Σ-7-Series Σ-7S/Σ-7W SERVOPACK with Dynamic Brake Hardware Option Specifications Product Manual (Manual No.: SIEP S800001 73)
- Do not use the dynamic brake for any application other than an emergency stop.
  There is a risk of failure due to rapid deterioration of elements in the SERVOPACK and the risk of unexpected operation, machine damage, burning, or injury.

NOTICE

- When you adjust the gain during system commissioning, use a measuring instrument to monitor the torque waveform and speed waveform and confirm that there is no vibration.
  If a high gain causes vibration, the Servomotor will be damaged quickly.
- Do not frequently turn the power supply ON and OFF. After you have started actual operation, allow at least one hour between turning the power supply ON and OFF (as a guideline).
  Do not use the product in applications that require the power supply to be turned ON and OFF frequently.
  The elements in the SERVOPACK will deteriorate quickly.
- An alarm or warning may occur if communications are performed with the host controller while the SigmaWin+ or Digital Operator is operating.
  If an alarm or warning occurs, it may interrupt the current process and stop the system.
- After you complete trial operation of the machine and facilities, use the SigmaWin+ to back up the settings of the SERVOPACK parameters. You can use them to reset the parameters after SERVOPACK replacement.
  If you do not copy backed up parameter settings, normal operation may not be possible after a faulty SERVOPACK is replaced, possibly resulting in machine or equipment damage.

■ Maintenance and Inspection Precautions

⚠ DANGER

- Do not change any wiring while power is being supplied.
  There is a risk of electric shock or injury.

⚠ WARNING

- Wiring and inspections must be performed only by qualified engineers.
  There is a risk of electric shock or product failure.

⚠ CAUTION

- Wait for at least six minutes after turning OFF the power supply (with a SERVOPACK for a 100-VAC power supply input, wait for at least nine minutes) and then make sure that the CHARGE indicator is not lit before starting wiring or inspection work. Do not touch the power supply terminals while the CHARGE lamp is lit because high voltage may still remain in the SERVOPACK even after turning OFF the power supply.
  There is a risk of electric shock.
- Before you replace a SERVOPACK, back up the settings of the SERVOPACK parameters. Copy the backed up parameter settings to the new SERVOPACK and confirm that they were copied correctly.
  If you do not copy backed up parameter settings or if the copy operation is not completed correctly, normal operation may not be possible, possibly resulting in machine or equipment damage.

NOTICE

- Discharge all static electricity from your body before you operate any of the buttons or switches inside the front cover of the SERVOPACK.
  There is a risk of equipment damage.

■ Troubleshooting Precautions

⚠ DANGER

- If the safety device (molded-case circuit breaker or fuse) installed in the power supply line operates, remove the cause before you supply power to the SERVOPACK again. If necessary, repair or replace the SERVOPACK, check the wiring, and remove the factor that caused the safety device to operate.
  There is a risk of fire, electric shock, or injury.

⚠ WARNING

- The product may suddenly start to operate when the power supply is recovered after a momentary power interruption. Design the machine to ensure human safety when operation restarts.
  There is a risk of injury.

⚠ CAUTION

- When an alarm occurs, remove the cause of the alarm and ensure safety. Then reset the alarm or turn the power supply OFF and ON again to restart operation.
  There is a risk of injury or machine damage.
- If the Servo ON signal is input to the SERVOPACK and an alarm is reset, the Servomotor may suddenly restart operation. Confirm that the servo is OFF and ensure safety before you reset an alarm.
  There is a risk of injury or machine damage.
- Always insert a magnetic contactor in the line between the main circuit power supply and the main circuit power supply terminals on the SERVOPACK so that the power supply can be shut OFF at the main circuit power supply.
  If a magnetic contactor is not connected when the SERVOPACK fails, a large current may flow continuously, possibly resulting in fire.
- If an alarm occurs, shut OFF the main circuit power supply.
  There is a risk of fire due to a regenerative resistor overheating as the result of regenerative transistor failure.
- Install a ground fault detector against overloads and short-circuiting or install a molded-case circuit breaker combined with a ground fault detector.
  There is a risk of SERVOPACK failure or fire if a ground fault occurs.
- The holding brake on a Servomotor will not ensure safety if there is the possibility that an external force (including gravity) may move the current position and create a hazardous situation when power is interrupted or an error occurs. If an external force may cause movement, install an external braking mechanism that ensures safety.

■ Disposal Precautions

- Correctly discard the product as stipulated by regional, local, and municipal laws and regulations. Be sure to include these contents in all labelling and warning notifications on the final product as necessary.



■ General Precautions

- Figures provided in this manual are typical examples or conceptual representations. There may be differences between them and actual wiring, circuits, and products.
- The products shown in illustrations in this manual are sometimes shown with their covers or protective guards removed to illustrate detail. Always replace all covers and protective guards before you use the product.
- If you need a new copy of this manual because it has been lost or damaged, contact your nearest Yaskawa representative or one of the offices listed on the back of this manual.
- This manual is subject to change without notice for product improvements, specifications changes, and improvements to the manual itself.
  We will update the manual number of the manual and issue revisions when changes are made.
- Any and all quality guarantees provided by Yaskawa are null and void if the customer modifies the product in any way. Yaskawa disavows any responsibility for damages or losses that are caused by modified products.

Warranty

◆ Details of Warranty

■ Warranty Period

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

■ Warranty Scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the above warranty period.
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.

- 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
- Causes not attributable to the delivered product itself
- Modifications or repairs not performed by Yaskawa
- Use of the delivered product in a manner in which it was not originally intended
- Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
- Events for which Yaskawa is not responsible, such as natural or human-made disasters

◆ Limitations of Liability

- 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.
- 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.
- 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.
- 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.

◆ Suitability for Use

- 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.
- The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
- 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
- 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.
- 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.
- Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

◆ 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.

Compliance with UL Standards, EU Directives, UK Regulations, and Other Safety Standards

Certification marks for the standards for which the product has been certified by certification bodies are shown on nameplate. Products that do not have the marks are not certified for the standards. Refer to the Servomotor manual for compliant standards of Servomotors.

◆ North American Safety Standards (UL)

Product	Model	North American Safety Standards (UL File No.)
SERVOPACK	SGD7S	UL 61800-5-1 (E147823) CSA C22.2 No.274

◆ European Directives

Product	Model	EU Directive	Harmonized Standards
SERVOPACK	SGD7S	Machinery Directive 2006/42/EC	EN ISO 13849-1: 2015 EN IEC 62061 EN 61800-5-2
		EMC Directive 2014/30/EU	EN 55011 Group 1, Class A EN 61000-6-2 EN 61000-6-4 EN 61800-3 (Category C2, Second environment)
		Low Voltage Directive 2014/35/EU	EN 61800-5-1
		RoHS Directive 2011/65/EU (EU)2015/863	EN IEC 63000

Note: 1. We declared the CE Marking based on the harmonized standards in the above table.
2. These products are for industrial use. In home environments, these products may cause electromagnetic interference and additional noise reduction measures may be necessary.

◆ UK Conformity Assessed (UKCA)

Product	Model	UK Regulations	Designated Standards
SERVOPACK	SGD7S	Supply of Machinery (Safety) Regulations S.I. 2008/1597	EN ISO 13849-1: 2015 EN IEC 62061 EN 61800-5-2
		Electromagnetic Compatibility Regulations S.I. 2016/1091	EN 55011 Group 1, Class A EN 61000-6-2 EN 61000-6-4 EN 61800-3 (Category C2, Second environment)
		Electrical Equipment (Safety) Regulations S.I. 2016/1101	EN 61800-5-1
		Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations S.I. 2012/3032	EN IEC 63000

Note: We declared the UKCA marking based on the designated standards in the above table.

◆ Safety Standards

Product	Model	Safety Standards	Standards
SERVOPACK	SGD7S	Safety of Machinery	EN ISO 13849-1: 2015 EN 60204-1
		Functional Safety	EN 61508 series EN IEC 62061 EN 61800-5-2
		Functional Safety EMC	EN 61326-3-1 EN 61000-6-7

■ Safety Parameters

Item	Standards	Performance Level	
Safety Integrity Level	EN 61508	SIL3	
	EN IEC 62061	maximum SIL 3	
Mission Time	EN 61508	10 years	20 years
Probability of Dangerous Failure per Hour	EN 61508 EN IEC 62061	PFH = 4.04×10^{-9} [1/h] (4.04% of SIL3)	PFH = 4.05×10^{-9} [1/h] (4.05% of SIL3)
Performance Level	EN ISO 13849-1	PLe (Category 3)	
Mean Time to Dangerous Failure of Each Channel	EN ISO 13849-1	MTTFd: High	
Average Diagnostic Coverage	EN ISO 13849-1	DCavg: Medium	
Stop Category	EN 60204-1	Stop category 0	
Safety Function	EN 61800-5-2	STO	
Hardware Fault Tolerance	EN 61508	HFT = 1	
Subsystem	EN 61508	B	

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Basic Information on SERVOPACKs

1

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1.1 Introduction to This Product

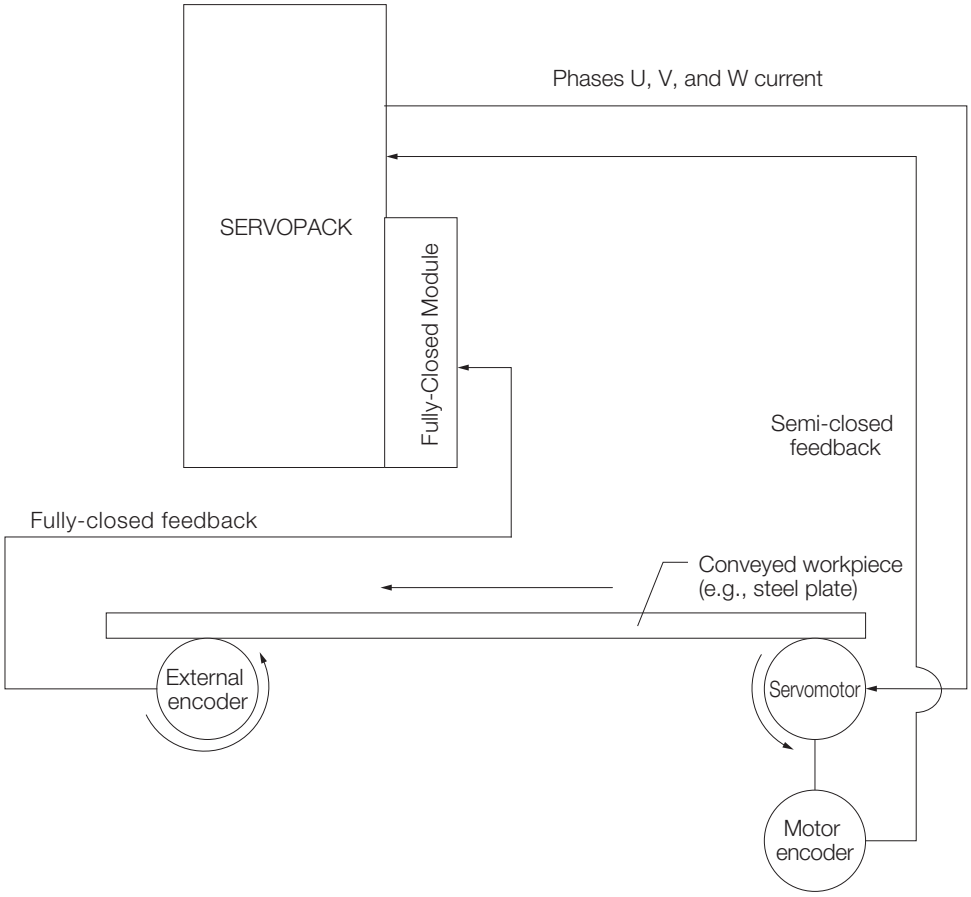
This product is capable of switching between semi-closed loop control and fully-closed loop control while online and without requiring the power supply of the SERVOPACK to be turned ON and OFF again. When this product is applied to leveler feeders, cutting machines, and other equipment, it can help achieve high-precision production and cutting that is little affected by slippage and warping.

The following figure shows an example of a system configuration using this product. The connected devices and cables depend on the type of external encoder that is used. Refer to the following manual for details.

Σ-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

Important

Use this product together with the Fully-Closed Module (model: SGDV-OFA01A).



Term

Motor Encoder

When using this product, the encoder included with the motor and an external encoder are required to switch between semi-closed loop control and fully-closed loop control. In this manual, the encoder that is included with the motor is referred to as the motor encoder.

Information

With a fully-closed control, an externally installed encoder is used to detect the position of the controlled machine and the machine's position information is fed back to the SERVOPACK. High-precision positioning is possible because the actual machine position is fed back directly. With a fully-closed control, looseness or twisting of mechanical parts may cause vibration or oscillation, resulting in unstable positioning.

1.2 Model Designations

1.2.1 Interpreting SERVOPACK Model Numbers

SGD7S - R70 A 00 A 000 F63

- SGD7S: Σ-7-Series Σ-7S SERVOPACKs
- R70: 1st+2nd+3rd digits
- A: 4th digit
- 00: 5th+6th digits
- A: 7th digit
- 000: 8th+9th+10th digits
- F63: 11th+12th+13th digits

1st+2nd+3rd digits Maximum Applicable Motor Capacity

Voltage	Code	Specification
Three-Phase, 200 VAC	R70*1	0.05 kW
	R90*1	0.1 kW
	1R6*1	0.2 kW
	2R8*1	0.4 kW
	3R8	0.5 kW
	5R5*1	0.75 kW
	7R6	1.0 kW
	120*2	1.5 kW
	180	2.0 kW
	200	3.0 kW
	330	5.0 kW
	470	6.0 kW
	550	7.5 kW
	590	11 kW
	780	15 kW
Single-Phase, 100 VAC	R70	0.05 kW
	R90	0.1 kW
	2R1	0.2 kW
	2R8	0.4 kW

4th digit Voltage

Code	Specification
A	200 VAC
F	100 VAC

5th+6th digits Interface

Code	Specification
00	Analog voltage/pulse train reference
20	MECHATROLINK-III communications reference

7th digit Design Revision Order

A

8th+9th+10th digits Hardware Options Specification

Code	Specification	Applicable Models
000	Without options	All models
001	Rack-mounted	SGD7S-R70A to -330A
		SGD7S-R70F to -2R8F
	Duct-ventilated	SGD7S-470A to -780A
002	Varnished	All models
008	Single-phase, 200-VAC power supply input	SGD7S-120A
020*3	No dynamic brake	SGD7S-R70A to -2R8A
		SGD7S-R70F to -2R8F
	External dynamic brake resistor	SGD7S-3R8A to -780A

11th+12th+13th digits FT/EX Specification

Code	Specification
F63	Semi-/fully-closed loop control online switching

*1. You can use these models with either a single-phase or three-phase input.

*2. A model with a single-phase, 200-VAC power supply input is available as a hardware option (model: SGD7S-120A20A008).

*3. Refer to the following manual for details.
Σ-7-Series Σ-7S/Σ-7W SERVOPACK with Dynamic Brake Hardware Option Specifications Product Manual (Manual No.: SIEP S800001 73)

1.2.2 Interpreting Servomotor Model Numbers

Refer to the following manuals for information on interpreting Σ-7-Series Servomotor model numbers.

Σ-7-Series Rotary Servomotor Product Manual (Manual No.: SIEP S800001 36)

Σ-7-Series Direct Drive Servomotor Product Manual (Manual No.: SIEP S800001 38)

1.3 Combinations of SERVOPACKs and Servomotors

Refer to the following manuals for information on combinations with Σ-7-Series Servomotors.

Σ-7-Series Rotary Servomotor Product Manual (Manual No.: SIEP S800001 36)
Σ-7-Series Direct Drive Servomotor Product Manual (Manual No.: SIEP S800001 38)

1.4 Functions

This section lists the functions provided by SERVOPACKs.

Functions given inside bold lines in the functions tables are restricted for the SERVOPACKs described in this manual. Refer to the following section for details on restrictions to these functions.

☞ *1.5.1 Function Application Restrictions* on page 1-9

- Functions Related to the Machine

Function	Reference
Power Supply Type Settings for the Main Circuit and Control Circuit	🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Automatic Detection of Connected Motor	
Motor Direction Setting	
Overtravel Function and Settings	
Holding Brake	
Motor Stopping Methods for Servo OFF and Alarms	
Resetting the Absolute Encoder	
Setting the Origin of the Absolute Encoder	
Setting the Regenerative Resistor Capacity	
Operation for Momentary Power Interruptions	
SEMI F47 Function	
Setting the Motor Maximum Speed	
Software Limits and Settings*	☞ *1.5.1 Function Application Restrictions* on page 1-9
Multiturn Limit Setting	🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Adjustment of Motor Current Detection Signal Offset	☞ *1.5.1 Function Application Restrictions* on page 1-9
Forcing the Motor to Stop	🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Overheat Protection	
Current Control Mode Selection	
Speed Ripple Compensation	☞ *1.5.1 Function Application Restrictions* on page 1-9
Current Gain Level Setting	🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Fully-Closed Loop Control	☞ *Chapter 4 Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching*
Speed Detection Method Selection	🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)
Safety Functions	🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
External Latches*	☞ *1.5.1 Function Application Restrictions* on page 1-9

* These functions can be used with SERVOPACKs with MECHATROLINK-III Communications References.

• Functions Related to the Host Controller

Function	Reference
Electronic Gear Settings	🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
I/O Signal Allocations	☞ *4.5.1 I/O Signal Allocations: SERVOPACK with Analog Voltage/Pulse Train References* on page 4-20
Σ-V Compatible Function	🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
ALM (Servo Alarm) Signal	
ALO1 to ALO3 (Alarm Code) Signals*	
/WARN (Warning) Signal	
/TGON (Rotation Detection) Signal	
/S-RDY (Servo Ready) Signal	
Speed Control*	
Basic Settings for Speed Control*	
Speed Reference Filter*	
Zero Clamping*	
/V-CMP (Speed Coincidence Detection) Signal	
Position Control*	
Reference Pulse Form*	
CLR (Position Deviation Clear) Signal Function and Settings*	
Reference Pulse Input Multiplication Switching*	
/COIN (Positioning Completion) Signal	
/NEAR (Near) Signal	
Reference Pulse Inhibition and Settings*	
Torque Control*	
Basic Settings for Torque Control*	
Torque Reference Filter Settings*	
Speed Limit during Torque Control	
/VLT (Speed Limit Detection) Signal	
/FLC (Semi-closed/Fully-closed Loop Control Selection Input) Signal	☞ *4.5.1 I/O Signal Allocations: SERVOPACK with Analog Voltage/Pulse Train References* on page 4-20
/SFECLR (Motor-Load Position Deviation Clear Input) Signal	
/FLCA (Semi-closed/Fully-closed Loop Control Status Output) Signal	
Encoder Divided Pulse Output	🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Selecting Torque Limits	
Vibration Detection Level Initialization	
Alarm Reset	
Replacing the Battery	
Setting the Position Deviation Overflow Alarm Level	

* These functions can be used with SERVOPACKs with Analog Voltage/Pulse Train References.

• Functions to Achieve Optimum Motions

Function	Reference
Speed Control*1	📖 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 📖 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Soft Start Settings*1	
Position Control*1	
Smoothing Settings*1	
Torque Control*1	
Tuning-less Function	☞ *1.5.1 Function Application Restrictions* on page 1-9
Autotuning without a Host Reference	
Autotuning with a Host Reference	📖 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 📖 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Custom Tuning	
Anti-Resonance Control Adjustment	
Vibration Suppression	
Gain Selection	
Friction Compensation	
Gravity Compensation	
Backlash Compensation*2	
Model Following Control	☞ *1.5.1 Function Application Restrictions* on page 1-9
Compatible Adjustment Functions	📖 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 📖 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Mechanical Analysis	☞ *1.5.1 Function Application Restrictions* on page 1-9
Easy FFT	

*1. These functions can be used with SERVOPACKs with Analog Voltage/Pulse Train References.
*2. These functions can be used with SERVOPACKs with MECHATROLINK-III Communications References.

• Functions for Trial Operation during Setup

Function	Reference
Software Reset	📖 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 📖 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Trial Operation of Servomotor without a Load	
Jogging	☞ *1.5.1 Function Application Restrictions* on page 1-9
Program Jogging	
Origin Search	
Test without a Motor	
Monitoring Machine Operation Status and Signal Waveforms	📖 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 📖 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

- Functions for Inspection and Maintenance

Function	Reference
Write Prohibition Setting for Parameters	📖 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26) 📖 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Initializing Parameter Settings	
Automatic Detection of Connected Motor	
Monitoring Product Information	
Monitoring Product Life	
Alarm History Display	
Alarm Tracing	

1.5 Restrictions

This section describes restrictions that apply when using the SERVOPACKs described in this manual.

1.5.1 Function Application Restrictions

The following functional restrictions apply when the SERVOPACKs described in this manual are used.

Function	Restriction
Control Method	Only position control can be used while Semi-/Fully-Closed Loop Control Online Switching is being used. Speed control and torque control cannot be used.
Model Following Control	These functions cannot be used.
Test without a Motor	
Software Limit*1	
Tuning-less Selection (Pn170 = n.□□□X)	Set Pn170 to n.□□□0 (Disable tuning-less function). If Pn170 is set to n.□□□1 (Enable tuning-less function), control may become unstable. Do not use this setting. Additional information: The default setting of Pn170 = n.□□□X for the standard product is n.□□□1 (Enable tuning-less function). However, the default setting of this product is n.□□□0 (Disable tuning-less function).
Fully-closed Control Speed Feedback Selection (Pn22A = n.X□□□)	Set Pn22A to n.0□□□ (Use motor encoder speed). If Pn22A is set to n.1□□□ (Use external encoder speed), control may become unstable. Do not use this setting.
Jog (Fn002)	If these functions are executed on the Panel Operator*2 or Digital Operator during fully-closed loop control, [NO-OP] will be displayed on the Operator and the function will not be executed. Switch to semi-closed loop control before executing these functions. If control is switched between semi-closed loop control and fully-closed loop control while these functions are being executed, an A.0b1 alarm (Semi-Closed Loop Control/Fully-Closed Loop Control Switching Operation Error) will occur.
Origin Search (Fn003)	
Jog Program (Fn004)	
Autotune Motor Current Detection Signal Offset (Fn00E)	
Advanced Autotuning without Reference (Fn201)	
EasyFFT (Fn206)	
Mechanical Analysis*3	
Moment of Inertia Ratio Estimation*3	
Speed Ripple Compensation*3	
Latch Functions (Phase-C Latch and External Latch)*1	Do not switch between semi-closed loop control and fully-closed loop control while these functions are being executed. Example: Do not use this product in a manner such as latching a signal in semi-closed loop control and then moving the machine to the latch position after switching to fully-closed loop control.
Parameter Copy Function of the Digital Operator	Use the parameter copy function of the Digital Operator between Σ-7-series FT63 SERVOPACKs. If the parameter copy function is used between the FT63 and a different model SERVOPACK, an alarm will occur (e.g., A.040 Parameter Setting Error) and the parameters will not be copied.

*1. Function that can be used when using a SERVOPACK with MECHATROLINK-III communications references.
*2. Panel Operator is available only on a SERVOPACK with analog voltage/pulse train references.
*3. Function that can be used only on SigmaWin+.

⚠ CAUTION

- **Do not switch between semi-closed loop control and fully-closed loop control while a latch function (phase-C latch or external latch) is being executed.**
  Unexpected machine operation, failure, or personal injury may occur.

1.5.2 Restrictions on Specifications

The following restrictions on specifications apply when the SERVOPACKs described in this manual are used.

Item	Restriction
Linear Servomotor, Linear Encoder	These devices cannot be used. Use a Rotary Servomotor and rotary encoder.
Absolute Encoder	Do not use an absolute encoder when using Semi-/Fully-Closed Loop Control Online Switching. Use an incremental encoder or configure the setting (Pn002 = n.□1□□) to use the absolute encoder as an incremental encoder. Additional information: The default setting of Pn002 = n.□X□□ for the standard product is n.□0□□ (Use the encoder according to encoder specifications). However, the default setting of this product is n.□1□□ (Use the encoder as an incremental encoder).
Safety Module	This device cannot be used.

Important

Vibration and shock may occur when switching between semi-closed loop control and fully-closed loop control if an absolute encoder is used (an absolute encoder is connected and Pn002 is set to n.□0□□ or n.□2□□.).
Use an incremental encoder or use the absolute encoder as an incremental encoder (Pn002 = n.□1□□).

Important

Use this product together with the Fully-Closed Module (model: SGDV-OFA01A).
If this product is used with the Safety Module instead of the Fully-Closed Module, the FT63 functions will not be available and the Safety Module will operate.
The safety standards obtained by the Safety Module will also no longer be applicable.

1.6 SigmaWin+

To use the SigmaWin+, a model information file for the SERVOPACK must be added to SigmaWin+ version 7. Contact your Yaskawa representative for the model information file.

1.7 Combining the SERVOPACKs with MP-Series Machine Controllers and the MPE720 Engineering Tool

If you combine the SERVOPACK with an MP-Series Machine Controller or the MPE720 Engineering Tool, it will be recognized as a SERVOPACK with standard specifications. To use the parameters that have been added or changed for the SERVOPACKs described in this manual, use the SigmaWin+.

Selecting a SERVOPACK

2

This chapter provides information on specifications required to select SERVOPACKs.

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2.1 Ratings

This section gives the ratings of SERVOPACKs.

2.1.1 Three-Phase, 200 VAC

Model SGD7S-			R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A
Maximum Applicable Motor Capacity [kW]			0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5	2.0	3.0	5.0
Continuous Output Current [Arms]			0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6	18.5	19.6	32.9
Instantaneous Maximum Output Current [Arms]			2.1	3.2	5.9	9.3	11	16.9	17	28	42	56	84
Main Circuit	Power Supply		200 VAC to 240 VAC, 50 Hz/60 Hz										
	Permitted Voltage Fluctuation		-15% to +10%										
	Input Current [Arms]*		0.4	0.8	1.3	2.5	3.0	4.1	5.7	7.3	10	15	25
Control	Power Supply		200 VAC to 240 VAC, 50 Hz/60 Hz										
	Permitted Voltage Fluctuation		-15% to +10%										
	Input Current [Arms]*		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.25	0.25	0.3
Power Supply Capacity [kVA]*			0.2	0.3	0.5	1.0	1.3	1.6	2.3	3.2	4.0	5.9	7.5
Power Loss*	Main Circuit Power Loss [W]		5.0	7.0	11.9	22.5	28.5	38.9	49.2	72.6	104.2	114.2	226.6
	Control Circuit Power Loss [W]		12	12	12	12	14	14	14	15	16	16	19
	Built-in Regenerative Resistor Power Loss [W]		–	–	–	–	8	8	8	12	12	12	36
	Total Power Loss [W]		17.0	19.0	23.9	34.5	50.5	60.9	71.2	97.6	136.2	146.2	281.6
Regenerative Resistor	Built-In Regenerative Resistor	Resistance [Ω]	–	–	–	–	40	40	40	20	12	12	8
		Capacity [W]	–	–	–	–	40	40	40	60	60	60	180
	Minimum Allowable External Resistance [Ω]		40	40	40	40	40	40	40	20	12	12	8
Overvoltage Category			III										

* This is the net value at the rated load.

Model SGD7S-			470A	550A	590A	780A
Maximum Applicable Motor Capacity [kW]			6.0	7.5	11	15
Continuous Output Current [Arms]			46.9	54.7	58.6	78.0
Instantaneous Maximum Output Current [Arms]			110	130	140	170
Main Circuit	Power Supply		200 VAC to 240 VAC, 50 Hz/60 Hz			
	Permitted Voltage Fluctuation		-15% to +10%			
	Input Current [Arms]*1		29	37	54	73
Control	Power Supply		200 VAC to 240 VAC, 50 Hz/60 Hz			
	Permitted Voltage Fluctuation		-15% to +10%			
	Input Current [Arms]*1		0.3	0.3	0.4	0.4
Power Supply Capacity [kVA]*1			10.7	14.6	21.7	29.6
Power Loss*1	Main Circuit Power Loss [W]		271.7	326.9	365.3	501.4
	Control Circuit Power Loss [W]		21	21	28	28
	External Regenerative Resistor Unit Power Loss [W]		180*2	350*3	350*3	350*3
	Total Power Loss [W]		292.7	347.9	393.3	529.4
External Regenerative Resistor Unit	External Regenerative Resistor Unit	Resistance [Ω]	6.25*2	3.13*3	3.13*3	3.13*3
		Capacity [W]	880*2	1760*3	1760*3	1760*3
	Minimum Allowable External Resistance [Ω]		5.8	2.9	2.9	2.9
Overvoltage Category			III			

*1. This is the net value at the rated load.
*2. This value is for the optional JUSP-RA04-E Regenerative Resistor Unit.
*3. This value is for the optional JUSP-RA05-E Regenerative Resistor Unit.

2.1.2 Single-Phase, 200 VAC

Model SGD7S-			R70A	R90A	1R6A	2R8A	5R5A	120A
Maximum Applicable Motor Capacity [kW]			0.05	0.1	0.2	0.4	0.75	1.5
Continuous Output Current [Arms]			0.66	0.91	1.6	2.8	5.5	11.6
Instantaneous Maximum Output Current [Arms]			2.1	3.2	5.9	9.3	16.9	28
Main Circuit	Power Supply		200 VAC to 240 VAC, 50 Hz/60 Hz					
	Permitted Voltage Fluctuation		-15% to +10%					
	Input Current [Arms]*		0.8	1.6	2.4	5.0	8.7	16
Control	Power Supply		200 VAC to 240 VAC, 50 Hz/60 Hz					
	Permitted Voltage Fluctuation		-15% to +10%					
	Input Current [Arms]*		0.2	0.2	0.2	0.2	0.2	0.25
Power Supply Capacity [kVA]*			0.2	0.3	0.6	1.2	1.9	4.0
Power Loss*	Main Circuit Power Loss [W]		5.0	7.1	12.1	23.7	39.2	71.8
	Control Circuit Power Loss [W]		12	12	12	12	14	16
	Built-in Regenerative Resistor Power Loss [W]		–	–	–	–	8	12
	Total Power Loss [W]		17.0	19.1	24.1	35.7	61.2	103.8
Regenerative Resistor	Built-In Regenerative Resistor	Resistance [Ω]	–	–	–	–	40	12
		Capacity [W]	–	–	–	–	40	60
	Minimum Allowable External Resistance [Ω]		40	40	40	40	40	12
Overvoltage Category			III					

* This is the net value at the rated load.

2.1.3 270 VDC

Model SGD7S-		R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A
Maximum Applicable Motor Capacity [kW]		0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5
Continuous Output Current [Arms]		0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6
Instantaneous Maximum Output Current [Arms]		2.1	3.2	5.9	9.3	11.0	16.9	17.0	28.0
Main Circuit	Power Supply	270 VDC to 324 VDC							
	Permitted Voltage Fluctuation	-15% to +10%							
	Input Current [Arms]*1	0.5	1.0	1.5	3.0	3.8	4.9	6.9	11
Control	Power Supply	270 VDC to 324 VDC							
	Permitted Voltage Fluctuation	-15% to +10%							
	Input Current [Arms]*1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2*2
Power Supply Capacity [kVA]*1		0.2	0.3	0.6	1	1.4	1.6	2.3	3.2
Power Loss*1	Main Circuit Power Loss [W]	4.4	5.9	9.8	17.5	23.0	30.7	38.7	55.8
	Control Circuit Power Loss [W]	12	12	12	12	14	14	14	15
	Total Power Loss [W]	16.4	17.9	21.8	29.5	37.0	44.7	52.7	70.8
Overvoltage Category		III							

*1. This is the net value at the rated load.
*2. The value is 0.25 Arms for the SGD7S-120A00A008.

Model SGD7S-		180A	200A	330A	470A	550A	590A	780A
Maximum Applicable Motor Capacity [kW]		2.0	3.0	5.0	6.0	7.5	11.0	15.0
Continuous Output Current [Arms]		18.5	19.6	32.9	46.9	54.7	58.6	78.0
Instantaneous Maximum Output Current [Arms]		42.0	56.0	84.0	110	130	140	170
Main Circuit	Power Supply	270 VDC to 324 VDC						
	Permitted Voltage Fluctuation	-15% to +10%						
	Input Current [Arms]*	14	20	34	36	48	68	92
Control	Power Supply	270 VDC to 324 VDC						
	Permitted Voltage Fluctuation	-15% to +10%						
	Input Current [Arms]*	0.25	0.25	0.3	0.3	0.3	0.4	0.4
Power Supply Capacity [kVA]*		4.0	5.9	7.5	10.7	14.6	21.7	29.6
Power Loss*	Main Circuit Power Loss [W]	82.7	83.5	146.2	211.6	255.3	243.6	343.4
	Control Circuit Power Loss [W]	16	16	19	21	21	28	28
	Total Power Loss [W]	98.7	99.5	165.2	232.6	276.3	271.6	371.4
Overvoltage Category		III						

* This is the net value at the rated load.

2.1.4 Single-Phase, 100 VAC

Model SGD7S-		R70F	R90F	2R1F	2R8F
Maximum Applicable Motor Capacity [kW]		0.05	0.1	0.2	0.4
Continuous Output Current [Arms]		0.66	0.91	2.1	2.8
Instantaneous Maximum Output Current [Arms]		2.1	3.2	6.5	9.3
Main Circuit	Power Supply	100 VAC to 120 VAC, 50 Hz/60 Hz			
	Permitted Voltage Fluctuation	-15% to +10%			
	Input Current [Arms]*	1.5	2.5	5	10
Control	Power Supply	100 VAC to 120 VAC, 50 Hz/60 Hz			
	Permitted Voltage Fluctuation	-15% to +10%			
	Input Current [Arms]*	0.38	0.38	0.38	0.38
Power Supply Capacity [kVA]*		0.2	0.3	0.6	1.4
Power Loss*	Main Circuit Power Loss [W]	5.3	7.8	14.2	26.2
	Control Circuit Power Loss [W]	12	12	12	12
	Total Power Loss [W]	17.3	19.8	26.2	38.2
Regenera-tive Resistor	Minimum Allowable Resistance [Ω]	40	40	40	40
Overvoltage Category		III			

* This is the net value at the rated load.

2.2 SERVOPACK Overload Protection Characteristics

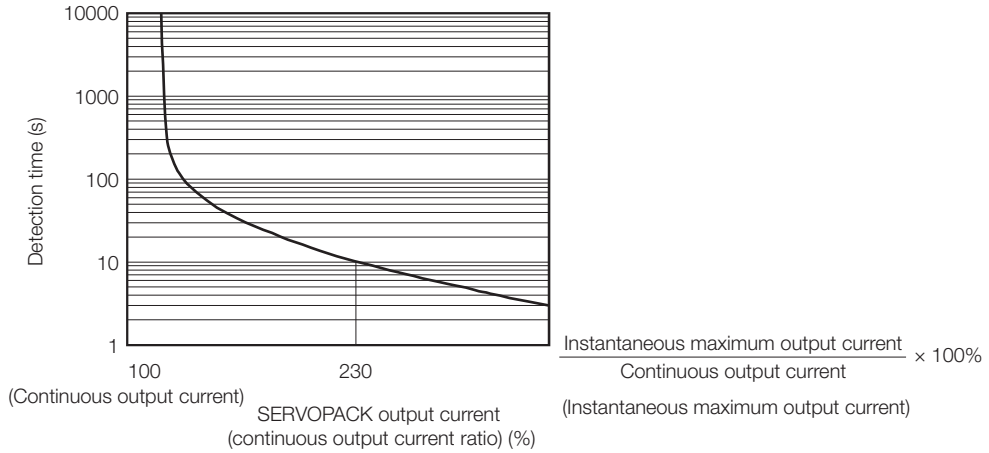
The overload detection level is set for hot start conditions with a SERVOPACK surrounding air temperature of 55°C.

An overload alarm (A.710 or A.720) will occur if overload operation that exceeds the overload protection characteristics shown in the following diagram (i.e., operation on the right side of the applicable line) is performed.

The actual overload detection level will be the detection level of the connected SERVOPACK or Servomotor that has the lower overload protection characteristics.

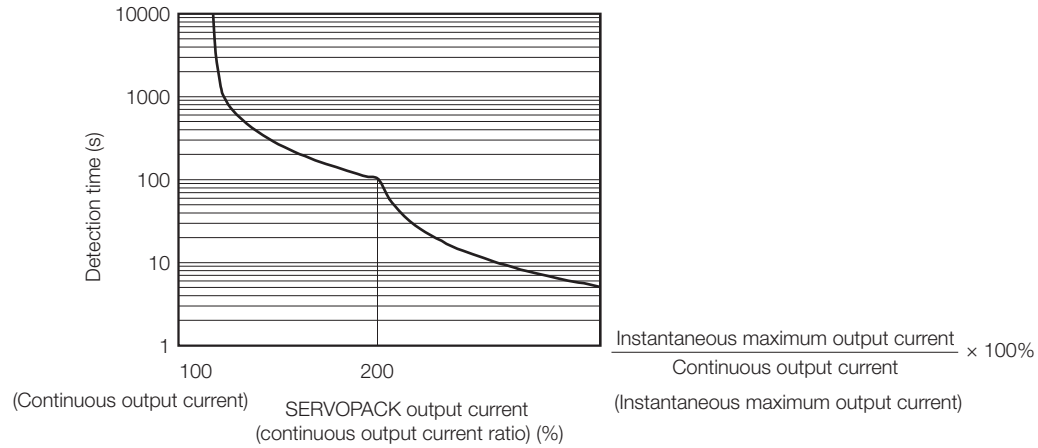
In most cases, that will be the overload protection characteristics of the Servomotor.

- SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, and -2R8F



Note: The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a Yaskawa-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

- SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, -470A, -550A, -590A, and -780A



Note: The above overload protection characteristics do not mean that you can perform continuous duty operation with an output of 100% or higher.
For a Yaskawa-specified combination of SERVOPACK and Servomotor, maintain the effective torque within the continuous duty zone of the torque-motor speed characteristic of the Servomotor.

2.3 Specifications

This section gives the general specifications of the SERVOPACKs.

2.3.1 SERVOPACK with Analog Voltage/Pulse Train References

<table>
<tr><th colspan="2">Item</th><th>Specification</th></tr>
<tr><td colspan="2">Drive Method</td><td>IGBT-based PWM control, sine wave current drive</td></tr>
<tr><td colspan="2">Feedback</td><td>Serial encoder: 17 bits (absolute encoder)
20 bits or 24 bits (incremental encoder/absolute encoder)
22 bits (absolute encoder)</td></tr>
<tr><td rowspan="8">Environmental Conditions</td><td>Surrounding Air Temperature*1</td><td>-5°C to 55°C
With derating, usage is possible between 55°C and 60°C.
Refer to the following manual for derating specifications.
Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)</td></tr>
<tr><td>Storage Temperature</td><td>-20°C to 85°C</td></tr>
<tr><td>Surrounding Air Humidity</td><td>95% relative humidity max. (with no freezing or condensation)</td></tr>
<tr><td>Storage Humidity</td><td>95% relative humidity max. (with no freezing or condensation)</td></tr>
<tr><td>Vibration Resistance</td><td>4.9 m/s^2</td></tr>
<tr><td>Shock Resistance</td><td>19.6 m/s^2</td></tr>
<tr><td>Degree of Protection</td><td><table><tr><th>Degree</th><th>SERVOPACK Model: SGD7S-</th></tr><tr><td>IP20</td><td>R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, and 120A, R70F, R90F, 2R1F, 2R8F</td></tr><tr><td>IP10</td><td>120A00A008, 180A, 200A, 330A, 470A, 550A, 590A, and 780A</td></tr></table></td></tr>
<tr><td>Pollution Degree</td><td>2
• Must be no corrosive or flammable gases.
• Must be no exposure to water, oil, or chemicals.
• Must be no dust, salts, or iron dust.</td></tr>
<tr><td>Altitude*1</td><td>1,000 m max.
With derating, usage is possible between 1,000 m and 2,000 m.
Refer to the following manual for derating specifications.
Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)</td></tr>
<tr><td>Others</td><td>Do not use the SERVOPACK in the following locations: Locations subject to static electricity, noise, strong electromagnetic/magnetic fields, or radioactivity</td></tr>
<tr><td colspan="2">Compliant Standards</td><td>Refer to the following section for details.
☞ Compliance with UL Standards, EU Directives, UK Regulations, and Other Safety Standards on page xxvii</td></tr>
<tr><td colspan="2">Mounting</td><td><table><tr><th>Mounting</th><th>SERVOPACK Model: SGD7S-</th></tr><tr><td>Base-mounted</td><td>All Models</td></tr><tr><td>Rack-mounted</td><td>R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A, R70F, R90F, 2R1F, 2R8F</td></tr><tr><td>Duct-ventilated</td><td>470A, 550A, 590A, 780A</td></tr></table></td></tr>
</table>

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Item			Specification
Performance	Speed Control Range		1:5000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.)
	Coefficient of Speed Fluctuation*2		±0.01% of rated speed max. (for a load fluctuation of 0% to 100%)
			0% of rated speed max. (for a voltage fluctuation of ±10%)
			±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C)
	Torque Control Precision (Repeatability)		±1%
	Soft Start Time Setting		0 s to 10 s (Can be set separately for acceleration and deceleration.)
I/O Signals	Encoder Divided Pulse Output		Phase A, phase B, phase C: Line-driver output Number of divided output pulses: Any setting is allowed.
	Overheat Protection Input		Number of input points: 1 Input voltage range: 0 V to +5 V
	Sequence Input Signals	Fixed Input	Allowable voltage range: 5 VDC ±5% Number of input points: 1 SEN (Absolute Data Request) signal
		Input Signals That Can Be Allocated	Allowable voltage range: 24 VDC ±20% Number of input points: 7
			Input method: Sink inputs or source inputs Input Signals • /S-ON (Servo ON) signal • /P-CON (Proportional Control) signal • P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals • /ALM-RST (Alarm Reset) signal • /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals • /SPD-D (Motor Direction) signal • /SPD-A and /SPD-B (Internal Set Speed Selection) signals • /C-SEL (Control Selection) signal • /ZCLAMP (Zero Clamping) signal • /INHIBIT (Reference Pulse Inhibit) signal • /G-SEL (Gain Selection) signal • SEN (Absolute Data Request) signal • /PSEL (Reference Pulse Input Multiplication Switch) signal • FSTP (Forced Stop Input) signal • /FLC (Semi-closed/Fully-closed Loop Control Selection Input) signal • /SFECLR (Motor - Load Position Deviation Clear Input) signal A signal can be allocated and the positive and negative logic can be changed.

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Item			Specification
I/O Signals	Sequence Output Signals	Fixed Output	Allowable voltage range: 5 VDC to 30 VDC Number of output points: 1 Output signal: ALM (Servo Alarm) signal
		Output Signals That Can Be Allocated	Allowable voltage range: 5 VDC to 30 VDC Number of output points: 6 (A photocoupler output (isolated) is used for three of the outputs.) (An open-collector output (non-isolated) is used for the other three outputs.)
			Output Signals • /COIN (Positioning Completion) signal • /V-CMP (Speed Coincidence Detection) signal • /TGON (Rotation Detection) signal • /S-RDY (Servo Ready) signal • /CLT (Torque Limit Detection) signal • /VLT (Speed Limit Detection) signal • /BK (Brake) signal • /WARN (Warning) signal • /NEAR (Near) signal • /PSELA (Reference Pulse Input Multiplication Switching Output) signal • ALO1, ALO2, and ALO3 (Alarm Code) signals • /FLCA (Semi-closed/Fully-closed Loop Control Status Output) signal A signal can be allocated and the positive and negative logic can be changed.
Communications	RS-422A Communications (CN3)	Interfaces	Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+)
		1:N Communications	Up to N = 15 stations possible for RS-422A port
		Axis Address Setting	Set with parameters.
	USB Communications (CN7)	Interface	Personal computer (with SigmaWin+)
		Communications Standard	Conforms to USB2.0 standard (12 Mbps).
Displays/Indicators			CHARGE indicator and five-digit seven-segment display
Panel Operator			Four push switches
Analog Monitor (CN5)			Number of points: 2 Output voltage range: ±10 VDC (effective linearity range: ±8 V) Resolution: 16 bits Accuracy: ±20 mV (Typ) Maximum output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)
Dynamic Brake (DB)			Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF.
Regenerative Processing			Built-in (An external resistor must be connected to the SGD7S-470A to -780A.) Refer to the following catalog for details. 📖 AC Servo Drives Σ-7 Series (Manual No.: KAEP S800001 23)
Overtravel (OT) Prevention			Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal
Protective Functions			Overcurrent, overvoltage, low voltage, overload, regeneration error, etc.
Utility Functions			Gain adjustment, alarm history, jogging, origin search, etc.

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Item					Specification
Safety Functions		Inputs			/HWBB1 and /HWBB2: Base block signals for Power Modules
		Output			EDM1: Monitors the status of built-in safety circuit (fixed output).
		Compliant Standards*3			ISO13849-1 PLe (Category 3), IEC61508 SIL3
Applicable Option Modules					Fully-closed Modules
Controls	Speed Control	Soft Start Time Setting			0 s to 10 s (Can be set separately for acceleration and deceleration.)
		Input Signal		Reference Voltage	• Maximum input voltage: ±12 V (forward motor rotation for positive reference). • 6 VDC at rated speed (default setting). Input gain setting can be changed.
				Input Impedance	Approx. 14 kΩ
				Circuit Time Constant	30 μs
		Internal Set Speed Control		Rotation Direction Selection	With Proportional Control signal
				Speed Selection	With Forward/Reverse External Torque Limit signals (speed 1 to 3 selection). Servomotor stops or another control method is used when both signals are OFF.
	Position Control	Feedforward Compensation			0% to 100%
		Output Signal Positioning Completed Width Setting			0 to 1,073,741,824 reference units
		Input Signals	Reference pulses	Reference Pulse Form	One of the following is selected: Sign + pulse train, CW + CCW pulse trains, and two-phase pulse trains with 90° phase differential
				Input Form	Line driver or open collector
				Maximum Input Frequency	• Line Driver Sign + pulse train or CW + CCW pulse trains: 4 Mpps Two-phase pulse trains with 90° phase differential: 1 Mpps • Open Collector Sign + pulse train or CW + CCW pulse trains: 200 kpps Two-phase pulse trains with 90° phase differential: 200 kpps
				Input Multiplication Switching	1 to 100 times
			Clear Signal		Position deviation clear Line driver or open collector

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Item				Specification
Controls	Torque Control	Input Signal	Reference Voltage	• Maximum input voltage: ±12 V (forward torque output for positive reference). • 3 VDC at rated torque (default setting). Input gain setting can be changed.
			Input Impedance	Approx. 14 kΩ
			Circuit Time Constant	16 μs

*1. If you combine a Σ-7-Series SERVOPACK with a Σ-V-Series Option Module, the following Σ-V-Series SERVOPACKs specifications must be used: a surrounding air temperature of 0°C to 55°C and an altitude of 1,000 m max. Also, the applicable surrounding range cannot be increased by derating.

*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. Always perform risk assessment for the system and confirm that the safety requirements are met.

2.3.2 SERVOPACK with MECHATROLINK-III Communications References

<table>
<tr><th colspan="2">Item</th><th>Specification</th></tr>
<tr><td colspan="2">Drive Method</td><td>IGBT-based PWM control, sine wave current drive</td></tr>
<tr><td colspan="2">Feedback</td><td>Serial encoder: 17 bits (absolute encoder)
20 bits or 24 bits (incremental encoder/absolute encoder)
22 bits (absolute encoder)</td></tr>
<tr><td rowspan="8">Environmental Conditions</td><td>Surrounding Air Temperature*1</td><td>-5°C to 55°C
(With derating, usage is possible between 55°C and 60°C.)
Refer to the following section for derating specifications.
Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)</td></tr>
<tr><td>Storage Temperature</td><td>-20°C to 85°C</td></tr>
<tr><td>Surrounding Air Humidity</td><td>95% relative humidity max. (with no freezing or condensation)</td></tr>
<tr><td>Storage Humidity</td><td>95% relative humidity max. (with no freezing or condensation)</td></tr>
<tr><td>Vibration Resistance</td><td>4.9 m/s^2</td></tr>
<tr><td>Shock Resistance</td><td>19.6 m/s^2</td></tr>
<tr><td>Degree of Protection</td><td><table><tr><th>Degree</th><th>SERVOPACK Model: SGD7S-</th></tr><tr><td>IP20</td><td>R70A, R90A, 1R6A, 2R8A, 3R8A, 5R5A, 7R6A, 120A, R70F, R90F, 2R1F, 2R8F</td></tr><tr><td>IP10</td><td>120A20A008, 180A, 200A, 330A, 470A, 550A, 590A, 780A</td></tr></table></td></tr>
<tr><td>Pollution Degree</td><td>2
• Must be no corrosive or flammable gases.
• Must be no exposure to water, oil, or chemicals.
• Must be no dust, salts, or iron dust.</td></tr>
<tr><td>Altitude*1</td><td>1,000 m max. (With derating, usage is possible between 1,000 m and 2,000 m.)
Refer to the following section for derating specifications.
Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)</td></tr>
<tr><td>Others</td><td>Do not use the SERVOPACK in the following locations: Locations subject to static electricity, noise, strong electromagnetic/magnetic fields, or radioactivity</td></tr>
<tr><td colspan="2">Compliant Standards</td><td>Refer to the following section for details.
Compliance with UL Standards, EU Directives, UK Regulations, and Other Safety Standards on page xxvii</td></tr>
<tr><td colspan="2">Mounting</td><td>Base-mounted</td></tr>
<tr><td rowspan="5">Performance</td><td>Speed Control Range</td><td>1:5000 (At the rated torque, the lower limit of the speed control range must not cause the Servomotor to stop.)</td></tr>
<tr><td rowspan="3">Coefficient of Speed Fluctuation*2</td><td>±0.01% of rated speed max. (for a load fluctuation of 0% to 100%)</td></tr>
<tr><td>0% of rated speed max. (for a voltage fluctuation of ±10%)</td></tr>
<tr><td>±0.1% of rated speed max. (for a temperature fluctuation of 25°C ±25°C)</td></tr>
<tr><td>Torque Control Precision (Repeatability)</td><td>±1%</td></tr>
<tr><td>Soft Start Time Setting</td><td>0 s to 10 s (Can be set separately for acceleration and deceleration.)</td></tr>
</table>

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Item			Specification
I/O Signals	Encoder Divided Pulse Output		Phase A, phase B, phase C: Line-driver output Number of divided output pulses: Any setting is allowed.
	Overheat Protection Input		Number of input points: 1 Input voltage range: 0 V to +5 V
	Sequence Input Signals	Input Signals That Can Be Allocated	Allowable voltage range: 24 VDC ±20% Number of input points: 7
			Input method: Sink inputs or source inputs Input Signals • P-OT (Forward Drive Prohibit) and N-OT (Reverse Drive Prohibit) signals • /P-CL (Forward External Torque Limit) and /N-CL (Reverse External Torque Limit) signals • /DEC (Origin Return Deceleration Switch) signal • /EXT1 to /EXT3 (External Latch Input 1 to 3) signals • FSTP (Forced Stop Input) signal A signal can be allocated and the positive and negative logic can be changed.
	Sequence Output Signals	Fixed Output	Allowable voltage range: 5 VDC to 30 VDC Number of output points: 1 Output signal: ALM (Servo Alarm) signal
		Output Signals That Can Be Allocated	Allowable voltage range: 5 VDC to 30 VDC Number of output points: 3 (A photocoupler output (isolated) is used.)
			Output Signals • /COIN (Positioning Completion) signal • /V-CMP (Speed Coincidence Detection) signal • /TGON (Rotation Detection) signal • /S-RDY (Servo Ready) signal • /CLT (Torque Limit Detection) signal • /VLT (Speed Limit Detection) signal • /BK (Brake) signal • /WARN (Warning) signal • /NEAR (Near) signal A signal can be allocated and the positive and negative logic can be changed.
Communications	RS-422A Communications (CN3)	Interfaces	Digital Operator (JUSP-OP05A-1-E) and personal computer (with SigmaWin+)
		1:N Communications	Up to N = 15 stations possible for RS-422A port
		Axis Address Setting	03h to EFh (maximum number of SDevices: 62) The rotary switches (S1 and S2) are used to set the station address.
	USB Communications (CN7)	Interface	Personal computer (with SigmaWin+)
		Communications Standard	Conforms to USB2.0 standard (12 Mbps).
Displays/Indicators			CHARGE, PWR, CN, L1, and L2 indicators, and one-digit seven-segment display
MECHATROLINK-III Communications	Communications Protocol		MECHATROLINK-III
	Station Address Settings		03h to EFh (maximum number of SDevices: 62) The rotary switches (S1 and S2) are used to set the station address.
	Transmission Speed		100 Mbps
	Transmission Cycle		125 µs, 250 µs, 500 µs, 750 µs, 1.0 ms to 4.0 ms (multiples of 0.5 ms)
	Number of Transmission Bytes		32 or 48 bytes/station A DIP switch (S3) is used to select the number of transmission bytes.

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Item		Specification
Reference Method	Performance	Position, speed, or torque control with MECHATROLINK-III communications
	Reference Input	MECHATROLINK-III commands (sequence, motion, data setting, data access, monitoring, adjustment, etc.)
	Profile	MECHATROLINK-III standard servo profile
MECHATROLINK-III Communications Setting Switches		Rotary switch (S1 and S2) positions: 16
		Number of DIP switch (S3) pins: 4
Analog Monitor (CN5)		Number of points: 2 Output voltage range: ±10 VDC (effective linearity range: ±8 V) Resolution: 16 bits Accuracy: ±20 mV (Typ) Maximum output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)
Dynamic Brake (DB)		Activated when a servo alarm or overtravel (OT) occurs, or when the power supply to the main circuit or servo is OFF.
Regenerative Processing		Built-in (An external resistor must be connected to the SGD7S-470A to -780A.) Refer to the following catalog for details. 📖 AC Servo Drives Σ-7 Series (Catalog No.: KAEP S800001 23)
Overtravel (OT) Prevention		Stopping with dynamic brake, deceleration to a stop, or coasting to a stop for the P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal
Protective Functions		Overcurrent, overvoltage, low voltage, overload, regeneration error, etc.
Utility Functions		Gain adjustment, alarm history, jogging, origin search, etc.
Safety Functions	Inputs	/HWBB1 and /HWBB2: Base block signals for Power Modules
	Output	EDM1: Monitors the status of built-in safety circuit (fixed output).
	Compliant Standards*3	ISO13849-1 PLe (Category 3), IEC61508 SIL3
Applicable Option Modules		Fully-closed Modules

*1. If you combine a Σ-7-Series SERVOPACK with a Σ-V-Series Option Module, the following Σ-V-Series SERVOPACKs specifications must be used: a surrounding air temperature of 0°C to 55°C and an altitude of 1,000 m max. Also, the applicable surrounding range cannot be increased by derating.

*2. The coefficient of speed fluctuation for load fluctuation is defined as follows:

$$\text{Coefficient of speed fluctuation} = \frac{\text{No-load motor speed - Total-load motor speed}}{\text{Rated motor speed}} \times 100\%$$

*3. Always perform risk assessment for the system and confirm that the safety requirements are met.

Wiring and Connecting SERVOPACKs

3

This chapter provides information on wiring and connecting SERVOPACKs to power supplies and peripheral devices.

3.1 Basic Wiring Diagrams 3-2

3.1.1 SERVOPACK with Analog Voltage/Pulse Train References 3-2
3.1.2 SERVOPACK with MECHATROLINK-III Communications References 3-5

3.2 Wiring the Fully-Closed Module 3-7

3.2.1 Wiring the Fully-Closed Module to the SERVOPACK 3-7
3.2.2 Wiring the Fully-Closed Module to the External Encoder 3-7

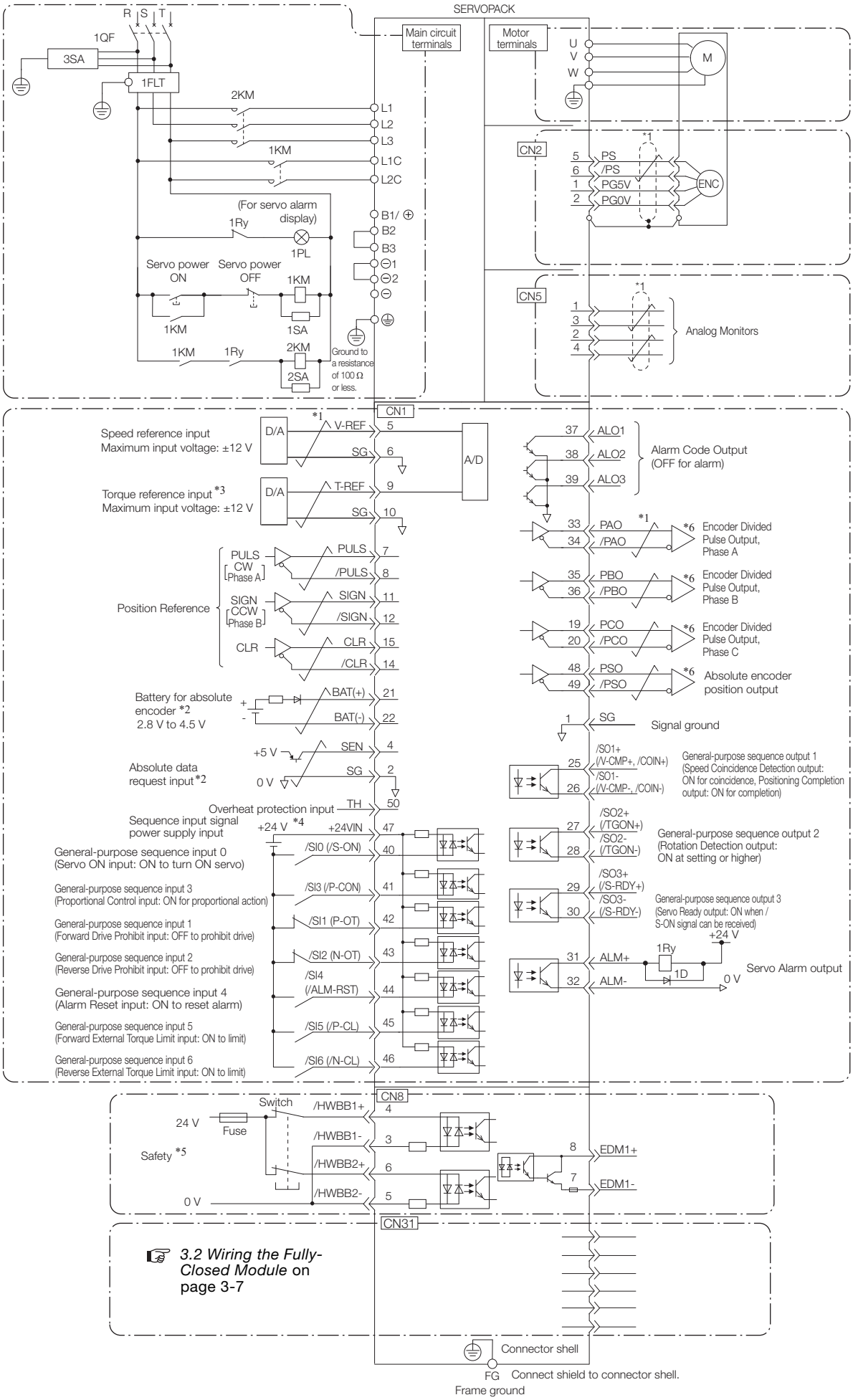
3.1 Basic Wiring Diagrams

This section provide the basic wiring diagrams.

3.1.1 SERVOPACK with Analog Voltage/Pulse Train References

Refer to the following manual for details on terminals and connectors in the diagram that do not have a reference page.

Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual
(Manual No.: SIEP S800001 26)



☞ *3.2 Wiring the Fully-Closed Module* on page 3-7

3.1.1 SERVOPACK with Analog Voltage/Pulse Train References

*1.  represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.

*3. You can enable this function with a parameter setting.

*4. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.

*5. Refer to the following chapter if you use a safety function device.

📖 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

If you do not use the safety function, insert the Safety Jumper Connector (provided as an accessory) into CN8 when you use the SERVOPACK.

*6. Always use line receivers to receive the output signals.

