YASKAWA

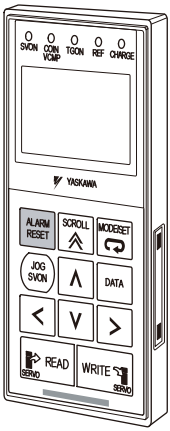
AC Servo Drives

Σ-V Series

USER'S MANUAL

Operation of Digital Operator

SGDV SERVOPACK



MANUAL NO. SIEP S800000 55A

About this Manual

This manual provides the users of the Σ-V series of SGM□S/SGDV servodrives with an explanation of the digital operator (Model: JUSP-OP05A-1-E) and its features, including the following items:

- Functions and connection method
- Parameters and monitor mode
- Utility function mode
- Parameter copy mode

■ Intended Audience

This manual is intended for the following users.

- Those performing trial operation or adjustments of Σ-V Series servodrives.
- Those maintaining or inspecting Σ-V Series servodrives.

■ Description of Technical Terms

The terms in this manual are defined as follows:

- Servomotor or motor = Σ-V Series SGMAV, SGMJV, SGMGV, SGMCS (direct drive), SGLGW, SGLFW, SGLTW, or SGLCW servomotor.
- SERVOPACK = Σ-V Series SGDV SERVOPACK.
- Servodrive = A set including a servomotor and servo amplifier.
- Servo System = A servo control system that includes the combination of a servo-drive with a host computer and peripheral devices.

■ Indication of Reverse Signals

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

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

■ Outline of the Contents

Chapter	Description
1. Outline	Describes the outline of the function, how to connect, and parts names of JUSP-OP05A-1-E digital operator.
2. Parameters and Monitor Modes	Describes how to operate the Parameter Mode and Monitor Mode.
3. Utility Function Modes	Describes how to operate the Utility Function Mode.
4. Parameter Copy Modes	Describes how to operate the Parameter Copy Mode.

■ Related Manuals

Refer to the following manuals as required.

Manuals	SERVOPACKs, Servomotors, and Peripheral Devices	Ratings and Characteristics	System Design	Panel Configuration and Wiring	Trial operation	Trial Operation and Servo Adjustment	Inspection and Maintenance
Σ-V series SGM□V/SGDV Catalogue (Manual No. KAEPS80000042)	✓	✓					
Σ-V series SGM□V/SGDV User's Manual Setup Rotational Motor (Manual No. SIEPS80000043)				✓	✓		
Σ-V series SGM□V/SGDV User's Manual Design and Maintenance Rotational Motor/ Analog and Pulse (Manual No. SIEPS80000045)		✓	✓	✓		✓	✓
Σ-V series SGM□V/SGDV User's Manual Design and Maintenance Linear Motor/ MECHATROLINK-II Communications Reference (Manual No. SIEPS80000048)		✓	✓	✓		✓	✓
Σ-Vseries AC SERVOPACK SGDV Safety Precautions (Manual No. TOBPC71080010)							✓
Σ-V series SGM□V/SGDV User's Manual MECHATROLINK-II Command (Manual No. SIEPS80000054)			✓		✓	✓	

Manuals	SERVOPACKs, Servomotors, and Peripheral Devices	Ratings and Characteristics	System Design	Panel Configuration and Wiring	Trial operation	Trial Operation and Servo Adjustment	Inspection and Maintenance
AC SERVOMOTOR Safety Precautions (Manual No. TOBPC23020000)							✓

Safety Information

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

⚠ WARNING	Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.
⚠ CAUTION	Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation. In some situations, the precautions indicated could have serious consequences if not heeded.
PROHIBITED	Indicates prohibited actions that must not be performed. For example, this symbol would be used to indicate that fire is prohibited as follows:  .
MANDATORY	Indicates compulsory actions that must be performed. For example, this symbol would be used as follows to indicate that grounding is compulsory:  .

Notes for Safe Operation

Read this manual thoroughly before checking products on delivery, storage and transportation, installation, wiring, operation and inspection, and disposal of the AC servodrives.

⚠ WARNING

- Never touch any rotating motor parts while the motor is running.
  Failure to observe this warning may result in injury.
- Before starting operation with a machine connected, make sure that an emergency stop can be applied at any time.
  Failure to observe this warning may result in injury or damage to the product.
- Never touch the inside of the SERVOPACKs.
  Failure to observe this warning may result in electric shock.
- Do not remove the cover of power supply terminal while the power is ON.
  Failure to observe this warning may result in electric shock.
- Do not touch terminals for five minutes after the power is turned OFF.
  Residual voltage may cause electric shock.
- Do not touch terminals for five minutes after voltage resistance test.
  Residual voltage may cause electric shock.
- Follow the procedures and instructions for the trial operation as noted in this manual.
  Malfunctions that occur after the servomotor is connected to the equipment not only damage the equipment, but may also cause an accident resulting in death or injury.
- The output range of multi-turn data for Σ-V series absolute detection system differs from that for conventional systems (15-bit encoder and 12-bit encoder).
  Especially when “Infinite length positioning system” of Σ series is to be configured with Σ-V series, be sure to make the system modification.
- The multi-turn limit value must be changed only for special applications.
  Changing it inappropriately or unintentionally can be dangerous.
- If the Multi-turn Limit Disagreement alarm occurs, check the setting of parameter Pn205 in the SERVOPACK to be sure that it is correct.
  If Fn013 is executed when an incorrect value is set in Pn205, an incorrect value will be set in the encoder. The alarm will disappear even if an incorrect value is set, but incorrect positions will be detected, resulting in a dangerous situation where the machine will move to unexpected positions.
- Do not remove the front cover, cables, connectors, or optional items on the foreside while the power is ON.
  Failure to observe this warning may result in electric shock.
- Do not damage, press, exert excessive force or place heavy objects on the cables.
  Failure to observe this warning may result in electric shock, stopping operation of the product, or fire.
- Do not modify the product.
  Failure to observe this warning may result in injury, damage to the product, or fire.

⚠ WARNING

- Provide an appropriate stopping device on the machine side to ensure safety. A holding brake for a servomotor with brake is not a stopping device for ensuring safety.
  Failure to observe this warning may result in injury.
- Do not come close to the machine immediately after resetting momentary power loss to avoid an unexpected restart. Take appropriate measures to ensure safety against an unexpected restart.
  Failure to observe this warning may result in injury.

- Connect the ground terminal to electrical codes (ground resistance: 100 Ω or less for a SERVOPACK with a 200 V power supply. 10 Ω or less for a SERVOPACK with a 400 V power supply).
  Improper grounding may result in electric shock or fire.

- Installation, disassembly, or repair must be performed only by authorized personnel.
  Failure to observe this warning may result in electric shock or injury.
- The person who designs a system using the safety function (Hard Wire Baseblock function) must have full knowledge of the related safety standards and full understanding of the instructions in Σ-V series User's Manual Design and Maintenance.
  Failure to observe this warning may result in injury or damage to the product.
- Do not come close to the machine immediately after resetting a momentary power loss. The machine may restart unexpectedly. Take appropriate measures to ensure safety against an unexpected restart.
  Failure to observe this warning may result in injury.

■ Storage and Transportation

⚠ CAUTION

- Do not store or install the product in the following places.
  - Locations subject to direct sunlight.
  - Locations subject to temperatures outside the range specified in the storage or installation temperature conditions.
  - Locations subject to humidity outside the range specified in the storage or installation humidity conditions.
  - Locations subject to condensation as the result of extreme changes in temperature.
  - Locations subject to corrosive or flammable gases.
  - Locations subject to dust, salts, or iron dust.
  - Locations subject to exposure to water, oil, or chemicals.
  - Locations subject to shock or vibration.

  Failure to observe this caution may result in fire, electric shock, or damage to the product.
- Do not hold the product by the cables or motor shaft while transporting it.
  Failure to observe this caution may result in injury or malfunction.
- Do not place any load exceeding the limit specified on the packing box.
  Failure to observe this caution may result in injury or malfunction.

■ Installation

⚠ CAUTION

- Never use the products in an environment subject to water, corrosive gases, inflammable gases, or combustibles.
  Failure to observe this caution may result in electric shock or fire.
- Do not step on or place a heavy object on the product.
  Failure to observe this caution may result in injury.
- Do not cover the inlet or outlet ports and prevent any foreign objects from entering the product.
  Failure to observe this caution may cause internal elements to deteriorate resulting in malfunction or fire.
- Be sure to install the product in the correct direction.
  Failure to observe this caution may result in malfunction.
- Provide the specified clearances between the SERVOPACK and the control panel or with other devices.
  Failure to observe this caution may result in fire or malfunction.
- Do not apply any strong impact.
  Failure to observe this caution may result in malfunction.

■ Wiring

⚠ CAUTION

- Be sure to wire correctly and securely.
  Failure to observe this caution may result in motor overrun, injury, or malfunction.
- Do not connect a commercial power supply to the U, V, or W servomoter connection terminals.
  Failure to observe this caution may result in injury or fire.
- Securely connect the power supply terminal screws and servomoter connection terminal screws.
  Failure to observe this caution may result in fire.
- Do not bundle or run the main circuit cables and input/output signal lines or the encoder cables together in the same duct. Keep power and signal lines separated by at least 30 cm (11.81 in).
- Use twisted-pair shielded wires or multi-core twisted pair shielded wires for input/output signal lines and the encoder cables.
  The maximum length is 3 m (118.11 in) for input/output signal lines and 20 m (787.40 in) for encoder cables.
- Do not touch the power terminals for 5 minutes after turning power OFF because high voltage may still remain in the SERVOPACK.
  Make sure the charge indicator is out first before wiring or starting an inspection.
- Observe the following precautions when wiring main circuit terminal blocks.
  - If the main circuit terminal is the connector, remove the connector from the SERVOPACK prior to wiring.
  - Insert only one wire per connector insertion slot on the terminal block.
  - Make sure that the core wire is not electrically shorted to adjacent core wires.
- Install the battery at either the host controller or the battery unit of the encoder.
  It is dangerous to install batteries at both simultaneously, because that sets up a loop circuit between the batteries.
- Always use the specified power supply voltage.
  An incorrect voltage may result in fire.
- Take appropriate measures to ensure that the input power supply is supplied within the specified voltage fluctuation range. Be particularly careful in places where the power supply is unstable.
  An incorrect power supply may result in damage to the product.
- Install external breakers or other safety devices against short-circuiting in external wiring.
  Failure to observe this caution may result in fire.
- Take appropriate and sufficient countermeasures for each when installing systems in the following locations.
  - Locations subject to static electricity or other forms of noise.
  - Locations subject to strong electromagnetic fields and magnetic fields.
  - Locations subject to possible exposure to radioactivity.
  - Locations close to power supplies.

  Failure to observe this caution may result in damage to the product.
- Do not reverse the polarity of the battery when connecting it.
  Failure to observe this caution may damage the battery, servopack, and servomotor or cause it to explode.
- Wiring or inspection must be performed by a technical expert.

■ Operation

⚠ CAUTION

- Conduct trial operation on the servomotor alone with the motor shaft disconnected from machine to avoid any unexpected accidents.
  Failure to observe this caution may result in injury.
- Before starting operation with a machine connected, change the settings to match the parameters of the machine.
  Starting operation without matching the proper settings may cause the machine to run out of control or malfunction.
- Avoid frequently turning power ON and OFF.
  Since the SERVOPACK has a capacitor in the power supply, a high charging current flows when power is turned ON. Frequently turning power ON and OFF causes main power devices like capacitors and fuses to deteriorate, resulting in unexpected problems.
- Forced stop function with forward/reverse overtravel is not effective during JOG mode operation using utility function Fn002 and zero point search using Fn003.
- When using the servomotor for a vertical axis, install the safety devices to prevent workpieces to fall off due to occurrence of alarm or overtravel. Set the servomotor so that it will stop in the zero clamp state at occurrence of overtravel.
  Failure to observe this caution may cause workpieces to fall off due to overtravel.
- When not using the tuning-less function, set to the correct moment of inertia ratio Pn103.
  Setting to an incorrect moment of inertia ratio may cause vibration.
- Do not touch the SERVOPACK heatsinks, regenerative resistor, or servomotor while power is ON or soon after the power is turned OFF.
  Failure to observe this caution may result in burns due to high temperatures.
- Do not make any extreme adjustments or setting changes of parameters.
  Failure to observe this caution may result in injury or damage to the product due to unstable operation.
- When an alarm occurs, remove the cause, reset the alarm after confirming safety, and then resume operation.
  Failure to observe this caution may result in damage to the product, fire, or injury.
- Do not use the holding brake of the servomotor for braking.
  Failure to observe this caution may result in malfunction.
- Always use the servomotor and SERVOPACK in one of the specified combinations.
  Failure to observe this caution so may result in fire or malfunction.

■ Maintenance and Inspection

⚠ CAUTION

- Do not disassemble the SERVOPACK.
  Failure to observe this caution may result in electric shock or injury.
- Do not attempt to change wiring while the power is ON.
  Failure to observe this caution may result in electric shock or injury.
- When replacing the SERVOPACK, resume operation only after transferring the previous SERVOPACK parameters to the new SERVOPACK.
  Failure to observe this caution may result in damage to the product.

■ Disposal

⚠ CAUTION
• When disposing of the products, treat them as ordinary industrial waste.

■ General Precautions

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

Warranty

(1) Details of Warranty

■ Warranty Period

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

■ Warranty Scope

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

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

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

(2) Limitations of Liability

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

(3) Suitability for Use

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

(4) Specifications Change

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

CONTENTS

1

Introduction

1.1 JUSP-OP05A-1-E Digital Operator

The JUSP-OP05A-1-E optional digital operator for the Σ-V Series SGDV SERVOPACK is used to set and display the SERVOPACK parameters. Connect the digital operator to the CN3 connector of the SERVOPACK.

(1) Display

JUSP-OP05A-1-E has a LCD display of 17 characters × 5 lines and five LED indicator lamps for servo ON status, positioning completion, and other statuses.

(2) Parameter Setting Functions (Pn□□□)

Sets and displays the parameters of the SERVOPACK.

(3) Monitoring Functions (Un□□□)

Shows the values of internal data such as position, speed, torque, and signal status.

(4) Utility Functions (Fn□□□)

Sets up the SERVOPACK, adjusts the servo gains, and maintains the SERVOPACK.

(5) Parameter Copy Functions

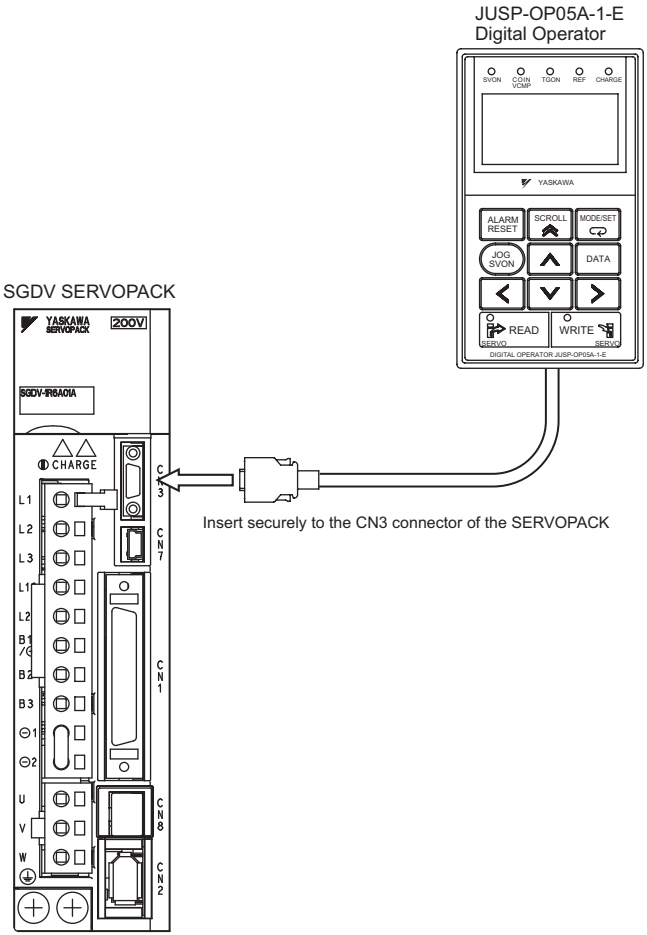
Copies and stores the SERVOPACK parameters settings to the digital operator, or writes them into the SERVOPACK.

1.2 Connecting the Digital Operator

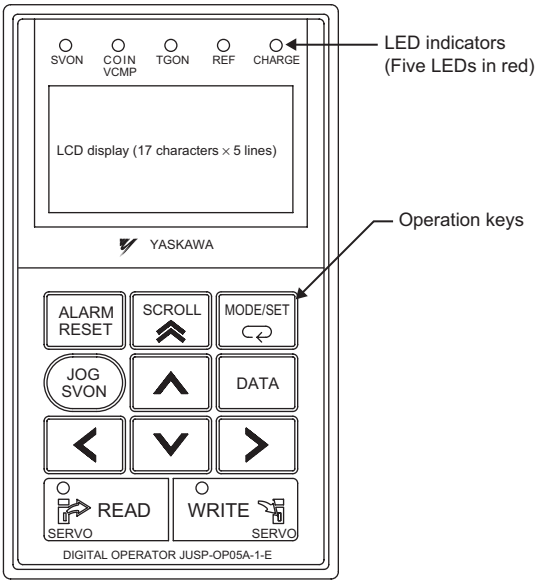
(1) Connecting the Digital Operator

Connect the digital operator to the CN3 connector of the SERVOPACK.

Note: The digital operator connector can be inserted or removed also when the power is supplied to the SERVOPACK.



1.3 Part Names and Functions



(1) LED Indicator Lamps

Name	Function
SVON	Lit when the servo is ON (when the power to the servomotor is ON). Unlit at base block (when the power to the servomotor is OFF).
COIN VCMP	Lit when positioning is completed. Unlit when positioning is not completed. Lit when the speed is coincident. Unlit when the speed is not coincident.
TGON	Lit while the servomotor is running. Unlit while the servomotor stops running.
REF	Position control: Lit when the reference pulse is input. Unlit when the reference pulse is output. Speed control: Lit when the speed reference input is greater than the setting value of Pn502. Unlit when the speed reference input is as same as the setting value of Pn502 or less. Torque control: Lit when the torque reference input exceeds 10 % of the rated torque. Unlit when the torque reference input is 10 % of the rated torque or less.
CHARGE	Lit when the main circuit power supply is ON. Unlit when the main circuit power supply is OFF.

(2) Operation Keys

Operation Key	Main Function
ALARM RESET	Resets the alarm. (The alarm cannot be reset unless the cause of the alarm is removed.)
MODE/SET	Switches the Display Mode of digital operator.
DATA	Switches the cursor position between the parameter number and the setting when setting a parameter. Opens the selected utility function display in Utility Function Mode.
SCROLL	Moves the cursor up or down in Parameter/Monitor Mode.
JOG SVON	Turns the servo ON or OFF at JOG operation.
< >	Moves the cursor to left or right in Parameter/Monitor Mode.
∧ ∨	Increases or decreases the parameter number, setting data, monitor number, and utility function number. Or, rotates the servomotor in forward or reverse direction at JOG operation.
READ SERVO	In Parameter Copy Mode, reads parameters saved in the SERVOPACK to the digital operator.
WRITE SERVO	In Parameter Copy Mode, writes parameters in the digital operator to the SERVOPACK. In Parameter/Monitor Mode, saves the status of the display to the digital operator.

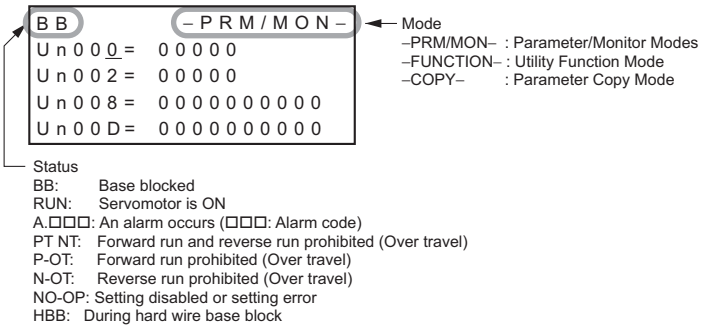
1.4 Display Modes

(1) Mode Selection

The digital operator has four modes:

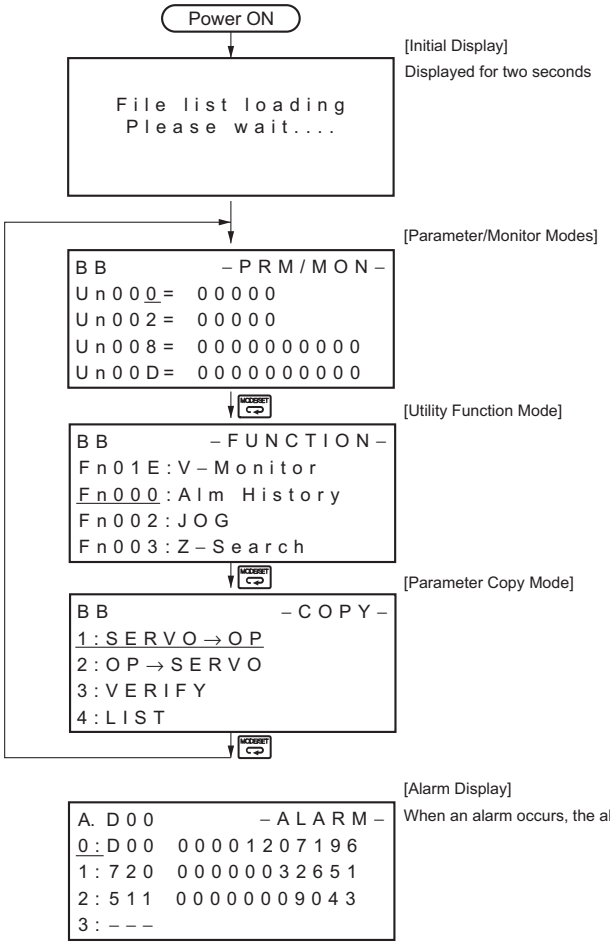
Mode	Display Example *	Function
Parameter/ Monitor Modes	BB –PRM/MON– Un000= 00000 Un002= 00000 Un008= 0000000000 Un00D= 0000000000	Displays the monitor item, Un□□□. Displays and sets parameter Pn□□□.
Utility Function Mode	BB –FUNCTION– Fn207:V–Monitor Fn000:Alm History Fn002:JOG Fn003:Z–Search	Executes the utility function, Fn□□□. For names of utility functions, refer to *3.1 Utility Functions List*.
Parameter Copy Mode	BB –COPY– 1:SERVO→OP 2:OP→SERVO 3:VERIFY 4:LIST	Writes and reads parameters to and from the SERVOPACKs and the digital operator. The JUSP-OP05A-1-E has a storage area of seven blocks of parameters.

* An abbreviation of the name of the active mode is displayed in the upper right, and the SERVOPACK status is displayed in the upper left.



