Σ-Ⅱ Series SGDH

DeviceNet INTERFACE MODULE

USER'S MANUAL

MODEL: JUSP-NS300

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YASKAWA

MANUAL NO. SIE-C718-6B

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.

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Visual Aids

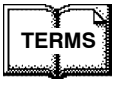
The following aids are used to indicate certain types of information for easier reference.

◀EXAMPLE▶ Indicates application examples.



Indicates supplemental information.

IMPORTANT Indicates important information that should be memorized.



- Explains difficult to understand terms and terms that have not been explained before.

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Overview

■ About this Manual

This manual provides the following information for the Σ-II Series SGM□H/SGDH Servodrives with a JUSP-NS300 DeviceNet Interface Module (hereinafter called the NS300 Module) mounted. The NS300 Module is an Application Module.

- Procedures for installing and wiring the NS300 Module
- Specifications and methods for SERVOPACK DeviceNet communications
- Procedures for setting parameters
- Information on the NSxxx Setup Tool
- Troubleshooting procedures

■ Related Manuals

Refer to the following manuals as required.

Read this manual carefully to ensure the proper use of Σ-II Series Servodrives. Also, keep this manual in a safe place so that it can be referred to whenever necessary.

Manual Name	Manual Number	Contents
Σ-II Series SGM□H/SGDH User's Manual Servo Selection and Data Sheets	SIE-S800-32.1	Describes the procedure used to select Σ-II Series Servodrives and capacities.
Σ-II Series SGM□H/SGDH User's Manual Design and Maintenance	SIE-S800-32.2	Provides detailed information on SGDH SERVOPACKs.

Using This Manual

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■ Intended Audience

This manual is intended for the following users.

- Those designing Servodrive systems using DeviceNet.
- Those designing Σ-II Series Servodrive systems.
- Those installing or wiring Σ-II Series Servodrives.
- Those performing trial operation or adjustments of Σ-II Series Servodrives.
- Those maintaining or inspecting Σ-II Series Servodrives.

■ Description of Technical Terms

In this manual, the following terms are defined as follows:

- **NS300 Module** = JUSP-NS300
- **Servomotor** = Σ-II Series SGMAH, SGMPH, SGMGH, or SGMSH servomotor.
- **SERVOPACK** = Σ-II Series SGDH-□□□E SERVOPACK.
- **Servodrive** = A set including a servomotor and Servo Amplifier.
- **Servo System** = A servo control system that includes the combination of a Servodrive 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 examples:

- /S-ON
- /P-CON

Registered Trademark

DeviceNet is a registered trademark of the ODVA (Open DeviceNet Vendor Association, Inc.).

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Safety Precautions

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The following precautions are for checking products upon delivery, installation, wiring, operation, maintenance and inspections.

■ Checking Products upon Delivery

⚠ CAUTION
● Always use the servomotor and SERVOPACK in one of the specified combinations. Not doing so may cause fire or malfunction.

■ Installation

⚠ CAUTION
● Never use the products in an environment subject to water, corrosive gases, inflammable gases, or combustibles. Doing so may result in electric shock or fire.

■ Wiring

⚠ WARNING
● Connect the SERVOPACK ground terminal effectively to a system grounding conductor or grounding electrode (100 Ω or less). Improper grounding may result in electric shock or fire.

⚠ CAUTION
● Do not connect a three-phase power supply to SERVOPACK U, V, or W output terminals. Doing so may result in injury or fire. ● Securely fasten the power supply terminal screws and motor output terminal screws. Not doing so may result in fire.

■ Operation

⚠ WARNING

- Never touch any rotating motor parts while the motor is running.

  Doing so may result in injury.

⚠ CAUTION

- Conduct trial operation on the servomotor alone with the motor shaft disconnected from machine to avoid any unexpected accidents.

  Not doing so 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.

- Before starting operation with a machine connected, make sure that an emergency stop can be applied at any time.

  Not doing so may result in injury.

- Do not touch the heat sinks during operation.

  Doing so may result in burns due to high temperatures.

■ Maintenance and Inspection

⚠ WARNING

- Never touch the inside of the SERVOPACKs.

  Doing so may result in electric shock.

- Do not remove the panel cover while the power is ON.

  Doing so may result in electric shock.

- Do not touch terminals for five minutes after the power is turned OFF.

  Residual voltage may cause electric shock.

⚠ CAUTION

- Do not disassemble the servomotor.

  Doing so may result in electric shock or injury.

- Do not attempt to change wiring while the power is ON.

  Doing so may result in electric shock or injury.

■ General Precautions

Note the following to ensure safe application.
• The drawings presented 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. • This manual is subject to change due to product improvement, specification modification, and manual improvement. When this manual is revised, the manual code is updated and the new manual is published as a next edition. The edition number appears on the front and back covers. • 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. • Yaskawa will not take responsibility for the results of unauthorized modifications of this product. Yaskawa shall not be liable for any damages or troubles resulting from unauthorized modification.

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1

Checking Products and Part Names

This chapter describes the procedure for checking Σ-II Series products and the NS300 Module upon delivery. It also describes the names of product parts.

1.1 Checking Products on Delivery . . . . . 1 -2
1.2 Product Part Names . . . . . 1 -3
1.3 Mounting the NS300 Module . . . . . 1 -4

1.1 Checking Products on Delivery

The following procedure is used to check products upon delivery. Check the following items when products are delivered.

Check Items	Comments
Are the delivered products the ones that were ordered?	Check the model numbers marked on the nameplates of the NS300 Module. (Refer to the descriptions of model numbers on following pages)
Is there any damage?	Check the overall appearance, and check for damage or scratches that may have occurred during shipping.
Can the NS300 Module be installed on the SERVOPACK used?	Check the model number given on the SERVOPACK nameplate. The model number must contain “SGDH” and “E” as shown below to support the NS300 Module. SGDH-□□□E-□

If any of the above items are faulty or incorrect, contact your Yaskawa sales representative or the dealer from whom you purchased the products.

■ External Appearance and Nameplate Example

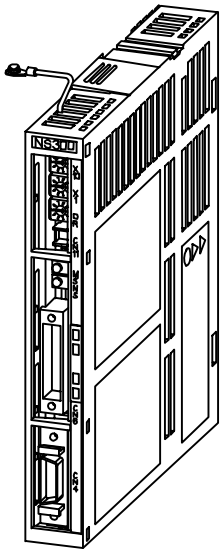


Figure 1.1 External Appearance of the NS300 Module

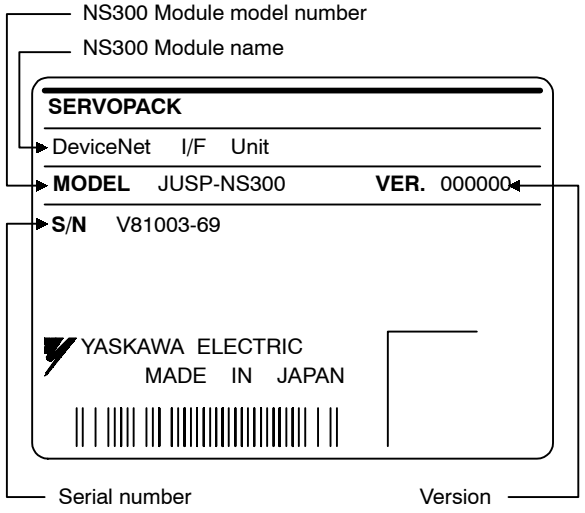


Figure 1.2 Nameplate

■ Model Number

NS300 Module

JUSP – NS30 0

SERVOPACK Peripheral Device

Type of device:
NS30: DeviceNet Interface Module

Design Revision Order

1.2 Product Part Names

The following diagram illustrates the part names of the NS300 Module.

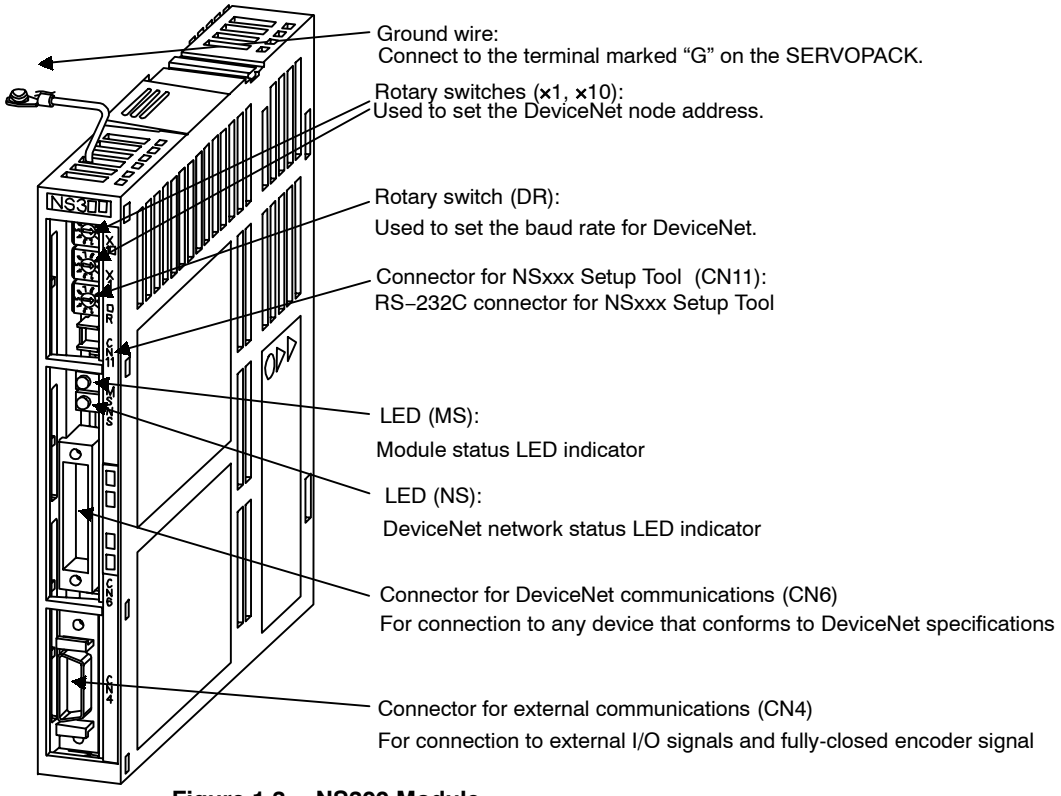


Figure 1.3 NS300 Module

1.3 Mounting the NS300 Module

This section describes how to mount a NS300 Module on the SGDH SERVOPACK.

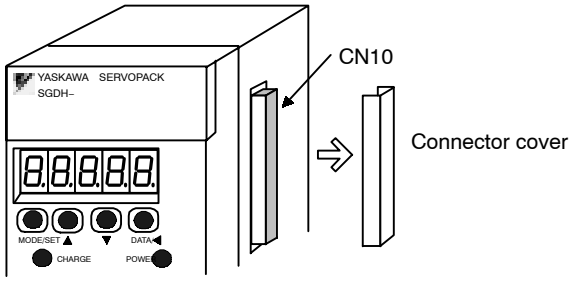
Prepare the screws for connecting the ground wire as shown in the following table:

Mounting Type	SERVOPACK Models	Screw	Remarks
Base Mounted	SGDH-A3 to 02BE SGDH-A3 to 10AE	M3 x 10 round-head screw (spring or flat washer)	Use attached screws on the NS300 Module.
	SGDH-15 to 50AE SGDH-05 to 30DE	M4 x 10 round-head screws (spring or flat washer)	Use attached screws on the NS300 Module.
	SGDH-60/75AE	M4 x 8 round-head screw (spring or flat washer)	Use front panel fixer screws.
Rack Mounted	SGDH-A3 to 02BE-R SGDH-A3 to 50AE-R SGDH-05 to 30DE-R	M4 x 6 round-head screws (spring or flat washer)	Use attached screws on the NS300 Module. (see note)
Duct Vent	SGDH-60/75AE-P	M4 x 8 round-head screw (spring or flat washer)	Use front panel fixer screws

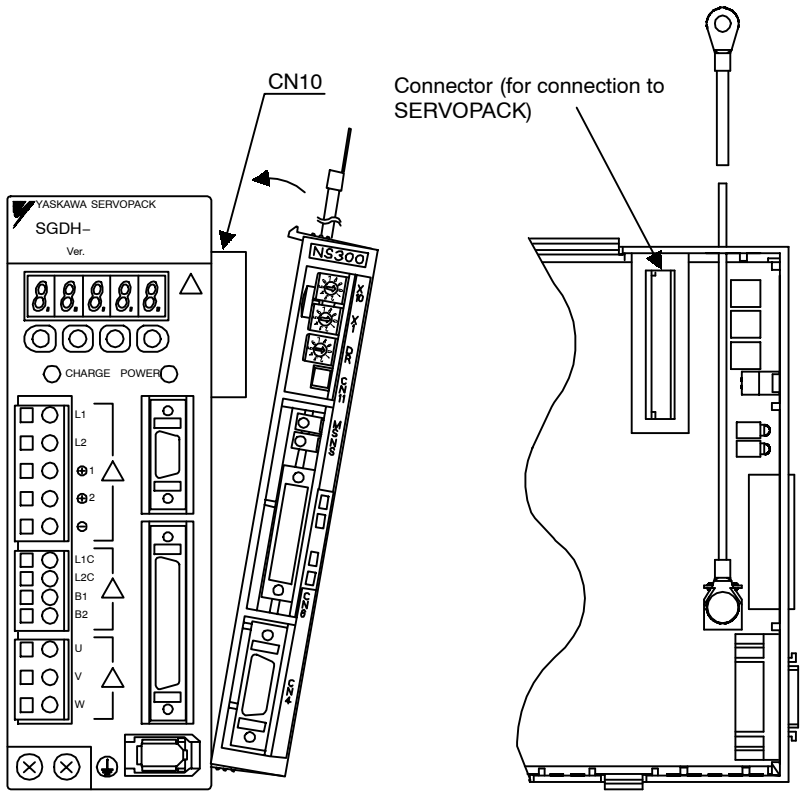
Note: Be sure to use spring washers or flat washers. Failure to do so may result in the screws for connecting the ground wire protruding behind the flange, preventing the SERVOPACK from being mounted.

By mounting NS300 Module, the SGDH SERVOPACK can be used in a DeviceNet network. Use the following procedure to ensure NS300 Modules are mounted correctly.

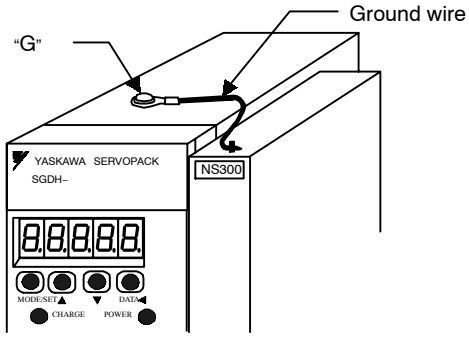
1. Remove the connector cover from the CN10 connector on the SERVOPACK.



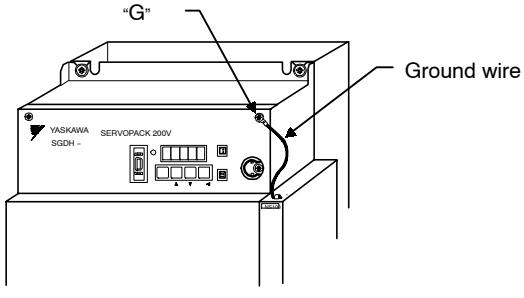
2. Mount the NS300 Module on the SERVOPACK.



3. For grounding, connect a ground wire of the NS300 Module to the point marked "G" on the SERVOPACK.

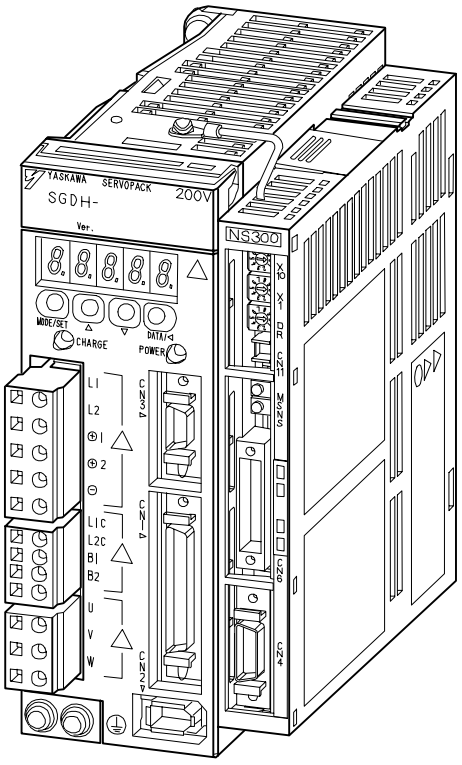


For SERVOPACK 30 W to 5.0 kW



For SERVOPACK 6.0 kW to 7.5 kW

When the NS300 Module has been mounted correctly, the SERVOPACK will appear as shown in the following diagram.



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2

Installation

This chapter describes precautions for Σ-II Series product installation.

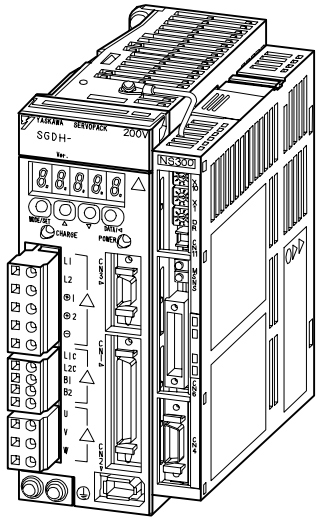
The SGDH SERVOPACKs are base-mounted servo amplifiers. Incorrect installation will cause problems. Always observe the installation precautions shown in this chapter.

2.1 Storage Conditions . . . . . 2 -2
2.2 Installation Site . . . . . 2 -2
2.3 Orientation . . . . . 2 -3
2.4 Installation . . . . . 2 -4

2.1 Storage Conditions

Store the SERVOPACK within the following temperature range when it is stored with the power cable disconnected.

Temperature range: –20 to 85°C



Σ-II Series SGDH SERVOPACK
with NS300 Module mounted

2.2 Installation Site

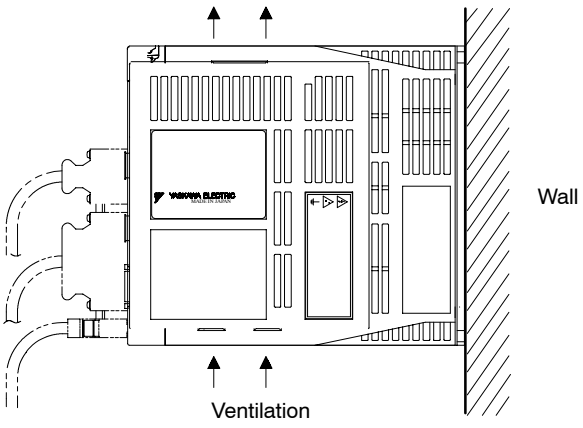
Take the following precautions at the installation site.

Situation	Installation Precaution
Installation in a Control Panel	Design the control panel size, module layout, and cooling method so that the temperature around the SERVOPACK does not exceed 55°C.
Installation Near a Heating Module	Minimize heat radiated from the heating module as well as any temperature rise caused by natural convection so that the temperature around the SERVOPACK does not exceed 55°C.
Installation Near a Source of Vibration	Install a vibration isolator beneath the SERVOPACK to avoid subjecting it to vibration.
Installation at a Site Exposed to Corrosive Gas	Corrosive gas does not have an immediate effect on the SERVOPACK, but will eventually cause electronic components and contactor-related devices to malfunction. Take appropriate action to avoid corrosive gas.
Other Situations	Do not install the SERVOPACK in hot or humid locations, or locations subject to excessive dust or iron powder in the air.

2.3 Orientation

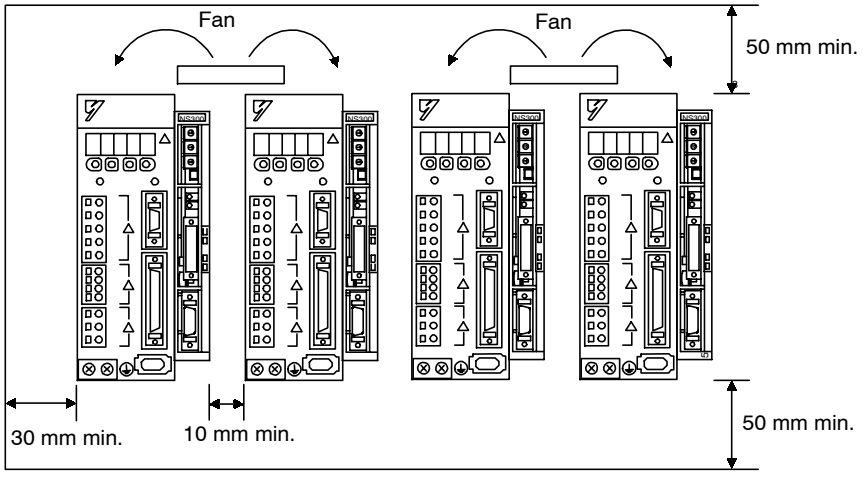
Install the SERVOPACK perpendicular to the wall as shown in the figure. The SERVOPACK must be oriented this way because it is designed to be cooled by natural convection or cooling fan.

Secure the SERVOPACK using 2 to 4 mounting holes. The number of holes depends on the SERVOPACK capacity.



2.4 Installation

Follow the procedure below to install multiple SERVOPACKs side by side in a control panel.



■ SERVOPACK Orientation

Install the SERVOPACK perpendicular to the wall so that the front panel (containing connectors) faces outward.

■ Cooling

As shown in the figure above, provide sufficient space around each SERVOPACK for cooling by cooling fans or natural convection.

■ Side-by-side Installation

When installing SERVOPACKs side by side as shown in the figure above, provide at least 10 mm (0.39 in) between and at least 50 mm (1.97 in) above and below each SERVOPACK. Install cooling fans above the SERVOPACKs to avoid excessive temperature rise and to maintain even temperature inside the control panel.

■ Environmental Conditions in the Control Panel

- Ambient Temperature: 0 to 55°C
- Humidity: 90% or less
- Vibration: 4.9 m/s^2
- Condensation and Freezing: None
- Ambient Temperature for Long-term Reliability: 45°C max.

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3

Connectors

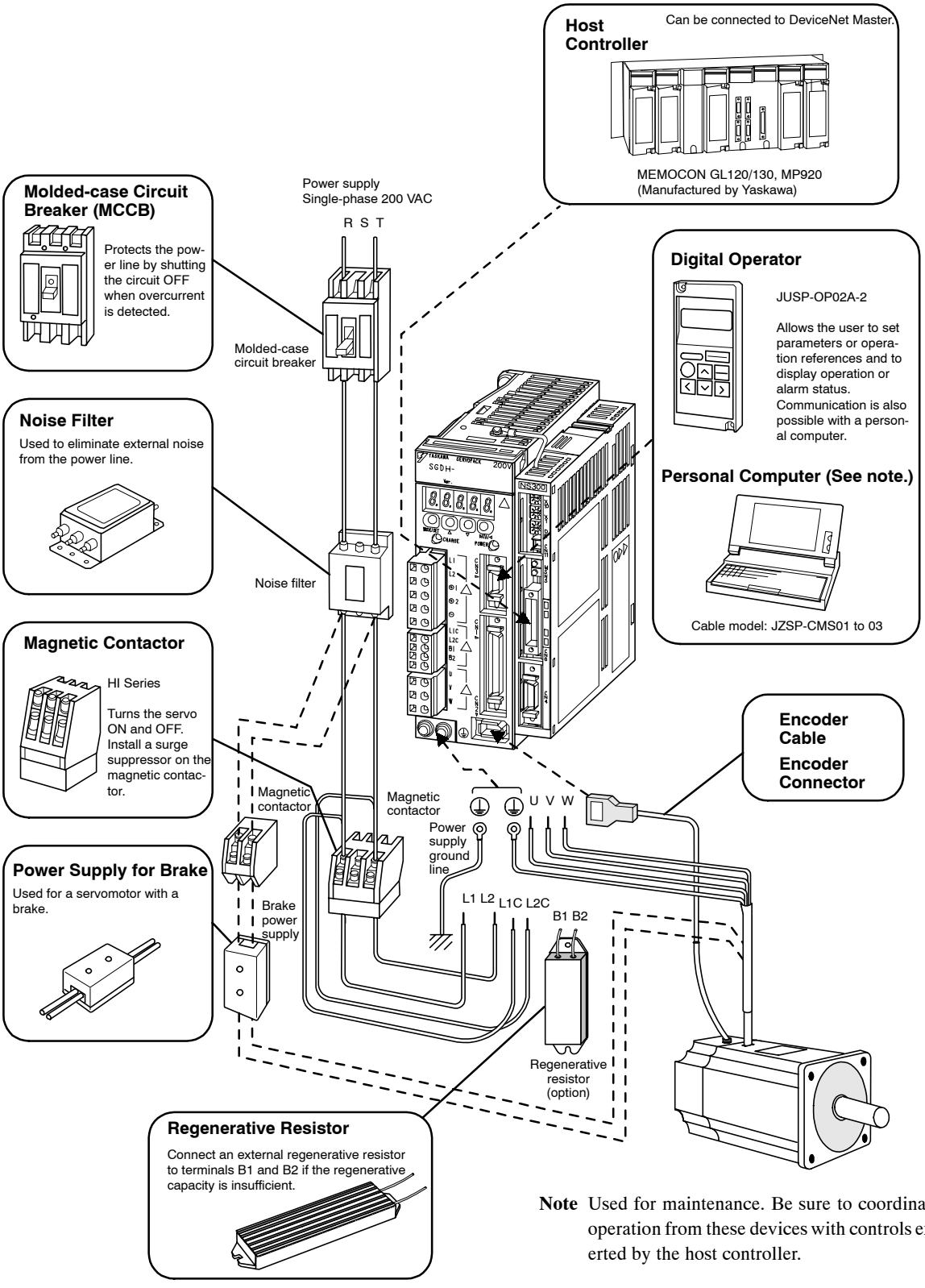
This chapter describes the procedure used to connect Σ-II Series products to peripheral devices when NS300 Module is mounted and gives typical examples of I/O signal connections.

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3.1 Connecting to Peripheral Devices

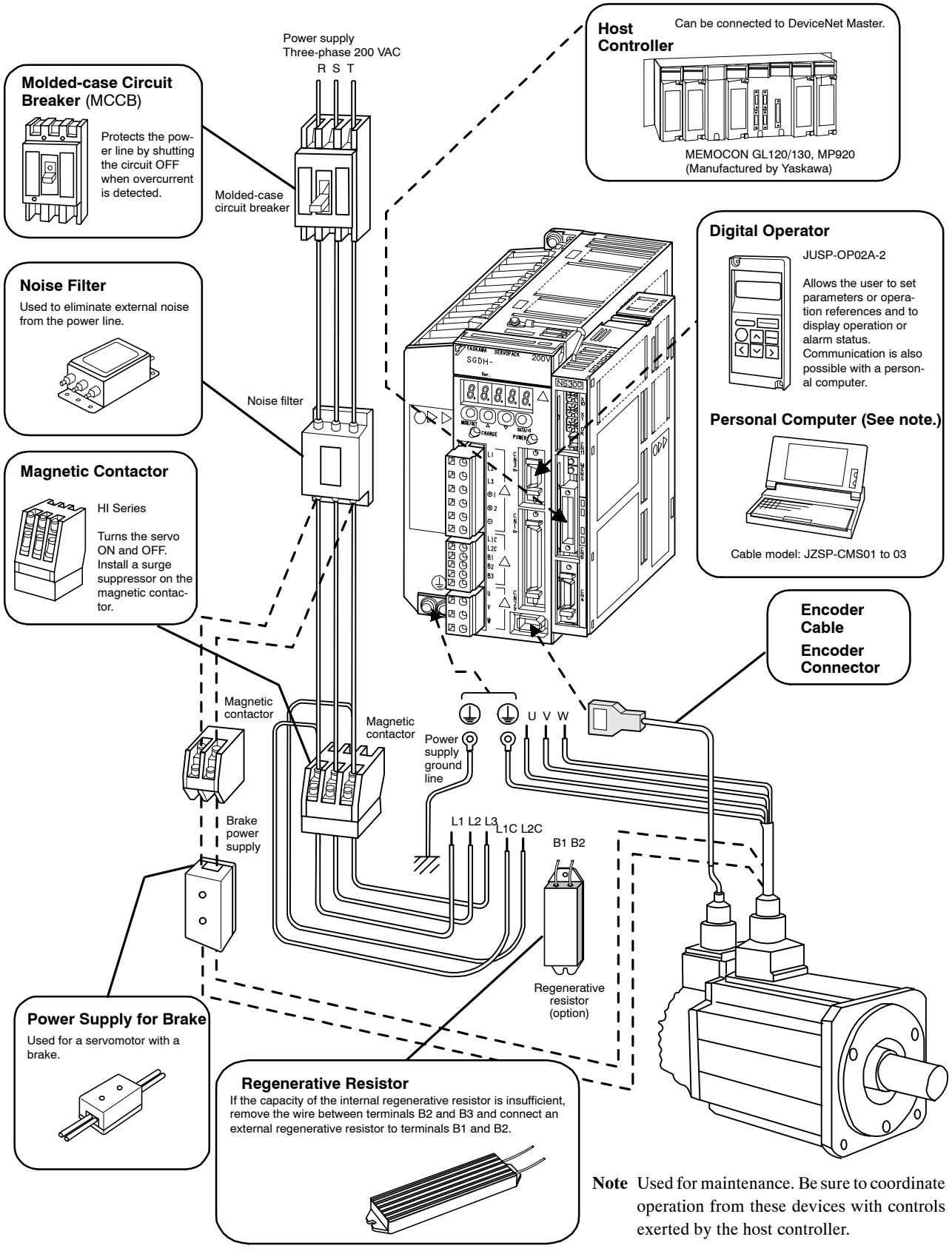
This section provides examples of standard Σ-II Series product connections to peripheral devices. It also briefly explains how to connect each peripheral device.