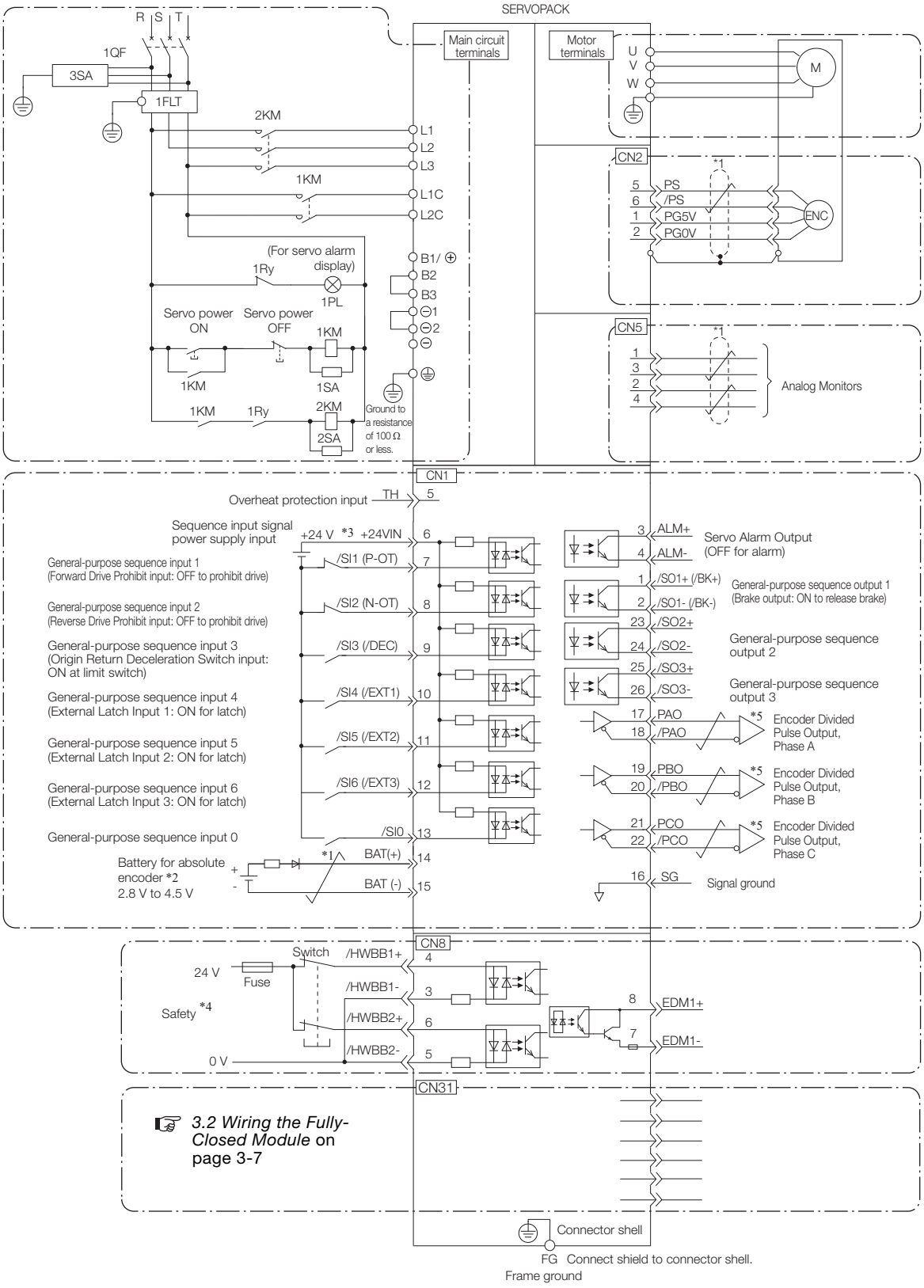
Note: 1. If you use a 24-V brake, install a separate power supply for the 24-VDC power supply from other power supplies, such as the one for the I/O signals of the CN1 connector. If the power supply is shared, the I/O signals may malfunction.

2. Default settings are given in parentheses.

3.1.2 SERVOPACK with MECHATROLINK-III Communications References

Refer to the following manual for details on terminals and connectors in the diagram that do not have a reference page.

Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)



3.1.2 SERVOPACK with MECHATROLINK-III Communications References

*1. ⏥ represents twisted-pair wires.

*2. Connect these when using an absolute encoder. If the Encoder Cable with a Battery Case is connected, do not connect a backup battery.

*3. The 24-VDC power supply is not provided by Yaskawa. Use a 24-VDC power supply with double insulation or reinforced insulation.

*4. Refer to the following chapter if you use a safety function device.

🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

If you do not use the safety function, insert the Safety Jumper Connector (provided as an accessory) into CN8 when you use the SERVOPACK.

*5. Always use line receivers to receive the output signals.

Note: 1. You can use parameters to change the functions allocated to the /DEC, P-OT, N-OT, /EXT1, /EXT2, and /EXT3 input signals and the /SO1, /SO2, and /SO3 output signals. Refer to the following section for details.

🕮 Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

2. If you use a 24-V brake, install a separate power supply for the 24-VDC power supply from other power supplies, such as the one for the I/O signals of the CN1 connector. If the power supply is shared, the I/O signals may malfunction.

3. Default settings are given in parentheses.

3.2 Wiring the Fully-Closed Module

3.2.1 Wiring the Fully-Closed Module to the SERVOPACK

The Fully-Closed Module is wired to the SERVOPACK by installing it in the SERVOPACK. Refer to the following manual for details about the installation procedure.

Σ-V-Series/Σ-V-Series for Large-Capacity Models/Σ-7-Series Installation Guide Fully-closed Module (Manual No.: TOBP C720829 03)

3.2.2 Wiring the Fully-Closed Module to the External Encoder

Connect CN31 on the Fully-Closed Module to the External Encoder with the External Encoder Cable.

Depending on the External Encoder that will be used, a device may be required in the connection between the Fully-Closed Module and External Encoder. Refer to the following manual for details about the necessary device and connection method.

Σ-7-Series AC Servo Drive Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching

4

This chapter provides detailed information about Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching.

4.1 Introduction 4-3
4.1.1 Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching 4-3
4.1.2 Semi-Closed Loop Control/Fully-Closed Loop Control Switching 4-5
4.1.3 Motor-Load Position Deviation Clear 4-7

4.2 Control Block Diagrams 4-9
4.2.1 During Semi-Closed Loop Control 4-9
4.2.2 During Fully-Closed Loop Control 4-9

4.3 Checking Operations 4-10
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4.1 Introduction

4.1.1 Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching

This section provides an introduction to Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching.

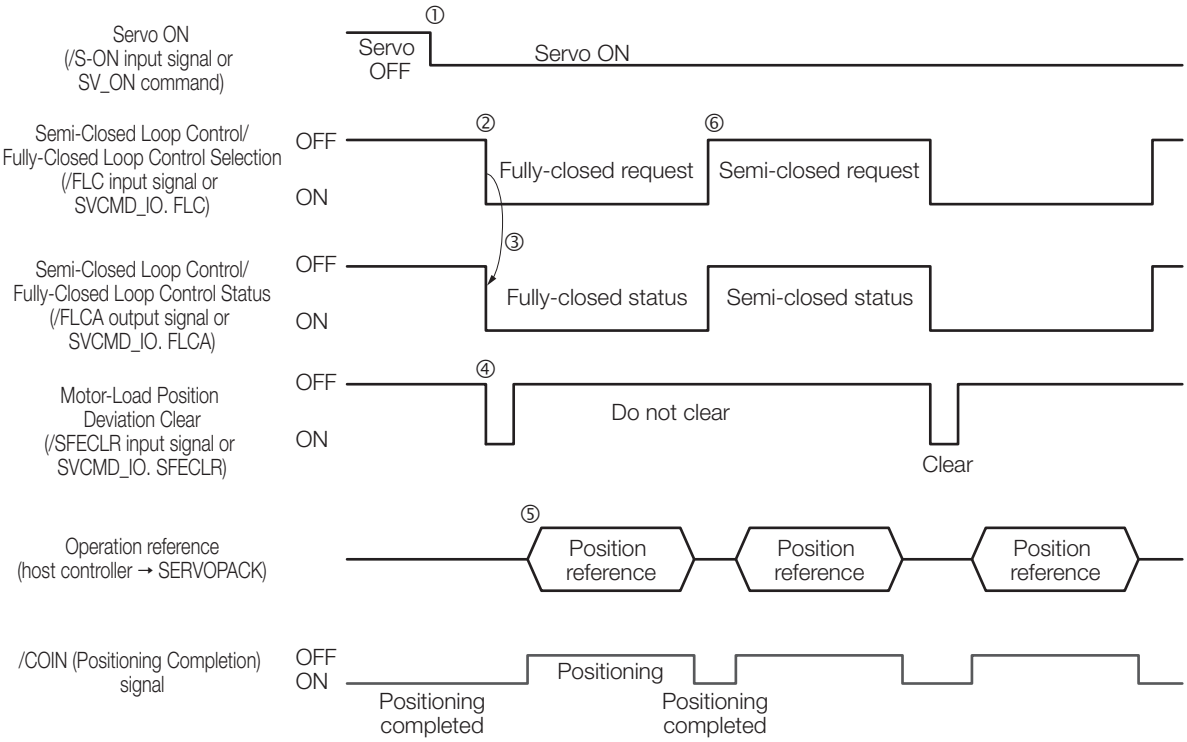
Information

Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching is the overall term for the function that combines the following two types of functions. The two types of functions and the reference pages are given in the following table.

Function Name	Reference
Semi-Closed Loop Control/ Fully-Closed Loop Control Switching	*4.1.2 Semi-Closed Loop Control/Fully-Closed Loop Control Switching* on page 4-5
Motor-Load Position Deviation Clear	*4.1.3 Motor-Load Position Deviation Clear* on page 4-7

Sequence

The following example shows the sequence for Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching.



No.	Description	
	Analog voltage/pulse train references	MECHATROLINK-III communications references
①	The host controller inputs the /S-ON (Servo ON) signal, and when operation preparations have been completed, the host controller confirms that the /COIN (Positioning Completion) signal has turned ON (positioning completed).	The host controller issues the SV_ON (Servo ON) command, and when operation preparations have been completed, the host controller confirms that the /COIN (Positioning Completion) signal has turned ON (positioning completed).
②	When positioning has been completed, the host controller inputs the /FLC (Semi-Closed Loop Control/Fully-Closed Loop Control Selection) signal.	When positioning has been completed, the host controller inputs Semi-Closed Loop Control/Fully-Closed Loop Control Selection (SVCMD_IO. FLC).

Continued on next page.

Continued from previous page.

No.	Description	
	Analog voltage/pulse train references	MECHATROLINK-III communications references
③	The SERVOPACK executes the processing to switch between semi-closed loop control and fully-closed loop control, and when that processing has completed, the SERVOPACK outputs the /FLCA (Semi-Closed Loop Control/Fully-Closed Loop Control Status) signal.	The SERVOPACK executes the processing to switch between semi-closed loop control and fully-closed loop control, and when that processing has completed, the SERVOPACK outputs Semi-Closed Loop Control/Fully-Closed Loop Control Status (SVCMD_IO. FLCA).
④	The host controller confirms that the /FLCA output signal has turned ON (fully-closed loop control status), and then it turns ON the /SFECLR (Motor-Load Position Deviation Clear) signal.	The host controller confirms that SVCMD_IO. FLCA = ON (1: Fully-closed loop control status), and then it turns ON Motor-Load Position Deviation Clear (SVCMD_IO. SFECLR).
⑤	The host controller returns the /SFECLR input signal to OFF, and then it outputs the position reference to operate the motor. When the motor starts operation, the /COIN (Positioning Completion) signal turns OFF.	The host controller returns SVCMD_IO. SFECLR to OFF, and then it outputs the position reference to operate the motor. When the motor starts operation, the /COIN (Positioning Completion) signal turns OFF.
⑥	After motor operation has completed, the host controller confirms that the /COIN (Positioning Completion) signal has turned ON (positioning completed), and then it inputs the /FLC input signal.	After motor operation has completed, the host controller confirms that the /COIN (Positioning Completion) signal has turned ON (positioning completed), and then it inputs SVCMD_IO. FLC.

Refer to the following section for details on how to use this function.

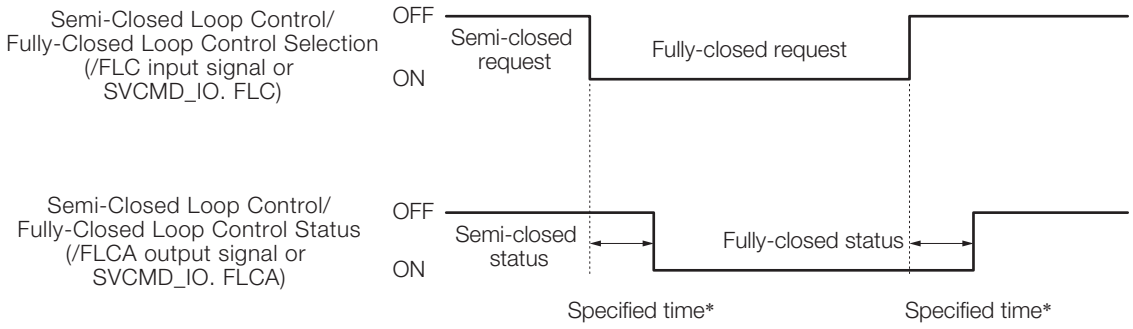
☞ *4.3 Checking Operations* on page 4-10

4.1.2 Semi-Closed Loop Control/Fully-Closed Loop Control Switching

Semi-Closed Loop Control/Fully-Closed Loop Control Switching is the function that switches between semi-closed loop control and fully-closed loop control.

Sequence

When Semi-Closed Loop Control/Fully-Closed Loop Control Selection (/FLC input signal or SVCMD_IO. FLC) is changed, the control will change within the specified time*. When the control is changed, Semi-Closed Loop Control/Fully-Closed Loop Control Status (/FLCA output signal or SVCMD_IO. FLCA) will change.



* SERVOPACK with analog voltage/pulse train references: Within 2 ms
SERVOPACK with MECHATROLINK-III communications references: Within 250 μs + transmission line delay time

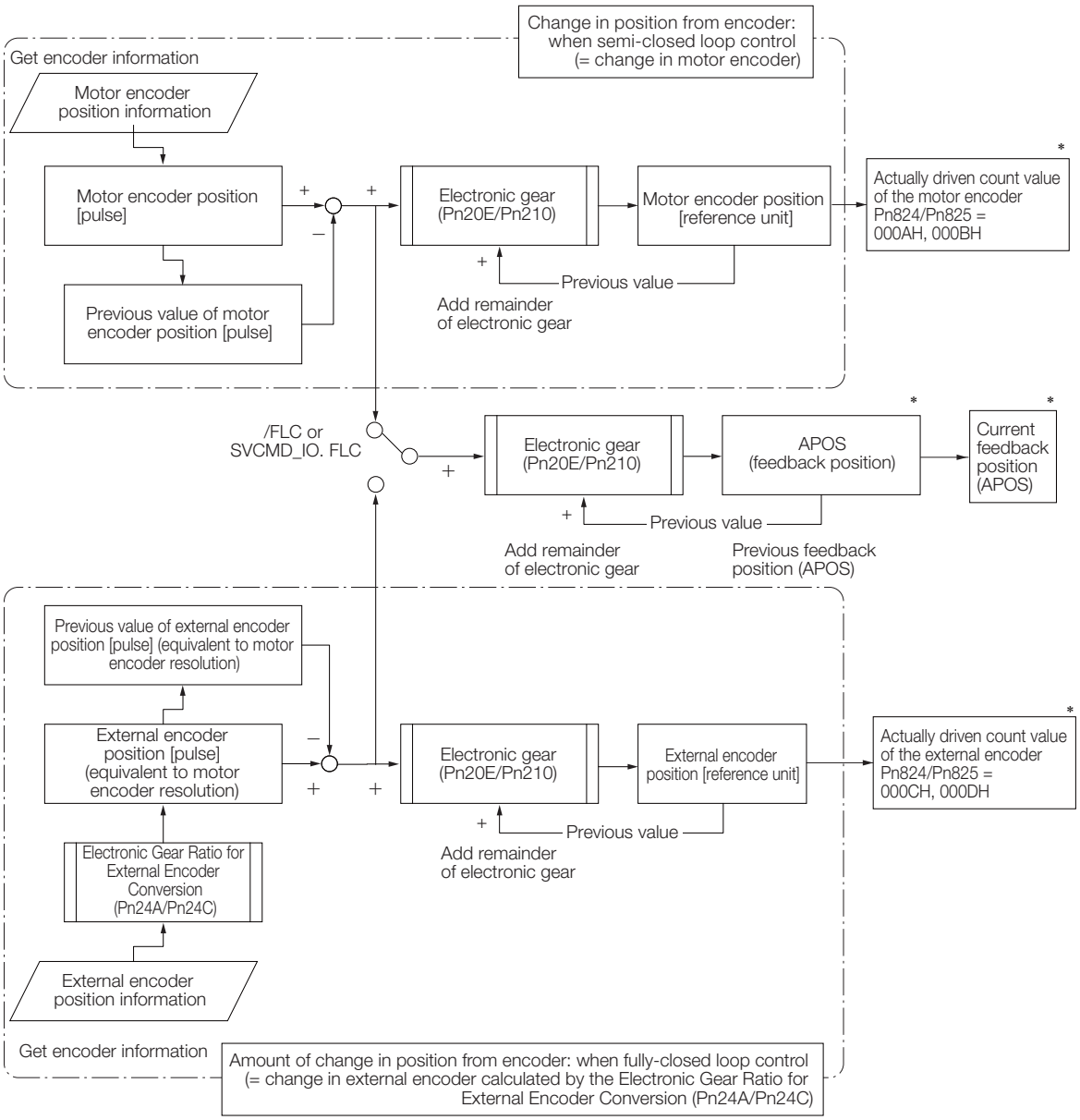
Internal Status of SERVOPACK

The following table gives the internal status of the SERVOPACK during semi-closed loop control and fully-closed loop control.

Item	Internal Status of SERVOPACK		Reference
	During Semi-Closed Loop Control	During Fully-Closed Loop Control	
Motor-load position deviation	Always zero.	Will be updated.	*4.1.3 Motor-Load Position Deviation Clear* on page 4-7
A.d10 (Motor-Load Position Deviation Overflow)	Will not be detected.	Will be detected.	
Encoder divided output	The motor encoder position is divided by Pn212.	• If Pn02A = n.□□0□: The external encoder position is converted to motor encoder units by the Electronic Gear Ratio for External Encoder Conversion (Pn24A/Pn24C), and that position is divided by Pn212. • If Pn02A = n.□□1□: The external encoder position is divided by Pn281.	*4.4.2 Encoder Divided Pulses during Fully-Closed Loop Control Setting* on page 4-15
Feedback Position (APOS)	Current feedback position (APOS) = Previous feedback position (APOS) + Change in motor encoder	Current feedback position (APOS) = Previous feedback position (APOS) + Change in external encoder calculated with the Electronic Gear Ratio for External Encoder Conversion (Pn24A/Pn24C)	◆ *Feedback Position (APOS)* on page 4-6

◆ Feedback Position (APOS)

The current feedback position (APOS) is calculated by adding the value of the change in position from the encoder (current position - previous position) to the previous feedback position (APOS). The position information from the external encoder is first converted to the equivalent of the motor encoder resolution by the Electronic Gear Ratio for External Encoder Conversion (Pn24A/Pn24C), and then it is added to APOS. For this reason, the host controller does not need to convert the reference amount for semi-closed loop control and fully-closed loop control.



* Can be checked with a monitor only when using a SERVOPACK with MECHATROLINK-III communications references.
For a SERVOPACK with analog voltage/pulse train references, the concept of the feedback position is the same as that presented in the above diagram, but the values of APOS, Pn824, and Pn825 cannot be monitored.

■ Pn824 and Pn825: MECHATROLINK-III Communications References

Due to differences in the resolutions of the motor encoder and external encoder, even when the target position (TPOS) is the same during semi-closed loop control and fully-closed loop control, the position of the machine may not be the same. To check the position information of the motor encoder and external encoder, use Pn824 and Pn825 (Option Monitor 1 and 2 Selection).

Parameter		Monitor Information	Output Unit	Remarks
Pn824 Pn825	000Ah	PG count (lower 32 bits)	Reference unit	Actually driven count value of the motor encoder
	000Bh	PG count (upper 32 bits)	Reference unit	
	000Ch	FPG count (lower 32 bits)	Reference unit	Actually driven count value of the external encoder
	000Dh	FPG count (upper 32 bits)	Reference unit	

■ Resetting the APOS Value: MECHATROLINK-III Communications References

Execute the CONFIG command to reset the value of APOS to 0.

4.1.3 Motor-Load Position Deviation Clear

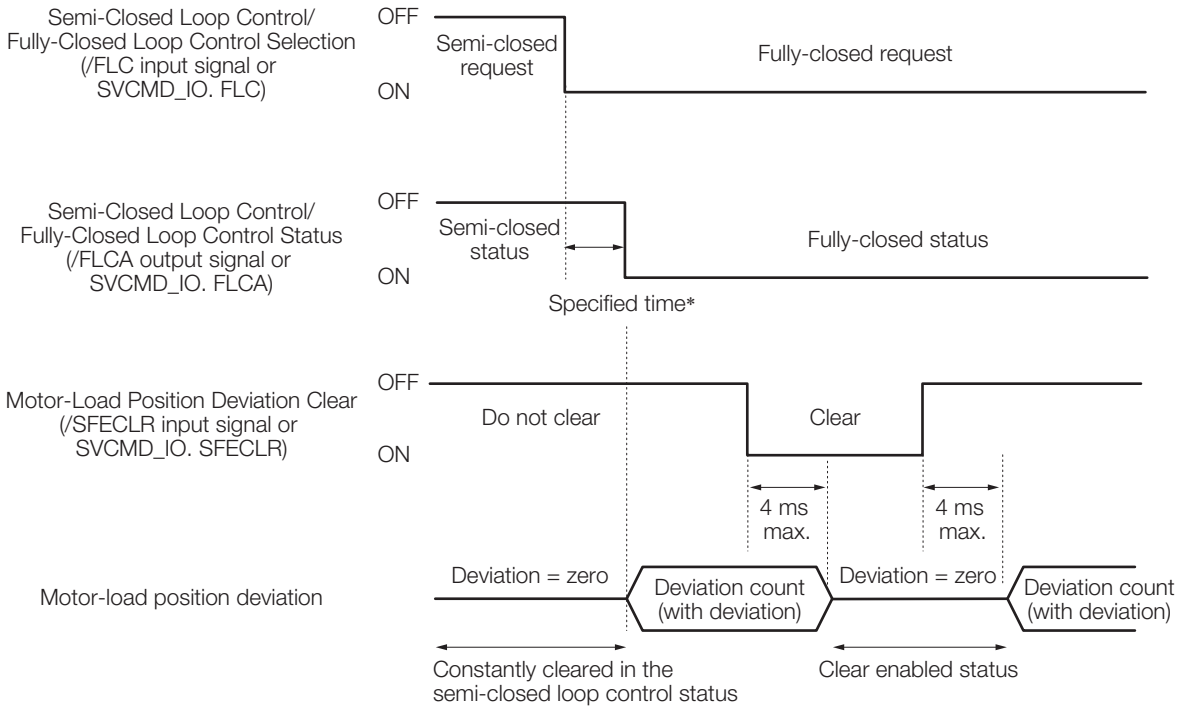
Motor-Load Position Deviation Clear is the function that clears the deviation between the motor and load position during fully-closed loop control. During semi-closed loop control, the motor-load position deviation is always cleared and set to zero.

Sequence

During fully-closed loop control, the motor-load position deviation is always cleared and set to zero when the /SFECLR input signal is enabled or SVCMD_IO. SFECLR = 1 (clear).

During fully-closed loop control, the motor-load position deviation is calculated and accumulated when the /SFECLR input signal is disabled or SVCMD_IO. SFECLR = 0 (do not clear).

Note: Hold the level of the SFECLR signal from when the status of the SFECLR signal changes until the status of motor-load position deviation changes (4 ms or longer).



* SERVOPACK with analog voltage/pulse train references: Within 2 ms
SERVOPACK with MECHATROLINK-III communications references: Within 250 μs + transmission line delay time

Analog Monitor Signal Settings

You can monitor motor-load position deviation with SigmaWin+ or an analog monitor.

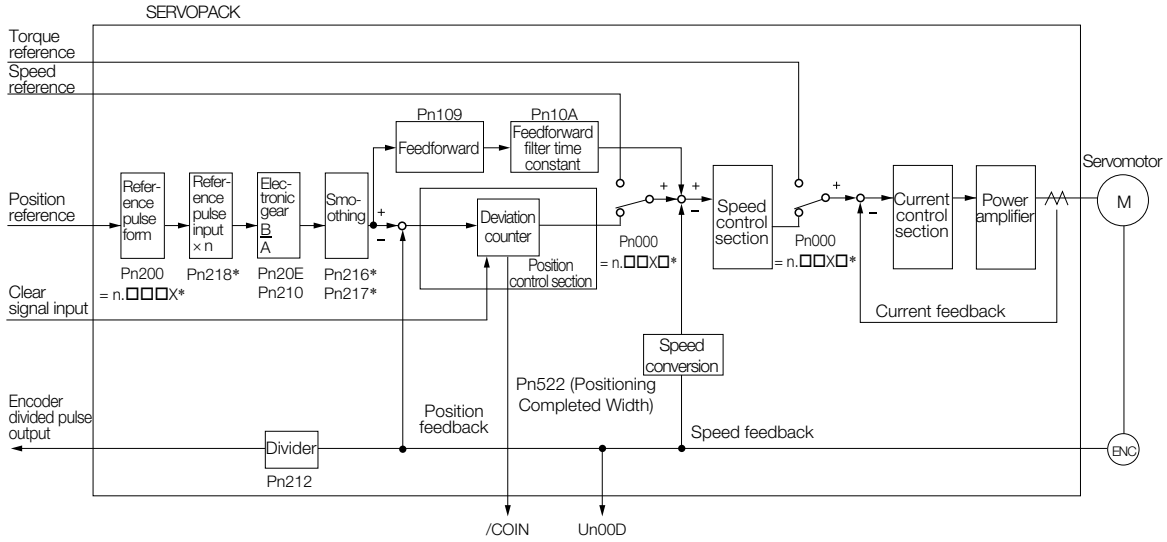
- SigmaWin+
  Menu – Trace
- Analog Monitors

Parameter		Name	Description	When Enabled	Classification
Pn006	n.□□07	Analog Monitor 1 Signal Selection	Position deviation between motor and load (output unit: 0.01 V/reference unit).	Immediately	Setup
Pn007	n.□□07	Analog Monitor 2 Signal Selection	Position deviation between motor and load (output unit: 0.01 V/reference unit).		

4.2 Control Block Diagrams

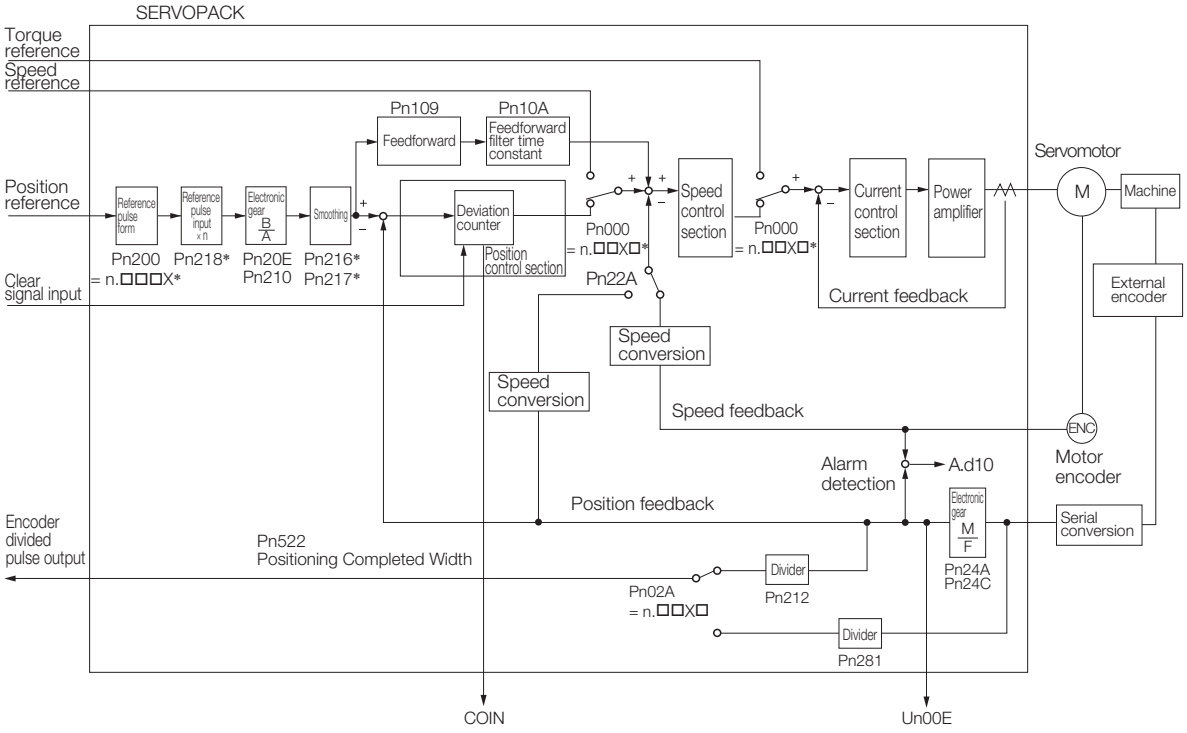
This section provides control block diagrams during semi-closed loop control and fully-closed loop control.

4.2.1 During Semi-Closed Loop Control



* Function that can be used when using a SERVOPACK with analog voltage/pulse train references.

4.2.2 During Fully-Closed Loop Control



* Function that can be used when using a SERVOPACK with analog voltage/pulse train references.

4.3 Checking Operations

This section provides the commissioning procedures for a SERVOPACK for using Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching. First confirm that the SERVOPACK operates correctly with semi-closed loop control. Next, confirm that switching semi-closed loop control and fully-closed loop control operates correctly, and confirm that the SERVOPACK operates correctly with fully-closed loop control.

4.3.1 Semi-Closed Loop Control

The procedure to check operation of semi-closed loop control is given below.

1. Check the Servomotor with no load.

2. Set Pn002 = n.0□□□ (do not use an external encoder) to enable semi-closed loop control.

3. Set Pn000 = n.□□1□ (position control with pulse train references) only when using a SERVOPACK with analog voltage/pulse train references.

4. Set the following parameters for your device.
   - Pn000 = n.□□□X (Rotation Direction Selection)
   - Pn001 = n.□□□X (Motor Stopping Method for Servo OFF and Group 1 Alarms)
   - Pn001 = n.□□X□ (Overtravel Stopping Method)
   - Pn20E (Electronic Gear Ratio (Numerator))
   - Pn210 (Electronic Gear Ratio (Denominator))
   - Pn212 (Number of Encoder Output Pulses)
   - Pn50A (Input Signal Selections 1)
   - Pn50B (Input Signal Selections 2)
   - Pn511 (Input Signal Selections 5)
   - Pn515 (Input Signal Selections 6): SERVOPACK with analog voltage/pulse train references only
   - Pn516 (Input Signal Selections 7)
   - Pn50E (Output Signal Selections 1)
   - Pn50F (Output Signal Selections 2)
   - Pn510 (Output Signal Selections 3)
   - Pn514 (Output Signal Selections 4)
   - Pn517 (Output Signal Selections 5): SERVOPACK with analog voltage/pulse train references only

   Refer to the following section for I/O signal settings on a SERVOPACK with analog voltage/pulse train references.

   ☞ *4.5.1 I/O Signal Allocations: SERVOPACK with Analog Voltage/Pulse Train References* on page 4-20

   Refer to the following manuals for information about settings other than those listed above.

   🕮 Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

   🕮 Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

5. To enable changes to the parameter settings, turn the power supply to the SERVOPACK OFF and ON again.

6. Operate the SERVOPACK and check the following items during operation.
   For a SERVOPACK with analog voltage/pulse train references, input the signals from the host controller. For a SERVOPACK with MECHATROLINK-III communications references, issue the Run command from the SERVOPACK or host controller.
   - Are there any errors in the SERVOPACK?
   - Does jogging function correctly when you operate the SERVOPACK without a load?
   - Do the I/O signals turn ON and OFF correctly?
   - SERVOPACK with analog voltage/pulse train references only: Is power supplied to the Servomotor when the /S-ON (Servo ON) signal is input?
   - SERVOPACK with MECHATROLINK-III communications references only: Is power supplied to the Servomotor when the SV_ON (Servo ON) command is sent from the host controller?
   - Does the Servomotor operate correctly when a position reference is input by the host controller?

7. Connect the Servomotor to the machine.

8. Set Pn103 (Moment of Inertia Ratio).
   If advanced autotuning can be applied, start advanced autotuning. This will automatically set Pn103 (Moment of Inertia Ratio).
   If advanced autotuning cannot be applied, directly set Pn103 (Moment of Inertia Ratio).

9. Issue the Run command from the host controller and check that the machine's movement direction, travel distance, and movement speed agree with the references from the host controller.

This concludes checking operation of semi-closed loop control.

4.3.2 Switching Semi-Closed Loop Control and Fully-Closed Loop Control, and Fully-Closed Loop Control

The procedure to check operation of switching semi-closed loop control and fully-closed loop control, and fully-closed loop control is given below.

1. Confirm that the following procedure has been completed.
   ☞ *4.3.1 Semi-Closed Loop Control* on page 4-10

2. Set the following parameters only when using a SERVOPACK with analog voltage/pulse train references.
   - Pn51A = n.□□□X (/FLCA (Semi-Closed Loop Control/Fully-Closed Loop Control Status Output) Signal Allocation)
   - Pn58A = n.□□□X (/FLC (Semi-Closed Loop Control/Fully-Closed Loop Control Selection Input) Signal Allocation)
   - Pn58A = n.□□X□ (/SFECLR (Motor-Load Position Deviation Clear) Signal Allocation)

   Refer to the following section for more information about the settings.
   ☞ *4.5.1 I/O Signal Allocations: SERVOPACK with Analog Voltage/Pulse Train References* on page 4-20

3. Set the following parameters to enable Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching.

Required Parameter Settings	Description
Pn002 = n.X□□□ (External Encoder Usage)	Set Pn002 to n.1□□□ ("The external encoder moves in the forward direction for CCW motor rotation"). Or set Pn002 to n.3□□□ ("The external encoder moves in the reverse direction for CCW motor rotation"). Either setting will enable fully-closed loop control. Set the appropriate value for the device that will be used.
Pn02A = n.□□□X (Semi-Closed Loop Control/Fully-Closed Loop Control Switching Selection)	Set Pn02A = n.□□□1 (Enable Semi-Closed Loop Control/Fully-Closed Loop Control Switching).

4. To enable changes to the parameter settings, turn the power supply to the SERVOPACK OFF and ON again.

5. Set the servo OFF state.

6. Confirm that the status of the inputs changes according to the signals and commands that are output.

Communications Reference	Confirmation Item
Analog voltage/pulse train references	Confirm that the /FLCA (Semi-Closed Loop Control/Fully-Closed Loop Control Status Output) signal changes according the ON and OFF status of the /FLC (Semi-Closed Loop Control/Fully-Closed Loop Control Selection Input) signal.
MECHATROLINK-III communications references	Confirm that Semi-Closed Loop Control/Fully-Closed Loop Control Status (SVCMD_IO. FLCA) changes according Semi-Closed Loop Control/Fully-Closed Loop Control Selection (SVCMD_IO. FLC). Refer to the following section for more information about the commands. ☞ *4.5.2 Command Details: SERVOPACK with MECHATROLINK-III Communications References* on page 4-25

Refer to the following section for details.
☞ *4.1.2 Semi-Closed Loop Control/Fully-Closed Loop Control Switching* on page 4-5

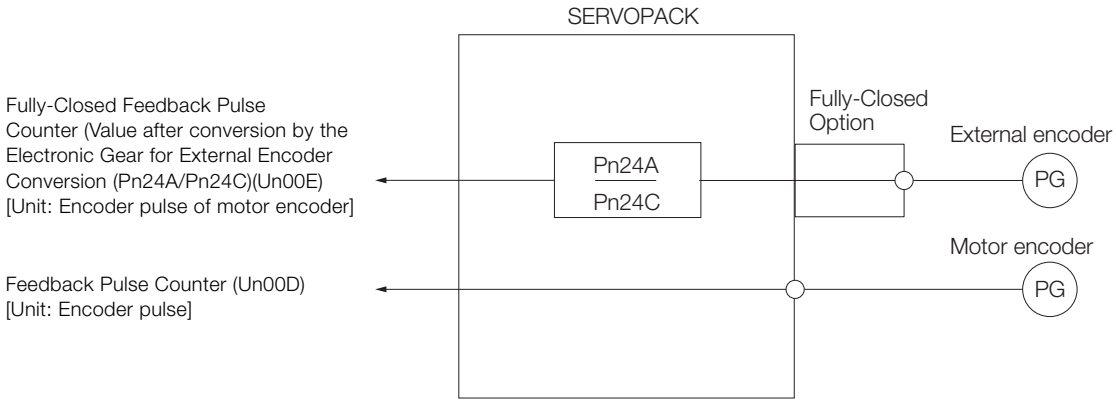
7. Set the following parameters required for fully-closed loop control according to your device.

Required Parameter Settings	Description
Pn20A (Number of External Encoder Scale Pitches)	Set the appropriate value for the device that will be used. Refer to the following section for details. ☞ *4.4.3 Setting the Number of External Encoder Scale Pitches* on page 4-17
Pn24A (Electronic Gear Ratio for External Encoder Conversion (Numerator))	If required, set the appropriate value for the device that will be used. Refer to the following section for details. ☞ *4.4.1 Electronic Gear Ratio for External Encoder Conversion Settings* on page 4-14
Pn24C (Electronic Gear Ratio for External Encoder Conversion (Denominator))	
Pn02A = n.□□X□ (Encoder Divided Pulses Output Method Selection during Fully-Closed Loop Control)	Set the appropriate value for the device that will be used. Refer to the following section for details. ☞ *4.4.2 Encoder Divided Pulses during Fully-Closed Loop Control Setting* on page 4-15
Pn212 (Number of Encoder Output Pulses)	
Pn281 (Encoder Output Resolution)	
Pn51B (Motor-Load Position Deviation Overflow Detection Level)	Set the appropriate value for the device that will be used. For details, refer to the following manuals. 🕮 Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)
Pn52A (Multiplier per Fully-closed Rotation)	
Pn522 (Positioning Completed Width)	🕮 Σ-7-Series AC Servo Drive Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)
Pn22A = n.0□□□ (Use motor encoder speed.)	If Pn22A is set to n.1□□□ (Use external encoder speed), control may become unstable. Do not use this setting.

8. To enable changes to the parameter settings, turn the power supply to the SERVOPACK OFF and ON again.

9. Move the machine with your hand and check the following status with the Digital Operator or SigmaWin+.
- Does Un00E (Fully-Closed Feedback Pulse Counter) count up when the Servomotor moves in the forward direction?
- Is the travel distance of the machine visually about the same as the amount counted by Un00E (Fully-Closed Feedback Pulse Counter)?

Note: The unit for Un00E (Fully-Closed Feedback Pulse Counter) is the value converted with the parameters.



10. Set the servo ON state.

11. Input the position reference from the host controller and check the status of the following items. Start from a low speed and gradually increase the speed.

Communications Reference	Confirmation Item
Analog voltage/pulse train reference	• Does switching semi-closed loop control/fully-closed loop control operate correctly, including the host controller? • Does the /SFECLR (Motor-Load Position Deviation Clear) signal operate correctly?
MECHATROLINK- III communications reference	• Does switching semi-closed loop control/fully-closed loop control operate correctly, including the host controller? • Does Motor-Load Position Deviation Clear (SVCMD_IO. SFECLR) operate correctly?

Refer to the following section for the sequence for clearing motor-load position deviation.

☞ *4.1.3 Motor-Load Position Deviation Clear* on page 4-7

4.4 Parameter Setting Details

4.4.1 Electronic Gear Ratio for External Encoder Conversion Settings

This product is equipped with the Electronic Gear for External Encoder Conversion. This function matches the resolution bits of the external encoder to the resolution bits of the motor encoder, and it is used for applications that switch between and use semi-closed loop control and fully-closed loop control. The following parameters set this gear.

Pn24A	Electronic Gear Ratio for External Encoder Conversion (Numerator)			Speed Position Torque	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	1 to 1,073,741,824	–	1	After restart	Setup
Pn24C	Electronic Gear Ratio for External Encoder Conversion (Denominator)			Speed Position Torque	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	1 to 1,073,741,824	–	1	After restart	Setup

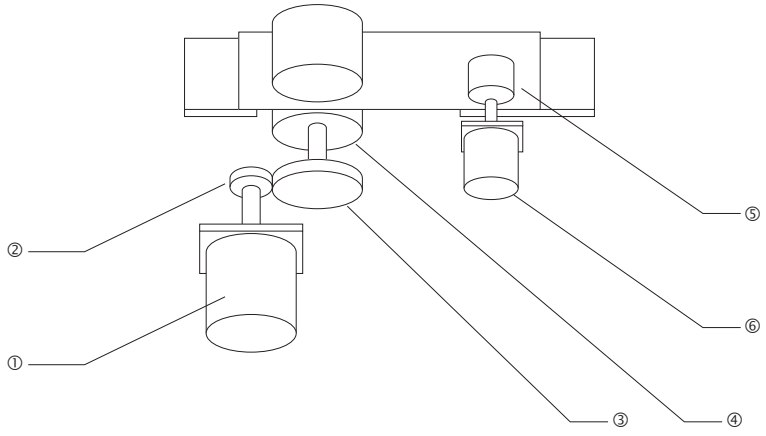
The effect of setting these parameters is as follows.

- During semi-closed loop control, control is performed with the resolution bits of the motor encoder. During fully-closed loop control, control is performed with the resolution bits of the external encoder. However, matching the resolution bits for the internal calculation of these two encoders eliminates the need to convert the number of pulses provided from the host controller, even when switching between semi-closed loop control and fully-closed loop control.

  Note: The encoder resolution bits as viewed from the host controller is that of the motor encoder.
- Since the position deviation unit will be the same during semi-closed loop control and fully-closed loop control, shock will be reduced even when control is switched from a state where position deviation has been accumulated.

Calculating the Settings Pn24A and Pn24C

This example gives the method of calculating Pn24A and Pn24C for a roll feeder.



No.	System Configuration	Example
①	Drive motor and motor encoder	Motor encoder resolution bits (Mr) = Resolution: 24 bits/rev
②	Drive gear on motor	Number of teeth (Nm) = 30
③	Drive gear on roll	Number of teeth (N1) = 80
④	Drive roll	Diameter of roll (Dr) = 200 mm
⑤	External encoder detection roll	Diameter of roll (Df) = 60 mm
⑥	External encoder	External encoder resolution bits (Fr) = Resolution: 20 bits/rev

◆ Calculating the Settings

$$\frac{Pn24A}{Pn24C} = \frac{Mr}{Fr} \times \frac{Df}{Dr} \times \frac{N1}{Nm} = \frac{16777216 \times 60 \times 80}{1048576 \times 200 \times 30} = \frac{80530636800}{6291456000} = \frac{64}{5}$$

4.4.2 Encoder Divided Pulses during Fully-Closed Loop Control Setting

This product has two types of division methods during fully-closed loop control. The methods are set with Pn02A = n.□□X□ (Encoder Divided Pulses Output Method Selection during Fully-Closed Loop Control).

Parameter		Meaning	When Enabled	Classification
Pn02A	n.□□0□ (default setting)	During fully-closed loop control, output encoder divided pulses for position feedback from an external encoder according to the value after conversion using the Electronic Gear Ratio for External Encoder Conversion (Pn24A/Pn24C) and the setting value of Pn212.	After restart	Setup
	n.□□1□	During fully-closed loop control, output encoder divide pulses for position feedback from an external encoder according to the setting value of Pn281.		

Information

Division Method during Semi-Closed Loop Control
During semi-closed loop control, position feedback from the motor encoder is output as divided pulses according to the setting of Pn212, regardless of whether Pn002A is set to n.□□0□ or n.□□1□.

Differences from the Standard Product
When Pn02A is set to n.□□1□, this product behaves in the same manner as the standard product during semi-closed loop control and fully-closed loop control.
When Pn02A is set to n.□□0□, this product behaves in the same manner as the standard product during semi-closed loop control, but it behaves in a different manner during fully-closed loop control. The standard product outputs position feedback as divided pulses according to the setting of Pn281 during fully-closed loop control, but this product outputs position feedback as divided pulses according to the setting of Pn212 during fully-closed loop control. However, shock is reduced when changing control because the value of the Electronic Gear Ratio for External Encoder Conversion (Pn24A/Pn24C) is used.

Calculating the Setting of Pn212

This section describes how to calculate the setting of Pn212 (Number of Encoder Output Pulses).

Pn212	Number of Encoder Output Pulses			Speed Position Torque	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	16 to 1,073,741,824	1 P/Rev	2048	After restart	Setup

The number of pulses from the encoder per rotation are processed inside the SERVOPACK, divided by the setting of Pn212, and then output.

Set the number of encoder divided output pulses according to the system specifications of the machine or host controller.

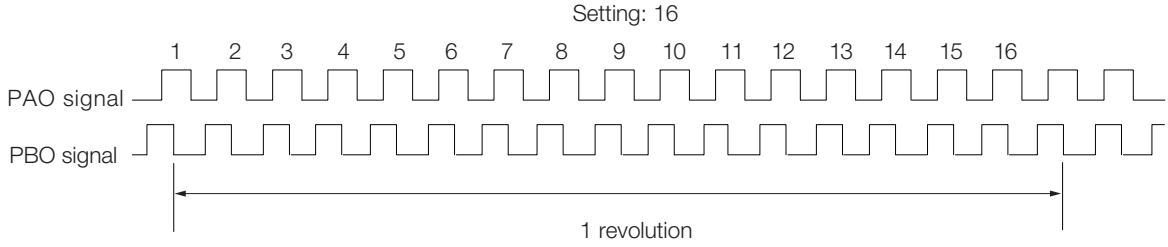
The setting of the number of encoder output pulses is limited by the resolution of the encoder.

Setting of the Number of Encoder Output Pulses [P/Rev]	Setting Increment	Encoder Resolution Bits			Upper Limit of Servomotor Speed for Set Number of Encoder Output Pulses [min^{-1}]
		20 bits (1,048,576 pulses)	22 bits (4,194,304 pulses)	24 bits (16,777,216 pulses)	
16 to 16,384	1	○	○	○	6000
16,386 to 32,768	2	○	○	○	3000
32,772 to 65,536	4	○	○	○	1500
65,544 to 131,072	8	○	○	○	750
131,088 to 262,144	16	○	○	○	375
262,176 to 524,288	32	–	○	○	187
524,352 to 1,048,576	64	–	○	○	93
1,048,704 to 2,097,152	128	–	–	○*	46
2,097,408 to 4,194,304	256	–	–	○*	23

* Available only for incremental encoder

Note: 1. The setting range of the number of encoder output pulses (Pn212) depends on the resolution of the Servomotor encoder. An A.041 alarm (Encoder Output Pulse Setting Error) will occur if the above setting conditions are not met.
Correct setting example: Pn212 can be set to 25,000 [P/Rev].
Incorrect setting example: Pn212 cannot be set to 25,001 [P/Rev] because the setting increment in the above table is not used.
2. The upper limit of the pulse frequency is approximately 1.6 Mpps. The Servomotor speed will be limited if the setting of the number of encoder output pulses is too high.
An A.511 alarm (Encoder Output Pulse Overspeed) will occur if the upper limit of the motor speed is exceeded.

Output example: An output example is given below for the PAO (Encoder Pulse Output Phase A) signal and the PBO (Encoder Pulse Output Phase B) signal when Pn212 is set to 16 (16 pulses output per revolution).



◆ Upper Limit of Pn212

When Pn02A is set to n.□□0□, the upper limit of Pn212 (Number of Encoder Output Pulses) is either the resolution bits of the motor encoder or the resolution bits of the external encoder, whichever resolution bits is lower.

Example If the resolution bits of the motor encoder is 24 bits/rev and the resolution bits of the external encoder is 20 bits/rev, the resolution bits of the external encoder is lower, so the upper limit of Pn212 will be 1,048,576 (encoder resolution) ÷ 4 (multiplier) = 262,141 pulses/rev. Therefore, confirm that the setting of Pn212 is less than or equal to the upper limit value of 262,144.

Calculating the Setting of Pn281

This section describes how to calculate the setting of Pn281 (Encoder Output Resolution).

Pn281	Encoder Output Resolution			Speed Position Torque	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	1 to 4096	1 edge/pitch	20	After restart	Setup

Note: 1. The maximum setting for the encoder output resolution is 4,096. Pulse output at an encoder resolution of 4,096 or higher is not possible.
2. If the setting of Pn281 exceeds the resolution of the external encoder, the A.041 alarm (Encoder Output Pulse Setting Error) will be output.

When Pn281 is set to the resolution (number of divisions) of the external encoder, divided pulses are output at the minimum resolution bits of the encoder. Calculate the appropriate setting for the machine that will be used based on the resolution (number of divisions) of the external encoder.

Refer to the following section for details on the resolution (number of divisions) of the external encoder.

☞ *Encoder Resolution Bits and Resolution (Number of Divisions)* on page 4-18

Information

When using external encoder RRU77-4096ADF
- Resolution bits: 20 bits/rev
- Resolution (number of divisions): 256

When Pn281 is set to 256, 1,048,576 pulses are output when the external encoder rotates once.
When Pn281 is set to 1, 4096 pulses are output when the external encoder rotates once.

4.4.3 Setting the Number of External Encoder Scale Pitches

Set the number of external encoder scale pitches in Pn20A. The setting of Pn20A will depend on the external encoder that you use.

Pn20A	Number of External Encoder Scale Pitches			Position	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	4 to 1048576	1 scale pitch/revolution	32768	After restart	Setup

Important

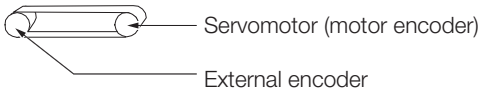
Pn20A must be set with the correct value because it affects the following functions.
- Position loop gain calculation and other calculations in the SERVOPACK during fully-closed loop control
- Phase C output of encoder divided pulses

Set the number of external encoder scale pitches per Servomotor rotation in Pn20A.

Note: 1. If there is a fraction, round off the digits below the decimal point.
2. If the number of external encoder scale pitches per Servomotor rotation is not an integer, there will be deviation in the position loop gain (Kp), feedforward, and position reference speed monitor. This is not relevant for the position loop and it therefore does not interfere with the position accuracy.

Example

An example where the external encoder rotates once when the Servomotor rotates once.



Resolution bits of the external encoder: 20 bits/rev
Resolution (number of divisions) of the external encoder: 256

$2^{20} \div 256 = 1{,}048{,}576 \div 256 = 4096$. The setting is 4096.

Encoder Resolution Bits and Resolution (Number of Divisions)

The following table gives the resolution bits and resolution (number of divisions) of various encoders.

Output Signal	Manufacturer	Rotary Encoder Type	Model		Relay device between Fully-Closed Module and rotary encoder	Resolution	Resolution Bit	Maximum Speed[*1] min^{-1}
			Scale	Sensor Head				
Encoder for Yaskawa's Serial Interface (Σ-LINK)	Magnescale Co., Ltd.	Sealed Type	RU77-4096ADF[*2]		–	256	20	2000
			RU77-4096AFFT01[*2]		–	1024	22	2000
	Dr. JOHANNES HEIDENHAIN GmbH	Exposed Type	ECA4412[*2]		EIB3391Y	4096	27	1600
						4096	28	800
						4096	29	400
		Sealed Type	RCN2□10[*2]			4096	26	3000
			RCN5□10[*2]			4096	28	800
			RCN8□10[*2]			4096	29	400
			ROC2310[*2]			4096	26	3000
			ROC7310[*2]			4096	28	800
	Renishaw PLC	Exposed Type	RA23Y-□□□□□□□□□[*2]		–	4096	23	14600
			RA26Y-□□□□□□□□□[*2]		–	4096	26	3250
			RA30Y-□□□□□□□□□[*2]		–	4096	30	200

*1. The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a SERVOPACK.
The actual speed will be restricted by either the maximum speed of the Rotary Servomotor or the maximum speed of the rotary encoder (given above).

*2. This is a single-turn absolute encoder.

Note: 1. Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the rotary encoder before you use it.
2. ∑-LINK is a registered trademark of Yaskawa Electric Corporation.

4.5 Signal and Command Setting Details

This section provides details about the signals or commands that must be configured to use this product.

Information

The method to switch between semi-closed loop control and fully-closed loop control will depend on the SERVOPACK that is used.

- SERVOPACK with analog voltage/pulse train references: Switch with I/O signals. Refer to the following section for details.
  ☞ *4.5.1 I/O Signal Allocations: SERVOPACK with Analog Voltage/Pulse Train References* on page 4-20
- SERVOPACK with MECHATROLINK-III communications references: Switch with MECHATROLINK-III communications commands. Refer to the following section for details.
  ☞ *4.5.2 Command Details: SERVOPACK with MECHATROLINK-III Communications References* on page 4-25

4.5.1 I/O Signal Allocations: SERVOPACK with Analog Voltage/Pulse Train References

Functions are allocated to the pins on the I/O signal connector (CN1) in advance. You can change the allocations and the polarity for some of the connector pins. Function allocations and polarity settings are made with parameters.

This section describes the I/O signal allocations.

Input Signal Allocations

Although you can use the input signals with the default settings, you must allocate the input signals related to Semi-Closed Loop Control/Fully-Closed Loop Control Switching to pins 40 to 46 on the I/O signal connector (CN1) when using this product.

First set Pn50A to n.□□□1 (Change the individual sequence input signal allocations).

Parameter		Description	When Enabled	Classification
Pn50A	n.□□□0 (default setting)	Use the sequence input signal terminals with the default allocations.	After restart	Setup
	n.□□□1	Change the individual sequence input signal allocations.		


Important

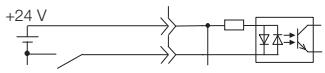
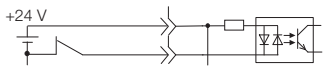
- If you change the default polarity settings for the /S-ON (Servo ON), P-OT (Forward Drive Prohibit), or N-OT (Reverse Drive Prohibit) signal, the main circuit power supply will not be turned OFF and the overtravel function will not operate if there are signal line disconnections or other problems. If you must change the polarity of one of these signals, verify operation and make sure that no safety problems will exist.
- If you allocate two or more signals to the same input circuit, a logical OR of the inputs will be used and all of the allocated signals will operate accordingly. This may result in unexpected operation.

The input signals that you can allocate to the pins on the I/O signal connector (CN1) and the related parameters are given in the following table. Signals in cells in bold lines are unique to this product.

Input Signal	Input Signal Name	Parameter
/S-ON	Servo ON	Pn50A = n.□□X□
/P-CON	Proportional Control	Pn50A = n.□X□□
P-OT	Forward Drive Prohibit	Pn50A = n.X□□□
N-OT	Reverse Drive Prohibit	Pn50B = n.□□□X
/ARM-RST	Alarm Reset	Pn50B = n.□□X□
/P-CL	Forward External Torque Limit	Pn50B = n.□X□□
/N-CL	Reverse External Torque Limit	Pn50B = n.X□□□
/SPD-D	Motor Direction	Pn50C = n.□□□X
/SPD-A	Internal Set Speed Selection	Pn50C = n.□□X□
/SPD-B	Internal Set Speed Selection	Pn50C = n.□X□□
/C-SEL	Control Selection	Pn50C = n.X□□□
/ZCLAMP	Zero Camping	Pn50D = n.□□□X
/INHIBIT	Reference Pulse Inhibit	Pn50D = n.□□X□
/G-SEL	Gain Selection	Pn50D = n.□X□□
SEN	Absolute Data Request	Pn515 = n.□□□X
/PSEL	Reference Pulse Input Multiplication Switch	Pn515 = n.□□X□
FSTP	Forced Stop	Pn516 = n.□□□X
/FLC	**Semi-Closed/Fully-Closed Loop Control Selection**	**Pn58A = n.□□□X**
/SFECLR	**Motor-Load Position Deviation Clear**	**Pn58A = n.□□X□**

◆ Relationship between Parameter Settings, Allocated Pins, and Polarities

The following table shows the relationship between the input signal parameter settings, the pins on the I/O signal connector (CN1), and polarities.

Parameter Setting	Pin No.	Description
0	40	 A reverse signal (a signal with "/" before the signal abbreviation, such as the /S-ON signal) is active when the contacts are ON (closed). A signal that does not have "/" before the signal abbreviation (such as the P-OT signal) is active when the contacts are OFF (open).
1	41	
2	42	
3	43	
4	44	
5	45	
6	46	
7	–	The input signal is not allocated to a connector pin and it is always active. If the signal is processed on a signal edge, then it is always inactive.
8	–	The input signal is not allocated to a connector pin and it is always inactive. Set the parameter to 8 if the signal is not used.
9	40	 A reverse signal (a signal with "/" before the signal abbreviation, such as the /S-ON signal) is active when the contacts are OFF (open). A signal that does not have "/" before the signal abbreviation (such as the P-OT signal) is active when the contacts are ON (closed).
A	41	
B	42	
C	43	
D	44	
E	45	
F	46	

Note: Refer to the following section for details on input signal parameter settings.
☞ *8.2.1 List of Servo Parameters* on page 8-3

◆ Example of Changing Input Signal Allocations

The following example shows reversing the P-OT (Forward Drive Prohibit) signal allocated to CN1-42 and the /P-CL (External Torque Limit) signal allocated to CN1-45.

Pn50A = n.2□□0	Pn50B = n.□5□□	Before change
↓	↓	
Pn50A = n.5□□1	Pn50B = n.□2□□	After change

Refer to the following manual for the parameter setting procedure.

🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

◆ Confirming Input Signals

You can confirm the status of input signals on the I/O signal monitor. Refer to the following manual for information on the I/O signal monitor.

🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

Output Signal Allocations

You can allocate the desired output signals to pins 25 to 30 and 37 to 39 on the I/O signal connector (CN1). You set the allocations in the following parameters: Pn50E, Pn50F, Pn510, Pn512, Pn513, Pn514, Pn517, and Pn51A.

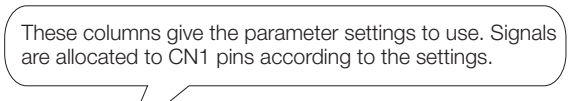
Important

- The signals that are not detected are considered to be OFF. For example, the /COIN (Positioning Completion) signal is considered to be OFF during speed control.
- Reversing the polarity of the /BK (Brake) signal, i.e., changing it to positive logic, will prevent the holding brake from operating if its signal line is disconnected. If you must change the polarity of this signal, verify operation and make sure that no safety problems will exist.
- If you allocate more than one signal to the same output circuit, a logical OR of the signals will be output.

Output signals are allocated as shown in the following table. Signals in cells in bold lines are unique to this product.

Refer to *Interpreting the Output Signal Allocation Tables* and change the allocations accordingly.

Interpreting the Output Signal Allocation Tables



Output Signal Name and Parameter	Output Signal	CN1 Pin No.						Disabled (Not Used)
		25 and 26	27 and 28	29 and 30	37	38	39	
Positioning Completion Pn50E = n.□□X□	/COIN	1	2	3	4	5	6	0

Output Signal Name and Parameter	Output Signal	CN1 Pin No.						Disabled (Not Used)
		25 and 26	27 and 28	29 and 30	37	38	39	
Positioning Completion Pn50E = n.□□□X	/COIN	1 (default setting)	2	3	4	5	6	0
Speed Coincidence Detection Pn50E = n.□□X□	/V-CMP	1 (default setting)	2	3	4	5	6	0
Rotation Detection Pn50E = n.□X□□	/TGON	1	2 (default setting)	3	4	5	6	0
Servo Ready Pn50E = n.X□□□	/S-RDY	1	2	3 (default setting)	4	5	6	0
Torque Limit Detection Pn50F = n.□□□X	/CLT	1	2	3	4	5	6	0 (default setting)
Speed Limit Detection Pn50F = n.□□X□	/VLT	1	2	3	4	5	6	0 (default setting)
Brake Pn50F = n.□X□□	/BK	1	2	3	4	5	6	0 (default setting)
Warning Pn50F = n.X□□□	/WARN	1	2	3	4	5	6	0 (default setting)
Near Pn510 = n.□□□X	NEAR	1	2	3	4	5	6	0 (default setting)
Reference Pulse Input Multiplication Switching Output Pn510 = n.□□X□	/PSELA	1	2	3	4	5	6	0 (default setting)
Preventative Maintenance Pn514 = n.□X□□	/PM	1	2	3	4	5	6	0 (default setting)
Alarm Code Pn517 = n.□□□X	ALO1	1	2	3	4 (default setting)	5	6	0
Alarm Code Pn517 = n.□□X□	ALO2	1	2	3	4	5 (default setting)	6	0
Alarm Code Pn517 = n.□X□□	ALO3	1	2	3	4	5	6 (default setting)	0
Semi-closed/Fully-closed Loop Control Status Pn51A = n.□□□X	/FLCA	1	2	3	4	5	6	0 (default setting)
Pn512 = n.□□□1	Reverse polarity for CN1-25 and CN1-26							0 (default setting) (The polarity is not reversed in the default settings.)
Pn512 = n.□□1□	Reverse polarity for CN1-27 and CN1-28							
Pn512 = n.□1□□	Reverse polarity for CN1-29 and CN1-30							
Pn512 = n.1□□□	Reverse polarity for CN1-37							
Pn513 = n.□□□1	Reverse polarity for CN1-38							
Pn513 = n.□□1□	Reverse polarity for CN1-39							

◆ Example of Changing Output Signal Allocations

The following example shows disabling the /COIN (Positioning Completion) signal allocated to CN1-25 and CN1-26 and allocating the /BK (Brake) signal.