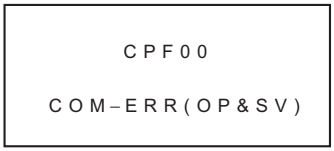
(2) Switching Mode

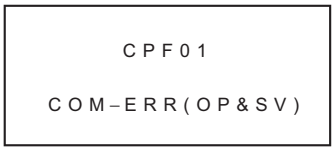
Connect the digital operator to the SERVOPACK, and turn ON the power to the SERVOPACK. The initial display appears, and then the Parameter/Monitor Mode display appears. Press the MODE/SET Key to change the mode. When an alarm occurs, the alarm display appears automatically.



<INFO> Other Alarm Displays

If a communications error occurs between the SERVOPACK and digital operator, the following communications error codes are displayed. These errors may be caused by incorrect connector connection. Check the connection and correct it. Then, turn the power OFF and ON. If the communications error message still appears, replace the digital operator or the SERVOPACK.





2

Parameter/Monitor Modes

2.1 Monitor Mode

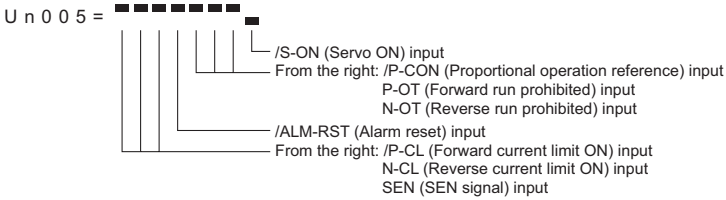
This section describes available monitor modes and operation procedures in the Parameter/Monitor Mode window.

2.1.1 Monitor Items

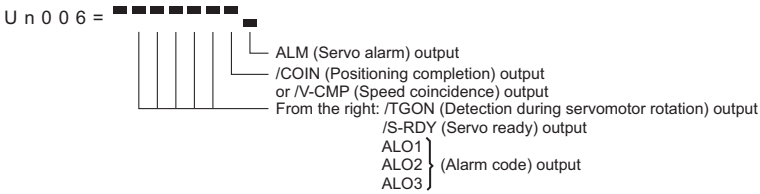
Parameter No	Name	Unit
Un000	Motor speed/Moving speed	min^{-1}, mm/s
Un001	Speed reference	min^{-1}, mm/s
Un002	Internal torque reference/Force reference (in percentage to the rated torque)	%
Un003	Electrical angle 1 (32 bits, base10)	Pulse
Un004	Electrical angle 2 (Angle from the zero degree of the U phase)	Degree
Un005	Input signal monitor *1	–
Un006	Output signal monitor*2	–
Un007	Input reference pulse speed (displayed only in position control mode)	min^{-1}, mm/s
Un008	Position error amount (32 bits, base10) (displayed only in position control mode)	Pulse
Un009	Accumulated load ratio (in percentage to the rated torque: effective torque in cycle of 10 seconds)	%
Un00A	Regenerative load ratio (in percentage to the processable regenerative power: regenerative power consumption in cycle of 10 seconds)	%
Un00B	Power consumed by DB resistance (in percentage to the processable power at DB activation: display in cycle of 10 seconds)	%
Un00C	Input reference pulse counter (32 bits, base10) (displayed only in position control mode)	Reference unit
Un00D	Feedback pulse counter (32 bits, base10)	Pulse of encoder
Un00E	Fully-closed feedback pulse counter (32 bits, base10)	External encoder
Un010	Upper limit setting of Motor maximum speed/ Upper limit setting of encoder output resolution	mm/s, pulse/pitch
Un011	Hall sensor signal monitor	–
Un012	Total run time (32 bits, base10)	100 ms
Un013	Feedback pulse counter (32 bits, base10)	Reference unit
Un014	Effective gain monitor	–
Un015	Safety input/output signal monitor	–

Parameter No	Name	Unit
Un020	Rated motor speed	min^{-1}, mm/s
Un021	Maximum motor speed	min^{-1}, mm/s
Un080	Max. amount of movement in a positive direction when a magnetic pole is detected	0.001 rev, 0.01 mm
Un081	Max. amount of movement in a negative direction when a magnetic pole is detected	0.001 rev, 0.01 mm
Un082	Required time for magnetic pole detection	0.1 s
Un083	Amount of phase offset at magnetic pole detection	0.1 deg
Un084	Linear scale pitch	pm
Un085	Exponent of linear scale pitch	Exponentiation of 10

∗1. The input signal monitor Un005 is displayed as follows. The upper portion indicates the OFF status, the lower portion indicates the ON status. The undefined digits are displayed in the upper portion (OFF status).

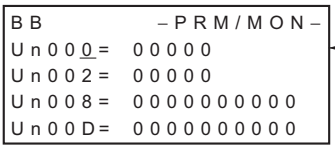


∗2. The output signal monitor Un006 is displayed as follows. The upper portion indicates the OFF status, the lower portion indicates the ON status. The undefined digits are displayed in the upper portion (OFF status).



2.1.2 Monitor Mode Display

(1) Display Example



- In Parameter/Monitor Mode, four items including monitor modes and parameters can be displayed on one screen.
- With the factory setting, the four items shown in the above example are displayed.

  Turn ON the power, and select the items to be displayed. Press the WRITE SERVO Key to save the display with selected items. The next time the power is turned ON, the selected and saved items are displayed.

Note: In the above example, the blinking digit in the actual display is shown with underline. In this manual, the "cursor" is indicated an onscreen by blinking.

(2) Operation Keys

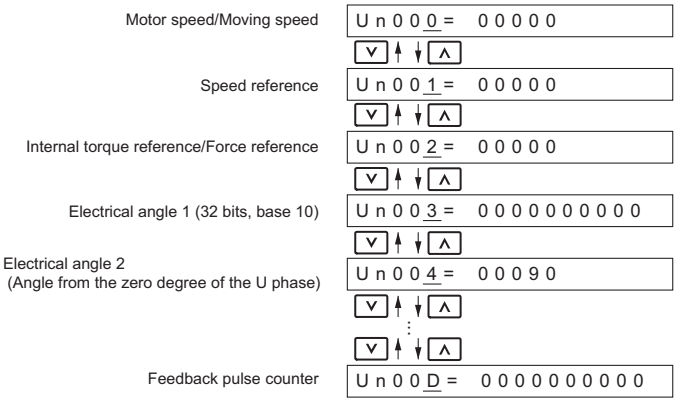
■ Functions

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Switches to the Utility Function Mode.
DATA	Not to be used in Monitor Mode. (Used for setting parameters in Parameter Mode)
SCROLL	Moves the cursor position upward.
JOG SVON	Disabled.
< >	Moves the cursor position to the left or right.
∧ ∨	Increases or decreases the parameter number.
READ SERVO	Disabled.
WRITE SERVO	Saves the display with selected items.

■ Function Details

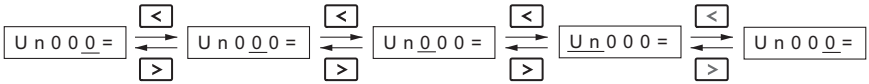
- [∧] and [∨] Keys

  Press the [∧] or [∨] Key. The parameter number changes and respective data is displayed.



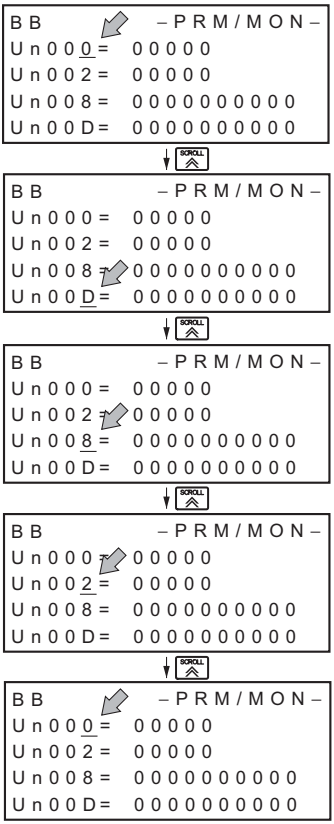
- [<] and [>] Keys

  Press the [<] or [>] Key. The cursor moves as follows.



- SCROLL Key

Press the SCROLL Key. The cursor moves as follows.

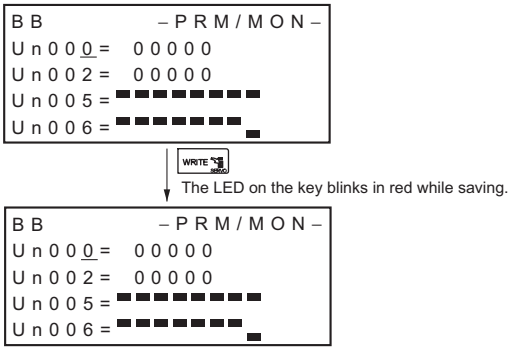


Note: 1. Press the SCROLL Key, and the cursor moves to the line above. Pressing this key when the cursor is on the first line jumps the cursor to the last line.
2. Use this key when selecting the items to be displayed when the power is ON.

- WRITE SERVO Key

Press the WRITE SERVO Key to save the display.

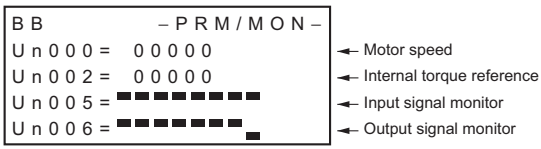
The saved display appears automatically the next time the power is turned ON.



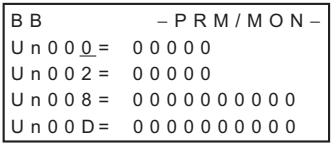
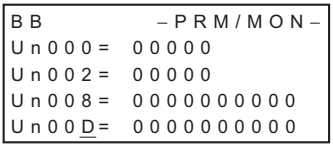
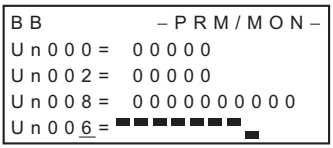
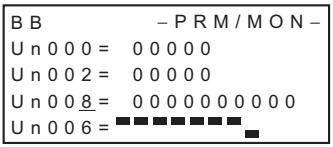
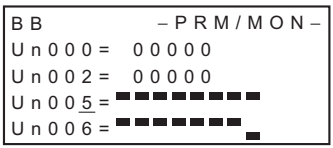
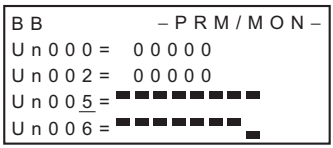
Note: Do not turn OFF the SERVOPACK's control power while saving. If the SERVOPACK's control power is turned OFF while saving, the saving process will be canceled. If the saving failed, the factory setting items will be displayed again. No alarm occurs.

(1) Operation Example

The procedure for the saving display is as follows:
Select Un000 (Motor speed) on the first line, Un002 (Internal torque reference) on the second line, Un005 (Input signal monitor) on the third line, and Un006 (Output signal monitor) on the fourth line, and then save the display.
The following example shows when changing the displayed factory setting items.



2.1.2 Monitor Mode Display

Step	Display Example	Description
1		Press the MODE/SET Key to select the Parameter/ Monitor Mode display.
2		Press the SCROLL Key once to move the cursor to the fourth line.
3		Press the ∧ or ∨ Key to display Un006 (Output signal monitor).
4		Press the SCROLL Key once to move the cursor to the line above.
5		Press the ∧ or ∨ Key to display Un005 (Input signal monitor). The desired items are displayed.
6		Press the WRITE Key. The LED on the key blinks and the display with selected items is saved. Note: Do not turn OFF the SERVOPACK's control power while saving.

2.2 Parameter Mode

This section describes how to display and set parameters in the Parameter/Monitor Mode.

Note: The details of parameters are not described in this manual. For more information on parameters, refer to manuals listed in ■ *Related Manuals* on page iv.

2.2.1 Definition of Parameter Display

The definition of parameter display used in this manual is as follows:

- To indicate a specific digit of the parameters whose each digit has a meaning and has to be set, the digit number is added to the parameter number. For example, "Pn001 = n.□□□0." (the digit number 0 of parameter Pn001)
- "0" of the higher digits of the factory setting of parameters other than above are omitted. For example, when the factory setting "0040.0," expressed as "40.0."

2.2.2 Parameter Types

The following table shows two types of parameters: setup parameters and tuning parameters. Only the setup parameters will be displayed with the factory settings.

Type	Meaning	Display	Setting
Setup parameters	Parameters necessary for setting up the servo-drive.	Factory settings are shown by default.	Set parameters individually.
Tuning parameters	Parameters for control gain adjustment and other functions for which tuning is required.	Values set in accordance with the Pn00B setting are shown.	Can be set from utility functions, and other functions regardless of parameter number.*

* Does not include functions that are not usually used, such as feed forward-related parameters and position integral time constants, or functions for which little adjustment is required, such those with mode switch-related and tuning-related settings or those related with magnetic pole detection or fully-closed circuits.

(1) Display Example

■ If Pn00B.0 = 0 to display only setup parameters

```
BB                  -PRMMON-
Pn00B= n.0000
Pn080= n.0000
Pn10B= n.0000
Pn200= n.0000
```

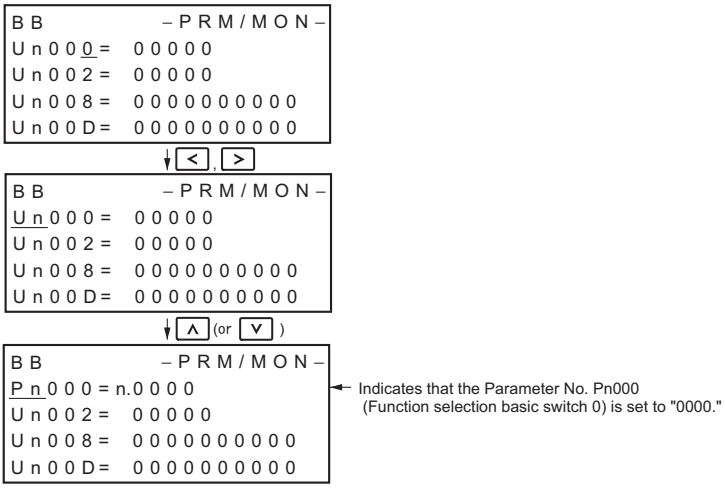
■ If Pn00B.0 = 1 to display all parameters

```
BB                  -ALLPRM-
Pn00B= n.0001
Pn080= n.0000
Pn100=    40.0
Pn101=  20.00
```

2.2.3 Parameter Display and Setting

(1) Display Example

- In the Parameter/Monitor Mode display, move the cursor to the position "Un" using the [<] or [>] Key, and press the [∧] or [∨] Key to switch "Un" to "Pn." A parameter is displayed.



- In Parameter/Monitor Mode, four items including monitor modes and parameters can be displayed on one screen.
- With the factory setting, the four items shown in the above example are displayed.

  Turn ON the power, and select the items to be displayed. Press the [WRITE / SERVO] Key to save the display with selected items. The next time the power is turned ON, the items selected and saved are displayed.

(2) Operation Keys

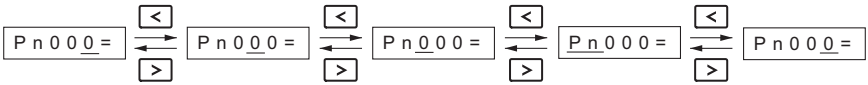
■ Functions

ALARM RESET	Resets the alarm. (The alarm cannot be reset unless the cause of the alarm is corrected).
MODE/SET	Switches to the Utility Function Mode.
DATA	Switches the cursor position between the parameter number and its setting. Writes the setting in the SERVOPACK.
SCROLL	Moves the cursor position upward.
JOG SVON	Disabled.
< >	Moves the cursor position to the left or right.
∧ ∨	Switches “Un” to/from “Pn.”
READ SERVO	Disabled.
WRITE SERVO	Saves the display with selected items.

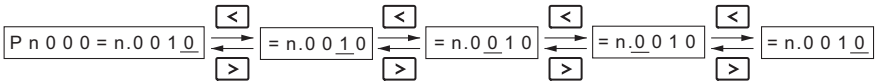
■ Function Details

- < and > Keys

When the cursor is on the left side (parameter number side), press the < or > Key to move the cursor as follows.



When the cursor is on the right side (setting side), press the < or > Key to move the cursor as follows.

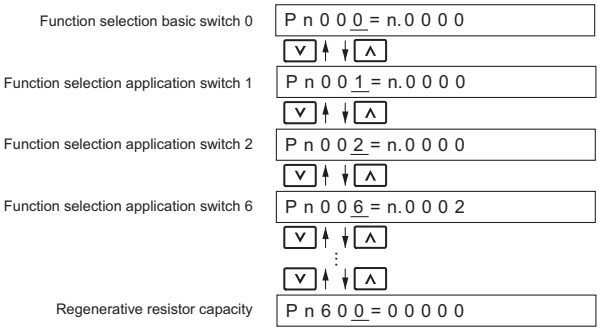


- [∧] and [∨] Keys

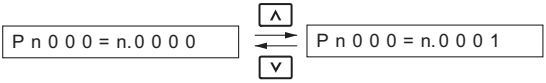
  When the cursor is on “Un” or “Pn” on the left side (parameter number side), press the [∧] or [∨] Key to switch the monitor mode number “Un” to/from the parameter number “Pn.”

  When the cursor is on a numeric character on the left side (parameter number side), press the [∧] or [∨] Key to change the parameter number and display respective setting.

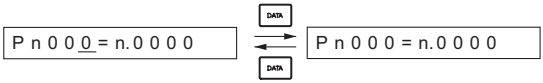
  

  When the cursor is on the right side (the setting side), press the [∧] or [∨] Key to increase or decrease the numerical value of the cursor position.

- [DATA] Key

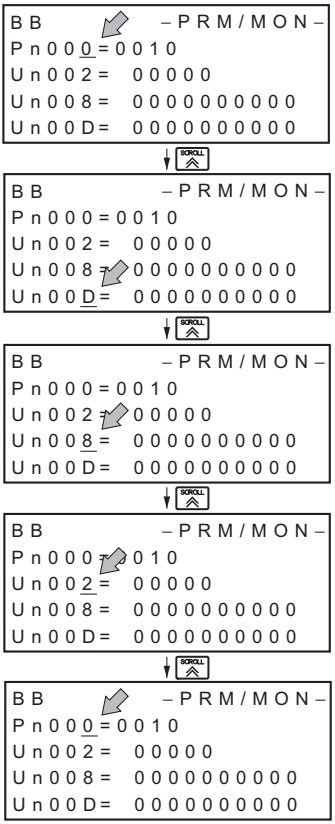
  Press this key to switch the cursor position between the parameter number and the setting.

  After having changed the setting, press the [DATA] Key to write the new setting in the SERVOPACK.

- SCROLL Key

Press the SCROLL Key. The cursor moves as follows.



Note: Pressing the SCROLL Key moves the cursor to the line above. Pressing this key when the cursor is on the first line jumps the cursor to the fourth line.

- WRITE SERVO Key

Press the WRITE SERVO Key to save the display with the selected items.
The saved display with the selected items appears automatically when the power is turned ON next time.

Note: Do not turn OFF the SERVOPACK's control power while saving. If the SERVOPACK's control power is turned OFF while saving, the saving process will be canceled. If the saving failed, the factory setting items will be displayed again. No alarm occurs.

(3) Operation Example 1: Setting the Function Selection Parameters

The following function selection parameters require the setting of each digit:

- Function selection basic switch (Pn000)
- Function selection application switch 1 (Pn001)
- Position control reference form selection switch (Pn200)
- Position control function switch (Pn207)
- Other related parameters for function selection

This example shows the operation procedure to set "0" (Clears error counter when the signal is at H level) for Clear Signal Form (Pn200.1) of Position Control Reference Form Selection Switch Pn200.

Step	Display Example	Description
1	BB –PRM/MON– Un000= 00000 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the MODE/SET Key to select the Parameter/ Monitor Mode.
2	BB –PRM/MON– Un000= 00000 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the < or > Key to move the cursor to "Un."
3	BB –PRM/MON– Pn000= n.0000 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the ∧ or ∨ Key to switch "Un" to "Pn."
4	BB –PRM/MON– Pn000= n.0000 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the > Key once to move the cursor to the right side of "Pn."
5	A.941 –PRM/MON– Pn200= n.0000 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the ∧ Key two times to display "Pn200."

2.2.3 Parameter Display and Setting

Step	Display Example	Description
6	BB –PRM/MON– Pn200=n.0000 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the DATA Key to move the cursor to the setting side (to the position of the first digit of Pn200.0).
7	BB –PRM/MON– Pn200=n.0000 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the < Key once to move the cursor to the second digit of Pn.200.1.
8	BB –PRM/MON– Pn200=n.0010 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the ∧ Key once to set “1” for the second digit of Pn.200.1.
9	A.941 –PRM/MON– Pn200=n.0010 Un002= 00000 Un008= 00000000000 Un00D= 00000000000	Press the DATA Key. The new setting of Pn200 is written to the SERVOPACK. The cursor moves to the parameter number side and the warning A.941 is displayed.

Note: When the setting is modified, the parameters whose modified setting is validated only after setting validation, the warning A.941 “Change of Parameters Requires the Setting Validation” is displayed. Turn the power OFF then ON to clear the warning and validate the new setting.

(4) Operation Example 2: Setting the Parameter

This example shows the operation procedure to set "1000" (min^{-1}) for JOG Speed Pn304.

Step	Display Example	Description
1	BB –PRM/MON– Un000= 00000 Un002= 00000 Un008= 000000000000 Un00D= 000000000000	Press the MODE/SET Key to select the Parameter/ Monitor Mode.
2	BB –PRM/MON– Un000= 00000 Un002= 00000 Un008= 000000000000 Un00D= 000000000000	Press the < or > Key to move the cursor to "Un."
3	BB –PRM/MON– Pn000=n.0010 Un002= 00000 Un008= 000000000000 Un00D= 000000000000	Press the ∧ or ∨ Key to switch "Un" to "Pn."
4	BB –PRM/MON– Pn000=n.1011 Un002= 00000 Un008= 00000pulse Un00D= 000000000000	Press the > Key once to move the cursor to the right side of "Pn."
5	BB –PRM/MON– Pn304=00500 Un002= 00000 Un008= 000000000000 Un00D= 000000000000	Display Pn304 in the following manner. Specify the digit by pressing the < or > Key. Set a number by pressing the ∧ or ∨ Key.
6	BB –PRM/MON– Pn304=00500 Un002= 00000 Un008= 000000000000 Un00D= 000000000000	Press the DATA Key. The cursor moves to the setting side (to the position of the first digit of Pn304).

Step	Display Example	Description
7	BB –PRM/MON– Pn304=00500 Un002= 00000 Un008= 0000000000 Un00D= 0000000000	Press the [<] Key twice to move the cursor to the third digit of Pn304.
8	BB –PRM/MON– Pn304=01000 Un002= 00000 Un008= 0000000000 Un00D= 0000000000	Press the [∧] Key five times to change the setting to "1000."
9	BB –PRM/MON– Pn304=01000 Un002= 00000 Un008= 0000000000 Un00D= 0000000000	Press the [DATA] Key. The setting value is written to the SERVOPACK, and the cursor moves to the parameter number side.