3.1.1 Single-phase (100 V or 200 V) Main Circuit Specifications



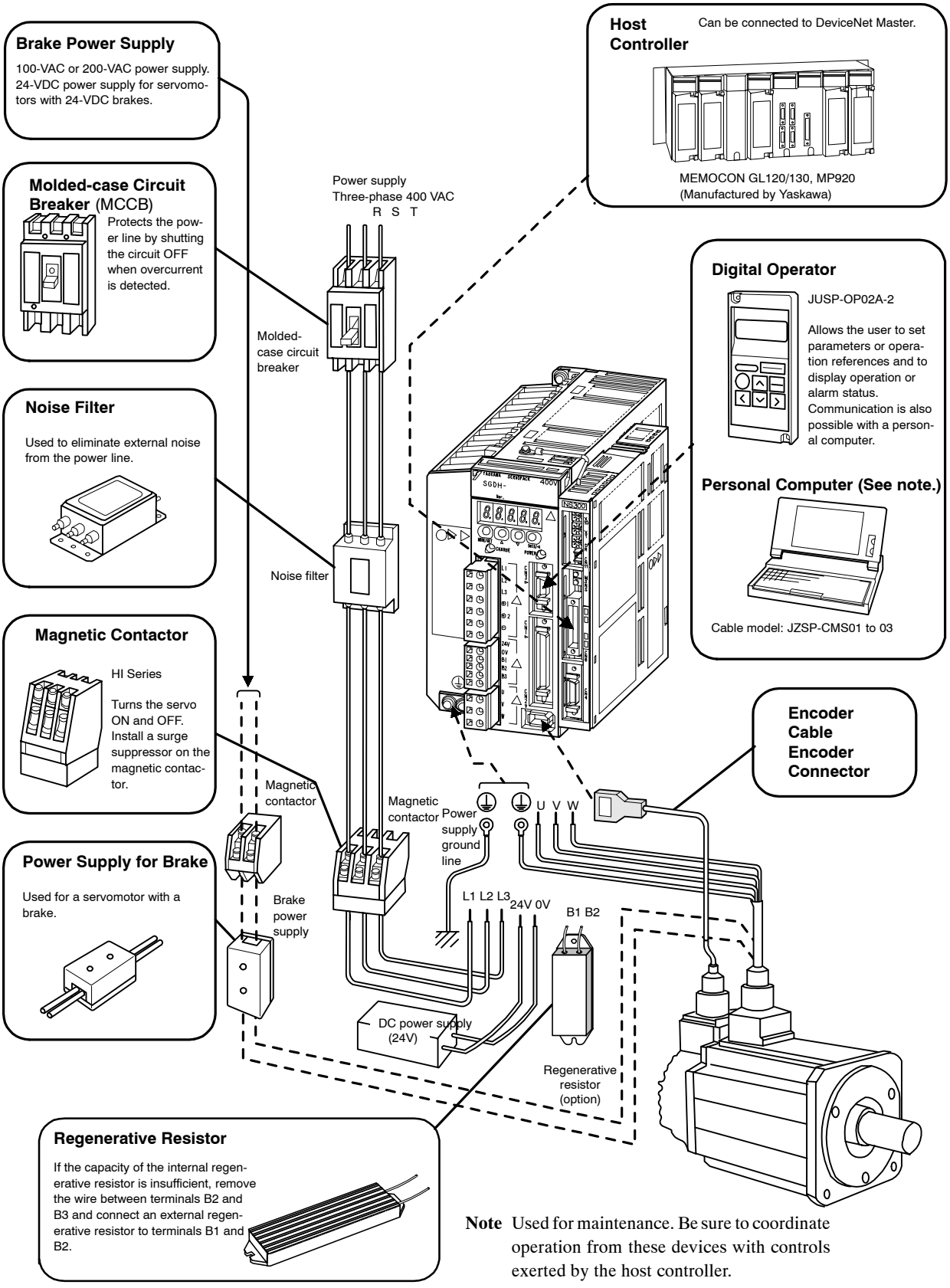
Note Used for maintenance. Be sure to coordinate operation from these devices with controls exerted by the host controller.

3.1.2 Three-phase, 200-V Main Circuit Specifications



Note Used for maintenance. Be sure to coordinate operation from these devices with controls exerted by the host controller.

3.1.3 Three-phase, 400-V Main Circuit Specifications

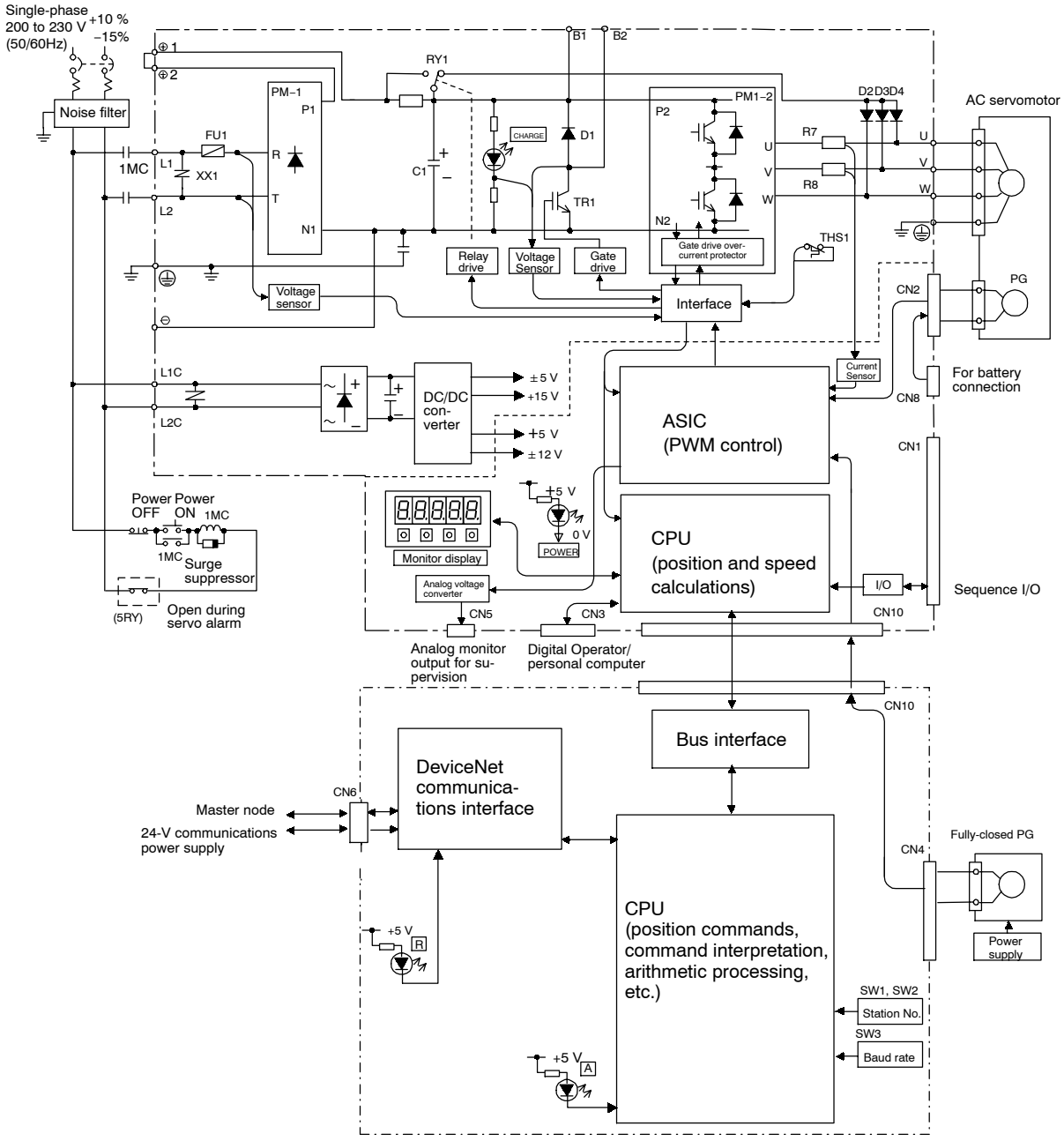


Note Used for maintenance. Be sure to coordinate operation from these devices with controls exerted by the host controller.

3.2 SERVOPACK Internal Block Diagrams

The following sections show an internal block diagram for the SERVOPACK with the NS300 Module.

30 to 400 W 200-V and 30 to 200 W 100-V Models

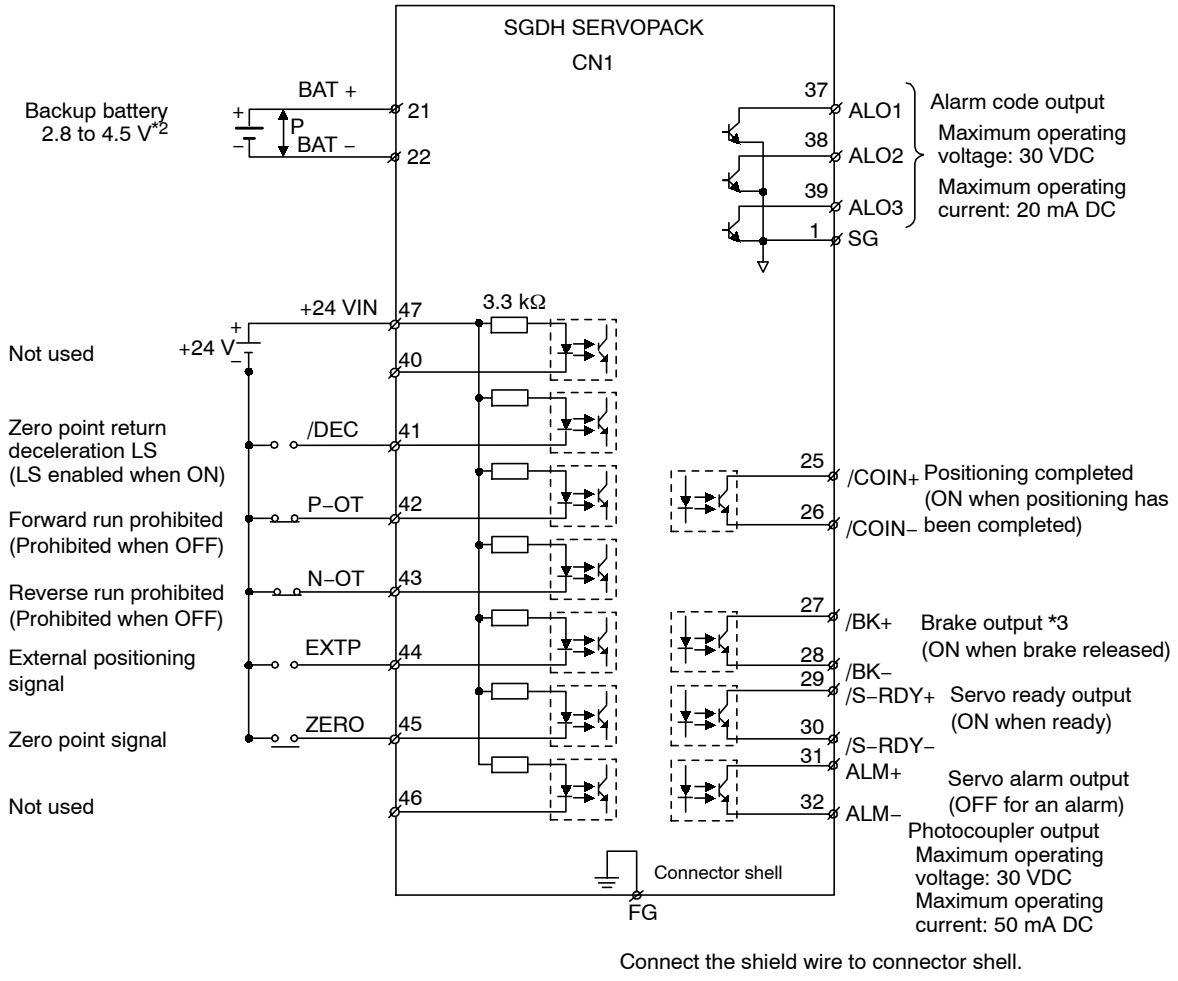


3.3 I/O Signals

This section describes I/O signals for the SERVOPACK with the NS300 Module.

3.3.1 Connection Example of I/O Signal Connector (CN1)

The following diagram shows a typical example of I/O signal connections.



*** 1.** ↕P represents twisted-pair wires.

*** 2.** When using an absolute encoder, connect a backup battery only when there is no battery connected to the CN8.

*** 3.** Make signal allocations using parameters. (Refer to *6.1.2 Standard Settings for CN1 I/O Signals*.)

Figure 3.1 I/O Signal Connections for CN1 Connectors

3.3.2 I/O Signals Connector (CN1)

The following diagram shows the layout of CN1 terminals.

■ CN1 Terminal Layout

			1	SG	GND				26	/COIN-	Positioning complete output
2	SG	GND				27	/BK+ (Note 3)	Brake interlock output			
			3	–	–				28	/BK- (Note 3)	Brake interlock output
4	–	–				29	/S-RDY+	Servo ready output			
			5	–	–				30	/S-RDY-	Servo ready output
6	SG	GND				31	ALM+	Servo alarm output			
			7	–	–				32	ALM-	Servo alarm output
8	–	–				33	–	–			
			9	–	–				34	–	–
10	SG	GND				35	–	–			
			11	–	–				36	–	–
12	–	–				37	AL01	Alarm code output (open-collector output)			
			13	–	–				38	AL02	Alarm code output
14	–	–				39	AL03				
			15	–	–				40	–	–
16	–	–				41	/DEC	Zero point return deceleration LS input			
			17	–	–				42	P-OT	Forward drive prohibited input
18	–	–				43	N-OT	Reverse run prohibited input			
			19	–	–				44	EXTP	External positioning signal
20	–	–				45	ZERO	Zero point signal			
			21	BAT (+)	Battery (+)				46	–	–
22	BAT (–)	Battery (–)				47	+24VIN	External power supply input			
			23	–	–				48	–	–
24	–	–				49	–	–			
			25	/COIN +	Positioning complete output				50	–	–

Note 1. Do not use unused terminals for relays.

2. Connect the shield of the I/O signal cable to the connector shell.
The shield is connected to the FG (frame ground) at the SERVOPACK-end connector.

3. Make signal allocations using parameters. (Refer to *6.1.2 Standard Settings for CN1 I/O Signals.)*

■ CN1 Specifications

Specifications for SERVOPACK Connectors	Applicable Receptacles		
	Soldered	Case	Manufacturer
10250-52A2JL 50-p Right Angle Plug	10150-3000VE	10350-52A0-008	Sumitomo 3M Ltd.

3.3.3 I/O Signal Names and Functions

The following section describes SERVOPACK I/O signal names and functions.

■ Input Signals

Signal Name		Pin No.	Function
Common	/DEC	41	Zero point return deceleration NS: Deceleration LS for zero point return connected.
	P-OT N-OT	42 43	Forward run prohibited Reverse run prohibited Overtravel prohibited: Stops servomotor when movable part travels beyond the allowable range of motion.
	EXTP	44	External positioning signal: Signal used for external positioning connected.
	ZERO	45	Zero point
	+24VIN	47	Control power supply input for sequence signals: Users must provide the +24-V power supply. Allowable voltage fluctuation range: 11 to 25 V
	BAT (+) BAT (–)	21 22	Connecting pin for the absolute encoder backup battery. Connect to either CN8 or CN1.

■ Output Signals

Signal Name		Pin No.	Function
Common	ALM+ ALM–	31 32	Servo alarm: Turns OFF when an error is detected.
	/BK+ /BK–	27 28	Brake interlock: Output that controls the brake. The brake is released when this signal is ON.
	/S-RDY+ /S-RDY–	29 30	Servo ready: Turns ON if there is no servo alarm when the control/main circuit power supply is turned ON.
	ALO1 ALO2 ALO3	37 38 39 (1)	Alarm code output: Outputs 3-bit alarm codes. Open-collector: 30 V and 20 mA rating maximum
	FG	Shell	Connected to frame ground if the shield wire of the I/O signal cable is connected to the connector shell.
Position	/COIN+ /COIN–	25 26	Positioning completed (output in Position Control Mode): Turns ON when the number of error pulses reaches the set value. The setting is the number of error pulses set in reference units (input pulse units defined by the electronic gear).

Note 1. Pin numbers in parenthesis () indicate signal grounds.

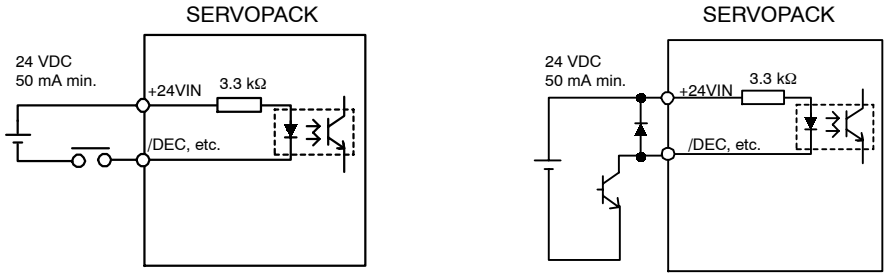
2. The functions allocated to /BK, /S-RDY, and /COIN can be changed via parameters. The /BK, /S-RDY, and /COIN output signals can be changed to /CLT, /VLT, /TGON, /WARN, or /NEAR signals.

3.3.4 Interface Circuits

The following diagram shows an example of connections between a host controller and the I/O signal for a SERVOPACK.

■ Sequence Input Circuit Interface

The sequence input circuit interface connects through a relay or open-collector transistor circuit. Select a low-current relay, otherwise a faulty contact will result.



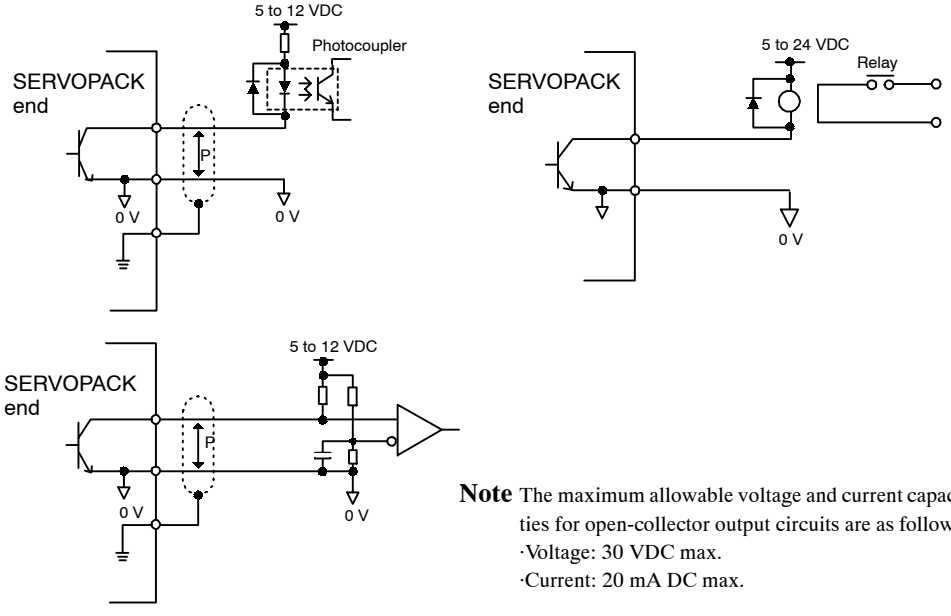
■ Output Circuit Interface

Any of the following three types of SERVOPACK output circuits can be used. Form an input circuit at the host controller that matches one of these types.

- Connecting to an Open-collector Output Circuit

  Alarm code signals are output from open-collector transistor output circuits.

  Connect an open-collector output circuit through a photocoupler, relay, or line receiver circuit.

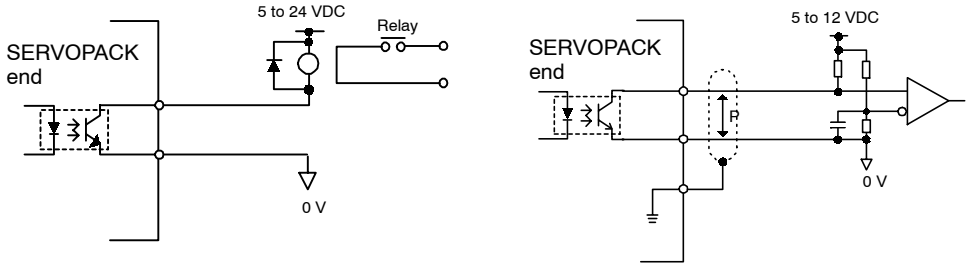


Note The maximum allowable voltage and current capacities for open-collector output circuits are as follows:
·Voltage: 30 VDC max.
·Current: 20 mA DC max.

- Connecting to a Photocoupler Output Circuit

  Photocoupler output circuits are used for servo alarm, servo ready, and other sequence output signal circuits.

  Connect a photocoupler output circuit through a relay or line receiver circuit.



Note The maximum allowable voltage and current capacities for photocoupler output circuits are as follows:
·Voltage: 30 VDC max.
·Current: 50 mA DC max.

3.4 I/O Signal Connections for NS300 Modules (CN4)

The CN4 on an NS300 Module is used for I/O signal and fully-closed encoder signal connections.

3.4.1 Connection Terminal Layout

The terminal layout and specifications for the CN4 are outlined below.

■ CN4 Terminal Layout

Pin No.	Signal	Description	Pin No.	Signal	Description
1	PG 0V	Signal ground	**11**	+24VIN	24-V common terminal for external input
2	PG 0V	Signal ground	**12**	NOTCH1+	Notch output 1
3	PG 0V	Signal ground	**13**	NOTCH1–	–
4	–	–	**14**	PC	Phase-C input
5	–	–	**15**	/PC	–
6	–	–	**16**	PA	Phase-A input
7	–	–	**17**	/PA	–
8	–	–	**18**	PB	Phase-B input
9	EMSTOP	Emergency stop input	**19**	/PB	–
10	NOTCH2+	Notch output 2	**20**	NOTCH2–	Notch output 2

Note 1. The PG power supply and battery must be supplied externally.

2. The FG is connected to the connector shell.

■ Connector Specifications

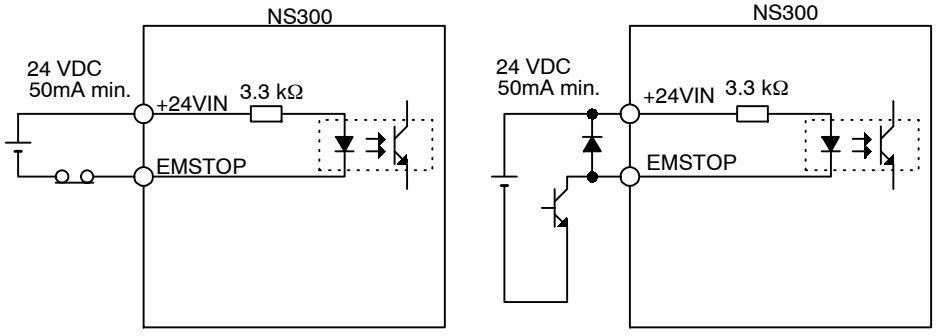
Part	Signal	Manufacturer
Connector	10120–3000VE (20P)	Sumitomo 3M Ltd.
Connector shell	10320–52A0–008	–

3.4.2 I/O Signal Interface Circuits

The following diagram shows an example of connections between a host controller and the I/O signals for an NS300 Module.

■ Sequence I/O Circuit Interface

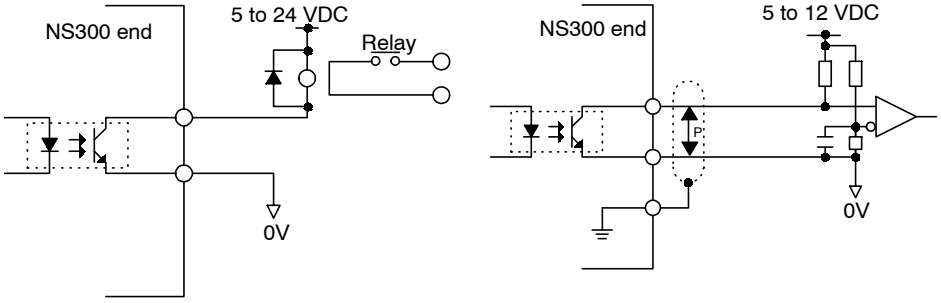
The sequence input circuit interface connects through a relay or open-collector transistor circuit. Select a low-current relay, otherwise a faulty contact will result.



Relay **Open Collector**

■ Output Circuit Interface

Notch output signals are used for photocoupler output circuits. Connect the notch output signals to relays or line receiver circuits.



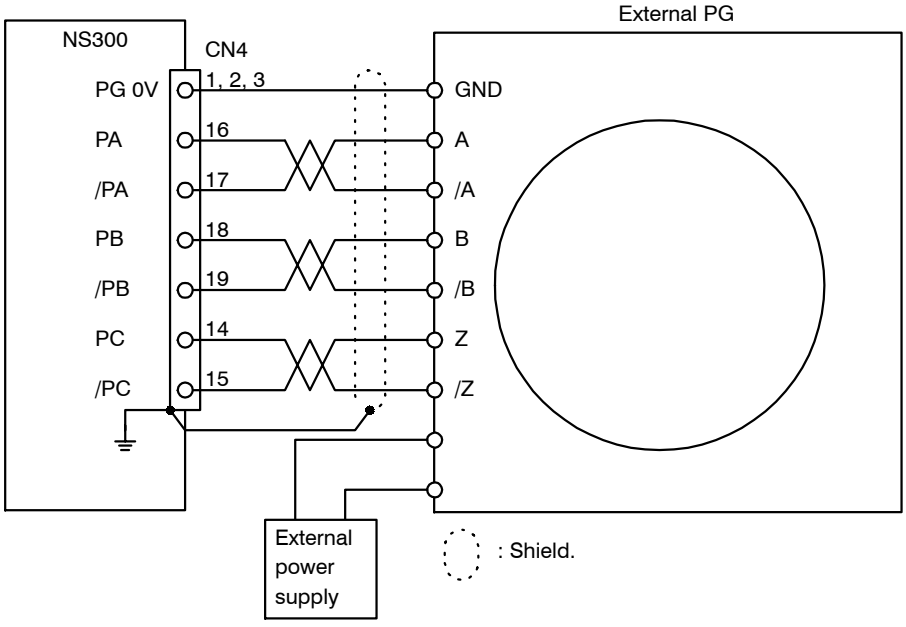
Relay **Line Receiver**

Note The maximum allowable voltage and current capacity for photocoupler output circuits are as follows:

- Voltage: 30 VDC max.
- Current: 50 mA DC max.

3.4.3 Fully-closed Encoder Connection Example

The following diagram shows a connection example for a fully-closed encoder.



3.5 Connections for DeviceNet Communications

This section describes the connection and wiring of connectors for DeviceNet communications.

3.5.1 DeviceNet Communications Connection Example

The following diagram shows an example of connections between a host controller and an NS300 Module (CN6) using DeviceNet communications cables.