Pn50E = n.□□1□ Pn50F = n.□0□□ Before change

↓ ↓

Pn50E = n.□□0□ Pn50F = n.□1□□ After change

Refer to the following manual for the parameter setting procedure.

🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

◆ Checking Output Signal Status

You can confirm the status of output signals on the I/O signal monitor. Refer to the following manual for information on the I/O signal monitor.

🕮 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

4.5.2 Command Details: SERVOPACK with MECHATROLINK-III Communications References

Commands for Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching

This product has the following MECHATROLINK-III communications commands for Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching.

- Semi-Closed Loop Control/Fully-Closed Loop Control Selection Signal (FLC)
- Motor-Load Position Deviation Clear Signal (SFECLR)
- Semi-Closed Loop Control/Fully-Closed Loop Control Status Signal (FLCA)

The following tables give the bit allocations and details of these signals.

◆ SVCMD_IO (output) region: 8th to 11th bytes of command field

Command region from host controller to SERVOPACK.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
N_CL	P_CL	P_PPI	V_PPI	Reserved (0)			

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved (0)				G-SEL			

Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Reserved	SO3	SO2	SO1	BANK_SEL			

Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
Reserved (0)						SFECLR	FLC

- Details of Output Signal Bits

Bit	Name	Description	Value	Setting	When Enabled
24	FLC	Semi-Closed Loop Control/ Fully-Closed Loop Control Selection	0	Semi-closed loop control	Level
			1	Fully-closed loop control	
	Switches the control between semi-closed loop control and fully-closed loop control when Semi-Closed Loop Control/Fully-Closed Loop Control Switching is enabled (Pn02A = n.□□□1).				
25	SFECLR	Motor-Load Position Deviation Clear	0	Do not clear	Level
			1	Clear	
	Clears the motor-load position deviation when Semi-Closed Loop Control/Fully-Closed Loop Control Switching is enabled (Pn02A = n.□□□1). Motor-load position deviation continues to be cleared while the signal is 1 (clear).				

◆ SVCMD_IO (I/O signal status) region: 8th to 11th bytes of response field

Response region from the SERVOPACK to the host controller.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
ESTP	EXT3	EXT2	EXT1	N-OT	P-OT	DEC	Reserved (0)

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
ZPOINT	PSET	NEAR	DEN	N-SOT	P-SOT	BRK_ON	Reserved (0)

Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
Reserved (0)				ZSPD	V_CMP	V_LIM	T_LIM

Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
IO_STS8	IO_STS7	IO_STS6	IO_STS5	IO_STS4	IO_STS3	IO_STS2	FLCA

• Details of I/O Signal Status Bits

Bit	Name	Description	Value	Setting
24	FLCA	Semi-Closed Loop Control/Fully-Closed Loop Control Status	0	Semi-closed loop control status
			1	Fully-closed loop control status
	Determines the control status (semi-closed loop control/fully-closed loop control).			



Bit 24 of SVCMD_IO can also be used as IO_STS1 in the same manner as the standard product. When an I/O signal monitor for CN1 is allocated to bit 24 with a setting, such as Pn860, the signal status changes with a logical OR of that signal and the FLCA signal.

Monitoring

5

This chapter provides information on monitoring SERVOPACK status.

5.1 Monitoring SERVOPACK Status 5-2

5.1.1 Monitoring Operation, Status, and I/O 5-2

5.2 Monitoring Machine Operation Status and Signal Waveforms . . 5-5

5.2.1 Using the SigmaWin+ 5-5

5.2.2 Using the Analog Monitors 5-7

5.1 Monitoring SERVOPACK Status

5.1.1 Monitoring Operation, Status, and I/O

Items That You Can Monitor

The items that you can monitor on the Operation Pane, Status Pane, and I/O Pane are listed below.

- Operation Pane

Monitor Items	
• Motor Speed • Speed Reference • Internal Torque Reference • Angle of Rotation 1 (number of encoder pulses from encoder phase C) • Angle of Rotation 2 (electrical angle from polarity origin) • Input Reference Pulse Speed • Deviation Counter (Position Deviation) • Cumulative Load • Regenerative Load • Power Consumption	• Consumed Power • Cumulative Power Consumption • DB Resistor Consumption Power • Absolute Encoder Multiturn Data • Absolute Encoder Position within One Rotation • Absolute Encoder (Lower) • Absolute Encoder (Upper) • Input Reference Pulse Counter • Feedback Pulse Counter • Fully Closed Feedback Pulse Counter • Total Operating Time

- Status Pane

Monitor Items	
• Main Circuit • Encoder (PGRDY) • Motor Power (Request) • Motor Power ON • Dynamic Brake (DB) • Rotation (Movement) Direction • Mode Switch • Speed Reference (V-Ref) • Torque Reference (T-Ref)	• Position Reference (PULS) • Position Reference Direction • Clear Signal (CLR)* • Surge Current Limiting Resistor Short Relay • Regenerative Transistor • Regenerative Error Detection • AC Power ON • Overcurrent • Origin Not Passed

* Can be monitored only when using a SERVOPACK with analog voltage/pulse train references.

• I/O Pane: SERVOPACK with Analog Voltage/Pulse Train References

Monitor Items			
Input Signal Status	• /S-ON (Servo ON Input Signal) • /P-CON (Proportional Control Input Signal) • P-OT (Forward Drive Prohibit Input Signal) • N-OT (Reverse Drive Prohibit Input Signal) • /P-CL (Forward External Torque Limit Signal) • /N-CL (Reverse External Torque Limit Signal) • /ALM-RST (Alarm Reset Input Signal) • SEN (Absolute Data Request Input Signal) • /SPD-D (Motor Direction Signal) • /SPD-A (Internal Set Speed Selection Input Signal) • /SPD-B (Internal Set Speed Selection Input Signal) • /C-SEL (Control Selection Input Signal) • /ZCLAMP (Zero Clamping Input Signal) • /INHIBIT (Reference Pulse Inhibit Input Signal) • /G-SEL (Gain Selection Input Signal) • /P-DET (Polarity Detection Input Signal) • PULS (Pulse Reference Input Signal) • SIGN (Sign Reference Input Signal) • CLR (Position Deviation Clear Input Signal) • /PSEL (Reference Pulse Input Multiplication Input Signal) • FSTP (Forced Stop Input Signal) • /FLC (Semi-closed/Fully-closed Loop Control Selection Input Signal) • /SFECLR (Motor-Load Position Deviation Clear Input Signal)	Output Signal Status	• ALM (Servo Alarm Output Signal) • /COIN (Positioning Completion Output Signal) • /V-CMP (Speed Coincidence Detection Output Signal) • /TGON (Rotation Detection Output Signal) • /S-RDY (Servo Ready Output Signal) • /CLT (Torque Limit Detection Output Signal) • /VLT (Speed Limit Detection Output Signal) • /BK (Brake Output Signal) • /WARN (Warning Output Signal) • /NEAR (Near Output Signal) • ALO1 (Alarm Code Output Signal) • ALO2 (Alarm Code Output Signal) • ALO3 (Alarm Code Output Signal) • PAO (Encoder Divided Pulse Output Phase A Signal) • PBO (Encoder Divided Pulse Output Phase B Signal) • PCO (Encoder Divided Pulse Output Phase C Signal) • /PSELA (Reference Pulse Input Multiplication Switching Output Signal) • /PM (Preventative Maintenance Output Signal) • /FLCA (Semi-closed/Fully-closed Loop Control Status Output Signal)

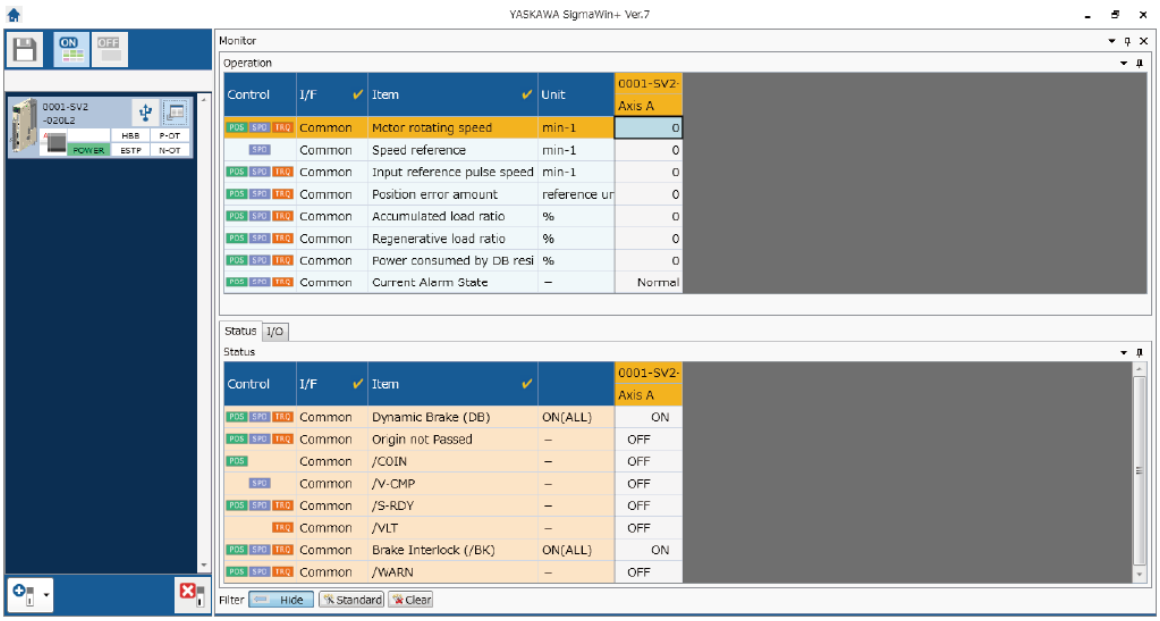
• I/O Pane: SERVOPACK with MECHATROLINK-III Communications References

Monitor Items			
Input Signal Status	• P-OT (Forward Drive Prohibit Input Signal) • N-OT (Reverse Drive Prohibit Input Signal) • /P-CL (Forward External Torque Limit Signal) • /N-CL (Reverse External Torque Limit Signal) • /G-SEL (Gain Selection Input Signal) • /P-DET (Polarity Detection Input Signal) • /DEC (Origin Return Deceleration Switch Input Signal) • /EXT1 (External Latch Input 1 Signal) • /EXT2 (External Latch Input 2 Signal) • /EXT3 (External Latch Input 3 Signal) • FSTP (Forced Stop Input Signal) • /FLC (Semi-closed/Fully-closed Loop Control Selection Input Signal) • /SFECLR (Motor-Load Position Deviation Clear Input Signal)	Output Signal Status	• ALM (Servo Alarm Output Signal) • /COIN (Positioning Completion Output Signal) • /V-CMP (Speed Coincidence Detection Output Signal) • /TGON (Rotation Detection Output Signal) • /S-RDY (Servo Ready Output Signal) • /CLT (Torque Limit Detection Output Signal) • /VLT (Speed Limit Detection Output Signal) • /BK (Brake Output Signal) • /WARN (Warning Output Signal) • /NEAR (Near Output Signal) • PAO (Encoder Divided Pulse Output Phase A Signal) • PBO (Encoder Divided Pulse Output Phase B Signal) • PCO (Encoder Divided Pulse Output Phase C Signal) • /PM (Preventative Maintenance Output Signal) • /FLCA (Semi-closed/Fully-closed Loop Control Status Output Signal)

Operating Procedure

Use the following procedure to display the Operation Monitor, Status Monitor, and I/O Monitor for the SERVOPACK.

- Select **Monitor** in the SigmaWin+ Menu Dialog Box.
  The Operation Pane, Status Pane, and I/O Pane will be displayed in the Monitor Window.



Information

You can flexibly change the contents that are displayed in the Monitor Window. Refer to the following manual for details.

Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)

5.2 Monitoring Machine Operation Status and Signal Waveforms

To monitor waveforms, use the SigmaWin+ trace function or a measuring instrument, such as a memory recorder.

5.2.1 Using the SigmaWin+

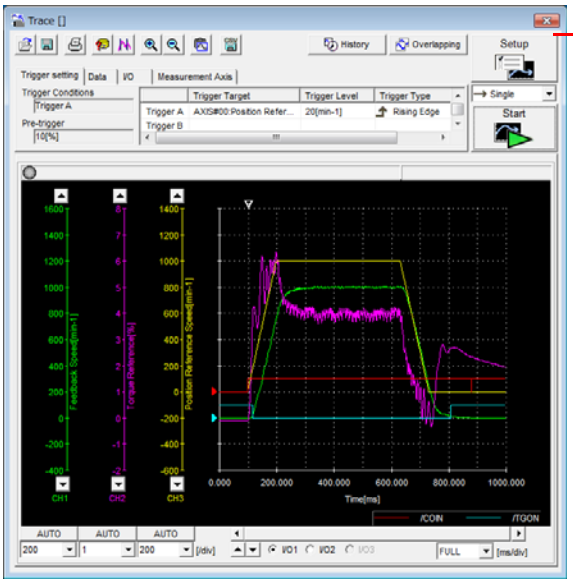
This section describes how to trace data and I/O with the SigmaWin+.

Refer to the following manual for detailed operating procedures for the SigmaWin+.

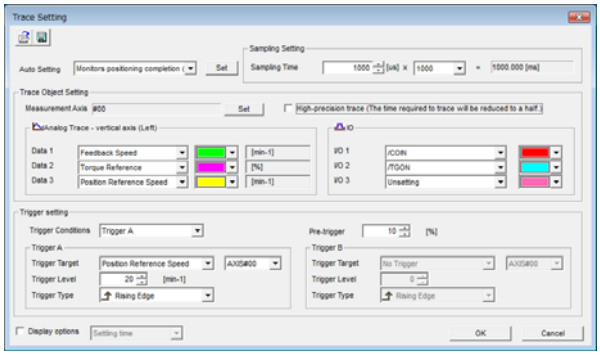
Engineering Tool SigmaWin+ Operation Manual (Manual No.: SIET S800001 34)

Operating Procedure

1. Click the Servo Drive Button in the workspace of the Main Window of the SigmaWin+.
2. Select **Trace** in the Menu Dialog Box.
   The Trace Dialog Box will be displayed.



Click this button to display the Trace Setting Dialog Box shown below, and set the data to trace and the trace conditions.



Trace Objects

You can trace the following items.

- Data Tracing

Trace Objects	
• Torque Reference • Feedback Speed • Reference Speed • Position Reference Speed • Position Error (Deviation) • Position Amplifier Error (Deviation)	• Motor - Load Position Deviation • Speed Feedforward • Torque Feedforward • Effective (Active) Gain • Main Circuit DC Voltage • External Encoder Speed • Control Mode

• I/O Tracing: SERVOPACK with Analog Voltage/Pulse Train References

<table>
<tr><th colspan="4">Trace Objects</th></tr>
<tr><td rowspan="2">Input Signals</td><td rowspan="2">• /S-ON (Servo ON Input Signal)
• /P-CON (Proportional Control Input Signal)
• P-OT (Forward Drive Prohibit Input Signal)
• N-OT (Reverse Drive Prohibit Input Signal)
• /ALM-RST (Alarm Reset Input Signal)
• /P-CL (Forward External Torque/Force Limit Input Signal)
• /N-CL (Reverse External Torque/Force Limit Input Signal)
• /SPD-D (Internal Set Speed Selection Input Signal)
• /SPD-A (Internal Set Speed Selection Input Signal)
• /SPD-B (Internal Set Speed Selection Input Signal)
• /C-SEL (Control Selection Input Signal)
• /ZCLAMP (Zero Clamping Input Signal)
• /INHIBIT (Reference Pulse Inhibit Input Signal)
• /G-SEL (Gain Selection Input Signal)
• /P-DET (Polarity Detection Input Signal)
• FSTP (Forced Stop Input Signal)
• SEN (Absolute Data Request Input Signal)
• PULS (Pulse Reference Input Signal)
• SIGN (Sign Reference Input Signal)
• CLR (Position Deviation Clear Input Signal)
• /PSEL (Reference Pulse Input Multiplication Input Signal)
• /HWBB1 (Hard Wire Base Block Input 1 Signal)
• /HWBB2 (Hard Wire Base Block Input 2 Signal)
• /FLC (Semi-closed/Fully-closed Loop Control Selection Input Signal)
• /SFECLR (Motor-Load Position Deviation Clear Input Signal)</td><td>Output Signals</td><td>• ALM (Servo Alarm Output Signal)
• /COIN (Positioning Completion Output Signal)
• /V-CMP (Speed Coincidence Detection Output Signal)
• /TGON (Rotation Detection Output Signal)
• /S-RDY (Servo Ready Output Signal)
• /CLT (Torque Limit Detection Output Signal)
• /VLT (Speed Limit Detection Output Signal)
• /BK (Brake Output Signal)
• /WARN (Warning Output Signal)
• /NEAR (Near Output Signal)
• ALO1 (Alarm Code Output Signal)
• ALO2 (Alarm Code Output Signal)
• ALO3 (Alarm Code Output Signal)
• PAO (Encoder Divided Pulse Output Phase A Signal)
• PBO (Encoder Divided Pulse Output Phase B Signal)
• PCO (Encoder Divided Pulse Output Phase C Signal)
• /PSELA (Reference Pulse Input Multiplication Switching Output Signal)
• /FLCA (Semi-closed/Fully-closed Loop Control Status Output Signal)</td></tr>
<tr><td>Internal Status</td><td>• ACON (Main Circuit ON Signal)
• PDETCMP (Polarity Detection Completed Signal)
• DEN (Position Reference Distribution Completed Signal)</td></tr>
</table>

• I/O Tracing: SERVOPACK with MECHATROLINK-III Communications References

Trace Objects			
Input Signals	• P-OT (Forward Drive Prohibit Input Signal) • N-OT (Reverse Drive Prohibit Input Signal) • /P-CL (Forward External Torque/Force Limit Input Signal) • /N-CL (Reverse External Torque/Force Limit Input Signal) • /G-SEL (Gain Selection Input Signal) • /P-DET (Polarity Detection Input Signal) • /DEC (Origin Return Deceleration Switch Input Signal) • /EXT1 (External Latch Input 1 Signal) • /EXT2 (External Latch Input 2 Signal) • /EXT3 (External Latch Input 3 Signal) • FSTP (Forced Stop Input Signal) • SEN (Absolute Data Request Input Signal) • /HWBB1 (Hard Wire Base Block Input 1 Signal) • /HWBB2 (Hard Wire Base Block Input 2 Signal) • /FLC (Semi-closed/Fully-closed Loop Control Selection Input Signal) • /SFECLR (Motor-Load Position Deviation Clear Input Signal)	Output Signals	• ALM (Servo Alarm Output Signal) • /COIN (Positioning Completion Output Signal) • /V-CMP (Speed Coincidence Detection Output Signal) • /TGON (Rotation Detection Output Signal) • /S-RDY (Servo Ready Output Signal) • /CLT (Torque Limit Detection Output Signal) • /VLT (Speed Limit Detection Output Signal) • /BK (Brake Output Signal) • /WARN (Warning Output Signal) • /NEAR (Near Output Signal) • PAO (Encoder Divided Pulse Output Phase A Signal) • PBO (Encoder Divided Pulse Output Phase B Signal) • PCO (Encoder Divided Pulse Output Phase C Signal) • /FLCA (Semi-closed/Fully-closed Loop Control Status Output Signal)
		Internal Status	• ACON (Main Circuit ON Signal) • PDETCMP (Polarity Detection Completed Signal) • DEN (Position Reference Distribution Completed Signal) • PSET (Positioning Completion Output Signal) • CMDRDY (Command Ready Signal)

5.2.2 Using the Analog Monitors

Connect a measuring instrument, such as a memory recorder, to the analog monitor connector (CN5) on the SERVOPACK to monitor analog signal waveforms. The measuring instrument is not provided by Yaskawa.

Refer to the following manuals for details on the connection.

Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

Setting the Monitor Object

Use Pn006 = n.□□XX and Pn007 = n.□□XX (Analog Monitor 1 and 2 Signal Selections) to set the items to monitor.

Line Color	Signal	Parameter Setting
White	Analog monitor 1	Pn006 = n.□□XX
Red	Analog monitor 2	Pn007 = n.□□XX
Black (2 lines)	GND	–

Parameter		Description		
		Monitor Signal	Output Unit	Remarks
Pn006 or Pn007	n.□□00 (default setting of Pn007)	Motor Speed	1 V/1,000 min^{-1}	–
	n.□□01	Speed Reference	1 V/1,000 min^{-1}	–
	n.□□02 (default setting of Pn006)	Torque Reference	1 V/100% rated torque	–
	n.□□03	Position Deviation	0.05 V/Reference unit	0 V for speed or torque control
	n.□□04	Position Amplifier Deviation	0.05 V/encoder pulse unit	Position deviation after electronic gear conversion
	n.□□05	Position Command Speed	1 V/1,000 min^{-1}	For a SERVOPACK with Analog Voltage/Pulse Train References, the input reference pulses will be multiplied by n to output the position command speed.
	n.□□06	Reserved parameter (Do not change.)	–	–
	n.□□07	Motor - Load Position Deviation	0.01 V/Reference unit	–
	n.□□08	Positioning Completion	Positioning completed: 5 V Positioning not completed: 0 V	Completion is indicated by the output voltage.
	n.□□09	Speed Feedforward	1 V/1,000 min^{-1}	–
	n.□□0A	Torque Feedforward	1 V/100% rated torque	–
	n.□□0B	Active Gain*	1st gain: 1 V 2nd gain: 2 V	The gain that is active is indicated by the output voltage.
	n.□□0C	Completion of Position Reference Distribution	Distribution completed: 5 V Distribution not completed: 0 V	Completion is indicated by the output voltage.
	n.□□0D	External Encoder Speed	1 V/1,000 min^{-1}	Value calculated at the motor shaft
	n.□□10	Main Circuit DC Voltage	1 V/100 V (main circuit DC voltage)	–

* Refer to the following manuals for details.

Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

Changing the Monitor Factor and Offset

You can change the monitor factors and offsets for the output voltages for analog monitor 1 and analog monitor 2. The relationships to the output voltages are as follows:

$$\text{Analog monitor 1 output voltage} = (-1) \times \left\{ \begin{array}{l} \text{Analog Monitor 1 Signal} \\ \text{Selection (Pn006 = n.□□XX)} \end{array} \times \begin{array}{l} \text{Analog Monitor 1} \\ \text{Magnification (Pn552)} \end{array} + \begin{array}{l} \text{Analog Monitor 1} \\ \text{Offset Voltage (Pn550)} \end{array} \right\}$$

$$\text{Analog monitor 2 output voltage} = (-1) \times \left\{ \begin{array}{l} \text{Analog Monitor 2 Signal} \\ \text{Selection (Pn007 = n.□□XX)} \end{array} \times \begin{array}{l} \text{Analog Monitor 2} \\ \text{Magnification (Pn553)} \end{array} + \begin{array}{l} \text{Analog Monitor 2} \\ \text{Offset Voltage (Pn551)} \end{array} \right\}$$

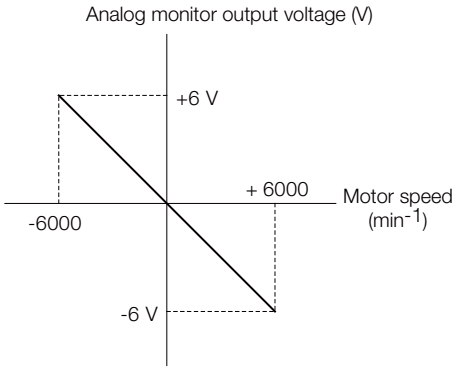
The following parameters are set.

Pn550	Analog Monitor 1 Offset Voltage			Speed Position Torque	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	-10,000 to 10,000	0.1 V	0	Immediately	Setup
Pn551	Analog Monitor 2 Offset Voltage			Speed Position Torque	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	-10,000 to 10,000	0.1 V	0	Immediately	Setup
Pn552	Analog Monitor 1 Magnification			Speed Position Torque	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	-10,000 to 10,000	×0.01	100	Immediately	Setup
Pn553	Analog Monitor 2 Magnification			Speed Position Torque	
	Setting Range	Setting Unit	Default Setting	When Enabled	Classification
	-10,000 to 10,000	×0.01	100	Immediately	Setup

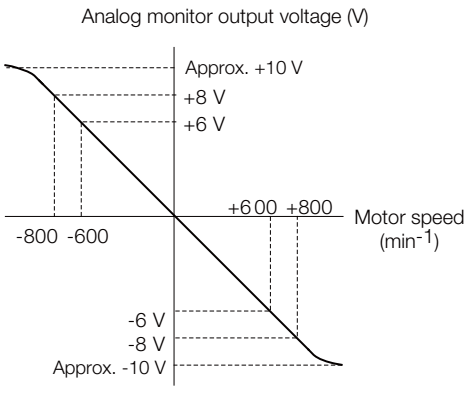
Example

- Example for Setting the Item to Monitor to the Motor Speed (Pn006 = n.□□00)

When Pn552 = 100 (Setting Unit: ×0.01)



When Pn552 = 1,000 (Setting Unit: ×0.01)



Note: The effective linearity range is ±8 V.
The resolution is 16 bits.

Adjusting the Analog Monitor Output

You can manually adjust the offset and gain for the analog monitor outputs for the torque reference monitor and motor speed monitor.

The offset is adjusted to compensate for offset in the zero point caused by output voltage drift or noise in the monitoring system.

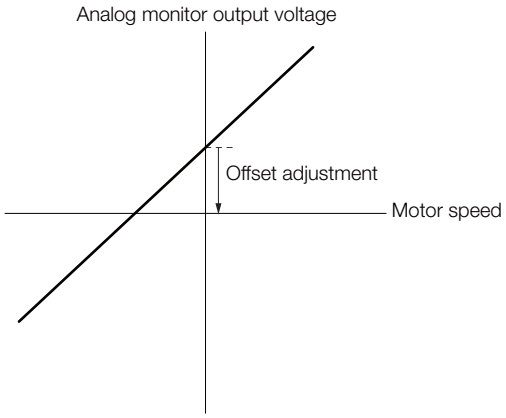
The gain is adjusted to match the sensitivity of the measuring system.

The offset and gain are adjusted at the factory. You normally do not need to adjust them.

◆ Adjustment Example

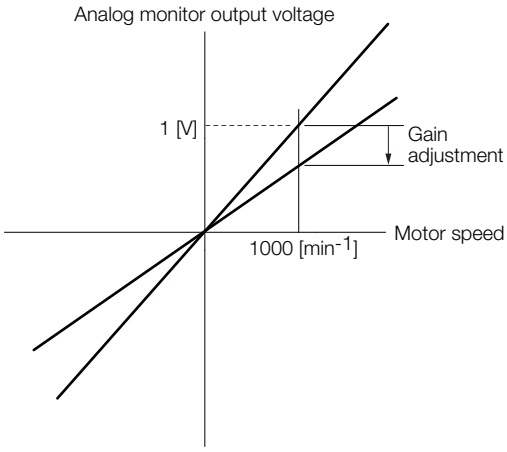
An example of adjusting the output of the motor speed monitor is provided below.

Offset Adjustment



Item	Specification
Offset Adjustment Range	-2.4 V to 2.4 V
Adjustment Unit	18.9 mV/LSB

Gain Adjustment



Item	Specification
Gain Adjustment Range	100 ±50%
Adjustment Unit	0.4%/LSB

The gain adjustment range is made using a 100% output value (gain adjustment of 0) as the reference value with an adjustment range of 50% to 150%.
A setting example is given below.

- Setting the Adjustment Value to -125
  100 + (-125 × 0.4) = 50 [%]
  Therefore, the monitor output voltage goes to 50% of the original value.
- Setting the Adjustment Value to 125
  100 + (125 × 0.4) = 150 [%]
  Therefore, the monitor output voltage goes to 150% of the original value.

Information

- The adjustment values do not use parameters, so they will not change even if the parameter settings are initialized.
- Adjust the offset with the measuring instrument connected so that the analog monitor output value goes to zero. The following setting example achieves a zero output.
  - While power is not supplied to the Servomotor, set the monitor signal to the torque reference.
  - In speed control, set the monitor signal to the position deviation.

◆ Preparations

Always check the following before you adjust the analog monitor output.

- The parameters must not be write prohibited.

◆ Applicable Tools

You can use the following tools to adjust analog monitor outputs.

- Offset Adjustment

Tool	Fn No./Function Name	Operating Procedure Reference
Panel Operator*	Fn00C	📖 Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)
Digital Operator	Fn00C	📖 Σ-7-Series Digital Operator Operating Manual (Manual No.: SIEP S800001 33)
SigmaWin+	***Others - Analog Monitor Output Adjustment***	☞ ◆ *Operating Procedure* on page 5-11

*Available for a SERVOPACK with Analog Voltage/Pulse Train References.

- Gain Adjustment

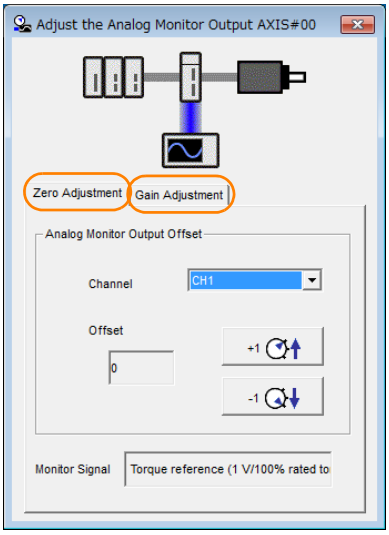
Tool	Fn No./Function Name	Operating Procedure Reference
Panel Operator*	Fn00D	Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)
Digital Operator	Fn00D	Σ-7-Series Digital Operator Operating Manual (Manual No.: SIEP S800001 33)
SigmaWin+	***Others - Analog Monitor Output Adjustment***	◆ *Operating Procedure* on page 5-11

*Available for a SERVOPACK with Analog Voltage/Pulse Train References.

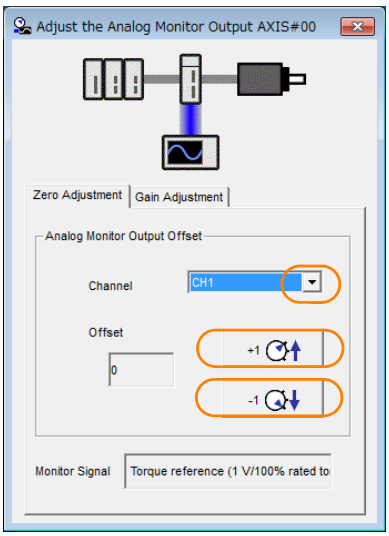
◆ Operating Procedure

Use the following procedure to adjust the analog monitor output.

1. Click the Servo Drive Button in the workspace of the Main Window of the SigmaWin+.
2. Select **Adjust the Analog Monitor Output** in the Menu Dialog Box.
   The Adjust the Analog Monitor Output Dialog Box will be displayed.
3. Click the **Zero Adjustment** or **Gain Adjustment** Tab.



4. While watching the analog monitor, use the **+1** and **-1** Buttons to adjust the offset.
   There are two channels: CH1 and CH2. If necessary, click the down arrow on the **Channel** Box and select the channel.



This concludes adjusting the analog monitor output.

Maintenance

6

This chapter provides information on the meaning of, causes of, and corrections for alarms and warnings.

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6.1 SERVOPACK with Analog Voltage/Pulse Train References

6.1.1 Alarm Displays

If an error occurs in the SERVOPACK, an alarm number will be displayed on the panel display. However, if only "-" appears on the panel display, this indicates a SERVOPACK system error. Replace the SERVOPACK.



Example: If an A.020 alarm occurs, "020" will flash on the display.

This section provides a list of the alarms that may occur and the causes of and corrections for those alarms.

6.1.2 List of Alarms

The list of alarms gives the alarm name, alarm meaning, alarm stopping method, alarm reset possibility, and alarm code output in order of the alarm numbers.

Servomotor Stopping Method for Alarms

Refer to the following manual for information on the stopping method for alarms.

Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

Alarm Reset Possibility

Yes: You can use an alarm reset to clear the alarm. However, this assumes that the cause of the alarm has been removed.
No: You cannot clear the alarm.

List of Alarms

Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?	Alarm Code Output		
					ALO1	ALO2	ALO3
A.020	Parameter Checksum Error	There is an error in the parameter data in the SERVOPACK.	Gr.1	No	H	H	H
A.021	Parameter Format Error	There is an error in the parameter data format in the SERVOPACK.	Gr.1	No	H	H	H
A.022	System Checksum Error	There is an error in the parameter data in the SERVOPACK.	Gr.1	No	H	H	H
A.024	System Alarm	An internal program error occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.025	System Alarm	An internal program error occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.030	Main Circuit Detector Error	There is an error in the detection data for the main circuit.	Gr.1	Yes	H	H	H
A.040	Parameter Setting Error	A parameter setting is outside of the setting range.	Gr.1	No	H	H	H

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?	Alarm Code Output		
					ALO1	ALO2	ALO3
A.041	Encoder Output Pulse Setting Error	The setting of Pn212 (Number of Encoder Output Pulses) or Pn281 (Encoder Output Resolution) is outside of the setting range or does not satisfy the setting conditions.	Gr.1	No	H	H	H
A.042	Parameter Combination Error	The combination of some parameters exceeds the setting range.	Gr.1	No	H	H	H
A.044	Semi-Closed/Fully-Closed Loop Control Parameter Setting Error	The settings of the Option Module and Pn002 = n.X□□□ (External Encoder Usage) do not match.	Gr.1	No	H	H	H
A.050	Combination Error	The capacities of the SERVOPACK and Servomotor do not match.	Gr.1	Yes	H	H	H
A.051	Unsupported Device Alarm	An unsupported device was connected.	Gr.1	No	H	H	H
A.070	Motor Type Change Detected	The connected motor is a different type of motor from the previously connected motor.	Gr.1	No	H	H	H
A.0b0	Invalid Servo ON Command Alarm	The /S-ON (Servo ON) signal was input from the host controller after a utility function that turns ON the Servomotor was executed.	Gr.1	Yes	H	H	H
A.0b1	Semi-closed/Fully-closed Loop Control Switching Operation Error	An error occurred when semi-closed/fully-closed loop control is switched.	Gr.1	Yes	H	H	H
A.100	Overcurrent Detected	An overcurrent flowed through the power transistor or the heat sink overheated.	Gr.1	No	L	H	H
A.101	Motor Overcurrent Detected	The current to the motor exceeded the allowable current.	Gr.1	No	L	H	H
A.300	Regeneration Error	There is an error related to regeneration.	Gr.1	Yes	L	L	H
A.320	Regenerative Overload	A regenerative overload occurred.	Gr.2	Yes	L	L	H
A.330	Main Circuit Power Supply Wiring Error	• The AC power supply input setting or DC power supply input setting is not correct. • The power supply wiring is not correct.	Gr.1	Yes	L	L	H
A.400	Overvoltage	The main circuit DC voltage is too high.	Gr.1	Yes	H	H	L
A.410	Undervoltage	The main circuit DC voltage is too low.	Gr.2	Yes	H	H	L
A.510	Overspeed	The motor exceeded the maximum speed.	Gr.1	Yes	L	H	L
A.511	Encoder Output Pulse Overspeed	The pulse output speed for the setting of Pn212 (Number of Encoder Output Pulses) or the setting of Pn281 (Encoder Output Resolution) was exceeded.	Gr.1	Yes	L	H	L

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?	Alarm Code Output		
					ALO1	ALO2	ALO3
A.520	Vibration Alarm	Abnormal oscillation was detected in the motor speed.	Gr.1	Yes	L	H	L
A.521	Autotuning Alarm	Vibration was detected during autotuning for the tuning-less function.	Gr.1	Yes	L	H	L
A.710	Instantaneous Overload	The Servomotor was operating for several seconds to several tens of seconds under a torque that largely exceeded the rating.	Gr.2	Yes	L	L	L
A.720	Continuous Overload	The Servomotor was operating continuously under a torque that exceeded the rating.	Gr.1	Yes	L	L	L
A.730	Dynamic Brake Overload	When the dynamic brake was applied, the rotational or linear kinetic energy exceeded the capacity of the dynamic brake resistor.	Gr.1	Yes	L	L	L
A.731							
A.740	Inrush Current Limiting Resistor Overload	The main circuit power supply was frequently turned ON and OFF.	Gr.1	Yes	L	L	L
A.7A1	Internal Temperature Error 1 (Control Board Temperature Error)	The surrounding temperature of the control PCB is abnormal.	Gr.2	Yes	L	L	L
A.7A2	Internal Temperature Error 2 (Power Board Temperature Error)	The surrounding temperature of the power PCB is abnormal.	Gr.2	Yes	L	L	L
A.7A3	Internal Temperature Sensor Error	An error occurred in the temperature sensor circuit.	Gr.2	No	L	L	L
A.7Ab	SERVOPACK Built-in Fan Stopped	The fan inside the SERVOPACK stopped.	Gr.1	Yes	L	L	L
A.810	Encoder Backup Alarm	The power supplies to the encoder all failed and the position data was lost.	Gr.1	No	H	H	H
A.820	Encoder Checksum Alarm	There is an error in the checksum results for encoder memory.	Gr.1	No	H	H	H
A.830	Encoder Battery Alarm	The battery voltage was lower than the specified level after the control power supply was turned ON.	Gr.1	Yes	H	H	H
A.840	Encoder Data Alarm	There is an internal data error in the encoder.	Gr.1	No	H	H	H
A.850	Encoder Overspeed	The encoder was operating at high speed when the power was turned ON.	Gr.1	No	H	H	H
A.860	Encoder Overheated	The internal temperature of the rotary encoder or linear encoder is too high.	Gr.1	No	H	H	H
A.861	Motor Overheated	The internal temperature of motor is too high.	Gr.1	No	H	H	H
A.862	Overheat Alarm	The input voltage (temperature) for the overheat protection input (TH) signal exceeded the setting of Pn61B (Overheat Alarm Level).	Gr.1	Yes	H	H	H

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?	Alarm Code Output		
					ALO1	ALO2	ALO3
A.8A0	External Encoder Error	An error occurred in the external encoder.	Gr.1	Yes	H	H	H
A.8A1	External Encoder Module Error	An error occurred in the Serial Converter Unit.	Gr.1	Yes	H	H	H
A.8A2	External Incremental Encoder Sensor Error	An error occurred in the external encoder.	Gr.1	Yes	H	H	H
A.8A3	External Absolute Encoder Position Error	An error occurred in the position data of the external encoder.	Gr.1	Yes	H	H	H
A.8A5	External Encoder Overspeed	An overspeed error occurred in the external encoder.	Gr.1	Yes	H	H	H
A.8A6	External Encoder Overheated	An overheating error occurred in the external encoder.	Gr.1	Yes	H	H	H
A.b10	Speed Reference A/D Error	An error occurred in the A/D converter for the speed reference input.	Gr.2	Yes	H	H	H
A.b11	Speed Reference A/D Data Error	An error occurred in the A/D conversion data for the speed reference.	Gr.2	Yes	H	H	H
A.b20	Torque Reference A/D Error	An error occurred in the A/D converter for the torque reference input.	Gr.2	Yes	H	H	H
A.b33	Current Detection Error 3	An error occurred in the current detection circuit.	Gr.1	No	H	H	H
A.bF0	System Alarm 0	Internal program error 0 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.bF1	System Alarm 1	Internal program error 1 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.bF2	System Alarm 2	Internal program error 2 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.bF3	System Alarm 3	Internal program error 3 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.bF4	System Alarm 4	Internal program error 4 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.bF5	System Alarm 5	Internal program error 5 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.bF6	System Alarm 6	Internal program error 6 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.bF7	System Alarm 7	Internal program error 7 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.bF8	System Alarm 8	Internal program error 8 occurred in the SERVOPACK.	Gr.1	No	H	H	H
A.C10	Servomotor Out of Control	The Servomotor ran out of control.	Gr.1	Yes	L	H	L
A.C80	Encoder Clear Error or Multiturn Limit Setting Error	The multiturn data for the absolute encoder was not correctly cleared or set.	Gr.1	No	L	H	L
A.C90	Encoder Communications Error	Communications between the encoder and SERVOPACK is not possible.	Gr.1	No	L	H	L
A.C91	Encoder Communications Position Data Acceleration Rate Error	An error occurred in calculating the position data of the encoder.	Gr.1	No	L	H	L

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?	Alarm Code Output		
					ALO1	ALO2	ALO3
A.C92	Encoder Communications Timer Error	An error occurred in the communications timer between the encoder and SERVOPACK.	Gr.1	No	L	H	L
A.CA0	Encoder Parameter Error	The parameters in the encoder are corrupted.	Gr.1	No	L	H	L
A.Cb0	Encoder Echoback Error	The contents of communications with the encoder are incorrect.	Gr.1	No	L	H	L
A.CC0	Multiturn Limit Disagreement	Different multiturn limits have been set in the encoder and the SERVOPACK.	Gr.1	No	L	H	L
A.CF1	Reception Failed Error in Feedback Option Module Communications	Receiving data from the Feedback Option Module failed.	Gr.1	No	L	H	L
A.CF2	Timer Stopped Error in Feedback Option Module Communications	An error occurred in the timer for communications with the Feedback Option Module.	Gr.1	No	L	H	L
A.d00	Position Deviation Overflow	The setting of Pn520 (Position Deviation Overflow Alarm Level) was exceeded by the position deviation.	Gr.1	Yes	L	L	H
A.d01	Position Deviation Overflow Alarm at Servo ON	The servo was turned ON after the position deviation exceeded the setting of Pn526 (Position Deviation Overflow Alarm Level at Servo ON) while the servo was OFF.	Gr.1	Yes	L	L	H
A.d02	Position Deviation Overflow Alarm for Speed Limit at Servo ON	If position deviation remains in the deviation counter, the setting of Pn529 (Speed Limit Level at Servo ON) limits the speed when the servo is turned ON. This alarm occurs if reference pulses are input and the setting of Pn520 (Position Deviation Overflow Alarm Level) is exceeded before the limit is cleared.	Gr.2	Yes	L	L	H
A.d10	Motor-Load Position Deviation Overflow	There was too much position deviation between the motor and load during fully-closed loop control.	Gr.2	Yes	L	L	H
A.d30	Position Data Overflow	The position feedback data exceeded ±1,879,048,192.	Gr.1	No	L	L	H
A.E71	Safety Option Module Detection Failure	Detection of the Safety Option Module failed.	Gr.1	No	H	L	L
A.E72	Feedback Option Module Detection Failure	Detection of the Feedback Option Module failed.	Gr.1	No	H	L	L
A.E74	Unsupported Safety Option Module	An unsupported Safety Option Module was connected.	Gr.1	No	H	L	L
A.Eb1	Safety Function Signal Input Timing Error	An error occurred in the input timing of the safety function signal.	Gr.1	No	H	L	L
A.EC8	Gate Drive Error 1	An error occurred in the gate drive circuit.	Gr.1	No	H	L	L

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Alarm Number	Alarm Name	Alarm Meaning	Servo-motor Stop-ping Method	Alarm Reset Possi-ble?	Alarm Code Output		
					ALO1	ALO2	ALO3
A.EC9	Gate Drive Error 2	An error occurred in the gate drive circuit.	Gr.1	No	H	L	L
A.F10	Power Supply Line Open Phase	The voltage was low for more than one second for phase R, S, or T when the main power supply was ON.	Gr.2	Yes	H	L	H
FL-1*	System Alarm	An internal program error occurred in the SERVOPACK.	–	No	Undefined.		
FL-2*							
FL-3*							
FL-4*							
FL-5*							
FL-6*							
CPF00	Digital Operator Communications Error 1	Communications were not possible between the Digital Operator (model: JUSP-OP05A-1-E) and the SERVOPACK (e.g., a CPU error occurred).	–	No	Undefined.		
CPF01	Digital Operator Communications Error 2						

* These alarms are not stored in the alarm history. They are only displayed on the panel display.

Note: The A.Eb0, A.Eb2 to A.Eb9, and A.EC0 to A.EC2 alarms can occur when a Safety Module is connected. Refer to the following manual for details.

📖 AC Servo Drive Σ-V-Series/Σ-V-Series for Large-Capacity Models/Σ-7-Series User's Manual Safety Module (Manual No.: SIEP C720829 06)

6.1.3 Troubleshooting Alarms

The causes of and corrections for the alarms are given in the following table. Contact your Yaskawa representative if you cannot solve a problem with the correction given in the table.

Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.020: Parameter Checksum Error (There is an error in the parameter data in the SERVOPACK.)	The power supply voltage suddenly dropped.	Measure the power supply voltage.	Set the power supply voltage within the specified range, and initialize the parameter settings.	*1
	The power supply was shut OFF while writing parameter settings.	Check the timing of shutting OFF the power supply.	Initialize the parameter settings and then set the parameters again.	
	The number of times that parameters were written exceeded the limit.	Check to see if the parameters were frequently changed from the host controller.	The SERVOPACK may be faulty. Replace the SERVOPACK. Reconsider the method for writing the parameters.	–
	A malfunction was caused by noise from the AC power supply, ground, static electricity, or other source.	Turn the power supply to the SERVOPACK OFF and ON again. If the alarm still occurs, noise may be the cause.	Implement countermeasures against noise.	*1
	Gas, water drops, or cutting oil entered the SERVOPACK and caused failure of the internal components.	Check the installation conditions.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	A failure occurred in the SERVOPACK.	Turn the power supply to the SERVOPACK OFF and ON again. If the alarm still occurs, the SERVOPACK may have failed.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.021: Parameter Format Error (There is an error in the parameter data format in the SERVOPACK.)	The software version of the SERVOPACK that caused the alarm is older than the software version of the parameters specified to write.	Read the product information to see if the software versions are the same. If they are different, it could be the cause of the alarm.	Write the parameters from another SERVOPACK with the same model and the same software version, and then turn the power OFF and ON again.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.022: System Checksum Error (There is an error in the parameter data in the SERVOPACK.)	The power supply voltage suddenly dropped.	Measure the power supply voltage.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The power supply was shut OFF while setting a utility function.	Check the timing of shutting OFF the power supply.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	A failure occurred in the SERVOPACK.	Turn the power supply to the SERVOPACK OFF and ON again. If the alarm still occurs, the SERVOPACK may have failed.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.024: System Alarm (An internal program error occurred in the SERVOPACK.)	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.025: System Alarm (An internal program error occurred in the SERVOPACK.)	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.030: Main Circuit Detector Error	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The jumper between the DC Reactor terminals (⊖1 and ⊖2) was removed or there is faulty contact.	–	Correct the wiring between the DC Reactor terminals.	–
	The cable between the DC Reactor and SERVOPACK is not wired correctly or there is a faulty contact.			
A.040: Parameter Setting Error (A parameter setting is outside of the setting range.)	The SERVOPACK and Servomotor capacities do not match each other.	Check the combination of the SERVOPACK and Servomotor capacities.	Select a proper combination of SERVOPACK and Servomotor capacities.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	A parameter setting is outside of the setting range.	Check the setting ranges of the parameters that have been changed.	Set the parameters to values within the setting ranges.	–
	The electronic gear ratio is outside of the setting range.	Check the electronic gear ratio. The ratio must be within the following range: 0.001 < (Pn20E/Pn210) < 64,000.	Set the electronic gear ratio in the following range: 0.001 < (Pn20E/Pn210) < 64,000.	*1
A.041: Encoder Output Pulse Setting Error	The setting of Pn212 (Number of Encoder Output Pulses) or Pn281 (Encoder Output Resolution) is outside of the setting range or does not satisfy the setting conditions.	Check the setting of Pn212 or Pn281.	Set Pn212 or Pn281 to an appropriate value.	*1

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.042: Parameter Combination Error	The speed of program jogging went below the setting range when the electronic gear ratio (Pn20E/ Pn210) or the Servomotor was changed.	Check to see if the detection conditions*2 are satisfied.	Decrease the setting of the electronic gear ratio (Pn20E/Pn210).	*1
	The speed of program jogging went below the setting range when Pn533 (Program Jogging Movement Speed) was changed.	Check to see if the detection conditions*2 are satisfied.	Increase the setting of Pn533.	*1
	The movement speed of advanced autotuning went below the setting range when the electronic gear ratio (Pn20E/ Pn210) or the Servomotor was changed.	Check to see if the detection conditions*3 are satisfied.	Decrease the setting of the electronic gear ratio (Pn20E/Pn210).	*1
A.044: Semi-Closed/ Fully-Closed Loop Control Parameter Setting Error	The setting of the Fully-Closed Module does not match the setting of Pn002 = n.X□□□ (External Encoder Usage).	Check the setting of Pn002 = n.X□□□.	Make sure that the setting of the Fully-closed Module agrees with the setting of Pn002 = n.X□□□.	*1
	The following parameters are not set correctly. • Pn002 = n.X□□□ (External Encoder Usage) • Pn02A = n.□□□X (Semi-closed/Fully-closed Loop Control Switching Selection)	Check the setting of Pn002 = n.X□□□ and Pn02A = n.□□□X.	When switching between semi-closed loop control and fully-closed loop control, set the parameters as follows: • Pn002 = n.1□□□ or n.3□□□ • Pn02A = n.□□□1	–
A.050: Combination Error (The capacities of the SERVOPACK and Servomotor do not match.)	The SERVOPACK and Servomotor capacities do not match each other.	Confirm that the following condition is met: 1/4 < (Servomotor capacity/SERVOPACK capacity) < 4	Select a proper combination of the SERVOPACK and Servomotor capacities.	*1
	A failure occurred in the encoder.	Replace the encoder and check to see if the alarm still occurs.	Replace the Servomotor or encoder.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.051: Unsupported Device Alarm	An unsupported Serial Converter Unit or encoder (e.g., an external encoder) is connected to the SERVOPACK.	Check the product combination specifications.	Change to a correct combination of models.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.070: Motor Type Change Detected (The connected motor is a different type of motor from the previously connected motor.)	A Rotary Servomotor was removed and a Linear Servomotor was connected.	–	Set the parameters for a Linear Servomotor and reset the motor type alarm. Then, turn the power supply to the SERVOPACK OFF and ON again.	*1
	A Linear Servomotor was removed and a Rotary Servomotor was connected.	–	Set the parameters for a Rotary Servomotor and reset the motor type alarm. Then, turn the power supply to the SERVOPACK OFF and ON again.	*1
A.0b0: Invalid Servo ON Command Alarm	The /S-ON (Servo ON) signal was input from the host controller after a utility function that turns ON the Servomotor was executed.	–	Turn the power supply to the SERVOPACK OFF and ON again. Or, execute a software reset.	*1
A.0b1: Semi-closed Loop Control/ Fully-closed Loop Control Switching Operation Error	Semi-closed Loop Control/Fully-closed Loop Control Switching was executed while one of the following functions was running: • Jog • Origin Search • Jog Program • Adjust the Motor Current Detection Signal Offsets • Autotuning without Host Reference • Easy FFT • Mechanical Analysis • Moment of Inertia Estimation • Speed Ripple Compensation	Check the timing of switching between semi-closed loop control and fully-closed loop control.	–	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.100: Overcurrent Detected (An overcurrent flowed through the power transistor or the heat sink overheated.)	The Main Circuit Cable is not wired correctly or there is faulty contact.	Check the wiring.	Correct the wiring.	*1
	There is a short-circuit or ground fault in a Main Circuit Cable.	Check for short-circuits across Servomotor phases U, V, and W, or between the ground and Servomotor phases U, V, and W.	The cable may be short-circuited. Replace the cable.	
	There is a short-circuit or ground fault inside the Servomotor.	Check for short-circuits across Servomotor phases U, V, and W, or between the ground and Servomotor phases U, V, or W.	The Servomotor may be faulty. Replace the Servomotor.	
	There is a short-circuit or ground fault inside the SERVOPACK.	Check for short-circuits across the Servomotor connection terminals U, V, and W on the SERVOPACK, or between the ground and terminals U, V, or W.	The SERVOPACK may be faulty. Replace the SERVOPACK.	
	The regenerative resistor is not wired correctly or there is faulty contact.	Check the wiring.	Correct the wiring.	*1