Note: The following parameters set in constants are validated after setting validation. For more information on parameters, refer to manuals listed in ■ *Related Manuals* on page iv.
- Pn20E (Electronic gear ratio (Numerator))
- Pn210 (Electronic gear ratio (Denominator))
- Pn205 (Multiturn limit setting)
- Pn50A (Input signal selection)

(5) When validating Parameter Setting

The parameters that do not require turning OFF the power and turning ON to validate the setting, are validated immediately. For example, when using the [∧] and [∨] Keys while changing the gain, the change is reflected in the motion immediately. However, the change is not saved in the SERVOPACK at this moment. Press the [DATA] Key to save the change in the SERVOPACK.

If another mode display is selected with the [MODE/SET] Key, or the cursor is moved on the setting side by pressing the [SCROLL] Key before pressing the [DATA] Key, the changes in the setting will not be saved in the SERVOPACK.

3

Utility Function Mode

3.1 Utility Functions List

Each utility function Fn□□□ can be executed in Utility Function Mode.

(1) Utility Functions List

Function No.	Name	Function	Remarks	
			∗1	∗2
Fn000	Alarm traceback data display	Displays the history up to the last 10 alarms.	–	–
Fn002	JOG mode operation	Runs the servomotor using the operation keys on the digital operator.	✓	✓
Fn003	Origin search mode	Runs the servomotor using the operation keys on the digital operator and stop the servomotor at the detected phase-C position.	✓	✓
Fn004	Program JOG operation	Runs the servomotor in the pre-programmed motion pattern.	✓	✓
Fn005	Initialize parameter settings	Initializes the settings of parameters to the factory setting.	✓	–
Fn006	Clear alarm traceback data	Clears the alarm traceback data.	✓	–
Fn008	Absolute encoder multiturn reset and encoder alarm reset	Resets the absolute encoder alarm, and resets the multiturn data to zero.	✓	✓
Fn009	Automatic tuning of analog (speed, torque) reference offset	Adjusts automatically the speed or torque analog reference offset.	✓	✓
Fn00A	Manual adjustment of speed reference offset	Adjusts manually the speed reference offset.	✓	–
Fn00B	Manual adjustment of torque reference offset	Adjusts manually the torque reference offset.	✓	–
Fn00C	Manual zero-adjustment of analog monitor output	Adjusts manually the analog monitor output offset.	✓	–
Fn00D	Manual gain-adjustment of analog monitor output	Adjusts manually the analog monitor output gain.	✓	–

∗1. The utility function marked with a "✓" in column *1 under Remarks is disabled when the Write Prohibited Setting (Fn010=0001) is set.
"NO-OP" is displayed when the Utility Function Mode main menu display is switched to each utility function display.

∗2. The utility function marked with a "✓" in column *2 under Remarks is disabled when the /S-ON (Servo ON) input signal is ON.
"NO-OP" is displayed when the Utility Function Mode main menu display is switched to each utility function display.

Function No.	Name	Function	Remarks	
			∗1	∗2
Fn00E	Automatic offset-adjustment of motor current detection signal	Adjusts automatically the servomotor current detection offset.	✓	✓
Fn00F	Manual offset-adjustment of motor current detection signal	Adjusts manually the servomotor current detection offset.	✓	–
Fn010	Write prohibited setting	Prohibits or permits overwriting the parameter.	–	–
Fn011	Servomotor model display	Displays the servomotor model.	–	–
Fn012	Software version display	Displays the software version number of the SERVOPACK.	–	–
Fn013	Multiturn limit value setting when a Multiturn Limit Disagreement alarm occurs	Resets the alarm A.CC0 occurred when the multiturn limit value was modified, and set the new limit value.	✓	–
Fn014	Clear detection results of option card	Clears the detected results that are saved on each individual option card.	✓	–
Fn01B	Initialize vibration detection level	Automatically adjusts the detection level of vibration alarm/warning.	✓	–
Fn01E *3	SERVOPACK and servomotor ID display	Displays the model, serial number, and manufacturing date of the SERVOPACK and servomotor stored in the feedback option card.	–	–
Fn01F *3	Motor ID display of feedback option	Displays encoder ID.		
Fn020	Home-position setting	Stores phase information of the motor from home position in the SERVOPACK, using the current position as the home position.		
Fn030	Software reset	Uses a software program to internally reset the SERVOPACK and, as when the power is turned OFF and then ON again, to make all calculations, including those for parameters.		
Fn080	Magnetic pole detection	Detects magnetic poles and stores phase information of the motor from home position in the SERVOPACK.		✓

∗1. The utility function marked with a "✓" in column *1 under Remarks is disabled when the Write Prohibited Setting (Fn010=0001) is set.
"NO-OP" is displayed when the Utility Function Mode main menu display is switched to each utility function display.

∗2. The utility function marked with a "✓" in column *2 under Remarks is disabled when the /S-ON (Servo ON) input signal is ON.
"NO-OP" is displayed when the Utility Function Mode main menu display is switched to each utility function display.

∗3. Fn01E (SERVOPACK and servomotor ID display) and Fn01F (Motor ID display of feedback option) can be executed only from the JUSP-OP05A-1-E digital operator.

Function No.	Name	Function	Remarks	
			∗1	∗2
Fn200	Tuning less level setting	Sets the level of tuning less function.	✓	
Fn201	Advanced autotuning	Automatically sets servo gain and filter by automatic operation.	✓	✓
Fn202	Reference input-type advanced autotuning	Sets servo gains and filters automatically while the motor is running.	✓	
Fn203	One-parameter autotuning	Changes four servo gains collectively at the same time.	✓	
Fn204	Anti-Resonance Control Adjustment	Detects the vibration frequency automatically and assists in adjustment of Anti-resonance control adjustment.	✓	
Fn205	Vibration suppression function	Suppresses low and transient vibration (trembling) of approximately 1 Hz to 100 Hz.	✓	
Fn206	EasyFFT	Brings the motor to micro motion from the servodrive during base block to detect vibration frequency and set notch filter.	✓	✓
Fn207	Online vibration monitor	Detects vibration frequency while motor is running and sets notch filter.	✓	

∗1. The utility function marked with a "✓" in column *1 under Remarks is disabled when the Write Prohibited Setting (Fn010=0001) is set.
"NO-OP" is displayed when the Utility Function Mode main menu display is switched to each utility function display.

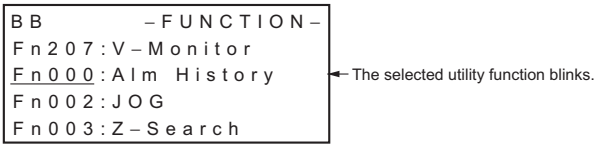
∗2. The utility function marked with a "✓" in column *2 under Remarks is disabled when the /S-ON (Servo ON) input signal is ON.
"NO-OP" is displayed when the Utility Function Mode main menu display is switched to each utility function display.

3.2 Operations in Utility Function Mode

Press the [MODE/SET] Key in the Parameter/Monitor Mode to display the main menu of Utility Function Mode.

Press the [∨] or [∧] Key to select a utility function to be executed, and then press the [DATA] Key to display the execution display of selected utility function.

(1) Utility Function Mode Main Menu Display



(2) Operation Keys

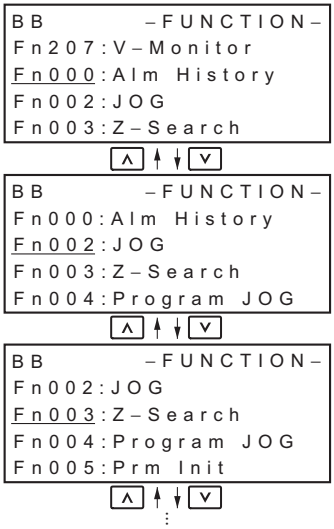
■ Functions

[ALARM RESET]	Resets the alarm. (The alarm cannot be reset unless the cause of the alarm is corrected.)
[MODE/SET]	Switches the display to that of the Parameter/Monitor Mode.
[DATA]	Displays the execution display of the selected utility function.
[SCROLL]	Scrolls up or down four lines at a time
[JOG SVON]	Disabled.
[<] [>]	Disabled.
[∧] [∨]	Selects a utility function.
[READ SERVO]	Disabled.
[WRITE SERVO]	Disabled.

■ Function Details

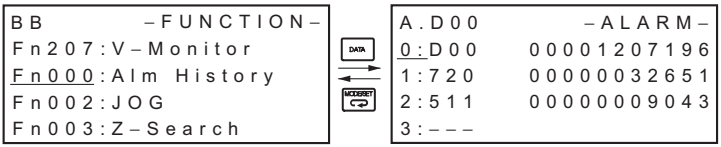
- [∧] and [∨] Keys

  Press the [∧] or [∨] Key to select a utility function number.

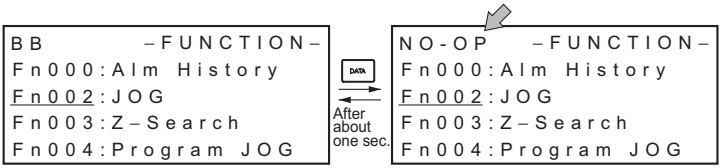


- [DATA] Key

  Press the [DATA] Key to switch to the execution display of the selected utility function.



  If the utility function that cannot be executed is selected and the [DATA] Key is pressed, "NO-OP" is displayed.



Note: When the Write Prohibited Setting (Fn010) is set, executing operation such as JOG operation (Fn002) displays "NO-OP."

3.3 Operation Method for Each Utility Function

This section describes the operation method on the execution display selected from the main menu of the utility function.

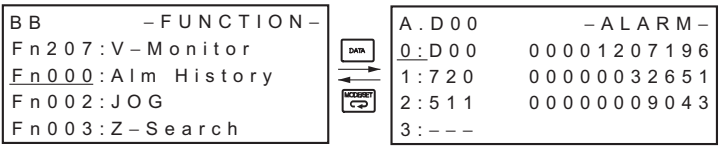
3.3.1 Alarm Traceback Data Display (Fn000)

The SERVOPACK stores the history of up to 10 alarms. The contents of these alarms can be read on the Alarm Traceback Data Display.

(1) Conditions that Disable This Function

None

(2) Display Example



(3) Operation Keys

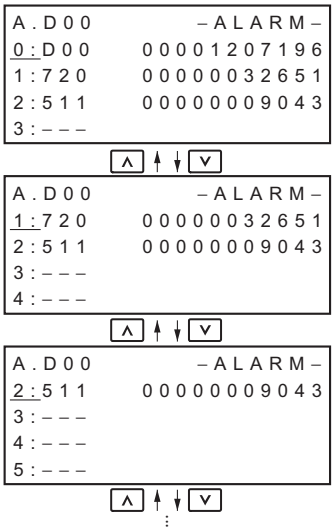
■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. (The alarm cannot be reset unless the cause of alarm is corrected.)
MODE/SET	Returns to the main menu of Utility Function Mode display.
∧ ∨	Scrolls the screen of alarm traceback data.

■ Function Details

- [∧] and [∨] Keys

  Press the [∧] or [∨] Key to scroll the alarm traceback data.



Note: 1. "0:": The latest alarm, "9:": The oldest alarm
2. CPF00 and CPF01 are the alarms related to digital operator, and not recorded in Alarm Traceback Data.
3. Warnings are not recorded in Alarm Traceback Data.
4. If the same alarms occur consecutively, the alarm traceback data will not be updated.

3.3.2 JOG Mode Operation (Fn002)

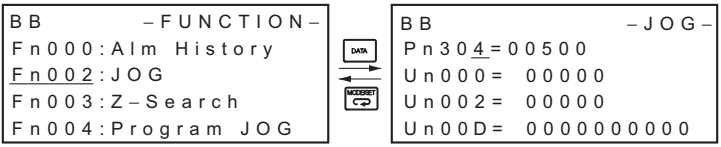
The servomotor rotates in the forward or reverse direction by using the operation keys on the digital operator.
For safety, execute JOG operation without connecting a load to the servomotor (without connecting the servomotor shaft to a machine). And, fix securely the servomotor mounting surface on a machine to prevent the motor overturning.
Turn OFF the power supply of the host controller, or disconnect the power supply to the host controller.

(1) Conditions that Disable This Function

This function is disabled by the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When/S-ON (Servo ON) input signal is ON. The display does not switch to the execution display of JOG mode operation.

(2) Display Example



Same as the Parameter/Monitor Mode display, four items including parameters and monitor modes can be displayed on one screen in the JOG Mode Operation display.
Also, the parameter settings can be changed while the servo is OFF.
After having selected the parameters and monitor modes to be displayed, and then press the WRITE 1 SERVO Key. The display with the selected items will be saved.

(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode. If the MODE/SET Key is pressed while the servo is ON by pressing the JOG SVON Key, the Utility Function Mode main menu reappears after the servo is turned OFF.
SCROLL	When the servo is OFF (BB): Switches the editing line. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Disabled.
JOG SVON	Switches the servo ON from/to OFF. In the status display field, "BB" is displayed when the servo is OFF, "RUN" is displayed when the servo is ON.
DATA	When the servo is OFF (BB): Edits the parameter. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Disabled.
∧ ∨	When the servo is OFF (BB): Changes the parameter number, monitor mode number, and parameter setting. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Rotates the servomotor at the JOG speed (Pn304) counterclockwise (CCW) by pressing the ∧ Key, or clockwise (CW) by pressing the ∨ Key. Note: 1. If Pn000.0 (Direction Selection) is set to "1," the direction of rotation is reversed. 2. The servomotor continues rotating as long as the key is pressed, and stops when the key is released.
< >	When the servo is OFF (BB): Moves the cursor to the left or the right. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Disabled.
WRITE SERVO	Saves the display with the selected items.

(4) Operation Example

The following operation example shows when the servomotor rotates at the JOG speed 1000 min^{-1}. The factory setting of JOG speed is 500 min^{-1}.

Step	Display Example	Description
1	BB –FUNCTION– Fn000:Alm History Fn002:JOG Fn003:Z–Search Fn004:Program JOG	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn002 using the ∧ or ∨ Key.
2	BB –JOG– Pn304=00500 Un000= 00000 Un002= 00000 Un00D= 00000000000	Press the DATA Key. The display is switched to the execution display of Fn002 (JOG mode operation). Note: If the display is not switched and "NO-OP" is displayed in the status display, / S-ON (Servo ON) signal is ON, or the Write Prohibited Setting is set in Fn010. Check the status and reset.
3	BB –JOG– Pn304=00500 Un000= 00000 Un002= 00000 Un00D= 00000000000	Press the DATA Key. The cursor moves to the setting side (the right side) of Pn304 (JOG mode operation).
4	BB –JOG– Pn304=01000 Un000= 00000 Un002= 00000 Un00D= 00000000000	Press the < or > Key and the ∧ or ∨ Key to set the JOG speed to 1000 min^{-1}.
5	BB –JOG– Pn304=01000 Un000= 00000 Un002= 00000 Un00D= 00000000000	Press the DATA Key. The setting value is entered, and the cursor moves to the parameter number side (the left side).
6	RUN –JOG– Pn304=01000 Un000= 00000 Un002= 00000 Un00D= 00000000000	Press the JOG/SVON Key. "RUN" is displayed in the status display, and the servo turns ON.

Step	Display Example	Description
7	RUN –JOG– Pn304=01000 Un000= 00000 Un002= 00000 Un00D= 00000000000	Press the [∧] Key to rotate the servomotor at the speed 1000 min^{-1} in forward direction. Press the [∨] Key to rotate the servomotor at the speed 1000 min^{-1} in reverse direction.
8	BB –JOG– Pn304=01000 Un000= 00000 Un002= 00000 Un00D= 00000000000	After having confirmed the correct motion of servomotor, press the [JOG SVON] Key. "BB" is displayed in the status display, and the servo turns OFF.
9	BB –FUNCTION– Fn000:Alm History Fn002:JOG Fn003:Z–Search Fn004:Program JOG	Press the [MODE/SET] Key. The display returns to the Utility Function Mode main menu.

3.3.3 Origin Search Mode (Fn003)

Fn003 rotates the servomotor, or stops the servomotor at the phase-C (Motor origin) detected position after detecting phase C by using the operation keys on the digital operator.

This function is used when the motor shaft needs to be aligned to the machine by adjusting the motor shaft and machine's zero position.

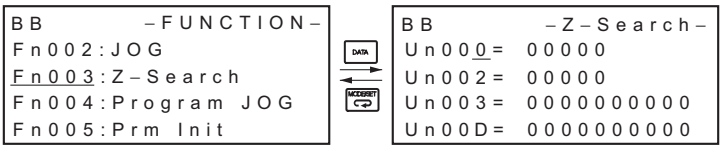
Note: Use the Origin Search Mode function without connecting the motor shaft to a machine.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When the RUN (run command) signal is ON. Set RUN signal OFF to enable this function.

(2) Display Example



Same as the Parameter/Monitor Mode display, four items including parameters and monitor modes can be displayed on one screen in the Origin Search Mode display.

Also, the parameter settings can be changed while the servo is OFF.

After having selected the parameters and monitor modes to be displayed, and then press the WRITE SERVO Key. The display with the selected items will be saved.

(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode. When the MODE/SET Key is pressed while the servo is ON by pressing the JOG SVON Key, the Utility Function Mode main menu reappears after the servo is turned OFF.
SCROLL	When the servo is OFF (BB): Switches the editing line. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Disabled.
JOG SVON	Switches the servo ON from/to OFF. In the status display, "BB" is displayed when the servo is OFF, "RUN" is displayed when the servo is ON.
DATA	When the servo is OFF (BB): Edits the parameter. (Same as for Parameter/Monitor Mode display) When the servo is ON (BB): Disabled.
∧ ∨	When the servo is OFF (BB): Changes the parameter number, monitor mode number, and parameter setting. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Rotates the servomotor at the speed 60 min^{-1} in the direction to counterclockwise (CCW) by pressing the ∧ Key, or clockwise (CW) by pressing the ∨ Key for positioning to the phase C. Note: 1. If Pn000.0 (Direction Selection) is set to "1," the direction of rotation is reversed. 2. The servomotor continues rotating as long as the key is pressed, and stops when the key is released. Keep pressing the key until the servomotor stops to stop the servomotor at the detected phase-C position.
< >	When the servo is OFF (BB): Moves the cursor to the left or the right. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Disabled.
WRITE SERVO	Saves the display with the selected items.

(4) Operation Example

The following operation example shows when the servomotor rotates counterclockwise until the servomotor stops at the detected phase-C position.

Step	Display Example	Description
1	BB –FUNCTION– Fn002:JOG Fn003:Z–Search Fn004:Program JOG Fn005:Prm Init	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn003 using the ∧ or ∨ Key.
2	BB –Z–Search– Un000= 00000 Un002= 00000 Un003= 0000000774 Un00D= 0000000000	Press the DATA Key. The display is switched to the execution display of Fn003 (Origin Search Mode). Note: If the display is not switched and "NO-OP" is displayed in the status display, / S-ON (Servo ON) signal is ON, or the Write Prohibited Setting (Fn010 = 0001) is set. Check the status and reset.
3	RUN –Z–Search– Un000= 00000 Un002= 00000 Un003= 0000000774 Un00D= 0000000000	Press the JOG/SVON Key. "RUN" is displayed in the status display, and the servomotor becomes servo ON status. Note: If the servomotor is already at the zero position, "-Complete-" is displayed.
4	RUN –Complete– Un000= 00000 Un002= 00000 Un003= 0000000000 Un00D= 0000001D58	Press the ∧ Key to rotate the servomotor in forward direction. And then stops at the phase-C position. Note: 1. Keep pressing the key until the servomotor stops. 2. When the origin search completed normally, "-Complete-" is displayed on the right top on the screen.
5	BB –Z–Search– Un000= 00000 Un002= 00000 Un003= 0000000000 Un00D= 0000001D58	When the origin search is completed, press the JOG/SVON Key. "BB" is displayed in the status display, and the servomotor becomes servo OFF status. The display "-Complete-" changes to "-Z-Search-."
6	BB –FUNCTION– Fn002:JOG Fn003:Z–Search Fn004:Program JOG Fn005:Prm Init	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.4 Program JOG Operation (Fn004)

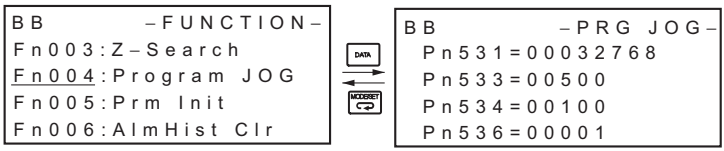
The Program JOG operation allows continuous automatic operation determined by the preset operation pattern, movement distance, movement speed, acceleration or deceleration time, and number of times of repetitive operation.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When /S-ON (Servo ON) input signal is ON. The display does not switch to the execution display of JOG mode operation.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode. Pressing the MODE/SET Key while the servo is ON turns the servo OFF (BB).
JOG SVON	Switches the servo ON from/to OFF. In the status display, "BB" is displayed when the servo is OFF, "RUN" when the servo is ON.
SCROLL	When the servo is OFF (BB): Switches the editing line. (Same as for Parameter/Monitor Mode display) When the servo if ON (RUN): Disabled.
∧ ∨	When the servo is OFF (BB): Changes the parameter number, monitor mode number, and parameter setting. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Rotates the servomotor in the preset operation pattern (according to the settings Pn530 to Pn536) in the direction to counterclockwise (CCW) by pressing the ∧ Key or clockwise (CW) by pressing the ∨ Key. Note: If Pn000.0 (Direction Selection) is set to "1," the direction of rotation is reversed.
< >	When the servo is OFF (BB): Moves the cursor to the left or the right. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Disabled.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn003:Z–Search Fn004:Program JOG Fn005:Prm Init Fn006:AlmHist Clr	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn004 using the ∧ or ∨ Key.
2	BB –PRG JOG– Pn531=00032768 Pn533=00500 Pn534=00100 Pn536=00001	Press the DATA Key. The display is switched to the program JOG operation basic display. Note: If the display is not switched and "NO-OP" is displayed in the status display, / S-ON (Servo ON) signal is ON, or the Write Prohibited Setting (Fn010 = 0001) is set. Check the status and reset.
3	BB –PRG JOG– Pn531=00032768 Pn533=00500 Pn534=00100 Pn536=00001	Sets "10" for Pn536 (number of times of repetitive operation), press the SCROLL Key to select Pn536.
4	BB –PRG JOG– Pn531=00032768 Pn533=00500 Pn534=00100 Pn536=00001	Press the < or > Key to select the digit to edit for Pn536 setting.
5	BB –PRG JOG– Pn531=00032768 Pn533=00500 Pn534=00100 Pn536=00010	Press the ∧ or ∨ Key to change "1" to "10."

Step	Display Example	Description
6	RUN –PRG JOG– Pn531=00032768 Pn533=00500 Pn534=00100 Pn536=00010	Press the JOG SVON Key to turn the servo ON. The main circuit power supply is turned ON, and if neither in Servo ON or OT status, the servo turns ON. The display "BB" is changed to "RUN." Then, press the ∧ (forward movement start) or ∨ (reverse movement start) Key according to the first movement direction of the preset operation pattern for one second, the servomotor starts moving after the preset waiting time in Pn535. Note: Pressing the JOG SVON Key again changes the status to "BB" (Servo OFF) and stops movement even during operation.
7	END –PRG JOG– Pn531=00032768 Pn533=00500 Pn534=00100 Pn536=00010	When the set program JOG operation movement is completed, "END" is displayed for one second, and then "RUN" is displayed. Press the MODE/SET Key. The servomotor becomes base-blocked status and the Utility Function Mode main menu reappears.