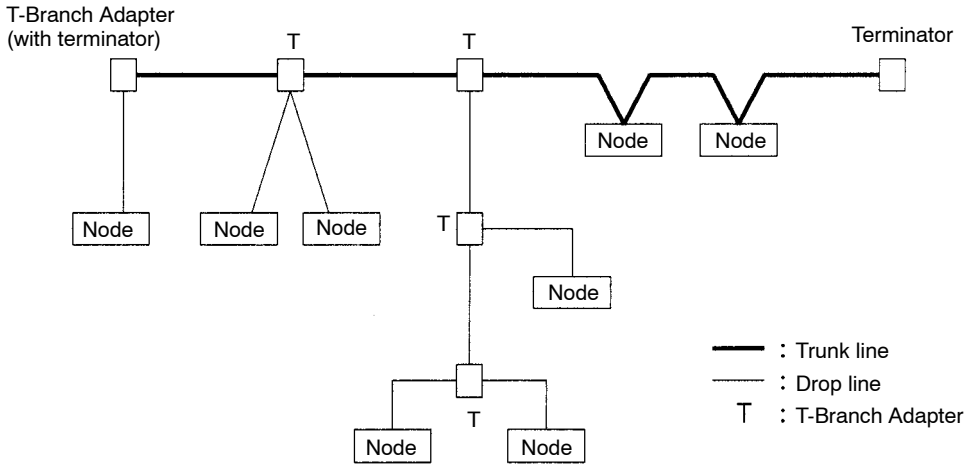


Figure 3.2 Network Connections

■ Configuration Elements

The network is configured from the following elements.

Nodes

A node is either a slave that connects to an NS300 Module or similar Module, or the master that manages the I/O of the slaves. There are no restrictions on the location of the master or slaves. Any node in *Figure 3.2* can be the master or a slave.

Trunk Line and Drop Lines

A cable with a terminator on each end is a trunk line. Any cable branching from the trunk line is a drop line.

Connection Methods

A node is connected using the T-branch method or multi-drop method. A T-Branch Adapter is used to connect a node with the T-branch method. A node is directly connected to the trunk line or a drop line with the multi-drop method. Both T-branch and multi-drop methods can be used together in the same network, as shown in *Figure 3.2*.

Terminator

Both ends of the trunk line must connect to terminating resistance to decrease signal reflection and ensure stable network communications.

Communications Power Supply

The communications connector of each node must be provided with a communications power supply through the communications cable for DeviceNet communications.

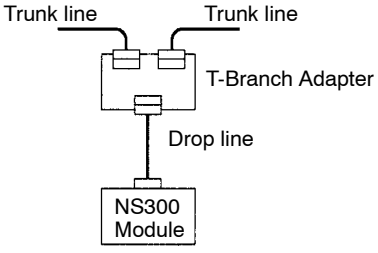
IMPORTANT

1. The communications cable must be a special DeviceNet cable.
2. Both ends of the trunk line must connect to a terminator.
3. Only DeviceNet devices can be connected to the network. Do not connect any other devices, such as a lightning arrester.

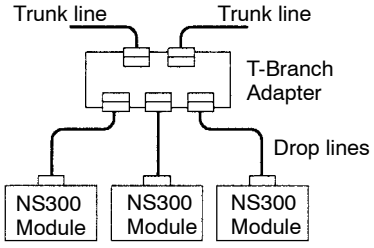
■ Branching from the Trunk Line

There are three methods that can be used to branch from the trunk line.

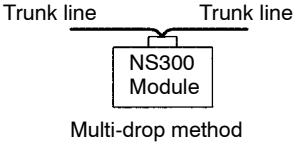
Single Branching



Branching to Three Drop Lines



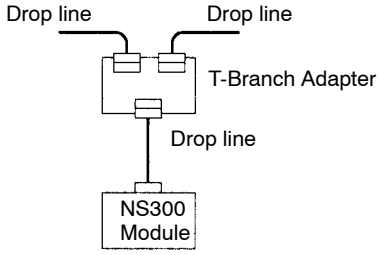
Direct Node Connection



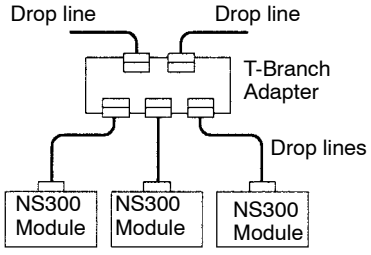
■ Branching from Drop Lines

There are three methods that can be used to branch from drop lines.

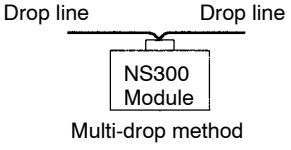
Single Branching



Branching to Three Drop Lines



Direct Node Connection



3.5.2 DeviceNet Communications Connectors (CN6)

The terminal layout and specifications of the CN6 connectors are shown below.

■ Connector Specifications

The following table shows the connector specifications. These connectors are metal plated with a flange attached.

Name	Model	Manufacturer
Connector	MSTB2.5/5-STF-5.08AU	PHOENIX CONTACT
Case		

■ Connector Pin Arrangement

The connector pin arrangement is as shown below.

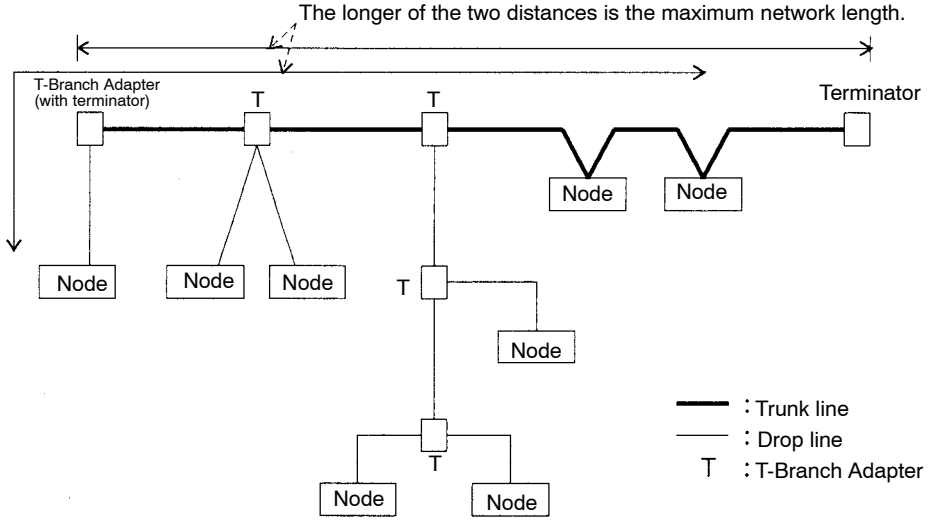
Pin No. and Code	Symbol	Detail
1	0 (24 V)	0 V external communications power supply
2	CAN L	CAN bus line dominant L
3	SHIELD	Shield
4	CAN H	CAN bus line dominant H
5	24 V	24 V external communications power supply

3.5.3 Precautions for Wiring DeviceNet Cables

Observe the following precautions when wiring DeviceNet cables.

■ Maximum Network Length

The maximum network length is either the line length between two nodes located farthest from each other or the line length between the terminators on the ends of the trunk line, whichever is longer.



Special DeviceNet cables can be either thick cables or thin cables. The characteristics of each type are given in the following table.

Item	Cable Type	
	Thick Cable	**Thin Cable**
Signal decay	Slight	Considerable
Communications distance	Long distance	Short distance
Characteristics	Rigid (difficult to bend)	Pliable (bends easily)

The maximum network length is determined by the type of cable, as shown in the following table.

Baud Rate (Kbps)	Maximum Network Length (m)	
	Thick Cable	Thin Cable
500	100	100
250	250	100
125	500	100

INFO

The line connecting two nodes located farthest from each other can use both thick and thin cables provided that the length of each cable satisfies the conditions in the following table.

Baud Rate (Kbps)	Maximum Network Length (m)
500	$L_{THICK} + L_{THIN} \leqq 100$
250	$L_{THICK} + 2.5 \times L_{THIN} \leqq 250$
125	$L_{THICK} + 5.0 \times L_{THIN} \leqq 500$

Note L_{THICK}: Thick cable length L_{THIN}: Thin cable length

■ Drop Line Length

The drop line length is the line length between a branch point on the trunk line to the farthest node that is located on the drop line. The maximum drop line length is 6 m. A drop line can be branched out into other drop lines.

■ Total Drop Line Length

The total drop line length is a total of all drop line lengths.

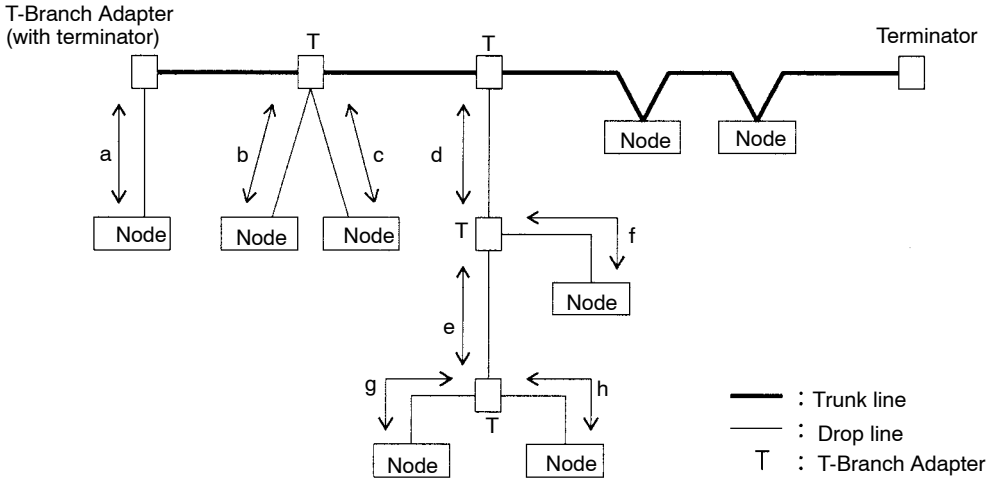
Length Limits

The total drop line length must be within the allowable range and even then, each drop line must be 6 m or less.

The allowable range of total drop line length varies with the baud rate as shown in the following table.

Baud Rate (Kbps)	Total Network Length (m)
500	39 max.
250	78 max.
125	156 max.

The following example is for a baud rate of 500 Kbps.



The above example must satisfy the following conditions.

- a ≦ 6 m
- b ≦ 6 m
- c ≦ 6 m
- d ≦ 6 m
- d+f ≦ 6 m
- d+e+g ≦ 6 m
- d+e+h ≦ 6 m

The total drop line length must satisfy the following condition.

- Total drop line length = a+b+c+d+e+f+g+h ≦ 39 m

■ Basic Precautions

Basic precautions are as follows:

- The communications power supply to the network must be 24 VDC.
- The communications power supply must have a sufficient margin in the capacity.
- Connect the communications power supply to the trunk line.
- If many nodes are provided with power from a single power supply, locate the power supply as close as possible to the middle of the trunk line.
- The allowable current flow in a thick cable is 8 A and that in a thin cable is 3 A.
- The power supply capacity for a drop line varies with the drop line length. The longer a drop line is, the lower the maximum current capacity of the drop line will be regardless of the thickness of the drop line. Obtain the allowable current (I) of the drop line (i.e., the allowable current consumption of the drop line and devices connected to it) from the following equation.

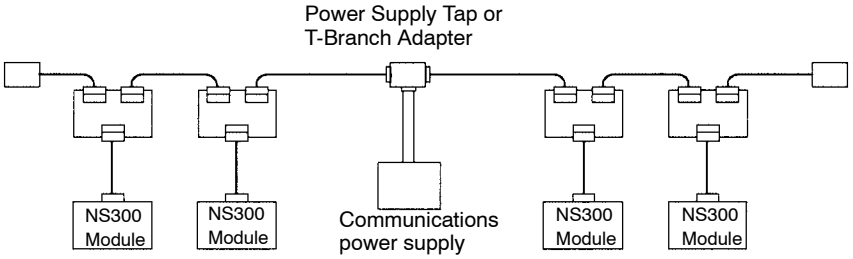
  I=4.57/L I: Allowable current (A)
  L: Drop line length (m)

- If only the communications power supply is turned OFF while the network is operating, errors may occur in the nodes that are communicating at that time.

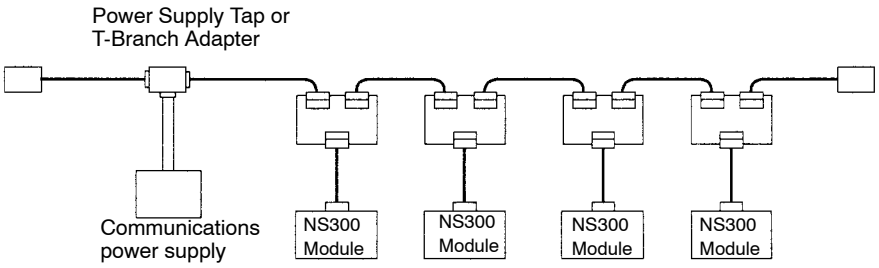
■ Location of Power Supply

The following two types of configuration are possible for the location of the power supply.

Nodes on Both Sides of the Power Supply



Nodes on One Side of the Power Supply

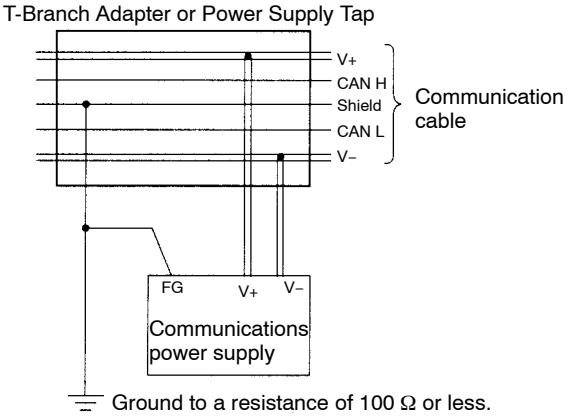


Note The "Nodes on Both Sides of the Power Supply" method is recommended if a single power supply is connected to many nodes.

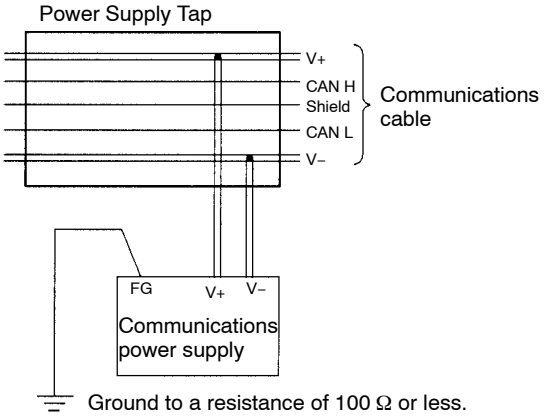
3.5.4 Grounding

As shown below, connect the shield wire of the cable to the FG terminal of the communications power supply and ground the shield wire to a resistance of 100 Ω or less.

■ Power Supply with Single-point Ground



■ Power Supply without Ground



If more than one communications power supply is used, ground only the power supply that is located closest to the middle of the network through the shield wire. Do not ground the power supply through the shield wire at any other point. If more than one communications power supply is connected to the network, connect them using a Power Supply Tap each.

IMPORTANT

1. Power supplies are not counted as nodes.
2. Ground the network to a resistance of 100 Ω or less.
3. Do not ground the network together with servodrivers or inverters.
4. Do not ground the network through the shield wire at more than one point; ground at a single point only.

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4

Parameter Settings

This chapter provides an outline and details of NS300 parameters.

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4.1 Parameters

4.1.1 Outline of Parameters

Parameters is the name given to the user constants that are required as the settings used to operate the NS300 Module. You must set the optimum values for parameters according to the NS300 Module and the machine to which the SGDH is mounted.

You can edit the NS300 Module parameters using the NSxxx Setup Tool, DeviceNet Configurator, or host controller.

For parameters, refer to *Chapter 6 Parameter Settings* or the Σ-II *Series SGM□H/SGDH User's Manual Design and Maintenance* (SIE-S800-32.2).

4.1.2 Parameter Types

Parameters are classified depending on their purpose as follows:

- Unit parameters
- Zero Point Return parameters
- Machine system and peripheral device parameters
- Speed, acceleration, and deceleration parameters
- Positioning parameters
- Multi-speed positioning parameters
- Notch output positioning parameters

Parameters are further classified according to the priority of the setting, as shown below.

Table 4.1 Parameter Types

Type	Meaning
A	Parameters that must be set even when using the NS300 Module in standard mode.
B	Parameters that must be set when using the NS300 Module in special mode.
C	Parameters whose settings hardly ever need to be changed.

4.1.3 Editing Parameters

You can edit parameters using the following methods.

Table 4.2 Methods of Editing Parameters

Tools	Methods	Remarks
NSxxx Setup Tool	Select ***Option Parameter List*** from the Parameter Menu to read all the NS300 Module parameters. After the parameters have been displayed, select the parameters you want to edit, and click the **Edit** Button to edit the parameters.	All changed parameters are stored in RAM, so they are erased when the power is turned OFF. Use the ***Module Reset*** Command to write the parameter data in RAM to the flash ROM.
Master Device or DeviceNet Configurator	You can edit using ***Explicit Message (Set_Attribute_Single)*** from the Master Device.	All changed parameters are stored in RAM, so they are erased when the power is turned OFF. Execute the **Reset Service** for the Identity Object to write the parameter data in RAM to the flash ROM.

IMPORTANT

Parameters changed from each setting device are stored in RAM.
To save parameters in flash ROM after adjustments have been completed, execute the ***Module Reset*** Command in the NSxxx Setup Tool or execute the Reset Service to the Identity Object via DeviceNet.

4.1.4 Effective Timing

Not all parameters edited from the NSxxx Setup Tool or Master Device are effective immediately. Changed parameters are effective at one of the following two times.

Table 4.3 Effective Timing for Parameters

Timing	Control or Processing
Power-up	The values of all parameters are made effective at the following times. 1. When power is turned ON. 2. When the Module is reset from the NSxxx Setup Tool or via a command message.
Immediate	The values of changed parameters are made effective immediately. However, parameters will be stored in the Flash ROM at the following times. 1. When the Module is reset from the NSxxx Setup Tool or via a command message. 2. When the Reset Service to the Identity Object is executed via DeviceNet.

4.2 Parameter Tables

The following tables list the parameters.

If using the NSxxx Setup Tool or reading/writing using a command message, edit parameters using Pn□□□. If editing via DeviceNet explicit messages, edit using the object number and attribute number. Refer to 5.6 *Changing Parameters* or the host controller manual for details.

4.2.1 Unit Parameters

The unit parameter table is shown below.

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#30	Pn810	Electronic Gear Ratio (Numerator)	1 to 10,000,000	---	Power-up	1	B
	#31	Pn811	Electronic Gear Ratio (Denominator)	1 to 10,000,000	---	Power-up	1	B

4.2.2 Zero Point Return Parameters

The table of zero point return parameters are shown below.

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#10	Pn800	Zero Point Return Mode	0 to 3	---	Immediate	0	B
	#11	Pn801	Zero Point Return Function Selection	0 to 7	---	Power-up	1	B
	#12	Pn802	Feed Speed for Zero Point Return	1 to 240,000	1000 reference units/min	Immediate	10,000	B
	#13	Pn803	Approach Speed for Zero Point Return	1 to 240,000	1000 reference units/min	Immediate	1,000	B
	#14	Pn804	Creep Speed for Zero Point Return	1 to 240,000	1000 reference units/min	Immediate	500	B
	#15	Pn805	Final Travel Distance for Zero Point Return	0 to 99,999,999	Reference units	Immediate	0	B
	#16	Pn806	Output Width for Zero Point Return	0 to 32, 767	Reference units	Immediate	100	B

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#17	Pn809	Zero Point Offset	–99,999,999 to 99,999,999	Reference units	Immediate	0	C
	#18	Pn80A	Accel/Decel Time for Zero Point Return	1 to 10,000	ms	Immediate	100	B

Note: 1. For reference unit details, refer to *4.3.1 Unit Parameters*.

2. If you set the reference unit to 0.001 mm, 1,000 reference units/min becomes mm/min.

4.2.3 Machine System and Peripheral Device Parameters

The machine system and peripheral device parameter table is shown below.

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#32	Pn812	Coordinate Type	0, 1	---	Immediate	0	C
	#33	Pn813	Reference units per Machine Rotation	1 to 1,500,000	---	Immediate	360,000	C
	#34	Pn814	Backlash Compensation	0 to 32,767	Reference units	Immediate	0	C
	#35	Pn815	Backlash Direction	0, 1	Reference units	Immediate	0	C
	#36	Pn816	Positive Software Limit	±99,999,999	---	Power-up	99999999	B
	#37	Pn817	Negative Software Limit	±99,999,999	Reference units	Power-up	–99999999	B
	#38	Pn818	Machine Function Selection	0 to 3	---	Immediate	0	B
	#39	Pn819	Hardware Limit Signal Function Selection	0 to 3	---	Immediate	1	B
	#40	Pn81A	Hardware Limit Action Selection	0, 1, 2	---	Immediate	0	B
	#41	Pn81B	Emergency Stop Signal Function Selection	0 to 3	---	Immediate	1	B
	#42	Pn81C	Action Selection on Emergency Stop	0	---	Immediate	0	B

Note: 1. For reference unit details, refer to *4.3.1 Unit Parameters*.

2. If you set the reference unit to 0.001 mm, 1,000 reference units/min becomes mm/min.

4.2.4 Speed, Acceleration, and Deceleration Parameters

A table of speed, acceleration, and deceleration parameters is shown below.

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#51	Pn821	Feed Speed for Positioning	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#52	Pn822	Acceleration Time for Positioning	1 to 10,000	ms	Immediate	100	B
	#53	Pn823	Deceleration Time for Positioning	1 to 10,000	ms	Immediate	100	C
	#54	Pn824	Switch Speed for Second Accel/Decel for Positioning	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#55	Pn825	Accel/Decel Time for Second Accel/Decel for Positioning	1 to 10,000	ms	Immediate	200	B
	#56	Pn826	Accel/Decel Type for Positioning	0 to 3	---	Immediate	0	B
	#57	Pn827	Feed Speed for External Positioning	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#58	Pn829	Filter Selection	0 to 3	---	Immediate	0	B
	#59	Pn830	Constant Feed Reference Module Selection	0, 1	---	Immediate	0	B
	#60	Pn831	Constant Feed Speed	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#61	Pn832	Acceleration Time for Constant Feed	1 to 10,000	ms	Immediate	100	B
	#62	Pn833	Deceleration Time for Constant Feed	1 to 10,000	ms	Immediate	100	C
	#63	Pn834	Switch Speed for Constant Feed Second Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#64	Pn835	Accel/Decel Time for Constant Feed Second Accel/Decel	1 to 10,000	ms	Immediate	200	C

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#65	Pn836	Accel/Decel Type for Constant Feed	0, 1, 2, 3	---	Immediate	0	B
	#70	Pn840	Time Constant for Exponential Accel/Decel	4 to 1,000	ms	Immediate	25	C
	#71	Pn841	Bias Speed for Exponential Accel/Decel	0 to 240,000	1000 reference units/min	Immediate	0	C
	#72	Pn842	Time Constant of Travelling Average	4 to 1,000	ms	Immediate	25	C
	#73	Pn843	Maximum Feed Speed	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#74	Pn844	Step Distance 1	0 to 99,999,999	Reference units	Immediate	1	B
	#75	Pn845	Step Distance 2	0 to 99,999,999	Reference units	Immediate	10	B
	#76	Pn846	Step Distance 3	0 to 99,999,999	Reference units	Immediate	100	B
	#77	Pn847	Step Distance 4	0 to 99,999,999	Reference units	Immediate	1,000	B

Note: 1. For reference unit details, refer to *4.3.1 Unit Parameters*.

2. If you set the reference unit to 0.001 mm, 1,000 reference units/min becomes mm/min.

4.2.5 Positioning Parameters

The positioning parameter table is shown below.

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#90	Pn850	Positioning Deadband	0 to 10,000	Reference units	Immediate	5	A
	#91	Pn851	Positioning Timeout	0 to 100,000	ms	Immediate	0	A
	#92	Pn852	Positioning Proximity Detection Width	0 to 32,767	Reference units	Immediate	10	B
	#93	Pn853	Direction for Rotation System	0, 1	---	Immediate	0	B
	#94	Pn854	Approach Speed for External Positioning	1 to 240,000	1,000 reference units/min	Immediate	24,000	B
	#95	Pn855	Travel Distance for External Positioning	-99,999,999 to 99,999,999	Reference units	Immediate	0	B
	#96	Pn856	Function Selection for External Positioning	0 to 1	---	Power-up	1	B
	#100	Pn85A	Number of Stations	1 to 32,767	---	Immediate	1	B

Note: 1. For reference unit details, refer to *4.3.1 Unit Parameters*.

2. If you set the reference unit to 0.001 mm, 1,000 reference units/min becomes mm/min.

4.2.6 Multi-speed Positioning Parameters

A table of multi-speed positioning parameters is shown below.

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#111	Pn861	Number of Points for Speed Switching	0 to 16	–	Immediate	0	C
	#112	Pn862	Initial Feed Speed for Multi-speed Positioning	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#113	Pn863	Speed Switching Position 1	0 to 99,999,999	Reference units	Immediate	0	C
	#114	Pn864	Speed Switching Position 2	0 to 99,999,999	Reference units	Immediate	0	C

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#115	Pn865	Speed Switching Position 3	0 to 99,999,999	Reference units	Immediate	0	C
	#116	Pn866	Speed Switching Position 4	0 to 99,999,999	Reference units	Immediate	0	C
	#117	Pn867	Speed Switching Position 5	0 to 99,999,999	Reference units	Immediate	0	C
	#118	Pn868	Speed Switching Position 6	0 to 99,999,999	Reference units	Immediate	0	C
	#119	Pn869	Speed Switching Position 7	0 to 99,999,999	Reference units	Immediate	0	C
	#120	Pn86A	Speed Switching Position 8	0 to 99,999,999	Reference units	Immediate	0	C
	#121	Pn86B	Speed Switching Position 9	0 to 99,999,999	Reference units	Immediate	0	C
	#122	Pn86C	Speed Switching Position 10	0 to 99,999,999	Reference units	Immediate	0	C
	#123	Pn86D	Speed Switching Position 11	0 to 99,999,999	Reference units	Immediate	0	C
	#124	Pn86E	Speed Switching Position 12	0 to 99,999,999	Reference units	Immediate	0	C
	#125	Pn86F	Speed Switching Position 13	0 to 99,999,999	Reference units	Immediate	0	C
	#126	Pn870	Speed Switching Position 14	0 to 99,999,999	Reference units	Immediate	0	C
	#127	Pn871	Speed Switching Position 15	0 to 99,999,999	Reference units	Immediate	0	C
	#128	Pn872	Speed Switching Position 16	0 to 99,999,999	Reference units	Immediate	0	C
	#129	Pn873	Switching Speed 1	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#130	Pn874	Switching Speed 2	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#131	Pn875	Switching Speed 3	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#132	Pn876	Switching Speed 4	1 to 240,000	1000 reference units/min	Immediate	24,000	C

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#133	Pn877	Switching Speed 5	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#134	Pn878	Switching Speed 6	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#135	Pn879	Switching Speed 7	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#136	Pn87A	Switching Speed 8	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#137	Pn87B	Switching Speed 9	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#138	Pn87C	Switching Speed 10	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#139	Pn87D	Switching Speed 11	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#140	Pn87E	Switching Speed 12	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#141	Pn87F	Switching Speed 13	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#142	Pn880	Switching Speed 14	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#143	Pn881	Switching Speed 15	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#144	Pn882	Switching Speed 16	1 to 240,000	1000 reference units/min	Immediate	24,000	C

Note: 1. For reference unit details, refer to *4.3.1 Unit Parameters*.

2. If you set the reference unit to 0.001 mm, 1,000 reference units/min becomes mm/min.

4.2.7 Notch Output Parameters

The notch output parameter table is shown below.

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#160	Pn890	Notch Signal Output Position Setting	0, 1	–	Immediate	0	C
	#161	Pn891	Notch Signal Output Setting	0 to 3	–	Immediate	0	C
	#162	Pn892	Notch 1 Output Position Lower Limit	±99,999,999	Reference units	Immediate	0	C
	#163	Pn893	Notch 1 Output Position Upper Limit	±99,999,999	Reference units	Immediate	0	C
	#164	Pn894	Notch 2 Output Position Lower Limit	±99,999,999	Reference units	Immediate	0	C
	#165	Pn895	Notch 2 Output Position Upper Limit	±99,999,999	Reference units	Immediate	0	C

Note: 1. For reference unit details, refer to *4.3.1 Unit Parameters*.