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.100: Overcurrent Detected (An overcurrent flowed through the power transistor or the heat sink overheated.)	The dynamic brake (DB, emergency stop executed from the SERVOPACK) was frequently activated, or a DB overload alarm occurred.	Check the power consumed by the DB resistor to see how frequently the DB is being used. Or, check the alarm display to see if a DB overload alarm (A.730 or A.731) has occurred.	Change the SERVOPACK model, operating methods, or the mechanisms so that the dynamic brake does not need to be used so frequently.	–
	The regenerative processing capacity was exceeded.	Check the regenerative load ratio in the SigmaWin+ Motion Monitor Tab Page to see how frequently the regenerative resistor is being used.	Recheck the operating conditions and load.	*4
	The SERVOPACK regenerative resistance is too small.	Check the regenerative load ratio in the SigmaWin+ Motion Monitor Tab Page to see how frequently the regenerative resistor is being used.	Change the regenerative resistance to a value larger than the SERVOPACK minimum allowable resistance.	
	A heavy load was applied while the Servomotor was stopped or running at a low speed.	Check to see if the operating conditions exceed Servo Drive specifications.	Reduce the load applied to the Servomotor. Or, increase the operating speed.	–
	A malfunction was caused by noise.	Improve the noise environment, e.g. by improving the wiring or installation conditions, and check to see if the alarm still occurs.	Implement countermeasures against noise, such as correct wiring of the FG. Use an FG wire size equivalent to the SERVOPACK's main circuit wire size.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.101: Motor Overcurrent Detected (The current to the motor exceeded the allowable current.)	The Main Circuit Cable is not wired correctly or there is faulty contact.	Check the wiring.	Correct the wiring.	*1
	There is a short-circuit or ground fault in a Main Circuit Cable.	Check for short-circuits across cable phases U, V, and W, or between the ground and cable phases U, V, and W.	The cable may be short-circuited. Replace the cable.	
	There is a short-circuit or ground fault inside the Servomotor.	Check for short-circuits across Servomotor phases U, V, and W, or between the ground and Servomotor phases U, V, or W.	The Servomotor may be faulty. Replace the Servomotor.	
	There is a short-circuit or ground fault inside the SERVOPACK.	Check for short-circuits across the Servomotor connection terminals U, V, and W on the SERVOPACK, or between the ground and terminals U, V, or W.	The SERVOPACK may be faulty. Replace the SERVOPACK.	
	A heavy load was applied while the Servomotor was stopped or running at a low speed.	Check to see if the operating conditions exceed Servo Drive specifications.	Reduce the load applied to the Servomotor. Or, increase the operating speed.	–
	A malfunction was caused by noise.	Improve the noise environment, e.g. by improving the wiring or installation conditions, and check to see if the alarm still occurs.	Implement countermeasures against noise, such as correct wiring of the FG. Use an FG wire size equivalent to the SERVOPACK's main circuit wire size.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.300: Regeneration Error	Pn600 (Regenerative Resistor Capacity) is not set to 0 and an External Regenerative Resistor is not connected to one of the following SERVOPACKs: SGD7S-R70A, -R90A,-1R6A, -2R8A, -R70F, -R90F, -2R1F, or -2R8F.	Check to see if an External Regenerative Resistor is connected and check the setting of Pn600.	Connect an External Regenerative Resistor, or set Pn600 (Regenerative Resistor Capacity) to 0 (setting unit: ×10 W) if no Regenerative Resistor is required.	*1
	An External Regenerative Resistor is not connected to one of the following SERVOPACKs: SGD7S-470A, -550A, -590A, or -780A.	Check to see if an External Regenerative Resistor or a Regenerative Resistor Unit is connected and check the setting of Pn600.	Connect an External Regenerative Resistor and set Pn600 to an appropriate value, or connect a Regenerative Resistor Unit and set Pn600 to 0.	
	The jumper between the regenerative resistor terminals (B2 and B3) was removed from one of the following SERVOPACKs: SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, or -330A.	Check to see if the jumper is connected between power supply terminals B2 and B3.	Correctly connect a jumper.	*1
	The External Regenerative Resistor is not wired correctly, or was removed or disconnected.	Check the wiring of the External Regenerative Resistor.	Correct the wiring of the External Regenerative Resistor.	
	A failure occurred in the SERVOPACK.	–	While the main circuit power supply is OFF, turn the control power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.320: Regenerative Overload	The power supply voltage exceeded the specified range.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	The external regenerative resistance value or regenerative resistor capacity is too small, or there has been a continuous regeneration state.	Check the operating conditions or the capacity using the SigmaJunmaSize+ Capacity Selection Software or other means.	Change the regenerative resistance value or capacity. Reconsider the operating conditions using the SigmaJunmaSize+ Capacity Selection Software or other means.	*4
	There was a continuous regeneration state because a negative load was continuously applied.	Check the load applied to the Servomotor during operation.	Reconsider the system including the servo, machine, and operating conditions.	–
	The setting of Pn600 (Regenerative Resistor Capacity) is smaller than the capacity of the External Regenerative Resistor.	Check to see if a Regenerative Resistor is connected and check the setting of Pn600.	Correct the setting of Pn600.	*1
	The setting of Pn603 (Regenerative Resistance) is smaller than the capacity of the External Regenerative Resistor.	Check to see if a Regenerative Resistor is connected and check the setting of Pn603.	Correct the setting of Pn603.	*1
	The external regenerative resistance is too high.	Check the regenerative resistance.	Change the regenerative resistance to a correct value or use an External Regenerative Resistor of an appropriate capacity.	*4
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.330: Main Circuit Power Supply Wiring Error (Detected when the main circuit power supply is turned ON.)	The regenerative resistor was disconnected when the SERVOPACK power supply voltage was high.	Measure the resistance of the regenerative resistor using a measuring instrument.	If you are using the regenerative resistor built into the SERVOPACK, replace the SERVOPACK. If you are using an External Regenerative Resistor, replace the External Regenerative Resistor.	–
	DC power was supplied when an AC power supply input was specified in the settings.	Check the power supply to see if it is a DC power supply.	Correct the power supply setting to match the actual power supply.	*1
	AC power was supplied when a DC power supply input was specified in the settings.	Check the power supply to see if it is an AC power supply.	Correct the power supply setting to match the actual power supply.	
	Pn600 (Regenerative Resistor Capacity) is not set to 0 and an External Regenerative Resistor is not connected to one of the following SERVOPACKs: SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, or -2R8F.	Check to see if an External Regenerative Resistor is connected and check the setting of Pn600.	Connect an External Regenerative Resistor, or if an External Regenerative Resistor is not required, set Pn600 to 0.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.400: Overvoltage (Detected in the main circuit power supply section of the SERVOPACK.)	The power supply voltage exceeded the specified range.	Measure the power supply voltage.	Set the AC/DC power supply voltage within the specified range.	–
	The power supply is not stable or was influenced by a lightning surge.	Measure the power supply voltage.	Improve the power supply conditions, install a surge absorber, and then turn the power supply OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The voltage for AC power supply was too high during acceleration or deceleration.	Check the power supply voltage and the speed and torque during operation.	Set the AC power supply voltage within the specified range.	–
	The external regenerative resistance is too high for the operating conditions.	Check the operating conditions and the regenerative resistance.	Select a regenerative resistance value that is appropriate for the operating conditions and load.	*4
	The moment of inertia ratio exceeded the allowable value.	Check to see if the moment of inertia ratio is within the allowable range.	Increase the deceleration time, or reduce the load.	–
	A failure occurred in the SERVOPACK.	–	While the main circuit power supply is OFF, turn the control power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.410: Undervoltage (Detected in the main circuit power supply section of the SERVOPACK.)	The power supply voltage went below the specified range.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	The power supply voltage dropped during operation.	Measure the power supply voltage.	Increase the power supply capacity.	–
	A momentary power interruption occurred.	Measure the power supply voltage.	If you have changed the setting of Pn509 (Momentary Power Interruption Hold Time), decrease the setting.	*1
	The SERVOPACK fuse is blown out.	Check the power supply wiring.	Correct the power supply wiring and replace the SERVOPACK.	–
	The SERVOPACK fuse is blown out.	–	Replace the SERVOPACK and connect a reactor to the DC reactor terminals (⊖1 and ⊖2) on the SERVOPACK.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The jumper between the DC Reactor terminals (⊖1 and ⊖2) was removed or there is faulty contact.	–	Correct the wiring between the DC Reactor terminals.	–
	The cable between the DC Reactor and SERVOPACK is not wired correctly or there is a faulty contact.			
A.510: Overspeed (The motor exceeded the maximum speed.)	The order of phases U, V, and W in the motor wiring is not correct.	Check the wiring of the Servomotor.	Make sure that the Servomotor is correctly wired.	–
	A reference value that exceeded the overspeed detection level was input.	Check the input reference.	Reduce the reference value. Or, adjust the gain.	*1
	The motor exceeded the maximum speed.	Check the waveform of the motor speed.	Reduce the speed reference input gain and adjust the servo gain. Or, reconsider the operating conditions.	
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.511: Encoder Output Pulse Overspeed	The encoder output pulse frequency exceeded the limit.	Check the encoder output pulse setting.	Decrease the setting of Pn212 (Number of Encoder Output Pulses) or Pn281 (Encoder Output Resolution).	*1
	The encoder output pulse frequency exceeded the limit because the motor speed was too high.	Check the encoder output pulse setting and the motor speed.	Reduce the motor speed.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.520: Vibration Alarm	Abnormal oscillation was detected in the motor speed.	Check for abnormal motor noise, and check the speed and torque waveforms during operation.	Reduce the motor speed. Or, reduce the setting of Pn100 (Speed Loop Gain).	*1
	The setting of Pn103 (Moment of Inertia Ratio) is greater than the actual moment of inertia or was greatly changed.	Check the moment of inertia ratio.	Set Pn103 (Moment of Inertia Ratio) to an appropriate value.	*1
	The vibration detection level (Pn312) is not suitable.	Check that the vibration detection level (Pn312) is suitable.	Set a suitable vibration detection level (Pn312).	*1
A.521: Autotuning Alarm (Vibration was detected while executing the custom tuning, Easy FFT, or the tuning-less function.)	The Servomotor vibrated considerably while performing the tuning-less function.	Check the waveform of the motor speed.	Reduce the load so that the moment of inertia ratio is within the allowable value. Or increase the load level or reduce the rigidity level in the tuning-less level settings.	*1
	The Servomotor vibrated considerably while performing custom tuning or Easy FFT.	Check the waveform of the motor speed.	Check the operating procedure of corresponding function and implement corrections.	*1
A.710: Instantaneous Overload A.720: Continuous Overload	The wiring is not correct or there is a faulty contact in the motor or encoder wiring.	Check the wiring.	Make sure that the Servomotor and encoder are correctly wired.	*1
	Operation was performed that exceeded the overload protection characteristics.	Check the motor overload characteristics and Run command.	Reconsider the load and operating conditions. Or, increase the motor capacity.	–
	An excessive load was applied during operation because the Servomotor was not driven due to mechanical problems.	Check the operation reference and motor speed.	Correct the mechanical problem.	–
	Operation was performed with a load applied to the shaft of the servomotor that exceeded the allowable value.	Check the condition of the machine to determine if a load was applied to the shaft of the servomotor that exceeded the allowable value.	Correct the condition of the machine so that the load on the shaft during servomotor operation does not exceed the allowable value.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.730 and A.731: Dynamic Brake Overload (An excessive power consumption by the dynamic brake was detected.)	The Servomotor was rotated by an external force.	Check the operation status.	Implement measures to ensure that the motor will not be rotated by an external force.	–
	When the Servomotor was stopped with the dynamic brake, the rotational or linear kinetic energy exceeded the capacity of the dynamic brake resistor.	Check the power consumed by the DB resistor to see how frequently the DB is being used.	Reconsider the following: • Reduce the Servomotor command speed. • Decrease the moment of inertia ratio. • Reduce the frequency of stopping with the dynamic brake.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.740: Inrush Current Limiting Resistor Overload (The main circuit power supply was frequently turned ON and OFF.)	The allowable frequency of the inrush current limiting resistor was exceeded when the main circuit power supply was turned ON and OFF.	–	Reduce the frequency of turning the main circuit power supply ON and OFF.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.7A1: Internal Temperature Error 1 (Control Board Temperature Error)	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat. Or, check the operating status with the SERVOPACK installation environment monitor.	Decrease the surrounding temperature by improving the SERVOPACK installation conditions.	*1
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	Use the accumulated load ratio to check the load during operation, and use the regenerative load ratio to check the regenerative processing capacity.	Reconsider the load and operating conditions.	–
	The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	Check the SERVOPACK installation conditions.	Install the SERVOPACK according to specifications.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.7A2: Internal Temperature Error 2 (Power Board Temperature Error)	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat. Or, check the operating status with the SERVOPACK installation environment monitor.	Decrease the surrounding temperature by improving the SERVOPACK installation conditions.	*1
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	Use the accumulated load ratio to check the load during operation, and use the regenerative load ratio to check the regenerative processing capacity.	Reconsider the load and operating conditions.	–
	The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	Check the SERVOPACK installation conditions.	Install the SERVOPACK according to specifications.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.7A3: Internal Temperature Sensor Error (An error occurred in the temperature sensor circuit.)	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.7Ab: SERVOPACK Built-in Fan Stopped	The fan inside the SERVOPACK stopped.	Check for foreign matter inside the SERVOPACK.	Remove foreign matter from the SERVOPACK. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.810: Encoder Backup Alarm (Detected at the encoder, but only when an absolute encoder is used.)	The power to the absolute encoder was turned ON for the first time.	Check to see if the power supply was turned ON for the first time.	Set up the encoder.	*1
	The Encoder Cable was disconnected and then connected again.	Check to see if the power supply was turned ON for the first time.	Check the encoder connection and set up the encoder.	
	Power is not being supplied both from the control power supply (+5 V) from the SERVOPACK and from the battery power supply.	Check the encoder connector battery and the connector status.	Replace the battery or implement similar measures to supply power to the encoder, and set up the encoder.	
	A failure occurred in the absolute encoder.	–	If the alarm still occurs after setting up the encoder again, replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.820: Encoder Checksum Alarm (Detected at the encoder.)	A failure occurred in the encoder.	–	■ When Using an Absolute Encoder Set up the encoder again. If the alarm still occurs, the Servomotor may be faulty. Replace the Servomotor. ■ When Using a Single-turn Absolute Encoder or Incremental Encoder The Servomotor may be faulty. Replace the Servomotor.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.830: Encoder Battery Alarm (The absolute encoder battery voltage was lower than the specified level.)	The battery connection is faulty or a battery is not connected.	Check the battery connection.	Correct the battery connection.	*1
	The battery voltage is lower than the specified value (2.7 V).	Measure the battery voltage.	Replace the battery.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.840: Encoder Data Alarm (Detected at the encoder.)	The encoder malfunctioned.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	The encoder malfunctioned due to noise.	–	Correct the wiring around the encoder by separating the Encoder Cable from the Servomotor Main Circuit Cable or by grounding the encoder.	–
A.850: Encoder Overspeed (Detected at the encoder when the control power supply is turned ON.)	The Servomotor speed was 200 min^{-1} or higher when the control power supply was turned ON.	Check the motor speed when the power supply is turned ON.	Reduce the Servomotor speed to a value less than 200 min^{-1}, and turn ON the control power supply.	–
	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.860: Encoder Overheated (Detected when a Rotary Servomotor, or Direct Drive Servomotor is connected. However, this alarm is not detected for SGMCS Servomotors.) (Detected at the encoder.)	The surrounding air temperature around the Servomotor is too high.	Measure the surrounding air temperature around the Servomotor.	Reduce the surrounding air temperature of the Servomotor to 40°C or less.	–
	The Servomotor load is greater than the rated load.	Use the accumulated load ratio to check the load.	Operate the Servo Drive so that the motor load remains within the specified range.	*1
	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.861: Motor Overheated	The surrounding temperature around the Servomotor is too high.	Measure the surrounding temperature around the Servomotor.	Reduce the surrounding air temperature of the Servomotor to 40°C or less.	–
	The motor load is greater than the rated load.	Check the load with the accumulated load ratio on the Motion Monitor Tab Page on the SigmaWin+.	Operate the Servo Drive so that the motor load remains within the specified range.	*1
	A failure occurred in the Serial Converter Unit.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Serial Converter Unit may be faulty. Replace the Serial Converter Unit.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.862: Overheat Alarm	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat.	Lower the surrounding temperature by improving the installation conditions of the machine.	–
	The overheat protection input signal line is disconnected or short-circuited.	Check the input voltage with the overheat protection input information on the Motion Monitor Tab Page on the SigmaWin+.	Repair the line for the overheat protection input signal.	–
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	Operation was performed under an excessive load.	Use the accumulated load ratio to check the load during operation.	Reconsider the load and operating conditions.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The temperature detection circuit in the sensor attached to the machine is faulty.	–	The temperature detection circuit in the sensor attached to the machine may be faulty. Repair the sensor attached to the machine.	–
A.8A0: External Encoder Error	A failure occurred in the external encoder.	–	Replace the external encoder.	–
A.8A1: External Encoder Module Error	A failure occurred in the external encoder.	–	Replace the external encoder.	–
	A failure occurred in the Serial Converter Unit.	–	Replace the Serial Converter Unit.	–
A.8A2: External Incremental Encoder Sensor Error	A failure occurred in the external encoder.	–	Replace the external encoder.	–
A.8A3: External Absolute Encoder Position Error	A failure occurred in the external absolute encoder.	–	The external absolute encoder may be faulty. Refer to the encoder manufacturer's instruction manual for corrections.	–
A.8A5: External Encoder Overspeed	An overspeed error was detected in the external encoder.	Check the maximum speed of the external encoder.	Keep the external encoder below its maximum speed.	–
A.8A6: External Encoder Overheated	An overheating error was detected in the external encoder.	–	Replace the external encoder.	–
A.b10: Speed Reference A/D Error (Detected when the servo is turned ON.)	A malfunction occurred in the speed reference input section.	–	Reset the alarm and restart operation.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.b11: Speed Reference A/D Data Error	A malfunction occurred in the speed reference input section.	–	Reset the alarm and restart operation.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.b20: Torque Reference A/D Error (Detected when the servo is turned ON.)	A malfunction occurred in the reading section for the torque reference input.	–	Reset the alarm and restart operation.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.b33: Current Detection Error 3	A failure occurred in the current detection circuit.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF0: System Alarm 0	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF1: System Alarm 1	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF2: System Alarm 2	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF3: System Alarm 3	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF4: System Alarm 4	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.bF5: System Alarm 5	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF6: System Alarm 6	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF7: System Alarm 7	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF8: System Alarm 8	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.C10: Servomotor Out of Control (Detected when the servo is turned ON.)	The order of phases U, V, and W in the motor wiring is not correct.	Check the Servomotor wiring.	Make sure that the Servomotor is correctly wired.	–
	A failure occurred in the encoder.	–	If the motor wiring is correct and an alarm still occurs after turning the power supply OFF and ON again, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.C80: Encoder Clear Error or Multiturn Limit Setting Error	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.C90: Encoder Communications Error	There is a faulty contact in the connector or the connector is not wired correctly for the encoder.	Check the condition of the encoder connector.	Reconnect the encoder connector and check the encoder wiring.	*1
	There is a cable disconnection or short-circuit in the encoder. Or, the cable impedance is outside the specified values.	Check the condition of the Encoder Cable.	Use the Encoder Cable within the specified specifications.	–
	One of the following has occurred: corrosion caused by improper temperature, humidity, or gas, a short-circuit caused by entry of water drops or cutting oil, or faulty contact in connector caused by vibration.	Check the operating environment.	Improve the operating environmental, and replace the cable. If the alarm still occurs, replace the SERVOPACK.	*1
	A malfunction was caused by noise.	–	Correct the wiring around the encoder by separating the Encoder Cable from the Servomotor Main Circuit Cable or by grounding the encoder.	*1
	A failure occurred in the SERVOPACK.	–	Connect the Servomotor to another SERVOPACK, and turn ON the control power supply. If no alarm occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
	A failure occurred in the encoder.	–	Connect the Servomotor to another SERVOPACK, and turn ON the control power supply. If the alarm occurs, the Servomotor may be faulty. Replace the Servomotor.	–
A.C91: Encoder Communications Position Data Acceleration Rate Error	Noise entered on the signal lines because the Encoder Cable is bent or the sheath is damaged.	Check the condition of the Encoder Cable and connectors.	Check the Encoder Cable to see if it is installed correctly.	*1
	The Encoder Cable is bundled with a high-current line or installed near a high-current line.	Check the installation condition of the Encoder Cable.	Confirm that there is no surge voltage on the Encoder Cable.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Check the installation condition of the Encoder Cable.	Properly ground the machine to separate it from the FG of the encoder.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.C92: Encoder Communications Timer Error	Noise entered on the signal line from the encoder.	–	Implement countermeasures against noise for the encoder wiring.	*1
	Excessive vibration or shock was applied to the encoder.	Check the operating conditions.	Reduce machine vibration. Correctly install the Servomotor.	–
	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.CA0: Encoder Parameter Error	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.Cb0: Encoder Echoback Error	The encoder is wired incorrectly or there is faulty contact.	Check the wiring of the encoder.	Make sure that the encoder is correctly wired.	*1
	The specifications of the Encoder Cable are not correct and noise entered on it.	–	Use a shielded twisted-pair wire cable or a screened twisted-pair cable with conductors of at least 0.12 mm^2.	–
	The Encoder Cable is too long and noise entered on it.	–	The Encoder Cable wiring distance must be 50 m max.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Check the condition of the Encoder Cable and connectors.	Properly ground the machine to separate it from the FG of the encoder.	–
	Excessive vibration or shock was applied to the encoder.	Check the operating conditions.	Reduce machine vibration. Correctly install the Servomotor.	–
	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.CC0: Multiturn Limit Disagreement	When using a Direct Drive Servomotor, the setting of Pn205 (Multiturn Limit) does not agree with the encoder.	Check the setting of Pn205.	Correct the setting of Pn205 (0 to 65,535).	*1
	The multiturn limit of the encoder is different from that of the SERVOPACK. Or, the multiturn limit of the SERVOPACK has been changed.	Check the setting of Pn205 in the SERVOPACK.	Change the setting if the alarm occurs.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.CF1: Reception Failed Error in Feedback Option Module Communications	The cable between the Serial Converter Unit and SERVOPACK is not wired correctly or there is a faulty contact.	Check the wiring of the external encoder.	Correctly wire the cable between the Serial Converter Unit and SERVOPACK.	*1
	A specified cable is not being used between Serial Converter Unit and SERVOPACK.	Check the wiring specifications of the external encoder.	Use a specified cable.	–
	The cable between the Serial Converter Unit and SERVOPACK is too long.	Measure the length of the cable that connects the Serial Converter Unit.	The length of the cable between the Serial Converter Unit and SERVOPACK must be 20 m or less.	–
	The sheath on cable between the Serial Converter Unit and SERVOPACK is broken.	Check the cable that connects the Serial Converter Unit.	Replace the cable between the Serial Converter Unit and SERVOPACK.	–
A.CF2: Timer Stopped Error in Feedback Option Module Communications	Noise entered the cable between the Serial Converter Unit and SERVOPACK.	–	Correct the wiring around the Serial Converter Unit, e.g., separate I/O signal lines from the Main Circuit Cables or ground.	–
	A failure occurred in the Serial Converter Unit.	–	Replace the Serial Converter Unit.	–
	A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–
A.d00: Position Deviation Overflow (The setting of Pn520 (Position Deviation Overflow Alarm Level) was exceeded by the position deviation.)	The Servomotor U, V, and W wiring is not correct.	Check the wiring of the Servomotor's Main Circuit Cables.	Make sure that there are no faulty contacts in the wiring for the Servomotor and encoder.	–
	The frequency of the position reference pulse is too high.	Reduce the reference pulse frequency and try operating the SERVOPACK.	Reduce the position reference pulse frequency or the reference acceleration rate, or reconsider the electronic gear ratio.	*1
	The acceleration of the position reference is too high.	Reduce the reference acceleration and try operating the SERVOPACK.	Apply smoothing, i.e., by using Pn216 (Position Reference Acceleration/ Deceleration Time Constant).	*1
	The setting of Pn520 (Position Deviation Overflow Alarm Level) is too low for the operating conditions.	Check Pn520 (Position Deviation Overflow Alarm Level) to see if it is set to an appropriate value.	Optimize the setting of Pn520.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.d01: Position Deviation Overflow Alarm at Servo ON	The servo was turned ON after the position deviation exceeded the setting of Pn526 (Position Deviation Overflow Alarm Level at Servo ON) while the servo was OFF.	Check the position deviation while the servo is OFF.	Set the position deviation to be cleared while the servo is OFF. Optimize the setting of Pn526 (Position Deviation Overflow Alarm Level at Servo ON).	
A.d02: Position Deviation Overflow Alarm for Speed Limit at Servo ON	If position deviation remains in the deviation counter, the setting of Pn529 (Speed Limit Level at Servo ON) limits the speed when the servo is turned ON. This alarm occurs if reference pulses are input and the setting of Pn520 (Position Deviation Overflow Alarm Level) is exceeded.	–	Set the position deviation to be cleared while the servo is OFF. Optimize the setting of Pn520 (Position Deviation Overflow Alarm Level). Or, adjust the setting of Pn529 (Speed Limit Level at Servo ON).	*1
A.d10: Motor-Load Position Deviation Overflow	The motor direction and external encoder installation orientation are backward.	Check the motor direction and the external encoder installation orientation.	Install the external encoder in the opposite direction, or change the setting of Pn002 = n.X□□□ (External Encoder Usage) to reverse the direction.	*1
	There is an error in the connection between the load (e.g., stage) and external encoder coupling.	Check the coupling of the external encoder.	Check the mechanical coupling.	–
A.d30: Position Data Overflow	The position data exceeded ±1,879,048,192.	Check the input reference pulse counter.	Reconsider the operating specifications.	–
A.E71: Safety Option Module Detection Failure	There is a faulty connection between the SERVOPACK and the Safety Option Module.	Check the connection between the SERVOPACK and the Safety Option Module.	Correctly connect the Safety Option Module.	–
	The Safety Option Module was disconnected.	–	Execute Fn014 (Reset Option Module Configuration Error) from the Digital Operator or SigmaWin+ and then turn the power supply to the SERVOPACK OFF and ON again.	*1
	A failure occurred in the Safety Option Module.	–	Replace the Safety Option Module.	–
	A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.E72: Feedback Option Module Detection Failure	There is a faulty connection between the SERVOPACK and the Feedback Option Module.	Check the connection between the SERVOPACK and the Feedback Option Module.	Correctly connect the Feedback Option Module.	–
	The Feedback Option Module was disconnected.	–	Reset the Option Module configuration error and turn the power supply to the SERVOPACK OFF and ON again.	*1
	A failure occurred in the Feedback Option Module.	–	Replace the Feedback Option Module.	–
	A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–
A.E74: Unsupported Safety Option Module	A failure occurred in the Safety Option Module.	–	Replace the Safety Option Module.	–
	An unsupported Safety Option Module was connected.	Refer to the catalog of the connected Safety Option Module.	Connect a compatible Safety Option Module.	–
A.Eb1: Safety Function Signal Input Timing Error	The delay between activation of the /HWBB1 and /HWBB2 input signals for the HWBB was ten second or longer.	Measure the time delay between the /HWBB1 and /HWBB2 signals.	The output signal circuits or devices for /HWBB1 and /HWBB2 or the SERVOPACK input signal circuits may be faulty. Alternatively, the input signal cables may be disconnected. Check to see if any of these items are faulty or have been disconnected.	–
	A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–
A.EC8: Gate Drive Error 1 (An error occurred in the gate drive circuit.)	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.EC9: Gate Drive Error 2 (An error occurred in the gate drive circuit.)				

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.F10: Power Supply Line Open Phase (The voltage was low for more than one second for phase R, S, or T when the main power supply was ON.)	The three-phase power supply wiring is not correct.	Check the power supply wiring.	Make sure that the power supply is correctly wired.	*1
	The three-phase power supply is unbalanced.	Measure the voltage for each phase of the three-phase power supply.	Balance the power supply by changing phases.	–
	A single-phase power supply was input without specifying a single-phase AC power supply input (Pn00B = n.□1□□).	Check the power supply and the parameter setting.	Match the parameter setting to the power supply.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
FL-1*5: System Alarm FL-2*5: System Alarm FL-3*5: System Alarm FL-4*5: System Alarm FL-5*5: System Alarm FL-6*5: System Alarm	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
CPF00: Digital Operator Communications Error 1	There is a faulty contact between the Digital Operator and the SERVOPACK.	Check the connector contact.	Disconnect the connector and insert it again. Or, replace the cable.	–
	A malfunction was caused by noise.	–	Keep the Digital Operator or the cable away from sources of noise.	–
CPF01: Digital Operator Communications Error 2	A failure occurred in the Digital Operator.	–	Disconnect the Digital Operator and then connect it again. If an alarm still occurs, the Digital Operator may be faulty. Replace the Digital Operator.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

*1. Refer to the following manual for details.
Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

*2. Detection Conditions
If either of the following conditions is detected, an alarm will occur.

- $\text{Pn533 [min}^{-1}\text{]} \times \frac{\text{Encoder resolution}}{6 \times 10^5} \leq \frac{\text{Pn20E}}{\text{Pn210}}$
- $\text{Maximum motor speed [min}^{-1}\text{]} \times \frac{\text{Encoder resolution}}{\text{Approx. } 3.66 \times 10^{12}} \geq \frac{\text{Pn20E}}{\text{Pn210}}$

*3. Detection Conditions
If either of the following conditions is detected, an alarm will occur.

- Rated motor speed [min^{-1}] × 1/3 × $\frac{\text{Encoder resolution}}{6\times10^5} \leq \frac{\text{Pn20E}}{\text{Pn210}}$
- Maximum motor speed [min^{-1}] × $\frac{\text{Encoder resolution}}{\text{Approx. } 3.66\times10^{12}} \geq \frac{\text{Pn20E}}{\text{Pn210}}$

*4. Refer to the following manual for details.
Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

*5. These alarms are not stored in the alarm history. They are only displayed on the panel display.

6.1.4 Warning Displays

If a warning occurs in the SERVOPACK, a warning number will be displayed on the panel display. Warnings are displayed to warn you before an alarm occurs.

This section provides a list of warnings and the causes of and corrections for warnings.

6.1.5 List of Warnings

The list of warnings gives the warning name, warning meaning, and warning code output in order of the warning numbers.

Warning Number	Warning Name	Meaning	Warning Code Output		
			ALO1	ALO2	ALO3
A.900	Position Deviation Overflow	The position deviation exceeded the percentage set with the following formula: (Pn520 × Pn51E/100)	H	H	H
A.901	Position Deviation Overflow Alarm at Servo ON	The position deviation when the servo was turned ON exceeded the percentage set with the following formula: (Pn526 × Pn528/100)	H	H	H
A.910	Overload	This warning occurs before an overload alarm (A.710 or A.720) occurs. If the warning is ignored and operation is continued, an alarm may occur.	L	H	H
A.911	Vibration	Abnormal vibration was detected during motor operation. The detection level is the same as A.520. Set whether to output an alarm or a warning by setting Pn310 (Vibration Detection Selection).	L	H	H
A.912	Internal Temperature Warning 1 (Control Board Temperature Error)	The surrounding temperature of the control PCB is abnormal.	H	L	H
A.913	Internal Temperature Warning 2 (Power Board Temperature Error)	The surrounding temperature of the power PCB is abnormal.	H	L	H
A.920	Regenerative Overload	This warning occurs before an A.320 alarm (Regenerative Overload) occurs. If the warning is ignored and operation is continued, an alarm may occur.	H	L	H
A.921	Dynamic Brake Overload	This warning occurs before an A.731 alarm (Dynamic Brake Overload) occurs. If the warning is ignored and operation is continued, an alarm may occur.	H	L	H
A.923	SERVOPACK Built-in Fan Stopped	The fan inside the SERVOPACK stopped.	H	L	H

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Warning Number	Warning Name	Meaning	Warning Code Output		
			ALO1	ALO2	ALO3
A.930	Absolute Encoder Battery Error	This warning occurs when the voltage of absolute encoder's battery is low.	L	L	H
A.93B	Overheat Warning	The input voltage (temperature) for the overheat protection input (TH) signal exceeded the setting of Pn61C (Overheat Warning Level).	L	L	H
A.941	Change of Parameters Requires Restart	Parameters have been changed that require the power supply to be turned OFF and ON again.	H	H	L
A.942	Speed Ripple Compensation Information Disagreement	The speed ripple compensation information stored in the encoder does not agree with the speed ripple compensation information stored in the SERVOPACK.	H	H	L
A.971	Undervoltage	This warning occurs before an A.410 alarm (Undervoltage) occurs. If the warning is ignored and operation is continued, an alarm may occur.	L	L	L
A.9A0	Overtravel	Overtravel was detected while the servo was ON.	H	L	L
A.9b0	Preventative Maintenance Warning	One of the consumable parts has reached the end of its service life.	H	L	H

Note: 1. A warning code is not output unless you set Pn001 to n.1□□□ (Output both alarm codes and warning codes).

2. Use Pn008 = n.□X□□ (Warning Detection Selection) to control warning detection.
However, the following warnings are not affected by the setting of Pn008 = n.□X□□ and other parameter settings are required in addition to Pn008 = n.□X□□.

Warning	Parameters That Must Be Set to Select Warning Detection
A.911	Pn310 = n.□□□X (Vibration Detection Selection)
A.923	– (Not affected by the setting of Pn008 = n.□X□□.)
A.930	Pn008 = n.□□□X (Low Battery Voltage Alarm/Warning Selection)
A.942	Pn423 = n.□□X□ (Speed Ripple Compensation Information Disagreement Warning Detection Selection)
A.971	Pn008 = n.□□X□ (Function Selection for Undervoltage) (Not affected by the setting of Pn008 = n.□X□□.)
A.9A0	Pn00D = n.X□□□ (Overtravel Warning Detection Selection) (Not affected by the setting of Pn008 = n.□X□□.)
A.9b0	Pn00F = n.□□□X (Preventative Maintenance Warning Selection)

Refer to the following manual for details.

Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

6.1.6 Troubleshooting Warnings

The causes of and corrections for the warnings are given in the following table. Contact your Yaskawa representative if you cannot solve a problem with the correction given in the table.

Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.900: Position Deviation Overflow	The Servomotor U, V, and W wiring is not correct.	Check the wiring of the Servomotor's Main Circuit Cables.	Make sure that there are no faulty connections in the wiring for the Servomotor and encoder.	–
	A SERVOPACK gain is too low.	Check the SERVOPACK gains.	Increase the servo gain, e.g., by using autotuning without a host reference.	*
	The frequency of the position reference pulse is too high.	Reduce the reference pulse frequency and try operating the SERVOPACK.	Reduce the position reference pulse frequency or the reference acceleration rate, or reconsider the electronic gear ratio.	*
	The acceleration of the position reference is too high.	Reduce the reference acceleration and try operating the SERVOPACK.	Apply smoothing, i.e., by using Pn216 (Position Reference Acceleration/ Deceleration Time Constant).	*
	The excessive position deviation alarm level (Pn520 × Pn51E/100) is too low for the operating conditions.	Check excessive position deviation alarm level (Pn520 × Pn51E/ 100) to see if it is set to an appropriate value.	Optimize the settings of Pn520 and Pn51E.	*
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.901: Position Deviation Overflow Alarm at Servo ON	The position deviation when the servo was turned ON exceeded the percentage set with the following formula: (Pn526 × Pn528/ 100)	–	Set the position deviation to be cleared while the servo is OFF. Optimize the setting of Pn528 (Position Deviation Overflow Warning Level at Servo ON).	*

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.910: Overload (warning before an A.710 or A.720 alarm occurs)	The wiring is not correct or there is a faulty contact in the motor or encoder wiring.	Check the wiring.	Make sure that the Servomotor and encoder are correctly wired.	–
	Operation was performed that exceeded the overload protection characteristics.	Check the motor overload characteristics and Run command.	Reconsider the load and operating conditions. Or, increase the motor capacity.	–
	An excessive load was applied during operation because the Servomotor was not driven because of mechanical problems.	Check the operation reference and motor speed.	Remove the mechanical problem.	–
	The overload warning level (Pn52B) is not suitable.	Check that the overload warning level (Pn52B) is suitable.	Set a suitable overload warning level (Pn52B).	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.911: Vibration	Abnormal vibration was detected during motor operation.	Check for abnormal motor noise, and check the speed and torque waveforms during operation.	Reduce the motor speed. Or, reduce the servo gain with custom tuning.	*
	The setting of Pn103 (Moment of Inertia Ratio) is greater than the actual moment of inertia or was greatly changed.	Check the moment of inertia ratio.	Set Pn103 (Moment of Inertia Ratio) to an appropriate value.	*
	The vibration detection level (Pn312) is not suitable.	Check that the vibration detection level (Pn312) is suitable.	Set a suitable vibration detection level (Pn312).	*

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.912: Internal Temperature Warning 1 (Control Board Temperature Error)	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat. Or, check the operating status with the SERVOPACK installation environment monitor.	Decrease the surrounding temperature by improving the SERVOPACK installation conditions.	*
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	Use the accumulated load ratio to check the load during operation, and use the regenerative load ratio to check the regenerative processing capacity.	Reconsider the load and operating conditions.	–
	The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	Check the SERVOPACK installation conditions.	Install the SERVOPACK according to specifications.	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.913: Internal Temperature Warning 2 (Power Board Temperature Error)	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat. Or, check the operating status with the SERVOPACK installation environment monitor.	Decrease the surrounding temperature by improving the SERVOPACK installation conditions.	*
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	Use the accumulated load ratio to check the load during operation, and use the regenerative load ratio to check the regenerative processing capacity.	Reconsider the load and operating conditions.	–
	The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	Check the SERVOPACK installation conditions.	Install the SERVOPACK according to specifications.	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.920: Regenerative Overload (warning before an A.320 alarm occurs)	The power supply voltage exceeded the specified range.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	There is insufficient external regenerative resistance, regenerative resistor capacity, or SERVOPACK capacity, or there has been a continuous regeneration state.	Check the operating conditions or the capacity using the SigmaJunmaSize+ Capacity Selection Software or another means.	Change the regenerative resistance value, regenerative resistance capacity, or SERVOPACK capacity. Reconsider the operating conditions using the SigmaJunmaSize+ Capacity Selection Software or other means.	–
	There was a continuous regeneration state because a negative load was continuously applied.	Check the load applied to the Servomotor during operation.	Reconsider the system including the servo, machine, and operating conditions.	–
A.921: Dynamic Brake Overload (warning before an A.731 alarm occurs)	The Servomotor was rotated by an external force.	Check the operation status.	Implement measures to ensure that the motor will not be rotated by an external force.	–
	When the Servomotor was stopped with the dynamic brake, the rotational or linear kinetic energy exceeded the capacity of the dynamic brake resistor.	Check the power consumed by the DB resistor to see how frequently the DB is being used.	Reconsider the following: • Reduce the Servomotor command speed. • Decrease the moment of inertia. • Reduce the frequency of stopping with the dynamic brake.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.923: SERVOPACK Built-in Fan Stopped	The fan inside the SERVOPACK stopped.	Check for foreign matter inside the SERVOPACK.	Remove foreign matter from the SERVOPACK. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.930: Absolute Encoder Battery Error (The absolute encoder battery voltage was lower than the specified level.) (Detected only when an absolute encoder is connected.)	The battery connection is faulty or a battery is not connected.	Check the battery connection.	Correct the battery connection.	*
	The battery voltage is lower than the specified value (2.7 V).	Measure the battery voltage.	Replace the battery.	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.93B: Overheat Warning	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat.	Lower the surrounding temperature by improving the installation conditions of machine.	–
	Operation was performed under an excessive load.	Use the accumulated load ratio to check the load during operation.	Reconsider the load and operating conditions.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The temperature detection circuit in the sensor attached to the machine is faulty.	–	The temperature detection circuit in the sensor attached to the machine may be faulty. Repair the sensor attached to the machine.	–
A.941: Change of Parameters Requires Restart	Parameters have been changed that require the power supply to be turned OFF and ON again.	–	Turn the power supply to the SERVOPACK OFF and ON again.	–
A.942: Speed Ripple Compensation Information Disagreement	The speed ripple compensation information stored in the encoder does not agree with the speed ripple compensation information stored in the SERVOPACK.	–	Reset the speed ripple compensation value on the SigmaWin+.	*
		–	Set Pn423 to n.□□1□ (Do not detect A.942 alarms). However, changing the setting may increase the speed ripple.	*
		–	Set Pn423 to n.□□□0 (Disable speed ripple compensation). However, changing the setting may increase the speed ripple.	*
A.971: Undervoltage	For a 200-V SERVOPACK, the AC power supply voltage dropped below 140 V.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	For a 100-V SERVOPACK, the AC power supply voltage dropped below 60 V.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	The power supply voltage dropped during operation.	Measure the power supply voltage.	Increase the power supply capacity.	–
	A momentary power interruption occurred.	Measure the power supply voltage.	If you have changed the setting of Pn509 (Momentary Power Interruption Hold Time), decrease the setting.	*
	The SERVOPACK fuse is blown out.	–	Replace the SERVOPACK and connect a reactor.	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.9A0: Overtravel (Overtravel status was detected.)	Overtravel was detected while the servo was ON.	Check the status of the overtravel signals on the input signal monitor.	Even if an overtravel signal is not shown by the input signal monitor, momentary overtravel may have been detected. Take the following precautions. • Do not specify movements that would cause overtravel from the host controller. • Check the wiring of the overtravel signals. • Implement countermeasures against noise.	*
A.9b0: Preventative Maintenance Warning	One of the consumable parts has reached the end of its service life.	–	Replace the part. Contact your Yaskawa representative for replacement.	*

* Refer to the following manual for details.
Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

6.1.7 Troubleshooting Based on the Operation and Conditions of the Servomotor

This section provides troubleshooting based on the operation and conditions of the Servomotor, including causes and corrections.

Problem	Possible Cause	Confirmation	Correction	Reference
Servomotor Does Not Start	The control power supply is not turned ON.	Measure the voltage between control power supply terminals.	Turn OFF the power supply to the servo system. Correct the wiring so that the control power supply is turned ON.	–
	The main circuit power supply is not turned ON.	Measure the voltage between the main circuit power input terminals.	Turn OFF the power supply to the servo system. Correct the wiring so that the main circuit power supply is turned ON.	–
	The I/O signal connector (CN1) pins are not wired correctly or are disconnected.	Turn OFF the power supply to the servo system. Check the wiring condition of the I/O signal connector (CN1) pins.	Correct the wiring of the I/O signal connector (CN1) pins.	*
	The wiring for the Servomotor Main Circuit Cables or Encoder Cable is disconnected.	Check the wiring conditions.	Turn OFF the power supply to the servo system. Wire the cable correctly.	–
	There is an overload on the Servomotor.	Operate the Servomotor with no load and check the load status.	Turn OFF the power supply to the servo system. Reduce the load or replace the Servomotor with a Servomotor with a larger capacity.	–
	The type of encoder that is being used does not agree with the setting of Pn002 = n.□X□□ (Encoder Usage).	Check the type of the encoder that is being used and the setting of Pn002 = n.□X□□.	Set Pn002 = n.□X□□ according to the type of the encoder that is being used.	*
	No speed or position reference is input.	Turn OFF the power supply to the servo system. Check the allocation status of the input signals.	Allocate an input signal so that the speed and position references are input correctly.	*
	There is a mistake in the input signal allocations (Pn50A to Pn50D, Pn515, and Pn516).	Check the input signal allocations (Pn50A to Pn50D, Pn515, and Pn516).	Correctly allocate the input signals (Pn50A to Pn50D, Pn515, and Pn516).	*
	The /S-ON (Servo ON) signal is OFF.	Check the settings of Pn50A = n.□□□X (Input Signal Allocation Mode) and Pn50A =n.□□X□ (/S-ON (Servo ON) Signal Allocation).	Set Pn50A = n.□□XX correctly and turn ON the /S-ON signal.	*
	The function setting of the /P-CON (Proportional Control) signal is not correct.	Check the setting of Pn000 = n.□□X□ (Control Method Selection).	Set the parameter to match the application.	*
	The SEN input is OFF.	Check the ON/OFF status of the SEN input.	If you are using an absolute encoder, turn ON the SEN signal.	*

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Problem	Possible Cause	Confirmation	Correction	Reference
	The reference pulse mode selection is not correct.	Check the setting of Pn200 =n.□□□X (Reference Pulse Form) and the reference pulse form.	Set Pn200 =n.□□□X so that is agrees with the reference pulse form.	*
	Speed control: The speed reference input is not appropriate.	Check between the speed reference input (V-REF) and signal ground (SG) to see if the control method and the input agree.	Correctly set the control method and input method.	*
	Torque control: The torque reference input is not appropriate.	Check between the torque reference input (T-REF) and signal ground (SG) to see if the control method and the input agree.	Correctly set the control method and input method.	*
	Position control: The reference pulse input is not appropriate.	Check the setting of Pn200 =n.□□□X (Reference Pulse Form) and the sign and pulse signals.	Correctly set the control method and input method.	*
	The /CLR (Position Deviation Clear) input signal has not been turned OFF.	Check the /CLR signal (CN1-14 and CN1-15).	Turn OFF the /CLR signal.	*
Servomotor Does Not Start	The P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal is still OFF.	Check the P-OT and N-OT signals.	Turn ON the P-OT and N-OT signals.	*
	The safety input signals (/HWBB1 or /HWBB2) were not turned ON.	Check the /HWBB1 and /HWBB2 input signals.	Turn ON the /HWBB1 and /HWBB2 input signals. If you are not using the safety function, connect the Safety Jumper Connector (provided as an accessory) to CN8.	*
	The FSTP (Forced Stop Input) signal is still OFF.	Check the FSTP signal.	• Turn ON the FSTP signal. • If you will not use the function to force the motor to stop, set Pn516 = n.□□□X (FSTP (Forced Stop Input) Signal Allocation) to disable the signal.	*
	A failure occurred in the SERVOPACK.	–	Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–
Servomotor Moves Instantaneously, and Then Stops	There is a mistake in the Servomotor wiring.	Turn OFF the power supply to the servo system. Check the wiring.	Wire the Servomotor correctly.	–
	There is a mistake in the wiring of the encoder or Serial Converter Unit.	Turn OFF the power supply to the servo system. Check the wiring.	Wire the Serial Converter Unit correctly.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Servomotor Speed Is Unstable	There is a faulty connection in the Servomotor wiring.	The connector connections for the power line (U, V, and W phases) and the encoder or Serial Converter Unit may be unstable. Turn OFF the power supply to the servo system. Check the wiring.	Tighten any loose terminals or connectors and correct the wiring.	–
Servomotor Moves without a Reference Input	Speed control: The speed reference input is not appropriate.	Check between the speed reference input (V-REF) and signal ground (SG) to see if the control method and the input agree.	Correctly set the control method and input method.	*
	Torque control: The torque reference input is not appropriate.	Check between the torque reference input (T-REF) and signal ground (SG) to see if the control method and the input agree.	Correctly set the control method and input method.	*
	The speed reference offset is not correct.	The SERVOPACK offset is adjusted incorrectly.	Adjust the SERVOPACK offset.	*
	Position control: The reference pulse input is not appropriate.	Check the setting of Pn200 =n.□□□X (Reference Pulse Form) and the sign and pulse signals.	Correctly set the control method and input method.	–
	A failure occurred in the SERVOPACK.	–	Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–
Dynamic Brake Does Not Operate	The setting of Pn001 = n.□□□X (Motor Stopping Method for Servo OFF and Group 1 Alarms) is not suitable.	Check the setting of Pn001 = n.□□□X.	Set Pn001 = n.□□□X correctly.	–
	The dynamic brake resistor is disconnected.	Check the moment of inertia, motor speed, and dynamic brake frequency of use. If the moment of inertia, motor speed, or dynamic brake frequency of use is excessive, the dynamic brake resistance may be disconnected.	Turn OFF the power supply to the servo system. Replace the SERVOPACK. To prevent disconnection, reduce the load.	–
	There was a failure in the dynamic brake drive circuit.	–	There is a defective component in the dynamic brake circuit. Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Abnormal Noise from Servomotor	The Servomotor vibrated considerably while performing the tuning-less function with the default settings.	Check the waveform of the motor speed.	Reduce the load so that the moment of inertia ratio is within the allowable value, or increase the load level or reduce the rigidity level in the tuning-less level settings. If the situation is not improved, disable the tuning-less function (i.e., set Pn170 to n.□□□0) and execute autotuning either with or without a host reference.	*
	The machine mounting is not secure.	Turn OFF the power supply to the servo system. Check to see if there are any loose mounting screws.	Tighten the mounting screws.	–
	The machine mounting is not secure.	Turn OFF the power supply to the servo system. Check to see if there is misalignment in the coupling.	Align the coupling.	–
		Turn OFF the power supply to the servo system. Check to see if the coupling is balanced.	Balance the coupling.	–
	The bearings are defective.	Turn OFF the power supply to the servo system. Check for noise and vibration around the bearings.	Replace the Servomotor.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Abnormal Noise from Servomotor	There is a vibration source at the driven machine.	Turn OFF the power supply to the servo system. Check for any foreign matter, damage, or deformation in the machine's moving parts.	Consult with the machine manufacturer.	–
	Noise interference occurred because of incorrect I/O signal cable specifications.	Turn OFF the power supply to the servo system. Check the I/O signal cables to see if they satisfy specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because an I/O signal cable is too long.	Turn OFF the power supply to the servo system. Check the lengths of the I/O signal cables.	The I/O signal cables must be no longer than 3 m.	–
	Noise interference occurred because of incorrect Encoder Cable specifications.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it satisfies specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because the Encoder Cable is too long.	Turn OFF the power supply to the servo system. Check the length of the Encoder Cable.	The Encoder Cable length must be 50 m max.	–
	Noise interference occurred because the Encoder Cable is damaged.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it is pinched or the sheath is damaged.	Replace the Encoder Cable and correct the cable installation environment.	–
	The Encoder Cable was subjected to excessive noise interference.	Turn OFF the power supply to the servo system. Check to see if the Encoder Cable is bundled with a high-current line or installed near a high-current line.	Correct the cable layout so that no surge is applied by high-current lines.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Turn OFF the power supply to the servo system. Check to see if the machines are correctly grounded.	Properly ground the machines to separate them from the FG of the encoder.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Abnormal Noise from Servomotor	There is a SERVOPACK pulse counting error due to noise.	Check to see if there is noise interference on the signal line from the encoder.	Turn OFF the power supply to the servo system. Implement countermeasures against noise for the encoder wiring.	–
	The encoder was subjected to excessive vibration or shock.	Turn OFF the power supply to the servo system. Check to see if vibration from the machine occurred. Check the Servomotor installation (mounting surface precision, securing state, and alignment).	Reduce machine vibration. Improve the mounting state of the Servomotor.	–
	A failure occurred in the encoder.	–	Turn OFF the power supply to the servo system. Replace the Servomotor.	–
	A failure occurred in the Serial Converter Unit.	–	Turn OFF the power supply to the servo system. Replace the Serial Converter Unit.	–
Servomotor Vibrates at Frequency of Approx. 200 to 400 Hz.	The servo gains are not balanced.	Check to see if the servo gains have been correctly tuned.	Perform autotuning without a host reference.	*
	The setting of Pn100 (Speed Loop Gain) is too high.	Check the setting of Pn100. The default setting is Kv = 40.0 Hz.	Set Pn100 to an appropriate value.	–
	The setting of Pn102 (Position Loop Gain) is too high.	Check the setting of Pn102. The default setting is Kp = 40.0/s.	Set Pn102 to an appropriate value.	–
	The setting of Pn101 (Speed Loop Integral Time Constant) is not appropriate.	Check the setting of Pn101. The default setting is Ti = 20.0 ms.	Set Pn101 to an appropriate value.	–
	The setting of Pn103 (Moment of Inertia Ratio) is not appropriate.	Check the setting of Pn103.	Set Pn103 to an appropriate value.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Large Motor Speed Overshoot on Starting and Stopping	The servo gains are not balanced.	Check to see if the servo gains have been correctly tuned.	Perform autotuning without a host reference.	*
	The setting of Pn100 (Speed Loop Gain) is too high.	Check the setting of Pn100. The default setting is Kv = 40.0 Hz.	Set Pn100 to an appropriate value.	–
	The setting of Pn102 (Position Loop Gain) is too high.	Check the setting of Pn102. The default setting is Kp = 40.0/s.	Set Pn102 to an appropriate value.	–
	The setting of Pn101 (Speed Loop Integral Time Constant) is not appropriate.	Check the setting of Pn101. The default setting is Ti = 20.0 ms.	Set Pn101 to an appropriate value.	–
	The setting of Pn103 (Moment of Inertia Ratio) is not appropriate.	Check the setting of Pn103.	Set Pn103 to an appropriate value.	–
	The torque reference is saturated.	Check the waveform of the torque reference.	Use the mode switch.	–
Absolute Encoder Position Deviation Error (The position that was saved in the host controller when the power was turned OFF is different from the position when the power was next turned ON.)	Noise interference occurred because of incorrect Encoder Cable specifications.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it satisfies specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because the Encoder Cable is too long.	Turn OFF the power supply to the servo system. Check the length of the Encoder Cable.	The Encoder Cable length must be 50 m max.	–
	Noise interference occurred because the Encoder Cable is damaged.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it is pinched or the sheath is damaged.	Replace the Encoder Cable and correct the cable installation environment.	–
	The Encoder Cable was subject to excessive noise interference.	Turn OFF the power supply to the servo system. Check to see if the Encoder Cable is bundled with a high-current line or installed near a high-current line.	Correct the cable layout so that no surge is applied by high-current lines.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Absolute Encoder Position Deviation Error (The position that was saved in the host controller when the power was turned OFF is different from the position when the power was next turned ON.)	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Turn OFF the power supply to the servo system. Check to see if the machines are correctly grounded.	Properly ground the machines to separate them from the FG of the encoder.	–
	There is a SERVOPACK pulse counting error due to noise.	Turn OFF the power supply to the servo system. Check to see if there is noise interference on the I/O signal line from the encoder or Serial Converter Unit.	Implement countermeasures against noise for the encoder or Serial Converter Unit wiring.	–
	The encoder was subjected to excessive vibration or shock.	Turn OFF the power supply to the servo system. Check to see if vibration from the machine occurred. Check the Servomotor installation (mounting surface precision, securing state, and alignment).	Reduce machine vibration. Improve the mounting state of the Servomotor.	–
	A failure occurred in the encoder.	–	Turn OFF the power supply to the servo system. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–
	Host Controller Multiturn Data or Absolute Encoder Position Data Reading Error	Check the error detection section of the host controller.	Correct the error detection section of the host controller.	–
		Check to see if the host controller is executing data parity checks.	Perform parity checks for the multiturn data or absolute encoder position data.	–
		Check for noise interference in the cable between the SERVOPACK and the host controller.	Implement countermeasures against noise and then perform parity checks again for the multiturn data or absolute encoder position data.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Overtravel Occurred	The P-OT/N-OT (Forward Drive Prohibit or Reverse Drive Prohibit) signal was input.	Check the external power supply (+24 V) voltage for the input signals.	Correct the external power supply (+24 V) voltage for the input signals.	–
		Check the operating condition of the overtravel limit switches.	Make sure that the overtravel limit switches operate correctly.	–
		Check the wiring of the overtravel limit switches.	Correct the wiring of the overtravel limit switches.	*
		Check the settings of the overtravel input signal allocations (Pn50A/ Pn50B).	Set the parameters to correct values.	*
	The P-OT/N-OT (Forward Drive Prohibit or Reverse Drive Prohibit) signal malfunctioned.	Check for fluctuation in the external power supply (+24 V) voltage for the input signals.	Eliminate fluctuation from the external power supply (+24 V) voltage for the input signals.	–
		Check to see if the operation of the overtravel limit switches is unstable.	Stabilize the operating condition of the overtravel limit switches.	–
		Check the wiring of the overtravel limit switches (e.g., check for cable damage and loose screws).	Correct the wiring of the overtravel limit switches.	–
	There is a mistake in the allocation of the P-OT or N-OT (Forward Drive Prohibit or Reverse Drive Prohibit) signal in Pn50A = n.X□□□ or Pn50B = n.□□□X.	Check to see if the P-OT signal is allocated in Pn50A = n.X□□□.	If another signal is allocated in Pn50A =n.X□□□, allocate the P-OT signal instead.	*
		Check to see if the N-OT signal is allocated in Pn50B = n.□□□X.	If another signal is allocated in Pn50B =n.□□□X, allocate the N-OT signal instead.	
	The selection of the Servomotor stopping method is not correct.	Check the servo OFF stopping method set in Pn001 = n.□□□X or Pn001 = n.□□X□.	Select a Servomotor stopping method other than coasting to a stop.	*
		Check the torque control stopping method set in Pn001 = n.□□□X or Pn001 = n.□□X□.	Select a Servomotor stopping method other than coasting to a stop.	
Improper Stop Position for Overtravel (OT) Signal	The limit switch position and dog length are not appropriate.	–	Install the limit switch at the appropriate position.	–
	The overtravel limit switch position is too close for the coasting distance.	–	Install the overtravel limit switch at the appropriate position.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Position Deviation (without Alarm)	Noise interference occurred because of incorrect Encoder Cable specifications.	Check the Encoder Cable to see if it satisfies specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because the Encoder Cable is too long.	Turn OFF the power supply to the servo system. Check the length of the Encoder Cable.	The Encoder Cable length must be 50 m max.	–
	Noise interference occurred because the Encoder Cable is damaged.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it is pinched or the sheath is damaged.	Replace the Encoder Cable and correct the cable installation environment.	–
	The Encoder Cable was subjected to excessive noise interference.	Turn OFF the power supply to the servo system. Check to see if the Encoder Cable is bundled with a high-current line or installed near a high-current line.	Correct the cable layout so that no surge is applied by high-current lines.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Turn OFF the power supply to the servo system. Check to see if the machines are correctly grounded.	Properly ground the machines to separate them from the FG of the encoder.	–
	There is a SERVOPACK pulse counting error due to noise.	Turn OFF the power supply to the servo system. Check to see if there is noise interference on the I/O signal line from the encoder or Serial Converter Unit.	Implement countermeasures against noise for the encoder wiring or Serial Converter Unit wiring.	–
	The encoder was subjected to excessive vibration or shock.	Turn OFF the power supply to the servo system. Check to see if vibration from the machine occurred. Check the Servomotor installation (mounting surface precision, securing state, and alignment).	Reduce machine vibration. Improve the mounting state of the Servomotor.	–
	The coupling between the machine and Servomotor is not suitable.	Turn OFF the power supply to the servo system. Check to see if position offset occurs at the coupling between machine and Servomotor.	Correctly secure the coupling between the machine and Servomotor.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Position Deviation (without Alarm)	Noise interference occurred because of incorrect I/O signal cable specifications.	Turn OFF the power supply to the servo system. Check the I/O signal cables to see if they satisfy specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	If reference pulse input multiplication switching is being used, noise may be causing the I/O signals used for this function (/PSEL and /PSELA) to be falsely detected.	Turn OFF the power supply to the servo system. Check the I/O signal cables to see if they satisfy specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Pulses are being lost because the filter for the reference pulse input is not appropriate.	Check the setting of Pn200=n.X□□□(Filter Selection).	Set the parameters to correct values.	*
	Noise interference occurred because an I/O signal cable is too long.	Turn OFF the power supply to the servo system. Check the lengths of the I/O signal cables.	The I/O signal cables must be no longer than 3 m.	–
	An encoder fault occurred. (The pulse count does not change.)	–	Turn OFF the power supply to the servo system. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–
Servomotor Overheated	The surrounding air temperature is too high.	Measure the surrounding air temperature around the Servomotor.	Reduce the surrounding air temperature to 40°C or less.	–
	The surface of the Servomotor is dirty.	Turn OFF the power supply to the servo system. Visually check the surface for dirt.	Clean dirt, dust, and oil from the surface.	–
	There is an overload on the Servomotor.	Check the load status with a monitor.	If the Servomotor is overloaded, reduce the load or replace the Servo Drive with a SERVOPACK and Servomotor with larger capacities.	–

* Refer to the following manual for details.
Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

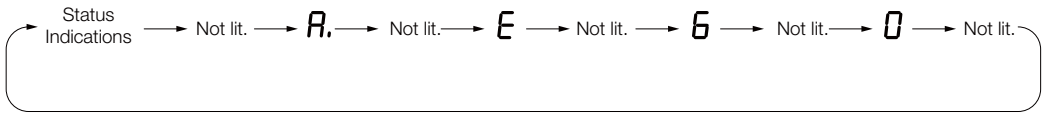
6.2 SERVOPACK with MECHATROLINK-III Communications References

6.2.1 Alarm Displays

If an error occurs in the SERVOPACK, an alarm number will be displayed on the panel display. However, if no alarm number appears on the panel display, this indicates a SERVOPACK system error. Replace the SERVOPACK.

If there is an alarm, the display will change in the following order.

Example: Alarm A.E60



This section provides a list of the alarms that may occur and the causes of and corrections for those alarms.

6.2.2 List of Alarms

The list of alarms gives the alarm name, alarm meaning, alarm stopping method, and alarm reset possibility in order of the alarm numbers.

Servomotor Stopping Method for Alarms

Refer to the following manual for information on the stopping method for alarms.

Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

Alarm Reset Possibility

Yes: You can use an alarm reset to clear the alarm. However, this assumes that the cause of the alarm has been removed.
No: You cannot clear the alarm.

List of Alarms

Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?
A.020	Parameter Checksum Error	There is an error in the parameter data in the SERVOPACK.	Gr.1	No
A.021	Parameter Format Error	There is an error in the parameter data format in the SERVOPACK.	Gr.1	No
A.022	System Checksum Error	There is an error in the parameter data in the SERVOPACK.	Gr.1	No
A.024	System Alarm	An internal program error occurred in the SERVOPACK.	Gr.1	No
A.025	System Alarm	An internal program error occurred in the SERVOPACK.	Gr.1	No
A.030	Main Circuit Detector Error	There is an error in the detection data for the main circuit.	Gr.1	Yes
A.040	Parameter Setting Error	A parameter setting is outside of the setting range.	Gr.1	No

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?
A.041	Encoder Output Pulse Setting Error	The setting of Pn212 (Number of Encoder Output Pulses) or Pn281 (Encoder Output Resolution) is outside of the setting range or does not satisfy the setting conditions.	Gr.1	No
A.042	Parameter Combination Error	The combination of some parameters exceeds the setting range.	Gr.1	No
A.044	Semi-Closed/Fully-Closed Loop Control Parameter Setting Error	The settings of the Option Module and Pn002 = n.X□□□ (External Encoder Usage) do not match.	Gr.1	No
A.04A	Parameter Setting Error 2	There is an error in the bank members or bank data settings.	Gr.1	No
A.050	Combination Error	The capacities of the SERVOPACK and Servomotor do not match.	Gr.1	Yes
A.051	Unsupported Device Alarm	An unsupported device was connected.	Gr.1	No
A.070	Motor Type Change Detected	The connected motor is a different type of motor from the previously connected motor.	Gr.1	No
A.0b0	Invalid Servo ON Command Alarm	The SV_ON (Servo ON) command was sent from the host controller after a utility function that turns ON the Servomotor was executed.	Gr.1	Yes
A.0b1	Semi-closed/Fully-closed Loop Control Switching Operation Error	An error occurred when semi-closed/fully-closed loop control is switched.	Gr.1	Yes
A.100	Overcurrent Detected	An overcurrent flowed through the power transistor or the heat sink overheated.	Gr.1	No
A.101	Motor Overcurrent Detected	The current to the motor exceeded the allowable current.	Gr.1	No
A.300	Regeneration Error	There is an error related to regeneration.	Gr.1	Yes
A.320	Regenerative Overload	A regenerative overload occurred.	Gr.2	Yes
A.330	Main Circuit Power Supply Wiring Error	• The AC power supply input setting or DC power supply input setting is not correct. • The power supply wiring is not correct.	Gr.1	Yes
A.400	Overvoltage	The main circuit DC voltage is too high.	Gr.1	Yes
A.410	Undervoltage	The main circuit DC voltage is too low.	Gr.2	Yes
A.510	Overspeed	The motor exceeded the maximum speed.	Gr.1	Yes
A.511	Encoder Output Pulse Overspeed	The pulse output speed for the setting of Pn212 (Number of Encoder Output Pulses) was exceeded.	Gr.1	Yes
A.520	Vibration Alarm	Abnormal oscillation was detected in the motor speed.	Gr.1	Yes
A.521	Autotuning Alarm	Vibration was detected during autotuning for the tuning-less function.	Gr.1	Yes
A.710	Instantaneous Overload	The Servomotor was operating for several seconds to several tens of seconds under a torque that largely exceeded the rating.	Gr.2	Yes
A.720	Continuous Overload	The Servomotor was operating continuously under a torque that exceeded the rating.	Gr.1	Yes
A.730	Dynamic Brake Overload	When the dynamic brake was applied, the rotational or linear kinetic energy exceeded the capacity of the dynamic brake resistor.	Gr.1	Yes
A.731				
A.740	Inrush Current Limiting Resistor Overload	The main circuit power supply was frequently turned ON and OFF.	Gr.1	Yes

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?
A.7A1	Internal Temperature Error 1 (Control Board Temperature Error)	The surrounding temperature of the control PCB is abnormal.	Gr.2	Yes
A.7A2	Internal Temperature Error 2 (Power Board Temperature Error)	The surrounding temperature of the power PCB is abnormal.	Gr.2	Yes
A.7A3	Internal Temperature Sensor Error	An error occurred in the temperature sensor circuit.	Gr.2	No
A.7Ab	SERVOPACK Built-in Fan Stopped	The fan inside the SERVOPACK stopped.	Gr.1	Yes
A.810	Encoder Backup Alarm	The power supplies to the encoder all failed and the position data was lost.	Gr.1	No
A.820	Encoder Checksum Alarm	There is an error in the checksum results for encoder memory.	Gr.1	No
A.830	Encoder Battery Alarm	The battery voltage was lower than the specified level after the control power supply was turned ON.	Gr.1	Yes
A.840	Encoder Data Alarm	There is an internal data error in the encoder.	Gr.1	No
A.850	Encoder Overspeed	The encoder was operating at high speed when the power was turned ON.	Gr.1	No
A.860	Encoder Overheated	The internal temperature of encoder is too high.	Gr.1	No
A.861	Motor Overheated	The internal temperature of motor is too high.	Gr.1	No
A.862	Overheat Alarm	The input voltage (temperature) for the overheat protection input (TH) signal exceeded the setting of Pn61B (Overheat Alarm Level).	Gr.1	Yes
A.8A0	External Encoder Error	An error occurred in the external encoder.	Gr.1	Yes
A.8A1	External Encoder Module Error	An error occurred in the Serial Converter Unit.	Gr.1	Yes
A.8A2	External Incremental Encoder Sensor Error	An error occurred in the external encoder.	Gr.1	Yes
A.8A3	External Absolute Encoder Position Error	An error occurred in the position data of the external encoder.	Gr.1	Yes
A.8A5	External Encoder Overspeed	An overspeed error occurred in the external encoder.	Gr.1	Yes
A.8A6	External Encoder Overheated	An overheating error occurred in the external encoder.	Gr.1	Yes
A.b33	Current Detection Error 3	An error occurred in the current detection circuit.	Gr.1	No
A.b6A	MECHATROLINK Communications ASIC Error 1	ASIC error 1 occurred in MECHATROLINK communications.	Gr.1	No
A.b6b	MECHATROLINK Communications ASIC Error 2	ASIC error 2 occurred in MECHATROLINK communications.	Gr.2	No
A.bF0	System Alarm 0	Internal program error 0 occurred in the SERVOPACK.	Gr.1	No
A.bF1	System Alarm 1	Internal program error 1 occurred in the SERVOPACK.	Gr.1	No
A.bF2	System Alarm 2	Internal program error 2 occurred in the SERVOPACK.	Gr.1	No
A.bF3	System Alarm 3	Internal program error 3 occurred in the SERVOPACK.	Gr.1	No
A.bF4	System Alarm 4	Internal program error 4 occurred in the SERVOPACK.	Gr.1	No

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?
A.bF5	System Alarm 5	Internal program error 5 occurred in the SERVOPACK.	Gr.1	No
A.bF6	System Alarm 6	Internal program error 6 occurred in the SERVOPACK.	Gr.1	No
A.bF7	System Alarm 7	Internal program error 7 occurred in the SERVOPACK.	Gr.1	No
A.bF8	System Alarm 8	Internal program error 8 occurred in the SERVOPACK.	Gr.1	No
A.C10	Servomotor Out of Control	The Servomotor ran out of control.	Gr.1	Yes
A.C80	Encoder Clear Error or Multiturn Limit Setting Error	The multiturn data for the absolute encoder was not correctly cleared or set.	Gr.1	No
A.C90	Encoder Communications Error	Communications between the encoder and SERVOPACK is not possible.	Gr.1	No
A.C91	Encoder Communications Position Data Acceleration Rate Error	An error occurred in calculating the position data of the encoder.	Gr.1	No
A.C92	Encoder Communications Timer Error	An error occurred in the communications timer between the encoder and SERVOPACK.	Gr.1	No
A.CA0	Encoder Parameter Error	The parameters in the encoder are corrupted.	Gr.1	No
A.Cb0	Encoder Echoback Error	The contents of communications with the encoder are incorrect.	Gr.1	No
A.CC0	Multiturn Limit Disagreement	Different multiturn limits have been set in the encoder and the SERVOPACK.	Gr.1	No
A.CF1	Reception Failed Error in Feedback Option Module Communications	Receiving data from the Feedback Option Module failed.	Gr.1	No
A.CF2	Timer Stopped Error in Feedback Option Module Communications	An error occurred in the timer for communications with the Feedback Option Module.	Gr.1	No
A.d00	Position Deviation Overflow	The setting of Pn520 (Position Deviation Overflow Alarm Level) was exceeded by the position deviation.	Gr.1	Yes
A.d01	Position Deviation Overflow Alarm at Servo ON	The servo was turned ON after the position deviation exceeded the setting of Pn526 (Position Deviation Overflow Alarm Level at Servo ON) while the servo was OFF.	Gr.1	Yes
A.d02	Position Deviation Overflow Alarm for Speed Limit at Servo ON	If position deviation remains in the deviation counter, the setting of Pn529 (Speed Limit Level at Servo ON) limits the speed when the servo is turned ON. This alarm occurs if a position reference is input and the setting of Pn520 (Position Deviation Overflow Alarm Level) is exceeded before the limit is cleared.	Gr.2	Yes
A.d10	Motor-Load Position Deviation Overflow	There was too much position deviation between the motor and load during fully-closed loop control.	Gr.2	Yes
A.d30	Position Data Overflow	The position feedback data exceeded ±1,879,048,192.	Gr.1	No
A.E02	MECHATROLINK Internal Synchronization Error 1	A synchronization error occurred during MECHATROLINK communications with the SERVOPACK.	Gr.1	Yes

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Alarm Number	Alarm Name	Alarm Meaning	Servomotor Stopping Method	Alarm Reset Possible?
A.E40	MECHATROLINK Transmission Cycle Setting Error	The setting of the MECHATROLINK communications transmission cycle is not correct.	Gr.2	Yes
A.E41	MECHATROLINK Communications Data Size Setting Error	The setting of the MECHATROLINK communications data size is not correct.	Gr.2	Yes
A.E42	MECHATROLINK Station Address Setting Error	The setting of the MECHATROLINK station address is not correct.	Gr.2	No
A.E50*	MECHATROLINK Synchronization Error	A synchronization error occurred during MECHATROLINK communications.	Gr.2	Yes
A.E51	MECHATROLINK Synchronization Failed	Synchronization failed during MECHATROLINK communications.	Gr.2	Yes
A.E60*	Reception Error in MECHATROLINK Communications	Communications errors occurred continuously during MECHATROLINK communications.	Gr.2	Yes
A.E61	Synchronization Interval Error in MECHATROLINK Transmission Cycle	An error occurred in the transmission cycle during MECHATROLINK communications.	Gr.2	Yes
A.E63	MECHATROLINK Synchronization Frame Not Received	Synchronization frames were continuously not received during MECHATROLINK communications.	Gr.2	Yes
A.E71	Safety Option Module Detection Failure	Detection of the Safety Option Module failed.	Gr.1	No
A.E72	Feedback Option Module Detection Failure	Detection of the Feedback Option Module failed.	Gr.1	No
A.E74	Unsupported Safety Option Module	An unsupported Safety Option Module was connected.	Gr.1	No
A.Eb1	Safety Function Signal Input Timing Error	An error occurred in the input timing of the safety function signal.	Gr.1	No
A.EC8	Gate Drive Error 1	An error occurred in the gate drive circuit.	Gr.1	No
A.EC9	Gate Drive Error 2	An error occurred in the gate drive circuit.	Gr.1	No
A.Ed1	Command Execution Timeout	A timeout error occurred for a MECHATROLINK command.	Gr.2	Yes
A.F10	Power Supply Line Open Phase	The voltage was low for more than one second for phase R, S, or T when the main power supply was ON.	Gr.2	Yes
FL-1*	System Alarm	An internal program error occurred in the SERVOPACK.	–	No
FL-2*				
FL-3*				
FL-4*				
FL-5*				
FL-6*				
CPF00	Digital Operator Communications Error 1	Communications were not possible between the Digital Operator (model: JUSP-OP05A-1-E) and the SERVOPACK (e.g., a CPU error occurred).	–	No
CPF01	Digital Operator Communications Error 2			

* These alarms are not stored in the alarm history. They are only displayed on the panel display.