3.3.5 Initialize Parameter Settings (Fn005)

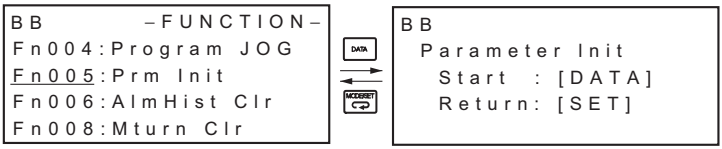
This function initializes the parameters to the factory settings.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When the servo is ON.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Executes initialization of parameters. "Parameter Init" is blinking in the display during initialization, and "Done" is displayed in the status display after initialization is completed.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn004:Program JOG Fn005:Prm Init Fn006:AlmHist Clr Fn008:Mturn Clr	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn005 using the ∧ or ∨ Key.
2	BB Parameter Init Start : [DATA] Return: [SET]	Press the DATA Key. The display is switched to the execution display of Fn005 (Initialize parameter setting). Note: If the display is not switched and "NO-OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the setting and reset.
3	BB Parameter Init Start : [DATA] Return: [SET]	Press the DATA Key to initialize parameters. During initialization, "Parameter Init" is blinking in the display. After the initialization is completed, "Parameter Init" stops blinking and the status display changes as follows: "BB" to "Done" to "A.941" Note: Press the MODE/SET Key not to initialize parameters. The display returns to the Utility Function Mode main menu.

Note: 1. The Initialize Parameter Settings (Fn005) initializes the parameter settings. However, some parameters require turning the power OFF then ON to validate the changes. Be sure to turn the power OFF then ON again.

2. "A.941" means that the setting validation is required to validate the new settings. After having changed the parameter setting, be sure to execute the setting validation.

3.3.6 Clear Alarm Traceback Data (Fn006)

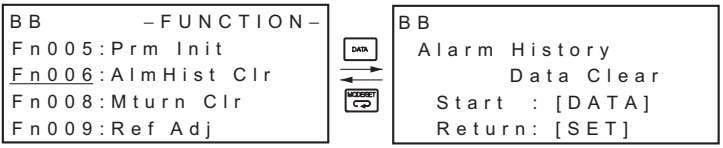
This function clears the alarm traceback data.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Clears the alarm traceback data. "Done" is displayed in the status display while clearing data.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn005:Prm Init Fn006:AlmHist Clr Fn008:Mturn Clr Fn009:Ref Adj	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn006 using the ∧ or ∨ Key.
2	BB Alarm History Data Clear Start : [DATA] Return: [SET]	Press the DATA Key. The display is switched to the execution display of Fn006 (Clear alarm traceback data). Note: If the display is not switched and "NO-OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the setting and reset.
3	Done Alarm History Data Clear Start : [DATA] Return: [SET]	Press the DATA Key to clear the alarm traceback data. During clearing, "Done" is displayed in the status display. After the clearing is completed, "BB" is displayed. Note: Press the MODE/SET Key not to clear the alarm traceback data. The display returns to the Utility Function Mode main menu.

3.3.7 Absolute Encoder Multiturn Reset and Encoder Alarm Reset (Fn008)

Setting up the absolute encoder is necessary in the following cases.

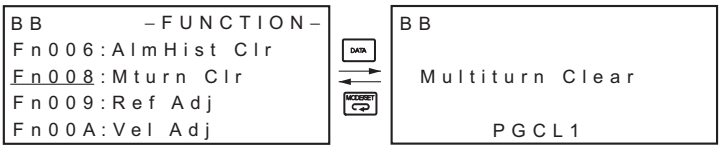
- When starting the machine for the first time.
- When an encoder backup alarm (A.810) occurred.
- When an encoder checksum error alarm (A.820) occurred.
- To set absolute encoder rotation amount data to 0.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	If the DATA Key is pressed while "PGCL5" is selected, resets the multiturn data to zero and clears any alarms in the encoder. After the encoder is reset, "Done" will appear. If the DATA Key is pressed while any other message is selected, the multiturn data and alarms of the encoder are not reset, and "NO_OP" will appear in the status display.
∧	Increases the setting value by 1. Note: The setting value become valid immediately, but it will not be written in the SERVOPACK unless the DATA Key is pressed.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn006:AlmHist Clr Fn008:Mturn Clr Fn009:Ref Adj Fn00A:Vel Adj	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn008 using the ∧ or ∨ Key.
2	BB Multiturn Clear PGCL1	Press the DATA Key. The display is switched to the execution display of Fn008 (Absolute encoder multiturn reset and encoder alarm reset). Note: If the display is not switched and "NO_OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the status and reset.
3	BB Multiturn Clear PGCL1	Keep pressing the ∧ Key until "PGCL1" is changed to "PGCL5."
4	Done Multiturn Clear PGCL5	Press the DATA Key. "BB" in the status display changes to "Done."
5	BB –FUNCTION– Fn006:AlmHist Clr Fn008:Mturn Clr Fn009:Ref Adj Fn00A:Vel Adj	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.8 Automatic Adjustment of Analog (Speed and Torque) Reference Offset (Fn009)

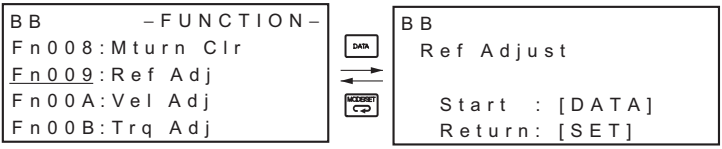
This function executes the automatic adjustment of analog voltage (speed and torque) reference offset. Set the analog voltage input to 0 V before starting the Fn009.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the Utility Function Mode main menu.
DATA	Starts the automatic adjustment. When the automatic adjustment is completed, “Done” is displayed in the status display.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn008:Mturn Clr Fn009:Ref Adj Fn00A:Vel Adj Fn00B:Trq Adj	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn009 using the ∧ or ∨ Key.
2	BB Ref Adjust Start : [DATA] Return: [SET]	Press the DATA Key. The display is switched to the execution display of Fn009 (Automatic adjustment of analog (speed and torque) reference offset). Note: If the display is not switched and "NO_OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the status and reset.
3	Done Ref Adjust Start : [DATA] Return: [SET]	Press the DATA Key to execute the automatic adjustment of analog voltage reference (speed and Torque) offset. "Done" is displayed during the processing, and "BB" is displayed at the completion. Press the MODE/SET Key not to execute the automatic adjustment. The display returns to the Utility Function Mode main menu.

3.3.9 Manual Adjustment of Speed Reference Offset (Fn00A)

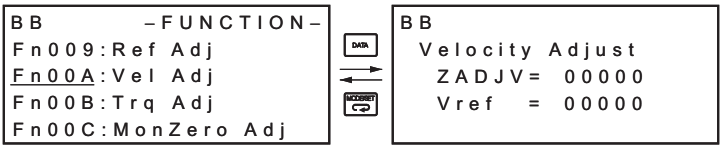
This function executes the manual adjustment of speed reference offset value. Set the speed reference input to 0V before starting the Fn00A.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the Utility Function Mode main menu.
DATA	Saves the adjusted value. When the saving is completed, “Done” is displayed in the status display.
∧ ∨	Increases or decreases the value of each digit.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn009:Ref Adj Fn00A:Vel Adj Fn00B:Trq Adj Fn00C:MonZero Adj	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn00A using the ∧ or ∨ Key.
2	BB Velocity Adjust ZADJV= 00000 Vref = 00000	Press the DATA Key. The display is switched to the execution display of Fn00A (Manual adjustment of speed reference offset). Note: If the display is not switched and "NO_OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the status and reset.
3	BB Velocity Adjust ZADJV=+00012 Vref = 00000	Press the ∧ or ∨ Key to adjust the reference speed offset value.
4	Done Velocity Adjust ZADJV=+00015 Vref = 00000	Press the DATA Key to write the speed reference offset value into the SERVOPACK. "Done" is displayed in the status display when the value is completed writing into the SERVOPACK.
5	BB –FUNCTION– Fn009:Ref Adj Fn00A:Vel Adj Fn00B:Trq Adj Fn00C:MonZero Adj	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.10 Manual Adjustment of Torque Reference Offset (Fn00B)

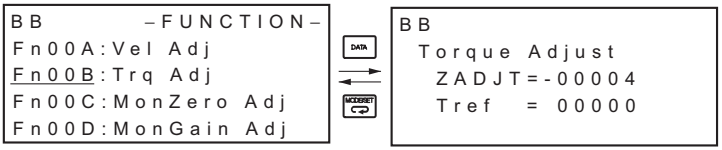
This function executes the manual adjustment or the torque reference offset value. Set the torque reference input to 0 V before starting the Fn00B.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the Utility Function Mode main menu.
DATA	Saves the adjusted value. When the saving is completed, “Done” is displayed in the status display.
∧ ∨	Increases or decreases a value of each digit.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn00A:Vel Adj Fn00B:Trq Adj Fn00C:MonZero Adj Fn00D:MonGain Adj	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn00B using the ∧ or ∨ Key.
2	BB Torque Adjust ZADJT=-00004 Tref = 00000	Press the DATA Key. The display changes to the execution display of the torque offset of the analog voltage reference. Note: If the display does not change and "NO_OP" appears as the status, the Write Prohibited Setting (Fn010 = 0001) has been selected. Check the status and reset.
3	BB Torque Adjust ZADJT=-00004 Tref = 00000	Press the ∧ or ∨ Key to adjust the reference torque offset value.
4	DONE Torque Adjust ZADJT=-00007 Tref = 00000	Press the DATA Key to write the torque offset value of the analog voltage reference into the SERVOPACK. "Done" appears as the status after the value has been successfully written in to the SERVOPACK.
5	BB –FUNCTION– Fn00A:Vel Adj Fn00B:Trq Adj Fn00C:MonZero Adj Fn00D:MonGain Adj	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.11 Manual Zero-adjustment of Analog Monitor Output (Fn00C)

This function executes manual offset adjustment of analog monitor outputs (torque reference monitor and motor speed monitor). The offset adjustment for torque reference monitor and motor speed monitor can be executed individually.

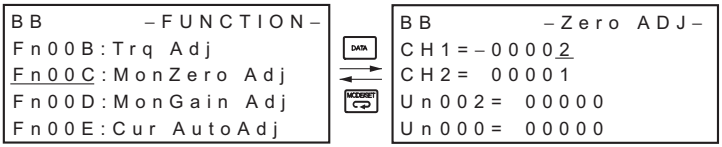
Note: 1. Even if the Parameter Settings Initialization function Fn005 is executed, the adjusted value will not change.
2. For the offset adjustment, connect the measurement instrument that is actually used in the state that the output voltage is 0 V. For example of the motor speed monitor, the servo is in OFF status, and the motor shaft does not rotate.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
SCROLL	Switches the channel for offset adjustment between CH1 and CH2.
∧ ∨	Increases the value for the channel by one by pressing the ∧ Key, and decreases by one by pressing the ∨ Key. The setting value is validated immediately, however, it will not be saved in the SERVOPACK unless the DATA Key is pressed.
DATA	Saves the setting values (both for CH1 and CH2) in the SERVOPACK. After the saving is completed, “Done” is displayed in the status display.

Note: 1. Pressing the < or > Key does not change the cursor position. The lowest digit is always the digit to be edited.
2. In the factory setting, CH1 is for the torque reference monitor and CH2 is for the motor speed monitor.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn00B:Trq Adj Fn00C:MonZero Adj Fn00D:MonGain Adj Fn00E:Cur AutoAdj	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn00C using the ∧ or ∨ Key.
2	BB –Zero ADJ– CH1=–00002 CH2= 00001 Un002= 00000 Un000= 00000	Press the DATA Key. The display is switched to the execution display of Fn00C (Manual zero-adjustment of analog monitor output). Note: If the display is not switched and "NO-OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the setting and reset.
3	BB –Zero ADJ– CH1=–00005 CH2= 00001 Un002= 00000 Un000= 00000	Adjust the offset of CH1 (torque reference monitor). Press the ∧ or ∨ Key to adjust the offset value. Adjust the offset so that the measurement instrument reading is as close to 0 V as possible.
4	BB –Zero ADJ– CH1=–00005 CH2= 00001 Un002= 00000 Un000= 00000	After the offset adjustment of CH1 has completed, adjust the offset of CH2 (motor speed monitor). Press the SCROLL Key. The cursor moves to CH2 side.
5	BB –Zero ADJ– CH1=–00005 CH2= 00006 Un002= 00000 Un000= 00000	Adjust the offset of CH2 in the same way as for CH1. Press the ∧ or ∨ Key to adjust the offset value. Adjust the offset so that the measurement instrument reading is as close to 0 V as possible.
6	Done –Zero ADJ– CH1=–00005 CH2= 00006 Un002= 00000 Un000= 00000	After having completed the offset adjustment both for CH1 and CH2, press the DATA Key. The adjustment results are saved in the SERVOPACK. "Done" is displayed in the status display after saving is completed.

3.3.11 Manual Zero-adjustment of Analog Monitor Output (Fn00C)

Step	Display Example	Description
7	BB –FUNCTION– Fn00B:Trq Adj Fn00C:MonZero Adj Fn00D:MonGain Adj Fn00E:Cur AutoAdj	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.12 Manual Gain-adjustment of Analog Monitor Output (Fn00D)

This function executes manual gain adjustment of analog monitor outputs (torque reference monitor and motor speed monitor). The manual gain adjustment for torque reference monitor and motor speed monitor can be executed individually.

The setting range of the gain adjustment width for analog monitor output is -128 to +127 (× 0.4%).

The setting of gain adjustment width is made on the base of 100%. For example, the setting "-125" makes 100% - (125 × 0.4%) = 50%, which means that the monitor output voltage is 1/2. The setting "125" makes 100% + (125 × 0.4%) = 150%, which means that the monitor output voltage is 1.5 times.

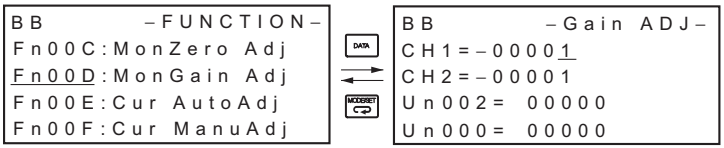
Note: Even if the Parameter Settings Initialization function Fn005 is executed, the adjusted value will not change.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
SCROLL	Switches the channel for gain adjustment between CH1 and CH2.
∧ ∨	Increases the setting value for the channel by one by pressing the ∧ Key, and decreases by pressing the ∨ Key. The setting value is validated immediately, however, it will not be saved in the SERVOPACK unless the DATA Key is pressed.
DATA	Saves the setting values (both for CH1 and CH2) in the SERVOPACK. After the saving is completed, “Done” is displayed in the status display.

Note: 1. Pressing the < or > Key does not change the cursor position. The lowest digit is always the digit to be edited.
2. In the factory setting, CH1 is for the torque reference monitor and CH2 is for the motor speed monitor.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn00C:MonZero Adj Fn00D:MonGain Adj Fn00E:Cur AutoAdj Fn00F:Cur ManuAdj	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn00D using the ∧ or ∨ Key.
2	BB –Gain ADJ– CH1=–00001 CH2=–00001 Un002= 00000 Un000= 00000	Press the DATA Key. The display is switched to the execution display of Fn00D (Manual gain-adjustment of analog monitor output). Note: If the display is not switched and "NO-OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the setting and reset.
3	BB –Gain ADJ– CH1= 00125 CH2=–00001 Un002= 00000 Un000= 00000	Adjust the gain adjustment width of CH1 (torque reference monitor). Press the ∧ or ∨ Key to adjust the gain adjustment width.
4	BB –Gain ADJ– CH1= 00125 CH2=–00001 Un002= 00000 Un000= 00000	After the gain adjustment of CH1, adjust the gain adjustment width of CH2 (motor speed monitor). Press the SCROLL Key. The cursor moves to CH2 side.
5	BB –Gain ADJ– CH1= 00125 CH2=–00125 Un002= 00000 Un000= 00000	Adjust the gain adjustment width of CH2 in the same way as for CH1. Press the ∧ or ∨ Key to adjust the gain adjustment width.
6	Done –Gain ADJ– CH1= 00125 CH2=–00125 Un002= 00000 Un000= 00000	After having completed the adjustment both for CH1 and CH2, press the DATA Key. The adjustment results are saved in the SERVOPACK. After the saving is completed, "Done" is displayed in the status display. And then, "BB" is displayed in the status display.
7	BB –FUNCTION– Fn00C:MonZero Adj Fn00D:MonGain Adj Fn00E:Cur AutoAdj Fn00F:Cur ManuAdj	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.13 Automatic Offset-adjustment of Motor Current Detection Signal (Fn00E)

The automatic offset-adjustment of motor current detection signal has been performed at Yaskawa before shipment. The user need not perform this adjustment.

If the torque ripple caused by the current detection section's offset is too large, perform the offset automatic adjustment of motor current detection signal Fn00E.

If the torque ripple needs to be more reduced after the automatic adjustment, perform the manual adjustment Fn00F. However, if the manual adjustment function is executed carelessly, the characteristics may be lowered.

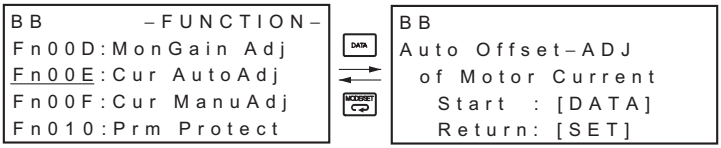
Note: Even if the Parameter Settings Initialization function Fn005 is executed, the adjusted value will not change.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the main circuit power supply is ON and the servo is OFF.
- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Starts the automatic adjustment. When the adjustment is completed, "Done" is displayed in the status display.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn00D:MonGain Adj Fn00E:Cur AutoAdj Fn00F:Cur ManuAdj Fn010:Prm Protect	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn00E using the ∧ or ∨ Key.
2	BB Auto Offset–ADJ of Motor Current Start : [DATA] Return: [SET]	Press the DATA Key. The display is switched to the execution display of Fn00E (Automatic offset-signal adjustment of the motor current detection).
3	Done Auto Offset–ADJ of Motor Current Start : [DATA] Return: [SET]	Press the DATA Key to start the automatic adjustment. When the adjustment is completed, "Done" is displayed in the status display, and then "BB" is displayed. Note: Press the MODE/SET Key to cancel the automatic adjustment. The display returns to the Utility Function Mode main menu.

3.3.14 Manual Offset-adjustment of the Motor Current Detection Signal (Fn00F)

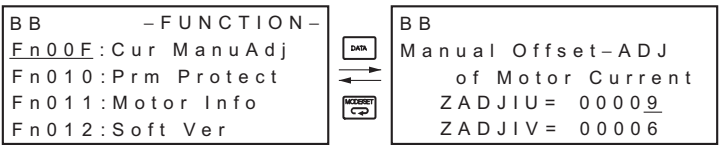
This function adjusts the motor current detection signal offset manually.
Adjust the phase-U and phase-V offsets alternately so that both offsets are well balanced.
At adjustment, rotate the servomotor without connecting a machine (no-load run) at the speed about 100 min^{-1}, monitoring the waveform of torque reference monitor of analog monitor output.
The manual adjustment range of motor current detection signal offset is -512 to +511.

Note: 1. Execute the automatic offset-signal adjustment Fn00E before executing the manual adjustment. Execute the manual adjustment only when the torque ripple is still large after the automatic adjustment.
2. Even if the Parameter Settings Initialization function Fn005 is executed, the adjusted value will not change.

(1) Conditions that Disable This Function

This function is disabled in the following settings.
- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example

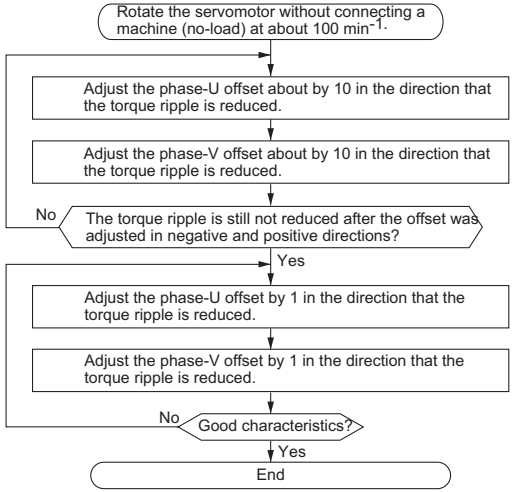


(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.)
MODE/SET	Returns to the main menu of Utility Function Mode.
SCROLL	Switches the phase for offset adjustment between phase-U and phase-V.
∧ ∨	Increases the setting value for the phase by one by pressing the ∧ Key, and decreases by pressing the ∨ Key. The setting value is validated immediately, however, it will not be saved in the SERVOPACK unless the DATA Key is pressed.
DATA	Saves the setting values (both for phase-U and phase-V) in the SERVOPACK. When the saving is completed, “Done” is displayed in the status display.

(4) Manual Offset-adjustment Operation Flowchart



Note: 1. Perform the offset adjustment monitoring the waveform of torque reference monitor.
2. Adjust the offset by 10 for rough adjustment, and by 1 for fine adjustment. Adjustment by 5 may be performed between the rough and fine adjustments.
3. Adjust the phase-U and-V offsets alternately and equally.

(5) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn00F:Cur ManuAdj Fn010:Prm Protect Fn011:Motor Info Fn012:Soft Ver	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn00F using the ∧ or ∨ Key.
2	RUN Manual Offset–ADJ of Motor Current ZADJIU=-00009 ZADJIV=-00006	Press the DATA Key. The display is switched to the execution display of Fn00F (Manual offset-signal adjustment of the motor current detection).
3	RUN Manual Offset–ADJ of Motor Current ZADJIU=-00019 ZADJIV=-00006	Adjust the phase-U offset. Press the ∧ or ∨ Key to adjust the offset amount. Adjust the offset amount by 10 in the direction that the torque ripple is reduced. (ZADJIU: Phase-U current zero-adjustment)
4	RUN Manual Offset–ADJ of Motor Current ZADJIU=-00019 ZADJIV=-00006	Adjust the phase-V offset. Press the SCROLL Key. The cursor moves to the phase-V side.
5	RUN Manual Offset–ADJ of Motor Current ZADJIU=-00019 ZADJIV=-00016	Press the ∧ or ∨ Key to adjust the offset amount. Adjust the offset amount by 10 in the direction that the torque ripple is reduced. (ZADJIV: Phase-V current zero-adjustment)
Note: Repeat the above operations (phase-U and-V alternately) until adjusting the offset amounts both for phase-U and-V in both directions cannot reduce the torque ripple any more. Then, perform the same operation by adjusting by smaller amount.		
6	Done Manual Offset–ADJ of Motor Current ZADJIU=-00019 ZADJIV=-00016	When the offset adjustment is completed, press the DATA Key to save the result of adjustment in the SERVOPACK. When the saving is completed, “Done” is displayed in the status display.
7	BB –FUNCTION– Fn00F:Cur ManuAdj Fn010:Prm Protect Fn011:Motor Info Fn012:Soft Ver	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.15 Write Prohibited Setting (Fn010 = 0001)

This function prevents accidental changes on the setting and adjusted values of parameters in utility function mode.
If the value for write prohibited is set, the setting and adjustment of the write-prohibited set parameters and utility modes are disabled from the next power ON. Reading the parameters and executing some functions of Utility Function Mode are possible. The following Utility Function Modes can be executed in write prohibited status.