2. If you set the reference unit to 0.001 mm, 1,000 reference units/min becomes mm/min.

4.3 Parameter Details

4.3.1 Unit Parameters

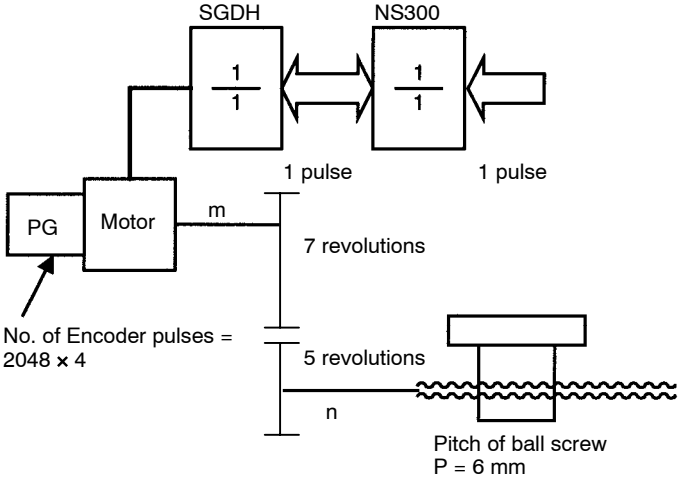
The unit for performing positioning using a NS300 Module is determined by the following two parameters.

Object	Attribute	No.	Name	Range	Units	Effective Timing	Default Value	Type
0x64	#30	Pn810	Electronic gear (numerator)	1 to 10,000,000	---	Power-up	1	B
	#31	Pn811	Electronic gear (denominator)	1 to 10,000,000	---	Power-up	1	B

The electronic gear function can be used to set the position command units equal to the amount of encoder pulses. The host controller can generate position commands in more familiar user-defined units such as millimeters or inches.

■ Not Using the Electronic Gear

If not using the electronic gear, set Pn810 and Pn811 to 1. This will set the reference unit to 1 pulse, so you must calculate the scale position units using the host controller.



IMPORTANT

In this manual, the reference unit explained in *Electronic Gear Settings When Using a Ball Screw* in *4.3.1 Unit Parameters* is based on a unit of 0.001 mm. The speed and other parameters must be interpreted as follows:

- Pn821: Feed Speed for Positioning (mm/min) → (1000 pulses/min)

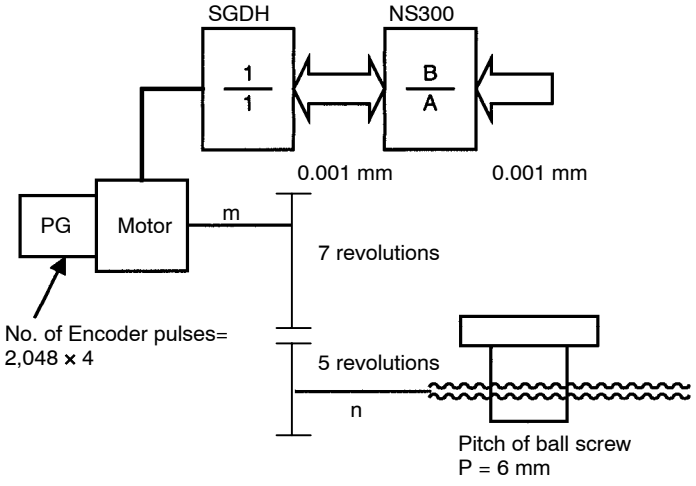
■ Electronic Gear Settings When Using a Ball Screw

If using a ball screw, first check the following specifications.

- Number of Encoder pulses
- Gear ratio
- Ball screw pitch

System Example

The following system example shows the formulas when the reference unit is set to 0.001 mm.



- $\text{REV} = \dfrac{\text{Travel distance of load per revolution (mm)}}{\text{Reference unit (mm)}} = \dfrac{6\text{ mm}}{0.001\text{ mm}} = 6000$
- A = (REV) × {Gear ratio (load rev.)} = 6000 × 5 = 30000
- B = (Encoder pulses) × (Pulse multiplier) × {Gear ratio (motor rev.)} = 2048 × 4 × 7 = 57344
- B/A = 57344/30000 = 1.911

Data ranges are shown below.

- A ≦ 10,000,000
- B ≦ 10,000,000
- 100 ≧ B/A ≧ 0.01

By storing the value of A in Pn811 and the value of B in Pn810, you can use the Electronic Gear function. These parameters are enabled when the power is turned ON. After you have changed the parameter, execute the Module Reset Command or the Reset Service to the Identity Object.

IMPORTANT

Setting B/A outside the range 0.01 to 100 may result in a misoperation. Make sure to set B and A within this range.

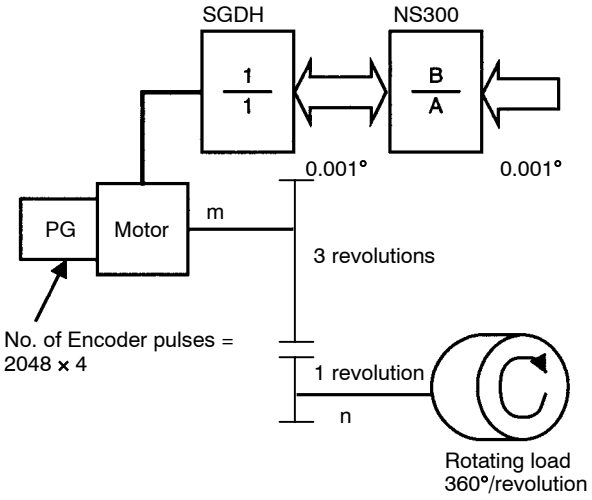
■ Electronic Gear Settings when Using a Rotary Table

If using a rotary table, first check the following specifications.

- Number of Encoder pulses
- Gear ratio

System Example

The following system example shows the formulas when the reference unit is set to 0.001°.



- REV = 360°/0.001° = 36000
- A = REV × {Gear Ratio (load rev.)} = 36000 × 1 = 36000
- B = (Encoder pulses) × (Pulse multiplier) × {Gear ratio (motor rev.)} = 2048 × 4 × 3 = 24576

Data ranges are shown below.

- A ≦ 10,000,000
- B ≦ 10,000,000
- 100 ≧ B/A ≧ 0.01

By storing the value of A in Pn811 and the value of B in Pn810, you can use the Electronic Gear function. These parameters are enabled when the power is turned ON. After you have changed the parameter, execute the Module Reset Command or the Reset Service to the Identity Object.

IMPORTANT

Setting B/A outside the range 0.01 to 100 may result in a misoperation. Make sure to set B and A within this range.

4.3.2 Zero Point Return Parameters

■ Zero Point Return Types

The following four types of zero point return are supported when the incremental detection system is used.

Type 0

This zero point return type returns to the zero point using the deceleration limit switch signal (DEC signal) and the phase C pulse of the encoder. The outline of the operation is as follows:

1. The axis travels in the direction specified as the zero point direction in the Zero Point Return Function Selection (Pn801) at the Zero Point Return Feed Speed (Pn802).
2. When the deceleration limit switch status changes, the axis decelerates and travels at the Zero Point Return Approach Speed (Pn803).
3. When the deceleration limit switch status changes again, the axis decelerates further when the first encoder phase C pulse is detected and then travels at the Zero Point Return Creep Speed (Pn804).
4. The axis travels the Zero Point Return Final Travel Distance (Pn805) from the position where the phase C was detected, and that position becomes the zero point.

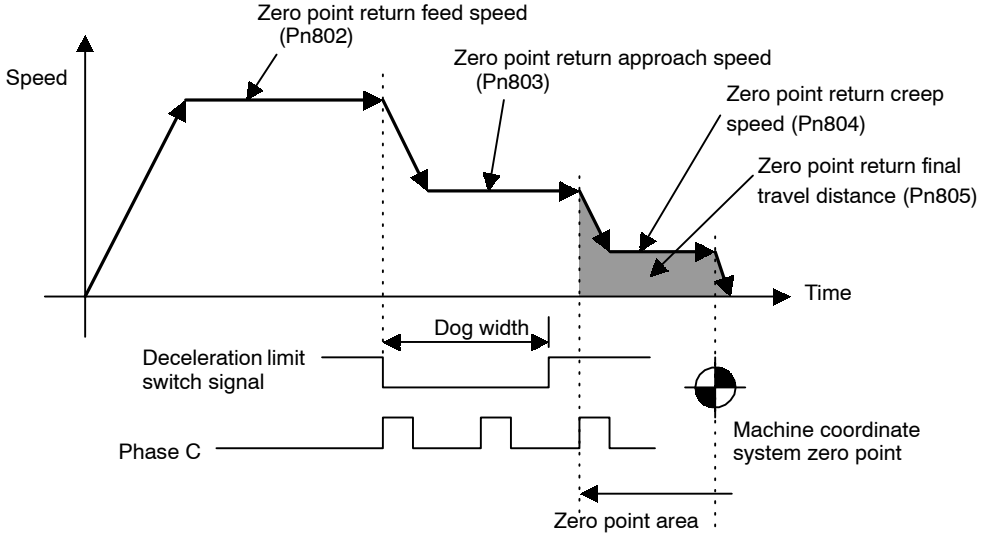


Figure 4.1 Type 0 Zero Point Return

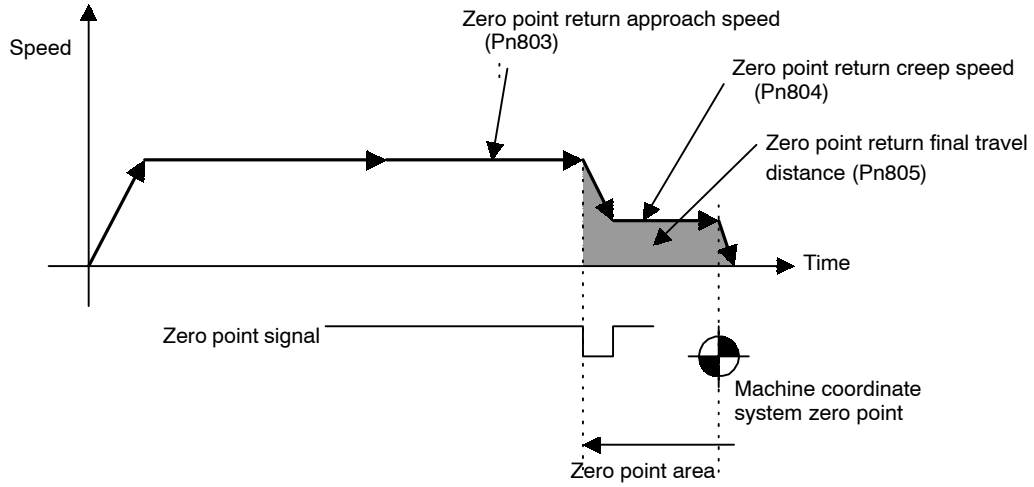
IMPORTANT

When an absolute detection system is being used, the zero point return is not performed and positioning will be performed to the zero point in the machine coordinate system at the Feed Speed for Positioning.

Type 1

This zero point return type returns to the zero point using the zero point signal (ZERO signal). The outline of the operation is as follows:

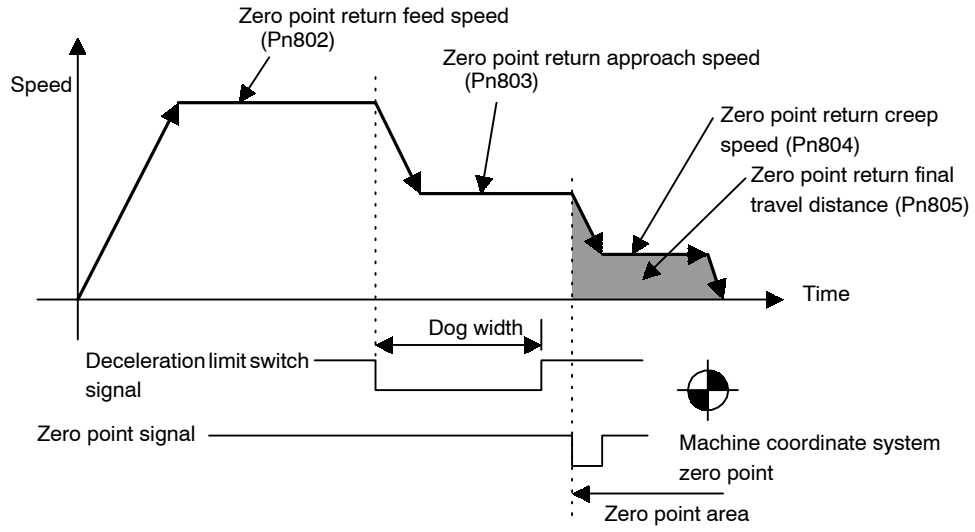
1. The axis travels in the direction specified as the zero point direction in the Zero Point Return Function Selection (Pn801) at the Zero Point Return Approach Speed (Pn803).
2. When the zero point signal status changes, the axis decelerates, and travels at the Zero Point Return Creep Speed (Pn804).
3. The axis travels the Zero Point Return Final Travel Distance (Pn805) from the position that the zero point signal status changed, and that position becomes the zero point.



Type 2

This zero point return type returns to the zero point using the deceleration limit switch (DEC signal) and the zero point signal (ZERO signal). The outline of the operation is as follows:

1. The axis travels in the direction specified as zero point direction in the Zero Point Return Function Selection (Pn801) at the Zero Point Return Feed Speed (Pn802).
2. When the deceleration limit switch status changes, the axis decelerates, and travels at the Zero Point Return Approach Speed (Pn803).
3. When the zero point signal changes, the axis decelerates further and travels at the Zero Point Return Creep Speed (Pn804).
4. The axis travels the Zero Point Return Final Travel Distance (Pn805) from the position where the zero point signal changed, and that position becomes the zero point.

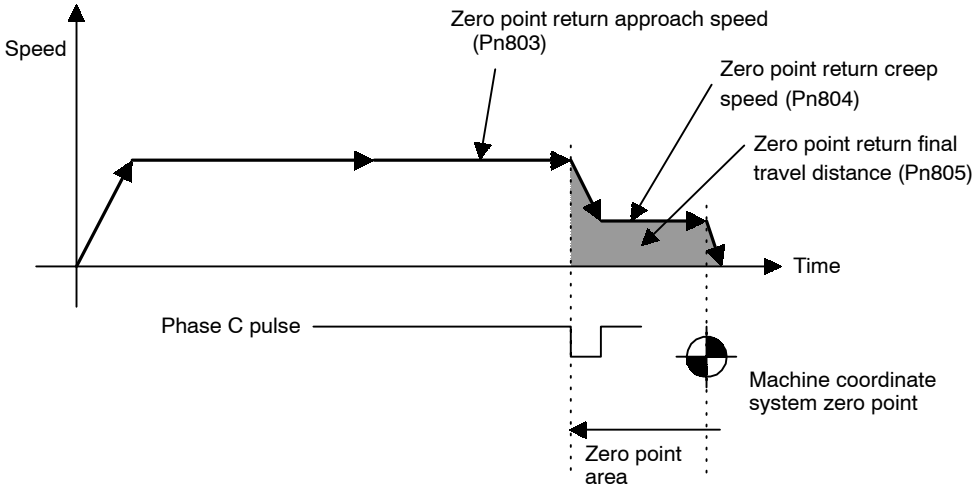


Type 3

This zero point return type returns to the zero point using the phase C pulse of the encoder only. The outline of the operation is as follows:

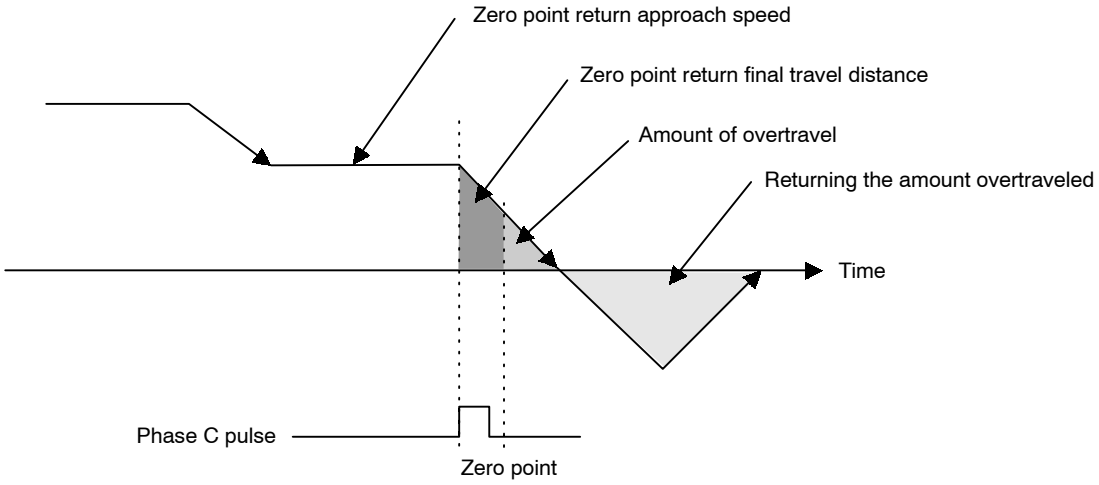
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1. The axis travels in the direction specified as zero point direction in the Zero Point Return Function Selection (Pn801) at the Zero Point Return Approach Speed (Pn803).
2. When the first phase C pulse of the encoder is detected, the axis decelerates, and travels at the Zero Point Return Creep Speed (Pn804).
3. The axis travels the Zero Point Return Final Travel Distance (Pn805) from the position where the phase C pulse was detected, and that position becomes the zero point.



INFO

When the setting for the Zero Point Return Final Travel Distance (Pn805) is small (when the distance is shorter than the distance required for the deceleration from approach speed), the axis will travel past the zero point and then return to it from the other direction.



4

■ Parameter Details (Object 0x64)

The details of parameters relating to zero point return are shown below.

Zero Point Return Mode (Object: 0x64, Attribute: #10; Pn800)

The zero point return type is specified in the zero point return mode.

Zero Point Return Mode	Zero Point Return Type
0	3-step deceleration using deceleration limit switch and phase C pulse
1	Double-step deceleration using zero point signal
2	3-step deceleration using deceleration limit switch and zero point signal
3	Double-step deceleration using phase C pulse

Zero Point Return Function Selection (Object: 0x64, Attribute: #11; Pn801)

The zero point return function selection has the following bit settings.

Bit	Name	Description
0	Zero Point Return Direction Setting*	0: Positive direction 1: Negative direction
1	Deceleration Limit Switch Signal Setting	0: Enabled on Low 1: Enabled on High
2	Zero Point Signal Setting	0: Enabled on trailing edge 1: Enabled on leading edge
3 to 15	Reserved	–

Zero Point Return Feed Speed (Object: 0x64, Attribute: #12; Pn802)

Use the Zero Point Return Feed Speed to set the initial feed speed for 3-step deceleration zero point return.

The setting unit is 1,000 reference units/min.

Zero Point Return Approach Speed (Object: 0x64, Attribute: #13; Pn803)

Use the Zero Point Return Approach Speed to set the approach speed for zero point return.
The setting unit is 1,000 reference units/min.

Zero Point Return Creep Speed (Object: 0x64, Attribute: #14; Pn804)

Use the Zero Point Return Creep Speed to set the creep speed for zero point return.
The setting unit is 1,000 reference units/min.

Zero Point Return Final Travel Distance (Object: 0x64, Attribute: #15; Pn805)

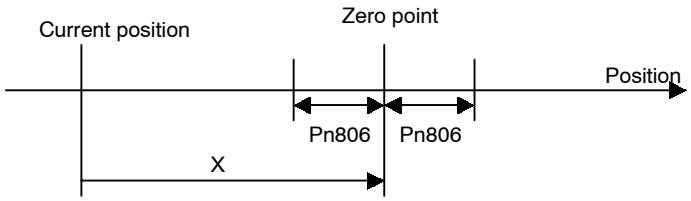
Use the Zero Point Return Final Travel Distance to set the distance from the position where the encoder phase C and zero point signal were detected to the machine zero point.
The setting unit is reference units.

Zero Point Output Width (Object: 0x64, Attribute:#16; Pn806)

Use the Zero Point Output Width to set the area that will be regarded as the zero point.
The setting unit is reference units.

In the following diagram, if the conditions outlined below are met, the Zero Point Flag in the response message will be set to 1.

- X = | Zero point − Current position | ≦ Pn806



Zero Point Offset (Object: 0x64, Attribute: #17; Pn809)

The system automatically writes to the Zero Point Offset the value of the offset from the zero point on the encoder when the zero point setting in the absolute value detection system has been completed. Normally, this parameter does not need to be set.

When using an absolute value detection system, set this value to enable adjustment of the zero point.

Zero Point Return Acceleration/Deceleration Time (Object: 0x64, Attribute: #18; Pn80A)

Use the Zero Point Return Acceleration/Deceleration Time to set the acceleration/declaration time constant used during zero point return. The setting unit is ms. Single-step linear acceleration/deceleration is used for zero point return. Refer to *4.3.4 Speed, Acceleration, and Deceleration* for information on this acceleration/deceleration type.

4.3.3 Machine System and Peripheral Devices

The details of parameters relating to the machine system and peripheral devices are shown below.

Coordinate Type (Object: 0x64, Attribute: #32; Pn812)

Use the Coordinate Type to set whether to use the NS300 Module as a linear axis or rotary axis.

Pn812	Description
0	The linear axis is designated. The unit of current value data: reference units
1	The rotary axis is designated. The unit of current value data: degrees

Reference Units per Machine Rotation (Object: 0x64, Attribute: #33; Pn813)

Use the Reference Units per Machine Rotation to set the reference unit for one machine rotation. This parameter is enabled only when the coordinate type is set to rotary axis. If this parameter is not set correctly, when the machine performs a 360° rotation, the current position will not be reset to 0°, so be careful.

The setting unit is reference units. The initial value is 360,000.

Backlash Compensation (Object: 0x64, Attribute: #34; Pn814)

Use the Backlash Compensation to set the amount of compensation when backlash compensation is used. The setting unit is reference units.

Backlash Compensation Direction (Object: 0x64, Attribute: #35; Pn815)

Use the Backlash Compensation Direction to set the direction of the backlash compensation.

Normally, set this parameter in the opposite direction to the zero point direction.

Pn815	Description
0	Positive Direction
1	Negative Direction

Positive Software Limit (Object: 0x64, Attribute: #36; Pn816)

Use the Positive Software Limit to set the software limit in the positive direction.
The setting unit is reference unit. Make the setting between –99,999,999 and 99,999,999.

Negative Software Limit (Object: 0x64, Attribute: #37; Pn817)

Use the Negative Software Limit to set the software limit in the negative direction.
The setting unit is reference unit. Make the setting between –99,999,999 and 99,999,999.

Machine Function Selection (Object: 0x64, Attribute: #38; Pn818)

Use the Machine Function Selection to set whether or not to use the software limit functions and the backlash compensation functions.

Bit	Description
0	0: Software Limit is disabled. 1: Software Limit is enabled.
1	0: Backlash Compensation is disabled. 1: Backlash Compensation is enabled.

Hardware Limit Signal Function Selection (Object: 0x64, Attribute: #39; Pn819)

Use the Hardware Limit Signal Function Selection to set whether or not to use the hardware limit and to set the signal polarity.

Bit	Name	Description
0	Enable/Disable Hardware Limit	0: Disabled 1: Enabled
1	Hardware Limit Signal Polarity	0: Enabled on Low 1: Enabled on High
2 to 15	Reserved	–

Hardware Limit Action (Object: 0x64, Attribute: #40; Pn81A)

Use the Hardware Limit Action to set the operation of the NS300 Module when a hardware limit is detected.

Pn81A	Description
0	Servo OFF
1	Hard Stop: Stops at the specified maximum torque without acceleration or deceleration.
2 to 255	Reserved

Emergency Stop Signal Function Selection (Object: 0x64, Attribute: #41: Pn81B)

Use the Emergency Stop Signal Function Selection to set whether or not to use the emergency stop function and to set the polarity of the signal.

Bit	Name	Description
0	Enable/disable Emergency Stop	0: Disabled 1: Enabled
1	Emergency Stop Signal Polarity	0: Enabled on Low 1: Enabled on High
2 to 15	Reserved	–

Operation Selection at Emergency Stop (Object: 0x64, Attribute: #42: Pn81C)

Use the Operation Selection at Emergency Stop to set the operation at emergency stop when the emergency stop signal has been enabled. The currently supported setting is 0: Stop immediately and turn OFF Servo.

4.3.4 Speed, Acceleration, and Deceleration

■ Acceleration and Deceleration Patterns

The following acceleration and deceleration patterns are possible by combining acceleration/deceleration types (Pn826 or Pn836) and filters (Pn829).

–		Acceleration/Deceleration Type (Pn826 or Pn836)			
		0: None	**1: Single-step Linear**	**2: Double-step Linear**	**3: Asymmetric**
Filter Selection (Pn829)	0: None	No acceleration and deceleration	Single-step Linear Accel/Decel Constant Accel/Decel*1	Double-step Linear Accel/Decel Constant Accel/Decel*1	Asymmetric Linear Accel/Decel Constant Accel/Decel*1
	1: Exponent	Exponential Accel/Decel Constant Accel/Decel time*2	---	---	---
	2: Exponent with Bias	Exponential Accel/Decel with Bias Constant Accel/Decel time*2	---	---	---
	3: Travelling Average	Single-step Linear Accel/Decel Constant Accel/Decel time*2	S-curve Accel/Decel Time Constant Accel/Decel*1	---	Asymmetric S-curve Accel/Decel Constant Accel/Decel*1

* 1. With Constant Accel/Decel, the time required for acceleration and deceleration changes with the feed speed changes.

* 2. With Constant Accel/Decel time, the time required for acceleration and deceleration does not change even if the feed speed changes.

Note: Combinations other than those given above may result in incorrect acceleration and deceleration.

Single-step Linear Acceleration/Deceleration with Constant Acceleration/Deceleration

For Single-step Linear Acceleration/Deceleration with Constant Acceleration/Deceleration, the acceleration/deceleration is determined by two parameters: the Maximum Feed Speed and the Acceleration Time for Positioning.

The time T required to reach the Feed Speed for Positioning can be calculated as follows:

T [ms] = Pn822 × (Pn821/Pn843)

If this acceleration/deceleration pattern is used, the acceleration/deceleration will remain constant even if the Feed Speed for Positioning is changed.

Table 4.4 Related Parameters

Object	Attribute	Pn□□□	Name
0x64	#56	Pn826	Acceleration/Deceleration Type for Positioning (= 1)
	#58	Pn829	Filter Selection (= 0)
	#51	Pn821	Feed Speed for Positioning
	#52	Pn822	Acceleration Time for Positioning
	#73	Pn843	Maximum Feed Speed

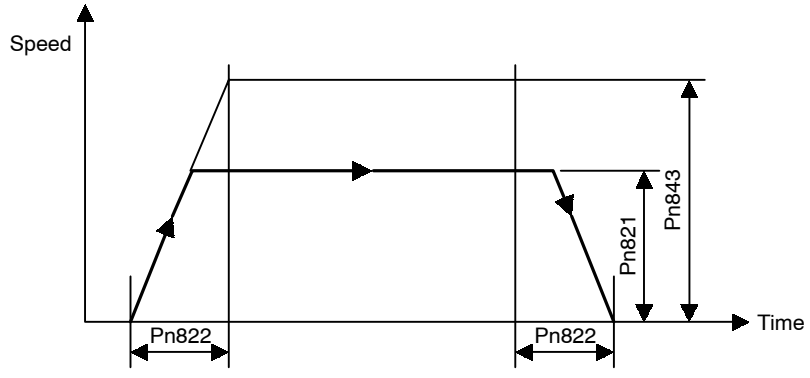


Figure 4.2 Single-step Linear Acceleration/Deceleration with Constant Acceleration/Deceleration

Double-step Linear Acceleration/Deceleration with Constant Acceleration/Deceleration

For Double-step Acceleration/Deceleration, the acceleration/deceleration will change when the Switch Speed for Second Acceleration/Deceleration is reached. The acceleration/deceleration for step 1 is determined by two parameters: the Maximum Feed Speed and the Acceleration Time for Positioning. The acceleration/deceleration for step 2 is determined by three parameters: the Maximum Feed Speed, the Switch Speed for the Second Acceleration/Deceleration, and the Acceleration/Deceleration Time Constant of the Second Acceleration/Deceleration.

The time T required to reach a constant speed for positioning can be calculated as follows:

T1 [ms] = Pn822 × (Pn824/Pn843)

T2 [ms] = Pn825 × (Pn821 − Pn824)/(Pn843 − Pn824)

T [ms] = T1 + T2

If this acceleration/deceleration pattern is used, the acceleration/deceleration will remain constant even if the Feed Speed for Positioning is changed.