Note: The A.Eb0, A.Eb2 to A.Eb9, and A.EC0 to A.EC2 alarms can occur when a Safety Module is connected. Refer to the following manual for details.

AC Servo Drive Σ-V-Series/Σ-V-Series for Large-Capacity Models/Σ-7-Series User's Manual Safety Module (Manual No.: SIEP C720829 06)

6.2.3 Troubleshooting Alarms

The causes of and corrections for the alarms are given in the following table. Contact your Yaskawa representative if you cannot solve a problem with the correction given in the table.

Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.020: Parameter Checksum Error (There is an error in the parameter data in the SERVOPACK.)	The power supply voltage suddenly dropped.	Measure the power supply voltage.	Set the power supply voltage within the specified range, and initialize the parameter settings.	*1
	The power supply was shut OFF while writing parameter settings.	Check the timing of shutting OFF the power supply.	Initialize the parameter settings and then set the parameters again.	
	The number of times that parameters were written exceeded the limit.	Check to see if the parameters were frequently changed from the host controller.	The SERVOPACK may be faulty. Replace the SERVOPACK. Reconsider the method for writing the parameters.	–
	A malfunction was caused by noise from the AC power supply, ground, static electricity, or other source.	Turn the power supply to the SERVOPACK OFF and ON again. If the alarm still occurs, noise may be the cause.	Implement countermeasures against noise.	*1
	Gas, water drops, or cutting oil entered the SERVOPACK and caused failure of the internal components.	Check the installation conditions.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	A failure occurred in the SERVOPACK.	Turn the power supply to the SERVOPACK OFF and ON again. If the alarm still occurs, the SERVOPACK may have failed.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.021: Parameter Format Error (There is an error in the parameter data format in the SERVOPACK.)	The software version of the SERVOPACK that caused the alarm is older than the software version of the parameters specified to write.	Read the product information to see if the software versions are the same. If they are different, it could be the cause of the alarm.	Write the parameters from another SERVOPACK with the same model and the same software version, and then turn the power OFF and ON again.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.022: System Checksum Error (There is an error in the parameter data in the SERVOPACK.)	The power supply voltage suddenly dropped.	Measure the power supply voltage.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The power supply was shut OFF while setting a utility function.	Check the timing of shutting OFF the power supply.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	A failure occurred in the SERVOPACK.	Turn the power supply to the SERVOPACK OFF and ON again. If the alarm still occurs, the SERVOPACK may have failed.	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.024: System Alarm (An internal program error occurred in the SERVOPACK.)	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.025: System Alarm (An internal program error occurred in the SERVOPACK.)	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.030: Main Circuit Detector Error	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The jumper between the DC Reactor terminals (⊖1 and ⊖2) was removed or there is faulty contact.	–	Correct the wiring between the DC Reactor terminals.	–
	The cable between the DC Reactor and SERVOPACK is not wired correctly or there is a faulty contact.			
A.040: Parameter Setting Error (A parameter setting is outside of the setting range.)	The SERVOPACK and Servomotor capacities do not match each other.	Check the combination of the SERVOPACK and Servomotor capacities.	Select a proper combination of SERVOPACK and Servomotor capacities.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	A parameter setting is outside of the setting range.	Check the setting ranges of the parameters that have been changed.	Set the parameters to values within the setting ranges.	–
	The electronic gear ratio is outside of the setting range.	Check the electronic gear ratio. The ratio must be within the following range: 0.001 < (Pn20E/Pn210) < 64,000.	Set the electronic gear ratio in the following range: 0.001 < (Pn20E/Pn210) < 64,000.	*1
A.041: Encoder Output Pulse Setting Error	The setting of Pn212 (Number of Encoder Output Pulses) or Pn281 (Encoder Output Resolution) is outside of the setting range or does not satisfy the setting conditions.	Check the setting of Pn212 or Pn281.	Set Pn212 or Pn281 to an appropriate value.	*1

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.042: Parameter Combination Error	The speed of program jogging went below the setting range when the electronic gear ratio (Pn20E/ Pn210) or the Servomotor was changed.	Check to see if the detection conditions*2 are satisfied.	Decrease the setting of the electronic gear ratio (Pn20E/Pn210).	*1
	The speed of program jogging went below the setting range when Pn533 (Program Jogging Movement Speed) was changed.	Check to see if the detection conditions*2 are satisfied.	Increase the setting of Pn533.	*1
	The movement speed of advanced autotuning went below the setting range when the electronic gear ratio (Pn20E/ Pn210) or the Servomotor was changed.	Check to see if the detection conditions*3 are satisfied.	Decrease the setting of the electronic gear ratio (Pn20E/Pn210).	*1
A.044: Semi-Closed/ Fully-Closed Loop Control Parameter Setting Error	The setting of the Fully-Closed Module does not match the setting of Pn002 = n.X□□□ (External Encoder Usage).	Check the setting of Pn002 = n.X□□□.	Make sure that the setting of the Fully-closed Module agrees with the setting of Pn002 = n.X□□□.	*1
	The following parameters are not set correctly. • Pn002 = n.X□□□ (External Encoder Usage) • Pn02A = n.□□□X (Semi-closed/Fully-closed Loop Control Switching Selection)	Check the setting of Pn002 = n.X□□□ and Pn02A = n.□□□X.	When switching between semi-closed loop control and fully-closed loop control, set the parameters as follows: • Pn002 = n.1□□□ or n.3□□□ • Pn02A = n.□□□1	–
A.04A: Parameter Setting Error 2	For 4-byte parameter bank members, there are two consecutive members with nothing registered.	–	Change the number of bytes for bank members to an appropriate value.	–
	The total amount of bank data exceeds 64 (Pn900 × Pn901 > 64).	–	Reduce the total amount of bank data to 64 or less.	–
A.050: Combination Error (The capacities of the SERVOPACK and Servomotor do not match.)	The SERVOPACK and Servomotor capacities do not match each other.	Confirm that the following condition is met: 1/4 < (Servomotor capacity/SERVOPACK capacity) < 4	Select a proper combination of the SERVOPACK and Servomotor capacities.	*1
	A failure occurred in the encoder.	Replace the encoder and check to see if the alarm still occurs.	Replace the Servomotor or encoder.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.051: Unsupported Device Alarm	An unsupported Serial Converter Unit or encoder (e.g., an external encoder) is connected to the SERVOPACK.	Check the product combination specifications.	Change to a correct combination of models.	–
A.070: Motor Type Change Detected (The connected motor is a different type of motor from the previously connected motor.)	A Rotary Servomotor was removed and a Linear Servomotor was connected.	–	Set the parameters for a Linear Servomotor and reset the motor type alarm. Then, turn the power supply to the SERVOPACK OFF and ON again.	*1
	A Linear Servomotor was removed and a Rotary Servomotor was connected.	–	Set the parameters for a Rotary Servomotor and reset the motor type alarm. Then, turn the power supply to the SERVOPACK OFF and ON again.	*1
A.0b0: Invalid Servo ON Command Alarm	The SV_ON (Servo ON) command was sent from the host controller after a utility function that turns ON the Servomotor was executed.	–	Turn the power supply to the SERVOPACK OFF and ON again. Or, execute a software reset.	*1
A.0b1: Semi-closed Loop Control/ Fully-closed Loop Control Switching Operation Error	Semi-closed Loop Control/Fully-closed Loop Control Switching was executed while one of the following functions was running: • Jog • Origin Search • Jog Program • Adjust the Motor Current Detection Signal Offsets • Autotuning without Host Reference • Easy FFT • Mechanical Analysis • Moment of Inertia Estimation • Speed Ripple Compensation	Check the timing of switching between semi-closed loop control and fully-closed loop control.	–	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.100: Overcurrent Detected (An overcurrent flowed through the power transistor or the heat sink overheated.)	The Main Circuit Cable is not wired correctly or there is faulty contact.	Check the wiring.	Correct the wiring.	*1
	There is a short-circuit or ground fault in a Main Circuit Cable.	Check for short-circuits across Servomotor phases U, V, and W, or between the ground and Servomotor phases U, V, and W.	The cable may be short-circuited. Replace the cable.	
	There is a short-circuit or ground fault inside the Servomotor.	Check for short-circuits across Servomotor phases U, V, and W, or between the ground and Servomotor phases U, V, or W.	The Servomotor may be faulty. Replace the Servomotor.	
	There is a short-circuit or ground fault inside the SERVOPACK.	Check for short-circuits across the Servomotor connection terminals U, V, and W on the SERVOPACK, or between the ground and terminals U, V, or W.	The SERVOPACK may be faulty. Replace the SERVOPACK.	
	The regenerative resistor is not wired correctly or there is faulty contact.	Check the wiring.	Correct the wiring.	*1

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.100: Overcurrent Detected (An overcurrent flowed through the power transistor or the heat sink overheated.)	The dynamic brake (DB, emergency stop executed from the SERVOPACK) was frequently activated, or a DB overload alarm occurred.	Check the power consumed by the DB resistor to see how frequently the DB is being used. Or, check the alarm display to see if a DB overload alarm (A.730 or A.731) has occurred.	Change the SERVOPACK model, operating methods, or the mechanisms so that the dynamic brake does not need to be used so frequently.	–
	The regenerative processing capacity was exceeded.	Check the regenerative load ratio in the SigmaWin+ Motion Monitor Tab Page to see how frequently the regenerative resistor is being used.	Recheck the operating conditions and load.	*4
	The SERVOPACK regenerative resistance is too small.	Check the regenerative load ratio in the SigmaWin+ Motion Monitor Tab Page to see how frequently the regenerative resistor is being used.	Change the regenerative resistance to a value larger than the SERVOPACK minimum allowable resistance.	
	A heavy load was applied while the Servomotor was stopped or running at a low speed.	Check to see if the operating conditions exceed Servo Drive specifications.	Reduce the load applied to the Servomotor. Or, increase the operating speed.	–
	A malfunction was caused by noise.	Improve the noise environment, e.g. by improving the wiring or installation conditions, and check to see if the alarm still occurs.	Implement countermeasures against noise, such as correct wiring of the FG. Use an FG wire size equivalent to the SERVOPACK's main circuit wire size.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.101: Motor Overcurrent Detected (The current to the motor exceeded the allowable current.)	The Main Circuit Cable is not wired correctly or there is faulty contact.	Check the wiring.	Correct the wiring.	*1
	There is a short-circuit or ground fault in a Main Circuit Cable.	Check for short-circuits across cable phases U, V, and W, or between the ground and cable phases U, V, and W.	The cable may be short-circuited. Replace the cable.	
	There is a short-circuit or ground fault inside the Servomotor.	Check for short-circuits across Servomotor phases U, V, and W, or between the ground and Servomotor phases U, V, or W.	The Servomotor may be faulty. Replace the Servomotor.	
	There is a short-circuit or ground fault inside the SERVOPACK.	Check for short-circuits across the Servomotor connection terminals U, V, and W on the SERVOPACK, or between the ground and terminals U, V, or W.	The SERVOPACK may be faulty. Replace the SERVOPACK.	
	A heavy load was applied while the Servomotor was stopped or running at a low speed.	Check to see if the operating conditions exceed Servo Drive specifications.	Reduce the load applied to the Servomotor. Or, increase the operating speed.	–
	A malfunction was caused by noise.	Improve the noise environment, e.g. by improving the wiring or installation conditions, and check to see if the alarm still occurs.	Implement countermeasures against noise, such as correct wiring of the FG. Use an FG wire size equivalent to the SERVOPACK's main circuit wire size.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.300: Regeneration Error	Pn600 (Regenerative Resistor Capacity) is not set to 0 and an External Regenerative Resistor is not connected to one of the following SERVOPACKs: SGD7S-R70A, -R90A,-1R6A, -2R8A, -R70F, -R90F, -2R1F, or -2R8F.	Check to see if an External Regenerative Resistor is connected and check the setting of Pn600.	Connect an External Regenerative Resistor, or set Pn600 (Regenerative Resistor Capacity) to 0 (setting unit: ×10 W) if no Regenerative Resistor is required.	*1
	An External Regenerative Resistor is not connected to one of the following SERVOPACKs: SGD7S-470A, -550A, -590A, or -780A.	Check to see if an External Regenerative Resistor or a Regenerative Resistor Unit is connected and check the setting of Pn600.	Connect an External Regenerative Resistor and set Pn600 to an appropriate value, or connect a Regenerative Resistor Unit and set Pn600 to 0.	
	The jumper between the regenerative resistor terminals (B2 and B3) was removed from one of the following SERVOPACKs: SGD7S-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, or -330A.	Check to see if the jumper is connected between power supply terminals B2 and B3.	Correctly connect a jumper.	*1
	The External Regenerative Resistor is not wired correctly, or was removed or disconnected.	Check the wiring of the External Regenerative Resistor.	Correct the wiring of the External Regenerative Resistor.	
	A failure occurred in the SERVOPACK.	–	While the main circuit power supply is OFF, turn the control power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.320: Regenerative Overload	The power supply voltage exceeded the specified range.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	The external regenerative resistance value or regenerative resistor capacity is too small, or there has been a continuous regeneration state.	Check the operating conditions or the capacity using the SigmaJunmaSize+ Capacity Selection Software or other means.	Change the regenerative resistance value or capacity. Reconsider the operating conditions using the SigmaJunmaSize+ Capacity Selection Software or other means.	*4
	There was a continuous regeneration state because a negative load was continuously applied.	Check the load applied to the Servomotor during operation.	Reconsider the system including the servo, machine, and operating conditions.	–
	The setting of Pn600 (Regenerative Resistor Capacity) is smaller than the capacity of the External Regenerative Resistor.	Check to see if a Regenerative Resistor is connected and check the setting of Pn600.	Correct the setting of Pn600.	*1
	The setting of Pn603 (Regenerative Resistance) is smaller than the capacity of the External Regenerative Resistor.	Check to see if a Regenerative Resistor is connected and check the setting of Pn603.	Correct the setting of Pn603.	*1
	The external regenerative resistance is too high.	Check the regenerative resistance.	Change the regenerative resistance to a correct value or use an External Regenerative Resistor of an appropriate capacity.	*4
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.330: Main Circuit Power Supply Wiring Error (Detected when the main circuit power supply is turned ON.)	The regenerative resistor was disconnected when the SERVOPACK power supply voltage was high.	Measure the resistance of the regenerative resistor using a measuring instrument.	If you are using the regenerative resistor built into the SERVOPACK, replace the SERVOPACK. If you are using an External Regenerative Resistor, replace the External Regenerative Resistor.	–
	DC power was supplied when an AC power supply input was specified in the settings.	Check the power supply to see if it is a DC power supply.	Correct the power supply setting to match the actual power supply.	*1
	AC power was supplied when a DC power supply input was specified in the settings.	Check the power supply to see if it is an AC power supply.	Correct the power supply setting to match the actual power supply.	
	Pn600 (Regenerative Resistor Capacity) is not set to 0 and an External Regenerative Resistor is not connected to one of the following SERVOPACKs: SGD7S-R70A, -R90A, -1R6A, -2R8A, -R70F, -R90F, -2R1F, or -2R8F.	Check to see if an External Regenerative Resistor is connected and check the setting of Pn600.	Connect an External Regenerative Resistor, or if an External Regenerative Resistor is not required, set Pn600 to 0.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.400: Overvoltage (Detected in the main circuit power supply section of the SERVOPACK.)	The power supply voltage exceeded the specified range.	Measure the power supply voltage.	Set the AC/DC power supply voltage within the specified range.	–
	The power supply is not stable or was influenced by a lightning surge.	Measure the power supply voltage.	Improve the power supply conditions, install a surge absorber, and then turn the power supply OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The voltage for AC power supply was too high during acceleration or deceleration.	Check the power supply voltage and the speed and torque during operation.	Set the AC power supply voltage within the specified range.	–
	The external regenerative resistance is too high for the operating conditions.	Check the operating conditions and the regenerative resistance.	Select a regenerative resistance value that is appropriate for the operating conditions and load.	*4
	The moment of inertia ratio exceeded the allowable value.	Check to see if the moment of inertia ratio is within the allowable range.	Increase the deceleration time, or reduce the load.	–
	A failure occurred in the SERVOPACK.	–	While the main circuit power supply is OFF, turn the control power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.410: Undervoltage (Detected in the main circuit power supply section of the SERVOPACK.)	The power supply voltage went below the specified range.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	The power supply voltage dropped during operation.	Measure the power supply voltage.	Increase the power supply capacity.	–
	A momentary power interruption occurred.	Measure the power supply voltage.	If you have changed the setting of Pn509 (Momentary Power Interruption Hold Time), decrease the setting.	*1
	The SERVOPACK fuse is blown out.	–	Replace the SERVOPACK and connect a reactor to the DC reactor terminals (⊖1 and ⊖2) on the SERVOPACK.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The jumper between the DC Reactor terminals (⊖1 and ⊖2) was removed or there is faulty contact.	–	Correct the wiring between the DC Reactor terminals.	–
	The cable between the DC Reactor and SERVOPACK is not wired correctly or there is a faulty contact.			
A.510: Overspeed (The motor exceeded the maximum speed.)	The order of phases U, V, and W in the motor wiring is not correct.	Check the wiring of the Servomotor.	Make sure that the Servomotor is correctly wired.	–
	A reference value that exceeded the overspeed detection level was input.	Check the input reference.	Reduce the reference value. Or, adjust the gain.	–
	The motor exceeded the maximum speed.	Check the waveform of the motor speed.	Reduce the speed reference input gain and adjust the servo gain. Or, reconsider the operating conditions.	
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.511: Encoder Output Pulse Overspeed	The encoder output pulse frequency exceeded the limit.	Check the encoder output pulse setting.	Decrease the setting of Pn212 (Number of Encoder Output Pulses) or Pn281 (Encoder Output Resolution).	*1
	The encoder output pulse frequency exceeded the limit because the motor speed was too high.	Check the encoder output pulse setting and the motor speed.	Reduce the motor speed.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.520: Vibration Alarm	Abnormal oscillation was detected in the motor speed.	Check for abnormal motor noise, and check the speed and torque waveforms during operation.	Reduce the motor speed. Or, reduce the setting of Pn100 (Speed Loop Gain).	*1
	The setting of Pn103 (Moment of Inertia Ratio) is greater than the actual moment of inertia or was greatly changed.	Check the moment of inertia ratio or mass ratio.	Set Pn103 (Moment of Inertia Ratio) to an appropriate value.	*1
	The vibration detection level (Pn312) is not suitable.	Check that the vibration detection level (Pn312) is suitable.	Set a suitable vibration detection level (Pn312).	*1
A.521: Autotuning Alarm (Vibration was detected while executing the custom tuning, Easy FFT, or the tuning-less function.)	The Servomotor vibrated considerably while performing the tuning-less function.	Check the waveform of the motor speed.	Reduce the load so that the moment of inertia ratio is within the allowable value. Or increase the load level or reduce the rigidity level in the tuning-less level settings.	*1
	The Servomotor vibrated considerably while performing custom tuning or Easy FFT.	Check the waveform of the motor speed.	Check the operating procedure of corresponding function and implement corrections.	*1
A.710: Instantaneous Overload A.720: Continuous Overload	The wiring is not correct or there is a faulty contact in the motor or encoder wiring.	Check the wiring.	Make sure that the Servomotor and encoder are correctly wired.	*1
	Operation was performed that exceeded the overload protection characteristics.	Check the motor overload characteristics and Run command.	Reconsider the load and operating conditions. Or, increase the motor capacity.	–
	An excessive load was applied during operation because the Servomotor was not driven due to mechanical problems.	Check the operation reference and motor speed.	Correct the mechanical problem.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.730 and A.731: Dynamic Brake Overload (An excessive power consumption by the dynamic brake was detected.)	The Servomotor was rotated by an external force.	Check the operation status.	Implement measures to ensure that the motor will not be rotated by an external force.	–
	When the Servomotor was stopped with the dynamic brake, the rotational or linear kinetic energy exceeded the capacity of the dynamic brake resistor.	Check the power consumed by the DB resistor to see how frequently the DB is being used.	Reconsider the following: • Reduce the Servomotor command speed. • Decrease the moment of inertia ratio. • Reduce the frequency of stopping with the dynamic brake.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.740: Inrush Current Limiting Resistor Overload (The main circuit power supply was frequently turned ON and OFF.)	The allowable frequency of the inrush current limiting resistor was exceeded when the main circuit power supply was turned ON and OFF.	–	Reduce the frequency of turning the main circuit power supply ON and OFF.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.7A1: Internal Temperature Error 1 (Control Board Temperature Error)	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat. Or, check the operating status with the SERVOPACK installation environment monitor.	Decrease the surrounding temperature by improving the SERVOPACK installation conditions.	*1
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	Use the accumulated load ratio to check the load during operation, and use the regenerative load ratio to check the regenerative processing capacity.	Reconsider the load and operating conditions.	–
	The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	Check the SERVOPACK installation conditions.	Install the SERVOPACK according to specifications.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.7A2: Internal Temperature Error 2 (Power Board Temperature Error)	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat. Or, check the operating status with the SERVOPACK installation environment monitor.	Decrease the surrounding temperature by improving the SERVOPACK installation conditions.	*1
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	Use the accumulated load ratio to check the load during operation, and use the regenerative load ratio to check the regenerative processing capacity.	Reconsider the load and operating conditions.	–
	The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	Check the SERVOPACK installation conditions.	Install the SERVOPACK according to specifications.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.7A3: Internal Temperature Sensor Error (An error occurred in the temperature sensor circuit.)	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.7Ab: SERVOPACK Built-in Fan Stopped	The fan inside the SERVOPACK stopped.	Check for foreign matter inside the SERVOPACK.	Remove foreign matter from the SERVOPACK. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.810: Encoder Backup Alarm (Detected at the encoder, but only when an absolute encoder is used.)	The power to the absolute encoder was turned ON for the first time.	Check to see if the power supply was turned ON for the first time.	Set up the encoder.	*1
	The Encoder Cable was disconnected and then connected again.	Check to see if the power supply was turned ON for the first time.	Check the encoder connection and set up the encoder.	
	Power is not being supplied both from the control power supply (+5 V) from the SERVOPACK and from the battery power supply.	Check the encoder connector battery and the connector status.	Replace the battery or implement similar measures to supply power to the encoder, and set up the encoder.	
	A failure occurred in the absolute encoder.	–	If the alarm still occurs after setting up the encoder again, replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.820: Encoder Checksum Alarm (Detected at the encoder.)	A failure occurred in the encoder.	–	■ When Using an Absolute Encoder Set up the encoder again. If the alarm still occurs, the Servomotor may be faulty. Replace the Servomotor. ■ When Using a Single-turn Absolute Encoder or Incremental Encoder The Servomotor may be faulty. Replace the Servomotor.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.830: Encoder Battery Alarm (The absolute encoder battery voltage was lower than the specified level.)	The battery connection is faulty or a battery is not connected.	Check the battery connection.	Correct the battery connection.	*1
	The battery voltage is lower than the specified value (2.7 V).	Measure the battery voltage.	Replace the battery.	*1
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.840: Encoder Data Alarm (Detected at the encoder.)	The encoder malfunctioned.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	The encoder malfunctioned due to noise.	–	Correct the wiring around the encoder by separating the Encoder Cable from the Servomotor Main Circuit Cable or by grounding the encoder.	–
A.850: Encoder Overspeed (Detected at the encoder when the control power supply is turned ON.)	The Servomotor speed was 200 min^{-1} or higher when the control power supply was turned ON.	Check the motor speed when the power supply is turned ON.	Reduce the Servomotor speed to a value less than 200 min^{-1}, and turn ON the control power supply.	–
	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.860: Encoder Overheated (Detected when a Rotary Servomotor, or Direct Drive Servomotor is connected. However, this alarm is not detected for SGMCS Servomotors with Incremental Encoders.) (Detected at the encoder.)	The surrounding air temperature around the Servomotor is too high.	Measure the surrounding air temperature around the Servomotor.	Reduce the surrounding air temperature of the Servomotor to 40°C or less.	–
	The Servomotor load is greater than the rated load.	Use the accumulated load ratio to check the load.	Operate the Servo Drive so that the motor load remains within the specified range.	*1
	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.861: Motor Overheated	The surrounding temperature around the Servomotor is too high.	Measure the surrounding temperature around the Servomotor.	Reduce the surrounding air temperature of the Servomotor to 40°C or less.	–
	The motor load is greater than the rated load.	Check the load with the accumulated load ratio on the Motion Monitor Tab Page on the SigmaWin+.	Operate the Servo Drive so that the motor load remains within the specified range.	*1
	A failure occurred in the Serial Converter Unit.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Serial Converter Unit may be faulty. Replace the Serial Converter Unit.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.862: Overheat Alarm	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat.	Lower the surrounding temperature by improving the installation conditions of the machine.	–
	The overheat protection input signal line is disconnected or short-circuited.	Check the input voltage with the overheat protection input information on the Motion Monitor Tab Page on the SigmaWin+.	Repair the line for the overheat protection input signal.	–
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	Operation was performed under an excessive load.	Use the accumulated load ratio to check the load during operation.	Reconsider the load and operating conditions.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The temperature detection circuit in the sensor attached to the machine is faulty.	–	The temperature detection circuit in the sensor attached to the machine may be faulty. Repair the sensor attached to the machine.	–
A.8A0: External Encoder Error	Setting the origin of the absolute linear encoder failed because the motor moved.	Before you set the origin, use the fully-closed feedback pulse counter to confirm that the motor is not moving.	The motor must be stopped while setting the origin position.	*1
	A failure occurred in the external encoder.	–	Replace the external encoder.	–
A.8A1: External Encoder Module Error	A failure occurred in the external encoder.	–	Replace the external encoder.	–
	A failure occurred in the Serial Converter Unit.	–	Replace the Serial Converter Unit.	–
A.8A2: External Incremental Encoder Sensor Error	A failure occurred in the external encoder.	–	Replace the external encoder.	–
A.8A3: External Absolute Encoder Position Error	A failure occurred in the external absolute encoder.	–	The external absolute encoder may be faulty. Refer to the encoder manufacturer's instruction manual for corrections.	–
A.8A5: External Encoder Overspeed	An overspeed error was detected in the external encoder.	Check the maximum speed of the external encoder.	Keep the external encoder below its maximum speed.	–
A.8A6: External Encoder Overheated	An overheating error was detected in the external encoder.	–	Replace the external encoder.	–
A.b33: Current Detection Error 3	A failure occurred in the current detection circuit.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.b6A: MECHATROLINK Communications ASIC Error 1	There is a fault in the SERVOPACK MECHATROLINK communications section.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.b6b: MECHATROLINK Communications ASIC Error 2	A malfunction occurred in the MECHATROLINK communications section due to noise.	–	Implement the following countermeasures against noise. • Check the MECHATROLINK Communications Cable and FG wiring. • Attach a ferrite core to the MECHATROLINK Communications Cable.	–
	There is a fault in the SERVOPACK MECHATROLINK communications section.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF0: System Alarm 0	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF1: System Alarm 1	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF2: System Alarm 2	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF3: System Alarm 3	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF4: System Alarm 4	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF5: System Alarm 5	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.bF6: System Alarm 6	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF7: System Alarm 7	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.bF8: System Alarm 8	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.C10: Servomotor Out of Control (Detected when the servo is turned ON.)	The order of phases U, V, and W in the motor wiring is not correct.	Check the Servomotor wiring.	Make sure that the Servomotor is correctly wired.	–
	A failure occurred in the encoder.	–	If the motor wiring is correct and an alarm still occurs after turning the power supply OFF and ON again, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.C80: Encoder Clear Error or Multiturn Limit Setting Error	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.C90: Encoder Communications Error	There is a faulty contact in the connector or the connector is not wired correctly for the encoder.	Check the condition of the encoder connector.	Reconnect the encoder connector and check the encoder wiring.	*1
	There is a cable disconnection or short-circuit in the encoder. Or, the cable impedance is outside the specified values.	Check the condition of the Encoder Cable.	Use the Encoder Cable within the specified specifications.	–
	One of the following has occurred: corrosion caused by improper temperature, humidity, or gas, a short-circuit caused by entry of water drops or cutting oil, or faulty contact in connector caused by vibration.	Check the operating environment.	Improve the operating environmental, and replace the cable. If the alarm still occurs, replace the SERVOPACK.	*1
	A malfunction was caused by noise.	–	Correct the wiring around the encoder by separating the Encoder Cable from the Servomotor Main Circuit Cable or by grounding the encoder.	*1
	A failure occurred in the SERVOPACK.	–	Connect the Servomotor to another SERVOPACK, and turn ON the control power supply. If no alarm occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
	A failure occurred in the encoder.	–	Connect the Servomotor to another SERVOPACK, and turn ON the control power supply. If the alarm occurs, the Servomotor may be faulty. Replace the Servomotor.	–
A.C91: Encoder Communications Position Data Acceleration Rate Error	Noise entered on the signal lines because the Encoder Cable is bent or the sheath is damaged.	Check the condition of the Encoder Cable and connectors.	Check the Encoder Cable to see if it is installed correctly.	*1
	The Encoder Cable is bundled with a high-current line or installed near a high-current line.	Check the installation condition of the Encoder Cable.	Confirm that there is no surge voltage on the Encoder Cable.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Check the installation condition of the Encoder Cable.	Properly ground the machine to separate it from the FG of the encoder.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.C92: Encoder Communications Timer Error	Noise entered on the signal line from the encoder.	–	Implement countermeasures against noise for the encoder wiring.	*1
	Excessive vibration or shock was applied to the encoder.	Check the operating conditions.	Reduce machine vibration. Correctly install the Servomotor or linear encoder.	–
	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.CA0: Encoder Parameter Error	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.Cb0: Encoder Echo-back Error	The encoder is wired incorrectly or there is faulty contact.	Check the wiring of the encoder.	Make sure that the encoder is correctly wired.	*1
	The specifications of the Encoder Cable are not correct and noise entered on it.	–	Use a shielded twisted-pair wire cable or a screened twisted-pair cable with conductors of at least 0.12 mm^2.	–
	The Encoder Cable is too long and noise entered on it.	–	The Encoder Cable wiring distance must be 50 m max.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Check the condition of the Encoder Cable and connectors.	Properly ground the machine to separate it from the FG of the encoder.	–
	Excessive vibration or shock was applied to the encoder.	Check the operating conditions.	Reduce machine vibration. Correctly install the Servomotor.	–
	A failure occurred in the encoder.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the Servomotor may be faulty. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.CC0: Multiturn Limit Disagreement	When using a Direct Drive Servomotor, the setting of Pn205 (Multiturn Limit) does not agree with the encoder.	Check the setting of Pn205.	Correct the setting of Pn205 (0 to 65,535).	*1
	The multiturn limit of the encoder is different from that of the SERVOPACK. Or, the multiturn limit of the SERVOPACK has been changed.	Check the setting of Pn205 in the SERVOPACK.	Change the setting if the alarm occurs.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.CF1: Reception Failed Error in Feedback Option Module Communications	The cable between the Serial Converter Unit and SERVOPACK is not wired correctly or there is a faulty contact.	Check the wiring of the external encoder.	Correctly wire the cable between the Serial Converter Unit and SERVOPACK.	*1
	A specified cable is not being used between Serial Converter Unit and SERVOPACK.	Check the wiring specifications of the external encoder.	Use a specified cable.	–
	The cable between the Serial Converter Unit and SERVOPACK is too long.	Measure the length of the cable that connects the Serial Converter Unit.	The length of the cable between the Serial Converter Unit and SERVOPACK must be 20 m or less.	–
	The sheath on cable between the Serial Converter Unit and SERVOPACK is broken.	Check the cable that connects the Serial Converter Unit.	Replace the cable between the Serial Converter Unit and SERVOPACK.	–
A.CF2: Timer Stopped Error in Feedback Option Module Communications	Noise entered the cable between the Serial Converter Unit and SERVOPACK.	–	Correct the wiring around the Serial Converter Unit, e.g., separate I/O signal lines from the Main Circuit Cables or ground.	–
	A failure occurred in the Serial Converter Unit.	–	Replace the Serial Converter Unit.	–
	A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–
A.d00: Position Deviation Overflow (The setting of Pn520 (Position Deviation Overflow Alarm Level) was exceeded by the position deviation.)	The Servomotor U, V, and W wiring is not correct.	Check the wiring of the Servomotor's Main Circuit Cables.	Make sure that there are no faulty contacts in the wiring for the Servomotor and encoder.	–
	The position command speed is too fast.	Reduce the position command speed and try operating the SERVOPACK.	Reduce the position reference speed or the reference acceleration rate, or reconsider the electronic gear ratio.	*1
	The acceleration of the position reference is too high.	Reduce the reference acceleration and try operating the SERVOPACK.	Reduce the acceleration of the position reference using a MECHATROLINK command. Or, smooth the position reference acceleration by selecting the position reference filter (ACCFIL) using a MECHATROLINK command.	–
	The setting of Pn520 (Position Deviation Overflow Alarm Level) is too low for the operating conditions.	Check Pn520 (Position Deviation Overflow Alarm Level) to see if it is set to an appropriate value.	Optimize the setting of Pn520.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.d01: Position Deviation Overflow Alarm at Servo ON	The servo was turned ON after the position deviation exceeded the setting of Pn526 (Position Deviation Overflow Alarm Level at Servo ON) while the servo was OFF.	Check the position deviation while the servo is OFF.	Optimize the setting of Pn526 (Position Deviation Overflow Alarm Level at Servo ON).	*1
A.d02: Position Deviation Overflow Alarm for Speed Limit at Servo ON	If position deviation remains in the deviation counter, the setting of Pn529 (Speed Limit Level at Servo ON) limits the speed when the servo is turned ON. This alarm occurs if a position reference is input and the setting of Pn520 (Position Deviation Overflow Alarm Level) is exceeded.	–	Optimize the setting of Pn520 (Position Deviation Overflow Alarm Level). Or, adjust the setting of Pn529 (Speed Limit Level at Servo ON).	
A.d10: Motor-Load Position Deviation Overflow	The motor direction and external encoder installation orientation are backward.	Check the motor direction and the external encoder installation orientation.	Install the external encoder in the opposite direction, or change the setting of Pn002 = n.X□□□ (External Encoder Usage) to reverse the direction.	*1
	There is an error in the connection between the load (e.g., stage) and external encoder coupling.	Check the coupling of the external encoder.	Check the mechanical coupling.	–
A.d30: Position Data Overflow	The position data exceeded ±1,879,048,192.	Check the input reference pulse counter.	Reconsider the operating specifications.	–
A.E02: MECHATROLINK Internal Synchronization Error 1	The MECHATROLINK transmission cycle fluctuated.	–	Remove the cause of transmission cycle fluctuation at the host controller.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.E40: MECHATROLINK Transmission Cycle Setting Error	The setting of MECHATROLINK transmission cycle is outside of the specified range.	Check the setting of the MECHATROLINK transmission cycle.	Set the MECHATROLINK transmission cycle to an appropriate value.	–
A.E41: MECHATROLINK Communications Data Size Setting Error	The number of transmission bytes set on DIP switch S3 is not correct.	Check the MECHATROLINK communications data size of the host controller.	Reset DIP switch S3 to change the number of transmission bytes to an appropriate value.	*1

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.E42: MECHATROLINK Station Address Setting Error	The station address is outside of the setting range.	Check rotary switches S1 and S2 to see if the station address is between 03 and EF.	Check the setting of the station address of the host controller, and reset rotary switches S1 and S2 to change the address to an appropriate value between 03 and EF.	*1
	Two or more stations on the communications network have the same address.	Check to see if two or more stations on the communications network have the same address.	Check the setting of the station address of the host controller, and reset rotary switches S1 and S2 to change the address to an appropriate value between 03 and EF.	
A.E50*5: MECHATROLINK Synchronization Error	The WDT data in the host controller was not updated normally.	Check to see if the WDT data is being updated at the host controller.	Correctly update the WDT data at the host controller.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.E51: MECHATROLINK Synchronization Failed	The WDT data at the host controller was not updated correctly at the start of synchronous communications, so synchronous communications could not be started.	Check to see if the WDT data is being updated in the host controller.	Correctly update the WDT data at the host controller.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.E60*5: Reception Error in MECHATROLINK Communications	MECHATROLINK wiring is not correct.	Check the MECHATROLINK wiring.	Correct the MECHATROLINK Communications Cable wiring.	–
	A MECHATROLINK data reception error occurred due to noise.	–	Implement countermeasures against noise. (Check the MECHATROLINK Communications Cable and FG wiring, and implement measures such as attaching a ferrite core to the MECHATROLINK Communications Cable.)	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.E61: Synchronization Interval Error in MECHATROLINK Transmission Cycle	The MECHATROLINK transmission cycle fluctuated.	Check the setting of the MECHATROLINK transmission cycle.	Remove the cause of transmission cycle fluctuation at the host controller.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.E63: MECHATROLINK Synchronization Frame Not Received	MECHATROLINK wiring is not correct.	Check the Servomotor wiring.	Correct the MECHATROLINK Communications Cable wiring.	–
	A MECHATROLINK data reception error occurred due to noise.	–	Implement countermeasures against noise. (Check the MECHATROLINK Communications Cable and FG wiring, and implement measures such as attaching a ferrite core to the MECHATROLINK Communications Cable.)	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.E71: Safety Option Module Detection Failure	There is a faulty connection between the SERVOPACK and the Safety Option Module.	Check the connection between the SERVOPACK and the Safety Option Module.	Correctly connect the Safety Option Module.	–
	The Safety Option Module was disconnected.	–	Execute Fn014 (Reset Option Module Configuration Error) from the Digital Operator or SigmaWin+ and then turn the power supply to the SERVOPACK OFF and ON again.	*1
	A failure occurred in the Safety Option Module.	–	Replace the Safety Option Module.	–
	A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–
A.E72: Feedback Option Module Detection Failure	There is a faulty connection between the SERVOPACK and the Feedback Option Module.	Check the connection between the SERVOPACK and the Feedback Option Module.	Correctly connect the Feedback Option Module.	–
	The Feedback Option Module was disconnected.	–	Reset the Option Module configuration error and turn the power supply to the SERVOPACK OFF and ON again.	*1
	A failure occurred in the Feedback Option Module.	–	Replace the Feedback Option Module.	–
	A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
A.E74: Unsupported Safety Option Module	A failure occurred in the Safety Option Module.	–	Replace the Safety Option Module.	–
	An unsupported Safety Option Module was connected.	Refer to the catalog of the connected Safety Option Module.	Connect a compatible Safety Option Module.	–
A.Eb1: Safety Function Signal Input Timing Error	The delay between activation of the /HWBB1 and /HWBB2 input signals for the HWBB was ten second or longer.	Measure the time delay between the /HWBB1 and /HWBB2 signals.	The output signal circuits or devices for /HWBB1 and /HWBB2 or the SERVOPACK input signal circuits may be faulty. Alternatively, the input signal cables may be disconnected. Check to see if any of these items are faulty or have been disconnected.	–
	A failure occurred in the SERVOPACK.	–	Replace the SERVOPACK.	–
A.EC8: Gate Drive Error 1 (An error occurred in the gate drive circuit.) A.EC9: Gate Drive Error 2 (An error occurred in the gate drive circuit.)	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.Ed1: Command Execution Timeout	A timeout error occurred for a MECHATROLINK command.	Check the motor status when the command is executed.	Execute the SV_ON or SENS_ON command only when the motor is not operating.	–
		Check the status of the external encoder when the command is executed.	Execute the SENS_ON command only when an external encoder is connected.	–
A.F10: Power Supply Line Open Phase (The voltage was low for more than one second for phase R, S, or T when the main power supply was ON.)	The three-phase power supply wiring is not correct.	Check the power supply wiring.	Make sure that the power supply is correctly wired.	*1
	The three-phase power supply is unbalanced.	Measure the voltage for each phase of the three-phase power supply.	Balance the power supply by changing phases.	–
	A single-phase power supply was input without specifying a single-phase AC power supply input (Pn00B = n.□1□□).	Check the power supply and the parameter setting.	Match the parameter setting to the power supply.	*1
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Alarm Number: Alarm Name	Possible Cause	Confirmation	Correction	Reference
FL-1*5: System Alarm	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
FL-2*5: System Alarm				
FL-3*5: System Alarm				
FL-4*5: System Alarm				
FL-5*5: System Alarm				
FL-6*5: System Alarm				
CPF00: Digital Operator Communications Error 1	There is a faulty contact between the Digital Operator and the SERVOPACK.	Check the connector contact.	Disconnect the connector and insert it again. Or, replace the cable.	–
	A malfunction was caused by noise.	–	Keep the Digital Operator or the cable away from sources of noise.	–
CPF01: Digital Operator Communications Error 2	A failure occurred in the Digital Operator.	–	Disconnect the Digital Operator and then connect it again. If an alarm still occurs, the Digital Operator may be faulty. Replace the Digital Operator.	–
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–

*1. Refer to the following manual for details.
Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

*2. Detection Conditions
If either of the following conditions is detected, an alarm will occur.

- $\text{Pn533 [min}^{-1}\text{]} \times \frac{\text{Encoder resolution}}{6 \times 10^5} \leq \frac{\text{Pn20E}}{\text{Pn210}}$
- $\text{Maximum motor speed [min}^{-1}\text{]} \times \frac{\text{Encoder resolution}}{\text{Approx. } 3.66 \times 10^{12}} \geq \frac{\text{Pn20E}}{\text{Pn210}}$

*3. Detection Conditions
If either of the following conditions is detected, an alarm will occur.

- $\text{Rated motor speed [min}^{-1}\text{]} \times 1/3 \times \frac{\text{Encoder resolution}}{6 \times 10^5} \leq \frac{\text{Pn20E}}{\text{Pn210}}$
- $\text{Maximum motor speed [min}^{-1}\text{]} \times \frac{\text{Encoder resolution}}{\text{Approx. } 3.66 \times 10^{12}} \geq \frac{\text{Pn20E}}{\text{Pn210}}$

*4. Refer to the following manual for details.
Σ-7-Series Peripheral Device Selection Manual (Manual No.: SIEP S800001 32)

*5. These alarms are not stored in the alarm history. They are only displayed on the panel display.

6.2.4 Warning Displays

If a warning occurs in the SERVOPACK, a warning number will be displayed on the panel display. Warnings are displayed to warn you before an alarm occurs.

This section provides a list of warnings and the causes of and corrections for warnings.

6.2.5 List of Warnings

The list of warnings gives the warning name and warning meaning in order of the warning numbers.

Warning Number	Warning Name	Meaning	Resetting
A.900	Position Deviation Overflow	The position deviation exceeded the percentage set with the following formula: (Pn520 × Pn51E/100)	Required.
A.901	Position Deviation Overflow Alarm at Servo ON	The position deviation when the servo was turned ON exceeded the percentage set with the following formula: (Pn526 × Pn528/100)	Required.
A.910	Overload	This warning occurs before an overload alarm (A.710 or A.720) occurs. If the warning is ignored and operation is continued, an alarm may occur.	Required.
A.911	Vibration	Abnormal vibration was detected during motor operation. The detection level is the same as A.520. Set whether to output an alarm or a warning by setting Pn310 (Vibration Detection Selection).	Required.
A.912	Internal Temperature Warning 1 (Control Board Temperature Error)	The surrounding temperature of the control PCB is abnormal.	Required.
A.913	Internal Temperature Warning 2 (Power Board Temperature Error)	The surrounding temperature of the power PCB is abnormal.	Required.
A.920	Regenerative Overload	This warning occurs before an A.320 alarm (Regenerative Overload) occurs. If the warning is ignored and operation is continued, an alarm may occur.	Required.
A.921	Dynamic Brake Overload	This warning occurs before an A.731 alarm (Dynamic Brake Overload) occurs. If the warning is ignored and operation is continued, an alarm may occur.	Required.
A.923	SERVOPACK Built-in Fan Stopped	The fan inside the SERVOPACK stopped.	Required.
A.930	Absolute Encoder Battery Error	This warning occurs when the voltage of absolute encoder's battery is low.	Required.
A.93B	Overheat Warning	The input voltage (temperature) for the overheat protection input (TH) signal exceeded the setting of Pn61C (Overheat Warning Level).	Required.
A.942	Speed Ripple Compensation Information Disagreement	The speed ripple compensation information stored in the encoder does not agree with the speed ripple compensation information stored in the SERVOPACK.	Required.
A.94A	Data Setting Warning 1 (Parameter Number Error)	There is an error in the parameter number for a Data Setting Warning 1 (Parameter Number) command.	Automatically reset.*
A.94b	Data Setting Warning 2 (Out of Range)	The command data is out of range.	Automatically reset.*
A.94C	Data Setting Warning 3 (Calculation Error)	A calculation error was detected.	Automatically reset.*
A.94d	Data Setting Warning 4 (Parameter Size)	The data sizes do not match.	Automatically reset.*
A.94E	Data Setting Warning 5 (Latch Mode Error)	A latch mode error was detected.	Required.
A.95A	Command Warning 1 (Unsatisfied Command Conditions)	A command was sent when the conditions for sending a command were not satisfied.	Automatically reset.*

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Warning Number	Warning Name	Meaning	Resetting
A.95b	Command Warning 2 (Unsupported Command)	An unsupported command was sent.	Automatically reset.*
A.95d	Command Warning 4 (Command Interference)	There was command interference, particularly latch command interference.	Automatically reset.*
A.95E	Command Warning 5 (Subcommand Not Possible)	The subcommand and main command interfere with each other.	Automatically reset.*
A.95F	Command Warning 6 (Undefined Command)	An undefined command was sent.	Automatically reset.*
A.960	MECHATROLINK Communications Warning	A communications error occurred during MECHATROLINK communications.	Required.
A.971	Undervoltage	This warning occurs before an A.410 alarm (Undervoltage) occurs. If the warning is ignored and operation is continued, an alarm may occur.	Required.
A.97A	Command Warning 7 (Phase Error)	A command that cannot be executed in the current phase was sent.	Automatically reset.*
A.97b	Data Clamp Out of Range	The set command data was clamped to the minimum or maximum value of the allowable setting range.	Automatically reset.*
A.9A0	Overtravel	Overtravel was detected while the servo was ON.	Required.
A.9b0	Preventative Maintenance Warning	One of the consumable parts has reached the end of its service life.	Required.

* The warning will automatically be cleared after the correct command is received.

Note: 1. A warning code is not output unless you set Pn001 to n.1□□□ (Output both alarm codes and warning codes).

2. Use Pn008 = n.□X□□ (Warning Detection Selection) to control warning detection.
However, the following warnings are not affected by the setting of Pn008 = n.□X□□ and other parameter settings are required in addition to Pn008 = n.□X□□.

Warning	Parameters That Must Be Set to Select Warning Detection
A.911	Pn310 = n.□□□X (Vibration Detection Selection)
A.923	– (Not affected by the setting of Pn008 = n.□X□□.)
A.930	Pn008 = n.□□□X (Low Battery Voltage Alarm/Warning Selection)
A.942	Pn423 = n.□□X□ (Speed Ripple Compensation Information Disagreement Warning Detection Selection)
A.94A to A.960 and A.97A to A.97b	Pn800=n.□□X□ (Warning Check Masks)
A.971	Pn008 = n.□□X□ (Function Selection for Undervoltage) (Not affected by the setting of Pn008 = n.□X□□.)
A.9A0	Pn00D = n.X□□□ (Overtravel Warning Detection Selection) (Not affected by the setting of Pn008 = n.□X□□.)
A.9b0	Pn00F = n.□□□X (Preventative Maintenance Warning Selection)

Refer to the following manual for details.
Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

6.2.6 Troubleshooting Warnings

The causes of and corrections for the warnings are given in the following table. Contact your Yaskawa representative if you cannot solve a problem with the correction given in the table.

Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.900: Position Deviation Overflow	The Servomotor U, V, and W wiring is not correct.	Check the wiring of the Servomotor's Main Circuit Cables.	Make sure that there are no faulty connections in the wiring for the Servomotor and encoder.	–
	A SERVOPACK gain is too low.	Check the SERVOPACK gains.	Increase the servo gain, e.g., by using autotuning without a host reference.	*
	The acceleration of the position reference is too high.	Reduce the reference acceleration and try operating the SERVOPACK.	Reduce the acceleration of the position reference using a MECHATROLINK command. Or, smooth the position reference acceleration by selecting the position reference filter (ACCFIL) using a MECHATROLINK command.	–
	The excessive position deviation alarm level (Pn520 × Pn51E/100) is too low for the operating conditions.	Check excessive position deviation alarm level (Pn520 × Pn51E/100) to see if it is set to an appropriate value.	Optimize the settings of Pn520 and Pn51E.	*
	A failure occurred in the SERVOPACK.	–	Turn the power supply to the SERVOPACK OFF and ON again. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.901: Position Deviation Overflow Alarm at Servo ON	The position deviation when the servo was turned ON exceeded the percentage set with the following formula: (Pn526 × Pn528/100)	–	Optimize the setting of Pn528 (Position Deviation Overflow Warning Level at Servo ON).	–

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.910: Overload (warning before an A.710 or A.720 alarm occurs)	The wiring is not correct or there is a faulty contact in the motor or encoder wiring.	Check the wiring.	Make sure that the Servomotor and encoder are correctly wired.	–
	Operation was performed that exceeded the overload protection characteristics.	Check the motor overload characteristics and Run command.	Reconsider the load and operating conditions. Or, increase the motor capacity.	–
	An excessive load was applied during operation because the Servomotor was not driven because of mechanical problems.	Check the operation reference and motor speed.	Remove the mechanical problem.	–
	The overload warning level (Pn52B) is not suitable.	Check that the overload warning level (Pn52B) is suitable.	Set a suitable overload warning level (Pn52B).	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.911: Vibration	Abnormal vibration was detected during motor operation.	Check for abnormal motor noise, and check the speed and torque waveforms during operation.	Reduce the motor speed. Or, reduce the servo gain with custom tuning.	*
	The setting of Pn103 (Moment of Inertia Ratio) is greater than the actual moment of inertia or was greatly changed.	Check the moment of inertia ratio.	Set Pn103 (Moment of Inertia Ratio) to an appropriate value.	*
	The vibration detection level (Pn312) is not suitable.	Check that the vibration detection level (Pn312) is suitable.	Set a suitable vibration detection level (Pn312).	*

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.912: Internal Temperature Warning 1 (Control Board Temperature Error)	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat. Or, check the operating status with the SERVOPACK installation environment monitor.	Decrease the surrounding temperature by improving the SERVOPACK installation conditions.	*
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	Use the accumulated load ratio to check the load during operation, and use the regenerative load ratio to check the regenerative processing capacity.	Reconsider the load and operating conditions.	–
	The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	Check the SERVOPACK installation conditions.	Install the SERVOPACK according to specifications.	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.913: Internal Temperature Warning 2 (Power Board Temperature Error)	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat. Or, check the operating status with the SERVOPACK installation environment monitor.	Decrease the surrounding temperature by improving the SERVOPACK installation conditions.	*
	An overload alarm was reset by turning OFF the power supply too many times.	Check the alarm display to see if there is an overload alarm.	Change the method for resetting the alarm.	–
	There was an excessive load or operation was performed that exceeded the regenerative processing capacity.	Use the accumulated load ratio to check the load during operation, and use the regenerative load ratio to check the regenerative processing capacity.	Reconsider the load and operating conditions.	–
	The SERVOPACK installation orientation is not correct or there is insufficient space around the SERVOPACK.	Check the SERVOPACK installation conditions.	Install the SERVOPACK according to specifications.	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.920: Regenerative Overload (warning before an A.320 alarm occurs)	The power supply voltage exceeded the specified range.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	There is insufficient external regenerative resistance, regenerative resistor capacity, or SERVOPACK capacity, or there has been a continuous regeneration state.	Check the operating conditions or the capacity using the SigmaJunmaSize+ Capacity Selection Software or another means.	Change the regenerative resistance value, regenerative resistance capacity, or SERVOPACK capacity. Reconsider the operating conditions using the SigmaJunmaSize+ Capacity Selection Software or other means.	–
	There was a continuous regeneration state because a negative load was continuously applied.	Check the load applied to the Servomotor during operation.	Reconsider the system including the servo, machine, and operating conditions.	–
A.921: Dynamic Brake Overload (warning before an A.731 alarm occurs)	The Servomotor was rotated by an external force.	Check the operation status.	Implement measures to ensure that the motor will not be rotated by an external force.	–
	When the Servomotor was stopped with the dynamic brake, the rotational or linear kinetic energy exceeded the capacity of the dynamic brake resistor.	Check the power consumed by the DB resistor to see how frequently the DB is being used.	Reconsider the following: • Reduce the Servomotor command speed. • Decrease the moment of inertia. • Reduce the frequency of stopping with the dynamic brake.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.923: SERVOPACK Built-in Fan Stopped	The fan inside the SERVOPACK stopped.	Check for foreign matter inside the SERVOPACK.	Remove foreign matter from the SERVOPACK. If an alarm still occurs, the SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.930: Absolute Encoder Battery Error (The absolute encoder battery voltage was lower than the specified level.) (Detected only when an absolute encoder is connected.)	The battery connection is faulty or a battery is not connected.	Check the battery connection.	Correct the battery connection.	*
	The battery voltage is lower than the specified value (2.7 V).	Measure the battery voltage.	Replace the battery.	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.93B: Overheat Warning	The surrounding temperature is too high.	Check the surrounding temperature using a thermostat.	Lower the surrounding temperature by improving the installation conditions of the machine.	–
	Operation was performed under an excessive load.	Use the accumulated load ratio to check the load during operation.	Reconsider the load and operating conditions.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
	The temperature detection circuit in the sensor attached to the machine is faulty.	–	The temperature detection circuit in the sensor attached to the machine may be faulty. Repair the sensor attached to the machine.	–
A.942: Speed Ripple Compensation Information Disagreement	The speed ripple compensation information stored in the encoder does not agree with the speed ripple compensation information stored in the SERVOPACK.	–	Reset the speed ripple compensation value on the SigmaWin+.	*
		–	Set Pn423 to n.□□1□ (Do not detect A.942 alarms). However, changing the setting may increase the speed ripple.	*
		–	Set Pn423 to n.□□□0 (Disable speed ripple compensation). However, changing the setting may increase the speed ripple.	*
A.94A: Data Setting Warning 1 (Parameter Number Error)	An invalid parameter number was used.	Check the command that caused the warning.	Use the correct parameter number.	*
A.94b: Data Setting Warning 2 (Out of Range)	The set command data was clamped to the minimum or maximum value of the setting range.	Check the command that caused the warning.	Set the parameter within the setting range.	*
A.94C: Data Setting Warning 3 (Calculation Error)	The calculation result of the setting is not correct.	Check the command that caused the warning.	Set the parameter within the setting range.	*
A.94d: Data Setting Warning 4 (Parameter Size)	The parameter size set in the command is not correct.	Check the command that caused the warning.	Set the correct parameter size.	*
A.94E: Data Setting Warning 5 (Latch Mode Error)	A latch mode error was detected.	Check the command that caused the warning.	Change the setting of Pn850 or the LT_MOD data for the LTMOD_ON command sent by the host controller to an appropriate value.	*
A.95A: Command Warning 1 (Unsatisfied Command Conditions)	The command conditions are not satisfied.	Check the command that caused the warning.	Send the command after the command conditions are satisfied.	*
A.95b: Command Warning 2 (Unsupported Command)	An unsupported command was received.	Check the command that caused the warning.	Do not send unsupported commands.	*

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.95d: Command Warning 4 (Command Interference)	The command sending conditions for latch-related commands was not satisfied.	Check the command that caused the warning.	Send the command after the command conditions are satisfied.	*
A.95E: Command Warning 5 (Subcommand Not Possible)	The command sending conditions for subcommands was not satisfied.	Check the command that caused the warning.	Send the command after the conditions are satisfied.	*
A.95F: Command Warning 6 (Undefined Command)	An undefined command was sent.	Check the command that caused the warning.	Do not send undefined commands.	*
A.960: MECHATROLINK Communications Warning	The MECHATROLINK Communications Cable is not wired correctly.	Check the wiring conditions.	Correct the MECHATROLINK communications cable wiring.	*
	A MECHATROLINK data reception error occurred due to noise.	Confirm the installation conditions.	Implement the following countermeasures against noise. • Check the MECHATROLINK Communications Cable and FG wiring and implement countermeasures to prevent noise from entering. • Attach a ferrite core to the MECHATROLINK Communications Cable.	–
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–
A.971: Undervoltage	For a 200-V SERVOPACK, the AC power supply voltage dropped below 140 V.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	For a 100-V SERVOPACK, the AC power supply voltage dropped below 60 V.	Measure the power supply voltage.	Set the power supply voltage within the specified range.	–
	The power supply voltage dropped during operation.	Measure the power supply voltage.	Increase the power supply capacity.	–
	A momentary power interruption occurred.	Measure the power supply voltage.	If you have changed the setting of Pn509 (Momentary Power Interruption Hold Time), decrease the setting.	*
	The SERVOPACK fuse is blown out.	–	Replace the SERVOPACK and connect a reactor.	*
	A failure occurred in the SERVOPACK.	–	The SERVOPACK may be faulty. Replace the SERVOPACK.	–

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Warning Number: Warning Name	Possible Cause	Confirmation	Correction	Reference
A.97A: Command Warning 7 (Phase Error)	A command that cannot be executed in the current phase was sent.	–	Send the command after the command conditions are satisfied.	–
A.97b: Data Clamp Out of Range	The set command data was clamped to the minimum or maximum value of the setting range.	–	Set the command data within the setting ranges.	–
A.9A0: Overtravel (Overtravel status was detected.)	Overtravel was detected while the servo was ON.	Check the status of the overtravel signals on the input signal monitor.	Even if an overtravel signal is not shown by the input signal monitor, momentary overtravel may have been detected. Take the following precautions. • Do not specify movements that would cause overtravel from the host controller. • Check the wiring of the overtravel signals. • Implement countermeasures against noise.	*
A.9b0: Preventative Maintenance Warning	One of the consumable parts has reached the end of its service life.	–	Replace the part. Contact your Yaskawa representative for replacement.	*

* Refer to the following manual for details.
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6.2.7 Troubleshooting Based on the Operation and Conditions of the Servomotor

This section provides troubleshooting based on the operation and conditions of the Servomotor, including causes and corrections.