Function No.	Name	Function
Fn000	Alarm traceback data display	Displays the history up to the last 10 alarms.
Fn010	Write prohibited setting	Prohibits or permits overwriting the parameter.
Fn011	Servomotor model display	Displays the servomotor model.
Fn012	Software version display	Displays the software version number of the SERVOPACK.
Fn01E	SERVOPACK and servomotor ID display	Displays the model, serial number, and manufacturing date of the SERVOPACK and servomotor stored in the feedback option card.
Fn01F	Motor ID display of feedback option	Displays encoder ID.
Fn030	Software reset	Uses a software program to internally reset the SERVOPACK and, as when the power is turned OFF and then ON again, to make all calculations, including those for parameters.

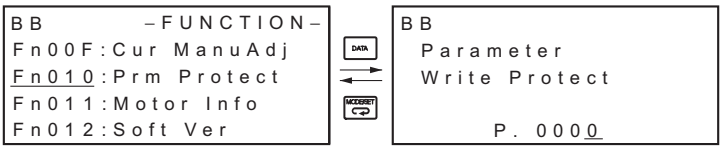
Executing the functions other than the above four functions displays “NO-OP” for one second and changes the display to the Utility Function Mode main menu.
Write prohibited status can be cancelled by setting the value for write permitted and overwriting is enabled from the next power ON.

3.3.15 Write Prohibited Setting (Fn010 = 0001)

(1) Conditions that Disable This Function

None

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Writes the entered value in the SERVOPACK. When the writing the value in the SERVOPACK has completed, "Done" is displayed in the status display. And then, "A.941" is displayed. If an invalid value is entered, "Error" is displayed.
< >	Moves the cursor to the left or the right.
∧ ∨	Increases the setting value by one by pressing the ∧ Key, and decreases by pressing the ∨ Key. The setting values are as follows: "0000": Write permitted "0001": Write prohibited

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn00F:Cur ManuAdj Fn010:Prm Protect Fn011:Motor Info Fn012:Soft Ver	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn010 using the ∧ or ∨ Key.
2	BB Parameter Write Protect P. 0000	Press the DATA Key. The display is switched to the execution display of Fn010 (Write prohibited setting).
3	BB Parameter Write Protect P. 0001	Press the ∧ Key to set the value "0001."
4	Done Parameter Write Protect P. 0001	Press the DATA Key. The setting value is written into the SERVOPACK. When the setting value is written, "Done" is displayed in the status display. And then "A.941" is displayed. Note: The setting value (Write-prohibit) will be valid from the next power ON.
5	BB –FUNCTION– Fn00F:Cur ManuAdj Fn010:Prm Protect Fn011:Motor Info Fn012:Soft Ver	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

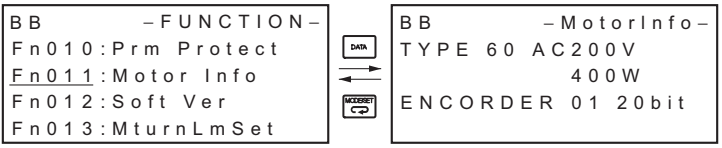
3.3.16 Check Servomotor Models (Fn011)

This function displays the servomotor input voltage, capacity, and encoder resolution.

(1) Conditions that Disable This Function

None

(2) Display Example

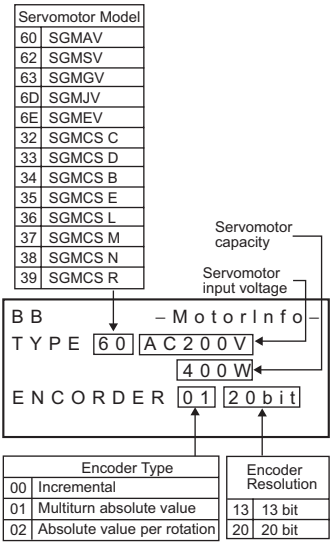


(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn010:Prm Protect Fn011:Motor Info Fn012:Soft Ver Fn013:MturnLmSet	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn011 using the ∧ or ∨ Key.
2		Press the DATA Key. The display is switched to the basic display of Fn011, and the information of servomotor and encoder is displayed.
3	BB –FUNCTION– Fn010:Prm Protect Fn011:Motor Info Fn012:Soft Ver Fn013:MturnLmSet	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

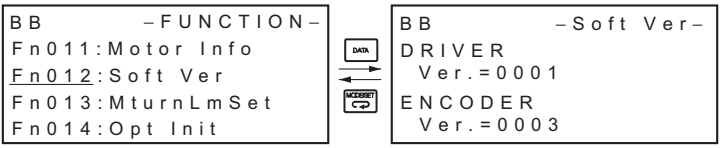
3.3.17 Software Version Display (Fn012)

This function displays the SERVOPACK software version number and the connected encoder software version number.

(1) Conditions that Disable This Function

None

(2) Display Example



Note: If the servomotor is not connected, “Not connect” is displayed for “ENCODER.”

(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.

3.3.18 Multiturn Limit Value Setting Change When a Multiturn Limit Disagreement Alarm (A.CC0) Occurs (Fn013)

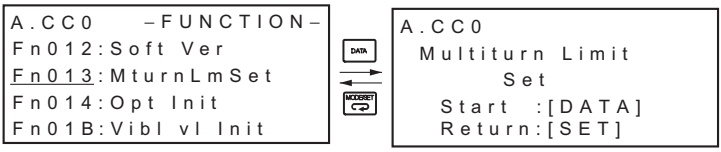
If the multiturn limit value set in Pn205 is changed when an absolute encoder is used, the alarm A.CC0 “Multiturn Limit Disagreement” is output. The utility function Fn013 is used to clear the alarm and change the multiturn limit value.

Note: This function is disabled when the Write Prohibited Setting (Fn010 = 0001) is set.

(1) Conditions that Disable This Function

None

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

MODE/SET	Returns to the Utility Function Mode main menu.
DATA	Sets the multiturn limit value. When the setting is completed, “Done” is displayed in the status display.

3.3.18 Multiturn Limit Value Setting Change When a Multiturn Limit Disagreement Alarm (A.CC0) Occurs (Fn013)

(4) Operation Example

Step	Display Example	Description
1	A.CC0 –FUNCTION– Fn012:Soft Ver Fn013:MturnLmSet Fn014:Opt Init Fn01B:Vibl vl Init	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn013 using the ∧ or ∨ Key.
2	A.CC0 Multiturn Limit Set Start :[DATA] Return:[SET]	Press the DATA Key. The display is switched to the setting display of Fn013 (Multiturn Limit Value Setting Change When a Multiturn Limit Disagreement Alarm (A.CC0) Occurs). Note: If the display is not switched and "NO-OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the setting and reset.
3	Done Multiturn Limit Set Start :[DATA] Return:[SET]	Press the DATA Key to set the multiturn limit value. When the setting is completed, "Done" is displayed in the status display. Turn the power OFF then ON to update the multiturn limit setting. Note: If the MODE/SET Key is pressed instead of the DATA Key, the multiturn limit value will not be reset.
4	A.CC0 –FUNCTION– Fn012:Soft Ver Fn013:MturnLmSet Fn014:Opt Init Fn01B:Vibl vl Init	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.19 Clear Detection Results of Option Card (Fn014)

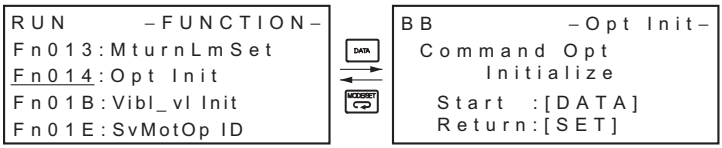
Clears the detection results individually for each of the three option cards: Command, Safety, or Feedback. Use this function when the servo should be operated independently or when the type of option module is to be changed. The setting will become effective after the power is turned ON again.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Selects the option card for which the detection results will be cleared. Press again to clear the detection results.

(4) Operation Example

Step	Display Example	Description
1	RUN –FUNCTION– Fn013:MturnLmSet Fn014:Opt Init Fn01B:Vibl_vl Init Fn01E:SvMotOp ID	Select an option card to be cleared using the [∧] or [∨] Key, and press the [MODE/SET] Key.
2	BB Advanced AT Jcalc=ON Mode=2 Type=2 Stroke=+00800000 (0003.0) rev	Press the [DATA] Key. The option card to be cleared will be set.
3	DONE –Opt Init– Command Opt Initialize Start :[DATA] Return:[SET]	Press the [DATA] Key to clear the detection results. After processing has successfully completed, "DONE" will be shown on the status display. Turn the power ON again to enable the settings.
4	RUN –FUNCTION– Fn013:MturnLmSet Fn014:Opt Init Fn01B:Vibl_vl Init Fn01E:SvMotOp ID	Press the [MODE/SET] Key. The display returns to the Utility Function Mode main menu.

3.3.20 Initialize Vibration Detection Level (Fn01B)

This function detects vibration when servomotor is connected to a machine and automatically adjust the vibration detection level (Pn312) to output more exactly the vibration alarm (A.520) and warning (A.911).
Use this function if the vibration alarm (A.520) or vibration warning (A.911) is not output correctly when a vibration is detected by the Vibration Detection Level (Pn312) of factory setting. Otherwise, this function should not be used.
The vibration detection function detects vibration elements according to the motor speed, and if the vibration exceeds the detection level calculated by the following formula, outputs an alarm or warning depending on the setting of vibration detection switch (Pn310).
The vibration alarm or warning detection sensibility differs depending on the machine conditions. In this case, a detection sensibility fine adjustment can be set in the detection sensibility Pn311.

$$\text{Detection level} = \frac{\text{Vibration detection level} \times \text{Detection sensibility (Pn311[\%])}}{100}$$

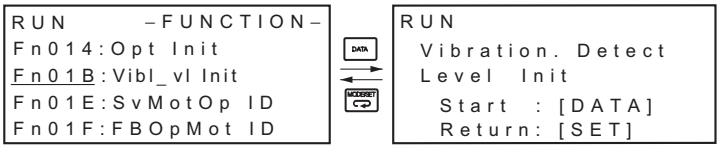
Note: This function is disabled when the Write Prohibited Setting (Fn010 = 0001) is set.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Updates the vibration level.

(4) Operation Example

Step	Display Example	Description
1	RUN –FUNCTION– Fn014:Opt Init Fn01B:Vibl_vl Init Fn01E:SvMotOp ID Fn01F:FBOpMot ID	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn01B using the ∧ or ∨ Key.
2	RUN Vibration Detect Level Init Start : [DATA] Return: [SET]	Press the DATA Key. The display is switched to the initialization basic display of Fn01B. Note: If the display is not switched and "NO-OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the setting and reset.
3	RUN Vibration Detect Level Init Init	Press the DATA Key. "Init" is displayed blinking, and the vibration level is initialized. Note: Continues initialization until the DATA Key is pressed again.
4	Done Vibration Detect Level Init Done	Press the DATA Key. "Done" is displayed, and the vibration level in Pn312 is updated.
5	RUN –FUNCTION– Fn014:Opt Init Fn01B:Vibl_vl Init Fn01E:SvMotOp ID Fn01F:FBOpMot ID	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

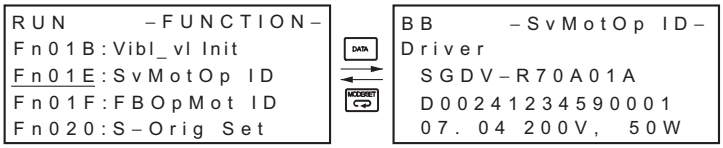
3.3.21 SERVOPACK and Servomotor ID Display (Fn01E)

This function displays the model, serial number, and manufacturing date of the SERVOPACK, servomotor, and encoder.

(1) Conditions that Disable This Function

None

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Changes the display in order: SERVOPACK to Servomotor to Encoder
< >	Scrolls the screen horizontally.

(4) Operation Example

Step	Display Example	Description
1	RUN –FUNCTION– Fn01B:Vibl_vl Init Fn01E:SvMotOp ID Fn01F:FBOpMot ID Fn020:S–Orig Set	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn01E using the ∧ or ∨ Key.
2	Serial No. SERVOPACK Model BB –SvMotOp ID– Driver SGDV–R70A01A D0024123459000 1 02. 04 200V, 50W Manufactured date / Voltage / Capacity	Press the DATA Key. The SERVOPACK information display appears. Press the < or > Keys to scroll the screen horizontally.
3	Serial No. SERVOPACK Model BB –SvMotOp ID– Motor SGMV–A5A2A21 D0024578909000 1 02. 04 200V, 50W Manufactured date / Model / Capacity	Press the DATA Key. The servomotor information display appears. Press the < or > Keys to scroll the screen horizontally.
4	Serial No. Model BB –SvMotOp ID– Encoder UTVIH–B20EA K247–0225E00200 07. 04 20bit–ABS Manufactured date / Number of bits / Encoder type	Press the DATA Key. The encoder information display appears. Press the < or > Keys to scroll the screen horizontally.
5	RUN –FUNCTION– Fn01B:Vibl_vl Init Fn01E:SvMotOp ID Fn01F:FBOpMot ID Fn020:S–Orig Set	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

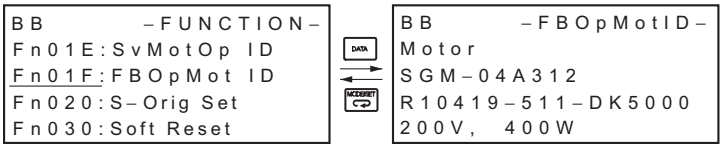
3.3.22 Feedback Option Motor ID Check (Fn01F)

Displays the encoder ID in the option card if a feedback option card with a microcomputer is installed.
If an option card is used without a microcomputer, only the encoder ID for the serial converter will be displayed.

(1) Conditions that Disable This Function

None

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Changes the data to be displayed in the order of motor ID, encoder ID and then parameter file ID
< >	Scrolls to the left and right and view the motor ID, encoder ID and parameter file ID data.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn01E:SvMotOp ID Fn01F:FBOpMot ID Fn020:S–Orig Set Fn030:Soft Reset	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn01F using the ∧ or ∨ Key.
2	Serial No. Servomotor type BB –FBOpMotID– Motor SGM–04A312 R10419–511–DK5000 200V, 400W Voltage Capacity	Press the DATA Key. The screen will change to the Fn01F main window. The Motor ID will be shown first. Use the < and > Keys to scroll left and right through the information.
3	Encoder type/Resolution Encoder type BB –FBOpMotID– Encoder UTTAH–U11DB Serial No. 11bit–INC	Press the DATA key, and the encoder ID will be shown. Use the < and > Keys to scroll left and right through the information.
4	Parameter file version Origin parameter file BB –FBOpMotID– Prm File: YEC–00000 Version: 0000	Press the DATA key, and the parameter file ID will be shown. Use the < and > Keys to scroll left and right through the information.
5	BB –FUNCTION– Fn01E:SvMotOp ID Fn01F:FBOpMot ID Fn020:S–Orig Set Fn030:Soft Reset	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

Note: If a feedback option card is not connected, the following message will appear.

Even if a feedback option card is connected, the following message will appear if the option card contains no motor data or encoder data.

3.3.23 Home Position Setting (Fn020)

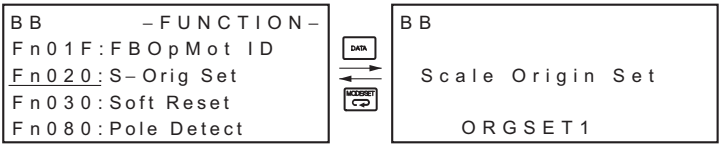
Sets the current position as the home position, and stores the motor phase information from the home position in the SERVOPACK. With this function, phase information stored in the SERVOPACK is read every time the power is turned ON, so an immediate start of operations is possible with no need to detect the magnetic poles.

(1) Conditions that Disable This Function

This function is disabled by the following settings.

- When the servo is not turned OFF.
- If Fn080 (Magnetic Pole Detection) is not implemented before executing this function. Be sure to implement Fn080 before executing Fn020 again.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Starts the processing to set the home position.
∧	Selects one of five positions of home position from ORGSET1 to ORGSET5.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn01F:FBOpMot ID Fn020:S–Orig Set Fn030:Soft Reset Fn080:Pole Detect	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn020 using the ∧ or ∨ Key.
2	BB Scale Origin Set ORGSET1	Press the DATA Key. The screen will change to the Fn020 main window.
3	BB Scale Origin Set ORGSET5	Press ∧ or ∨ Key to select one of five positions of home position from ORGSET1 to ORGSET5.
4	BB Scal Origin Set	Press the DATA Key to start the processing to set the home position. While processing, Scale Origin Set will appear and blink in the window. After the home position has been successfully set, the blinking will stop, and the status will be shown as BB, DONE, and then A.941*.
5	BB –FUNCTION– Fn01F:FBOpMot ID Fn020:S–Orig Set Fn030:Soft Reset Fn080:Pole Detect	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

* With SGDV SERVOPACK that support MECHATROLINK-II, “A.941” will not be shown, and “BB” will be displayed instead.

3.3.24 Software Reset (Fn030)

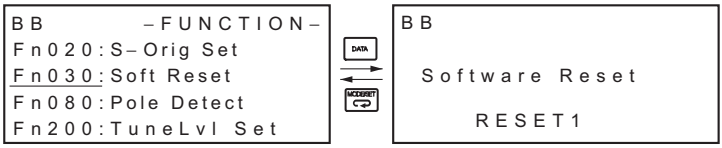
Uses a software program to internally reset the SERVOPACK and, as when the power is turned ON again, to make all calculations, including those for parameters.

Note: When this function is executed, the SERVOPACK will not run as when the control power is turned ON for a maximum time of four seconds.

(1) Conditions that Disable This Function

None

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

DATA	Resets the SERVOPACK with a software program.
MODE/SET	Returns to the main menu of Utility Function Mode.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn020:S–Orig Set Fn030:Soft Reset Fn080:Pole Detect Fn200:TuneLvl Set	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn030 using the ∧ or ∨ Key.
2	BB Software Reset RESET1	Press the DATA Key to change to the Fn030 main window.
3	BB Software Reset RESET5	Press either the ∧ or ∨ Key, and "RESET5" will be displayed.
4	BB Software Reset	While "RESET5" is displayed, press the DATA Key to reset the SERVOPACK using a software program.
5	File First Loading Please Wait...	After the SERVOPACK has been successfully reset, you will be returned to the window seen at power ON. The window then changes to the Parameter/Monitor display mode.
6	BB –FUNCTION– Fn020:S–Orig Set Fn030:Soft Reset Fn080:Pole Detect Fn200:TuneLvl Set	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

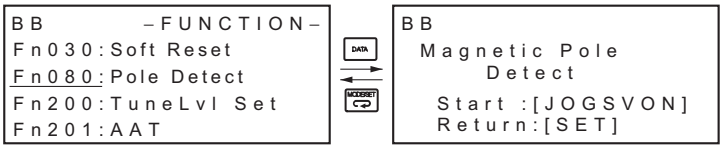
3.3.25 Magnetic Pole Detection (Fn080)

This function detects the magnetic poles and stores motor phase information from the home position in the SERVOPACK when the absolute encoder is used. With this function, phase information stored in the SERVOPACK is read every time the power is turned ON, so an immediate start of operations is possible with no need to detect the magnetic poles.

(1) Conditions that Disable This Function

None

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

JOG SVON	Starts detection of the magnetic poles.
MODE/SET	Returns to the main menu of Utility Function Mode.

(4) Operation Example

Step	Display Example	Description
1	BB –FUNCTION– Fn030:Soft Reset Fn080:Pole Detect Fn200:TuneLvl Set Fn201:AAT	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn080 using the ∧ or ∨ Key.
2	BB Magnetic Pole Detect Start :[JOG SVON] Return:[SET]	Press the DATA Key to change to the Fn080 main window.
3	P DET Magnetic Pole Adjustment Return:[SET]	Press the JOG SVON Key to start magnetic pole detection. "Magnetic Pole Adjustment" will blink while the magnetic poles are being detected. After the poles are successfully detected, the servo will automatically turn OFF.
4	BB Magnetic Pole Detect Return:[SET]	After the magnetic poles are successfully detected, the message shown in the column on the left will be displayed.
5	BB –FUNCTION– Fn030:Soft Reset Fn080:Pole Detect Fn200:TuneLvl Set Fn201:AAT	Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.26 Tuning less Level Setting (Fn200)

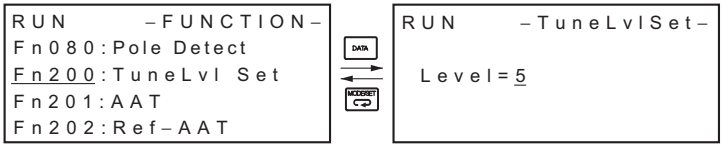
This function sets the load level during tuning less function.

(1) Conditions that Disable This Function

This function is disabled by the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When the tuning less function switch is set to disable (Pn170 = n.□□□1).

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

JOG SVON	Automatically sets the notch filter to vibration frequency.
>	Cancels the setting that was assigned to the notch filter.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Stores the setting to the SERVOPACK.

(4) Operation Example

Step	Display Example	Description
1	RUN –FUNCTION– Fn080:Pole Detect Fn200:TuneLvl Set Fn201:AAT Fn202:Ref–AAT	Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn200 using the ∧ or ∨ Key.
2	RUN –TuneLvlSet– MODE=OFF	Press the DATA Key. “MODE” will appear.

Step	Display Example	Description
3	RUN –TuneLvlSet– MODE=ON	Press the [∧] or [∨] Key to select a mode. Note: If overshoot or vibration occurs, or the load is larger than the allowable load moment, select "ON." If mechanical resonance occurs, select "OFF."
4	RUN –TuneLvlSet– Level=4	Press the [DATA] Key. A level will appear.
5	RUN –TuneLvlSet– Level=3	Press the [∧] or [∨] Key to select a level. If vibration noise occurs, lower the setting value. Note: If overshoot or vibration occurs, or the load is larger than the allowable load moment, select "ON." If vibration noise occurs, select "OFF."
6	RUN –TuneLvlSet– Level=3	Press the [>] Key to cancel the automatically set notch filter.
7	Done –TuneLvlSet– Level=3	Press the [DATA] Key, and "Done" will blink in the status display. Then, the setting will be stored to the SERVOPACK.
8	RUN –FUNCTION– Fn080:Pole Detect Fn200:TuneLvl Set Fn201:AAT Fn202:Ref–AAT	Press the [MODE/SET] Key. The display returns to the Utility Function Mode main menu.

3.3.27 Advanced Autotuning (Fn201)

This function automatically sets the moment of inertia ratio/mass ratio, gain, filter, and friction compensation in accordance with the machine used.