Table 4.5 Related Parameters

Object	Attribute	Pn□□□	Name
0x64	#56	Pn826	Acceleration/Deceleration Type for Positioning (= 2)
	#58	Pn829	Filter Selection (= 0)
	#51	Pn821	Feed Speed for Positioning
	#52	Pn822	Acceleration Time Constant for Positioning
	#54	Pn824	Switch Speed for Second Accel/Decel
	#55	Pn825	Accel/Decel Time Constant of Second Accel/Decel
	#73	Pn843	Maximum Feed Speed

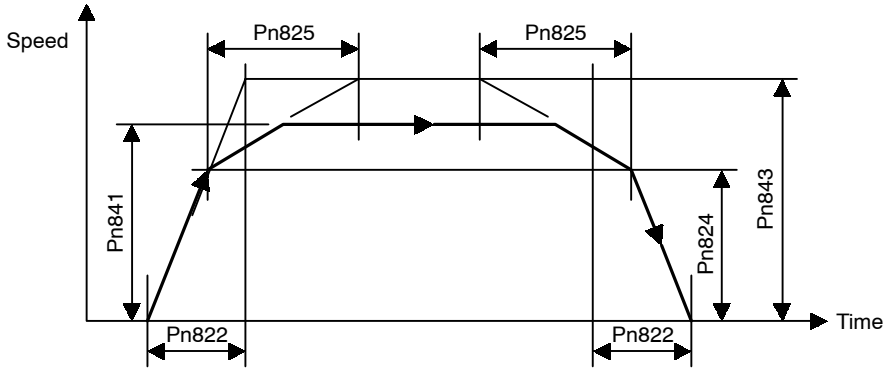


Figure 4.3 Double-step Linear Acceleration/Deceleration with Constant Acceleration/Deceleration

Asymmetric Linear Acceleration/Deceleration with Constant Acceleration/Deceleration

For Asymmetric Linear Acceleration/Deceleration, the acceleration and deceleration can be set separately in Single-step Linear Acceleration/Deceleration.

For example, for deceleration, the time T required to stop from the Feed Speed for Positioning can be calculated as follows:

T [ms] = Pn823 × (Pn821/Pn843)

If this acceleration/deceleration pattern is used, the acceleration/deceleration will remain constant even if the Feed Speed for Positioning is changed.

Table 4.6 Related Parameters

Object	Attribute	Pn□□□	Name
0x64	#56	Pn826	Acceleration/Deceleration Type for Positioning (= 3)
	#58	Pn829	Filter Selection (= 0)
	#51	Pn821	Feed Speed for Positioning
	#52	Pn822	Acceleration Time for Positioning
	#53	Pn823	Deceleration Time for Positioning
	#73	Pn843	Maximum Feed Speed

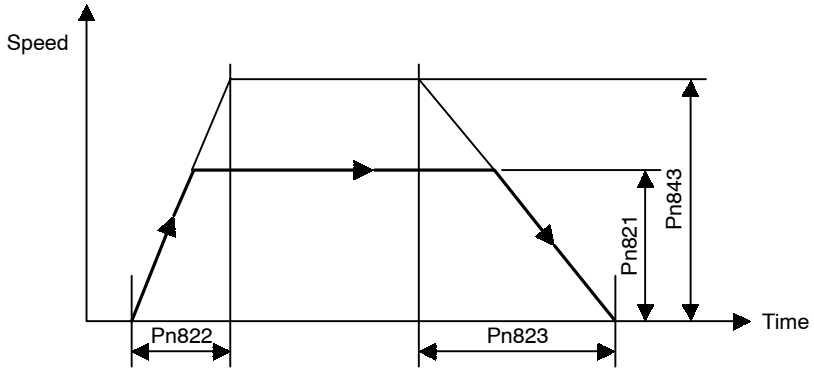


Figure 4.4 Asymmetric Linear Acceleration/Deceleration with Constant Acceleration/Deceleration

Exponential Acceleration/Deceleration with Constant Acceleration/Deceleration Time

For Exponential Acceleration/Deceleration, the acceleration/deceleration is determined by two parameters: the Feed Speed for Positioning and the Time Constant for Exponential Acceleration/Deceleration. Set the time required to reach 63.2% of the Feed Speed for Positioning to Time Constant for Exponential Acceleration/Deceleration. The acceleration/deceleration time will be 3.91 × Pn840 ms.

If this acceleration/deceleration pattern is used, the acceleration/deceleration will remain constant even if the Feed Speed for Positioning is changed.

Table 4.7 Related Parameters

Object	Attribute	Pn□□□	Name
0x64	#56	Pn826	Acceleration/Deceleration Type for Positioning (= 0)
	#58	Pn829	Filter Selection (= 1)
	#51	Pn821	Feed Speed for Positioning
	#70	Pn840	Time Constant for Exponential Acceleration/Deceleration

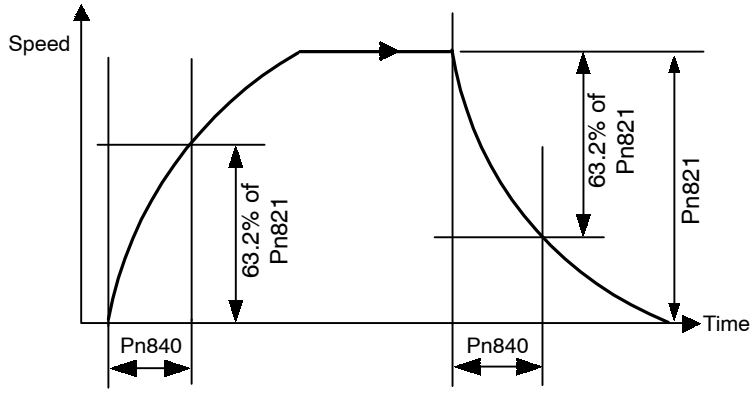


Figure 4.5 Exponential Acceleration/Deceleration with Constant Acceleration/Deceleration Time

Exponential Acceleration/Deceleration with Bias with Constant Acceleration/Deceleration Time

For Exponential Acceleration/Deceleration with Bias, a bias is applied to the Exponential Acceleration/Deceleration.

Feed speed = Bias Speed for Exponential Acceleration/Deceleration +
(Feed Speed for Positioning – Bias Speed for Exponential Acceleration/Deceleration) × 0.632

The acceleration/deceleration time can be calculated as 3.91 × Pn840 ms.

If this acceleration/deceleration pattern is used, the acceleration/deceleration will remain constant even if the Feed Speed for Positioning is changed. If the Bias Speed for Exponential Acceleration/Deceleration is set to 0 (zero), this Acceleration/Deceleration pattern will be the same as the Exponential's pattern.

Table 4.8 Related Parameters

Object	Attribute	Pn□□□	Name
0x64	#56	Pn826	Acceleration/Deceleration Type for Positioning (= 0)
	#58	Pn829	Filter Selection (= 2)
	#51	Pn821	Feed Speed for Positioning
	#70	Pn840	Time Constant for Exponential Acceleration/Deceleration
	#71	Pn841	Bias Speed for Exponential Acceleration/Deceleration

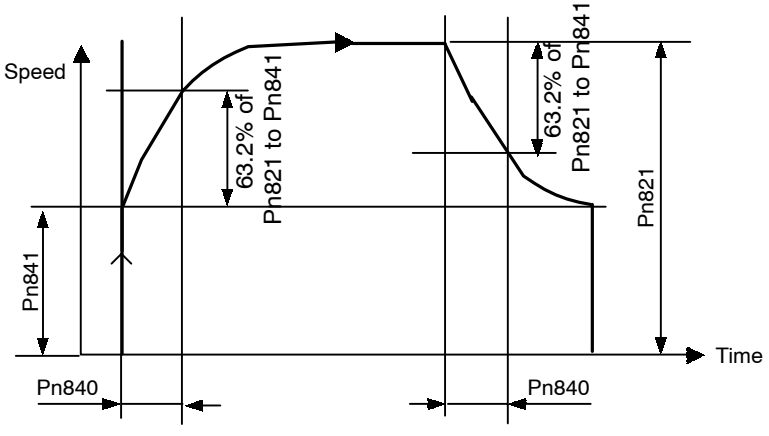


Figure 4.6 Exponential Acceleration/Deceleration with Bias with Constant Acceleration/Deceleration Time

Single-step Linear Acceleration/Deceleration with Constant Acceleration/Deceleration Time

For Single-step Linear Acceleration/Deceleration with Constant Acceleration/Deceleration Time, the acceleration/deceleration is determined by two parameters: the Feed Speed for Positioning and the Time Constant of Travelling Average.

If this acceleration/deceleration pattern is used, the acceleration/deceleration will remain constant even if the Feed Speed for Positioning is changed.

Table 4.9 Related Parameters

Object	Attribute	Pn□□□	Name
0x64	#56	Pn826	Acceleration/Deceleration Type for Positioning (= 0)
	#58	Pn829	Filter Selection (= 3)
	#51	Pn821	Feed Speed for Positioning
	#72	Pn842	Time Constant of Travelling Average

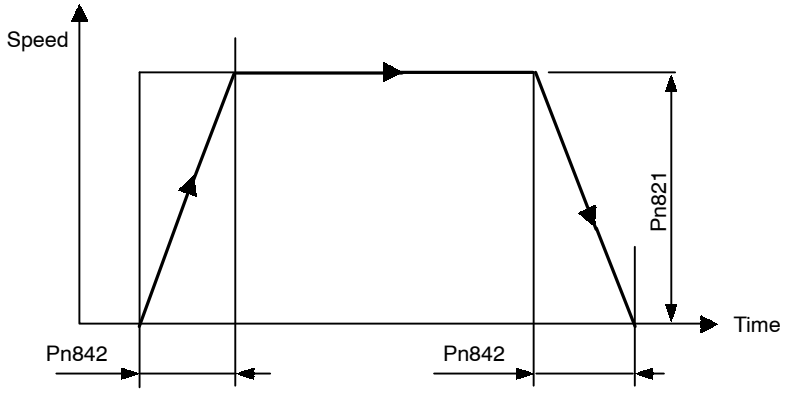


Figure 4.7 Single-step Linear Acceleration/Deceleration with Constant Acceleration/Deceleration Time

S-curve Acceleration/Deceleration with Constant Acceleration/Deceleration

For S-curve Acceleration/Deceleration with Constant Acceleration/Deceleration, the acceleration/deceleration is determined by two parameters as same as Single-step Linear Acceleration/Deceleration: the Maximum Feed Speed and the Acceleration Time for Positioning. For S-curve Acceleration/Deceleration, however, a filter is applied when starting and just before reaching the Feed Speed for Positioning to smooth the corners. The time for rounding the corners is set in the Time Constant of the Travelling Average.

The time T required to reach the Feed Speed for Positioning for positioning can be calculated as follows:

T [ms] = Pn842 + Pn822 × (Pn821/Pn843)

If this acceleration/deceleration pattern is used, the acceleration/deceleration will remain constant even if the Feed Speed for Positioning is changed.

Table 4.10 Related Parameters

Object	Attribute	Pn□□□	Name
0x64	#56	Pn826	Acceleration/Deceleration Type for Positioning (= 1)
	#58	Pn829	Filter Selection (= 3)
	#51	Pn821	Feed Speed for Positioning
	#52	Pn822	Acceleration Time for Positioning
	#72	Pn842	Time Constant of Travelling Average
	#73	Pn843	Maximum Feed Speed

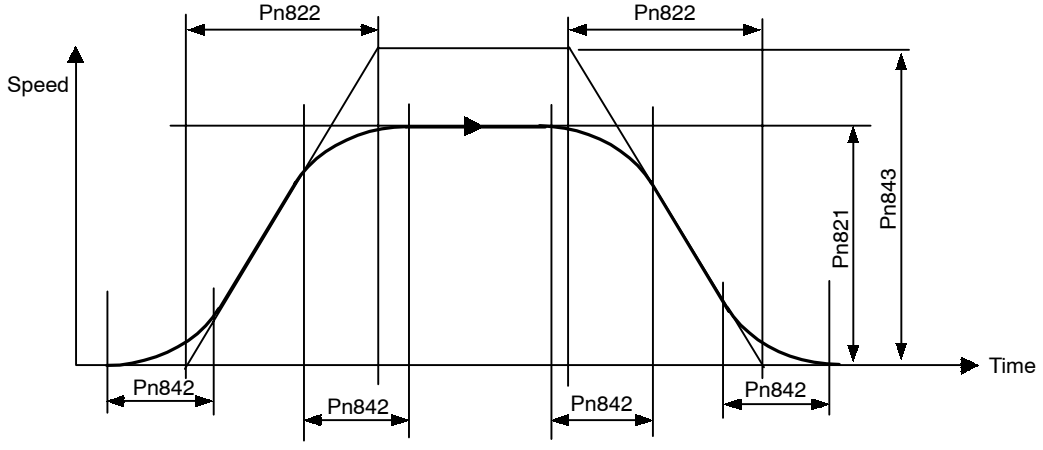


Figure 4.8 S-curve Acceleration/Deceleration with Constant Acceleration/Deceleration

Asymmetric S-curve Acceleration/Deceleration with Constant Acceleration/Deceleration

For Asymmetric S-curve Acceleration/Deceleration with constant Acceleration/Deceleration, the acceleration and deceleration can be set separately to the S-curve Acceleration/Deceleration.

Same as for Asymmetric Linear Acceleration/Deceleration, the acceleration and deceleration are determined by the Maximum Feed Speed, Acceleration Time for Positioning, and Deceleration Time for Positioning. For Asymmetric S-curve Acceleration/Deceleration, however, a filter is applied when starting, ending, and just before reaching the Feed Speed for Positioning to smooth the corners. The time for rounding the corners is set in the Time Constant of the Travelling Average.

The time T required to reach the Feed Speed for Positioning can be calculated as follows:

$T\ [ms] = Pn842 + Pn822 \times (Pn821/Pn843)$

If this acceleration/deceleration pattern is used, the acceleration/deceleration will remain constant even if the Feed Speed for Positioning is changed.

Table 4.11 Related Parameters

Object	Attribute	Pn□□□	Name
0x64	#56	Pn826	Acceleration/Deceleration Type for Positioning
	#58	Pn829	Filter Selection
	#51	Pn821	Feed Speed for Positioning (mm/min)
	#52	Pn822	Acceleration Time for Positioning
	#53	Pn823	Deceleration Time for Positioning
	#72	Pn842	Time Constant for Travelling Average
	#73	Pn843	Maximum Feed Speed

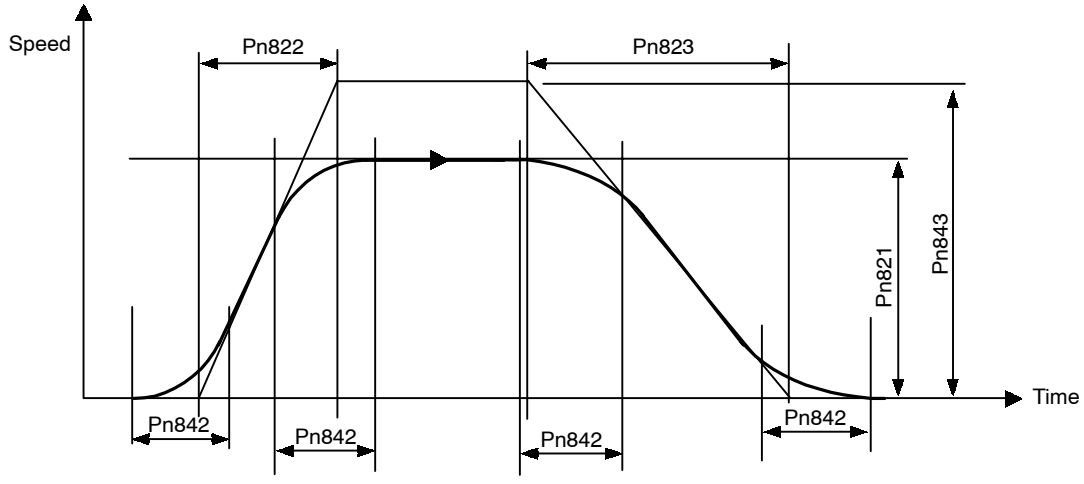


Figure 4.9 Asymmetric S-curve Acceleration/Deceleration with Constant Acceleration/Deceleration

■ Parameter Details

Feed Speed for Positioning (Object: 0x64, Attribute: #51; Pn821)

Use the Feed Speed for Positioning to set the feed speed of the positioning.
The setting unit is 1,000 reference units/min.

Acceleration Time for Positioning (Object: 0x64, Attribute: #52; Pn822)

Use the Acceleration Time for Positioning to set the acceleration time for the positioning.
The setting unit is ms.

Deceleration Time for Positioning (Object: 0x64, Attribute: #53; Pn823)

Use the Deceleration Time for Positioning to set the deceleration time for positioning.
The setting unit is ms.

This parameter is enabled only when the Acceleration/Deceleration Type for Positioning (Object: 0x64, Attribute: #56; Pn826) is set to the asymmetrical linear acceleration and deceleration.

Switch Speed for Second Acceleration/Deceleration for Positioning (Object: 0x64, Attribute: #54; Pn824)

Use the Switch Speed for Second Acceleration/Deceleration for Positioning to set the switching speed to acceleration and deceleration of the second step when using double-step linear acceleration and deceleration. The setting unit is 1,000 reference units/min.

This parameter is enabled only when the Acceleration/Deceleration Type for Positioning (Object: 0x64, Attribute: #56; Pn826) is set to double-step linear acceleration and deceleration.

Acceleration/Deceleration Time for Second Acceleration/Deceleration for Positioning (Object: 0x64, Attribute: #55; Pn825)

Use the Acceleration/Deceleration Time for Second Acceleration/Deceleration for Positioning to set the acceleration and deceleration time for the second step when using double-step linear acceleration and deceleration. The setting unit is ms.

This parameter is enabled only when the Acceleration/Deceleration Type for Positioning (Object: 0x64, Attribute: 56; Pn826) is set to double-step linear acceleration and deceleration.

Acceleration/Deceleration Type for Positioning (Object: 0x64, Attribute: #56; Pn826)

Use the Acceleration/Deceleration Type for Positioning to set the type of acceleration and deceleration for the positioning.

You can set eight different acceleration and deceleration patterns using different combinations of Acceleration/Deceleration Type for Positioning and Filter Selection (Object: 0x64, Attribute: #58; Pn829).

Setting	Description
0	None
1	Single Step Linear
2	Double Step Linear
3	Asymmetric

External Positioning Feed Speed (Object: 0x64, Attribute: #57; Pn827)

Use the External Positioning Feed Speed to set the feed speed for external positioning.

The setting unit is 1,000 reference units/min.

Filter Selection (Object: 0x64, Attribute: #58; Pn829)

Use the Filter Selection to set the acceleration and deceleration filter type. This parameter is used in common by the positioning, constant feeding, and zero point return operations.

Setting	Description
0	None
1	Exponential
2	Exponential with Bias
3	Travelling Average

Constant Feed Reference Module Selection (Object: 0x64, Attribute: #59; Pn830)

Use the Constant Feed Reference Module Selection to set the reference unit for the speed setting for a constant feed Command message.

Setting	Description
0	Sets an override value (%) for the feed speed for FEED (Pn831) in the command message.
1	Speed set directly in the command message. The setting unit is 1,000 reference units/min.

Constant Feed Speed (Object: 0x64, Attribute: #60; Pn831)

Use the Constant Feed Speed to set the feed speed when using the FEED operation.
The setting unit is 1,000 reference units/min.

Acceleration Time for Constant Feed (Object: 0x64, Attribute: #61; Pn832)

Use the Acceleration Time for Constant Feed to set the acceleration time when using the feed operation. The setting unit is ms.

Deceleration Time for Constant Feed (Object: 0x64, Attribute: #62; Pn833)

Use the Deceleration Time for Constant Feed to set the deceleration time when using asymmetrical acceleration and deceleration with the constant feed operation. The setting unit is ms.

This parameter is enabled only when the Acceleration/Deceleration Type for Constant Feed (Object: 0x64, Attribute: #65; Pn836) is set to asymmetrical linear acceleration and deceleration.

Switch Speed for Constant Feed Second Accel/Decel (Object: 0x64, Attribute: #63; Pn834)

Use the Switch Speed for Constant Feed Second Acceleration/Deceleration to set the switching speed to double-step acceleration and deceleration when using double-step linear acceleration and deceleration with the constant feed operation. The setting unit is 1,000 reference units/min.

This parameter is enabled only when the Acceleration/Deceleration Type for Constant Feed (Object: 0x64, Attribute: #65; Pn836) is set to double-step linear acceleration and deceleration.

Accel/Decel Time for Constant Feed Second Accel/Decel (Object: 0x64, Attribute: #64; Pn835)

Use the Acceleration/Deceleration Time for Constant Feed Second Acceleration/Deceleration to set the second acceleration/deceleration time when using double-step linear acceleration and deceleration with the constant feed operation. The setting unit is ms.

This parameter is enabled only when the Acceleration/Deceleration Type for Constant Feed (Object: 0x64, Attribute: #65; Pn836) is set to double-step linear acceleration and deceleration.

Acceleration/Deceleration Type for Constant Feed (Object: 0x64, Attribute: #65; Pn836)

Use the Acceleration/Deceleration Type for Constant Feed to set the acceleration and deceleration type with the constant feed operation.

You can set eight different acceleration and deceleration patterns using different combinations of Acceleration/Deceleration Type for Constant Feed and Filter Selection (Object: 0x64, Attribute: #58; Pn829).

Setting	Description
0	None
1	Single Step Linear
2	Double Step Linear
3	Asymmetric

Time Constant for Exponential Acceleration/Deceleration (Object: 0x64, Attribute: #70; Pn840)

Use the Time Constant for Exponential Acceleration/Deceleration to set the time constant when using exponential acceleration and deceleration. This parameter is used in common by the positioning and the continuous rotary operation. The setting unit is ms.

Bias Speed for Exponential Acceleration/Deceleration (Object: 0x64, Attribute: #71; Pn841)

Use the Bias Speed for Exponential Acceleration/Deceleration to set the bias speed of the exponential acceleration and deceleration. The setting unit is 1,000 reference units/min.

Time Constant of Travelling Average (Object: 0x64, Attribute: #72; Pn842)

Use the Time Constant of Travelling Average to set the time constant of the average travel speed of the acceleration and deceleration. This parameter is used in common by the positioning and the continuous rotary operation. The setting unit is ms.

Maximum Feed Speed (Object: 0x64, Attribute: #73; Pn843)

Use the maximum Feed Speed to set the maximum feed speeds for all speed-related parameters. The acceleration and deceleration data is calculated from this data and the time constants. The setting unit is 1,000 reference units/min.
The speed-related parameters are as follows: Pn802, Pn803, Pn804, Pn821, Pn824, Pn827, Pn831, Pn834, Pn841, Pn854, Pn862, Pn873 to Pn882, and Pn940 to Pn971.

Step Distance 1 (Object: 0x64, Attribute: #74; Pn844)

Use the Step Distance 1 to set the amount of travel when executing step operation. This value is used when the 0 has been specified as the command data in a command message.

The setting unit is reference units.

Step Distance 2 (Object: 0x64, Attribute: #75; Pn845)

Use the Step Distance 2 to set the amount of travel when executing step operation. This value is used when the 1 has been specified as the command data in a command message.

The setting unit is reference units.

Step Distance 3 (Object: 0x64, Attribute: #76; Pn846)

Use the Step Distance 3 to set the amount of travel when executing step operation. This value is used when the 2 has been specified as the command data in a command message.

The setting unit is reference units.

Step Distance 4 (Object: 0x64, Attribute: #77; Pn847)

Use the Step Distance 4 to set the amount of travel when executing step operation. This value is used when the 3 has been specified as the command data in a command message.

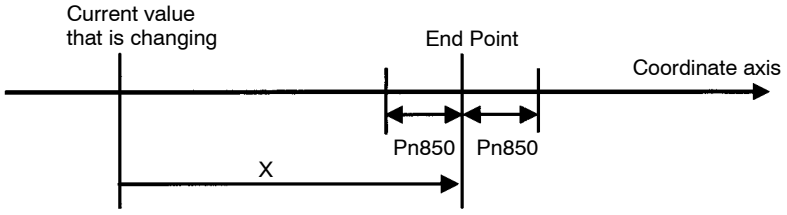
The setting unit is reference units.

4.3.5 Positioning

■ Parameter Details

Positioning Deadband (Object: 0x64, Attribute: #90; Pn850)

Use the Positioning Deadband to set the positioning completed range, i.e., to determine if the axis is on-target position. The setting unit is reference units. When the positioning deadband is set to 0, no on-target position check will be performed.



Positioning Deadband

When the following condition is satisfied in the above figure, the axis is viewed as being at the on-target position and the On-target Flag in the response message will be set to 1.

- X = (End point – Current value) ≤ Pn850

Positioning Timeout (Object: 0x64, Attribute: #91; Pn851)

Use the Positioning Timeout to set the time for performing on-target position check. The setting unit is ms. If, after the move command distribution has been completed, the positioning completed range is not entered within the time set, A.9A positioning a completion timeout warning will be sent.

If this parameter is set to 0, the check time becomes infinite.

Positioning Proximity Detection Width (Object: 0x64, Attribute: #92; Pn852)

Use the Positioning Proximity Detection Width to set the range for positioning area proximity to be detected. If the difference between the current position and the target position are within this parameter range, the proximity signal in the response message will be set to 1. The setting unit is reference units.

Direction for Rotation System (Object: 0x64, Attribute: #93; Pn853)

Use the Direction for Rotation System to set the rotation direction for when Station Commands or rotation commands using absolute values are used.

Setting	Description
0	Uses the rotation direction in command message.
1	Uses the direction for the shortest travel.

Approach Speed for External Positioning (Object: 0x64, Attribute: #94; Pn854)

Use the Approach Speed for External Positioning to set the approach speed after the external signal has reversed status for an external positioning command.

The setting unit is 1,000 reference units/min.

Travel Distance for External Positioning (Object: 0x64, Attribute: #95; Pn855)

Use the Travel Distance for External Positioning to set the travel distance after the external signal has reversed status for an external positioning command.

The setting unit is reference units.

Function Selection for External Positioning (Object: 0x64, Attribute: #96; Pn856)

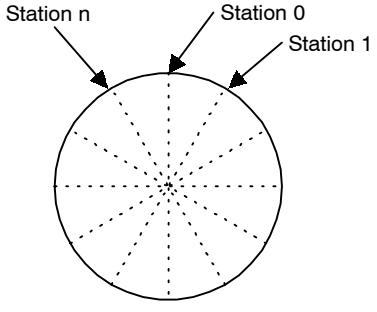
Use the Function Selection for External Positioning to select the polarity of the external signal.

Bit	Name	Description
0	External Signal Polarity	0: Enabled on low 1: Enabled on high
2 to 15	Reserved	–

Number of Stations (Object: 0x64, Attribute: #100; Pn85A)

Use the Number of Stations to set how many stations one revolution of the servomotor will be evenly split into when Station Commands are used.

In Station Commands, equally divided stations are numbered in order from 0 and positioning is performed by specifying a station number.

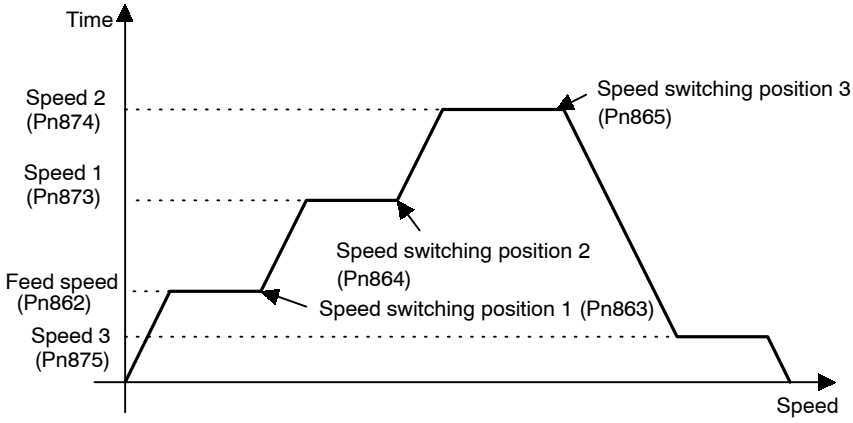


4.3.6 Multi-speed Positioning

By using multi-speed positioning, the speed can be changed in stages during positioning.

Up to 16 speed change stages are possible.

When the axis reaches a specified position, the speed switches to the speed for the next stage and the axis travels to the specified position in that next stage.