Problem	Possible Cause	Confirmation	Correction	Reference
Servomotor Does Not Start	The control power supply is not turned ON.	Measure the voltage between control power supply terminals.	Turn OFF the power supply to the servo system. Correct the wiring so that the control power supply is turned ON.	–
	The main circuit power supply is not turned ON.	Measure the voltage across the main circuit power input terminals.	Turn OFF the power supply to the servo system. Correct the wiring so that the main circuit power supply is turned ON.	–
	The I/O signal connector (CN1) pins are not wired correctly or are disconnected.	Turn OFF the power supply to the servo system. Check the wiring condition of the I/O signal connector (CN1) pins.	Correct the wiring of the I/O signal connector (CN1) pins.	*
	The wiring for the Servomotor Main Circuit Cables or Encoder Cable is disconnected.	Check the wiring conditions.	Turn OFF the power supply to the servo system. Wire the cable correctly.	–
	There is an overload on the Servomotor.	Operate the Servomotor with no load and check the load status.	Turn OFF the power supply to the servo system. Reduce the load or replace the Servomotor with a Servomotor with a larger capacity.	–
	The type of encoder that is being used does not agree with the setting of Pn002 = n.□X□□ (Encoder Usage).	Check the type of the encoder that is being used and the setting of Pn002 = n.□X□□.	Set Pn002 = n.□X□□ according to the type of the encoder that is being used.	*
	There is a mistake in the input signal allocations (Pn50A, Pn50B, Pn511, and Pn516).	Check the input signal allocations (Pn50A, Pn50B, Pn511, and Pn516).	Correctly allocate the input signals (Pn50A, Pn50B, Pn511, and Pn516).	*
	The SV_ON command was not sent.	Check the commands sent from the host controller.	Send the SV_ON command from the host controller.	–
	The SENS_ON (Turn ON Sensor) command was not sent.	Check the commands sent from the host controller.	Send the commands to the SERVOPACK in the correct sequence.	–
	The P-OT (Forward Drive Prohibit) or N-OT (Reverse Drive Prohibit) signal is still OFF.	Check the P-OT and N-OT signals.	Turn ON the P-OT and N-OT signals.	*
	The safety input signals (/HWBB1 or /HWBB2) were not turned ON.	Check the /HWBB1 and /HWBB2 input signals.	Turn ON the /HWBB1 and /HWBB2 input signals. If you are not using the safety function, connect the Safety Jumper Connector (provided as an accessory) to CN8.	*

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Problem	Possible Cause	Confirmation	Correction	Reference
Servomotor Does Not Start	The FSTP (Forced Stop Input) signal is still OFF.	Check the FSTP signal.	• Turn ON the FSTP signal. • If you will not use the function to force the motor to stop, set Pn516 = n.□□□X (FSTP (Forced Stop Input) Signal Allocation) to disable the signal.	*
	A failure occurred in the SERVOPACK.	–	Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–
Servomotor Moves Instantaneously, and Then Stops	There is a mistake in the Servomotor wiring.	Turn OFF the power supply to the servo system. Check the wiring.	Wire the Servomotor correctly.	–
	There is a mistake in the wiring of the encoder or Serial Converter Unit.	Turn OFF the power supply to the servo system. Check the wiring.	Wire the Serial Converter Unit correctly.	–
Servomotor Speed Is Unstable	There is a faulty connection in the Servomotor wiring.	The connector connections for the power line (U, V, and W phases) and the encoder or Serial Converter Unit may be unstable. Turn OFF the power supply to the servo system. Check the wiring.	Tighten any loose terminals or connectors and correct the wiring.	–
Servomotor Moves without a Reference Input	A failure occurred in the SERVOPACK.	–	Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–
Dynamic Brake Does Not Operate	The setting of Pn001 = n.□□□X (Motor Stopping Method for Servo OFF and Group 1 Alarms) is not suitable.	Check the setting of Pn001 = n.□□□X.	Set Pn001 = n.□□□X correctly.	–
	The dynamic brake resistor is disconnected.	Check the moment of inertia, motor speed, and dynamic brake frequency of use. If the moment of inertia, motor speed, or dynamic brake frequency of use is excessive, the dynamic brake resistance may be disconnected.	Turn OFF the power supply to the servo system. Replace the SERVOPACK. To prevent disconnection, reduce the load.	–
	There was a failure in the dynamic brake drive circuit.	–	There is a defective component in the dynamic brake circuit. Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Abnormal Noise from Servomotor	The Servomotor vibrated considerably while performing the tuning-less function with the default settings.	Check the waveform of the motor speed.	Reduce the load so that the moment of inertia ratio is within the allowable value, or increase the load level or reduce the rigidity level in the tuning-less level settings. If the situation is not improved, disable the tuning-less function (i.e., set Pn170 to n.□□□0) and execute autotuning either with or without a host reference.	*
	The machine mounting is not secure.	Turn OFF the power supply to the servo system. Check to see if there are any loose mounting screws.	Tighten the mounting screws.	–
		Turn OFF the power supply to the servo system. Check to see if there is misalignment in the coupling.	Align the coupling.	–
		Turn OFF the power supply to the servo system. Check to see if the coupling is balanced.	Balance the coupling.	–
	The bearings are defective.	Turn OFF the power supply to the servo system. Check for noise and vibration around the bearings.	Replace the Servomotor.	–
	There is a vibration source at the driven machine.	Turn OFF the power supply to the servo system. Check for any foreign matter, damage, or deformation in the machine's moving parts.	Consult with the machine manufacturer.	–
	Noise interference occurred because of incorrect I/O signal cable specifications.	Turn OFF the power supply to the servo system. Check the I/O signal cables to see if they satisfy specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because an I/O signal cable is too long.	Turn OFF the power supply to the servo system. Check the lengths of the I/O signal cables.	The I/O signal cables must be no longer than 3 m.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Abnormal Noise from Servomotor	Noise interference occurred because of incorrect Encoder Cable specifications.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it satisfies specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because the Encoder Cable is too long.	Turn OFF the power supply to the servo system. Check the length of the Encoder Cable.	The Encoder Cable length must be 50 m max.	–
	Noise interference occurred because the Encoder Cable is damaged.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it is pinched or the sheath is damaged.	Replace the Encoder Cable and correct the cable installation environment.	–
	The Encoder Cable was subjected to excessive noise interference.	Turn OFF the power supply to the servo system. Check to see if the Encoder Cable is bundled with a high-current line or installed near a high-current line.	Correct the cable layout so that no surge is applied by high-current lines.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Turn OFF the power supply to the servo system. Check to see if the machines are correctly grounded.	Properly ground the machines to separate them from the FG of the encoder.	–
	There is a SERVOPACK pulse counting error due to noise.	Check to see if there is noise interference on the signal line from the encoder.	Turn OFF the power supply to the servo system. Implement countermeasures against noise for the encoder wiring.	–
	The encoder was subjected to excessive vibration or shock.	Turn OFF the power supply to the servo system. Check to see if vibration from the machine occurred. Check the Servomotor installation (mounting surface precision, securing state, and alignment).	Reduce machine vibration. Improve the mounting state of the Servomotor.	–
	A failure occurred in the encoder.	–	Turn OFF the power supply to the servo system. Replace the Servomotor.	–
	A failure occurred in the Serial Converter Unit.	–	Turn OFF the power supply to the servo system. Replace the Serial Converter Unit.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Servomotor Vibrates at Frequency of Approx. 200 to 400 Hz.	The servo gains are not balanced.	Check to see if the servo gains have been correctly tuned.	Perform autotuning without a host reference.	*
	The setting of Pn100 (Speed Loop Gain) is too high.	Check the setting of Pn100. The default setting is Kv = 40.0 Hz.	Set Pn100 to an appropriate value.	–
	The setting of Pn102 (Position Loop Gain) is too high.	Check the setting of Pn102. The default setting is Kp = 40.0/s.	Set Pn102 to an appropriate value.	–
	The setting of Pn101 (Speed Loop Integral Time Constant) is not appropriate.	Check the setting of Pn101. The default setting is Ti = 20.0 ms.	Set Pn101 to an appropriate value.	–
	The setting of Pn103 (Moment of Inertia Ratio) is not appropriate.	Check the setting of Pn103.	Set Pn103 to an appropriate value.	–
Large Motor Speed Overshoot on Starting and Stopping	The servo gains are not balanced.	Check to see if the servo gains have been correctly tuned.	Perform autotuning without a host reference.	*
	The setting of Pn100 (Speed Loop Gain) is too high.	Check the setting of Pn100. The default setting is Kv = 40.0 Hz.	Set Pn100 to an appropriate value.	–
	The setting of Pn102 (Position Loop Gain) is too high.	Check the setting of Pn102. The default setting is Kp = 40.0/s.	Set Pn102 to an appropriate value.	–
	The setting of Pn101 (Speed Loop Integral Time Constant) is not appropriate.	Check the setting of Pn101. The default setting is Ti = 20.0 ms.	Set Pn101 to an appropriate value.	–
	The setting of Pn103 (Moment of Inertia Ratio) is not appropriate.	Check the setting of Pn103.	Set Pn103 to an appropriate value.	–
	The torque reference is saturated.	Check the waveform of the torque reference.	Use the mode switch.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Absolute Encoder Position Deviation Error (The position that was saved in the host controller when the power was turned OFF is different from the position when the power was next turned ON.)	Noise interference occurred because of incorrect Encoder Cable specifications.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it satisfies specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because the Encoder Cable is too long.	Turn OFF the power supply to the servo system. Check the length of the Encoder Cable.	The Encoder Cable length must be 50 m max.	–
	Noise interference occurred because the Encoder Cable is damaged.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it is pinched or the sheath is damaged.	Replace the Encoder Cable and correct the cable installation environment.	–
	The Encoder Cable was subject to excessive noise interference.	Turn OFF the power supply to the servo system. Check to see if the Encoder Cable is bundled with a high-current line or installed near a high-current line.	Correct the cable layout so that no surge is applied by high-current lines.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Turn OFF the power supply to the servo system. Check to see if the machines are correctly grounded.	Properly ground the machines to separate them from the FG of the encoder.	–
	There is a SERVOPACK pulse counting error due to noise.	Turn OFF the power supply to the servo system. Check to see if there is noise interference on the I/O signal line from the encoder or Serial Converter Unit.	Implement countermeasures against noise for the encoder or Serial Converter Unit wiring.	–
	The encoder was subjected to excessive vibration or shock.	Turn OFF the power supply to the servo system. Check to see if vibration from the machine occurred. Check the Servomotor installation (mounting surface precision, securing state, and alignment).	Reduce machine vibration. Improve the mounting state of the Servomotor.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Absolute Encoder Position Deviation Error (The position that was saved in the host controller when the power was turned OFF is different from the position when the power was next turned ON.)	A failure occurred in the encoder.	–	Turn OFF the power supply to the servo system. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–
	Host Controller Multiturn Data or Absolute Encoder Position Data Reading Error	Check the error detection section of the host controller.	Correct the error detection section of the host controller.	–
		Check to see if the host controller is executing data parity checks.	Perform parity checks for the multiturn data or absolute encoder position data.	–
		Check for noise interference in the cable between the SERVOPACK and the host controller.	Implement countermeasures against noise and then perform parity checks again for the multiturn data or absolute encoder position data.	–
Overtravel Occurred	The P-OT/N-OT (Forward Drive Prohibit or Reverse Drive Prohibit) signal was input.	Check the external power supply (+24 V) voltage for the input signals.	Correct the external power supply (+24 V) voltage for the input signals.	–
		Check the operating condition of the overtravel limit switches.	Make sure that the overtravel limit switches operate correctly.	–
		Check the wiring of the overtravel limit switches.	Correct the wiring of the overtravel limit switches.	*
		Check the settings of the overtravel input signal allocations (Pn50A/ Pn50B).	Set the parameters to correct values.	*
	The P-OT/N-OT (Forward Drive Prohibit or Reverse Drive Prohibit) signal malfunctioned.	Check for fluctuation in the external power supply (+24 V) voltage for the input signals.	Eliminate fluctuation from the external power supply (+24 V) voltage for the input signals.	–
		Check to see if the operation of the overtravel limit switches is unstable.	Stabilize the operating condition of the overtravel limit switches.	–
		Check the wiring of the overtravel limit switches (e.g., check for cable damage and loose screws).	Correct the wiring of the overtravel limit switches.	–
	There is a mistake in the allocation of the P-OT or N-OT (Forward Drive Prohibit or Reverse Drive Prohibit) signal in Pn50A = n.X□□□ or Pn50B = n.□□□X.	Check to see if the P-OT signal is allocated in Pn50A = n.X□□□.	If another signal is allocated in Pn50A =n.X□□□, allocate the P-OT signal instead.	*
		Check to see if the N-OT signal is allocated in Pn50B = n.□□□X.	If another signal is allocated in Pn50B =n.□□□X, allocate the N-OT signal instead.	

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Problem	Possible Cause	Confirmation	Correction	Reference
Overtravel Occurred	The selection of the Servomotor stopping method is not correct.	Check the servo OFF stopping method set in Pn001 = n.□□□X or Pn001 = n.□□X□.	Select a Servomotor stopping method other than coasting to a stop.	*
		Check the torque control stopping method set in Pn001 = n.□□□X or Pn001 = n.□□X□.	Select a Servomotor stopping method other than coasting to a stop.	
Improper Stop Position for Overtravel (OT) Signal	The limit switch position and dog length are not appropriate.	–	Install the limit switch at the appropriate position.	–
	The overtravel limit switch position is too close for the coasting distance.	–	Install the overtravel limit switch at the appropriate position.	–
Position Deviation (without Alarm)	Noise interference occurred because of incorrect Encoder Cable specifications.	Check the Encoder Cable to see if it satisfies specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because the Encoder Cable is too long.	Turn OFF the power supply to the servo system. Check the length of the Encoder Cable.	The Encoder Cable length must be 50 m max.	–
	Noise interference occurred because the Encoder Cable is damaged.	Turn OFF the power supply to the servo system. Check the Encoder Cable to see if it is pinched or the sheath is damaged.	Replace the Encoder Cable and correct the cable installation environment.	–
	The Encoder Cable was subjected to excessive noise interference.	Turn OFF the power supply to the servo system. Check to see if the Encoder Cable is bundled with a high-current line or installed near a high-current line.	Correct the cable layout so that no surge is applied by high-current lines.	–
	There is variation in the FG potential because of the influence of machines on the Servomotor side, such as a welder.	Turn OFF the power supply to the servo system. Check to see if the machines are correctly grounded.	Properly ground the machines to separate them from the FG of the encoder.	–
	There is a SERVOPACK pulse counting error due to noise.	Turn OFF the power supply to the servo system. Check to see if there is noise interference on the I/O signal line from the encoder or Serial Converter Unit.	Implement countermeasures against noise for the encoder wiring or Serial Converter Unit wiring.	–

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Problem	Possible Cause	Confirmation	Correction	Reference
Position Deviation (without Alarm)	The encoder was subjected to excessive vibration or shock.	Turn OFF the power supply to the servo system. Check to see if vibration from the machine occurred. Check the Servomotor installation (mounting surface precision, securing state, and alignment).	Reduce machine vibration. Improve the mounting state of the Servomotor.	–
	The coupling between the machine and Servomotor is not suitable.	Turn OFF the power supply to the servo system. Check to see if position offset occurs at the coupling between machine and Servomotor.	Correctly secure the coupling between the machine and Servomotor.	–
	Noise interference occurred because of incorrect I/O signal cable specifications.	Turn OFF the power supply to the servo system. Check the I/O signal cables to see if they satisfy specifications. Use shielded twisted-pair cables or screened twisted-pair cables with conductors of at least 0.12 mm^2 (stranded wire).	Use cables that satisfy the specifications.	–
	Noise interference occurred because an I/O signal cable is too long.	Turn OFF the power supply to the servo system. Check the lengths of the I/O signal cables.	The I/O signal cables must be no longer than 3 m.	–
	An encoder fault occurred. (The pulse count does not change.)	–	Turn OFF the power supply to the servo system. Replace the Servomotor.	–
	A failure occurred in the SERVOPACK.	–	Turn OFF the power supply to the servo system. Replace the SERVOPACK.	–
Servomotor Overheated	The surrounding air temperature is too high.	Measure the surrounding air temperature around the Servomotor.	Reduce the surrounding air temperature to 40°C or less.	–
	The surface of the Servomotor is dirty.	Turn OFF the power supply to the servo system. Visually check the surface for dirt.	Clean dirt, dust, and oil from the surface.	–
	There is an overload on the Servomotor.	Check the load status with a monitor.	If the Servomotor is overloaded, reduce the load or replace the Servo Drive with a SERVOPACK and Servomotor with larger capacities.	–

* Refer to the following manual for details.
Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

Panel Displays and Panel Operator Procedures

7

This chapter describes how to interpret panel displays.

7.1 Monitor Display (Un□□□) Operations on the Panel Operator . . 7-2

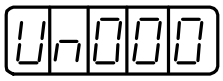
7.1.1 Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching-Related Monitor (Un08B) 7-2

7.1 Monitor Display (Un□□□) Operations on the Panel Operator

You can monitor the status of the reference values and I/O signals that are set in the SERVOPACK and the internal status of the SERVOPACK with monitor displays. This function is available only on SERVOPACKs with analog voltage/pulse train references.

The Panel Operator displays numbers beginning with “Un.”

Display Example for Motor Speed



This section describes monitor numbers that are not available on the standard product.

Refer to the following manual for monitor numbers that are not listed here.

Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

7.1.1 Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching-Related Monitor (Un08B)

You can use Un08B to display the status of signals related to Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching on the LED segments of the Panel Operator.

Information You can also use Un005 (Input Signal Monitor) and Un006 (Output Signal Monitor) to monitor the signals related to Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching. However, Un08B allows you to monitor the status of the three signals at one time.

◆ Interpreting the Display

LED Segments

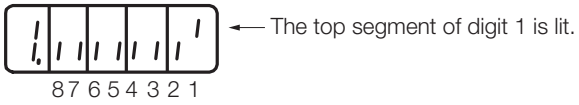


Display Digit Number	Description
1	Top: Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching enabled Bottom: Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching disabled
2	Top: Fully-closed loop control status Bottom: Semi-closed loop control status
3	Top: Motor-Load Position Deviation Clear enabled Bottom: Motor-Load Position Deviation Clear disabled
4 to 8	Reserved (The display is fixed as shown below.)

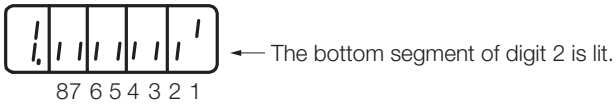
◆ Display Examples

Display examples are shown below.

- When Semi-Closed Loop Control/Fully-Closed Loop Control Online Switching is enabled



- Semi-closed loop control status



Parameter Lists

8

This chapter provides information on the parameters.

8.1 Interpreting Parameter Lists 8-2
8.1.1 List of Servo Parameters 8-2
8.1.2 List of MECHATROLINK-III Common Parameters 8-2

8.2 SERVOPACK with Analog Voltage/Pulse Train References . . 8-3
8.2.1 List of Servo Parameters 8-3

8.3 SERVOPACK with MECHATROLINK-III Communications References . . 8-33
8.3.1 List of Servo Parameters 8-33
8.3.2 List of MECHATROLINK-III Common Parameters 8-65

8.1 Interpreting Parameter Lists

8.1.1 List of Servo Parameters

All of the parameters given in this manual can be used with any type of Servomotor. There is no need for the user to be concerned with the "All" and "Rotary" specifications given in this column. These are used for maintenance by Yaskawa.

Indicates when a change to the parameter will be effective.
"After restart" indicates parameters that will be effective after one of the following is executed.
- The power supply is turned OFF and ON again.
- The CONFIG command is sent.
- A software reset is executed.

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn000	2	Basic Function Selections 0	0000h to 10B1h	–	0000h	All	After restart	Setup	–

There are the following two classifications.
- Tuning
- Setup

Refer to the following manuals for details.
- Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)
- Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

n.□□□X	Rotati	
	0	
	1	Use CW as the forward direction. (Reverse Rotation Mode)

n.□□X□	Reserved parameter (Do not change.)
n.□X□□	Reserved parameter (Do not change.)

		Rotary/Linear Servomotor Startup Selection When Encoder Is Not Connected	Reference
n.X□□□	0	When an encoder is not connected, start as SERVOPACK for Rotary Servomotor.	–
	1	When an encoder is not connected, start as SERVOPACK for Linear Servomotor.	

8.1.2 List of MECHATROLINK-III Common Parameters

All of the parameters given in this manual can be used with any type of Servomotor. There is no need for the user to be concerned with the "All" and "Rotary" specifications given in this column. These are used for maintenance by Yaskawa.

Indicates when a change to the parameter will be effective.
"After restart" indicates parameters that will be effective after one of the following is executed.
- The power supply is turned OFF and ON again.
- The CONFIG command is sent.
- A software reset is executed.

Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
61 PnAC2	4	Speed Loop Gain	1,000 to 2,000,000	0.001 Hz [0.1 Hz]	40000	All	Immediately	Tuning

You can set the parameter in increments of the setting unit.
However, if a unit is given in square brackets, the setting is automatically converted in the Servomotor to the resolution given in the square brackets.

8.2 SERVOPACK with Analog Voltage/Pulse Train References

8.2.1 List of Servo Parameters

The following table lists the parameters.

Note: Do not change the following parameters from their default settings.
- Reserved parameters
- Parameters not given in this manual
- Parameters that are not valid for the Servomotor that you are using, as given in the parameter table

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn000	2	Basic Function Selections 0	0000h to 10B1h	–	0000h	All	After restart	Setup	–

n.□□□X	Rotation Direction Selection		Reference
	0	Use CCW as the forward direction.	*1
	1	Use CW as the forward direction. (Reverse Rotation Mode)	

n.□□X□	Control Method Selection		Reference
	0	Speed control with analog references	*1
	1	Position control with pulse train references	
	2	Torque control with analog references	
	3	Internal set speed control with contact commands	
	4	Switching between internal set speed control with contact references and speed control with analog references	
	5	Switching between internal set speed control with contact references and position control with pulse train references	
	6	Switching between internal set speed control with contact references and torque control with analog references	
	7	Switching between position control with pulse train references and speed control with analog references	
	8	Switching between position control with pulse train references and torque control with analog references	
	9	Switching between torque control with analog references and speed control with analog references	
	A	Switching between speed control with analog references and speed control with zero clamping	
	B	Switching between position control with pulse train references and position control with reference pulse inhibition	

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Rotary/Linear Servomotor Startup Selection When Encoder Is Not Connected		Reference
	0	When an encoder is not connected, start as SERVOPACK for Rotary Servomotor.	*1
	1	When an encoder is not connected, start as SERVOPACK for Linear Servomotor.	

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn001	2	Application Function Selections 1	0000h to 1142h	–	0000h	All	After restart	Setup	–

n.□□□X	Motor Stopping Method for Servo OFF and Group 1 Alarms		Reference
	0	Stop the motor by applying the dynamic brake.	*1
	1	Stop the motor by the applying dynamic brake and then release the dynamic brake.	
	2	Coast the motor to a stop without the dynamic brake.	

n.□□X□	Overtravel Stopping Method		Reference
	0	Apply the dynamic brake or coast the motor to a stop.	*1
	1	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque and then servo-lock the motor.	
	2	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque and then let the motor coast.	
	3	Decelerate the motor to a stop using the deceleration time set in Pn30A and then servo-lock the motor.	
	4	Decelerate the motor to a stop using the deceleration time set in Pn30A and then let the motor coast.	

n.□X□□	Main Circuit Power Supply AC/DC Input Selection		Reference
	0	Input AC power as the main circuit power supply using the L1, L2, and L3 terminals (do not use shared converter).	*1
	1	Input DC power as the main circuit power supply using the B1/⊕ and ⊖ 2 terminals or the B1 and ⊖ 2 terminals (use an external converter or the shared converter).	

n.X□□□	Warning Code Output Selection		Reference
	0	Output only alarm codes on the ALO1, ALO2, and ALO3 terminals.	*1
	1	Output both warning codes and alarm codes on the ALO1, ALO2, and ALO3 terminals. However, while an warning code is being output, the ALM (Servo Alarm) output signal will remain ON (normal state).	

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn002	2	Application Function Selections 2	0000h to 4213h	–	0111h	–	After restart	Setup	–

n.□□□X	Speed/Position Control Option (T-REF Input Allocation)		Applicable Motors	Reference
	0	Do not use T-REF.	All	–
	1	Use T-REF as an external torque limit input.		*1
	2	Use T-REF as a torque feedback input.		*1
	3	Use T-REF as an external torque limit input when /P-CL or /N-CL is ON.		*1

n.□□X□	Torque Control Option (V-REF Input Allocation)		Applicable Motors	Reference
	0	Do not use V-REF.	All	*1
	1	Use V-REF as an external speed limit input.		

n.□X□□	Encoder Usage		Applicable Motors	Reference
	0	Use the encoder according to encoder specifications.	All	*1
	1	Use the encoder as an incremental encoder.		
	2	Use the encoder as a single-turn absolute encoder.	Rotary	

n.X□□□	External Encoder Usage		Applicable Motors	Reference
	0	Do not use an external encoder.	Rotary	*1
	1	The external encoder moves in the forward direction for CCW motor rotation.		
	2	Reserved setting (Do not use.)		
	3	The external encoder moves in the reverse direction for CCW motor rotation.		
	4	Reserved setting (Do not use.)		

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn006	2	Application Function Selections 6	0000h to 105Fh	–	0002h	All	Immediately	Setup	*1

n.□□XX	Analog Monitor 1 Signal Selection	
	00	Motor speed (1 V/1,000 min^{-1})
	01	Speed reference (1 V/1,000 min^{-1})
	02	Torque reference (1 V/100% rated torque)
	03	Position deviation (0.05 V/reference unit)
	04	Position amplifier deviation (after electronic gear) (0.05 V/encoder pulse unit)
	05	Position reference speed (1 V/1,000 min^{-1})
	06	Reserved setting (Do not use.)
	07	Load-motor position deviation (0.01 V/reference unit)
	08	Positioning completion (positioning completed: 5 V, positioning not completed: 0 V)
	09	Speed feedforward (1 V/1,000 min^{-1})
	0A	Torque feedforward (1 V/100% rated torque)
	0B	Active gain (1st gain: 1 V, 2nd gain: 2 V)
	0C	Completion of position reference distribution (completed: 5 V, not completed: 0 V)
	0D	External encoder speed (1 V/1,000 min^{-1}: value at the motor shaft)
	0E	Reserved setting (Do not use.)
	0F	Reserved setting (Do not use.)
	10	Main circuit DC voltage
	11 to 5F	Reserved settings (Do not use.)
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn007	2	Application Function Selections 7	0000h to 105Fh	–	0000h	All	Immediately	Setup	*1

n.□□XX	Analog Monitor 2 Signal Selection	
	00	Motor speed (1 V/1,000 min^{-1})
	01	Speed reference (1 V/1,000 min^{-1})
	02	Torque reference (1 V/100% rated torque)
	03	Position deviation (0.05 V/reference unit)
	04	Position amplifier deviation (after electronic gear) (0.05 V/encoder pulse unit)
	05	Position reference speed (1 V/1,000 min^{-1})
	06	Reserved setting (Do not use.)
	07	Load-motor position deviation (0.01 V/reference unit)
	08	Positioning completion (positioning completed: 5 V, positioning not completed: 0 V)
	09	Speed feedforward (1 V/1,000 min^{-1})
	0A	Torque feedforward (1 V/100% rated torque)
	0B	Active gain (1st gain: 1 V, 2nd gain: 2 V)
	0C	Completion of position reference distribution (completed: 5 V, not completed: 0 V)
	0D	External encoder speed (1 V/1,000 min^{-1}: value at the motor shaft)
	0E	Reserved setting (Do not use.)
	0F	Reserved setting (Do not use.)
	10	Main circuit DC voltage
	11 to 5F	Reserved settings (Do not use.)

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn008	2	Application Function Selections 8	0000h to 7121h	–	0000h	Rotary	After restart	Setup	–

n.□□□X	Low Battery Voltage Alarm/Warning Selection		Reference
	0	Output alarm (A.830) for low battery voltage.	*1
	1	Output warning (A.930) for low battery voltage.	

n.□□X□	Function Selection for Undervoltage		Reference
	0	Do not detect undervoltage.	*1
	1	Detect undervoltage warning and limit torque at host controller.	
	2	Detect undervoltage warning and limit torque with Pn424 and Pn425 (i.e., only in SERVOPACK).	

n.□X□□	Warning Detection Selection		Reference
	0	Detect warnings.	*1
	1	Do not detect warnings except for A.971.	

n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn009	2	Application Function Selections 9	0000h to 0121h	–	0010h	All	After restart	Tuning	–

n.□□□X	Reserved parameter (Do not change.)	

n.□□X□	Current Control Mode Selection		Reference
	0	Use current control mode 1.	*1
	1	• SERVOPACK Models SGD7S-R70A, -R90A, -1R6A, -2R8A, -3R8A, -5R5A, and -7R6A: Use current control mode 1. • SERVOPACK Models SGD7S-120A, -180A, -200A, -330A, -470A, -550A, -590A, and -780A: Use current control mode 2.	
	2	Use current control mode 2.	

n.□X□□	Speed Detection Method Selection		Reference
	0	Use speed detection 1.	*1
	1	Use speed detection 2.	

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn00A	2	Application Function Selections A	0000h to 1044h	–	0001h	All	After restart	Setup	–

n.□□□X	Motor Stopping Method for Group 2 Alarms		Reference
	0	Apply the dynamic brake or coast the motor to a stop (use the stopping method set in Pn001 = n.□□□X).	*1
	1	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque. Use the setting of Pn001 = n.□□□X for the status after stopping.	
	2	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque and then let the motor coast.	
	3	Decelerate the motor to a stop using the deceleration time set in Pn30A. Use the setting of Pn001 = n.□□□X for the status after stopping.	
	4	Decelerate the motor to a stop using the deceleration time set in Pn30A and then let the motor coast.	

n.□□X□	Stopping Method for Forced Stops		Reference
	0	Apply the dynamic brake or coast the motor to a stop (use the stopping method set in Pn001 = n.□□□X).	*1
	1	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque. Use the setting of Pn001 = n.□□□X for the status after stopping.	
	2	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque and then let the motor coast.	
	3	Decelerate the motor to a stop using the deceleration time set in Pn30A. Use the setting of Pn001 = n.□□□X for the status after stopping.	
	4	Decelerate the motor to a stop using the deceleration time set in Pn30A and then let the motor coast.	

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn00B	2	Application Function Selections B	0000h to 1121h	–	0000h	All	After restart	Setup	–

n.□□□X	Operator Parameter Display Selection		Reference
	0	Display only setup parameters.	*1
	1	Display all parameters.	

n.□□X□	Motor Stopping Method for Group 2 Alarms		Reference
	0	Stop the motor by setting the speed reference to 0.	*1
	1	Apply the dynamic brake or coast the motor to a stop (use the stopping method set in Pn001 = n.□□□X).	
	2	Set the stopping method with Pn00A = n.□□□X.	

n.□X□□	Power Input Selection for Three-phase SERVOPACK		Reference
	0	Use a three-phase power supply input.	*1
	1	Use a three-phase power supply input as a single-phase power supply input.	

n.X□□□	Reserved parameter (Do not change.)

Pn00C	2	Application Function Selections C	0000h to 0130h	–	0000h	–	After restart	Setup	*1

n.□□□X	Function Selection for Test without a Motor		Applicable Motors
	0	Disable tests without a motor.	All

n.□□X□	Encoder Resolution for Tests without a Motor		Applicable Motors
	0	Use 13 bits.	Rotary
	1	Use 20 bits.	
	2	Use 22 bits.	
	3	Use 24 bits.	

n.□X□□	Encoder Type Selection for Tests without a Motor		Applicable Motors
	0	Use an incremental encoder.	All
	1	Use an absolute encoder.	

n.X□□□	Reserved parameter (Do not change.)

Pn00D	2	Application Function Selections D	0000h to 1001h	–	0000h	All	Immediately	Setup	*1

n.□□□X	Reserved parameter (Do not change.)

n.□□X□	Reserved parameter (Do not change.)

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Overtravel Warning Detection Selection	
	0	Do not detect overtravel warnings.
	1	Detect overtravel warnings.

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn00F	2	Application Function Selections F	0000h to 2011h	–	0000h	All	After restart	Setup	–

n.□□□X	Preventative Maintenance Warning Selection		Reference
	0	Do not detect preventative maintenance warnings.	*1
	1	Detect preventative maintenance warnings.	
n.□□X□	Reserved parameter (Do not change.)		
n.□X□□	Reserved parameter (Do not change.)		
n.X□□□	Reserved parameter (Do not change.)		

Pn010	2	Axis Address Selection for UART/USB Communications	0000h to 007Fh	–	0001h	All	After restart	Setup	–
Pn021	2	Reserved parameter (Do not change.)	–	–	0000h	All	–	–	–
Pn022	2	Reserved parameter (Do not change.)	–	–	0000h	All	–	–	–
Pn02A	2	Semi-closed/Fully-closed Loop Control Switching-Related Selection	0000h to 0011h	–	0000h	All	After restart	Setup	–

n.□□□X	Semi-closed/Fully-closed Loop Control Switching Selection		
	0	Disable Semi-closed/Fully-closed Loop Control Switching.	
	1	Enable Semi-closed/Fully-closed Loop Control Switching.	
n.□□X□	Encoder Divided Pulses Output Method Selection during Fully-closed Loop Control		Reference
	0	During fully-closed loop control, output encoder divided pulses for position feedback from an external encoder according to the value of Electronic Gear Ratio for External Encoder Conversion (Pn24A/Pn24C) after conversion and the setting value of Pn212.	page 4-15
	1	During fully-closed loop control, output encoder divided pulses for position feedback from an external encoder according to the setting value of Pn281.	
n.□X□□	Reserved parameter (Do not change.)		
n.X□□□	Reserved parameter (Do not change.)		

Pn040	2	Reserved parameter (Do not change.)	–	–	0000h	–	–	–	–
Pn081	2	Application Function Selections 81	0000h to 1111h	–	0000h	All	After restart	Setup	*1

n.□□□X	Phase-C Pulse Output Selection		
	0	Output phase-C pulses only in the forward direction.	
	1	Output phase-C pulses in both the forward and reverse directions.	
n.□□X□	Reserved parameter (Do not change.)		
n.□X□□	Reserved parameter (Do not change.)		
n.X□□□	Reserved parameter (Do not change.)		

Pn100	2	Speed Loop Gain	10 to 20,000	0.1 Hz	400	All	Immediately	Tuning	*1
Pn101	2	Speed Loop Integral Time Constant	15 to 51,200	0.01 ms	2000	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn102	2	Position Loop Gain	10 to 20,000	0.1/s	400	All	Immediately	Tuning	*1
Pn103	2	Moment of Inertia Ratio	0 to 20,000	1%	100	All	Immediately	Tuning	*1
Pn104	2	Second Speed Loop Gain	10 to 20,000	0.1 Hz	400	All	Immediately	Tuning	*1
Pn105	2	Second Speed Loop Integral Time Constant	15 to 51,200	0.01 ms	2000	All	Immediately	Tuning	*1
Pn106	2	Second Position Loop Gain	10 to 20,000	0.1/s	400	All	Immediately	Tuning	*1
Pn109	2	Feedforward	0 to 100	1%	0	All	Immediately	Tuning	*1
Pn10A	2	Feedforward Filter Time Constant	0 to 6,400	0.01 ms	0	All	Immediately	Tuning	*1
Pn10B	2	Gain Application Selections	0000h to 5334h	–	0000h	All	–	Setup	–

n.□□□X	Mode Switching Selection		When Enabled	Reference
	0	Use the internal torque reference as the condition (level setting: Pn10C).	Immediately	*1
	1	Use the speed reference as the condition (level setting: Pn10D).		
	2	Use the acceleration reference as the condition (level setting: Pn10E).		
	3	Use the position deviation as the condition (level setting: Pn10F).		
	4	Do not use mode switching.		

n.□□X□	Speed Loop Control Method		When Enabled	Reference
	0	PI control	After restart	*1
	1	I-P control		
	2 and 3	Reserved settings (Do not use.)		

n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

Pn10C	2	Mode Switching Level for Torque Reference	0 to 800	1%	200	All	Immediately	Tuning	*1
Pn10D	2	Mode Switching Level for Speed Reference	0 to 10,000	1 min^{-1}	0	Rotary	Immediately	Tuning	*1
Pn10E	2	Mode Switching Level for Acceleration	0 to 30,000	1 min^{-1}/s	0	Rotary	Immediately	Tuning	*1
Pn10F	2	Mode Switching Level for Position Deviation	0 to 10,000	1 reference unit	0	All	Immediately	Tuning	*1
Pn11F	2	Position Integral Time Constant	0 to 50,000	0.1 ms	0	All	Immediately	Tuning	*1
Pn121	2	Friction Compensation Gain	10 to 1,000	1%	100	All	Immediately	Tuning	*1
Pn122	2	Second Friction Compensation Gain	10 to 1,000	1%	100	All	Immediately	Tuning	*1
Pn123	2	Friction Compensation Coefficient	0 to 100	1%	0	All	Immediately	Tuning	*1
Pn124	2	Friction Compensation Frequency Correction	-10,000 to 10,000	0.1 Hz	0	All	Immediately	Tuning	*1
Pn125	2	Friction Compensation Gain Correction	1 to 1,000	1%	100	All	Immediately	Tuning	*1
Pn131	2	Gain Switching Time 1	0 to 65,535	1 ms	0	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn132	2	Gain Switching Time 2	0 to 65,535	1 ms	0	All	Immediately	Tuning	*1
Pn135	2	Gain Switching Waiting Time 1	0 to 65,535	1 ms	0	All	Immediately	Tuning	*1
Pn136	2	Gain Switching Waiting Time 2	0 to 65,535	1 ms	0	All	Immediately	Tuning	*1
Pn139	2	Automatic Gain Switching Selections 1	0000h to 0052h	–	0000h	All	Immediately	Tuning	*1

	Gain Switching Selection	
n.□□□X	0	Use manual gain switching. The gain is switched manually with the /G-SEL (Gain Selection) signal.
	1	Reserved setting (Do not use.)
	2	Use automatic gain switching pattern 1. The gain settings 1 switch automatically to 2 when switching condition A is satisfied. The gain settings 2 switch automatically to 1 when switching condition A is not satisfied.

	Gain Switching Condition A	
n.□□X□	0	/COIN (Positioning Completion Output) signal turns ON.
	1	/COIN (Positioning Completion Output) signal turns OFF.
	2	/NEAR (Near Output) signal turns ON.
	3	/NEAR (Near Output) signal turns OFF.
	4	Position reference filter output is 0 and reference pulse input is OFF.
	5	Position reference pulse input is ON.

n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

Pn13D	2	Current Gain Level	100 to 2,000	1%	2000	All	Immediately	Tuning	*1
Pn140	2	Model Following Control-Related Selections	0000h to 1120h	–	0100h	All	Immediately	Tuning	–

	Model Following Control Selection		Reference
n.□□□X	0	Do not use model following control.	*1

	Vibration Suppression Selection		Reference
n.□□X□	0	Do not perform vibration suppression.	*1
	1	Perform vibration suppression for a specific frequency.	
	2	Perform vibration suppression for two specific frequencies.	

	Vibration Suppression Adjustment Selection		Reference
n.□X□□	0	Do not adjust vibration suppression automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.	*1
	1	Adjust vibration suppression automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.	

	Speed Feedforward (VFF)/Torque Feedforward (TFF) Selection		Reference
n.X□□□	0	Do not use model following control and speed/torque feedforward together.	*1
	1	Use model following control and speed/torque feedforward together.	

Pn141	2	Model Following Control Gain	10 to 20,000	0.1/s	500	All	Immediately	Tuning	*1
Pn142	2	Model Following Control Gain Correction	500 to 2,000	0.1%	1000	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn143	2	Model Following Control Bias in the Forward Direction	0 to 10,000	0.1%	1000	All	Immediately	Tuning	*1
Pn144	2	Model Following Control Bias in the Reverse Direction	0 to 10,000	0.1%	1000	All	Immediately	Tuning	*1
Pn145	2	Vibration Suppression 1 Frequency A	10 to 2,500	0.1 Hz	500	All	Immediately	Tuning	*1
Pn146	2	Vibration Suppression 1 Frequency B	10 to 2,500	0.1 Hz	700	All	Immediately	Tuning	*1
Pn147	2	Model Following Control Speed Feedforward Compensation	0 to 10,000	0.1%	1000	All	Immediately	Tuning	*1
Pn148	2	Second Model Following Control Gain	10 to 20,000	0.1/s	500	All	Immediately	Tuning	*1
Pn149	2	Second Model Following Control Gain Correction	500 to 2,000	0.1%	1000	All	Immediately	Tuning	*1
Pn14A	2	Vibration Suppression 2 Frequency	10 to 2,000	0.1 Hz	800	All	Immediately	Tuning	*1
Pn14B	2	Vibration Suppression 2 Correction	10 to 1,000	1%	100	All	Immediately	Tuning	*1
Pn14F	2	Control-Related Selections	0000h to 0021h	–	0021h	All	After restart	Tuning	–

	Model Following Control Type Selection		Reference
n.□□□X	0	Use model following control type 1.	*1
	1	Use model following control type 2.	

	Tuning-less Type Selection		Reference
n.□□X□	0	Use tuning-less type 1.	*1
	1	Use tuning-less type 2.	
	2	Use tuning-less type 3.	

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn160	2	Anti-Resonance Control-Related Selections	0000h to 0011h	–	0010h	All	Immediately	Tuning	–

	Anti-Resonance Control Selection		Reference
n.□□□X	0	Do not use anti-resonance control.	*1
	1	Use anti-resonance control.	

	Anti-Resonance Control Adjustment Selection		Reference
n.□□X□	0	Do not adjust anti-resonance control automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.	*1
	1	Adjust anti-resonance control automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.	

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

Pn161	2	Anti-Resonance Frequency	10 to 20,000	0.1 Hz	1000	All	Immediately	Tuning	*1
Pn162	2	Anti-Resonance Gain Correction	1 to 1,000	1%	100	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn163	2	Anti-Resonance Damping Gain	0 to 300	1%	0	All	Immediately	Tuning	*1
Pn164	2	Anti-Resonance Filter Time Constant 1 Correction	-1,000 to 1,000	0.01 ms	0	All	Immediately	Tuning	*1
Pn165	2	Anti-Resonance Filter Time Constant 2 Correction	-1,000 to 1,000	0.01 ms	0	All	Immediately	Tuning	*1
Pn166	2	Anti-Resonance Damping Gain 2	0 to 1,000	1%	0	All	Immediately	Tuning	*1
Pn170	2	Tuning-less Function-Related Selections	0000h to 2711h	–	1400h	All	–	Setup	*1

n.□□□X	Tuning-less Selection		When Enabled
	0	Disable tuning-less function.	After restart
	1	Enable tuning-less function.	

n.□□X□	Speed Control Method		When Enabled
	0	Use for speed control.	After restart
	1	Use for speed control and use host controller for position control.	

n.□X□□	Rigidity Level		When Enabled
	0 to 7	Set the rigidity level.	Immediately

n.X□□□	Tuning-less Load Level		When Enabled
	0 to 2	Set the load level for the tuning-less function.	Immediately

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn200	2	Position Control Reference Form Selections	0000h to 2236h	–	0000h	All	After restart	Setup	–

n.□□□X	Reference Pulse Form		Reference
	0	Sign and pulse train, positive logic.	*1
	1	CW and CCW pulse trains, positive logic	
	2	Two-phase pulse trains with 90° phase differential (phase A and phase B) ×1, positive logic	
	3	Two-phase pulse trains with 90° phase differential (phase A and phase B) ×2, positive logic	
	4	Two-phase pulse trains with 90° phase differential (phase A and phase B) ×4, positive logic	
	5	Sign and pulse train, negative logic.	
	6	CW and CCW pulse trains, negative logic	

n.□□X□	Clear Signal Form		Reference
	0	Clear position deviation when the signal is at high level.	*1
	1	Clear position deviation on the rising edge of the signal.	
	2	Clear position deviation when the signal is at low level.	
	3	Clear position deviation on the falling edge of the signal.	

n.□X□□	Clear Operation		Reference
	0	Clear position deviation at a base block (at servo OFF or when alarm occurs).	*1
	1	Do not clear position error (cleared only with CLR (Clear Position Deviation) signal).	
	2	Clear position deviation when an alarm occurs.	

n.X□□□	Filter Selection		Reference
	0	Use the reference input filter for a line-driver signal. (1 Mpps max.)	*1
	1	Use the reference input filter for an open-collector signal. (200 kpps max.)	
	2	Use reference input filter 2 for a line-driver signal. (1 to 4 Mpps)	

Pn205	2	Multiturn Limit	0 to 65,535	1 rev	65535	Rotary	After restart	Setup	*1
Pn207	2	Position Control Function Selections	0000h to 2210h	–	0000h	All	After restart	Setup	–

n.□□□X	Reserved parameter (Do not change.)

n.□□X□	Position Control Option		Reference
	0	Do not use V-REF.	*1
	1	Use V-REF as a speed feedback input.	

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	/COIN (Positioning Completion Output) Signal Output Timing		Reference
	0	Output when the absolute value of the position deviation is the same or less than the setting of Pn522 (Positioning Completed Width).	*1
	1	Output when the absolute value of the position error is the same or less than the setting of Pn522 (Positioning Completed Width) and the reference after the position reference filter is 0.	
	2	Output when the absolute value of the position error is the same or less than the setting of Pn522 (Positioning Completed Width) and the reference input is 0.	

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn20A	4	Number of External Encoder Scale Pitches	4 to 1,048,576	1 scale pitch/revolution	32768	Rotary	After restart	Setup	*1
Pn20E	4	Electronic Gear Ratio (Numerator)	1 to 1,073,741,824	1	64	All	After restart	Setup	*1
Pn210	4	Electronic Gear Ratio (Denominator)	1 to 1,073,741,824	1	1	All	After restart	Setup	*1
Pn212	4	Number of Encoder Output Pulses	16 to 1,073,741,824	1 P/Rev	2048	Rotary	After restart	Setup	*1
Pn216	2	Position Reference Acceleration/Deceleration Time Constant	0 to 65,535	0.1 ms	0	All	Immediately after the motor stops	Setup	*1
Pn217	2	Average Position Reference Movement Time	0 to 10,000	0.1 ms	0	All	Immediately after the motor stops	Setup	*1
Pn218	2	Reference Pulse Input Multiplier	1 to 100	× 1	1	All	Immediately	Setup	*1
Pn22A	2	Fully-closed Control Selections	0000h to 1003h	–	0000h	Rotary	After restart	Setup	*1

n.□□□X	Reserved parameter (Do not change.)	
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Fully-closed Control Speed Feedback Selection	
	0	Use motor encoder speed.
	1	Use external encoder speed.

Pn24A	4	Electronic Gear Ratio for External Encoder Conversion (Numerator)	1 to 1073741824	–	1	All	After restart	Setup	page 4-14
Pn24C	4	Electronic Gear Ratio for External Encoder Conversion (Denominator)	1 to 1073741824	–	1	All	After restart	Setup	page 4-14
Pn281	2	Encoder Output Resolution	1 to 4,096	1 edge/pitch	20	All	After restart	Setup	*1
Pn300	2	Speed Reference Input Gain	150 to 3,000	0.01 V/Rated motor speed	600	All	Immediately	Setup	*1
Pn301	2	Internal Set Speed 1	0 to 10,000	Rotary: 1 min^{-1} Direct Drive: 0.1 min^{-1}	100	Rotary	Immediately	Setup	*1
Pn302	2	Internal Set Speed 2	0 to 10,000	Rotary: 1 min^{-1} Direct Drive: 0.1 min^{-1}	200	Rotary	Immediately	Setup	*1
Pn303	2	Internal Set Speed 3	0 to 10,000	Rotary: 1 min^{-1} Direct Drive: 0.1 min^{-1}	300	Rotary	Immediately	Setup	*1
Pn304	2	Jogging Speed	0 to 10,000	Rotary: 1 min^{-1} Direct Drive: 0.1 min^{-1}	500	Rotary	Immediately	Setup	*1
Pn305	2	Soft Start Acceleration Time	0 to 10,000	1 ms	0	All	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn306	2	Soft Start Deceleration Time	0 to 10,000	1 ms	0	All	Immediately	Setup	*1
Pn307	2	Speed Reference Filter Time Constant	0 to 65,535	0.01 ms	40	All	Immediately	Setup	*1
Pn308	2	Speed Feedback Filter Time Constant	0 to 65,535	0.01 ms	0	All	Immediately	Setup	*1
Pn30A	2	Deceleration Time for Servo OFF and Forced Stops	0 to 10,000	1 ms	0	All	Immediately	Setup	*1
Pn30C	2	Speed Feedforward Average Movement Time	0 to 5,100	0.1 ms	0	All	Immediately	Setup	*1
Pn310	2	Vibration Detection Selections	0000h to 0002h	–	0000h	All	Immediately	Setup	*1

	Vibration Detection Selection	
n.□□□X	0	Do not detect vibration.
	1	Output a warning (A.911) if vibration is detected.
	2	Output an alarm (A.520) if vibration is detected.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Pn311	2	Vibration Detection Sensitivity	50 to 500	1%	100	All	Immediately	Tuning	*1
Pn312	2	Vibration Detection Level	0 to 5,000	1 min^{-1}	50	Rotary	Immediately	Tuning	*1
Pn316	2	Maximum Motor Speed	0 to 65,535	1 min^{-1}	10000	Rotary	After restart	Setup	*1
Pn324	2	Moment of Inertia Calculation Starting Level	0 to 20,000	1%	300	All	Immediately	Setup	*1
Pn400	2	Torque Reference Input Gain	10 to 100	0.1 V/rated torque	30	All	Immediately	Setup	*1
Pn401	2	First Stage First Torque Reference Filter Time Constant	0 to 65,535	0.01 ms	100	All	Immediately	Tuning	*1
Pn402	2	Forward Torque Limit	0 to 800	1%*2	800	Rotary	Immediately	Setup	*1
Pn403	2	Reverse Torque Limit	0 to 800	1%*2	800	Rotary	Immediately	Setup	*1
Pn404	2	Forward External Torque Limit	0 to 800	1%*2	100	All	Immediately	Setup	*1
Pn405	2	Reverse External Torque Limit	0 to 800	1%*2	100	All	Immediately	Setup	*1
Pn406	2	Emergency Stop Torque	0 to 800	1%*2	800	All	Immediately	Setup	*1
Pn407	2	Speed Limit during Torque Control	0 to 10,000	1 min^{-1}	10000	Rotary	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn408	2	Torque-Related Function Selections	0000h to 1111h	–	0000h	All	–	Setup	–

n.□□□X	Notch Filter Selection 1		When Enabled	Reference
	0	Disable first stage notch filter.	Immediately	*1
	1	Enable first stage notch filter.		

n.□□X□	Speed Limit Selection		When Enabled	Reference
	0	Use the smaller of the maximum motor speed and the setting of Pn407 as the speed limit.	After restart	*1
	1	Use the smaller of the overspeed alarm detection speed and the setting of Pn407 as the speed limit.		

n.□X□□	Notch Filter Selection 2		When Enabled	Reference
	0	Disable second stage notch filter.	Immediately	*1
	1	Enable second stage notch filter.		

n.X□□□	Friction Compensation Function Selection		When Enabled	Reference
	0	Disable friction compensation.	Immediately	*1
	1	Enable friction compensation.		

Pn409	2	First Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn40A	2	First Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn40B	2	First Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn40C	2	Second Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn40D	2	Second Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn40E	2	Second Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn40F	2	Second Stage Second Torque Reference Filter Frequency	100 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn410	2	Second Stage Second Torque Reference Filter Q Value	50 to 100	0.01	50	All	Immediately	Tuning	*1
Pn412	2	First Stage Second Torque Reference Filter Time Constant	0 to 65,535	0.01 ms	100	All	Immediately	Tuning	*1
Pn415	2	T-REF Filter Time Constant	0 to 65,535	0.01 ms	0	All	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn416	2	Torque-Related Function Selections 2	0000h to 1111h	–	0000h	All	Immediately	Setup	*1

n.□□□X	Notch Filter Selection 3	
	0	Disable third stage notch filter.
	1	Enable third stage notch filter.
n.□□X□	Notch Filter Selection 4	
	0	Disable fourth stage notch filter.
	1	Enable fourth stage notch filter.
n.□X□□	Notch Filter Selection 5	
	0	Disable fifth stage notch filter.
	1	Enable fifth stage notch filter.
n.X□□□	Reserved parameter (Do not change.)	

Pn417	2	Third Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn418	2	Third Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn419	2	Third Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn41A	2	Fourth Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn41B	2	Fourth Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn41C	2	Fourth Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn41D	2	Fifth Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn41E	2	Fifth Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn41F	2	Fifth Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn423	2	Speed Ripple Compensation Selections	0000h to 1111h	–	0000h	Rotary	–	Setup	*1

n.□□□X	Speed Ripple Compensation Function Selection		When Enabled
	0	Disable speed ripple compensation.	Immediately
	1	Enable speed ripple compensation.	
n.□□X□	Speed Ripple Compensation Information Disagreement Warning Detection Selection		When Enabled
	0	Detect A.942 alarms.	After restart
	1	Do not detect A.942 alarms.	
n.□X□□	Speed Ripple Compensation Enable Condition Selection		When Enabled
	0	Speed reference	After restart
	1	Motor speed	
n.X□□□	Reserved parameter (Do not change.)		

Pn424	2	Torque Limit at Main Circuit Voltage Drop	0 to 100	1%*2	50	All	Immediately	Setup	*1
Pn425	2	Release Time for Torque Limit at Main Circuit Voltage Drop	0 to 1,000	1 ms	100	All	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn426	2	Torque Feedforward Average Movement Time	0 to 5,100	0.1 ms	0	All	Immediately	Setup	*1
Pn427	2	Speed Ripple Compensation Enable Speed	0 to 10,000	1 min^{-1}	0	Rotary	Immediately	Tuning	*1
Pn456	2	Sweep Torque Reference Amplitude	1 to 800	1%	15	All	Immediately	Tuning	*1
Pn460	2	Notch Filter Adjustment Selections 1	0000h to 0101h	–	0101h	All	Immediately	Tuning	*1

n.□□□X	Notch Filter Adjustment Selection 1	
	0	Do not adjust the first stage notch filter automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.
	1	Adjust the first stage notch filter automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Notch Filter Adjustment Selection 2	
	0	Do not adjust the second stage notch filter automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.
	1	Adjust the second stage notch filter automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.
n.X□□□	Reserved parameter (Do not change.)	

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn475	2	Gravity Compensation-Related Selections	0000h to 0001h	–	0000h	All	After restart	Setup	*1

n.□□□X	Gravity Compensation Selection	
	0	Disable gravity compensation.
	1	Enable gravity compensation.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn476	2	Gravity Compensation Torque	-1,000 to 1,000	0.1%	0	All	Immediately	Tuning	*1
Pn501	2	Zero Clamping Level	0 to 10,000	1 min^{-1}	10	Rotary	Immediately	Setup	*1
Pn502	2	Rotation Detection Level	1 to 10,000	1 min^{-1}	20	Rotary	Immediately	Setup	*1
Pn503	2	Speed Coincidence Detection Signal Output Width	0 to 100	1 min^{-1}	10	Rotary	Immediately	Setup	*1
Pn506	2	Brake Reference-Servo OFF Delay Time	0 to 50	10 ms	0	All	Immediately	Setup	*1
Pn507	2	Brake Reference Output Speed Level	0 to 10,000	1 min^{-1}	100	Rotary	Immediately	Setup	*1
Pn508	2	Servo OFF-Brake Command Waiting Time	10 to 100	10 ms	50	All	Immediately	Setup	*1
Pn509	2	Momentary Power Interruption Hold Time	20 to 50,000	1 ms	20	All	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn50A	2	Input Signal Selections 1	0000h to FFF2h	–	2100h	All	After restart	Setup	–

n.□□□X	Input Signal Allocation Mode		Reference
	0	Use the sequence input signal terminals with the default allocations.	*1
	1	Change the sequence input signal allocations.	
	2	Reserved setting (Do not use.)	

n.□□X□	/S-ON (Servo ON) Signal Allocation		Reference
	0	Active when CN1-40 input signal is ON (closed).	*1
	1	Active when CN1-41 input signal is ON (closed).	
	2	Active when CN1-42 input signal is ON (closed).	
	3	Active when CN1-43 input signal is ON (closed).	
	4	Active when CN1-44 input signal is ON (closed).	
	5	Active when CN1-45 input signal is ON (closed).	
	6	Active when CN1-46 input signal is ON (closed).	
	7	The signal is always active.	
	8	The signal is always inactive.	
	9	Active when CN1-40 input signal is OFF (open).	
	A	Active when CN1-41 input signal is OFF (open).	
	B	Active when CN1-42 input signal is OFF (open).	
	C	Active when CN1-43 input signal is OFF (open).	
	D	Active when CN1-44 input signal is OFF (open).	
	E	Active when CN1-45 input signal is OFF (open).	
	F	Active when CN1-46 input signal is OFF (open).	

n.□X□□	/P-CON (Proportional Control) Signal Allocation		Reference
	0 to F	The allocations are the same as the /S-ON (Servo ON) signal allocations.	*1

n.X□□□	P-OT (Forward Drive Prohibit) Signal Allocation		Reference
	0	Enable forward drive when CN1-40 input signal is ON (closed).	*1
	1	Enable forward drive when CN1-41 input signal is ON (closed).	
	2	Enable forward drive when CN1-42 input signal is ON (closed).	
	3	Enable forward drive when CN1-43 input signal is ON (closed).	
	4	Enable forward drive when CN1-44 input signal is ON (closed).	
	5	Enable forward drive when CN1-45 input signal is ON (closed).	
	6	Enable forward drive when CN1-46 input signal is ON (closed).	
	7	Set the signal to always prohibit forward drive.	
	8	Set the signal to always enable forward drive.	
	9	Enable forward drive when CN1-40 input signal is OFF (open).	
	A	Enable forward drive when CN1-41 input signal is OFF (open).	
	B	Enable forward drive when CN1-42 input signal is OFF (open).	
	C	Enable forward drive when CN1-43 input signal is OFF (open).	
	D	Enable forward drive when CN1-44 input signal is OFF (open).	
	E	Enable forward drive when CN1-45 input signal is OFF (open).	
	F	Enable forward drive when CN1-46 input signal is OFF (open).	