(1) Conditions that Disable This Function

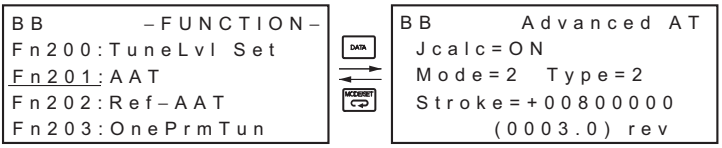
This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When the tuning less function switch is set to disable (Pn170 = n.□□□1).
- When the main-circuit power is turned OFF.
- When an alarm or a warning occurs.
- When overtravel occurs.
- When a communications error occurs in the SigmaWin.
- When the second gain is selected at gain switching.
- When tuning less function is enabled and the load moment of inertia ratio/mass ratio is not calculated (Jcalc = OFF).

In these cases, press the MODE/SET Key to cancel adjustment and remove the causes.

Then, retry adjustment.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Saves the servo gains and filter time constant after the tuning in the SERVOPACK. When the saving is completed, “Done” is displayed in the status display.
∧ ∨	When the servo is OFF (BB): Selects a value for Jcalc, MODE, and STROKE When the servo is ON (RUN): Pressing the ∧ or ∨ Key according to the sign of STROKE (+ or -) starts calculation of moment of inertia ratio/mass ratio. (∧ Key for positive (+) direction, ∨ Key for negative direction (-)) If the moment of inertia ratio/mass ratio is not to be calculated, the autotuning for gains is started.
SCROLL	Switches the line to be edited, Jcalc, MODE, Type, or STROKE.
JOG SVON	When the servo is OFF (BB): Switches the servo ON to/from OFF. In the status display, “BB” is displayed when the servo is OFF, and “RUN” is displayed when the servo is ON.

(4) Operation Example

Step	Display Example and Description
1	BB –FUNCTION– Fn200:TuneLvl Set Fn201:AAT Fn202:Ref–AAT Fn203:OnePrmTun Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn201 using the ∧ or ∨ Key.
2	BB Advanced AT Jcalc=ON Mode=2 Type=2 Stroke=+00800000 (0003.0) rev Press the DATA Key to display the initial setting screen for advanced autotuning. Note: If the display does not change and NO-OP is displayed, take proper measures referring to *(1) Conditions that Disable This Function*.
3	BB Advanced AT Jcalc=ON Mode=2 Type=2 Stroke=+00800000 (0003.0) rev Using the ∧, ∨ or SCROLL Key, set the initial values of the advanced autotuning. ■ Jcalc Select the Mode. Jcalc=ON: the load moment of inertia ratio/mass ratio calculated Jcalc=OFF: the load moment of inertia ratio/mass ratio not calculated Usually, set Jcalc to ON. <Supplementary Information> If the moment of inertia ratio/mass ratio is known from the machine specifications, set it in Pn103, and then set the Jcalc to OFF. Otherwise, use this function in mode 0 (inertia calculated). ■ Adjustment Level Select the adjustment level. Mode=1: Standard Makes adjustments considering responsiveness and stability. Mode=2: Exclusively for positioning Makes adjustments giving priority to positioning performance by using model following control and friction compensation. Mode=3: Exclusively for positioning (mainly to suppress overshoot) Set to this mode if the position error overshoots when the mode is set to 2. This mode suppresses overshoot in the gain settings when the mode is set to 2. Note: Use a setting of “0: loose” or “1: normal” if reference input-type advanced autotuning is performed after advanced autotuning.

Step	Display Example and Description
3	■ Filter Type Setting Select the filter type to set a filter according to the machine element to be driven. Set the filter referring to the following functional elements. Type = 1: Filter type 1 Selects a filter suitable for belt drive mechanisms. Type = 2: Filter type 2 Selects a filter suitable for ball screw drive mechanisms and linear motors (factory setting). Type = 3: Filter type 3 Selects a filter suitable for rigid systems without speed reducers and drive system. <Supplementary Information> If there is noise or the gain does not increase, good results may be obtained by changing the filter type. ■ STROKE (Travel Distance) Setting Specify a travel distance in increments of 1,000 references. Travel distance setting range: The travel distance setting range is from -99990000 to +99990000. The negative (-) direction is for reverse rotation, and the positive (+) direction is for forward rotation. Initial value: Approx. three rotations Note: • Move the position using JOG operation to where a suitable movable range is ensured. • Set the number of motor rotations to at least 0.5; otherwise, “Error” will be displayed and the travel distance cannot be set. • To calculate the load moment of inertia ratio/mass ratio and ensure precise tuning, it is recommended to set the number of motor rotations to around 3.
4	BB ADVANCED AT Pn103=00000 Pn100=0040.0 Pn101=0020.00 Pn102=0040.0 Press the DATA Key. The advanced autotuning execution screen will be displayed.
5	RUN ADVANCED AT Pn103=00000 Pn100=0040.0 Pn101=0020.00 Pn141=0050.0 Press the JOG SVON Key. The servo will be ON and the display will change from “BB” to “RUN.” Note: If the mode is set to 2 (Exclusively for positioning), “Pn102” will change to “Pn141.”

Step	Display Example and Description
6	RUN ADVANCED AT Pn103=00300 Pn100=0040.0 Pn101=0020.0 Pn141=0050.0 This example shows when the moment of inertia ratio/mass ratio is calculated. Press the [∧] Key if a positive (+) value is to be set for the STROKE (travel distance), or press the [∨] Key if a negative (-) value is to be set. Calculation of the moment of inertia ratio/mass ratio will start. While the moment of inertia ratio/mass ratio is being calculated, the set value for Pn103 will flash. When the calculation has been completed, the set value will stop flashing and the calculated load moment of inertia ratio/mass ratio will be displayed. The servo will remain ON, but the auto run operation will enter HOLD status. Note: • The wrong key for the set travel direction is pressed, the calculation will not start. • If the tuning operation or the calculation of the moment of inertia ratio/mass ratio does not start, "NO-OP" will blink. Refer to *(5) Note on Advanced Autotuning Function*, and take a corrective action to enable operation. • If the calculation of the moment of inertia ratio/mass ratio is not completed normally because the required conditions are not met, "Pn103 = ERROR" will be displayed. Refer to *(6) Notes on Reference Input-type Advanced Autotuning*, press the [MODE/SET] Key to cancel the function, modify the settings, and then restart. <Supplementary Information> If the moment of inertia ratio/mass ratio is not calculated, the set value for Pn103 will be displayed but not flash.
7	Adj ADVANCED AT Pn103=00300 Pn100=0100.0 Pn101=0006.36 Pn141=0150.0 When the [∧] or [∨] Key is pressed according to the sign (+ or -) of the value set for STROKE (travel distance), the calculated value of the moment of inertia ratio/mass ratio will be written to the SERVOPACK and the auto run operation will restart. While the servomotor is running, the notch filter, the torque reference filter, and gains will be automatically set. "ADJ" will flash during the auto setting operation. Note: If the tuning operation is not completely normally, "Error" will appear on the status display. Adjust using Fn203 (One-parameter autotuning).
8	End Advanced AT Pn103=00300 Pn100=0100.0 Pn101=0006.36 Pn141=0150.0 When the adjustment has been completed normally, the servo will turn OFF, and "End" will blink for two seconds and "ADJ" will be displayed on the status display.

Step	Display Example and Description
9	Done ADVANCED AT Pn103=00300 Pn100=0100.0 Pn101=0006.36 Pn141=0150.0 Press the DATA Key. The values adjusted in steps 7 to 8 will be written to the SERVO-PACK, "DONE" will blink for two seconds, and "ADJ" will be displayed again. <Supplementary Information> Not to save the setting values, press the MODE/SET Key.
10	BB –FUNCTION– Fn200:TuneLvl Set Fn201:AAT Fn202:Ref–AAT Fn203:OnePrmTun Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

(5) Note on Advanced Autotuning Function

If the advanced autotuning could not be completed, "Error" is displayed blinking. In this case, press the MODE/SET Key to exit the advanced autotuning function, and restart the procedure to display the initial setting display. Increase the setting value of Pn522 (positioning completion width), and then try again the advanced autotuning.

Display Example when the Advanced Autotuning Failed

```
Error ADVANCED AT
Pn103=00123
Pn100=0063.0
Pn101=017.00
Pn141=0063.0
```

(6) Notes on Reference Input-type Advanced Autotuning

If "NO-OP" or "Error" appear during adjustment, the adjustment will be stopped.

■ Probable Causes of "NO-OP" Blinking

- When the main-circuit power is turned OFF.
- When an alarm or a warning occurs.
- When overtravel occurs.
- When a communications error occurs in the SigmaWin.
- When the second gain is selected at gain switching.
- When tuning less function is enabled and the load moment of inertia ratio/ mass ratio is not calculated.

In these cases, press the MODE/SET Key to cancel adjustment and remove the causes.

Then, retry adjustment.

■ Probable Causes of "Error" Blinking and Remedies

Press the MODE/SET Key and stop the adjustment once, and take the following remedies to enable operation.

Error	Probable Cause	Corrective Actions
The gain dropped below the minimum adjustable gain.	Machine vibration is occurring or the positioning completion signal (/COIN) is turning ON and OFF.	Increase the set value for Pn522. If there is machine vibration, suppress the vibration with the anti-resonance control adjustment function.
An error occurred during the calculation of the load moment of inertia ratio/mass ratio.	refer to *(7) Errors during Calculation of Load Moment of Inertia Ratio/Mass Ratio and Corrective Actions*.	
Travel distance setting error	The travel distance is set to approximately 0.5 rotation or less, which is less than the minimum adjustable travel distance. If the SGMCS servomotor is used, the travel distance is set to 0.05 rotations.	Increase the travel distance. It is recommended to set the motor rotations to around 3.
The positioning completion signal (/COIN) did not turn ON within approximately 10 seconds after positioning adjustment was completed.	The positioning completion width is too small or P control operation (proportional control) is being used.	Increase the set value for Pn522. If the P control is set, disable the mode switch.

(7) Errors during Calculation of Load Moment of Inertia Ratio/Mass Ratio and Corrective Actions

The following table shows the probable causes of errors that may occur during the calculation of the load moment of inertia ratio with the MODE set to 0, along with corrective actions for the errors.

Error Display	Error Type	Cause	Corrective Action
Err1	Failure in starting calculation of moment of inertia	The SERVOPACK started calculating the moment of inertia, but the calculation was not completed.	• Increase the speed loop gain (Pn100). • Increase the STROKE (travel distance).
Err2	Failure in calculation of moment of inertia	The moment of inertia fluctuated greatly and did not converge within 10 tries.	Set the calculation value based on the machine specifications in Pn103 and execute the calculation with the MODE set to 1.
Err3	Low-frequency vibration error	Low-frequency vibration was detected.	Double the calculation starting level of the moment of inertia (Pn324).
Err4	Torque limit error	The torque limit was reached.	• Increase the torque limit value. • Double the calculation starting level of the moment of inertia (Pn324).
Err5	Proportional control error	While calculating the moment of inertia, the speed control was set to proportional control with P-CON input.	Operate the SERVOPACK with PI control while calculating the moment of inertia.

3.3.28 Reference Input-type Advanced Autotuning (Fn202)

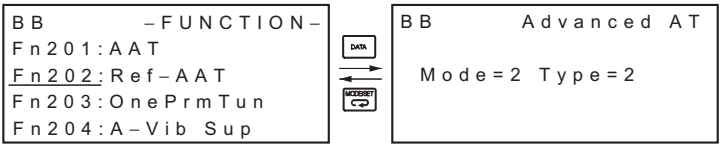
Use this function for final adjustments after successful completion of advanced auto tuning (Fn201). This function automatically sets the gain, filter, and friction compensation in accordance with the machinery being used.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.

(2) Display Example

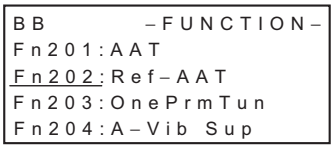
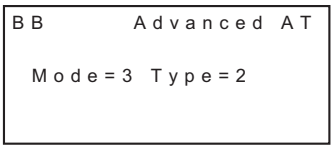


(3) Operation Keys

■ Functions (The disabled keys are not included.)

MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Saves the servo gains and filter time constant after the reference input-type advanced autotuning in the SERVOPACK. When the saving is completed, "Done" is displayed in the status display.
∧ ∨	When the servo is OFF (BB): Selects a value for STROKE. When the servo is ON (RUN): Pressing the ∧ or ∨ Key according to the STROKE (+ or -) starts tuning gains. (∧ Key for positive (+) direction, ∨ Key for negative direction (-)).
SCROLL	When the servo is OFF (BB): Switches the line to be edited. (Same as for Parameter/Monitor Mode display) When the servo is ON (RUN): Disabled.

(4) Operation Example

Step	Display Example and Description
1	 Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn202 using the ∧ or ∨ Key.
2	 Press the DATA Key to display the initial setting screen for advanced autotuning. Note: If the display does not change and NO-OP is displayed, take proper measures referring to *(1) Conditions that Disable This Function*.

3.3.28 Reference Input-type Advanced Autotuning (Fn202)

Step	Display Example and Description
3	BB Advanced AT Mode=3 Type=2 Press the [∧], [∨], or [SCROLL] Key and set tuning level and filter type setting. ■ Adjustment Level Select the adjustment level. Mode=1: Standard Makes adjustments considering responsiveness and stability. Mode=2: Exclusively for positioning Makes adjustments giving priority to positioning performance by using model following control and friction compensation. Mode=3: Exclusively for positioning (mainly to suppress overshoot) Set to this mode if the position error overshoots when the mode is set to 2. This mode suppresses overshoot in the gain settings when the mode is set to 2. Note: Use a setting of "0: loose" or "1: normal" if reference input-type advanced autotuning is performed after advanced autotuning. ■ Filter Type Setting Select the filter type to set a filter according to the machine element to be driven. Set the filter referring to the following functional elements. Type = 1: Filter type 1 Selects a filter suitable for belt drive mechanisms. Type = 2: Filter type 2 Selects a filter suitable for ball screw drive mechanisms and linear motors (factory setting). Type = 3: Filter type 3 Selects a filter suitable for rigid systems without speed reducers and drive system. <Supplementary Information> If there is noise or the gain does not increase, good results may be obtained by changing the filter type.
4	BB Advanced AT Pn103:00000 Pn100:0040.0 Pn101:0020.00 Pn141:0050.0 Press the [DATA] Key. The advanced autotuning execution screen will be displayed. Note: If the mode is set to 2 (Exclusively for positioning), the "Pn102" display will change to the "Pn141."
5	ADJ Advanced AT Pn103:00300 Pn100:0040.0 Pn101:0020.00 Pn141:0050.0 Input an external /S-ON signal, and then input a reference from the host controller.

Step	Display Example and Description
6	ADJ Advanced AT Pn103:00300 Pn100:0100.0 Pn101:0006.36 Pn141:0150.0 Starts to adjust using [∧] or [∨] Key. "Adj" will blink on the status display. Note: Adjustment cannot be performed during "BB" is shown on the status display.
7	END Advanced AT Pn103:00300 Pn100:0100.0 Pn101:0006.36 Pn141:0150.0 When the adjustment has been completed normally, "END" will blink for two seconds on the status display.
8	DONE Advanced AT Pn103:00300 Pn100:0100.0 Pn101:0006.36 Pn141:0150.0 Press the [DATA] Key. The adjusted values will be written to the SERVOPACK, "DONE" will flash for two seconds. <Supplementary Information> Not to save the setting values, press the [MODE/SET] Key.
9	BB –FUNCTION– Fn201:AAT Fn202:Ref–AAT Fn203:OnePrmTun Fn204:A–Vib Sup Press the [MODE/SET] Key. The display returns to the Utility Function Mode main menu.

(5) Notes on Reference Input-type Advanced Autotuning

If "NO-OP" or "Error" blinks for approximately two seconds during adjustment, the adjustment will be stopped.
"NO-OP" or "Error" will be turned OFF after the adjustment is canceled.

■ Probable Causes of "NO-OP" Blinking

- When the main-circuit power is turned OFF.
- When an alarm or a warning occurs.
- When overtravel occurs.
- When a communications error occurs in the SigmaWin.
- When the second gain is selected at gain switching.
- When tuning less function is enabled and the load moment of inertia ratio/ mass ratio is not calculated.

In these cases, press the MODE/SET Key to cancel adjustment and remove the causes.

Then, retry adjustment.

■ Probable Causes of "Error" Blinking and Remedies

Press the MODE/SET Key and stop the adjustment once, and take the following remedies to enable operation.

Error	Probable Cause	Corrective Actions
The positioning completion signal (/COIN) did not turn ON within approximately 10 seconds after positioning adjustment was completed.	The positioning completion width is too small or P control operation (proportional control) is being used.	Increase the set value for Pn522. If the P control is set, disable the mode switch.
The gain dropped below the minimum adjustable gain.	Machine vibration is occurring or the positioning completion signal (/COIN) is turning ON and OFF.	Increase the set value for Pn522. If there is machine vibration, suppress the vibration with the anti-resonance control adjustment function.

3.3.29 One-parameter Autotuning (Fn203)

This function inputs the position reference or speed reference from the host controller and allows the user to manually adjust the tuning level during operation.
By adjusting one or two levels, the setting value of the related servo gains are automatically adjusted to the appropriate values.
This function enables the following adjustments.

- Gain adjustment (such as position loop gain and speed loop gain)
- Filter adjustment (torque reference filter and notch filter)
- Friction compensation.

The type of adjustment can be selected by setting the following tuning modes.

Tuning Mode	Type
Tuning Mode=0	Adjusts with priority given to stability. Refer to ■ *Example 2 [Tuning Mode set to 0 or 1]* on page 3-84.
Tuning Mode=1	Adjusts with priority given to high responsiveness. Refer to ■ *Example 2 [Tuning Mode set to 0 or 1]* on page 3-84
Tuning Mode=2	Adjusts with priority given to high responsiveness for positioning. Refer to ■ *Example 3 [Tuning Mode set to 2 or 3]* on page 3-86
Tuning Mode=3	Adjust with priority given to overshoot suppression (Exclusively for positioning). Refer to ■ *Example 3 [Tuning Mode set to 2 or 3]* on page 3-86

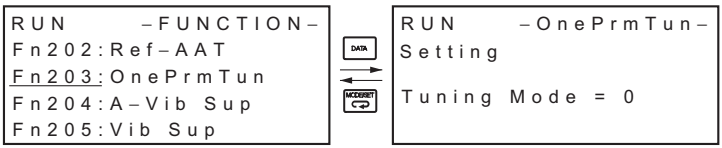
Note: 1. Use this function if sufficiently responsive advanced autotuning and reference-input type advanced autotuning is not output.
2. To execute fine adjustment of each servo gain, execute manual tuning. For details, refer to the user's manual.
3. Before executing one-parameter autotuning, be sure to set the moment of inertia ratio (Pn103) using advanced autotuning. If the moment of inertia ratio is larger than the actual value, normal control will not work and vibration will occur.

(1) Conditions that Disable This Function

This function is disabled by the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When using the torque control.

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Saves the servo gains after the autotuning in the SERVOPACK. When the saving has completed, "Done" is displayed in the status display.
∧ ∨	Selects a tuning mode. Changes the tuning level.
< >	Moves the cursor to the left or the right.

(4) Operation Example

■ Example 1

Step	Display Example and Description
1	RUN –FUNCTION– Fn202:Ref–AAT Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn203 using the ∧ or ∨ Key.
2	BB –OnePrmTun– Pn103=00300 Press the DATA Key to display the moment of inertia ratio/mass ratio set in Pn103 at present. Select the digit with the < or > Key, change the set value with the ∧ or ∨ Key. Note: If the display does not change and NO-OP is displayed, take proper measures referring to *(1) Conditions that Disable This Function*.

Step	Display Example and Description
3	BB –OnePrmTun– Setting Tuning Mode = 2 Type = 2 Press the DATA Key. The display is switched to the basic setting display of Fn203. Note: If the display is not switched and "NO-OP" is displayed in the status display, the Write Prohibited Setting (Fn010 = 0001) is set. Check the setting and reset.
4	BB –OnePrmTun– Setting Tuning Mode = 2 Type = 2 Press the ∧ or ∨ Key to select a tuning mode and a filter type. ■ Turning Mode Select the tuning Mode. Tuning Mode = 0: Makes adjustments giving priority to stability. Tuning Mode = 1: Makes adjustments giving priority to responsiveness. Tuning Mode = 2: Makes adjustments giving priority to responsiveness for positioning. Tuning Mode = 3: Set to this mode if the position error overshoots when the mode is set to 2. This mode suppresses overshoot in the gain settings when the mode is set to 2. When Tuning Mode is set to 0 or 1, refer to ■*Example 2 [Tuning Mode set to 0 or 1]*. When Tuning Mode is set to 2 or 3, refer to ■*Example 3 [Tuning Mode set to 2 or 3]*. ■ Filter Type Setting Select the filter type to set a filter according to the machine element to be driven. Set the filter referring to the following functional elements. Type = 1: Filter type 1 Selects a filter suitable for belt drive mechanisms. Type = 2: Filter type 2 Selects a filter suitable for ball screw drive mechanisms and linear motors (factory setting). Type = 3: Filter type 3 Selects a filter suitable for rigid systems without speed reducers and drive system. <Supplementary Information> If there is noise or the gain does not increase, good results may be obtained by changing the filter type.

■ Example 2 [Tuning Mode set to 0 or 1]

Step	Display Example and Description
1	Input an external /S-ON signal. The display will change from “BB” to “RUN.” Input a reference from the host controller.
2	RUN –OnePrmTun– Pn100=0040.0 Pn101=0020.00 Pn102=0040.0 The set value will be displayed. Press the DATA Key after checking the value.
3	RUN –OnePrmTun– LEVEL=0040 NF1 ARES Check level settings with the tuning mode set to 0 or 1. When the level is increased, responsiveness will improve. If the value is too large, however, vibration will occur. SERVOPACK will detect vibration frequencies automatically and make notch filter or anti-resonance control adjustment settings. Select the digit with the < or > Key, adjust the level with ∧ or ∨ Key, and press the DATA Key. When the notch filter is set, “NF1” or “NF2” will be displayed on the bottom row. “NF1” shows that a one-level notch filter is set. If the anti-resonance control adjustment is set, “ARES” will appear. Note: The vibration frequencies may not be detected if the amplitude is too small. If that occurs, press the JOG SVON Key to forcibly detect the vibration frequencies.
4	RUN –OnePrmTun– Pn100=0040.0 Pn101=0020.00 Pn102=0040.8 A confirmation screen is displayed after level adjustment. Check the value and press the DATA Key.

Step	Display Example and Description
5	RUN –OnePrmTun– Pn100=0040.0 Pn101=0020.00 Pn102=0040.8 Press the DATA Key. The adjusted values will be written to the SERVOPACK, "DONE" will blink for two seconds. <Supplementary Information> Not to save the setting values, press the MODE/SET Key. The screen in step 3 will appear with the < Key.
6	RUN –FUNCTION– Fn202:Ref–AAT Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Press the MODE/SET Key to complete the one-parameter tuning operation. The screen in step 1 will appear again.

Note: Tuning Mode and Settings
0: Selects the servo gain with priority to stability. (Adjusts notch filter and anti-resonance control adjustment.)
1: Selects the servo gain with priority to responsiveness. (Adjusts notch filter and anti-resonance control adjustment.)