■ Parameter Details

Number of Points for Speed Switching (Object: 0x64, Attribute: #111; Pn861)

Use the Number of Points for Speed Switching to set the number of points at which the speed will be switched. If, for example, the parameters for speed switching positions were set from 1 to 16 but this setting for the number of points was set to 3, the speed switching would be enabled for 3 points only.

Initial Feed Speed for Multi-speed Positioning (Object: 0x64, Attribute: #112; Pn862)

Use the Initial Feed Speed for Multi-speed Positioning to set the initial feed speed when performing speed multi-step positioning. This speed will be enabled until the position in the speed switching position 1 parameter is reached.

The setting unit is 1,000 reference units/min.

Speed Switching Positions 1 to 16 (Object: 0x64, Attribute: #113 to #128; Pn863 to Pn872)

Use the Speed Switching Position to set the position at which the speed is to change at a position relative to the start position. The speed switching position xx and switching speed xx are used

together. For example, the axis will travel from speed switching position 1 to speed switching position 2 at speed 1.

The setting unit is reference units.

Switching Speeds 1 to 16 (Object: 0x64, Attribute: #129 to #144; Pn873 to Pn882)

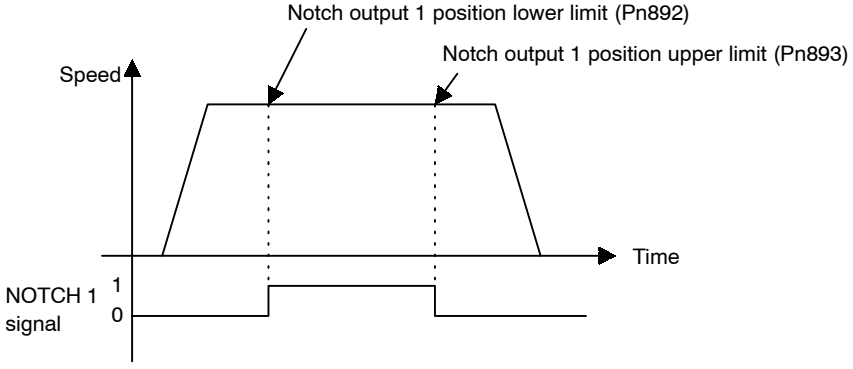
Use the Switching Speed to set the feed speed between specified speed switching positions. For example, the axis will travel at speed 2 between speed switching position 2 and speed switching position 3.

The setting unit is 1,000 reference units/min.

4.3.7 Notch Signal Output Positioning

During the positioning, notch signals (NOTCH 1 and NOTCH 2) are output when specified points are passed.

Two notch signals, NOTCH 1 and NOTCH 2, can be output.



■ Parameter Details

Notch Signal Output Position Setting (Object: 0x64, Attribute: #160; Pn890)

Use the Notch Signal Output Position Setting to set whether absolute or relative positions are set for the notch signal output position parameters.

Setting	Description
0	Setting absolute position.
1	Specifies relative position.

Notch Signal Output Setting (Object: 0x64, Attribute: #161; Pn891)

Use the Notch Signal Output Setting to set the polarity of the notch signal output.

Table 4.12 Notch Signal Output Setting

Setting	Description
0	Sets NOTCH 1 signal.
1	Sets NOTCH 2 signal.

Table 4.13 Bit Meanings

Bit 0/ Bit 1	Description
0	Normally: OFF When passed: ON
1	Normally: ON When passed: OFF

Notch 1 Output Position Lower Limit (Object: 0x64, Attribute: #162; Pn892)
Notch 1 Output Position Upper Limit (Object: 0x64, Attribute: #163; Pn893)

Use the Notch 1 Output Position Upper/Lower Limits to set the output position range for notch signal (NOTCH 1). When the current position is inside this range, the status of the NOTCH 1 signal output is reversed based on the notch signal output setting.

Notch 2 Output Position Lower Limit (Object: 0x64, Attribute: #164; Pn894)
Notch 2 Output Position Upper Limit (Object: 0x64, Attribute: #165; Pn895)

Use the Notch 2 Output Position Upper/Lower Limits to set the output position range for notch signal (NOTCH 2). When the current position is inside this range, the status of the NOTCH 2 signal output is reversed based on the notch signal output setting.

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5

DeviceNet Communications

This chapter explains using DeviceNet communications to execute commands and editing parameters for an NS300 Module.

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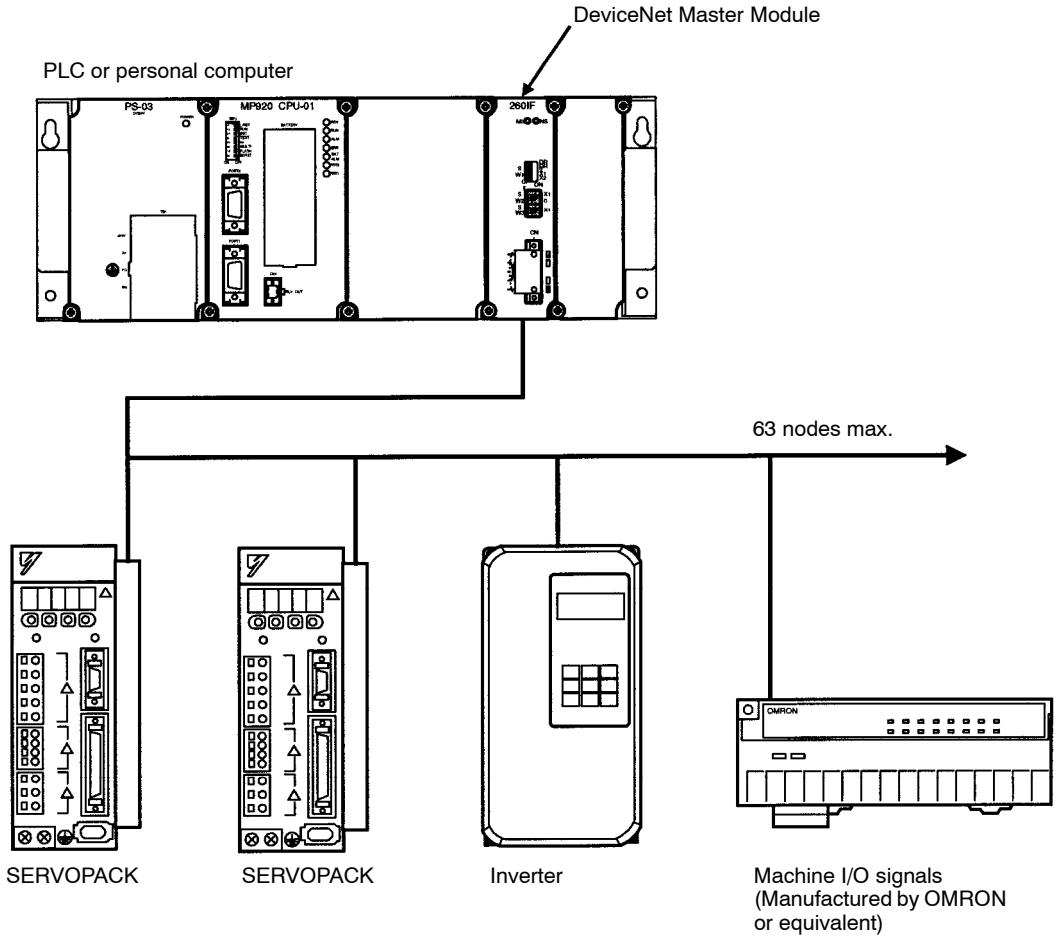
5.1 Specifications and Configuration

5.1.1 Specifications

Refer to *DeviceNet Specification Release 2.0* for details not specified in this manual.

5.1.2 Control Configuration

An outline of the control configuration is shown below. A maximum of 63 NS300 Modules or other slave devices can be connected to one DeviceNet Master.



5.2 DeviceNet Communications Setting Switches

This section explains the switch settings required for DeviceNet communications.

5.2.1 Rotary Switch Settings for Setting Node Address

Use the rotary switches (x1, x10) to set the DeviceNet node address. After making the settings, cycle the communications power to enable the settings.

The node address can be set between 0 and 63. If you make a setting outside this range, a setting error will occur.

Select the node address of the NS300 Module using the switch settings as shown in the following table.

× 10	× 1	Node Address	× 10	× 1	Node Address	× 10	× 1	Node Address
0	0	0	3	4	34	6	8	Setting error
0	1	1	3	5	35	6	9	Setting error
0	2	2	3	6	36	7	0	Setting error
0	3	3	3	7	37	7	1	Setting error
0	4	4	3	8	38	7	2	Setting error
0	5	5	3	9	39	7	3	Setting error
0	6	6	4	0	40	7	4	Setting error
0	7	7	4	1	41	7	5	Setting error
0	8	8	4	2	42	7	6	Setting error
0	9	9	4	3	43	7	7	Setting error
1	0	10	4	4	44	7	8	Setting error
1	1	11	4	5	45	7	9	Setting error
1	2	12	4	6	46	8	0	Setting error
1	3	13	4	7	47	8	1	Setting error
1	4	14	4	8	48	8	2	Setting error
1	5	15	4	9	49	8	3	Setting error
1	6	16	5	0	50	8	4	Setting error
1	7	17	5	1	51	8	5	Setting error
1	8	18	5	2	52	8	6	Setting error
1	9	19	5	3	53	8	7	Setting error
2	0	20	5	4	54	8	8	Setting error
2	1	21	5	5	55	8	9	Setting error
2	2	22	5	6	56	9	0	Setting error
2	3	23	5	7	57	9	1	Setting error
2	4	24	5	8	58	9	2	Setting error
2	5	25	5	9	59	9	3	Setting error
2	6	26	6	0	60	9	4	Setting error
2	7	27	6	1	61	9	5	Setting error
2	8	28	6	2	62	9	6	Setting error
2	9	29	6	3	63	9	7	Setting error
3	0	30	6	4	Setting error	9	8	Setting error
3	1	31	6	5	Setting error	9	9	Setting error
3	2	32	6	6	Setting error	---	---	---
3	3	33	6	7	Setting error	---	---	---

5.2.2 Rotary Switch Settings for Setting Baud Rate

Use the DR rotary switches to set the DeviceNet baud rate. After making the settings, cycle the communications power supply to enable the settings.

Table 5.1 DR Settings

DR	Baud Rate Setting
0	125 Kbps
1	250 Kbps
2	500 Kbps
3 to 9	A setting error will occur.

5.2.3 LED Indicators

NS300 Modules are equipped with two LED indicators, the Module Status indicator to indicate the Module status, and the Network Status indicator to indicate the DeviceNet communications status.

The LED indicator specifications conform to *DeviceNet Specification Release 2.0*.

■ Module Status (MS) Indicator

The MS indicator shows the status of the NS300 Module.

Status	Indicator
SGDH control power supply is turned OFF.	Not lit.
Module is operating normally.	Lit green.
Module is warming up.	Flashes green.
Minor Module failure.	Flashes red.
Major Module failure.	Lit red.
Module is performing self-diagnosis.	Red and green flash alternately.

Refer to the alarm codes in *Appendix C* for details on the malfunction if the the Module Status indicator is either flashing red or lit red.

■ Network Status (NS) Indicator

The NS indicator shows the status of DeviceNet communications.

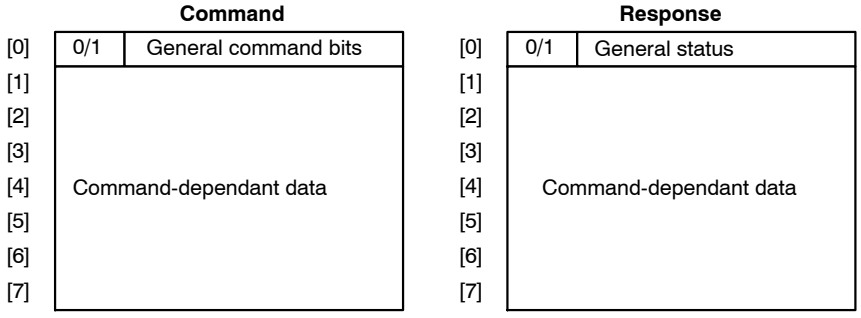
Status	Indicator
SGDH control power supply is turned OFF or Module is not online.	Not lit.
Module is online, but is not connected to the master device.	Flashes green.
Module is online, and is connected to the master device.	Lit green.
Connection to the master device has timed out.	Flashes red.
A fatal error has occurred in DeviceNet communications.	Lit red.

5.3 Command/Response Format

This section explains command messages sent to an NS300 Module from the master device and the response messages sent from the NS300 Module.

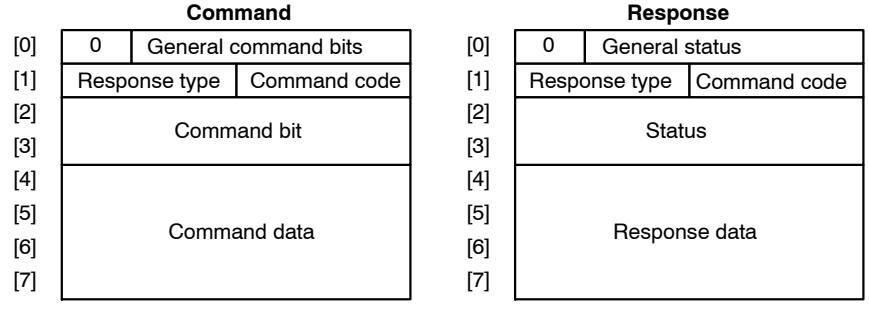
5.3.1 Command Format

This section explains the basic format of command messages sent to an NS300 Module from the master device and the response messages sent from the NS300 Module to the master device. Command and response messages are in an 8-byte data format.

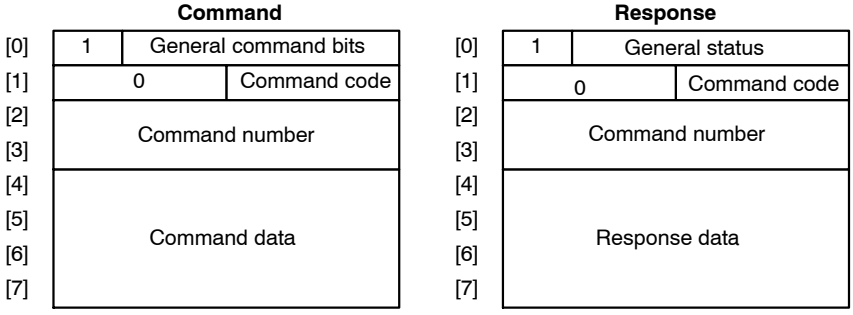


Both the command and response data are separated into two sections. Byte 0 is a general area and bytes 1 to 7 make up the command-dependant data area. The command-dependant data area depends on the two types of commands, move commands and set/read commands. The type of command is defined by the most-significant bit of byte 0.

■ Format for Move Commands



■ Format for Set/Read Commands



5.3.2 General Command Bits and Status

■ General Command Bits

The general command bit area is detailed below.

Table 5.2 General Command Bits

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	MOD	0	ALRST	ESTP	0	0	SVON	C_STRT

Mode: MOD

Use the MOD bit to specify the data format for bytes 1 to 7.

- 0: Move command format
- 1: Set/read command format



The MOD bit alters the data format for bytes 1 to 7. Set it carefully.

Alarm Reset Command: ALRST

Set the ALRST bit to 1 to reset the current alarm/warning. When an alarm or warning occurs in the NS300 Module or SGDH, remove the cause of the alarm before setting this bit to 1. The alarm/warming will be cleared.

Always make sure this bit is set to 0 during normal operation and after an alarm has been cleared.

Emergency Stop Command: ESTP

When the ESTP bit is changed from 1 to 0, a move command is canceled and the SGDH servo is turned OFF. If the axis is travelling, axis travel is stopped immediately and the SGDH servo is turned OFF as soon as the servomotor stops.

The ESTP Command has negative logic to confirm that DeviceNet communications have been established. Therefore, set the bit to 1 for normal operation and set it to 0 for emergency stops.

The emergency stop status will continue while this bit is set to 0. To release the emergency stop status, set the bit to 1. To turn ON the servo after releasing an emergency stop, set the Servo ON Command bit to 0 and then set it to 1.

Servo ON Command: SVON

Set the SVON bit to 1 to turn ON the SGDH servo. When the leading edge of the bit is detected, the SGDH servo is turned ON and remains ON while the command bit is set to 1. When the command bit setting changes to 0, the servo is turned OFF.

If an alarm turns OFF the SGDH servo, the command bit must be set to 0 and then set to 1 again.

Command Start Command: C_STRT

Set the C_STRT bit to 1 to start execution of the command specified by the command code. Always set the command code and command area data before (or at the same time as) setting the C_STRT bit to 1.

Refer to *5.3.3 Move Command Messages* and *5.3.4 Set/Read Command Messages* for details on using command codes.

■ General Status

Details on the general status area are shown below.

Table 5.3 General Status Bits

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	MOD_R	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R

Mode: MOD_R

The MOD_R bit specifies the data format of bytes 1 to 7.

This bit will be the same as the mode given in the command message.

- 0: Response format for move commands
- 1: Response format for set/read commands

Command Ready: READY

The READY bit will be set to 1 when the NS300 Module is ready to receive commands from the host device. The READY status will be 0 when the Servo ON Command is being executed, when the Parameter Read Command is being executed, when the Parameter Write Command is being executed, when the power is turned ON, when the Module Reset Command in the command message has been received and when the NS300 Module is initializing.

Main Power Supply Status: PWRON

The PWRON bit will be set to 1 when the SGDH main power supply is turned ON. If the main power supply is turned OFF, the bit will be 0 and the Servo ON and other commands cannot be executed.

Emergency Stop: ESTP_R

The ESTP_R bit will be set to 0 when the Emergency Stop Command in the command message has been set to 0 and the NS300 Module is in emergency stop status. Set the Emergency Stop Command in the command message to 1 to clear the emergency stop status, and this bit will change to 1.

This status has negative logic.

Alarm: ALRM

The ALRM bit will be set to 1 when the NS300 Module has detected an alarm. When all alarms have been cleared by the Alarm Reset Command in the command message, this bit will change to 0.

Warning: WARN

The WARN bit will be set to 1 when the NS300 Module has detected a warning. When all warnings have been cleared by the Alarm Reset Command in the command message, this bit will change to 0.

When a warning has occurred, the command that generated the warning and commands other than data setting commands can still be executed normally.

Servo ON: SVON_R

The SVON_R bit will be set to 1 when the Servo ON Command in the command message is set to 1 and the SGDH servo is ON.

The SVON_R bit will be 0 in the following circumstances.

- When the Servo ON Command in the command message has been set to 0
- When the Emergency Stop Command has been set to 0
- When the Module Reset Command has been set to 1
- When an alarm has occurred

Command Start Response: C_STRT_R

The C_STRT_R bit will be set to 1 when the Command Start Command in the command message has been set to 1. The host device can recognize that the NS300 Module has received a command from the host device by checking that this bit is 1.

5.3.3 Move Command Messages

■ Command Messages

Details on command messages for move commands are shown below.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	ALRST	ESTP	0	0	SVON	C_STRT
1	Response type				Command code			
2	HOME	PTBL	STN	STEP	FEED	0	HOLD	CANCEL
3	0	0	0	0	0	0	DIR	INC
4	Command data							
5								
6								
7								

5

Command Codes

Command codes are used to specify positioning and other commands. To start execution of a command, set the command code and command data first (or at the same time), and then change the Command Start Command from 0 to 1.

Command Codes	Description
0000	No operation
0001	Simple positioning
0010	External positioning
0011	Positioning with notch signal outputs
0100	Multi-speed positioning

Response Types

The response type in the command message specifies the type of data that will be stored as the response data in the response message. The NS300 Module creates response data in the response messages based on the specified response type.

Response Type	Response Data
0000	Command position (reference units)
0001	Current position (reference units)
0010	Position error (reference units)
0011	Command speed (1000 reference units/min)
0100	Current speed (1000 reference units/min)
0101	Torque (%)
1010	Station number
1011	Point table number

Cancel Command: CANCEL

If the Cancel Command is set to 1 during execution of a move command, the execution of the move command will be stopped and the servomotor will decelerate to a stop. The remaining travel distance will be canceled.

Hold Command: HOLD

If the Hold Command is set to 1 during execution of a move command, the execution of the move command will be held and the servomotor will decelerate to a stop. The NS300 Module will wait for command execution to be restarted. Set the Hold Command to 0 again to restart the execution of a move command.

Constant Feed Command: FEED

The NS300 Module will start feeding at a constant speed when it detects the leading edge of the FEED bit. Constant feeding will continue while this bit is set to 1.

When the FEED bit is set to 0, the servomotor will decelerate to a stop. The direction for feeding is determined by the Movement Direction set in the command data area.

An override can be set for this command in the command data area. The override can be from 0% to 200% of the parameter speed or a specific speed can be set in the command data. Which method is used depends on Pn830 (Constant Feed Reference Unit Selection).

Settings Data Area	Description	
Movement direction	0: Forward 1: Reverse	
Command data	When Pn830 = 0	Set an override value (0 to 200). Set to 100 when not using the override function.
	When Pn830 = 1	Set the feed speed.

Step Command: STEP

The NS300 Module will start step operation when it detects the leading edge of the STEP bit. While the STEP bit is set to 1, the axis will travel only the distance set in the specified parameter. If the STEP bit is set to 0 during step operation, the servomotor will decelerate to a stop and the step operation will end. The remaining travel distance will be canceled.

The direction of movement for step operations is determined by the Movement Direction set in the command data area. The number of the step travel distance (0 to 3) is also set in the command data area. The parameter data set in Pn844 to Pn847 will be used for the step travel distance.

Settings Data Area	Description
Movement direction	0: Forward 1: Reverse
Command data	Set the selection number for step travel distance. 0: Uses Pn844 data. 1: Uses Pn845 data. 2: Uses Pn846 data. 3: Uses Pn847 data.

Station Command: STN

The NS300 Module will start station operation when it detects the leading edge of the STN bit. If this command is set to 0 while the axis is travelling, the servomotor will decelerate to a stop and the station operation will end. The remaining travel distance will be cancelled.

Settings Data Area	Description
Movement direction	0: Forward 1: Reverse
Absolute/incremental value	Specify whether the station number is an absolute value or incremental value.
Command data	Specify the target station number.

Point Table Command: PTBL

The NS300 Module will start point table operation when it detects the leading edge of the PTBL bit. If this command is set to 0 while the axis is travelling, the servomotor will decelerate to a stop and the point table operation will end. The remaining travel distance will be cancelled.

Settings Data Area	Description
Absolute/incremental value	Specify whether the position data in the point table is an absolute value or incremental value.
Command data	Specify the point table number to be used.

Zero Point Return Command: HOME

The NS300 Module will start a zero point return when it detects the leading edge of the HOME bit. If this command is set to 0 while the axis is travelling, the servomotor will decelerate to a stop and the zero point return operation will end. The zero point return operation will not restart even if the HOME bit is set to 1 again.

The type of zero point return depends on the zero point return mode setting in Pn800.

Incremental Specification: INC

The INC bit specifies whether the data that indicates a position is used as an absolute value or an incremental value. Set this bit to 0 to specify an absolute position and to 1 to specify an incremental position.

This setting is used for the following commands.

- Station Command
- Point Table Command
- Positioning Command

Movement Direction: DIR

The DR bit specifies the movement direction. Set this bit to 0 for forward and to 1 for reverse operation.

This specification is used for the following commands.

- Feed Command
- Step Command
- Station Command

The movement direction specification is disabled during normal positioning.

■ Response Messages

The response messages for move commands are shown below.

Table 5.4 Responses for Move Commands

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	Response type				Command code			
2	HOME_R	PTBL_R	STN_R	STEP_R	FEED_R	0	HOLD_R	PRGS
3	POT	NOT	INPOS	NEAR	HOME_P	0	DIR_R	INC_R
4	Command message							
5								
6								
7								

Progressing Flag: PRGS

The PRGS bit is set to 1 during the execution of a command. For move commands, this flag will be set to 1 while outputting to the SGDH.

When command execution has been completed or when a Cancel Command or other stop command has been received, the Progressing Flag is set to 0.

Holding Flag: HOLD_R

The HOLD_R bit is set to 1 when a Hold Command is received from the host device and for the duration of the hold.

The host device can confirm that the NS300 Module correctly received the Hold Command by checking that the Holding Flag is set to 1.

Constant Feed Flag: FEED_R

The FEED_R bit reflects the status of the Constant Feed Command in the command message. The host device can confirm that the NS300 Module correctly received the Constant Feed Command by checking that the Feed Flag is set to 1.

This flag is set to 1 even if constant feeding cannot be executed because of a Servo OFF status, for example. The user must monitor for alarms during constant feeding for the Constant Feed Command.

The movement direction during constant feeding can be checked using the Movement Direction Flag: DIR_R.

Step Flag: STEP_R

The STEP_R bit reflects the status of the Step Command in the command message. The host device can confirm that the NS300 Module correctly received the Step Command by checking that the Step Flag is set to 1.

This flag is set to 1 even if the step operation cannot be executed because of a Servo OFF status, for example. The user must monitor for alarms during step operation.

Station Flag: STN_R

The STN_R bit reflects the status of the Station Command in the command message. The host device can confirm that the NS300 Module correctly received the Station Command by checking that the Station Flag is set to 1.

This flag is set to 1 even if the station operation cannot be executed because of a Servo OFF status, for example. The user must monitor for alarms during station operation.

Point Table Flag: PTBL_R

The PTBL_R bit reflects the status of the Point Table Command in the command message. The host device can confirm that the NS300 Module correctly received the Point Table Command by checking that the Point Table Flag is set to 1.

This flag is set to 1 even if the point table operation cannot be executed because of a Servo OFF status, for example. The user must monitor for alarms during point table operation.

Zero Point Return Flag: HOME_R

The HOME_R bit reflects the status of the Zero Point Return Command in the command message. The host device can confirm that the NS300 Module correctly received the Zero Point Return Command by checking that the Zero Point Return Flag is set to 1.

This flag is set to 1 even if the zero point return cannot be executed because of a Servo OFF status, for example. The user must monitor for alarms during zero point return.

Incremental Specification Flag: INC_R

The INC_R bit reflects the status of the Incremental Specification in the command message. The host device can confirm by the change of status of this flag that the NS300 Module has correctly received change in the incremental specification.

Movement Direction Flag: DIR_R

The DIR_R bit reflects the status of the Movement Direction Specification in the command message. This flag is set to 0 to indicate forward, and to 1 to indicate reverse.

Zero Point Flag: HOME_P

The HOME_P bit is set to 1 when the servomotor is within the zero point range. The zero point range is set in Pn806 (Zero Point Return Output Width).

When an incremental position detection system is used, this flag cannot be set to 1 for the period from when power is turned ON to the SGDH until the initial zero point return has been completed.

Near Signal Flag: NEAR

The NEAR bit is set to 1 when the current position is within the On-target position range. When the current position is outside the On-target position range, the flag is set to 0. The On-target position range is set in Pn852 (Positioning Proximity Detection Width).

In-position Flag: INPOS

The INPOS bit is set to 1 when the current position is within the positioning completed range of the target position. The flag is set to 0 when the current position is outside the positioning completed range. The On-target position range is set in Pn850 (Positioning Deadband).

Negative Overtravel Flag: NOT

The NOT bit indicates the status of the negative overtravel signal for the external input connected to CN1 on the SGDH.

Positive Overtravel Flag: POT

The POT bit indicates the status of the positive overtravel signal for the external input connected to CN1 on the SGDH.

5.3.4 Set/Read Command Messages

■ Command Messages

Details on bytes 1 to 7 of the command messages for set/read commands (MOD = 1) are shown below.

The response type does not need to be specified for set/read commands.

Table 5.5 Set/Read Commands

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	ALRST	ESTP	0	0	SVON	C_STRT
1	0				Command code			
2	Command number							
3								
4	Command message							
5								
6								
7								

Command Codes

A list of command codes is shown in the following table. Set “No operation” for commands that will not be executed.

The command codes in the response messages will basically be a copy of the command codes in the command messages. A warning for parameter setting error will be returned when the parameter number is different or the data is outside the setting range for the parameter.

Table 5.6 Command Codes

Command Code	Description
0000	No operation
1000	Read parameter
1001	Write parameter
1010	Set current position
1011	Set zero point
1100	Read alarm
1110	Reset Module

■ Response Messages

Details on bytes 1 to 7 of the response messages for set/read commands (MOD = 1) are shown below.

Table 5.7 Responses for Set/Read Commands

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	0				Command code			
2	Command number							
3								
4	Response data							
5								
6								
7								

■ Parameter Read Command

The Parameter Read Command reads SGDH and NS300 Module parameters.