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn50B	2	Input Signal Selections 2	0000h to FFFFh	–	6543h	All	After restart	Setup	–

n.□□□X	N-OT (Reverse Drive Prohibit) Signal Allocation		Reference
	0	Enable reverse drive when CN1-40 input signal is ON (closed).	*1
	1	Enable reverse drive when CN1-41 input signal is ON (closed).	
	2	Enable reverse drive when CN1-42 input signal is ON (closed).	
	3	Enable reverse drive when CN1-43 input signal is ON (closed).	
	4	Enable reverse drive when CN1-44 input signal is ON (closed).	
	5	Enable reverse drive when CN1-45 input signal is ON (closed).	
	6	Enable reverse drive when CN1-46 input signal is ON (closed).	
	7	Set the signal to always prohibit reverse drive.	
	8	Set the signal to always enable reverse drive.	
	9	Enable reverse drive when CN1-40 input signal is OFF (open).	
	A	Enable reverse drive when CN1-41 input signal is OFF (open).	
	B	Enable reverse drive when CN1-42 input signal is OFF (open).	
	C	Enable reverse drive when CN1-43 input signal is OFF (open).	
	D	Enable reverse drive when CN1-44 input signal is OFF (open).	
	E	Enable reverse drive when CN1-45 input signal is OFF (open).	
	F	Enable reverse drive when CN1-46 input signal is OFF (open).	

n.□□X□	/ALM-RST (Alarm Reset) Signal Allocation		Reference
	0	Active on signal edge when CN1-40 input signal changes from OFF (open) to ON (closed).	*1
	1	Active on signal edge when CN1-41 input signal changes from OFF (open) to ON (closed).	
	2	Active on signal edge when CN1-42 input signal changes from OFF (open) to ON (closed).	
	3	Active on signal edge when CN1-43 input signal changes from OFF (open) to ON (closed).	
	4	Active on signal edge when CN1-44 input signal changes from OFF (open) to ON (closed).	
	5	Active on signal edge when CN1-45 input signal changes from OFF (open) to ON (closed).	
	6	Active on signal edge when CN1-46 input signal changes from OFF (open) to ON (closed).	
	7	Reserved setting (Do not use.)	
	8	The signal is always inactive.	
	9	Active on signal edge when CN1-40 input signal changes from ON (closed) to OFF (open).	
	A	Active on signal edge when CN1-41 input signal changes from ON (closed) to OFF (open).	
	B	Active on signal edge when CN1-42 input signal changes from ON (closed) to OFF (open).	
	C	Active on signal edge when CN1-43 input signal changes from ON (closed) to OFF (open).	
	D	Active on signal edge when CN1-44 input signal changes from ON (closed) to OFF (open).	
	E	Active on signal edge when CN1-45 input signal changes from ON (closed) to OFF (open).	
	F	Active on signal edge when CN1-46 input signal changes from ON (closed) to OFF (open).	

n.□X□□	/P-CL (Forward External Torque Limit Input) Signal Allocation		Reference
	0 to F	The allocations are the same as the /S-ON (Servo ON) signal allocations.	*1

n.X□□□	/N-CL (Reverse External Torque Limit Input) Signal Allocation		Reference
	0 to F	The allocations are the same as the /S-ON (Servo ON) signal allocations.	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn50C	2	Input Signal Selections 3	0000h to FFFFh	–	8888h	All	After restart	Setup	–

	/SPD-D (Motor Direction) Signal Allocation		Reference
n.□□□X	0	Active when CN1-40 input signal is ON (closed).	*1
	1	Active when CN1-41 input signal is ON (closed).	
	2	Active when CN1-42 input signal is ON (closed).	
	3	Active when CN1-43 input signal is ON (closed).	
	4	Active when CN1-44 input signal is ON (closed).	
	5	Active when CN1-45 input signal is ON (closed).	
	6	Active when CN1-46 input signal is ON (closed).	
	7	The signal is always active.	
	8	The signal is always inactive.	
	9	Active when CN1-40 input signal is OFF (open).	
	A	Active when CN1-41 input signal is OFF (open).	
	B	Active when CN1-42 input signal is OFF (open).	
	C	Active when CN1-43 input signal is OFF (open).	
	D	Active when CN1-44 input signal is OFF (open).	
	E	Active when CN1-45 input signal is OFF (open).	
	F	Active when CN1-46 input signal is OFF (open).	

	/SPD-A (Internal Set Speed Selection Input) Signal Allocation		Reference
n.□□X□	0 to F	The allocations are the same as the /SPD-D (Motor Direction) signal allocations.	*1

	/SPD-B (Internal Set Speed Selection Input) Signal Allocation		Reference
n.□X□□	0 to F	The allocations are the same as the /SPD-D (Motor Direction) signal allocations.	*1

	/C-SEL (Control Selection Input) Signal Allocation		Reference
n.X□□□	0 to F	The allocations are the same as the /SPD-D (Motor Direction) signal allocations.	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn50D	2	Input Signal Selections 4	0000h to FFFFh	–	8888h	–	After restart	Setup	–

n.□□□X	/ZCLAMP (Zero Clamping Input) Signal Allocation		Applicable Motors	Reference
	0	Active when CN1-40 input signal is ON (closed).	All	*1
	1	Active when CN1-41 input signal is ON (closed).		
	2	Active when CN1-42 input signal is ON (closed).		
	3	Active when CN1-43 input signal is ON (closed).		
	4	Active when CN1-44 input signal is ON (closed).		
	5	Active when CN1-45 input signal is ON (closed).		
	6	Active when CN1-46 input signal is ON (closed).		
	7	The signal is always active.		
	8	The signal is always inactive.		
	9	Active when CN1-40 input signal is OFF (open).		
	A	Active when CN1-41 input signal is OFF (open).		
	B	Active when CN1-42 input signal is OFF (open).		
	C	Active when CN1-43 input signal is OFF (open).		
	D	Active when CN1-44 input signal is OFF (open).		
	E	Active when CN1-45 input signal is OFF (open).		
	F	Active when CN1-46 input signal is OFF (open).		

n.□□X□	/INHIBIT (Reference Pulse Inhibit Input) Signal Allocation		Applicable Motors	Reference
	0 to F	The allocations are the same as the /ZCLAMP (Zero Clamping Input) signal allocations.	All	*1

n.□X□□	/G-SEL (Gain Selection Input) Signal Allocation		Applicable Motors	Reference
	0 to F	The allocations are the same as the /ZCLAMP (Zero Clamping Input) signal allocations.	All	*1

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn50E	2	Output Signal Selections 1	0000h to 6666h	–	3211h	All	After restart	Setup	–

n.□□□X	/COIN (Positioning Completion Output) Signal Allocation		Reference
	0	Disabled (the above signal output is not used).	*1
	1	Output the signal from the CN1-25 or CN1-26 output terminal.	
	2	Output the signal from the CN1-27 or CN1-28 output terminal.	
	3	Output the signal from the CN1-29 or CN1-30 output terminal.	
	4	Output the signal from the CN1-37 output terminal.	
	5	Output the signal from the CN1-38 output terminal.	
	6	Output the signal from the CN1-39 output terminal.	

n.□□X□	/V-CMP (Speed Coincidence Detection Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /COIN (Positioning Completion) signal allocations.	*1

n.□X□□	/TGON (Rotation Detection Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /COIN (Positioning Completion) signal allocations.	*1

n.X□□□	/S-RDY (Servo Ready) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /COIN (Positioning Completion) signal allocations.	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn50F	2	Output Signal Selections 2	0000h to 6666h	–	0000h	All	After restart	Setup	–

n.□□□X	/CLT (Torque Limit Detection Output) Signal Allocation		Reference
	0	Disabled (the above signal output is not used).	*1
	1	Output the signal from the CN1-25 or CN1-26 output terminal.	
	2	Output the signal from the CN1-27 or CN1-28 output terminal.	
	3	Output the signal from the CN1-29 or CN1-30 output terminal.	
	4	Output the signal from the CN1-37 output terminal.	
	5	Output the signal from the CN1-38 output terminal.	
	6	Output the signal from the CN1-39 output terminal.	

n.□□X□	/VLT (Speed Limit Detection) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /CLT (Torque Limit Detection Output) signal allocations.	*1

n.□X□□	/BK (Brake Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /CLT (Torque Limit Detection Output) signal allocations.	*1

n.X□□□	/WARN (Warning Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /CLT (Torque Limit Detection Output) signal allocations.	*1

Pn510	2	Output Signal Selections 3	0000h to 0666h	–	0000h	All	After restart	Setup	–

n.□□□X	/NEAR (Near Output) Signal Allocation		Reference
	0	Disabled (the above signal output is not used).	*1
	1	Output the signal from the CN1-25 or CN1-26 output terminal.	
	2	Output the signal from the CN1-27 or CN1-28 output terminal.	
	3	Output the signal from the CN1-29 or CN1-30 output terminal.	
	4	Output the signal from the CN1-37 output terminal.	
	5	Output the signal from the CN1-38 output terminal.	
	6	Output the signal from the CN1-39 output terminal.	

n.□□X□	Reserved parameter (Do not change.)

n.□X□□	/PSELA (Reference Pulse Input Multiplication Switching Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /NEAR (Near) signal allocations.	*1

n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn512	2	Output Signal Inverse Settings	0000h to 1111h	–	0000h	All	After restart	Setup	*1

n.□□□X	Output Signal Inversion for CN1-25 and CN1-26 Terminals	
	0	The signal is not inverted.
	1	The signal is inverted.
n.□□X□	Output Signal Inversion for CN1-27 and CN1-28 Terminals	
	0	The signal is not inverted.
	1	The signal is inverted.
n.□X□□	Output Signal Inversion for CN1-29 and CN1-30 Terminals	
	0	The signal is not inverted.
	1	The signal is inverted.
n.X□□□	Output Signal Inversion for CN1-37 Terminal	
	0	The signal is not inverted.
	1	The signal is inverted.

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn513	2	Output Signal Inverse Settings 2	0000h to 0011h	–	0000h	All	After restart	Setup	*1

n.□□□X	Output Signal Inversion for CN1-38 Terminal	
	0	The signal is not inverted.
	1	The signal is inverted.
n.□□X□	Output Signal Inversion for CN1-39 Terminal	
	0	The signal is not inverted.
	1	The signal is inverted.
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn514	2	Output Signal Selections 4	0000h to 0666h	–	0000h	All	After restart	Setup	–

n.□□□X	Reserved parameter (Do not change.)		
n.□□X□	Reserved parameter (Do not change.)		
n.□X□□	/PM (Preventative Maintenance Output) Signal Allocation		Reference
	0	Disabled (the above signal output is not used).	*1
	1	Output the signal from the CN1-25 or CN1-26 output terminal.	
	2	Output the signal from the CN1-27 or CN1-28 output terminal.	
	3	Output the signal from the CN1-29 or CN1-30 output terminal.	
	4	Output the signal from the CN1-37 output terminal.	
	5	Output the signal from the CN1-38 output terminal.	
	6	Output the signal from the CN1-39 output terminal.	
n.X□□□	Reserved parameter (Do not change.)		

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn515	2	Input Signal Selections 6	0000h to FFFFh	–	8888h	All	After restart	Setup	–

	SEN (Absolute Data Request Input) Signal Allocation		Reference
n.□□□X	0	Active when CN1-40 input signal is ON (closed).	*1
	1	Active when CN1-41 input signal is ON (closed).	
	2	Active when CN1-42 input signal is ON (closed).	
	3	Active when CN1-43 input signal is ON (closed).	
	4	Active when CN1-44 input signal is ON (closed).	
	5	Active when CN1-45 input signal is ON (closed).	
	6	Active when CN1-46 input signal is ON (closed).	
	7	The signal is always active.	
	8	Enable when 5 V is input to CN1-4.	
	9	Active when CN1-40 input signal is OFF (open).	
	A	Active when CN1-41 input signal is OFF (open).	
	B	Active when CN1-42 input signal is OFF (open).	
	C	Active when CN1-43 input signal is OFF (open).	
	D	Active when CN1-44 input signal is OFF (open).	
	E	Active when CN1-45 input signal is OFF (open).	
	F	Active when CN1-46 input signal is OFF (open).	

	/PSEL (Reference Pulse Input Multiplication Switching Input) Signal Allocation		Reference
n.□□X□	0	Active when CN1-40 input signal is ON (closed).	*1
	1	Active when CN1-41 input signal is ON (closed).	
	2	Active when CN1-42 input signal is ON (closed).	
	3	Active when CN1-43 input signal is ON (closed).	
	4	Active when CN1-44 input signal is ON (closed).	
	5	Active when CN1-45 input signal is ON (closed).	
	6	Active when CN1-46 input signal is ON (closed).	
	7	The signal is always enabled.	
	8	The signal is always inactive.	
	9	Active when CN1-40 input signal is OFF (open).	
	A	Active when CN1-41 input signal is OFF (open).	
	B	Active when CN1-42 input signal is OFF (open).	
	C	Active when CN1-43 input signal is OFF (open).	
	D	Active when CN1-44 input signal is OFF (open).	
	E	Active when CN1-45 input signal is OFF (open).	
	F	Active when CN1-46 input signal is OFF (open).	

n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn516	2	Input Signal Selections 7	0000h to FFFFh	–	8888h	All	After restart	Setup	–

	FSTP (Forced Stop Input) Signal Allocation		Reference
n.□□□X	0	Enable drive when CN1-40 input signal is ON (closed).	*1
	1	Enable drive when CN1-41 input signal is ON (closed).	
	2	Enable drive when CN1-42 input signal is ON (closed).	
	3	Enable drive when CN1-43 input signal is ON (closed).	
	4	Enable drive when CN1-44 input signal is ON (closed).	
	5	Enable drive when CN1-45 input signal is ON (closed).	
	6	Enable drive when CN1-46 input signal is ON (closed).	
	7	Set the signal to always prohibit drive (always force the motor to stop).	
	8	Set the signal to always enable drive (always disable forcing the motor to stop).	
	9	Enable drive when CN1-40 input signal is OFF (open).	
	A	Enable drive when CN1-41 input signal is OFF (open).	
	B	Enable drive when CN1-42 input signal is OFF (open).	
	C	Enable drive when CN1-43 input signal is OFF (open).	
	D	Enable drive when CN1-44 input signal is OFF (open).	
	E	Enable drive when CN1-45 input signal is OFF (open).	
	F	Enable drive when CN1-46 input signal is OFF (open).	

n.□□X□	Reserved parameter (Do not change.)
n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

Pn517	2	Output Signal Selections 5	0000h to 0666h	–	0654h	All	After restart	Setup	*1

	ALO1 (Alarm Code Output) Signal Allocation	
n.□□□X	0	Disabled (the above signal output is not used).
	1	Output the signal from the CN1-25 or CN1-26 output terminal.
	2	Output the signal from the CN1-27 or CN1-28 output terminal.
	3	Output the signal from the CN1-29 or CN1-30 output terminal.
	4	Output the signal from the CN1-37 output terminal.
	5	Output the signal from the CN1-38 output terminal.
	6	Output the signal from the CN1-39 output terminal.

	ALO2 (Alarm Code Output) Signal Allocation	
n.□□X□	0 to 6	The allocations are the same as the ALO1 (Alarm Code Output) signal allocations.

	ALO3 (Alarm Code Output) Signal Allocation	
n.□X□□	0 to 6	The allocations are the same as the ALO1 (Alarm Code Output) signal allocations.

n.X□□□	Reserved parameter (Do not change.)

Pn518*3	–	Safety Module-Related Parameters	–	–	–	All	–	–	–

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn51A	2	Output Signal Selections 8	0000h to 0006h	–	0000h	All	After restart	Setup	page 4-22

n.□□□X	/FLCA (Semi-closed/Fully-closed Loop Control Status Output) Signal Allocation	
	0	Disabled (the above signal output is not used.)
	1	Output the signal from the CN1-25 or CN1-26 output terminal.
	2	Output the signal from the CN1-27 or CN1-28 output terminal.
	3	Output the signal from the CN1-29 or CN1-30 output terminal.
	4	Output the signal from the CN1-37 output terminal.
	5	Output the signal from the CN1-38 output terminal.
	6	Output the signal from the CN1-39 output terminal.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Pn51B	4	Motor-Load Position Deviation Overflow Detection Level	0 to 1,073,741,824	1 reference unit	1000	Rotary	Immediately	Setup	*1
Pn51E	2	Position Deviation Overflow Warning Level	10 to 100	1%	100	All	Immediately	Setup	*1
Pn520	4	Position Deviation Overflow Alarm Level	1 to 1,073,741,823	1 reference unit	5242880	All	Immediately	Setup	*1
Pn522	4	Positioning Completed Width	0 to 1,073,741,824	1 reference unit	7	All	Immediately	Setup	*1
Pn524	4	Near Signal Width	1 to 1,073,741,824	1 reference unit	1073741824	All	Immediately	Setup	*1
Pn526	4	Position Deviation Overflow Alarm Level at Servo ON	1 to 1,073,741,823	1 reference unit	5242880	All	Immediately	Setup	*1
Pn528	2	Position Deviation Overflow Warning Level at Servo ON	10 to 100	1%	100	All	Immediately	Setup	*1
Pn529	2	Speed Limit Level at Servo ON	0 to 10,000	1 min^{-1}	10000	Rotary	Immediately	Setup	*1
Pn52A	2	Multiplier per Fully-closed Rotation	0 to 100	1%	20	Rotary	Immediately	Tuning	*1
Pn52B	2	Overload Warning Level	1 to 100	1%	20	All	Immediately	Setup	*1
Pn52C	2	Base Current Derating at Motor Overload Detection	10 to 100	1%	100	All	After restart	Setup	*1
Pn52F	2	Monitor Display at Startup	0000h to 0FFFh	–	0FFFh	All	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn530	2	Program Jogging-Related Selections	0000h to 0005h	–	0000h	All	Immediately	Setup	*1

n.□□□X	Program Jogging Operation Pattern	
	0	(Waiting time in Pn535 → Forward by travel distance in Pn531) × Number of movements in Pn536
	1	(Waiting time in Pn535 → Reverse by travel distance in Pn531) × Number of movements in Pn536
	2	(Waiting time in Pn535 → Forward by travel distance in Pn531) × Number of movements in Pn536 (Waiting time in Pn535 → Reverse by travel distance in Pn531) × Number of movements in Pn536
	3	(Waiting time in Pn535 → Reverse by travel distance in Pn531) × Number of movements in Pn536 (Waiting time in Pn535 → Forward by travel distance in Pn531) × Number of movements in Pn536
	4	(Waiting time in Pn535 → Forward by travel distance in Pn531 → Waiting time in Pn535 → Reverse by travel distance in Pn531) × Number of movements in Pn536
	5	(Waiting time in Pn535 → Reverse by travel distance in Pn531 → Waiting time in Pn535 → Forward by travel distance in Pn531) × Number of movements in Pn536
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Pn531	4	Program Jogging Travel Distance	1 to 1,073,741,824	1 reference unit	32768	All	Immediately	Setup	*1
Pn533	2	Program Jogging Movement Speed	1 to 10,000	Rotary: 1 min^{-1} Direct Drive: 0.1 min^{-1}	500	Rotary	Immediately	Setup	*1
Pn534	2	Program Jogging Acceleration/Deceleration Time	2 to 10,000	1 ms	100	All	Immediately	Setup	*1
Pn535	2	Program Jogging Waiting Time	0 to 10,000	1 ms	100	All	Immediately	Setup	*1
Pn536	2	Program Jogging Number of Movements	0 to 1,000	1 time	1	All	Immediately	Setup	*1
Pn550	2	Analog Monitor 1 Offset Voltage	-10,000 to 10,000	0.1 V	0	All	Immediately	Setup	*1
Pn551	2	Analog Monitor 2 Offset Voltage	-10,000 to 10,000	0.1 V	0	All	Immediately	Setup	*1
Pn552	2	Analog Monitor 1 Magnification	-10,000 to 10,000	× 0.01	100	All	Immediately	Setup	*1
Pn553	2	Analog Monitor 2 Magnification	-10,000 to 10,000	× 0.01	100	All	Immediately	Setup	*1
Pn55A	2	Power Consumption Monitor Unit Time	1 to 1,440	1 min	1	All	Immediately	Setup	–
Pn560	2	Residual Vibration Detection Width	1 to 3,000	0.1%	400	All	Immediately	Setup	*1
Pn561	2	Overshoot Detection Level	0 to 100	1%	100	All	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn58A	2	Input Signal Selections 9	0000h to 00FFh	–	0088h	All	After restart	Setup	page 4-20

n.□□□X	/FLC (Semi-closed/Fully-closed Loop Control Selection Input) Signal Allocation	
	0	Fully-closed loop control when CN1-40 input signal is ON (closed).
	1	Fully-closed loop control when CN1-41 input signal is ON (closed).
	2	Fully-closed loop control when CN1-42 input signal is ON (closed).
	3	Fully-closed loop control when CN1-43 input signal is ON (closed).
	4	Fully-closed loop control when CN1-44 input signal is ON (closed).
	5	Fully-closed loop control when CN1-45 input signal is ON (closed).
	6	Fully-closed loop control when CN1-46 input signal is ON (closed).
	7	The signal is always active. (Always fixed to fully-closed loop control.)
	8	The signal is always inactive. (Always fixed to semi-closed loop control.)
	9	Fully-closed loop control when CN1-40 input signal is OFF (open).
	A	Fully-closed loop control when CN1-41 input signal is OFF (open).
	B	Fully-closed loop control when CN1-42 input signal is OFF (open).
	C	Fully-closed loop control when CN1-43 input signal is OFF (open).
	D	Fully-closed loop control when CN1-44 input signal is OFF (open).
	E	Fully-closed loop control when CN1-45 input signal is OFF (open).
	F	Fully-closed loop control when CN1-46 input signal is OFF (open).

n.□□X□	/SFECLR (Motor-Load Position Deviation Clear Input) Signal Allocation	
	0	Clear deviation when CN1-40 input signal is ON (closed).
	1	Clear deviation when CN1-41 input signal is ON (closed).
	2	Clear deviation when CN1-42 input signal is ON (closed).
	3	Clear deviation when CN1-43 input signal is ON (closed).
	4	Clear deviation when CN1-44 input signal is ON (closed).
	5	Clear deviation when CN1-45 input signal is ON (closed).
	6	Clear deviation when CN1-46 input signal is ON (closed).
	7	The signal is always active. (Deviation is always cleared.)
	8	The signal is always inactive. (Deviation is always not cleared.)
	9	Clear deviation when CN1-40 input signal is OFF (open).
	A	Clear deviation when CN1-41 input signal is OFF (open).
	B	Clear deviation when CN1-42 input signal is OFF (open).
	C	Clear deviation when CN1-43 input signal is OFF (open).
	D	Clear deviation when CN1-44 input signal is OFF (open).
	E	Clear deviation when CN1-45 input signal is OFF (open).
	F	Clear deviation when CN1-46 input signal is OFF (open).

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn600	2	Regenerative Resistor Capacity*4	Depends on model.*5	10 W	0	All	Immediately	Setup	*1
Pn601	2	Dynamic Brake Resistor Allowable Energy Consumption	0 to 65,535	10 J	0	All	After restart	Setup	*6
Pn603	2	Regenerative Resistance	0 to 65,535	10 mΩ	0	All	Immediately	Setup	*1
Pn604	2	Dynamic Brake Resistance	0 to 65,535	10 mΩ	0	All	After restart	Setup	*6

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn61A	2	Overheat Protection Selections	0000h to 0003h	–	0000h	All	After restart	Setup	*1

n.□□□X	Overheat Protection Selection	
	0	Disable overheat protection.
	1	Reserved setting (Do not use.)
	2	Monitor a negative voltage input from a sensor attached to the machine and use overheat protection.
	3	Monitor a positive voltage input from a sensor attached to the machine and use overheat protection.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Pn61B *7	2	Overheat Alarm Level	0 to 500	0.01 V	250	All	Immediately	Setup	*1
Pn61C *7	2	Overheat Warning Level	0 to 100	1%	100	All	Immediately	Setup	*1
Pn61D *7	2	Overheat Alarm Filter Time	0 to 65,535	1 s	0	All	Immediately	Setup	*1
Pn621 to Pn628*3	–	Safety Module-Related Parameters	–	–	–	All	–	–	–

*1. Refer to the following manual for details.
Σ-7-Series Σ-7S SERVOPACK with Analog Voltage/Pulse Train References Product Manual (Manual No.: SIEP S800001 26)

*2. Set a percentage of the motor rated torque.

*3. These parameters are for SERVOPACKs with a Safety Module. Refer to the following manual for details.
Σ-V-Series/Σ-V-Series for Large-Capacity Models/Σ-7-Series User's Manual Safety Module (Manual No.: SIEP C720829 06)

*4. Normally set this parameter to 0. If you use an External Regenerative Resistor, set the capacity (W) of the External Regenerative Resistor.

*5. The upper limit is the maximum output capacity (W) of the SERVOPACK.

*6. These parameters are for SERVOPACKs with the dynamic brake option. Refer to the following manual for details.
Σ-7-Series AC Servo Drive Σ-7S/Σ-7W SERVOPACK with Dynamic Brake Hardware Option Specifications Product Manual (Manual No.: SIEP S800001 73)

*7. Enabled only when Pn61A is set to n.□□□2 or n.□□□3.

8.3 SERVOPACK with MECHATROLINK-III Communications References

8.3.1 List of Servo Parameters

The following table lists the parameters.

Note: Do not change the following parameters from their default settings.
- Reserved parameters
- Parameters not given in this manual
- Parameters that are not valid for the Servomotor that you are using, as given in the parameter table

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn000	2	Basic Function Selections 0	0000h to 10B1h	–	0000h	All	After restart	Setup	–

n.□□□X	Rotation Direction Selection		Reference
	0	Use CCW as the forward direction.	*1
	1	Use CW as the forward direction. (Reverse Rotation Mode)	

n.□□X□	Reserved parameter (Do not change.)

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Rotary/Linear Servomotor Startup Selection When Encoder Is Not Connected		Reference
	0	When an encoder is not connected, start as SERVOPACK for Rotary Servomotor.	*1
	1	When an encoder is not connected, start as SERVOPACK for Linear Servomotor.	

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn001	2	Application Function Selections 1	0000h to 1142h	–	0000h	All	After restart	Setup	–

n.□□□X	Motor Stopping Method for Servo OFF and Group 1 Alarms		Reference
	0	Stop the motor by applying the dynamic brake.	*1
	1	Stop the motor by the applying dynamic brake and then release the dynamic brake.	
	2	Coast the motor to a stop without the dynamic brake.	

n.□□X□	Overtravel Stopping Method		Reference
	0	Apply the dynamic brake or coast the motor to a stop.	*1
	1	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque and then servo-lock the motor.	
	2	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque and then let the motor coast.	
	3	Decelerate the motor to a stop using the deceleration time set in Pn30A and then servo-lock the motor.	
	4	Decelerate the motor to a stop using the deceleration time set in Pn30A and then let the motor coast.	

n.□X□□	Main Circuit Power Supply AC/DC Input Selection		Reference
	0	Input AC power as the main circuit power supply using the L1, L2, and L3 terminals (do not use shared converter).	*1
	1	Input DC power as the main circuit power supply using the B1/⊕ and ⊖ 2 terminals or the B1 and ⊖ 2 terminals (use an external converter or the shared converter).	

n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn002	2	Application Function Selections 2	0000h to 4213h	–	0111h	–	After restart	Setup	–

n.□□□X	MECHATROLINK Command Position and Speed Control Option		Applicable Motors	Reference
	0	Reserved setting (Do not use.)	All	*2
	1	Use TLIM as the torque limit.		
	2	Reserved setting (Do not use.)		
	3	Reserved setting (Do not use.)		

n.□□X□	Torque Control Option		Applicable Motors	Reference
	0	Reserved setting (Do not use.)	All	*2
	1	Use the speed limit for torque control (VLIM) as the speed limit.		

n.□X□□	Encoder Usage		Applicable Motors	Reference
	0	Use the encoder according to encoder specifications.	All	*1
	1	Use the encoder as an incremental encoder.		
	2	Use the encoder as a single-turn absolute encoder.	Rotary	

n.X□□□	External Encoder Usage		Applicable Motors	Reference
	0	Do not use an external encoder.	Rotary	*1
	1	The external encoder moves in the forward direction for CCW motor rotation.		
	2	Reserved setting (Do not use.)		
	3	The external encoder moves in the reverse direction for CCW motor rotation.		
	4	Reserved setting (Do not use.)		

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn006	2	Application Function Selections 6	0000h to 105Fh	–	0002h	All	Immediately	Setup	*1

n.□□XX	Analog Monitor 1 Signal Selection	
	00	Motor speed (1 V/1,000 min^{-1})
	01	Speed reference (1 V/1,000 min^{-1})
	02	Torque reference (1 V/100% rated torque)
	03	Position deviation (0.05 V/reference unit)
	04	Position amplifier deviation (after electronic gear) (0.05 V/encoder pulse unit)
	05	Position reference speed (1 V/1,000 min^{-1})
	06	Reserved setting (Do not use.)
	07	Load-motor position deviation (0.01 V/reference unit)
	08	Positioning completion (positioning completed: 5 V, positioning not completed: 0 V)
	09	Speed feedforward (1 V/1,000 min^{-1})
	0A	Torque feedforward (1 V/100% rated torque)
	0B	Active gain (1st gain: 1 V, 2nd gain: 2 V)
	0C	Completion of position reference distribution (completed: 5 V, not completed: 0 V)
	0D	External encoder speed (1 V/1,000 min^{-1}: value at the motor shaft)
	0E	Reserved setting (Do not use.)
	0F	Reserved setting (Do not use.)
	10	Main circuit DC voltage
	11 to 5F	Reserved settings (Do not use.)

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn007	2	Application Function Selections 7	0000h to 105Fh	–	0000h	All	Immediately	Setup	*1

n.□□XX	Analog Monitor 2 Signal Selection	
	00	Motor speed (1 V/1,000 min^{-1})
	01	Speed reference (1 V/1,000 min^{-1})
	02	Torque reference (1 V/100% rated torque)
	03	Position deviation (0.05 V/reference unit)
	04	Position amplifier deviation (after electronic gear) (0.05 V/encoder pulse unit)
	05	Position reference speed (1 V/1,000 min^{-1})
	06	Reserved setting (Do not use.)
	07	Load-motor position deviation (0.01 V/reference unit)
	08	Positioning completion (positioning completed: 5 V, positioning not completed: 0 V)
	09	Speed feedforward (1 V/1,000 min^{-1})
	0A	Torque feedforward (1 V/100% rated torque)
	0B	Active gain (1st gain: 1 V, 2nd gain: 2 V)
	0C	Completion of position reference distribution (completed: 5 V, not completed: 0 V)
	0D	External encoder speed (1 V/1,000 min^{-1}: value at the motor shaft)
	0E	Reserved setting (Do not use.)
	0F	Reserved setting (Do not use.)
	10	Main circuit DC voltage
	11 to 5F	Reserved settings (Do not use.)

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn008	2	Application Function Selections 8	0000h to 7121h	–	4000h	Rotary	After restart	Setup	–

n.□□□X	Low Battery Voltage Alarm/Warning Selection		Reference
	0	Output alarm (A.830) for low battery voltage.	*1
	1	Output warning (A.930) for low battery voltage.	

n.□□X□	Function Selection for Undervoltage		Reference
	0	Do not detect undervoltage.	*1
	1	Detect undervoltage warning and limit torque at host controller.	
	2	Detect undervoltage warning and limit torque with Pn424 and Pn425 (i.e., only in SERVOPACK).	

n.□X□□	Warning Detection Selection		Reference
	0	Detect warnings.	*1
	1	Do not detect warnings except for A.971.	

n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn009	2	Application Function Selections 9	0000h to 0121h	–	0010h	All	After restart	Tuning	–

n.□□□X	Reserved parameter (Do not change.)

			Reference
n.□□X□	Current Control Mode Selection		
	0	Use current control mode 1.	*1
	1	• SERVOPACK Models SGD7S-R70A, -R90A, -1R6A, -2R8A, -3R8A, -5R5A, and -7R6A: Use current control mode 1. • SERVOPACK Models SGD7S-120A, -180A, -200A, -330A, -470A, -550A, -590A, and -780A: Use current control mode 2.	
	2	Use current control mode 2.	

			Reference
n.□X□□	Speed Detection Method Selection		
	0	Use speed detection 1.	*1
	1	Use speed detection 2.	

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn00A	2	Application Function Selections A	0000h to 1044h	–	0001h	All	After restart	Setup	–

			Reference
n.□□□X	Motor Stopping Method for Group 2 Alarms		
	0	Apply the dynamic brake or coast the motor to a stop (use the stopping method set in Pn001 = n.□□□X).	*1
	1	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque. Use the setting of Pn001 = n.□□□X for the status after stopping.	
	2	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque and then let the motor coast.	
	3	Decelerate the motor to a stop using the deceleration time set in Pn30A. Use the setting of Pn001 = n.□□□X for the status after stopping.	
	4	Decelerate the motor to a stop using the deceleration time set in Pn30A and then let the motor coast.	

			Reference
n.□□X□	Stopping Method for Forced Stops		
	0	Apply the dynamic brake or coast the motor to a stop (use the stopping method set in Pn001 = n.□□□X).	*1
	1	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque. Use the setting of Pn001 = n.□□□X for the status after stopping.	
	2	Decelerate the motor to a stop using the torque set in Pn406 as the maximum torque and then let the motor coast.	
	3	Decelerate the motor to a stop using the deceleration time set in Pn30A. Use the setting of Pn001 = n.□□□X for the status after stopping.	
	4	Decelerate the motor to a stop using the deceleration time set in Pn30A and then let the motor coast.	

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn00B	2	Application Function Selections B	0000h to 1121h	–	0000h	All	After restart	Setup	–

n.□□□X	Operator Parameter Display Selection		Reference
	0	Display only setup parameters.	*1
	1	Display all parameters.	

n.□□X□	Motor Stopping Method for Group 2 Alarms		Reference
	0	Stop the motor by setting the speed reference to 0.	*1
	1	Apply the dynamic brake or coast the motor to a stop (use the stopping method set in Pn001 = n.□□□X).	
	2	Set the stopping method with Pn00A = n.□□□X.	

n.□X□□	Power Input Selection for Three-phase SERVOPACK		Reference
	0	Use a three-phase power supply input.	*1
	1	Use a three-phase power supply input as a single-phase power supply input.	

n.X□□□	Reserved parameter (Do not change.)

Pn00C	2	Application Function Selections C	0000h to 0130h	–	0000h	–	After restart	Setup	*1

n.□□□X	Function Selection for Test without a Motor		Applicable Motors
	0	Disable tests without a motor.	All

n.□□X□	Encoder Resolution for Tests without a Motor		Applicable Motors
	0	Use 13 bits.	Rotary
	1	Use 20 bits.	
	2	Use 22 bits.	
	3	Use 24 bits.	

n.□X□□	Encoder Type Selection for Tests without a Motor		Applicable Motors
	0	Use an incremental encoder.	All
	1	Use an absolute encoder.	

n.X□□□	Reserved parameter (Do not change.)

Pn00D	2	Application Function Selections D	0000h to 1001h	–	0000h	All	Immediately	Setup	*1

n.□□□X	Reserved parameter (Do not change.)

n.□□X□	Reserved parameter (Do not change.)

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Overtravel Warning Detection Selection	
	0	Do not detect overtravel warnings.
	1	Detect overtravel warnings.

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn00F	2	Application Function Selections F	0000h to 2011h	–	0000h	All	After restart	Setup	–

n.□□□X	Preventative Maintenance Warning Selection		Reference
	0	Do not detect preventative maintenance warnings.	*1
	1	Detect preventative maintenance warnings.	
n.□□X□	Reserved parameter (Do not change.)		
n.□X□□	Reserved parameter (Do not change.)		
n.X□□□	Reserved parameter (Do not change.)		

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn021	2	Reserved parameter (Do not change.)	–	–	0000h	All	–	–	–
Pn022	2	Reserved parameter (Do not change.)	–	–	0000h	All	–	–	–
Pn02A	2	Semi-closed/Fully-closed Loop Control Switching-Related Selection	0000h to 0011h	–	0000h	All	After restart	Setup	–

n.□□□X	Semi-closed/Fully-closed Loop Control Switching Selection		
	0	Disable Semi-closed/Fully-closed Loop Control Switching.	
	1	Enable Semi-closed/Fully-closed Loop Control Switching.	
n.□□X□	Encoder Divided Pulses Output Method Selection during Fully-closed Loop Control		Reference
	0	During fully-closed loop control, output encoder divided pulses for position feedback from an external encoder according to the value of Electronic Gear Ratio for External Encoder Conversion (Pn24A/Pn24C) after conversion and the setting value of Pn212.	page 4-15
	1	During fully-closed loop control, output encoder divided pulses for position feedback from an external encoder according to the setting value of Pn281.	
n.□X□□	Reserved parameter (Do not change.)		
n.X□□□	Reserved parameter (Do not change.)		

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn040	2	Reserved parameter (Do not change.)	–	–	0000h	–	–	–	–
Pn081	2	Application Function Selections 81	0000h to 1111h	–	0000h	All	After restart	Setup	*1

n.□□□X	Phase-C Pulse Output Selection		
	0	Output phase-C pulses only in the forward direction.	
	1	Output phase-C pulses in both the forward and reverse directions.	
n.□□X□	Reserved parameter (Do not change.)		
n.□X□□	Reserved parameter (Do not change.)		
n.X□□□	Reserved parameter (Do not change.)		

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn100	2	Speed Loop Gain	10 to 20,000	0.1 Hz	400	All	Immediately	Tuning	*1
Pn101	2	Speed Loop Integral Time Constant	15 to 51,200	0.01 ms	2000	All	Immediately	Tuning	*1
Pn102	2	Position Loop Gain	10 to 20,000	0.1/s	400	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn103	2	Moment of Inertia Ratio	0 to 20,000	1%	100	All	Immediately	Tuning	*1
Pn104	2	Second Speed Loop Gain	10 to 20,000	0.1 Hz	400	All	Immediately	Tuning	*1
Pn105	2	Second Speed Loop Integral Time Constant	15 to 51,200	0.01 ms	2000	All	Immediately	Tuning	*1
Pn106	2	Second Position Loop Gain	10 to 20,000	0.1/s	400	All	Immediately	Tuning	*1
Pn109	2	Feedforward	0 to 100	1%	0	All	Immediately	Tuning	*1
Pn10A	2	Feedforward Filter Time Constant	0 to 6,400	0.01 ms	0	All	Immediately	Tuning	*1
Pn10B	2	Gain Application Selections	0000h to 5334h	–	0000h	All	–	Setup	–

n.□□□X	Mode Switching Selection		When Enabled	Reference
	0	Use the internal torque reference as the condition (level setting: Pn10C).	Immediately	*1
	1	Use the speed reference as the condition (level setting: Pn10D).		
	2	Use the acceleration reference as the condition (level setting: Pn10E).		
	3	Use the position deviation as the condition (level setting: Pn10F).		
	4	Do not use mode switching.		

n.□□X□	Speed Loop Control Method		When Enabled	Reference
	0	PI control	After restart	*1
	1	I-P control		
	2 and 3	Reserved settings (Do not use.)		

n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

Pn10C	2	Mode Switching Level for Torque Reference	0 to 800	1%	200	All	Immediately	Tuning	*1
Pn10D	2	Mode Switching Level for Speed Reference	0 to 10,000	1 min^{-1}	0	Rotary	Immediately	Tuning	*1
Pn10E	2	Mode Switching Level for Acceleration	0 to 30,000	1 min^{-1}/s	0	Rotary	Immediately	Tuning	*1
Pn10F	2	Mode Switching Level for Position Deviation	0 to 10,000	1 reference unit	0	All	Immediately	Tuning	*1
Pn11F	2	Position Integral Time Constant	0 to 50,000	0.1 ms	0	All	Immediately	Tuning	*1
Pn121	2	Friction Compensation Gain	10 to 1,000	1%	100	All	Immediately	Tuning	*1
Pn122	2	Second Friction Compensation Gain	10 to 1,000	1%	100	All	Immediately	Tuning	*1
Pn123	2	Friction Compensation Coefficient	0 to 100	1%	0	All	Immediately	Tuning	*1
Pn124	2	Friction Compensation Frequency Correction	-10,000 to 10,000	0.1 Hz	0	All	Immediately	Tuning	*1
Pn125	2	Friction Compensation Gain Correction	1 to 1,000	1%	100	All	Immediately	Tuning	*1
Pn131	2	Gain Switching Time 1	0 to 65,535	1 ms	0	All	Immediately	Tuning	*1
Pn132	2	Gain Switching Time 2	0 to 65,535	1 ms	0	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn135	2	Gain Switching Waiting Time 1	0 to 65,535	1 ms	0	All	Immediately	Tuning	*1
Pn136	2	Gain Switching Waiting Time 2	0 to 65,535	1 ms	0	All	Immediately	Tuning	*1
Pn139	2	Automatic Gain Switching Selections 1	0000h to 0052h	–	0000h	All	Immediately	Tuning	*1

n.□□□X	Gain Switching Selection
0	Use manual gain switching. The gain is switched manually with G-SEL in the servo command output signals (SVCMD_IO).
1	Reserved setting (Do not use.)
2	Use automatic gain switching pattern 1. The gain settings 1 switch automatically to 2 when switching condition A is satisfied. The gain settings 2 switch automatically to 1 when switching condition A is not satisfied.

n.□□X□	Gain Switching Condition A
0	/COIN (Positioning Completion Output) signal turns ON.
1	/COIN (Positioning Completion Output) signal turns OFF.
2	/NEAR (Near Output) signal turns ON.
3	/NEAR (Near Output) signal turns OFF.
4	Position reference filter output is 0 and position reference input is OFF.
5	Position reference input is ON.

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

Pn13D	2	Current Gain Level	100 to 2,000	1%	2000	All	Immediately	Tuning	*1
Pn140	2	Model Following Control-Related Selections	0000h to 1120h	–	0100h	All	Immediately	Tuning	–

n.□□□X	Model Following Control Selection	Reference
0	Do not use model following control.	*1

n.□□X□	Vibration Suppression Selection	Reference
0	Do not perform vibration suppression.	*1
1	Perform vibration suppression for a specific frequency.	
2	Perform vibration suppression for two specific frequencies.	

n.□X□□	Vibration Suppression Adjustment Selection	Reference
0	Do not adjust vibration suppression automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.	*1
1	Adjust vibration suppression automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.	

n.X□□□	Speed Feedforward (VFF)/Torque Feedforward (TFF) Selection	Reference
0	Do not use model following control and speed/torque feedforward together.	*1
1	Use model following control and speed/torque feedforward together.	

Pn141	2	Model Following Control Gain	10 to 20,000	0.1/s	500	All	Immediately	Tuning	*1
Pn142	2	Model Following Control Gain Correction	500 to 2,000	0.1%	1000	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn143	2	Model Following Control Bias in the Forward Direction	0 to 10,000	0.1%	1000	All	Immediately	Tuning	*1
Pn144	2	Model Following Control Bias in the Reverse Direction	0 to 10,000	0.1%	1000	All	Immediately	Tuning	*1
Pn145	2	Vibration Suppression 1 Frequency A	10 to 2,500	0.1 Hz	500	All	Immediately	Tuning	*1
Pn146	2	Vibration Suppression 1 Frequency B	10 to 2,500	0.1 Hz	700	All	Immediately	Tuning	*1
Pn147	2	Model Following Control Speed Feedforward Compensation	0 to 10,000	0.1%	1000	All	Immediately	Tuning	*1
Pn148	2	Second Model Following Control Gain	10 to 20,000	0.1/s	500	All	Immediately	Tuning	*1
Pn149	2	Second Model Following Control Gain Correction	500 to 2,000	0.1%	1000	All	Immediately	Tuning	*1
Pn14A	2	Vibration Suppression 2 Frequency	10 to 2,000	0.1 Hz	800	All	Immediately	Tuning	*1
Pn14B	2	Vibration Suppression 2 Correction	10 to 1,000	1%	100	All	Immediately	Tuning	*1
Pn14F	2	Control-Related Selections	0000h to 0021h	–	0021h	All	After restart	Tuning	–

	Model Following Control Type Selection		Reference
n.□□□X	0	Use model following control type 1.	*1
	1	Use model following control type 2.	

	Tuning-less Type Selection		Reference
n.□□X□	0	Use tuning-less type 1.	*1
	1	Use tuning-less type 2.	
	2	Use tuning-less type 3.	

n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn160	2	Anti-Resonance Control-Related Selections	0000h to 0011h	–	0010h	All	Immediately	Tuning	–

	Anti-Resonance Control Selection		Reference
n.□□□X	0	Do not use anti-resonance control.	*1
	1	Use anti-resonance control.	

	Anti-Resonance Control Adjustment Selection		Reference
n.□□X□	0	Do not adjust anti-resonance control automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.	*1
	1	Adjust anti-resonance control automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.	

n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn161	2	Anti-Resonance Frequency	10 to 20,000	0.1 Hz	1000	All	Immediately	Tuning	*1
Pn162	2	Anti-Resonance Gain Correction	1 to 1,000	1%	100	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn163	2	Anti-Resonance Damping Gain	0 to 300	1%	0	All	Immediately	Tuning	*1
Pn164	2	Anti-Resonance Filter Time Constant 1 Correction	-1,000 to 1,000	0.01 ms	0	All	Immediately	Tuning	*1
Pn165	2	Anti-Resonance Filter Time Constant 2 Correction	-1,000 to 1,000	0.01 ms	0	All	Immediately	Tuning	*1
Pn166	2	Anti-Resonance Damping Gain 2	0 to 1,000	1%	0	All	Immediately	Tuning	*1
Pn170	2	Tuning-less Function-Related Selections	0000h to 2711h	–	1400h	All	–	Setup	*1

n.□□□X	Tuning-less Selection		When Enabled
	0	Disable tuning-less function.	After restart
	1	Enable tuning-less function.	

n.□□X□	Speed Control Method		When Enabled
	0	Use for speed control.	After restart
	1	Use for speed control and use host controller for position control.	

n.□X□□	Rigidity Level		When Enabled
	0 to 7	Set the rigidity level.	Immediately

n.X□□□	Tuning-less Load Level		When Enabled
	0 to 2	Set the load level for the tuning-less function.	Immediately

Pn205	2	Multiturn Limit	0 to 65,535	1 rev	65535	Rotary	After restart	Setup	*1
Pn207	2	Position Control Function Selections	0000h to 2210h	–	0010h	All	After restart	Setup	–

n.□□□X	Reserved parameter (Do not change.)
n.□□X□	Reserved parameter (Do not change.)
n.□X□□	Reserved parameter (Do not change.)

n.X□□□	/COIN (Positioning Completion Output) Signal Output Timing		Reference
	0	Output when the absolute value of the position deviation is the same or less than the setting of Pn522 (Positioning Completed Width).	*1
	1	Output when the absolute value of the position error is the same or less than the setting of Pn522 (Positioning Completed Width) and the reference after the position reference filter is 0.	
	2	Output when the absolute value of the position error is the same or less than the setting of Pn522 (Positioning Completed Width) and the reference input is 0.	

Pn20A	4	Number of External Encoder Scale Pitches	4 to 1,048,576	1 scale pitch/ revolution	32768	Rotary	After restart	Setup	*1
Pn20E	4	Electronic Gear Ratio (Numerator)	1 to 1,073,741,824	1	16	All	After restart	Setup	*1
Pn210	4	Electronic Gear Ratio (Denominator)	1 to 1,073,741,824	1	1	All	After restart	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn212	4	Number of Encoder Output Pulses	16 to 1,073,741,824	1 P/Rev	2048	Rotary	After restart	Setup	*1
Pn22A	2	Fully-closed Control Selections	0000h to 1003h	–	0000h	Rotary	After restart	Setup	*1

n.□□□X	Reserved parameter (Do not change.)	
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Fully-closed Control Speed Feedback Selection	
	0	Use motor encoder speed.
	1	Use external encoder speed.

Pn230	2	Position Control Expansion Function Selections	0000h to 0001h	–	0000h	All	After restart	Setup	*1

n.□□□X	Backlash Compensation Direction	
	0	Compensate forward references.
	1	Compensate reverse references.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Pn231	4	Backlash Compensation	-500,000 to 500,000	0.1 reference units	0	All	Immediately	Setup	*1
Pn233	2	Backlash Compensation Time Constant	0 to 65,535	0.01 ms	0	All	Immediately	Setup	*1
Pn24A	4	Electronic Gear Ratio for External Encoder Conversion (Numerator)	1 to 1073741824	–	1	All	After restart	Setup	page 4-14
Pn24C	4	Electronic Gear Ratio for External Encoder Conversion (Denominator)	1 to 1073741824	–	1	All	After restart	Setup	page 4-14
Pn281	2	Encoder Output Resolution	1 to 4,096	1 edge/pitch	20	All	After restart	Setup	*1
Pn304	2	Jogging Speed	0 to 10,000	Rotary: 1 min^{-1} Direct Drive: 0.1 min^{-1}	500	Rotary	Immediately	Setup	*1
Pn305	2	Soft Start Acceleration Time	0 to 10,000	1 ms	0	All	Immediately	Setup	*2
Pn306	2	Soft Start Deceleration Time	0 to 10,000	1 ms	0	All	Immediately	Setup	*2
Pn308	2	Speed Feedback Filter Time Constant	0 to 65,535	0.01 ms	0	All	Immediately	Setup	*1
Pn30A	2	Deceleration Time for Servo OFF and Forced Stops	0 to 10,000	1 ms	0	All	Immediately	Setup	*1
Pn30C	2	Speed Feedforward Average Movement Time	0 to 5,100	0.1 ms	0	All	Immediately	Setup	–

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn310	2	Vibration Detection Selections	0000h to 0002h	–	0000h	All	Immediately	Setup	*1

n.□□□X	Vibration Detection Selection	
	0	Do not detect vibration.
	1	Output a warning (A.911) if vibration is detected.
	2	Output an alarm (A.520) if vibration is detected.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn311	2	Vibration Detection Sensitivity	50 to 500	1%	100	All	Immediately	Tuning	*1
Pn312	2	Vibration Detection Level	0 to 5,000	1 min^{-1}	50	Rotary	Immediately	Tuning	*1
Pn316	2	Maximum Motor Speed	0 to 65,535	1 min^{-1}	10000	Rotary	After restart	Setup	*1
Pn324	2	Moment of Inertia Calculation Starting Level	0 to 20,000	1%	300	All	Immediately	Setup	*1
Pn401	2	First Stage First Torque Reference Filter Time Constant	0 to 65,535	0.01 ms	100	All	Immediately	Tuning	*1
Pn402	2	Forward Torque Limit	0 to 800	1%*3	800	Rotary	Immediately	Setup	*1
Pn403	2	Reverse Torque Limit	0 to 800	1%*3	800	Rotary	Immediately	Setup	*1
Pn404	2	Forward External Torque Limit	0 to 800	1%*3	100	All	Immediately	Setup	*1
Pn405	2	Reverse External Torque Limit	0 to 800	1%*3	100	All	Immediately	Setup	*1
Pn406	2	Emergency Stop Torque	0 to 800	1%*3	800	All	Immediately	Setup	*1
Pn407	2	Speed Limit during Torque Control	0 to 10,000	1 min^{-1}	10000	Rotary	Immediately	Setup	*1
Pn408	2	Torque-Related Function Selections	0000h to 1111h	–	0000h	All	–	Setup	–

n.□□□X	Notch Filter Selection 1		When Enabled	Reference
	0	Disable first stage notch filter.	Immediately	*1
	1	Enable first stage notch filter.		

n.□□X□	Speed Limit Selection		When Enabled	Reference
	0	Use the smaller of the maximum motor speed and the setting of Pn407 as the speed limit.	After restart	*1
	1	Use the smaller of the overspeed alarm detection speed and the setting of Pn407 as the speed limit.		

n.□X□□	Notch Filter Selection 2		When Enabled	Reference
	0	Disable second stage notch filter.	Immediately	*1
	1	Enable second stage notch filter.		

n.X□□□	Friction Compensation Function Selection		When Enabled	Reference
	0	Disable friction compensation.	Immediately	*1
	1	Enable friction compensation.		

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn409	2	First Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn40A	2	First Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn40B	2	First Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn40C	2	Second Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn40D	2	Second Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn40E	2	Second Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn40F	2	Second Stage Second Torque Reference Filter Frequency	100 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn410	2	Second Stage Second Torque Reference Filter Q Value	50 to 100	0.01	50	All	Immediately	Tuning	*1
Pn412	2	First Stage Second Torque Reference Filter Time Constant	0 to 65,535	0.01 ms	100	All	Immediately	Tuning	*1
Pn416	2	Torque-Related Function Selections 2	0000h to 1111h	–	0000h	All	Immediately	Setup	*1

n.□□□X	Notch Filter Selection 3	
	0	Disable third stage notch filter.
	1	Enable third stage notch filter.
n.□□X□	Notch Filter Selection 4	
	0	Disable fourth stage notch filter.
	1	Enable fourth stage notch filter.
n.□X□□	Notch Filter Selection 5	
	0	Disable fifth stage notch filter.
	1	Enable fifth stage notch filter.
n.X□□□	Reserved parameter (Do not change.)	

Pn417	2	Third Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn418	2	Third Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn419	2	Third Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn41A	2	Fourth Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn41B	2	Fourth Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn41C	2	Fourth Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1
Pn41D	2	Fifth Stage Notch Filter Frequency	50 to 5,000	1 Hz	5000	All	Immediately	Tuning	*1
Pn41E	2	Fifth Stage Notch Filter Q Value	50 to 1,000	0.01	70	All	Immediately	Tuning	*1
Pn41F	2	Fifth Stage Notch Filter Depth	0 to 1,000	0.001	0	All	Immediately	Tuning	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn423	2	Speed Ripple Compensation Selections	0000h to 1111h	–	0000h	Rotary	–	Setup	*1

n.□□□X	Speed Ripple Compensation Function Selection		When Enabled
	0	Disable speed ripple compensation.	Immediately
	1	Enable speed ripple compensation.	

n.□□X□	Speed Ripple Compensation Information Disagreement Warning Detection Selection		When Enabled
	0	Detect A.942 alarms.	After restart
	1	Do not detect A.942 alarms.	

n.□X□□	Speed Ripple Compensation Enable Condition Selection		When Enabled
	0	Speed reference	After restart
	1	Motor speed	

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn424	2	Torque Limit at Main Circuit Voltage Drop	0 to 100	1%*3	50	All	Immediately	Setup	*1
Pn425	2	Release Time for Torque Limit at Main Circuit Voltage Drop	0 to 1,000	1 ms	100	All	Immediately	Setup	*1
Pn426	2	Torque Feedforward Average Movement Time	0 to 5,100	0.1 ms	0	All	Immediately	Setup	–
Pn427	2	Speed Ripple Compensation Enable Speed	0 to 10,000	1 min^{-1}	0	Rotary	Immediately	Tuning	*1
Pn456	2	Sweep Torque Reference Amplitude	1 to 800	1%	15	All	Immediately	Tuning	*1
Pn460	2	Notch Filter Adjustment Selections 1	0000h to 0101h	–	0101h	All	Immediately	Tuning	*1

n.□□□X	Notch Filter Adjustment Selection 1	
	0	Do not adjust the first stage notch filter automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.
	1	Adjust the first stage notch filter automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.

n.□□X□	Reserved parameter (Do not change.)

n.□X□□	Notch Filter Adjustment Selection 2	
	0	Do not adjust the second stage notch filter automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.
	1	Adjust the second stage notch filter automatically during execution of autotuning without a host reference, autotuning with a host reference, and custom tuning.

n.X□□□	Reserved parameter (Do not change.)

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn475	2	Gravity Compensation-Related Selections	0000h to 0001h	–	0000h	All	After restart	Setup	*1

n.□□□X	Gravity Compensation Selection	
	0	Disable gravity compensation.
	1	Enable gravity compensation.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Pn476	2	Gravity Compensation Torque	-1,000 to 1,000	0.1%	0	All	Immediately	Tuning	*1
Pn502	2	Rotation Detection Level	1 to 10,000	1 min^{-1}	20	Rotary	Immediately	Setup	*1
Pn503	2	Speed Coincidence Detection Signal Output Width	0 to 100	1 min^{-1}	10	Rotary	Immediately	Setup	*1
Pn506	2	Brake Reference-Servo OFF Delay Time	0 to 50	10 ms	0	All	Immediately	Setup	*1
Pn507	2	Brake Reference Output Speed Level	0 to 10,000	1 min^{-1}	100	Rotary	Immediately	Setup	*1
Pn508	2	Servo OFF-Brake Command Waiting Time	10 to 100	10 ms	50	All	Immediately	Setup	*1
Pn509	2	Momentary Power Interruption Hold Time	20 to 50,000	1 ms	20	All	Immediately	Setup	*1
Pn50A	2	Input Signal Selections 1	0000h to FFF2h	–	1881h	All	After restart	Setup	–

n.□□□X	Reserved parameter (Do not change.)	
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	

n.X□□□	P-OT (Forward Drive Prohibit) Signal Allocation		Reference
	0	Enable forward drive when CN1-13 input signal is ON (closed).	*1
	1	Enable forward drive when CN1-7 input signal is ON (closed).	
	2	Enable forward drive when CN1-8 input signal is ON (closed).	
	3	Enable forward drive when CN1-9 input signal is ON (closed).	
	4	Enable forward drive when CN1-10 input signal is ON (closed).	
	5	Enable forward drive when CN1-11 input signal is ON (closed).	
	6	Enable forward drive when CN1-12 input signal is ON (closed).	
	7	Set the signal to always prohibit forward drive.	
	8	Set the signal to always enable forward drive.	
	9	Enable forward drive when CN1-13 input signal is OFF (open).	
	A	Enable forward drive when CN1-7 input signal is OFF (open).	
	B	Enable forward drive when CN1-8 input signal is OFF (open).	
	C	Enable forward drive when CN1-9 input signal is OFF (open).	
	D	Enable forward drive when CN1-10 input signal is OFF (open).	
	E	Enable forward drive when CN1-11 input signal is OFF (open).	
	F	Enable forward drive when CN1-12 input signal is OFF (open).	

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn50B	2	Input Signal Selections 2	0000h to FFFFh	–	8882h	All	After restart	Setup	–

	N-OT (Reverse Drive Prohibit) Signal Allocation		Reference
n.□□□X	0	Enable reverse drive when CN1-13 input signal is ON (closed).	*1
	1	Enable reverse drive when CN1-7 input signal is ON (closed).	
	2	Enable reverse drive when CN1-8 input signal is ON (closed).	
	3	Enable reverse drive when CN1-9 input signal is ON (closed).	
	4	Enable reverse drive when CN1-10 input signal is ON (closed).	
	5	Enable reverse drive when CN1-11 input signal is ON (closed).	
	6	Enable reverse drive when CN1-12 input signal is ON (closed).	
	7	Set the signal to always prohibit reverse drive.	
	8	Set the signal to always enable reverse drive.	
	9	Enable reverse drive when CN1-13 input signal is OFF (open).	
	A	Enable reverse drive when CN1-7 input signal is OFF (open).	
	B	Enable reverse drive when CN1-8 input signal is OFF (open).	
	C	Enable reverse drive when CN1-9 input signal is OFF (open).	
	D	Enable reverse drive when CN1-10 input signal is OFF (open).	
	E	Enable reverse drive when CN1-11 input signal is OFF (open).	
	F	Enable reverse drive when CN1-12 input signal is OFF (open).	

n.□□X□	Reserved parameter (Do not change.)