■ Example 3 [Tuning Mode set to 2 or 3]

Step	Display Example and Description
1	Input an external /S-ON signal. The display will change from “BB” to “RUN.” Input a reference from the host controller.
2	RUN –OnePrmTun– Pn100=0040.0 Pn101=0020.00 Pn141=0050.0 The set value will be displayed. Press the DATA Key after confirming the value.
3	RUN –OnePrmTun– FF LEVEL=0050.0 FB LEVEL=0040.0 NF1 ARES Check FF level and FB level settings with the tuning mode set to 2. When the FB level is increased, the responsiveness will improve. As the FF level increases, positioning time will be reduced. If the value is too large, however, vibration will occur. SERVOPACK will detect vibration frequencies automatically and make notch filter or anti-resonance control adjustment settings. Adjust FF level and FB level with the <, >, ∧, or ∨ Keys, and press the DATA Key. Note: • A change in the FF level will become effective after the motor stops (i.e., the motor comes to a stop with no reference input), and the response of the motor will change. Wait until the set operation reference stops and check the response before adjusting the FF level. If the FF level is changed greatly while the SERVOPACK is in operation, the response will change radically. This may cause vibration. • “FF LEVEL” will blink until the FF level is enabled. If the motor does not stop approximately 10 seconds after the setting is changed, a timeout error will result and the previous setting will be enabled again. • The vibration frequencies may not be detected if the amplitude is too small. If that occurs, press the JOG SVON Key to forcibly detect the vibration frequencies.
4	RUN –OnePrmTun– Pn100=0040.0 Pn101=0020.00 Pn141=0050.0 NF1 A confirmation screen is displayed after adjustment.

Step	Display Example and Description
5	RUN –OnePrmTun– Pn100=0040.0 Pn101=0020.00 Pn141=0050.0 NF1 Press the DATA Key. The adjusted values will be written to the SERVOPACK, "DONE" will blink for two seconds. <Supplementary Information> Not to save the values set in step 3, press the MODE/SET Key. The screen in step 3 will appear with the < Key.
6	RUN –FUNCTION– Fn202:Ref–AAT Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.30 Anti-Resonance Control Adjustment (Fn204)

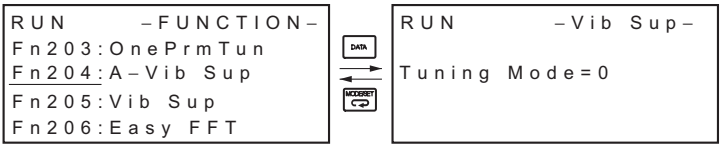
This function assists with the adjustment of the Anti-resonance control adjustment. This control is effective if the vibration frequency, generated when the control gain is raised, is within the range of 100 Hz to 1000 Hz.
Three methods are available to use the Anti-resonance control adjustment. Refer to the following operation examples, and choose the most suitable for your needs.

- Starting execution with vibration suppression when the anti-resonance control adjustment function has not been used
  → Refer to page 3-89.
- Starting execution without vibration suppression when the anti-resonance control adjustment function has not been used
  → Refer to page 3-92.
- Starting execution for fine-tuning when the anti-resonance control adjustment function has been used
  → Refer to page 3-95.

(1) Conditions that Disable This Function

This function is disabled in the following settings.
- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When in the torque control.
- When the tuning less function is enabled (Pn140 = n.□□□0).

(2) Display Example



(3) Operation Keys

■ Functions (The disabled keys are not included.)

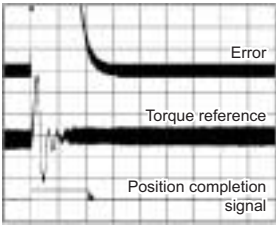
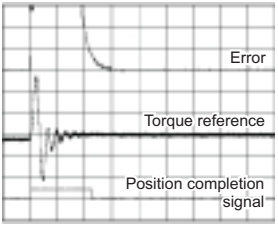
DATA	Sets the vibration frequency or stores data.
∧ ∨	Used to select a tuning mode.
SCROLL	Used to select the vibration frequency or damping gain.
MODE/SET	Returns to the main menu of Utility Function Mode.

(4) Operation Example

■ Starting Execution with Vibration Suppression When the Anti-Resonance Control Adjustment Function Has Not Been Used

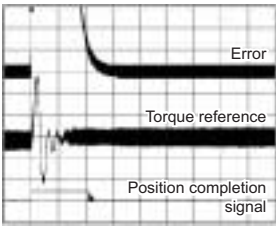
Step	Display Example and Description
1	RUN –FUNCTION– Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Fn206:Easy FFT Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn204 using the ∧ or ∨ Key.
2	RUN –Vib Sup– Tuning Mode=0 Press the DATA Key to display the initial setting screen for tuning mode. Note: If the display does not change and NO-OP is displayed, take proper measures referring to *(1) Conditions that Disable This Function*.
3	RUN –Vib Sup– Tuning Mode=0 Press the ∧ or ∨ Key and select the tuning mode "0".
4	RUN –Vib Sup– freq=----Hz damp=00000 Press the DATA Key while "Tuning Mode = 0" is displayed. The screen shown on the left will appear. The detection of vibration frequencies will start and "freq" will blink. Note: Return to step 3 if vibration is not detected. Lower the vibration detection sensitivity (Pn311). When this parameter is lowered, the detection sensitivity will be increased. Vibration may not be detected accurately if too small value is set.

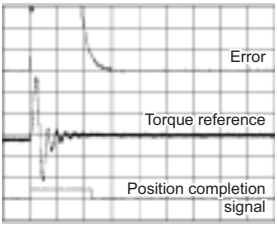
3.3.30 Anti-Resonance Control Adjustment (Fn204)

Step	Display Example and Description
5	RUN –Vib Sup– freq=0400 Hz damp=00000 The vibration frequency will be displayed if vibration is detected 
6	RUN –Vib Sup– freq=0400 Hz damp=00100 Press the DATA Key. The cursor will move to “damp,” and “freq” will be displayed normally.
7	RUN –Vib Sup– freq=0400 Hz damp=00120 Select the digit with the < or > Key, and press the ∧ or ∨ Key to adjust the damping gain.  Note: Increase the damping gain from about 0% to 200% in 10% increments while checking the effect of vibration reduction. If vibration reduction is still insufficient at a gain of 200%, cancel the setting, and lower the control gain by using a different method, such as one-parameter tuning.

Step	Display Example and Description
8	RUN –Vib Sup– freq=0400 Hz damp=00120 Press the SCROLL Key. The cursor will move from “damp” to “freq.”
9	RUN –Vib Sup– freq=0420 Hz damp=00120 Select the digit with the < or > Key, and press the ∧ or ∨ Key to fine-tune the frequency. Skip this step and go to step 10 if the fine-tuning of the frequency is not necessary.
10	RUN –Vib Sup– freq=0420 Hz damp=00120 Press the DATA Key to save the settings.
11	DONE –Vib Sup– freq=0420 Hz damp=00120 “DONE” will blink for two seconds.
12	RUN –FUNCTION– Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Fn206:Easy FFT Press the MODE/SET Key to complete the Anti-Resonance Control Adjustment function. The screen in step 1 will appear again.

■ Starting Execution without Vibration Suppression When the Anti-Resonance Control Adjustment Function Has Not Been Used

Step	Display Example and Description
1	RUN –FUNCTION– Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Fn206:Easy FFT Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn204 using the ∧ or ∨ Key.
2	RUN –Vib Sup– Tuning Mode=0 Press the DATA Key to display the initial setting screen for tuning mode.
3	RUN –Vib Sup– Tuning Mode=1 Press the ∧ or ∨ Key and select the tuning mode “1.”
4	RUN –Vib Sup– freq=0420 Hz damp=00000 Press the DATA Key while “Tuning Mode = 1” is displayed. The screen shown below will appear and “freq” will blink. 

Step	Display Example and Description
5	RUN –Vib Sup– freq=0400 Hz damp=00000 Select the digit with the < or > Key, and press the ∧ or ∨ Key to adjust the frequency.
6	RUN –Vib Sup– freq=0400 Hz damp=00000 Press the SCROLL Key. The cursor will move to "damp."
7	RUN –Vib Sup– freq=0400 Hz damp=00020 Select the digit with the < or > Key, and press the ∧ or ∨ Key to adjust the damping gain.  Note: Increase the damping gain from about 0% to 200% in 10% increments while checking the effect of vibration reduction. If vibration reduction is still insufficient at a gain of 200%, cancel the setting, and lower the control gain by using a different method, such as one-parameter tuning.
8	RUN –Vib Sup– freq=0400 Hz damp=00120 Press the SCROLL Key. The cursor will move from "damp" to "freq."

3.3.30 Anti-Resonance Control Adjustment (Fn204)

Step	Display Example and Description
9	RUN –Vib Sup– freq=0400 Hz damp=00120 Select the digit with the [<] or [>] Key, and press the [∧] or [∨] Key to fine-tune the frequency. Skip this step and go to step 10 if the fine-tuning of the frequency is not necessary.
10	RUN –Vib Sup– freq=0400 Hz damp=00120 Press the [DATA] Key to save the settings.
11	RUN –Vib Sup– freq=0400 Hz damp=0150 "DONE" will blink for two seconds.
12	RUN –FUNCTION– Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Fn206:Easy FFT Press the [MODE/SET] Key. The display returns to the Utility Function Mode main menu.

■ Starting Execution for Fine-tuning When the Anti-Resonance Control Adjustment Function Has Been Used

Step	Display Example and Description
1	RUN –FUNCTION– Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Fn206:Easy FFT Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn204 using the ∧ or ∨ Key.
2	RUN –Vib Sup– Tuning Mode=1 Press the DATA Key. The displays is switched to the initial setting display of Fn204. Note: If the display does not change and NO-OP is displayed, take proper measures referring to *(1) Conditions that Disable This Function*.
3	RUN –Vib Sup– freq=0400 Hz damp=00120 Press the DATA Key while "Tuning Mode = 1" is displayed. The screen shown on the left will appear and "damp" will blink.
4	RUN –Vib Sup– freq=0400 Hz damp=00150 Select the digit with the < or > Key, and press the ∧ or ∨ Key to adjust the damping gain. Note: Increase the damping gain from about 0% to 200% in 10% increments while checking the effect of vibration reduction. If vibration reduction is still insufficient at a gain of 200%, cancel the setting, and lower the control gain by using a different method, such as one-parameter tuning.

3.3.30 Anti-Resonance Control Adjustment (Fn204)

Step	Display Example and Description
5	RUN –Vib Sup– freq=0400 Hz damp=0150 Press the [SCROLL] Key. The cursor will move from “damp” to “freq.”
6	RUN –Vib Sup– freq=0420 Hz damp=0150 Select the digit with the [<] or [>] Key, and press the [∧] or [∨] Key to fine-tune the frequency. Skip this step and go to step 7 if the fine-tuning of the frequency is not necessary.
7	RUN –Vib Sup– freq=0400 Hz damp=0150 Press the [DATA] Key to save the settings.
8	RUN –FUNCTION– Fn203:OnePrmTun Fn204:A–Vib Sup Fn205:Vib Sup Fn206:Easy FFT Press the [MODE/SET] Key. The display returns to the Utility Function Mode main menu.

3.3.31 Vibration Suppression Function（Fn205）

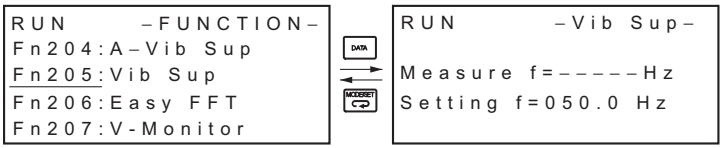
This function suppresses low and transient vibration (trembling) of approximately 1 Hz to 100 Hz, primarily resulting from the base vibrating or shaking during positioning.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When the control method is selected other than position control.
- When the automatic gain switching is disabled.
- When the tuning less function is enabled (Pn140 = n.□□□0).

(2) Display Example



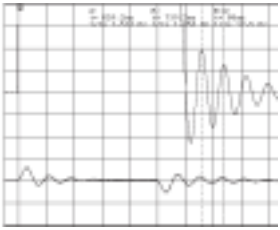
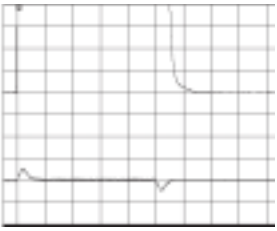
(3) Operation Keys

■ Functions (The disabled keys are not included.)

SCROLL	Used to reflect “Measure f” indications on “Setting f.”
< >	Used to move the next digit.
∧ ∨	Used for fine adjustment of frequency.
MODE/SET	Returns to the main menu of Utility Function Mode.

(4) Operation Example

Step	Display Example and Description
1	RUN –FUNCTION– Fn204:A–Vib Sup Fn205:Vib Sup Fn206:Easy FFT Fn207:V-Monitor Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn205 using the ∧ or ∨ Key.
2	RUN –Vib Sup– Measure f=–––––Hz Setting f=050.0 Hz Press the DATA Key. The display shown on the left will appear. Measure f: Measurement frequency Setting f: Setting frequency [Factory-set to the set value for Pn145] If the setting frequency and actual operating frequency are different, “Setting” will blink. The detected vibration frequency will be displayed. RUN –Vib Sup– Measure f=010.0 Hz Setting f=050.0 Hz Frequency detection will not be performed if there is no vibration in the position error occurred or the vibration frequency is outside the range of detectable frequencies. The following screen will be displayed if vibration is not detected. RUN –Vib Sup– Measure f=–––––Hz Setting f=050.0 Hz In this case, measure the vibration frequencies with devices such as a laser displacement gauge and vibration indicator. If vibration is not suppressed after an automatically detected vibration frequency, an error may exist between the actual vibration frequency and detected vibration frequency. Execute fine adjustment for detected vibration frequency.

Step	Display Example and Description
3	RUN –Vib Sup– Measure f=010.4Hz Setting f=010.4 Hz Press the [SCROLL] Key. The displayed measure f value will be displayed as the setting f value as well.  Position error Torque reference
4	RUN –Vib Sup– Measure f=010.4 Hz Setting f=012.4 Hz If the vibration is not completely suppressed, press the [<] or [>] Key and move the digit, and press the [∧] or [∨] Key to fine-tune the frequency. Skip this step and go to step 7 if the fine-tuning of the frequency is not necessary. Note: If the setting frequency and actual operating frequency are different, “Setting” will blink.
5	RUN –Vib Sup– Measure f=010.4Hz Setting f=012.4 Hz Press the [DATA] Key. The “Setting f” will change to usual display and the frequency currently displayed will be set for the vibration suppression function.  Position error Torque reference

3.3.31 Vibration Suppression Function（Fn205）

Step	Display Example and Description
6	RUN –Vib Sup– Measure f=–––––Hz Setting f=012.4 Hz Press the DATA Key to save the settings.
7	RUN –FUNCTION– Fn204:A–Vib Sup Fn205:Vib Sup Fn206:Easy FFT Fn207:V-Monitor Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.32 EasyFFT (Fn206)

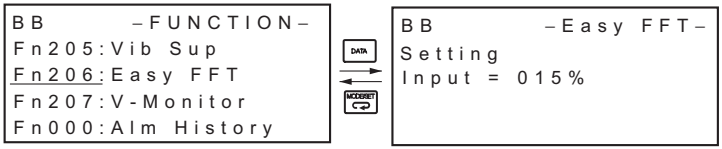
The EasyFFT detects the machine vibration frequency for setting the notch filter frequency.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- When the/S-ON (servo ON) signal is ON.
  Display does not changes to the EasyFFT execute display.

(2) Display Example

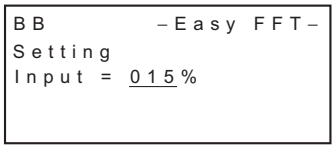
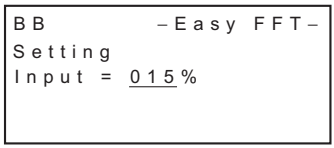
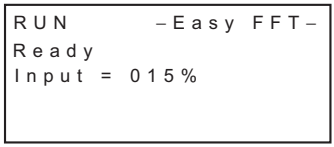


(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Press this key after the frequency measurement has been completed. The optimum notch filter frequency obtained from the measurement is saved in the SERVOPACK.
∧ ∨	When the servo is OFF (BB): Sets the Sweep Torque Reference Amplitude. When the servo is ON (RUN): Press the key corresponds to the motor rotating direction to measure the frequency.
<	When the servo is ON (RUN): Press this key during or after the frequency measurement. The display returns to the state before the execution of frequency measurement and “Ready” is displayed.
JOG SVON	Switches the servo ON to/from OFF. “BB” is displayed in the status display when the servo is OFF, and “RUN” is displayed when the servo is ON.

(4) Operation Example

Step	Display Example and Description
1	 Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn206 using ∧ or ∨ Key.
2	 Press the DATA Key. The display is switched to the basic setting display of Fn206. Note: If the display does not change and NO-OP is displayed, take proper measures referring to *(1) Conditions that Disable This Function*.
3	 The cursor is on the setting of "Input." Press the ∧ or ∨ Key to set the sweep torque reference amplitude. Note: At the initial execution of Fn019, do not change the reference amplitude setting, but start with the initial value. Increasing reference amplitude increases the detection accuracy, but the vibration and noise from the machine will increase. Increase the amplitude value little by little.
4	 Press the JOG/SVON Key to turn ON the power to the servomotor. The display "BB" and "Setting" changes to "RUN" and "Ready."

Step	Display Example and Description
5	RUN –Easy FFT– Measure Input = 015% Press the [∧] (forward run start) Key or [∨] (reverse run start) Key to run the servomotor and start the frequency measurement. Note: "Measure" is displayed during the measurement.
6	RUN –Easy FFT– Result Input = 015% Res = 1250 Hz Filter1 1250 Hz When the detection processing has completed normally, the result and the notch filter value to be set are displayed. Press the (JOG SVON) Key after the detection to turn OFF the power to the servomotor (BB). Note: 1. If a notch filter has been set and is being used, "*" is displayed on the second line. If the first stage notch filter has been set, the second stage notch filter value is displayed. If the first and second stage notch filters have been set, only the result of frequency detection is displayed. 2. If the (JOG SVON) Key is pressed while the servomotor is running, the servomotor will stop, and the frequency detection will be canceled. 3. If the detection processing is not completed normally, "No Measure" is displayed.
7	RUN –Easy FFT– Ready Input = 015% Press the (MODE/SET) Key to exit the EasyFFT function at this stage. The power to the servomotor is turned OFF and the display returns to the Utility Function Mode main menu. Press the [<] Key to return to "Ready" display.

3.3.32 EasyFFT (Fn206)

Step	Display Example and Description
8	Done –Easy FFT– Result Input = 015% Res = 1250 Hz Filter1 1250 Hz Press the DATA Key after the normal completion of frequency detection. The notch filter frequencies (Pn408 and Pn409) are updated to the optimum values and saved in the SERVOPACK. If the first stage notch filter has been set, the second stage notch filter is set. If the first and second stage notch filters have been set, the filter frequency value will not be updated. Processing: Pn408.0 = 1, Pn409 = 1375 (Hz) First stage Pn408.2 = 1, Pn40C = 1375 (Hz) Second stage
9	BB –FUNCTION– Fn205:Vib Sup Fn206:Easy FFT Fn207:V-Monitor Fn000:Alm History Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

3.3.33 Online Vibration Monitor (Fn207)

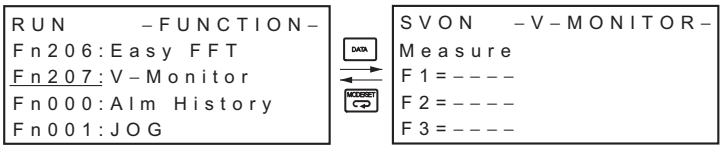
The online vibration monitor detects the generated vibration frequency during operation, displays the results of the largest the peak frequencies, and automatically sets the torque reference filter or notch filter frequency.

(1) Conditions that Disable This Function

This function is disabled in the following settings.

- When the Write Prohibited Setting (Fn010 = 0001) is set.
- The correct moment of inertia ratio/mass ratio (Pn103) is not set.

(2) Display Example

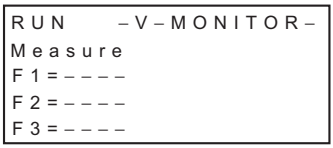


(3) Operation Keys

■ Functions (The disabled keys are not included.)

ALARM RESET	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
MODE/SET	Returns to the main menu of Utility Function Mode.
DATA	Starts the online vibration monitor function. Press the key again to end the processing.

(4) Operation Example

Step	Display Example and Description
1	 Press the MODE/SET Key to open the Utility Function Mode main menu, and select Fn207 using the ∧ or ∨ Key.
2	 Press the DATA Key. The display is switched to the basic setting display of Fn207. Note: If the display does not change and NO-OP is displayed, take proper measures referring to *(1) Conditions that Disable This Function*.
3	 Press the DATA Key until the vibration detection starts. During detection, “Measure” blinks. Note: Press the DATA Key for about one second until “Measure” starts blinking, or the vibration detection cannot be executed normally. When “Measure” starts blinking, release the DATA Key. The detection is automatically carried out.

Step	Display Example and Description
4	RUN –V–MONITOR– Measure F1= 0850[Hz] F2= 1600[Hz] F3= 0225[Hz] When the vibration detection has completed, “Measure” stops blinking and the detection processing ends automatically. When the detection processing has completed normally, the vibrations with three largest peak values in vibration frequency are displayed as F1, F2, and F3. Note: 1. Press the MODE/SET Key to exit the online vibration monitor function. The display returns to the Utility Function Mode main menu. 2. Up to three detected frequency is displayed. For the vibration with undetectable peak frequency, “----” is displayed. If no frequency was detected, “----” is displayed for F1, F2, and F3. 3. If the detection could not be completed normally, “NO MONITOR” is displayed.
5	Done –V–MONITOR– SETTING DONE F1= 0850[Hz] F2= 1600[Hz] F3= 0225[Hz] After the detection has normally completed, press the DATA Key. The optimum frequency (time constant) of notch filter or torque reference filter for F1 is set automatically. At the same time, the parameter Pn409 is updated for a notch filter, or the parameter Pn401 is updated for a torque reference filter.
6	RUN –FUNCTION– Fn206:Easy FFT Fn207:V–Monitor Fn000:Alm History Fn001:JOG Press the MODE/SET Key. The display returns to the Utility Function Mode main menu.

4

Parameter Copy Mode

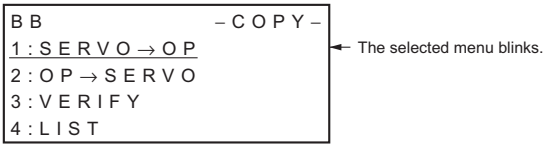
4.1 Operations in Parameter Copy Mode

The JUSP-OP05A-1-E digital operator for Σ-V Series SGDV SERVOPACK has the storage area of seven blocks of parameters. The Parameter Copy Mode can operate parameter blocks to save parameters.

Press the MODE/SET Key to display the Parameter Copy Mode menu.

Press the ∨ or ∧ Key to select a menu to be executed, and press the DATA Key to switch the display to the corresponding menu execution display.

(1) Parameter Copy Mode Menu Display



(2) Parameter Copy Mode Menus and Functions

The following four functions can be executed in Parameter Copy Mode.