To use the Parameter Read Command, make the following settings and then change the Command Start Command from 0 to 1.

- Command code
- Parameter number

Table 5.8 Parameter Read Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	ALRST	ESTP	0	0	SVON	C_STRT
1	0				8			
2	Parameter number							
3								
4	0							
5								
6								
7								

Table 5.9 Response for Parameter Read Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	0				8			
2	Parameter number							
3								
4	Parameter data							
5								
6								
7								

■ Parameter Write Command

The Parameter Write Command writes SGDH and NS300 Module parameters.

To use the Parameter Write Command, make the following settings and then change the Command Start Command from 0 to 1.

- Command code
- Parameter number
- Parameter data

Table 5.10 Parameter Write Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	ALRST	ESTP	0	0	SVON	C_STRT
1	0				9			
2	Parameter number							
3								
4	Parameter data							
5								
6								
7								

Table 5.11 Response for Parameter Write Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	0				9			
2	Parameter number							
3								
4	Parameter data							
5								
6								
7								

■ Current Position Setting Command

The Current Position Setting Command sets the specified value as the current position of the servomotor.

To use the Current Position Setting Command, make the following settings and then change the Command Start Command from 0 to 1.

- Command code
- Current position data

Table 5.12 Current Position Setting Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	ALRST	ESTP	0	0	SVON	C_STRT
1	0				10 (decimal)			
2	0							
3								
4	Current position data							
5								
6								
7								

Table 5.13 Response for Current Position Setting Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	0				10 (decimal)			
2	0							
3								
4	Current position data							
5								
6								
7								

■ Setting the Zero Point

If using an absolute encoder, the current position of the motor is set as the zero point. To execute the Zero Point Setting Command, set the command code and then change the Command Start Command from 0 to 1. It is not necessary to make any settings in the data area.

If the Zero Point Setting Command is completed successfully, an offset will be set in Pn809 (Zero Point Offset). The setting of this parameter will be deleted when the power supply to the NS300 Module is turned OFF. After carrying out the Zero Point Setting Command, always use the Module Reset Command to store the parameters in flash ROM.

Table 5.14 Zero Point Setting Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	ALRST	ESTP	0	0	SVON	C_STRT
1	0				11 (decimal)			
2	0							
3								
4	0							
5								
6								
7								

Table 5.15 Response for Zero Point Setting Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	0				11 (decimal)			
2	0							
3								
4	0							
5								
6								
7								

■ Alarm Read Command

The Alarm Read Command reads the last four alarms that have occurred on the SGDH and the NS300 Module.

To use the Alarm Read Command, make the command code settings and then change the Command Start Command from 0 to 1.

Table 5.16 Alarm Read Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	ALRST	ESTP	0	0	SVON	C_STRT
1	0				12 (decimal)			
2	0							
3								
4	0							
5								
6								
7								

Table 5.17 Response for Alarm Read Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	0				12 (decimal)			
2	0							
3								
4	Last alarm code							
5	Second last alarm code							
6	Third last alarm code							
7	Fourth last alarm code							

■ Module Reset Command

The Module Reset Command restarts the SGDH and NS300 Module software. When this command is executed, the NS300 Module parameters are stored in flash ROM and then the NS300 Module is restarted.

To use the Module Reset Command, make the command code settings and then change the Command Start Command from 0 to 1.

When the NS300 Module is resetting the Module, the Command Ready Flag is set to 0. When the reset has been completed, the flag is set to 1.

Table 5.18 Module Reset Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	ALRST	ESTP	0	0	SVON	C_STRT
1	0				14 (decimal)			
2	0							
3								
4	0							
5								
6								
7								

Table 5.19 Response for Module Reset Command

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	0				14 (decimal)			
2	0							
3								
4	0							
5								
6								
7								

5.4 Motion Command Methods

5.4.1 Constant Feed Command

■ Function

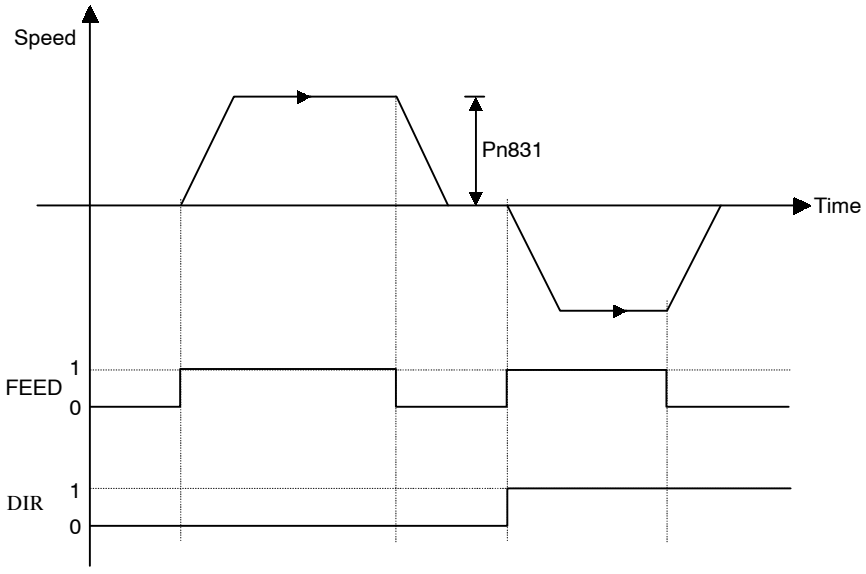
While the Constant Feed Command is set to 1, the axis travels in the direction specified as the movement direction at the speed specified in the parameters. Parameter settings are used for acceleration/deceleration speeds, acceleration/deceleration types, etc.

The speed during movement can be changed by changing the override value.

■ Related Parameters

Object	Attribute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#58	Pn829	Filter Selection	0, 1, 2, 3	–	Immediate	0	B
	#59	Pn830	Constant Feed Reference Unit Selection	0, 1	–	Immediate	0	B
	#60	Pn831	Constant Feed Speed	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#61	Pn832	Acceleration Time for Constant Feed	1 to 10,000	ms	Immediate	100	B
	#62	Pn833	Deceleration Time for Constant Feed	1 to 10,000	ms	Immediate	100	C
	#63	Pn834	Switch Speed for Constant Feed Second Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#64	Pn835	Accel/Decel Time for Constant FEED Second Accel/Decel	1 to 10,000	ms	Immediate	200	C
	#65	Pn836	Accel/Decel Type for Constant Feed	0, 1, 2, 3	–	Immediate	0	B
	#70	Pn840	Time Constant for Exponential Accel/Decel	4 to 1,000	ms	Immediate	25	C
	#71	Pn841	Bias Speed for Exponential Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	0	C
	#72	Pn842	Time Constant of Travelling Average	4 to 1,000	ms	Immediate	25	C
	#73	Pn843	Maximum Feed Speed	1 to 240,000	1000 reference units/min	Immediate	24,000	B

■ Operation



■ Command Method

1. Set the Servo ON Command (byte 0, bit 1) to 1.
2. Set the movement direction (byte 3, bit 1).
3. Set the override value. The Pn830 setting determines whether the override will be set as a ratio (%) or as a speed (1000 reference units/min).
4. Set the Feed Command (byte 2, bit 3) to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	0
1	Response type				00h			
2	0	0	0	0	1	0	0	0
3	0	0	0	0	0	0	DIR	0
4	Override value (% or 1000 reference units/min)							
5								
6								
7								

5.4.2 Step Command

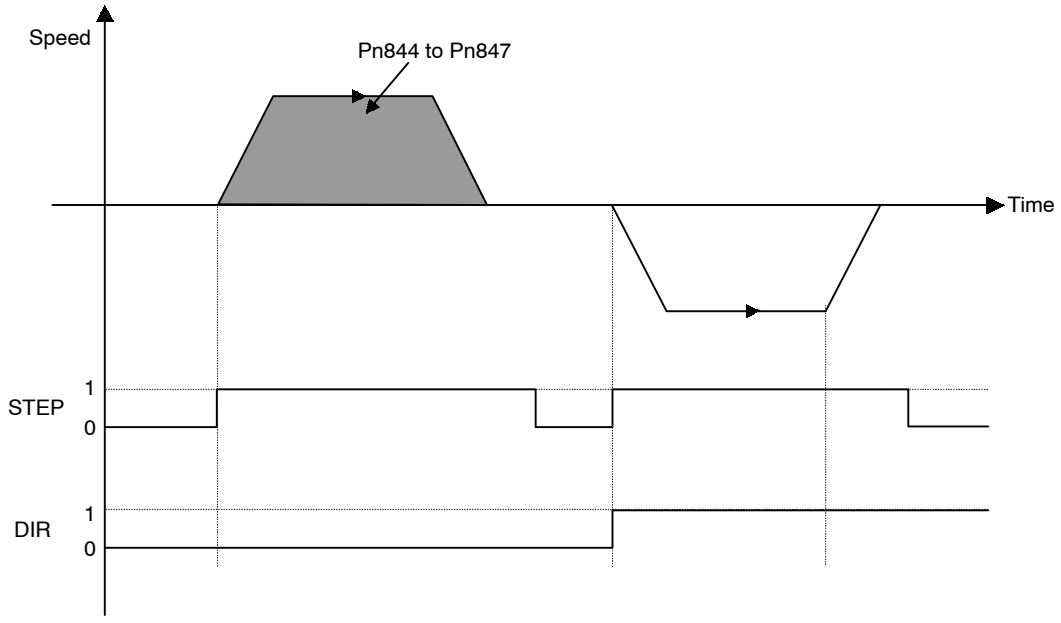
■ Function

When the Step Command is set to 1, the axis will travel in the set direction for the set travel distance and then stop. The travel distance can be selected from four parameters.

■ Related Parameters

Object	Attribute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#51	Pn821	Feed Speed for Positioning	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#52	Pn822	Acceleration Time for Positioning	1 to 10,000	ms	Immediate	100	B
	#53	Pn823	Deceleration Time for Positioning	1 to 10,000	ms	Immediate	100	C
	#54	Pn824	Switch Speed for Positioning Second Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#55	Pn825	Accel/Decel Time for Positioning Second Accel/Decel	1 to 10,000	ms	Immediate	200	B
	#56	Pn826	Accel/Decel Type for Positioning	0, 1, 2, 3	–	Immediate	0	B
	#58	Pn829	Filter Selection	0, 1, 2, 3	–	Immediate	0	B
	#70	Pn840	Time Constant for Exponential Accel/Decel	4 to 1,000	ms	Immediate	25	C
	#71	Pn841	Bias Speed for Exponential Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	0	C
	#72	Pn842	Time Constant of Travelling Average	4 to 10,000	ms	Immediate	25	C
	#73	Pn843	Maximum Feed Speed	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#74	Pn844	Step Distance 1	0 to 99, 999, 999	Reference Units	Immediate	1	B
	#75	Pn845	Step Distance 2	0 to 99, 999, 999	Reference Units	Immediate	10	B
	#76	Pn846	Step Distance 3	0 to 99, 999, 999	Reference Units	Immediate	100	B
	#77	Pn847	Step Distance 4	0 to 99, 999, 999	Reference Units	Immediate	1,000	B

■ Operation



■ Command Method

1. Set the Servo ON Command (byte 0, bit 1) to 1.

2. Set the movement direction (byte 3, bit 1).

3. Select the travel distance to be used for step operation from within the range from Pn844 (=0) to Pn847 (=3).

4. Set the Step Command (byte 2, bit 4) to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	0
1	Response type				00h			
2	0	0	0	1	0	0	0	0
3	0	0	0	0	0	0	DIR	0
4	Step travel distance selection (0 to 3)							
5								
6								
7								

5.4.3 Station Command

■ Function

The Station Command can be used when the NS300 Module is used in a rotating system.

One rotation of the servomotor is divided into a specified number of stations and station numbers are allocated.

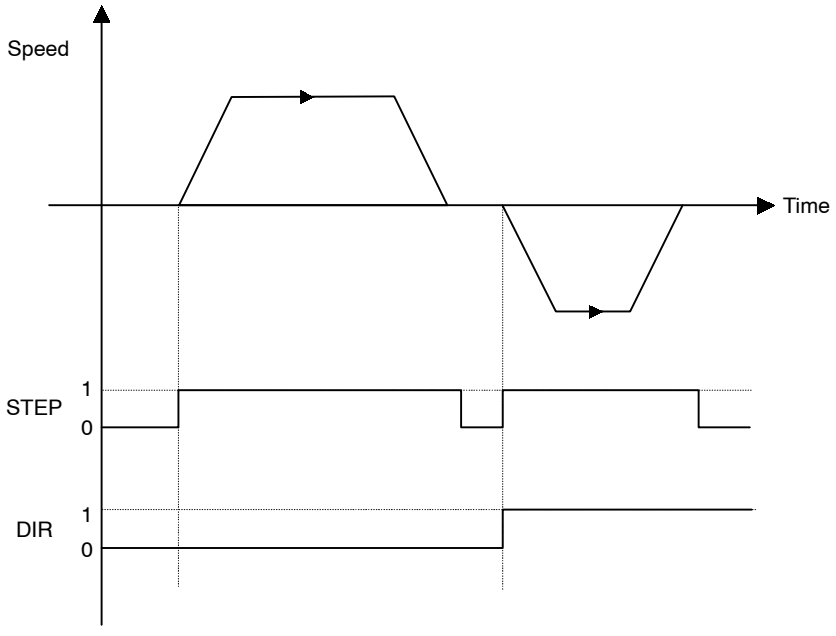
When a station number is specified, the axis travels in the specified direction to specified position.

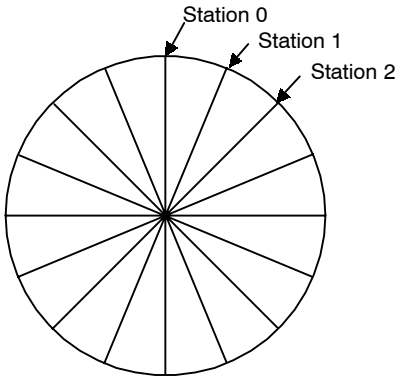
■ Related Parameters

The same speed and acceleration/deceleration data is used as for the Positioning Command.

Object	Attribute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#32	Pn812	Coordinate Type	0, 1	–	Immediate	0	C
	#93	Pn853	Direction for Rotation System	0, 1	–	Immediate	0	B
	#100	Pn85A	Number of Stations	1 to 32, 767	–	Immediate	1	B

■ Operation





■ Command Method

1. Set the Servo ON Command (byte 0, bit 1) to 1.
2. Set the movement direction (byte 3, bit 1).
   The movement direction setting is disabled when the Pn853 setting is 1 (travel the shortest distance).
3. Set absolute/incremental (byte 3, bit 0). If an incremental position has been specified, set the value corresponding to (target station number) – (current station number) in bytes 4 to 7.
4. Set the target station number.
5. Set the Station Command (byte 2, bit 5) to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	0
1	Response type				00h			
2	0	0	1	0	0	0	0	0
3	0	0	0	0	0	0	DIR	INC
4	Target station number							
5								
6								
7								

5.4.4 Point Table Command

■ Function

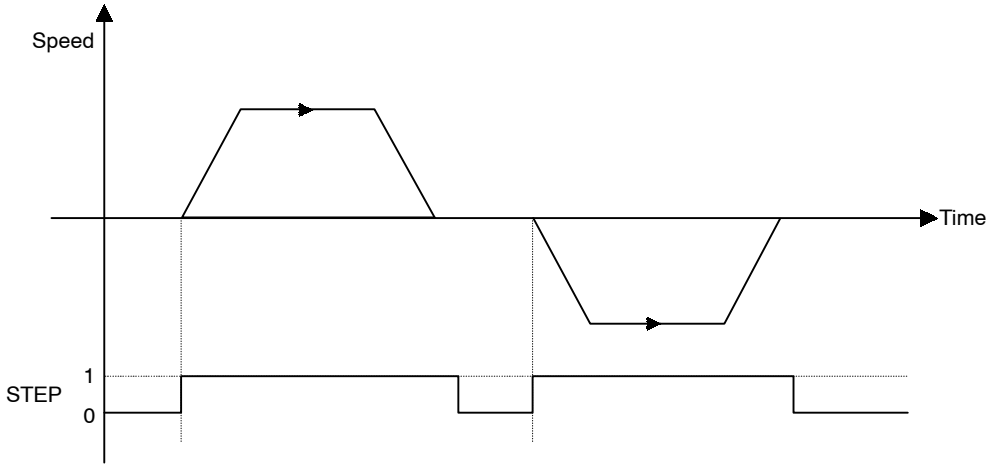
The Point Table Command performs positioning at the position and speed stored in advance in the point table.

■ Related Parameters

Object	Attribute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#51	Pn821	Feed Speed for Positioning	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#52	Pn822	Acceleration Time for Positioning	1 to 10,000	ms	Immediate	100	B
	#53	Pn823	Deceleration Time for Positioning	1 to 10,000	ms	Immediate	100	C
	#54	Pn824	Switch Speed for Positioning Second Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#55	Pn825	Accel/Decel Time for Positioning Second Accel/Decel	1 to 10,000	ms	Immediate	200	B
	#56	Pn826	Accel/Decel Type for Positioning	0, 1, 2, 3	–	Immediate	0	B
	#58	Pn829	Filter Selection	0, 1, 2, 3	–	Immediate	0	B
	#70	Pn840	Time Constant for Exponential Accel/Decel	4 to 1,000	ms	Immediate	25	C
	#71	Pn841	Bias Speed for Exponential Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	0	C
	#72	Pn842	Time Constant of Travelling Average	4 to 1,000	ms	Immediate	25	C
	#73	Pn843	Maximum Feed Speed	1 to 240,000	1000 reference units/min	Immediate	24,000	B

Object	Attrib-ute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x65	#50	Pn900	Target Position 1	±99, 999, 999	Reference Units	Immediate	0	B
	#51	Pn901	Target Position 2	±99, 999, 999	Reference Units	Immediate	0	B
		:	:					
	#99	Pn931	Target Position 50	±99, 999, 999	Reference Units	Immediate	0	B
	#150	Pn940	Target Speed 1	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#151	Pn941	Target Speed 2	1 to 240,000	1000 reference units/min	Immediate	24,000	B
		:	:					
	#199	Pn971	Target Speed 50	1 to 240,000	1000 reference units/min	Immediate	24,000	B

■ Operation



■ Command Method

1. Set the Servo ON Command (byte 0, bit 1) to 1.
2. Set absolute/incremental (byte 3, bit 0). If an incremental position has been specified, the target position will be (current position) + (position stored in point table).
3. Set the point table number to be specified.
4. Set the Point Table Command (byte 2, bit 6) to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	0
1	Response type				00h			
2	0	1	0	0	0	0	0	0
3	0	0	0	0	0	0	DIR	INC
4	Point table number to be specified							
5								
6								
7								

5.4.5 Zero Point Return Command

■ Function

The Zero Point Return Command moves the axis in the specified direction, and sets the zero point based on the specified zero point return mode.

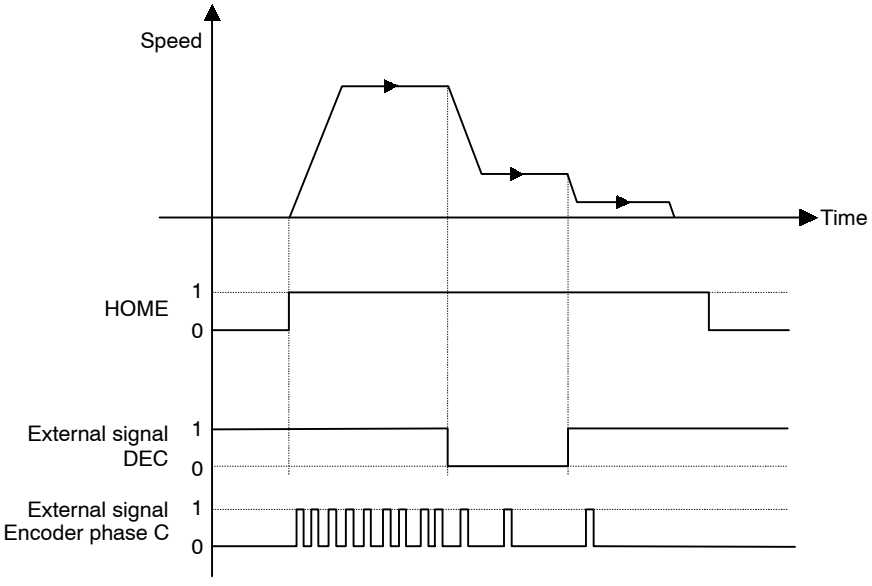
When an absolute position detection system has been selected, the positioning will be performed to the zero point.

■ Related Parameters

Object	Attrib-ute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#10	Pn800	Zero Point Return Mode	0 to 3	–	Immediate	0	B
	#11	Pn801	Zero Point Return Function Selection	0 to 7	–	Power-up	1	B
	#12	Pn802	Feed Speed for Zero Point Return	1 to 240,000	1000 reference units/min	Immediate	10,000	B
	#13	Pn803	Approach Speed for Zero Point Return	1 to 240,000	1000 reference units/min	Immediate	1,000	B
	#14	Pn804	Creep Speed for Zero Point Return	1 to 240,000	1000 reference units/min	Immediate	500	B
	#15	Pn805	Final Travel Distance for Zero Point Return	0 to 99,999,999	Reference Units	Immediate	0	B
	#16	Pn806	Output Width for Zero Point Return	0 to 32, 767	Reference Units	Immediate	100	B
	#17	Pn809	Zero Point Offset	–99,999,999 to 99,999,999	Reference Units	Immediate	0	C
	#18	Pn80A	Accel/Decel Time for Zero Point Return	1 to 10,000	ms	Immediate	100	B

■ Operation

The Zero Point Return Command performs zero point return based on each zero point return mode.



■ Command Method

Set the Servo ON Command (byte 0, bit 1) to 1.

Set the Zero Point Return Command (byte 2, bit 7) to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	0
1	Response type				00h			
2	1	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0							
5								
6								
7								

5.4.6 Positioning Command

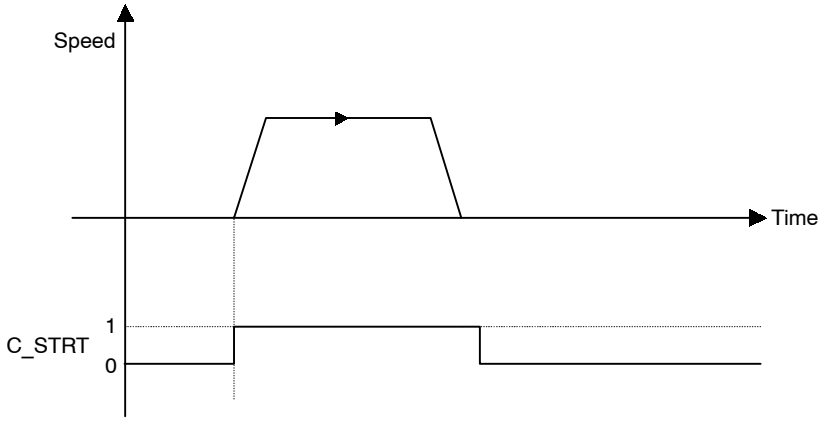
■ Function

The Positioning Command performs positioning to the specified target position.

■ Related Parameters

Object	Attribute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#51	Pn821	Feed Speed for Positioning	1 to 240,000	1000 reference units/min	Immediate	24,000	B
	#52	Pn822	Acceleration Time for Positioning	1 to 10,000	ms	Immediate	100	B
	#53	Pn823	Deceleration Time for Positioning	1 to 10,000	ms	Immediate	100	C
	#54	Pn824	Switch Speed for Positioning Second Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#55	Pn825	Accel/Decel Time for Positioning Second Accel/Decel	1 to 10,000	ms	Immediate	200	B
	#56	Pn826	Accel/Decel Type for Positioning	0, 1, 2, 3	–	Immediate	0	B
	#58	Pn829	Filter Selection	0, 1, 2, 3	–	Immediate	0	B
	#70	Pn840	Time Constant for Exponential Accel/Decel	4 to 1,000	ms	Immediate	25	C
	#71	Pn841	Bias Speed for Exponential Accel/Decel	1 to 240,000	1000 reference units/min	Immediate	0	C
	#72	Pn842	Time Constant of Travelling Average	4 to 1,000	ms	Immediate	25	C
	#73	Pn843	Maximum Feed Speed	1 to 240,000	1000 reference units/min	Immediate	24,000	B

■ Operation



■ Command Method

1. Set the command code (byte 1, bits 0 to 3) to no operation (= 0) if it is not already set to 0.
2. Set the Servo ON Command (byte 0, bit 1) to 1.
3. Set absolute/incremental (byte 3, bit 0). If an incremental position has been specified, the target position will be (current position) + (position specified from bytes 4 to 7).
4. Set the target position in the command message (bytes 4 to 7).
5. Set simple positioning (=1) in the command code (byte 1, bits 0 to 3).
6. Change the Command Start Command (byte 0, bit 0) from 0 to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	1
1	Response type				01h			
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	Target position data							
5								
6								
7								

5.4.7 External Positioning

■ Function

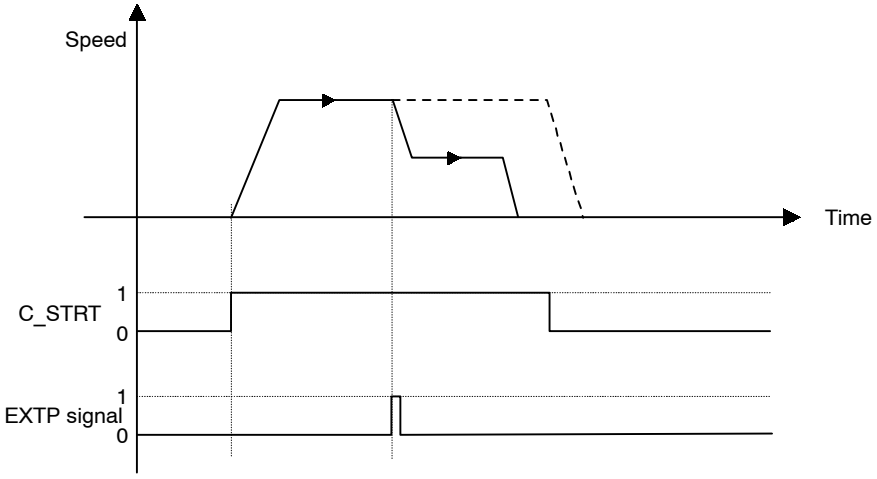
The External Positioning Command performs positioning at the specified target position. If the status of the external signal changes during movement, the axis will decelerate to the external positioning approach speed from the position where the status changed and travel the distance specified in the parameter.

■ Related Parameters

The same speed and acceleration/deceleration data is used as for the Positioning Command.

Object	Attrib-ute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#94	Pn854	Approach Speed for External Positioning	1 to 240,000	1,000 reference units/min	Immediate	24,000	B
	#95	Pn855	Travel Distance for External Positioning	-99, 999, 999 to 99, 999, 999	Reference Units	Immediate	0	B

■ Operation



■ Command Method

1. Set the command code (byte 1, bits 0 to 3) to no operation (= 0), if it is not already set to 0.
2. Set the Servo ON Command (byte 0, bit 1) to 1.
3. Set absolute/incremental (byte 3, bit 0). If an incremental position has been specified, the target position will be (current position) + (position specified from bytes 4 to 7).
4. Set the target position in the command message (bytes 4 to 7).
5. Set external positioning (=2) in the command code (byte 1, bits 0 to 3).
6. Change the Command Start Command (byte 0, bit 0) from 0 to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	1
1	Response type				02h			
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	Target position data							
5								
6								
7								

5.4.8 Notch Output Positioning Command

■ Function

The Notch Output Positioning Command performs positioning to the specified position.

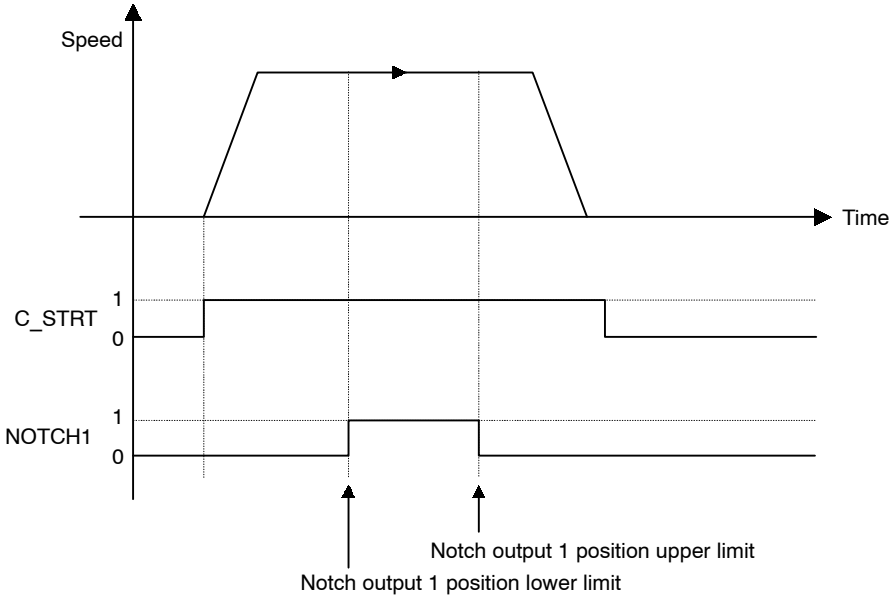
If a specified position is passed during the positioning, a notch output signal (notch signal) will be output.