	/P-CL (Forward External Torque Limit Input) Signal Allocation		Reference
n.□X□□	0	Active when CN1-13 input signal is ON (closed).	*1
	1	Active when CN1-7 input signal is ON (closed).	
	2	Active when CN1-8 input signal is ON (closed).	
	3	Active when CN1-9 input signal is ON (closed).	
	4	Active when CN1-10 input signal is ON (closed).	
	5	Active when CN1-11 input signal is ON (closed).	
	6	Active when CN1-12 input signal is ON (closed).	
	7	The signal is always active.	
	8	The signal is always inactive.	
	9	Active when CN1-13 input signal is OFF (open).	
	A	Active when CN1-7 input signal is OFF (open).	
	B	Active when CN1-8 input signal is OFF (open).	
	C	Active when CN1-9 input signal is OFF (open).	
	D	Active when CN1-10 input signal is OFF (open).	
	E	Active when CN1-11 input signal is OFF (open).	
	F	Active when CN1-12 input signal is OFF (open).	

	/N-CL (Reverse External Torque Limit Input) Signal Allocation		Reference
n.X□□□	0 to F	The allocations are the same as the /P-CL (Forward External Torque Limit Input) signal allocations.	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn50E	2	Output Signal Selections 1	0000h to 6666h	–	0000h	All	After restart	Setup	–

n.□□□X	/COIN (Positioning Completion Output) Signal Allocation		Reference
	0	Disabled (the above signal output is not used).	*1
	1	Output the signal from the CN1-1 or CN1-2 output terminal.	
	2	Output the signal from the CN1-23 or CN1-24 output terminal.	
	3	Output the signal from the CN1-25 or CN1-26 output terminal.	
	4 to 6	Reserved settings (Do not use.)	

n.□□X□	/V-CMP (Speed Coincidence Detection Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /COIN (Positioning Completion) signal allocations.	*1

n.□X□□	/TGON (Rotation Detection Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /COIN (Positioning Completion) signal allocations.	*1

n.X□□□	/S-RDY (Servo Ready) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /COIN (Positioning Completion) signal allocations.	*1

Pn50F	2	Output Signal Selections 2	0000h to 6666h	–	0100h	All	After restart	Setup	–

n.□□□X	/CLT (Torque Limit Detection Output) Signal Allocation		Reference
	0	Disabled (the above signal output is not used).	*1
	1	Output the signal from the CN1-1 or CN1-2 output terminal.	
	2	Output the signal from the CN1-23 or CN1-24 output terminal.	
	3	Output the signal from the CN1-25 or CN1-26 output terminal.	
	4 to 6	Reserved settings (Do not use.)	

n.□□X□	/VLT (Speed Limit Detection) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /CLT (Torque Limit Detection Output) signal allocations.	*1

n.□X□□	/BK (Brake Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /CLT (Torque Limit Detection Output) signal allocations.	*1

n.X□□□	/WARN (Warning Output) Signal Allocation		Reference
	0 to 6	The allocations are the same as the /CLT (Torque Limit Detection Output) signal allocations.	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn510	2	Output Signal Selections 3	0000h to 0666h	–	0000h	All	After restart	Setup	–

	/NEAR (Near Output) Signal Allocation		Reference
n.□□□X	0	Disabled (the above signal output is not used).	*1
	1	Output the signal from the CN1-1 or CN1-2 output terminal.	
	2	Output the signal from the CN1-23 or CN1-24 output terminal.	
	3	Output the signal from the CN1-25 or CN1-26 output terminal.	
	4 to 6	Reserved settings (Do not use.)	

n.□□X□	Reserved parameter (Do not change.)
n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

Pn511	2	Input Signal Selections 5	0000h to FFFFh	–	6543h	All	After restart	Setup	*1

	/DEC (Origin Return Deceleration Switch Input) Signal Allocation	
n.□□□X	0	Active when CN1-13 input signal is ON (closed).
	1	Active when CN1-7 input signal is ON (closed).
	2	Active when CN1-8 input signal is ON (closed).
	3	Active when CN1-9 input signal is ON (closed).
	4	Active when CN1-10 input signal is ON (closed).
	5	Active when CN1-11 input signal is ON (closed).
	6	Active when CN1-12 input signal is ON (closed).
	7	The signal is always active.
	8	The signal is always inactive.
	9	Active when CN1-13 input signal is OFF (open).
	A	Active when CN1-7 input signal is OFF (open).
	B	Active when CN1-8 input signal is OFF (open).
	C	Active when CN1-9 input signal is OFF (open).
	D	Active when CN1-10 input signal is OFF (open).
	E	Active when CN1-11 input signal is OFF (open).
	F	Active when CN1-12 input signal is OFF (open).

	/EXT1 (External Latch Input 1) Signal Allocation	
n.□□X□	0 to 3	The signal is always inactive.
	4	Active when CN1-10 input signal is ON (closed).
	5	Active when CN1-11 input signal is ON (closed).
	6	Active when CN1-12 input signal is ON (closed).
	D	Active when CN1-10 input signal is OFF (open).
	E	Active when CN1-11 input signal is OFF (open).
	F	Active when CN1-12 input signal is OFF (open).
	7 to C	The signal is always inactive.

	/EXT2 (External Latch Input 2) Signal Allocation	
n.□X□□	0 to F	The allocations are the same as the /EXT1 (External Latch Input 1) signal allocations.

	/EXT3 (External Latch Input 3) Signal Allocation	
n.X□□□	0 to F	The allocations are the same as the /EXT1 (External Latch Input 1) signal allocations.

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn512	2	Output Signal Inverse Settings	0000h to 1111h	–	0000h	All	After restart	Setup	*1

n.□□□X	Output Signal Inversion for CN1-1 and CN1-2 Terminals	
	0	The signal is not inverted.
	1	The signal is inverted.
n.□□X□	Output Signal Inversion for CN1-23 and CN1-24 Terminals	
	0	The signal is not inverted.
	1	The signal is inverted.
n.□X□□	Output Signal Inversion for CN1-25 and CN1-26 Terminals	
	0	The signal is not inverted.
	1	The signal is inverted.
n.X□□□	Reserved parameter (Do not change.)	

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn514	2	Output Signal Selections 4	0000h to 0666h	–	0000h	All	After restart	Setup	–

n.□□□X	Reserved parameter (Do not change.)		
n.□□X□	Reserved parameter (Do not change.)		
n.□X□□	/PM (Preventative Maintenance Output) Signal Allocation		Reference
	0	Disabled (the above signal output is not used).	*1
	1	Output the signal from the CN1-1 or CN1-2 output terminal.	
	2	Output the signal from the CN1-23 or CN1-24 output terminal.	
	3	Output the signal from the CN1-25 or CN1-26 output terminal.	
	4 to 6	Reserved settings (Do not use.)	
n.X□□□	Reserved parameter (Do not change.)		

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn516	2	Input Signal Selections 7	0000h to FFFFh	–	8888h	All	After restart	Setup	–

	FSTP (Forced Stop Input) Signal Allocation		Reference
n.□□□X	0	Enable drive when CN1-13 input signal is ON (closed).	*1
	1	Enable drive when CN1-7 input signal is ON (closed).	
	2	Enable drive when CN1-8 input signal is ON (closed).	
	3	Enable drive when CN1-9 input signal is ON (closed).	
	4	Enable drive when CN1-10 input signal is ON (closed).	
	5	Enable drive when CN1-11 input signal is ON (closed).	
	6	Enable drive when CN1-12 input signal is ON (closed).	
	7	Set the signal to always prohibit drive (always force the motor to stop).	
	8	Set the signal to always enable drive (always disable forcing the motor to stop).	
	9	Enable drive when CN1-13 input signal is OFF (open).	
	A	Enable drive when CN1-7 input signal is OFF (open).	
	B	Enable drive when CN1-8 input signal is OFF (open).	
	C	Enable drive when CN1-9 input signal is OFF (open).	
	D	Enable drive when CN1-10 input signal is OFF (open).	
	E	Enable drive when CN1-11 input signal is OFF (open).	
	F	Enable drive when CN1-12 input signal is OFF (open).	

n.□□X□	Reserved parameter (Do not change.)
n.□X□□	Reserved parameter (Do not change.)
n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn518*4	–	Safety Module-Related Parameters	–	–	–	All	–	–	–
Pn51B	4	Motor-Load Position Deviation Overflow Detection Level	0 to 1,073,741,824	1 reference unit	1000	Rotary	Immediately	Setup	*1
Pn51E	2	Position Deviation Overflow Warning Level	10 to 100	1%	100	All	Immediately	Setup	*1
Pn520	4	Position Deviation Overflow Alarm Level	1 to 1,073,741,823	1 reference unit	5242880	All	Immediately	Setup	*1
Pn522	4	Positioning Completed Width	0 to 1,073,741,824	1 reference unit	7	All	Immediately	Setup	*1
Pn524	4	Near Signal Width	1 to 1,073,741,824	1 reference unit	1073741824	All	Immediately	Setup	*1
Pn526	4	Position Deviation Overflow Alarm Level at Servo ON	1 to 1,073,741,823	1 reference unit	5242880	All	Immediately	Setup	*1
Pn528	2	Position Deviation Overflow Warning Level at Servo ON	10 to 100	1%	100	All	Immediately	Setup	*1
Pn529	2	Speed Limit Level at Servo ON	0 to 10,000	1 min^{-1}	10000	Rotary	Immediately	Setup	*1
Pn52A	2	Multiplier per Fully-closed Rotation	0 to 100	1%	20	Rotary	Immediately	Tuning	*1
Pn52B	2	Overload Warning Level	1 to 100	1%	20	All	Immediately	Setup	*1
Pn52C	2	Base Current Derating at Motor Overload Detection	10 to 100	1%	100	All	After restart	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn530	2	Program Jogging-Related Selections	0000h to 0005h	–	0000h	All	Immediately	Setup	*1

n.□□□X	Program Jogging Operation Pattern	
	0	(Waiting time in Pn535 → Forward by travel distance in Pn531) × Number of movements in Pn536
	1	(Waiting time in Pn535 → Reverse by travel distance in Pn531) × Number of movements in Pn536
	2	(Waiting time in Pn535 → Forward by travel distance in Pn531) × Number of movements in Pn536 (Waiting time in Pn535 → Reverse by travel distance in Pn531) × Number of movements in Pn536
	3	(Waiting time in Pn535 → Reverse by travel distance in Pn531) × Number of movements in Pn536 (Waiting time in Pn535 → Forward by travel distance in Pn531) × Number of movements in Pn536
	4	(Waiting time in Pn535 → Forward by travel distance in Pn531 → Waiting time in Pn535 → Reverse by travel distance in Pn531) × Number of movements in Pn536
	5	(Waiting time in Pn535 → Reverse by travel distance in Pn531 → Waiting time in Pn535 → Forward by travel distance in Pn531) × Number of movements in Pn536
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn531	4	Program Jogging Travel Distance	1 to 1,073,741,824	1 reference unit	32768	All	Immediately	Setup	*1
Pn533	2	Program Jogging Movement Speed	1 to 10,000	Rotary: 1 min^{-1} Direct Drive: 0.1 min^{-1}	500	Rotary	Immediately	Setup	*1
Pn534	2	Program Jogging Acceleration/Deceleration Time	2 to 10,000	1 ms	100	All	Immediately	Setup	*1
Pn535	2	Program Jogging Waiting Time	0 to 10,000	1 ms	100	All	Immediately	Setup	*1
Pn536	2	Program Jogging Number of Movements	0 to 1,000	1 time	1	All	Immediately	Setup	*1
Pn550	2	Analog Monitor 1 Offset Voltage	-10,000 to 10,000	0.1 V	0	All	Immediately	Setup	*1
Pn551	2	Analog Monitor 2 Offset Voltage	-10,000 to 10,000	0.1 V	0	All	Immediately	Setup	*1
Pn552	2	Analog Monitor 1 Magnification	-10,000 to 10,000	× 0.01	100	All	Immediately	Setup	*1
Pn553	2	Analog Monitor 2 Magnification	-10,000 to 10,000	× 0.01	100	All	Immediately	Setup	*1
Pn55A	2	Power Consumption Monitor Unit Time	1 to 1,440	1 min	1	All	Immediately	Setup	–
Pn560	2	Residual Vibration Detection Width	1 to 3,000	0.1%	400	All	Immediately	Setup	*1
Pn561	2	Overshoot Detection Level	0 to 100	1%	100	All	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn56A	2	Output Signal Reference Method Selections 1	0000h to 1111h	–	0000h	All	After restart	Setup	*1

n.□□□X	SO1 Output Signal Reference Method Selection	
	0	Output parameter-assigned SO1 signal.
	1	Output OR of parameter-assigned SO1 signal and signal set by SVCMD_IO.
n.□□X□	SO2 Output Signal Reference Method Selection	
	0	Output parameter-assigned SO2 signal.
	1	Output OR of parameter-assigned SO2 signal and signal set by SVCMD_IO.
n.□X□□	SO3 Output Signal Reference Method Selection	
	0	Output parameter-assigned SO3 signal.
	1	Output OR of parameter-assigned SO3 signal and signal set by SVCMD_IO.
n.X□□□	Reserved parameter (Do not change.)	

Pn56B	2	Reserved parameters	–	–	0000h	All	–	–	–
Pn600	2	Regenerative Resistor Capacity*5	Depends on model.*6	10 W	0	All	Immediately	Setup	*1
Pn601	2	Dynamic Brake Resistor Allowable Energy Consumption	0 to 65,535	10 J	0	All	After restart	Setup	*7
Pn603	2	Regenerative Resistance	0 to 65,535	10 mΩ	0	All	Immediately	Setup	*1
Pn604	2	Dynamic Brake Resistance	0 to 65,535	10 mΩ	0	All	After restart	Setup	*7
Pn61A	2	Overheat Protection Selections	0000h to 0003h	–	0000h	All	After restart	Setup	*1

n.□□□X	Overheat Protection Selection	
	0	Disable overheat protection.
	1	Reserved setting (Do not use.)
	2	Monitor a negative voltage input from a sensor attached to the machine and use overheat protection.
	3	Monitor a positive voltage input from a sensor attached to the machine and use overheat protection.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Pn61B *8	2	Overheat Alarm Level	0 to 500	0.01 V	250	All	Immediately	Setup	*1
Pn61C *8	2	Overheat Warning Level	0 to 100	1%	100	All	Immediately	Setup	*1
Pn61D *8	2	Overheat Alarm Filter Time	0 to 65,535	1 s	0	All	Immediately	Setup	*1
Pn621 to Pn628*4	–	Safety Module-Related Parameters	–	–	–	All	–	–	–

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn800	2	Communications Controls	0000h to 1FF3h	–	1040h	All	Immediately	Setup	–

n.□□□X	MECHATROLINK Communications Check Mask for Debugging	
	0	Do not mask.
	1	Ignore MECHATROLINK communications errors (A.E60).
	2	Ignore WDT errors (A.E50).
	3	Ignore both MECHATROLINK communications errors (A.E60) and WDT errors (A.E50).

n.□□X□	Warning Check Masks	
	0	Do not mask.
	1	Ignore data setting warnings (A.94□).
	2	Ignore command warnings (A.95□).
	3	Ignore both A.94□ and A.95□ warnings.
	4	Ignore communications warnings (A.96□).
	5	Ignore both A.94□ and A.96□ warnings.
	6	Ignore both A.95□ and A.96□ warnings.
	7	Ignore A.94□, A.95□, and A.96□ warnings.
	8	Ignore data setting warnings (A.97A and A.97b).
	9	Ignore A.94□, A.97A, and A.97b warnings.
	A	Ignore A.95□, A.97A, and A.97b warnings.
	B	Ignore A.94□, A.95□, A.97A, and A.97b warnings.
	C	Ignore A.96□, A.97A, and A.97b warnings.
	D	Ignore A.94□, A.96□, A.97A, and A.97b warnings.
	E	Ignore A.95□, A.96□, A.97A, and A.97b warnings.
	F	Ignore A.94□, A.95□, A.96□, A.97A, and A.97b warnings.

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Automatic Warning Clear Selection for Debugging	
	0	Retain warnings for debugging.
	1	Automatically clear warnings (MECHATROLINK-III specification).

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn801	2	Application Function Selections 6 (Software Limits)	0000h to 0103h	–	0003h	All	Immediately	Setup	*1

n.□□□X	Software Limit Selection	
	0	Enable both forward and reverse software limits.
	1	Disable forward software limit.
	2	Disable reverse software limit.
	3	Disable both forward and reverse software limits.

n.□□X□	Reserved parameter (Do not change.)

n.□X□□	Software Limit Check for References	
	0	Do not perform software limit checks for references.
	1	Perform software limit checks for references.

n.X□□□	Reserved parameter (Do not change.)

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn803	2	Origin Range	0 to 250	1 reference unit	10	All	Immediately	Setup	*2
Pn804	4	Forward Software Limit	-1,073,741,823 to 1,073,741,823	1 reference unit	1073741823	All	Immediately	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn806	4	Reverse Software Limit	-1,073,741,823 to 1,073,741,823	1 reference unit	-10737 41823	All	Immediately	Setup	*1
Pn808	4	Absolute Encoder Origin Offset	-1,073,741,823 to 1,073,741,823	1 reference unit	0	All	Immediately *9	Setup	*1
Pn80A	2	First Stage Linear Acceleration Constant	1 to 65,535	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn80B	2	Second Stage Linear Acceleration Constant	1 to 65,535	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn80C	2	Acceleration Constant Switching Speed	0 to 65,535	100 reference units/s	0	All	Immediately *10	Setup	*2
Pn80D	2	First Stage Linear Deceleration Constant	1 to 65,535	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn80E	2	Second Stage Linear Deceleration Constant	1 to 65,535	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn80F	2	Deceleration Constant Switching Speed	0 to 65,535	100 reference units/s	0	All	Immediately *10	Setup	*2
Pn810	2	Exponential Acceleration/Deceleration Bias	0 to 65,535	100 reference units/s	0	All	Immediately *11	Setup	*2
Pn811	2	Exponential Acceleration/Deceleration Time Constant	0 to 5,100	0.1 ms	0	All	Immediately *11	Setup	*2
Pn812	2	Movement Average Time	0 to 5,100	0.1 ms	0	All	Immediately *11	Setup	*2
Pn814	4	External Positioning Final Travel Distance	-1,073,741,823 to 1,073,741,823	1 reference unit	100	All	Immediately	Setup	*2
Pn816	2	Reserved parameters (Do not change.)	–	–	0000h	All	–	–	–
Pn817 *12	2	Origin Approach Speed 1	0 to 65,535	100 reference units/s	50	All	Immediately *10	Setup	*2
Pn818 *13	2	Origin Approach Speed 2	0 to 65,535	100 reference units/s	5	All	Immediately *10	Setup	*2
Pn819	4	Final Travel Distance for Origin Return	-1,073,741,823 to 1,073,741,823	1 reference unit	100	All	Immediately	Setup	*2
Pn81E	2	Reserved parameters (Do not change.)	–	–	0000h	All	–	–	–
Pn81F	2	Reserved parameters (Do not change.)	–	–	0010h	All	–	–	–
Pn820	4	Forward Latching Area	-2,147,483,648 to 2,147,483,647	1 reference unit	0	All	Immediately	Setup	*2
Pn822	4	Reverse Latching Area	-2,147,483,648 to 2,147,483,647	1 reference unit	0	All	Immediately	Setup	*2

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn824	2	Option Monitor 1 Selection	0000h to FFFFh	–	0000h	–	Immediately	Setup	*2

Setting	Monitor	Applicable Motors
High-Speed Monitor Region		
0000h	Motor speed [overspeed detection speed*14/1000000h]	All
0001h	Speed reference [overspeed detection speed*14/1000000h]	All
0002h	Torque [maximum torque/1000000h]	All
0003h	Position deviation (lower 32 bits) [reference units]	All
0004h	Position deviation (upper 32 bits) [reference units]	All
000Ah	Encoder count (lower 32 bits) [reference units]	All
000Bh	Encoder count (upper 32 bits) [reference units]	All
000Ch	FPG count (lower 32 bits) [reference units]	All
000Dh	FPG count (upper 32 bits) [reference units]	All
Low-Speed Monitor Region		
0010h	Un000: Motor speed [min^{-1}]	All
0011h	Un001: Speed Reference [min^{-1}]	All
0012h	Un002: Torque Reference [%]	All
0013h	Un003: Rotational Angle 1 [encoder pulses] Number of encoder pulses from encoder phase C displayed in decimal	All
0014h	Un004: Rotational Angle 2 [deg] Electrical angle from polarity origin	All
0015h	Un005: Input Signal Monitor	All
0016h	Un006: Output Signal Monitor	All
0017h	Un007: Input Reference Speed [min^{-1}]	All
0018h	Un008: Position Deviation [reference units]	All
0019h	Un009: Accumulated Load Ratio [%]	All
001Ah	Un00A: Regenerative Load Ratio [%]	All
001Bh	Un00B: Dynamic Brake Resistor Power Consumption [%]	All
001Ch	Un00C: Input Reference Pulse Counter [reference units]	All
001Dh	Un00D: Feedback Pulse Counter [encoder pulses]	All
001Eh	Un00E: Fully-closed Loop Feedback Pulse Counter (value after electronic gear conversion (Pn24A and Pn24C) for external encoder conversion) [encoder pulses of motor-end encoder]	Rotary
0023h	Initial multiturn data [Rev]	Rotary
0024h	Initial incremental data [pulses]	Rotary
0040h	Un025: SERVOPACK Installation Environment Monitor	All
0041h	Un026: Servomotor Installation Environment Monitor	All
0042h	Un027: Built-in Fan Remaining Life Ratio	All
0043h	Un028: Capacitor Remaining Life Ratio	All
0044h	Un029: Surge Prevention Circuit Remaining Life Ratio	All
0045h	Un02A: Dynamic Brake Circuit Remaining Life Ratio	All
0046h	Un032: Instantaneous Power	All
0047h	Un033: Power Consumption	All
0048h	Un034: Cumulative Power Consumption	All

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn824									

Setting	Monitor	Applicable Motors
Low-Speed Monitor Region (Communications Module only)		
0080h	Previous value of latched feedback position (LPOS1) [reference units]	All
0081h	Previous value of latched feedback position (LPOS2) [reference units]	All
0084h	Continuous Latch Status (EX STATUS)	All
All Areas		
Other values	Reserved settings (Do not use.)	All

Pn825	2	Option Monitor 2 Selection	0000h to FFFFh	–	0000h	All	Immediately	Setup	*2

0000h to 0084h	The settings are the same as those for the Option Monitor 1 Selection.

Pn827	2	Linear Deceleration Constant 1 for Stopping	1 to 65,535	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn829	2	SVOFF Waiting Time (for SVOFF at Deceleration to Stop)	0 to 65,535	10 ms	0	All	Immediately *10	Setup	*2
Pn82A	2	Reserved parameters (Do not change.)	–	–	1813h	All	–	–	–
Pn82B	2	Reserved parameters (Do not change.)	–	–	1D1Ch	All	–	–	–
Pn82C	2	Reserved parameters (Do not change.)	–	–	1F1Eh	All	–	–	–
Pn82D	2	Reserved parameters (Do not change.)	–	–	0000h	All	–	–	–
Pn82E	2	Reserved parameters (Do not change.)	–	–	0000h	All	–	–	–
Pn833	2	Motion Settings	0000h to 0001h	–	0000h	All	After restart	Setup	*2

n.□□□X	Linear Acceleration/Deceleration Constant Selection	
	0	Use Pn80A to Pn80F and Pn827. (The settings of Pn834 to Pn840 are ignored.)
	1	Use Pn834 to Pn840. (The settings of Pn80A to Pn80F and Pn827 are ignored.)
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

Pn834	4	First Stage Linear Acceleration Constant 2	1 to 20,971,520	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn836	4	Second Stage Linear Acceleration Constant 2	1 to 20,971,520	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn838	4	Acceleration Constant Switching Speed 2	0 to 2,097,152,000	1 reference unit/s	0	All	Immediately *10	Setup	*2

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn83A	4	First Stage Linear Deceleration Constant 2	1 to 20,971,520	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn83C	4	Second Stage Linear Deceleration Constant 2	1 to 20,971,520	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn83E	4	Deceleration Constant Switching Speed 2	0 to 2,097,152,000	1 reference unit/s	0	All	Immediately *10	Setup	*2
Pn840	4	Linear Deceleration Constant 2 for Stopping	1 to 20,971,520	10,000 reference units/s^2	100	All	Immediately *10	Setup	*2
Pn842 *12	4	Second Origin Approach Speed 1	0 to 20,971,520	100 reference units/s	0	All	Immediately *10	Setup	*2
Pn844 *13	4	Second Origin Approach Speed 2	0 to 20,971,520	100 reference units/s	0	All	Immediately *10	Setup	*2
Pn846	2	POSING Command Scurve Acceleration/ Deceleration Rate	0 to 50	1%	0	All	Immediately *10	Setup	–
Pn850	2	Number of Latch Sequences	0 to 8	–	0	All	Immediately	Setup	*2
Pn851	2	Continuous Latch Sequence Count	0 to 255	–	0	All	Immediately	Setup	*2
Pn852	2	Latch Sequence 1 to 4 Settings	0000h to 3333h	–	0000h	All	Immediately	Setup	*2

n.□□□X	Latch Sequence 1 Signal Selection
0	Phase C
1	EXT1 signal
2	EXT2 signal
3	EXT3 signal

n.□□X□	Latch Sequence 2 Signal Selection
0 to 3	The settings are the same as those for the Latch Sequence 1 Signal Selection.

n.□X□□	Latch Sequence 3 Signal Selection
0 to 3	The settings are the same as those for the Latch Sequence 1 Signal Selection.

n.X□□□	Latch Sequence 4 Signal Selection
0 to 3	The settings are the same as those for the Latch Sequence 1 Signal Selection.

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn853	2	Latch Sequence 5 to 8 Settings	0000h to 3333h	–	0000h	All	Immediately	Setup	*2

n.□□□X	Latch Sequence 5 Signal Selection	
	0	Phase C
	1	EXT1 signal
	2	EXT2 signal
	3	EXT3 signal

n.□□X□	Latch Sequence 6 Signal Selection	
	0 to 3	The settings are the same as those for the Latch Sequence 5 Signal Selection.

n.□X□□	Latch Sequence 7 Signal Selection	
	0 to 3	The settings are the same as those for the Latch Sequence 5 Signal Selection.

n.X□□□	Latch Sequence 8 Signal Selection	
	0 to 3	The settings are the same as those for the Latch Sequence 5 Signal Selection.

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn860	2	SVCMD_IO Input Signal Monitor Allocations 1	0000h to 1717h	–	0000h	All	Immediately	Setup	*2

n.□□□X	Input Signal Monitor Allocation for CN1-13 (SVCMD_IO)	
	0	Allocate bit 24 (IO_STS1) to CN1-13 input signal monitor.
	1	Allocate bit 25 (IO_STS2) to CN1-13 input signal monitor.
	2	Allocate bit 26 (IO_STS3) to CN1-13 input signal monitor.
	3	Allocate bit 27 (IO_STS4) to CN1-13 input signal monitor.
	4	Allocate bit 28 (IO_STS5) to CN1-13 input signal monitor.
	5	Allocate bit 29 (IO_STS6) to CN1-13 input signal monitor.
	6	Allocate bit 30 (IO_STS7) to CN1-13 input signal monitor.
	7	Allocate bit 31 (IO_STS8) to CN1-13 input signal monitor.

n.□□X□	CN1-13 Input Signal Monitor Enable/Disable Selection	
	0	Disable allocation for CN1-13 input signal monitor.
	1	Enable allocation for CN1-13 input signal monitor.

n.□X□□	Input Signal Monitor Allocation for CN1-7 (SVCMD_IO)	
	0 to 7	The settings are the same as the CN1-13 allocations.

n.X□□□	CN1-7 Input Signal Monitor Enable/Disable Selection	
	0	Disable allocation for CN1-7 input signal monitor.
	1	Enable allocation for CN1-7 input signal monitor.

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn861	2	SVCMD_IO Input Signal Monitor Allocations 2	0000h to 1717h	–	0000h	All	Immediately	Setup	*2

n.□□□X	Input Signal Monitor Allocation for CN1-8 (SVCMD_IO)	
	0 to 7	The settings are the same as the CN1-13 allocations.
n.□□X□	CN1-8 Input Signal Monitor Enable/Disable Selection	
	0	Disable allocation for CN1-8 input signal monitor.
	1	Enable allocation for CN1-8 input signal monitor.
n.□X□□	Input Signal Monitor Allocation for CN1-9 (SVCMD_IO)	
	0 to 7	The settings are the same as the CN1-13 allocations.
n.X□□□	CN1-9 Input Signal Monitor Enable/Disable Selection	
	0	Disable allocation for CN1-9 input signal monitor.
	1	Enable allocation for CN1-9 input signal monitor.

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn862	2	SVCMD_IO Input Signal Monitor Allocations 3	0000h to 1717h	–	0000h	All	Immediately	Setup	*2

n.□□□X	Input Signal Monitor Allocation for CN1-10 (SVCMD_IO)	
	0 to 7	The settings are the same as the CN1-13 allocations.
n.□□X□	CN1-10 Input Signal Monitor Enable/Disable Selection	
	0	Disable allocation for CN1-10 input signal monitor.
	1	Enable allocation for CN1-10 input signal monitor.
n.□X□□	Input Signal Monitor Allocation for CN1-11 (SVCMD_IO)	
	0 to 7	The settings are the same as the CN1-13 allocations.
n.X□□□	CN1-11 Input Signal Monitor Enable/Disable Selection	
	0	Disable allocation for CN1-11 input signal monitor.
	1	Enable allocation for CN1-11 input signal monitor.

Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn863	2	SVCMD_IO Input Signal Monitor Allocations 4	0000h to 1717h	–	0000h	All	Immediately	Setup	*2

n.□□□X	Input Signal Monitor Allocation for CN1-12 (SVCMD_IO)	
	0 to 7	The settings are the same as the CN1-13 allocations.
n.□□X□	CN1-12 Input Signal Monitor Enable/Disable Selection	
	0	Disable allocation for CN1-12 input signal monitor.
	1	Enable allocation for CN1-12 input signal monitor.
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn868	2	SVCMD_IO Output Signal Monitor Allocations 1	0000h to 1717h	–	0000h	All	Immediately	Setup	*2

n.□□□X	Output Signal Monitor Allocation for CN1-1 and CN1-2 (SVCMD_IO)
	0 Allocate bit 24 (IO_STS1) to CN1-1/CN1-2 output signal monitor.
	1 Allocate bit 25 (IO_STS2) to CN1-1/CN1-2 output signal monitor.
	2 Allocate bit 26 (IO_STS3) to CN1-1/CN1-2 output signal monitor.
	3 Allocate bit 27 (IO_STS4) to CN1-1/CN1-2 output signal monitor.
	4 Allocate bit 28 (IO_STS5) to CN1-1/CN1-2 output signal monitor.
	5 Allocate bit 29 (IO_STS6) to CN1-1/CN1-2 output signal monitor.
	6 Allocate bit 30 (IO_STS7) to CN1-1/CN1-2 output signal monitor.
	7 Allocate bit 31 (IO_STS8) to CN1-1/CN1-2 output signal monitor.

n.□□X□	CN1-1/CN1-2 Output Signal Monitor Enable/Disable Selection
	0 Disable allocation for CN1-1/CN1-2 output signal monitor.
	1 Enable allocation for CN1-1/CN1-2 output signal monitor.

n.□X□□	Output Signal Monitor Allocation for CN1-23 and CN1-24 (SVCMD_IO)
	0 to 7 The settings are the same as the CN1-1/CN1-2 allocations.

n.X□□□	CN1-23/CN1-24 Output Signal Monitor Enable/Disable Selection
	0 Disable allocation for CN1-23/CN1-24 output signal monitor.
	1 Enable allocation for CN1-23/CN1-24 output signal monitor.

Pn869	2	SVCMD_IO Output Signal Monitor Allocations 2	0000h to 1717h	–	0000h	All	Immediately	Setup	*2

n.□□□X	Output Signal Monitor Allocation for CN1-25 and CN1-26 (SVCMD_IO)
	0 to 7 The settings are the same as the CN1-1/CN1-2 allocations.

n.□□X□	CN1-25/CN1-26 Output Signal Monitor Enable/Disable Selection
	0 Disable allocation for CN1-25/CN1-26 output signal monitor.
	1 Enable allocation for CN1-25/CN1-26 output signal monitor.

n.□X□□	Reserved parameter (Do not change.)

n.X□□□	Reserved parameter (Do not change.)

Pn880	2	Station Address Monitor (for maintenance, read only)	03h to EFh	–	–	All	–	Setup	*1
Pn881	2	Set Transmission Byte Count Monitor [bytes] (for maintenance, read only)	17, 32, 48	–	–	All	–	Setup	*1
Pn882	2	Transmission Cycle Setting Monitor [× 0.25 µs] (for maintenance, read only)	0h to FFFFh	–	–	All	–	Setup	*1
Pn883	2	Communications Cycle Setting Monitor [transmission cycles] (for maintenance, read only)	0 to 32	–	–	All	–	Setup	*1

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Parameter No.	Size	Name	Setting Range	Setting Unit	Default Setting	Applicable Motors	When Enabled	Classification	Reference
Pn884	2	Communications Controls 2	0000h to 0001h	–	0000h	All	Immediately	Setup	*2
Pn88A	2	MECHATROLINK Receive Error Counter Monitor (for maintenance, read only)	0 to 65,535	–	0	All	–	Setup	–
Pn890 to Pn8A6	4	Command Data Monitor during Alarm/Warning (for maintenance, read only)	0h to FFFFFFFFh	–	0h	All	–	Setup	*1
Pn8A8 to Pn8BE	4	Response Data Monitor during Alarm/Warning (for maintenance, read only)	0h to FFFFFFFFh	–	0h	All	–	Setup	*1
Pn900	2	Number of Parameter Banks	0 to 16	–	0	All	After restart	Setup	*2
Pn901	2	Number of Parameter Bank Members	0 to 15	–	0	All	After restart	Setup	*2
Pn902 to Pn910	2	Parameter Bank Member Definition	0000h to 08FFh	–	0000h	All	After restart	Setup	*2
Pn920 to Pn95F	2	Parameter Bank Data (Not saved in nonvolatile memory.)	0000h to FFFFh	–	0000h	All	Immediately	Setup	*2

Pn884

n.□□□X	MECHATROLINK Communications Error Holding Brake Signal Setting	
	0	Maintain the status set by the BRK_ON or BRK_OFF command when a MECHATROLINK communications error occurs.
	1	Apply the holding brake when a MECHATROLINK communications error occurs.
n.□□X□	Reserved parameter (Do not change.)	
n.□X□□	Reserved parameter (Do not change.)	
n.X□□□	Reserved parameter (Do not change.)	

*1. Refer to the following manual for details.
Σ-7-Series Σ-7S SERVOPACK with MECHATROLINK-III Communications References Product Manual (Manual No.: SIEP S800001 28)

*2. Refer to the following manual for details.
Σ-7-Series AC Servo Drive MECHATROLINK-III Communications Standard Servo Profile Command Manual (Manual No.: SIEP S800001 31)

*3. Set a percentage of the motor rated torque.

*4. These parameters are for SERVOPACKs with a Safety Module. Refer to the following manual for details.
Σ-V-Series/Σ-V-Series for Large-Capacity Models/Σ-7-Series User's Manual Safety Module (Manual No.: SIEP C720829 06)

*5. Normally set this parameter to 0. If you use an External Regenerative Resistor, set the capacity (W) of the External Regenerative Resistor.

*6. The upper limit is the maximum output capacity (W) of the SERVOPACK.

*7. These parameters are for SERVOPACKs with the dynamic brake option. Refer to the following manual for details.
Σ-7-Series AC Servo Drive Σ-7S/Σ-7W SERVOPACK with Dynamic Brake Hardware Option Specifications Product Manual (Manual No.: SIEP S800001 73)

*8. Enabled only when Pn61A is set to n.□□□2 or n.□□□3.

*9. The parameter setting is enabled after SENS_ON command execution is completed.

*10. Change the setting when the reference is stopped (i.e., while DEN is set to 1). If you change the setting during operation, the reference output will be affected.

*11. The settings are updated only if the reference is stopped (i.e., only if DEN is set to 1).

*12. The setting of Pn842 is valid while Pn817 is set to 0.

*13. The setting of Pn844 is valid while Pn818 is set to 0.

*14. You can check overspeed detection speed with MECHATROLINK-III Common Parameter 05 PnA0A (Maximum Output Speed).

8.3.2 List of MECHATROLINK-III Common Parameters

The following table lists the common MECHATROLINK-III parameters. These common parameters are used to make settings from the host controller via MECHATROLINK communications. Do not change the settings with the Digital Operator or any other device.

Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
01 PnA02	4	Encoder Type Selection (read only)	0h or 1h	–	–	All	–	Device information
	0000h: Absolute encoder 0001h: Incremental encoder							
02 PnA04	4	Motor Type Selection (read only)	0h or 1h	–	–	All	–	
	0000h: Rotary Servomotor 0001h: Linear Servomotor							
03 PnA06	4	Semi-closed/Fully-closed Type Selection (read only)	0h or 1h	–	–	All	–	
	0000h: Semi-closed 0001h: Fully-closed							
04 PnA08	4	Rated Speed (read only)	0h to FFFFFFFFh	x10^PnA0C min^{-1}	–	All	–	
05 PnA0A	4	Maximum Output Speed (read only)	0h to FFFFFFFFh	x10^PnA0C min^{-1}	–	All	–	
06 PnA0C	4	Speed Multiplier (read only)	-1,073,741,823 to 1,073,741,823	–	–	All	–	Device information
07 PnA0E	4	Rated Torque (read only)	0h to FFFFFFFFh	x10^PnA12 N·m	–	All	–	
08 PnA10	4	Maximum Output Torque (read only)	0h to FFFFFFFFh	x10^PnA12 N·m	–	All	–	
09 PnA12	4	Torque Multiplier (read only)	-1,073,741,823 to 1,073,741,823	–	–	All	–	
0A PnA14	4	Resolution (read only)	0h to FFFFFFFFh	1 pulse/rev	–	Rotary	–	

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Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
21 PnA42	4	Electronic Gear Ratio (Numerator)	1 to 1,073,741,824	–	16	All	After restart	Machine specifications
22 PnA44	4	Electronic Gear Ratio (Denominator)	1 to 1,073,741,824	–	1	All	After restart	
23 PnA46	4	Absolute Encoder Origin Offset	-1,073,741,823 to 1,073,741,823	1 reference unit	0	All	Immediately[*1]	
24 PnA48	4	Multiturn Limit	0 to 65,535	1 Rev	65535	Rotary	After restart	
25 PnA4A	4	Limit Setting	0h to 33h	–	0000h	All	After restart	
		Bit 0: P-OT (0: Enabled, 1: Disabled) Bit 1: N-OT (0: Enabled, 1: Disabled) Bit 2: Reserved. Bit 3: Reserved. Bit 4: P-SOT (0: Disabled, 1: Enabled) Bit 5: N-SOT (0: Disabled, 1: Enabled) Bits 6 to 31: Reserved.						
26 PnA4C	4	Forward Software Limit	-1,073,741,823 to 1,073,741,823	1 reference unit	1073741823	All	Immediately	
27 PnA4E	4	Reserved parameter (Do not change.)	–	–	0	All	Immediately	
28 PnA50	4	Reverse Software Limit	-1,073,741,823 to 1,073,741,823	1 reference unit	-1073741823	All	Immediately	
29 PnA52	4	Reserved parameter (Do not change.)	–	–	0	All	Immediately	
41 PnA82	4	Speed Unit Selection[*2]	0h to 4h	–	0h	All	After restart	Unit settings
		0000h: Reference units/s 0001h: Reference units/min 0002h: Percentage (%) of rated speed[*3, *4] 0003h: min^{-1} [*4] 0004h: Maximum motor speed/40000000h[*5]						
42 PnA84	4	Speed Base Unit Selection [*3, *4, *5] (Set the value of n from the following formula: Speed unit selection (41 PnA82) × 10^n)	-3 to 3	–	0	All	After restart	
43 PnA86	4	Position Unit Selection	0h	–	0h	All	After restart	
		0000h: Reference units						

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Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
44 PnA88	4	Position Base Unit Selection (Set the value of n from the following formula: Position unit selection (43 PnA86) × 10^n)	0	–	0	All	After restart	Unit settings
45 PnA8A	4	Acceleration Unit Selection	0h	–	0h	All	After restart	
		0000h: Reference units/s^2						
46 PnA8C	4	Acceleration Base Unit Selection (Set the value of n from the following formula: Acceleration unit selection (45 PnA8A) × 10^n)	4 to 6	–	4	All	After restart	
47 PnA8E	4	Torque Unit Selection	1h or 2h	–	1h	All	After restart	
		0001h: Percentage (%) of rated torque[*6] 0002h: Maximum torque/40000000h[*7]						
48 PnA90	4	Torque Base Unit Selection[*6, *7] (Set the value of n from the following formula: Torque unit selection (47 PnA8E) × 10^n)	-5 to 0	–	0	All	After restart	
49 PnA92	4	Supported Unit (read only)	–	–	0601011Fh	All	–	

Speed Units	
Bit 0	Reference units/s (1: Enabled)
Bit 1	Reference units/min (1: Enabled)
Bit 2	Percentage (%) of rated speed (1: Enabled)
Bit 3	min^{-1} (rpm) (1: Enabled)
Bit 4	Maximum motor speed/4000000h (1: Enabled)
Bits 5 to 7	Reserved (0: Disabled).
Position Units	
Bit 8	Reference units (1: Enabled)
Bits 9 to 15	Reserved (0: Disabled).
Acceleration Units	
Bit 16	Reference units/s^2 (1: Enabled)
Bit 17	ms (acceleration time required to reach rated speed) (0: Disabled)
Bits 18 to 23	Reserved (0: Disabled).
Torque Units	
Bit 24	N·m (0: Disabled)
Bit 25	Percentage (%) of rated torque (1: Enabled)
Bit 26	Maximum torque/40000000h
Bits 27 to 31	Reserved (0: Disabled).

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Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
61 PnAC2	4	Speed Loop Gain	1,000 to 2,000,000	0.001 Hz [0.1 Hz]	40000	All	Immediately	Tuning
62 PnAC4	4	Speed Loop Integral Time Constant	150 to 512,000	1 µs [0.01 ms]	20000	All	Immediately	
63 PnAC6	4	Position Loop Gain	1,000 to 2,000,000	0.001/s [0.1/s]	40000	All	Immediately	
64 PnAC8	4	Feed Forward Compensation	0 to 100	1%	0	All	Immediately	
65 PnACA	4	Position Loop Integral Time Constant	0 to 5,000,000	1 µs [0.1 ms]	0	All	Immediately	
66 PnACC	4	In-position Range	0 to 1,073,741,824	1 reference unit	7	All	Immediately	
67 PnACE	4	Near-position Range	1 to 1,073,741,824	1 reference unit	1073741824	All	Immediately	
81 PnB02	4	Exponential Function Acceleration/ Deceleration Time Constant	0 to 510,000	1 µs [0.1 ms]	0	All	Immediately*8	
82 PnB04	4	Movement Average Time	0 to 510,000	1 µs [0.1 ms]	0	All	Immediately*8	
83 PnB06	4	Final Travel for External Input Positioning	-1,073,741,823 to 1,073,741,823	1 reference unit	100	All	Immediately	
84 PnB08	4	Zero Point Return Approach Speed	0h to 3FFFFFFFh	10^{-3} min^{-1}	× 5,000h reference units/s converted to 10^{-3} min^{-1}	All	Immediately	
85 PnB0A	4	Zero Point Return Creep Speed	0h to 3FFFFFFFh	10^{-3} min^{-1}	× 500h reference units/s converted to 10^{-3} min^{-1}	All	Immediately	
86 PnB0C	4	Final Travel for Zero Point Return	-1,073,741,823 to 1,073,741,823	1 reference unit	100	All	Immediately	
87 PnB0E	4	Monitor Select 1	0h to Fh	–	1h	All	Immediately	

0000h	APOS
0001h	CPOS
0002h	PERR
0003h	LPOS1
0004h	LPOS2
0005h	FSPD
0006h	CSPD
0007h	TRQ
0008h	ALARM
0009h	MPOS
000Ah	Reserved (undefined value).
000Bh	Reserved (undefined value).
000Ch	CMN1 (common monitor 1)
000Dh	CMN2 (common monitor 2)
000Eh	OMN1 (optional monitor 1)
000Fh	OMN2 (optional monitor 2)

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Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
88 PnB10	4	Monitor Select 2	0h to Fh	–	0h	All	Immediately	Command-related parameters

0000 to 000Fh	The settings are the same as those for Fixed Monitor Selection 1.

Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
89 PnB12	4	Monitor Select for SEL_MON1	0h to 9h	–	0h	All	Immediately	Command-related parameters

0000h	TPOS (target position in reference coordinate system)
0001h	IPOS (reference position in reference coordinate system)
0002h	POS_OFFSET (offset set in POS_SET (Set Coordinate System) command)
0003h	TSPD (target speed)
0004h	SPD_LIM (speed limit)
0005h	TRQ_LIM (torque limit)
0006h	SV_STAT (servo actual operating status) Monitor Description Byte 1: Current communications phase 00h: Phase 0 01h: Phase 1 02h: Phase 2 03h: Phase 3 Byte 2: Current control mode 00h: Position control mode 01h: Speed control mode 02h: Torque control mode Byte 3: Reserved Byte 4: Expansion signal monitor

Bit	Name	Description	Value	Setting
Bit 0	LT_RDY1	Processing status for latch detection for LT_REQ1 in SVCMD_CTRL region	0	Latch detection not yet processed.
			1	Processing latch detection in progress.
Bit 1	LT_RDY1	Processing status for latch detection for LT_REQ2 in SVCMD_CTRL region	0	Latch detection not yet processed.
			1	Processing latch detection in progress.
Bits 2 and 3	LT_SEL1R	Latch signal	0	Phase C
			1	External input signal 1
			2	External input signal 2
			3	External input signal 3
Bits 4 and 5	LT_SEL2R	Latch signal	0	Phase C
			1	External input signal 1
			2	External input signal 2
			3	External input signal 3
Bit 6	Reserved (0).			

0007h	Reserved.	
0008h	INIT_PGPOS (Low)	Lower 32 bits of initial encoder position converted to 64-bit position reference data
0009h	INIT_PGPOS (High)	Upper 32 bits of initial encoder position converted to 64-bit position reference data

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Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
8A PnB14	4	Monitor Select for SEL_MON2	0h to 9h	–	0h	All	Immediately	Command-related parameters
	0000 to 0009h	The settings are the same as those for SEL_MON Monitor Selection 1.						
8B PnB16	4	Zero Point Detection Range	0 to 250	1 reference unit	10	All	Immediately	
8C PnB18	4	Forward Torque Limit	0 to 800	1%	100	All	Immediately	
8D PnB1A	4	Reverse Torque Limit	0 to 800	1%	100	All	Immediately	
8E PnB1C	4	Zero Speed Detection Range	1,000 to 10,000,000	10^{-3} min^{-1}	20000	All	Immediately	
8F PnB1E	4	Speed Match Signal Detection Range	0 to 100,000	10^{-3} min^{-1}	10000	All	Immediately	
90 PnB20	4	SVCMD_CTRL bit Enabled/Disabled (read only)	–	–	0FFF3F3Fh	All	–	
	Bit 0	CMD_PAUSE (1: Enabled)						
	Bit 1	CMD_CANCEL (1: Enabled)						
	Bits 2 and 3	STOP_MODE (1: Enabled)						
	Bits 4 and 5	ACCFIL (1: Enabled)						
	Bits 6 and 7	Reserved (0: Disabled).						
	Bit 8	LT_REQ1 (1: Enabled)						
	Bit 9	LT_REQ2 (1: Enabled)						
	Bits 10 and 11	LT_SEL1 (1: Enabled)						
	Bits 12 and 13	LT_SEL2 (1: Enabled)						
	Bits 14 and 15	Reserved (0: Disabled).						
	Bits 16 to 19	SEL_MON1 (1: Enabled)						
	Bits 20 to 23	SEL_MON2 (1: Enabled)						
	Bits 24 to 27	SEL_MON3 (1: Enabled)						
	Bits 28 to 31	Reserved (0: Disabled).						

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Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
91 PnB22	4	SVCMD_STAT bit Enabled/Disabled (read only)	–	–	0FFF3F33h	All	–	Command-related parameters

Bit 0	CMD_PAUSE_CMP (1: Enabled)
Bit 1	CMD_CANCEL_CMP (1: Enabled)
Bit 2 and 3	Reserved (0: Disabled).
Bits 4 and 5	ACCFIL (1: Enabled)
Bits 6 and 7	Reserved (0: Disabled).
Bit 8	L_CMP1 (1: Enabled)
Bit 9	L_CMP2 (1: Enabled)
Bit 10	POS_RDY (1: Enabled)
Bit 11	PON (1: Enabled)
Bit 12	M_RDY (1: Enabled)
Bit 13	SV_ON (1: Enabled)
Bits 14 and 15	Reserved (0: Disabled).
Bits 16 to 19	SEL_MON1 (1: Enabled)
Bits 20 to 23	SEL_MON2 (1: Enabled)
Bits 24 to 27	SEL_MON3 (1: Enabled)
Bits 28 to 31	Reserved (0: Disabled).

Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
92 PnB24	4	I/O Bit Enabled/Disabled (Output) (read only)	–	–	037F01F0h	All	–	Command-related parameters

Bits 0 to 3	Reserved (0: Disabled).
Bit 4	V_PPI (1: Enabled)
Bit 5	P_PPI (1: Enabled)
Bit 6	P_CL (1: Enabled)
Bit 7	N_CL (1: Enabled)
Bit 8	G_SEL (1: Enabled)
Bits 9 to 11	G_SEL (0: Disabled)
Bits 12 to 15	Reserved (0: Disabled).
Bits 16 to 19	BANK_SEL (1: Enabled)
Bits 20 to 22	SO1 to SO3 (1: Enabled)
Bit 23	Reserved (0: Disabled).
Bit 24	FLC (1: Enabled)
Bit 25	SFECLR (1: Enabled)
Bits 26 to 31	Reserved (0: Disabled).

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Parameter No.	Size	Name	Setting Range	Setting Unit [Resolution]	Default Setting	Applicable Motors	When Enabled	Classification
93 PnB26	4	I/O Bit Enabled/Disabled (Input) (read only)	–	–	FF0FFEFEh	All	–	Command-related parameters

Bit 0	Reserved (0: Disabled).
Bit 1	DEC (1: Enabled)
Bit 2	P-OT (1: Enabled)
Bit 3	N-OT (1: Enabled)
Bit 4	EXT1 (1: Enabled)
Bit 5	EXT2 (1: Enabled)
Bit 6	EXT3 (1: Enabled)
Bit 7	ESTP (1: Enabled)
Bit 8	Reserved (0: Disabled).
Bit 9	BRK_ON (1: Enabled)
Bit 10	P-SOT (1: Enabled)
Bit 11	N-SOT (1: Enabled)
Bit 12	DEN (1: Enabled)
Bit 13	NEAR (1: Enabled)
Bit 14	PSET (1: Enabled)
Bit 15	ZPOINT (1: Enabled)
Bit 16	T_LIM (1: Enabled)
Bit 17	V_LIM (1: Enabled)
Bit 18	V_CMP (1: Enabled)
Bit 19	ZSPD (1: Enabled)
Bits 20 to 23	Reserved (0: Disabled).
Bits 24 to 31	I0_STS1 to I0_STS8 (1: Enabled)

*1. The parameter setting is enabled after SENS_ON command execution is completed.

*2. When using fully-closed loop control, set the reference units/s.

*3. If you set the Speed Unit Selection (parameter 41: PnA82) to 0002h adjust the Speed Base Unit Selection (parameter 42: PnA84) to satisfy the following formula.
Rotary Servomotor: 1.28 × Rated speed [min^{-1}] × 10^{PnA84} < Maximum speed [min^{-1}]
Linear Servomotor: 1.28 × Rated speed [mm/s] × 10^{PnA84} < Maximum speed [mm/s]

*4. If you set the Speed Unit Selection (parameter 41: PnA82) to either 0002h or 0003h, set the Speed Base Unit Selection (parameter 42: PnA84) to a number between -3 and 0.

*5. If you set the Speed Unit Selection (parameter 41: PnA82) to 0004h, set the Speed Base Unit Selection (parameter 42: PnA84) to 0.

*6. If you set the Torque Unit Selection (parameter 47: PnA8E) to 0001h, adjust the Torque Base Unit Selection (parameter 48: PnA90) to satisfy the following formula.
128 × 10^{PnA90} < Maximum torque [%]

*7. If you set the Torque Unit Selection (parameter 47: PnA8E) to 0002h, set the Torque Base Unit Selection (parameter 48: PnA90) to 0.

*8. Change the setting when the reference is stopped (i.e., while DEN is set to 1). If you change the setting during operation, the reference output will be affected.

Appendix

9

The appendix provides information on tables of corresponding SERVOPACK and SigmaWin+ function names.

9.1 Corresponding SERVOPACK and SigmaWin+ Function Names . .9-2

9.1.1 Corresponding SERVOPACK Monitor Display Function Names 9-2

9.1 Corresponding SERVOPACK and SigmaWin+ Function Names

This section gives the names and numbers of the monitor display functions used by the SERVOPACKs and the names used by the SigmaWin+.

9.1.1 Corresponding SERVOPACK Monitor Display Function Names

SigmaWin+		SERVOPACK	
Button in Menu Dialog Box	Name [Unit]	Un No.	Name [Unit]
Motion Monitor	Motor Speed [min^{-1}]	Un000	Motor Speed [min^{-1}]
	Speed Reference [min^{-1}]	Un001	Speed Reference [min^{-1}]
	Torque Reference [%]	Un002	Torque Reference [%] (percentage of rated torque)
	Rotational Angle 1 [encoder pulses] (number of encoder pulses from encoder phase C)	Un003	Rotational Angle 1 [encoder pulses] (number of encoder pulses from encoder phase C displayed in decimal)
	Rotational Angle 2 [deg] (electrical angle from polarity origin)	Un004	Rotational Angle 2 [deg] (electrical angle from polarity origin)
	Input Reference Pulse Speed [min^{-1}]	Un007	Input Reference Pulse Speed [min^{-1}] (displayed only during position control)
	Position Deviation [reference units]	Un008	Position Error Amount [reference units] (displayed only during position control)
	Accumulated Load Ratio [%]	Un009	Accumulated Load Ratio [%] (percentage of rated torque: effective torque in cycles of 10 seconds)
	Regenerative Load Ratio [%]	Un00A	Regenerative Load Ratio [%] (percentage of processable regenerative power: regenerative power consumption in cycles of 10 seconds)
	Dynamic Brake Resistor Power Consumption [%]	Un00B	Power Consumed by DB Resistance [%] (percentage of processable power at DB activation: displayed in cycles of 10 seconds)
	Input Reference Pulse Counter [reference units]	Un00C	Input Reference Pulse Counter [reference units]
	Feedback Pulse Counter [encoder pulses]	Un00D	Feedback Pulse Counter [encoder pulses]
Motion Monitor: SERVOPACK with Analog Voltage/ Pulse Train References	Fully-closed Loop Feedback Pulse Counter (value after electronic gear conversion (Pn24A and Pn24C) for external encoder conversion) [encoder pulses of motor-end encoder]	Un00E	Fully-closed Loop Feedback Pulse Counter (value after electronic gear conversion (Pn24A and Pn24C) for external encoder conversion) [encoder pulses of motor-end encoder]
	Total Operation Time [100 ms]	Un012	Total Operation Time [100 ms]
	Feedback Pulse Counter [reference units]	Un013	Feedback Pulse Counter [reference units]
	Overheat Protection Input [0.01 V]	Un02F	Overheat Protection Input [0.01 V]
	Power Consumption [W]	Un032	Power Consumption [W]
	Consumed Power [0.001 Wh]	Un033	Consumed Power [0.001 Wh]
	Cumulative Power Consumption [Wh]	Un034	Cumulative Power Consumption [Wh]
	Absolute Encoder Multiturn Data	Un040	Absolute Encoder Multiturn Data

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SigmaWin+		SERVOPACK	
Button in Menu Dialog Box	Name [Unit]	Un No.	Name [Unit]
Motion Monitor: SERVOPACK with Analog Voltage/ Pulse Train References	Position within One Rotation of Absolute Encoder [encoder pulses]	Un041	Position within One Rotation of Absolute Encoder [encoder pulses]
	Lower Bits of Absolute Encoder Position [encoder pulses]	Un042	Lower Bits of Absolute Encoder Position [encoder pulses]
	Upper Bits of Absolute Encoder Position [encoder pulses]	Un043	Upper Bits of Absolute Encoder Position [encoder pulses]
Motion Monitor:SERVOPACK with MECHATROLINK-III Communications Reference	Fully-closed Loop Feedback Pulse Counter [encoder pulses of motor-end encoder]	Un00E	Fully-closed Loop Feedback Pulse Counter [encoder pulses of motor-end encoder]
	Total Operation Time [100 ms]	Un012	Total Operation Time [100 ms]
	Feedback Pulse Counter [reference units]	Un013	Feedback Pulse Counter [reference units]
	Overheat Protection Input [0.01 V]	Un02F	Overheat Protection Input [0.01 V]
	Current Backlash Compensation Value [0.1 reference units]	Un030	Current Backlash Compensation Value [0.1 reference units]
	Backlash Compensation Value Setting Limit [0.1 reference units]	Un031	Backlash Compensation Value Setting Limit [0.1 reference units]
	Power Consumption [W]	Un032	Power Consumption [W]
	Consumed Power [0.001 Wh]	Un033	Consumed Power [0.001 Wh]
	Cumulative Power Consumption [Wh]	Un034	Cumulative Power Consumption [Wh]
	Absolute Encoder Multiturn Data	Un040	Absolute Encoder Multiturn Data
	Position within One Rotation of Absolute Encoder [encoder pulses]	Un041	Position within One Rotation of Absolute Encoder [encoder pulses]
	Lower Bits of Absolute Encoder Position [encoder pulses]	Un042	Lower Bits of Absolute Encoder Position [encoder pulses]
	Upper Bits of Absolute Encoder Position [encoder pulses]	Un043	Upper Bits of Absolute Encoder Position [encoder pulses]
Status Monitor	Active Gain Monitor	Un014	Effective Gain Monitor (gain settings 1 = 1, gain settings 2 = 2)
	Safety I/O Signal Monitor	Un015	Safety I/O Signal Monitor
	Semi-closed/Fully-closed Loop Control Online Switching Monitor	Un08B	Semi-closed/Fully-closed Loop Control Online Switching Monitor
Input Signal Monitor	Input Signal Monitor	Un005	Input Signal Monitor
Output Signal Monitor	Output Signal Monitor	Un006	Output Signal Monitor
Service Life Monitor	Installation Environment Monitor – SERVOPACK	Un025	SERVOPACK Installation Environment Monitor [%]
	Installation Environment Monitor – Servomotor*	Un026	Servomotor Installation Environment Monitor [%]
	Service Life Prediction Monitor – Built-in Fan	Un027	Built-in Fan Remaining Life Ratio [%]
	Service Life Prediction Monitor – Capacitor	Un028	Capacitor Remaining Life Ratio [%]
	Service Life Prediction Monitor – Surge Prevention Circuit	Un029	Surge Prevention Circuit Remaining Life Ratio [%]
	Service Life Prediction Monitor – Dynamic Brake Circuit	Un02A	Dynamic Brake Circuit Remaining Life Ratio [%]

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SigmaWin+		SERVOPACK	
Button in Menu Dialog Box	Name [Unit]	Un No.	Name [Unit]
Product Information	Motor – Resolution	–	–
–	–	Un020	Rated Motor Speed [min^{-1}]
	–	Un021	Maximum Motor Speed [min^{-1}]

* This applies to the following motors. The display will show 0 for all other models.
SGM7J, SGM7A, SGM7P, SGM7G, SGMMV, SGM7E, SGM7F, and SGMCV

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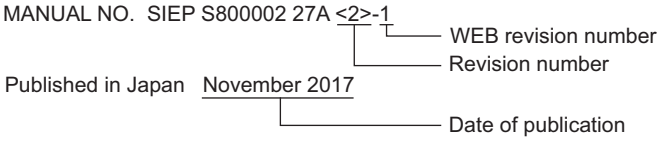
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Σ-7-Series AC Servo Drive

Σ-7S SERVOPACK with FT/EX Specification for Semi-/Fully-Closed Loop Control Online Switching for Conveyance Application

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