Menu Display	Function
1: SERVO → OP	Copies the SERVOPACK parameters to the digital operator.
2: OP → SERVO	Copies the parameters saved in the digital operator to the SERVOPACK.
3: VERIFY	Verifies the parameters in the SERVOPACK and the digital operator, and displays the result.
4: LIST	Displays the parameter blocks saved in the digital operator.

(3) Operation Keys

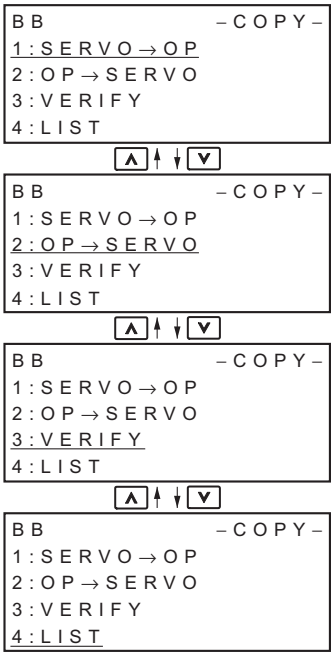
■ Functions

	Resets the alarm. The alarm cannot be reset unless the cause of alarm is corrected.
	Switches the display to the Parameter/Monitor Mode display.
	Opens the selected menu.
	Disabled.
	Disabled.
	Disabled.
	Selects a menu.
	Reads the parameters of the SERVOPACK to the digital operator.
	Writes the parameters of the digital operator to the SERVOPACK.

■ Function Details

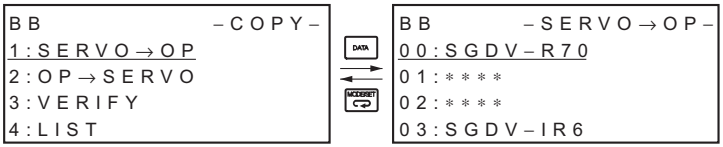
- [∧] and [∨] Keys

  Press the [∧] or [∨] Key to select a menu. The selected menu blinks.



- [DATA] Key

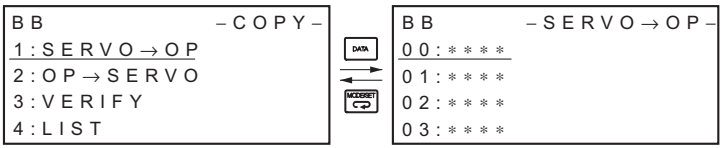
  Press the [DATA] Key to switch the display to the execution display of the selected (blinking) menu.



4.2 Read-out Parameters from SERVOPACK (SERVO → OP)

This function reads out the parameters saved in the SERVOPACK, and saves in the storage area (one of seven blocks) in the digital operator.

(1) Display Example



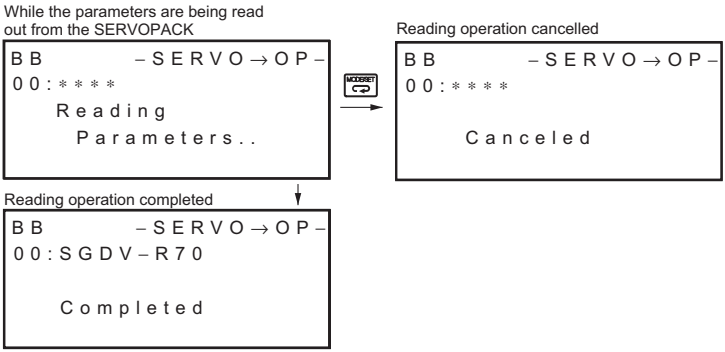
(2) Operation Procedure

Step	Display Example	Description
1	B B – C O P Y – 1 : S E R V O → O P 2 : O P → S E R V O 3 : V E R I F Y 4 : L I S T	Select a menu. Open the Parameter Copy Mode menu display, and select "SERVO → OP" using the [∧] or [∨] Key. The selected menu is blinking.
2	B B – S E R V O → O P – 0 0 : * * * * 0 1 : * * * * 0 2 : * * * * 0 3 : * * * *	Execute the menu. Press the [DATA] Key. The display is switched to the parameter block selection display.
3	B B – S E R V O → O P – 0 0 : * * * * 0 1 : * * * * 0 2 : * * * * 0 3 : * * * *	Select a parameter block. Press the [∧] or [∨] Key to select a parameter block (00 to 06) of the digital operator in which the parameters read out from the SERVOPACK are to be saved.
4	B B – S E R V O → O P – 0 0 : * * * * S t a r t : [R E A D] R e t u r n : [M O D E]	Switch the display to the execution display. Press the [DATA] Key. The display is switched to the execution display.

Step	Display Example	Description
5	BB –SERVO→OP– 00:**** Reading Parameters..	Execute reading the parameters. Press the SERVO READ Key to start reading parameters from the SERVOPACK. Note: Press the MODE/SET Key not to execute reading. The display returns to the parameter block selection display.
6	BB –SERVO→OP– 00:**** Completed	Reading Completion. When the parameters have been read out from the SERVOPACK, "Completed" is displayed.
7	BB –SERVO→OP– 00:SGDV–R70 01:**** 02:**** 03:****	Return to the parameter block selection display. When the parameters were read out and "Completed" is displayed, the display returns to the parameter block selection display. At this moment, the SERVOPACK model number is displayed for the selected block ("SGDV-R70" in the display on the left).
8	BB –COPY– 1:SERVO→OP 2:OP→SERVO 3:VERIFY 4:LIST	To the Parameter Copy Mode menu display. Press the MODE/SET Key to return to the Parameter Copy Mode menu display.

(3) Notes on Read-out Parameters Function

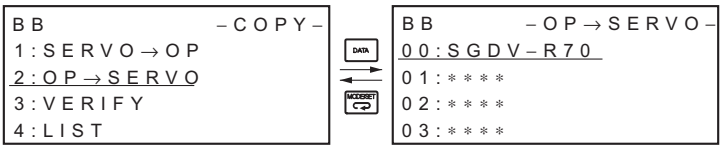
- If the parameter block which has been already saved is selected, and read-out parameter function is executed, the parameter block is overwritten.
- Press the MODE/SET Key to cancel the operation while reading parameters. "Canceled" is displayed and the display returns to the parameter block selection display.
- When the reading operation is cancelled, or the digital operator is disconnected from the SERVOPACK during reading operation, the selected parameter block becomes empty block ("****").
- During reading operation, the executing process is displayed sequentially as shown below. The reading operation takes about 10 seconds.
- When the reading operation is completed, a part of the SERVOPACK model number is registered as the name of block where the parameters are saved. The blocks whose parameters were read out from the same SERVOPACK have the same name.



4.3 Write-in Parameters (OP → SERVO)

The selected block of parameters saved in the digital operator are written into the SERVOPACK.

(1) Display Example



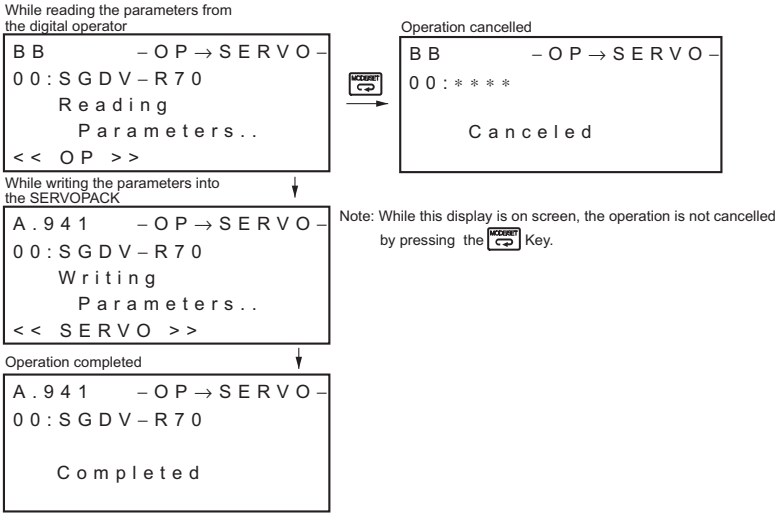
(2) Operation Procedure

Step	Display Example	Description
1	B B – C O P Y – 1 : S E R V O → O P 2 : O P → S E R V O 3 : V E R I F Y 4 : L I S T	Select a menu. Open the Parameter Copy Mode menu display, and select "OP → SERVO" using the ∧ or ∨ Key. The blinking menu is one that is being selected.
2	B B – O P → S E R V O – 0 0 : S G D V – R 7 0 0 1 : * * * * 0 2 : * * * * 0 3 : * * * *	Execute the menu. Press the DATA Key. The display is switched to the parameter block selection display.
3	B B – O P → S E R V O – 0 0 : S G D V – R 7 0 0 1 : * * * * 0 2 : * * * * 0 3 : * * * *	Select a parameter block. Press the ∧ or ∨ Key to select a parameter block (00 to 06) of the digital operator that is to be written into the SERVOPACK.
4	B B – O P → S E R V O – 0 0 : S G D V – R 7 0 S t a r t : [W R I T E] R e t u r n : [M O D E]	Switch the display to the execution display. Press the DATA Key. The display is switched to the execution display.

Step	Display Example	Description
5	BB –OP→SERVO– 00:SGDV–R70 Reading Parameters.. << OP >>	Execute writing the parameters. Press the WRITE SERVO Key to start writing parameters into the SERVOPACK. Note: While the power to the servomotor is ON (RUN) and the Write Prohibited Setting (Fn010 = 0001) is set, the WRITE SERVO Key is disabled and "Not Available" is displayed if it is pressed.
6	A. 941 –OP→SERVO– 00:SGDV–R70 Completed	Writing completion When the parameters were read out from the specified block in digital operator, and saved in the SERVOPACK, "Completed" is displayed. And A.941 "Change of Parameters Requires the Setting Validation" is displayed.
7	A.941 –OP→SERVO– 00:SGDV–R70 01:**** 02:**** 03:****	Return to the parameter block selection display. When the parameters were written and saved, "Completed" is displayed, and then the parameter block selection display appears.
8	A.941 –COPY– 1:SERVO→OP 2:OP→SERVO 3:VERIFY 4:LIST	To the Parameter Copy Mode menu display Press the MODE/SET Key. The display returns to the Parameter Copy Mode menu display. Turn OFF the power and turn ON again to clear A.941.

(3) Notes on Write-in Parameters Function

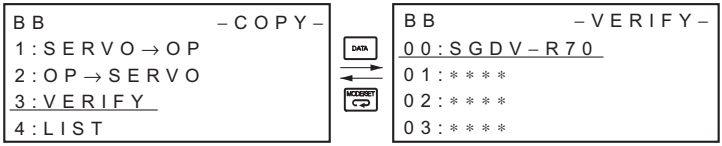
- Do not disconnect the digital operator from the SERVOPACK while the parameters are being written in. Otherwise, the writing process is cancelled, and a part of parameters are not written in. In such case, re-execute the writing operation. Turning the power OFF then ON before re-executing the writing operation may cause a Parameter Checksum Error (A.020) or Parameter Setting Error (A.040). To clear an alarm, execute Fn005 “Initialize Parameter Settings.”
- If an empty block (“****”) is selected and the Write-in Parameter function is executed, the message “No Data” is displayed and the writing will a not be executed.
- Writing a parameter block to a SERVOPACK with a different voltage and capacity displays the message “Unmatched Parameters” and the parameters cannot be written.
- If the servo is turned ON, “Not Available” will appear for the Write-prohibit setting, and the parameters cannot be written.
- While writing in parameters, the steps are displayed in sequence as they are being processed. The SERVOPACK can write in parameters in 10 seconds.
- After the parameter block has been written into the SERVOPACK, turn the power OFF then ON again. The servo ON input signal is invalid until the setting validation is executed.



4.4 Verify Parameters (VERIFY)

The parameters of the selected block saved in the Digital Operator and those in the SERVOPACK are verified, and the result is displayed.

(1) Display Example



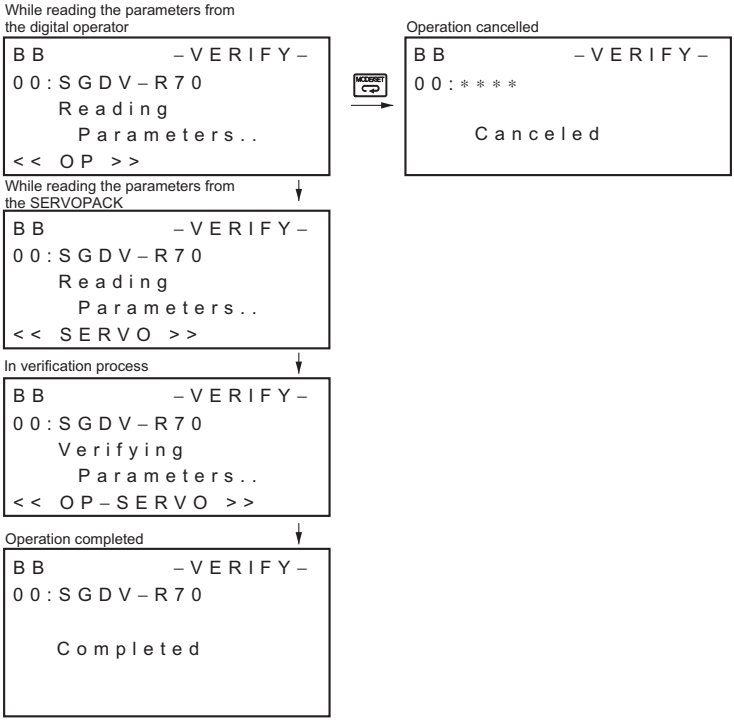
(2) Operation Procedure

Step	Display Example	Description
1	B B – C O P Y – 1 : S E R V O → O P 2 : O P → S E R V O 3 : V E R I F Y 4 : L I S T	Select a menu. Open the Parameter Copy Mode menu display using the [∧] or [∨] Key, and select "VERIFY." The blinking menu is one that is being selected.
2	B B – V E R I F Y – 0 0 : S G D V – R 7 0 0 1 : * * * * 0 2 : * * * * 0 3 : * * * *	Execute the menu. Press the [DATA] Key. The display is switched to the parameter block selection display.
3	B B – V E R I F Y – 0 0 : S G D V – R 7 0 0 1 : * * * * 0 2 : * * * * 0 3 : * * * *	Select a parameter block. Press the [∧] or [∨] Key to select a parameter block (00 to 06) of the digital operator that is to be compared with the SERVOPACK parameters.
4	B B – V E R I F Y – 0 0 : S G D V – R 7 0 S t a r t : [R E A D] R e t u r n : [M O D E]	Switch the display to the execution display. Press the [DATA] Key. The display is switched to the execution display.

Step	Display Example	Description
5	BB –OP→SERVO– 00:SGDV–R70 Reading Parameters.. << OP >>	Execute verifying the parameters. Press the [SERVO READ] Key to start verifying parameters. Note: Not to execute verifying, press the [MODE/SET] Key. The display returns to the parameter block selection display.
6	BB –VERIFY– 00:SGDV–R70 Completed	Verification completed. When the verification of the parameters read out from the digital operator, the parameters read out from the SERVOPACK, and the verification is completed, "Completed" is displayed.
7	When all parameters are matched. BB –VERIFY– All Parameters are matched When unmatched parameters are found. BB –VERIFY– Pn001 Pn100 Unmatched Pn101 Parameters Pn202	Display the result. The verification result is displayed. If any unmatched parameters were found, these unmatched parameter numbers are displayed in a list. Press the [∧] or [∨] Key to scroll the screen to display all the unmatched parameter numbers. (five numbers can be displayed at once.) Pn*** among the displayed unmatched parameters are the reserved parameters for the SERVOPACK.
8	BB –VERIFY– 00:SGDV–R70 01:**** 02:**** 03:****	Return to the parameter block selection display. Press the [MODE/SET] Key. The parameter block selection display appears.
9	BB –COPY– 1:SERVO→OP 2:OP→SERVO 3:VERIFY 4:LIST	To the Parameter Copy Mode menu display Press the [MODE/SET] Key. The display returns to the Parameter Copy Mode menu display.

(3) Notes on Verify Parameters Function

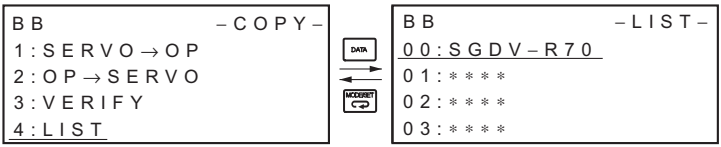
- If an empty block (“****”) is selected and the verify function is executed, the message “No Data” is displayed, and the verification will not be executed. Press the MODE/SET Key to return to the parameter block selection display.
- Pressing the MODE/SET Key while “Reading Parameters” is displayed cancels the operation, and “Canceled” is displayed. Then, the parameter block selection display appears.
- During verification operation, the executing process is displayed sequentially as shown below. The verification takes about 10 seconds.
- If parameter matching is executed with a parameter block that differs from the model of the SERVOPACK, the message “unmatched parameters” will appear and matching will not be executed.



4.5 Parameter Block List Display (LIST)

The statuses of one of seven parameter blocks in the storage area of digital operator are displayed in a list, and unnecessary parameter blocks can be deleted.

(1) Display Example



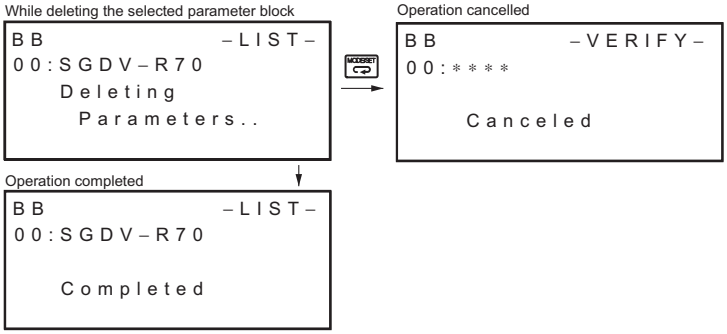
(2) Operation Procedure

Step	Display Example	Description
1	B B – C O P Y – 1 : S E R V O → O P 2 : O P → S E R V O 3 : V E R I F Y 4 : L I S T	Select a menu. Open the Parameter Copy Mode menu display, and select "LIST" using the [∧] or [∨] Key. The blinking menu is one that is being selected.
2	B B – L I S T – 0 0 : S G D V – R 7 0 0 1 : * * * * 0 2 : * * * * 0 3 : * * * *	Execute the menu. Press the [DATA] Key. The display is switched to the parameter block selection display.
3	B B – L I S T – 0 0 : S G D V – R 7 0 0 1 : * * * * 0 2 : * * * * 0 3 : * * * *	Select a parameter block. Press the [∧] or [∨] Key to select a parameter block (00 to 06) of the digital operator that is to be deleted.
4	B B – L I S T – 0 0 : S G D V – R 7 0 F I L E D E L E T E S t a r t : [W R I T E] R e t u r n : [M O D E]	Switch the display to the deletion execution display. Press the [DATA] Key. The display is switched to the deletion execution display.

Step	Display Example	Description
5		Delete the parameter block. Press the WRITE SERVO Key to start deleting the parameter block. If power is supplied to the motor and RUN is displayed, "Not Available" will be displayed when the WRITE SERVO Key is pressed. In this case, writing into SERVOPACK will be disabled.
6		Completion of deletion. When the selected parameter block is deleted, "Completed" is displayed.
7		Return to the parameter block selection display. After "Completed" is displayed, the parameter block selection display appears. "****" is displayed for the deleted block as an empty block.
8		To the Parameter Copy Mode menu display. Press the MODE/SET Key. The display returns to the Parameter Copy Mode menu display.

(3) Notes on Deleting Parameters Function

- If an empty block (“****”) is selected and the deletion is executed, the message “No Data” is displayed and the deletion will not be executed. Press the MODE/SET Key to return to the parameter block selection display.
- If the digital operator is disconnected from the SERVOPACK during operation, the selected parameter block becomes an empty block (“****”).
- During deleting operation, the executing process is displayed sequentially as shown below. The deleting operation takes about two seconds.



Revision History

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

MANUAL NO. SIEP S800000 55A

Published in Japan September 2009 07-4 ◇1 -1

- September 2009: Date of publication
- 07-4: Date of original publication
- ◇1: Revision number
- -1: WEB revision number

Date of Publication	Rev. No.	WEB REV. No.	Section	Revised Contents
October 2010	◇3	0	Front cover	Revision: Format
			Back cover	Revision: Address, format
August 2010	◇2	0	Back cover	Revision: Address
				Addition: Original instructions
September 2009	◇1	1	Preface	Addition: Warranty
			Back cover	Revision: Address
June 2009		0	Back cover	Revision: Address
April 2007	–	–	–	First edition

AC Servo Drives

Σ-V Series

USER'S MANUAL

Operation of Digital Operator

IRUMA BUSINESS CENTER (SOLUTION CENTER)
480, Kamifujisawa, Iruma, Saitama 358-8555, Japan
Phone 81-4-2962-5151 Fax 81-4-2962-6138

YASKAWA AMERICA, INC.
2121 Norman Drive South, Waukegan, IL 60085, U.S.A.
Phone (800) YASKAWA (800-927-5292) or 1-847-887-7000 Fax 1-847-887-7310

YASKAWA ELÉTRICO DO BRASIL LTDA.
Avenida Fagundes Filho, 620 São Paulo-SP CEP 04304-000, Brazil
Phone 55-11-3585-1100 Fax 55-11-5581-8795

YASKAWA EUROPE GmbH
Hauptstraβe 185, Eschborn 65760, Germany
Phone 49-6196-569-300 Fax 49-6196-569-398

YASKAWA ELECTRIC UK LTD.
1 Hunt Hill Orchardton Woods Cumbernauld, G68 9LF, United Kingdom
Phone 44-1236-735000 Fax 44-1236-458182

YASKAWA ELECTRIC KOREA CORPORATION
7F, Doore Bldg. 24, Yeoido-dong, Yeoungdungpo-gu, Seoul 150-877, Korea
Phone 82-2-784-7844 Fax 82-2-784-8495

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.
151 Lorong Chuan, #04-01, New Tech Park 556741, Singapore
Phone 65-6282-3003 Fax 65-6289-3003

YASKAWA ELECTRIC (SHANGHAI) CO., LTD.
No.18 Xizang Zhong Road. 17F, Harbour Ring Plaza Shanghai 200001, China
Phone 86-21-5385-2200 Fax 86-21-5385-3299

YASKAWA ELECTRIC (SHANGHAI) CO., LTD. BEIJING OFFICE
Room 1011, Tower W3 Oriental Plaza, No.1 East Chang An Ave.,
Dong Cheng District, Beijing 100738, China
Phone 86-10-8518-4086 Fax 86-10-8518-4082

YASKAWA ELECTRIC TAIWAN CORPORATION
9F, 16, Nanking E. Rd., Sec. 3, Taipei 104, Taiwan
Phone 886-2-2502-5003 Fax 886-2-2505-1280

YASKAWA ELECTRIC CORPORATION

MANUAL NO. SIEP S800000 55A

Published in Japan October 2010 07-4 ◈-0
10-10-4
Original instructions