Two notch signals can be used in the NS300 Module.

■ Related Parameters

Object	Attribute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#160	Pn890	Notch Signal Output Position Setting	0, 1	–	Immediate	0	C
	#161	Pn891	Notch Signal Output Setting	0 to 3	–	Immediate	0	C
	#162	Pn892	Notch 1 Output Position Lower Limit	±99, 999, 999	Reference Units	Immediate	0	C
	#163	Pn893	Notch 1 Output Position Upper Limit	±99, 999, 999	Reference Units	Immediate	0	C
	#164	Pn894	Notch 2 Output Position Lower Limit	±99, 999, 999	Reference Units	Immediate	0	C
	#165	Pn895	Notch 2 Output Position Upper Limit	±99, 999, 999	Reference Units	Immediate	0	C

■ Operation



■ Command Method

1. Set the command code (byte 1, bits 0 to 3) to no operation (= 0), if it is not already set to 0.
2. Set the Servo ON Command (byte 0, bit 1) to 1.
3. Set absolute/incremental (byte 3, bit 0). If an incremental position has been specified, the target position will be (current position) + (position specified from bytes 4 to 7).
4. Set the target position in the command message (bytes 4 to 7).
5. Set positioning with notch signal output (=3) in the command code (byte 1, bits 0 to 3).
6. Change the Command Start Command (byte 0, bit 0) from 0 to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	1
1	Response type				03h			
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	Target position data							
5								
6								
7								

5.4.9 Multi-speed Positioning Command

■ Function

The Multi-speed Positioning Command changes the speed in stages and performs positioning to specified positions.

When the positions specified in the parameters are reached during axis travel, the axis switches to the next set speed and travels to the position specified in the next stage. Up to 16 speed switching positions can be set.

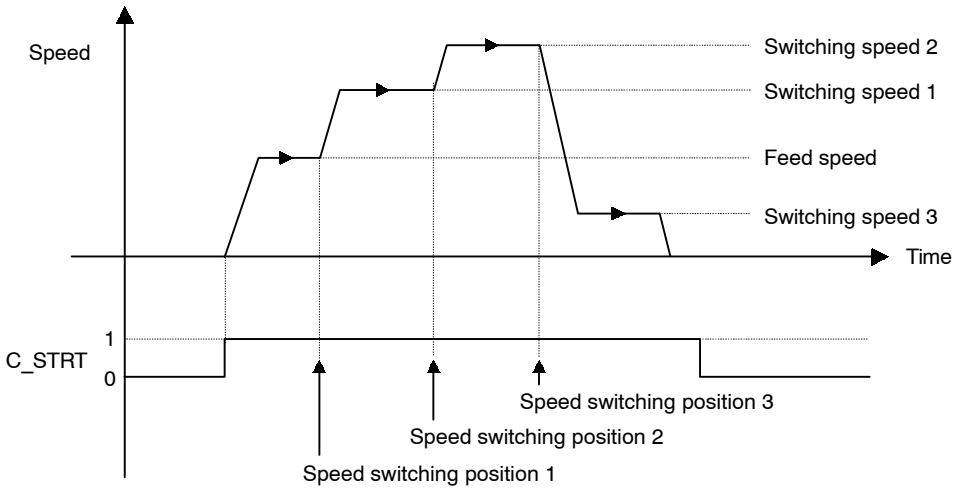
Set the speed switching positions as increments from the position where the Multi-speed Positioning Command is carried out.

■ Related Parameters

Object	Attribute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#111	Pn861	Number of Points for Speed Switching	0 to 16	–	Immediate	0	C
	#112	Pn862	Initial Feed Speed for Multi-speed Positioning	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#113	Pn863	Speed Switching Position 1	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#114	Pn864	Speed Switching Position 2	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#115	Pn865	Speed Switching Position 3	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#116	Pn866	Speed Switching Position 4	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#117	Pn867	Speed Switching Position 5	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#118	Pn868	Speed Switching Position 6	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#119	Pn869	Speed Switching Position 7	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#120	Pn86A	Speed Switching Position 8	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#121	Pn86B	Speed Switching Position 9	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#122	Pn86C	Speed Switching Position 10	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#123	Pn86D	Speed Switching Position 11	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#124	Pn86E	Speed Switching Position 12	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#125	Pn86F	Speed Switching Position 13	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#126	Pn870	Speed Switching Position 14	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#127	Pn871	Speed Switching Position 15	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#128	Pn872	Speed Switching Position 16	0 to 99, 999, 999	Reference Units	Immediate	0	C
	#129	Pn873	Switching Speed 1	1 to 240,000	1000 reference units/min	Immediate	24,000	C

Object	Attrib-ute	No.	Name	Setting Range	Unit	Effective Timing	Factory Setting	Type
0x64	#130	Pn874	Switching Speed 2	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#131	Pn875	Switching Speed 3	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#132	Pn876	Switching Speed 4	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#133	Pn877	Switching Speed 5	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#134	Pn878	Switching Speed 6	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#135	Pn879	Switching Speed 7	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#136	Pn87A	Switching Speed 8	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#137	Pn87B	Switching Speed 9	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#138	Pn87C	Switching Speed 10	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#139	Pn87D	Switching Speed 11	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#140	Pn87E	Switching Speed 12	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#141	Pn87F	Switching Speed 13	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#142	Pn880	Switching Speed 14	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#143	Pn881	Switching Speed 15	1 to 240,000	1000 reference units/min	Immediate	24,000	C
	#144	Pn882	Switching Speed 16	1 to 240,000	1000 reference units/min	Immediate	24,000	C

■ Operation



■ Command Method

1. Set the command code (byte 1, bits 0 to 3) to no operation (= 0), if it is not already set to 0.
2. Set the Servo ON Command (byte 0, bit 1) to 1.
3. Set absolute/incremental (byte 3, bit 0). If an incremental position has been specified, the target position will be (current position) + (position specified from bytes 4 to 7).
4. Set the target position in the command message (bytes 4 to 7).
5. Set multi-speed positioning (=4) in the command code (byte 1, bits 0 to 3).
6. Change the Command Start Command (byte 0, bit 0) from 0 to 1.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	0	1	1
1	Response type				04h			
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	Target position data							
5								
6								
7								

5.5 Commands from the Host Controller

5.5.1 Basic Operation

The basic operation of the NS300 Module is shown below.

1. After DeviceNet communications have started, check that the Command Ready (READY) is set to 1.
2. Set the Emergency Stop Command (ESTP) to 1 to clear emergency stop status.
3. Set the Servo ON Command (SVON) to 1 to turn ON the servo.
4. Confirm that the SERVOPACK servo is ON by checking the status of SVON_R.
5. Set a command.
6. Confirm that the Progressing Flag (PRGS) has changed to 1.
7. Monitor the Progressing Flag (PRGS). When it changes to 0 again, the operation has been completed.
8. Set another command.

5.5.2 Command Method

For the following commands that involve movement, always wait until one command has been completed before executing another command. If commands are executed simultaneously or while the axis is travelling, a command error warning will occur (A.95).

- Feed Command
- Step Command
- Station Command
- Point Table Command
- Zero Point Return Command
- Move command based on a Command Start Command

The Emergency Stop, Servo ON, Cancel, and Hold Commands are effective any time.

■ Servo ON/OFF Command

When the Servo ON Command (SVON) is changed from 0 to 1, current is supplied to the SGDH. When it is changed from 1 to 0, the current is not supplied.

If DeviceNet communications time out, the NS300 Module automatically enters Servo OFF status. To restart communications, the Servo ON Command must be changed from 0 to 1.

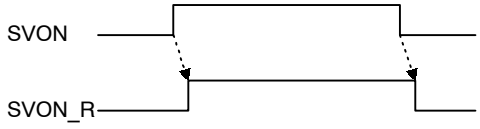


Figure 5.1 Servo ON/OFF Signal

■ Emergency Stop Command

While the Emergency Stop Command (ESTP) is set to 0, the SGDH is in emergency stop status. During this status, the Emergency Stop Flag (ESTP_R) is 0.

The emergency stop status can be released by setting the Emergency Stop Command (ESTP) to 1 and changing the Servo ON Command (SVON) from 0 to 1.

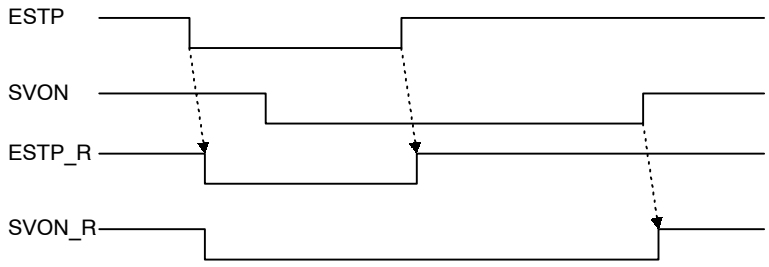


Figure 5.2 Emergency Stop Command

■ Alarm Reset Command

When an alarm occurs, use the following procedure to restart the NS300 Module.

1. Set the Servo ON Command (SVON) to 0 and set the Cancel Command (CANCEL) to 1.
2. Remove the cause of the alarm.
3. Clear any move commands that have been set.
4. Execute the Alarm Reset Command.
5. Check that the Alarm Flag (ALRM) is 0.

Alarm reset is executed by changing the Alarm Reset Command (ALRST) from 0 to 1. When execution of the alarm reset has been completed and all alarms have been cleared, the alarm bit (ALRM) will change to 0.

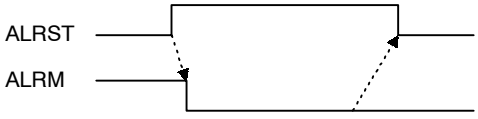


Figure 5.3 Alarm Rest Command

■ Constant Feed Command

While the Constant Feed Command (FEED) is set to 1, the axis travels in the direction specified as the movement direction (DIR) at the feed speed.

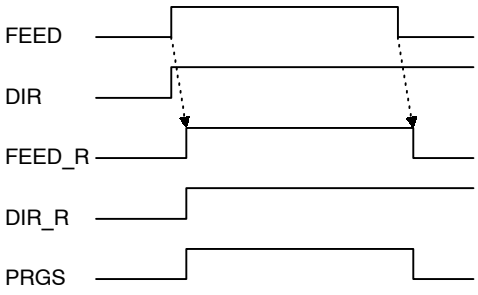


Figure 5.4 Constant Feed Command

■ Step Command

While the Step Command (STEP) is set to 1, the axis travels in the direction specified as the movement direction (DIR) at the feed speed for the step travel distance.

If the Step Command is set to 0 during the step operation, the step operation stops and the remaining travel distance is canceled.

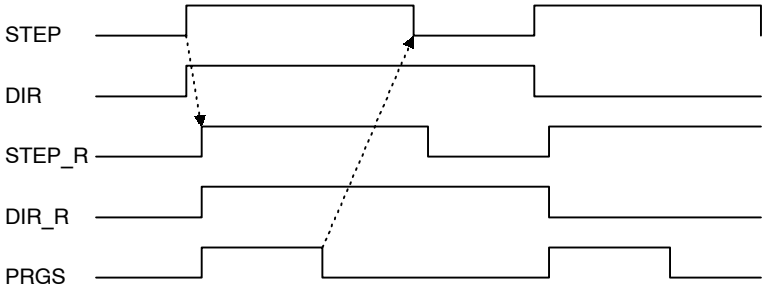


Figure 5.5 Step Command

■ Station Command

The station operation starts when the Station Command (STN) is changed from 0 to 1. The following data must be set before the station operation is started.

- Rotation direction: Specified in the byte 3 area.
- Station number: Specified at the word 1 of bytes 4 and 5.
- Absolute/incremental : Specify whether the station number is an absolute value or an incremental value.

■ Point Table Command

The point table operation starts when the Point Table Command (PTBL) is changed from 0 to 1. The following data must be set before the operation is started.

- Point table number: Specified in bytes 4 and 5 of word 1.

■ Zero Point Return Command

When the Zero Point Return Command (HOME) is changed from 0 to 1, the axis travels in the direction specified in the zero point return direction parameter. If the Zero Point Return Command is changed from 1 to 0 during zero point return, the zero point return stops. Therefore, the Zero Point Return Command must be maintained to 1 until the zero point return has been completed.

Using an Incremental Detection System

When the power is turned ON, the current position is 0 and the Zero Point Flag (HOME_P) is 0. When the zero point return has been completed, the Zero Point Flag changes to 1.

Using an Absolute Value Detection System

When the Zero Point Return Command is changed from 0 to 1, the zero point return is not performed but the axis is positioned to the machine coordinate zero point based on the positioning feed speed parameter.

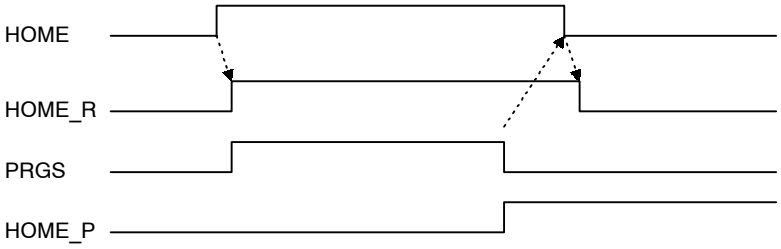


Figure 5.6 Zero Point Return Command

■ Positioning Command

When the Command Start Command (C_STRT) is changed from 0 to 1, positioning starts according to the command code.

If the Hold Command (HOLD) is changed from 0 to 1 during execution of positioning, axis travel is held. Confirm that the Hold Command has been received by checking that the Holding Flag (HOLD_R) is set to 1. Change the Hold Command from 1 to 0 to restart the remaining axis travel.

If the Cancel Command (CANCEL) is changed from 0 to 1 during execution of the positioning, the moving axis decelerates to stop and the remaining travel distance is discarded. Confirm that the Cancel Command has been received by checking that the Progressing Flag (PRGS) has changed from 1 to 0.

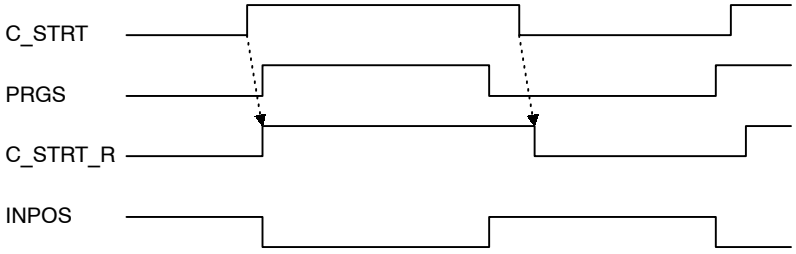


Figure 5.7 Positioning Command

■ Module Reset Command

The Module is reset by setting the Module Reset Command and changing the Command Start Command (C_STRT) from 0 to 1. When the Module Reset Command is executed, the Command Ready Flag (READY) is changed from 1 to 0. When NS300 Module and SGDH reset processing has been completed, the Command Ready Flag changes from 0 to 1.

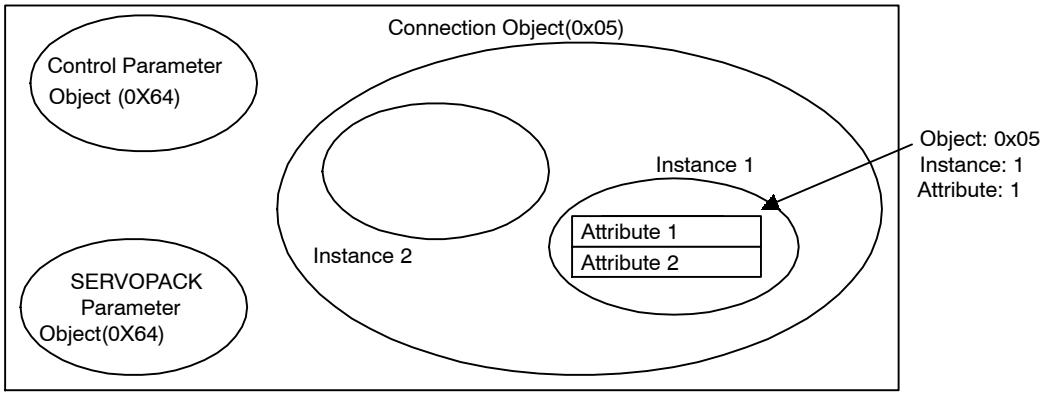
The Module reset operation process is outlined below.

- If the axis is travelling, it decelerates to stop and the remaining travel distance is discarded.
- If the current status is servo ON, it changes to servo OFF.
- If an alarm has occurred, the alarm is reset.
- All of the latest NS300 Module parameters are stored in flash memory.

5.6 Changing Parameters

5.6.1 Managing DeviceNet Data

In DeviceNet, all parameters and point tables are managed as objects, instances, and attributes. A conceptual diagram is given below.



NS300 Modules have the following objects.

Object Name	No. of Instances	Description
Identity Object	1	Manages device types and serial numbers.
Message Router Object	1	Acts as a router to distribute explicit messages to objects.
DeviceNet Object	1	Manages the physical connection to the DeviceNet.
Assembly Object	1	Manages response messages.
	2	Manages command messages.
Connection Object	1	Manages explicit messages.
	2	Manages I/O messages.
Control Parameter Object	1	Manages detailed motion settings.
Point Table Object	1	Manages point table data.
SERVOPACK Parameter Object	1	Manages SGDH parameters.

Instances within objects hold data called attributes. The attributes show the settings and status of the NS300 Module. If referencing or changing attributes via DeviceNet, you must specify the object name, instance number, and attribute number.

For example, when referencing via DeviceNet the attribute of the NS300 Module parameter Pn802 (Feed Speed for Zero Point Return) specify the attribute as follows:

- Control Parameter Object (0x64), Instance 1, Attribute 12

Refer to *Appendix B DeviceNet Attributes* for a table of attributes.

5.6.2 Editing Parameters

■ Editing Parameters Using Command Messages

SGDH parameters, NS300 Module parameters, and point table data can be changed using command messages.

Refer to *5.3 Command/Response Format*.

■ Editing Parameters Using Message Communications

DeviceNet supports message communications, called explicit messages. Parameters can be referenced or changed using message communications. To use explicit messages, specify the objects, instances, and attributes explained in *5.6.1 Managing DeviceNet Data* and change the parameters. The basic format of explicit messages is shown below.

Commands (Master Device to NS300 Module)

7	6	5	4	3	2	1	0
0	0/1	Master device node number					
0	Service code						
Object number							
Instance number							
Attribute number							
Service data							

Responses (NS300 Module to Master Device)

7	6	5	4	3	2	1	0
0	0/1	Master device node number					
1	Service code						
Object number							
Instance number							
Attribute number							
Service data							

The following example shows the Zero Point Return Feed Speed (Object 0x25, instance 1, attribute 12) being read by using the Get_Attribute_Single command (code: 0x0e) when the master device node number is 0.

Command (Master Device to NS300 Module)

7	6	5	4	3	2	1	0
0	0	0					
0	0x0e						
0x25							
0x01							
0x08							

Response (NS300 Module to Master Device)

7	6	5	4	3	2	1	0
0	0	0					
1	0x0e						
0x25							
0x01							
0x08							
0x00001234							

Refer to the manual for the master device for details on explicit messages.

5.7 Data Trace Function

The data trace function enables to read operating status data and I/O data stored in the memory of the SERVOPACK from a host controller using the explicit message of DeviceNet communications. If tracing has been selected, data will be stored in memory of the SERVOPACK. The stored data can be read from a host controller by reading trace data. The data trace function is outlined in the following table.

IMPORTANT

If the sticker on the side of the NS300 Module shows Ver. □□□OA or later, the trace data function can be used.

Table 5.20 Outline of Trace Function

Item	Description
Traced Items	Data: 2 specifications max. I/O: 2 specifications max.
Traced Data	Internal torque reference, speed feedback, reference pulse speed, and position errors
Traced I/O	ALM, /COIN, /V-CMP, /TGON, /S-RDY, /CLT, /VLT, /BK, /WARN, /NEAR, ALO1, ALO2, and ALO3
Traced Points	1,000 for each specification
Sampling Time	250 to 8,191,750 μs (set in increments of 250 μs)

Note: 1. A few minutes is required to complete tracing.

2. Trace parameters are not saved when the Module is reset. These parameters will revert to their default settings if the Module is reset or the power supply is turned OFF.

3. The display on the SERVOPACK's Panel Operator will go blank while tracing is being executed.

5.7.1 Trace Parameters

■ Setting a Trace

The following table lists the parameters used to select the data trace function.

Table 5.21 Parameters for Setting the Data Trace Functions

Object	Attribute	Access	Name	Data Type	Description
0x67	#10	Get/Set	Data Trace 1	UINT	Data trace 1
	#11	Get/Set	Data Trace 2	UINT	Data trace 2
	#12	Get/Set	I/O Trace 1	UINT	I/O trace 1
	#13	Get/Set	I/O Trace 2	UINT	I/O trace 2
	#14	Get/Set	Sampling Time	UINT	Sampling time
	#15	Get/Set	Trigger Target	UINT	Trigger
	#16	Get/Set	Trigger Target	INT	Trigger level
	#17	Get/Set	Edge Type	UINT	Edge type
	#18	Get/Set	Pre-Trigger	UINT	Amount of pre-trigger data
	#19	Get/Set	Start Trace	UINT	Trace start command
	#20	Get	Trace Status	UINT	Trace status

■ Description of Parameters

This section describes the parameters used for the data trace function.

Data Trace 1 (Object: 0x67, Instance: 0x01, Attribute: #10)

Select the first type of data to be traced for Data Trace 1.

Table 5.22 Data to be Traced

Setting	Data	Unit
0x0	Torque reference	%
0x1	Feedback speed	min^{-1}
0x3	Reference pulse speed	min^{-1}
0x4	Position errors	Reference units

Data Trace 2 (Object: 0x67, Instance: 0x01, Attribute: #11)

Select the second type of data to be traced for Data Trace 2. The settings are the same as those for Data Trace 1.

I/O Trace 1 (Object: 0x67, Instance: 0x01, Attribute: #12)

Select the first type of I/O to be traced for I/O Trace 1.

Table 5.23 I/O to be Traced

Setting	I/O	Description
0x0080	ALM	Alarm output
0x0081	/COIN	Positioning complete output
0x0082	/V-CMP	Speed coincidence output
0x0083	/TGON	Rotation detected output
0x0084	/S-RDY	Servo ready output
0x0085	/CLT	Torque control output
0x0086	/VLT	Speed limit detected output
0x0087	/BK	Brake interlock output
0x0088	/WARN	Warning output
0x0089	/NEAR	Near output
0x008B	ALO1	Alarm code output 1
0x008C	ALO2	Alarm code output 2
0x008D	ALO3	Alarm code output 3

I/O Trace 2 (Object: 0x67, Instance: 0x01, Attribute: #13)

Select the second type of I/O to be traced for I/O Trace 2. The settings are the same as those for I/O Trace 1.

Sampling Time (Object: 0x67, Instance: 0x01, Attribute: #14)

Select the time in which data can be traced for the Sampling Period. The time can be set in multiples of 250 μs between 250 and 8,191,750 μs.

Trigger Target (Object: 0x67, Instance: 0x01, Attribute: #15)

Select the item to be used as a trigger for the Trigger Target. Any of the items selected for Data Trace 1, Data Trace 2, I/O Trace 1, or I/O Trace 2 can be assigned, or no trigger can be selected. If no trigger is selected, then sampling will begin as soon as the trace is started, and the Trigger Level, Trigger Edge, and Pre-Trigger settings will be invalid.

Table 5.24 Trigger Settings

Setting	Description
0x0	No trigger
0x1	Data set for Data Trace 1
0x2	Data set for Data Trace 2
0x3	I/O set for I/O Trace 1
0x4	I/O set for I/O Trace 2

Trigger Level (Object: 0x67, Instance: 0x01, Attribute: #16)

Select the level to use to detect the trigger for the Trigger Level.

The unit for this setting will be the same as that for the Trigger Target. If the Trigger Target is set to I/O Trace 1, I/O Trace 2, or no trigger, this setting is invalid.

Edge Type (Object: 0x67, Instance: 0x01, Attribute: #17)

Select the direction of change to detect the trigger for the Edge Type. If the Trigger Target is set to no trigger, this setting is invalid.

Table 5.25 Edge Types

Setting	Description	Trace Type	Remarks
0x0	Rising Edge	Data trace	The trigger is detected when the data changes from below the trigger level to the trigger level or higher.
		I/O trace	The trigger is detected when the signal changes from low to high.
0x1	Falling Edge	Data trace	The trigger is detected when the data changes from above the trigger level to the trigger level or lower.
		I/O trace	The trigger is detected when the signal changes from high to low.
0x2	Changing Edge	Data trace	The trigger is detected when the data passes the trigger level.
		I/O trace	The trigger is detected when the signal level changes.

Pre-trigger (Object: 0x67, Instance: 0x01, Attribute: #18)

For the Pre-trigger, select the number of samples that can be saved as part of the 1000 points before the Trigger is activated. Set the number of samples to a value between 0 and 999. If the Trigger Target is set to no trigger, this setting is invalid.

Start trace (Object: 0x67, Instance: 0x01, Attribute: #19)

Set starting and canceling the trace for Start Trace. To start tracing again, specify starting the trace again.

Table 5.26 Start Trace

Setting	Description
0x0	No operation (NOP)
0x1	Start trace
0x2	Cancel trace

Trace Status (Object: 0x67, Instance: 0x01, Attribute: #20)

The trace status is stored in the Trace Status.

Table 5.27 Trace Status

Setting	Description
0x0000	Initial status
0x0001	Tracing
0x0002	Trace completed
0x0010	Trace canceled
0x0011	Setting error

5.7.2 Reading Trace Data

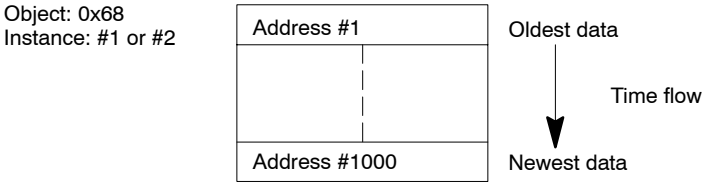
■ Trace Data Object

The data traced by the SERVOPACK is stored in the trace data object. The trace data object has four instances.

Trace	Data Range	Object and Instance
Data Trace 1	1 to 1,000	Object 0x68, Instance #1
Data Trace 2	1 to 1,000	Object 0x68, Instance #2
I/O Trace 1	1 to 63	Object 0x68, Instance #3
I/O Trace 2	1 to 63	Object 0x68, Instance #4

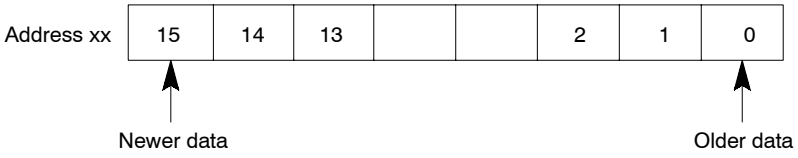
Data Trace 1 and Data Trace 2

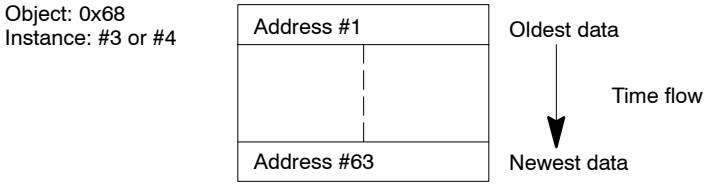
The following figure shows how data from a data trace is stored.



I/O Trace 1 and I/O Trace 2

The following figure shows how data from an I/O trace is stored. Zeros are stored in the final eight bits remaining in the 1000 points of data (bits 8 to 15 of address #63).





■ Explicit Messages

This section describes the commands and responses in explicit messages used to read trace data. Trace Data Read is used for Byte Data Read and Word Data Read.

Byte Data Read

Command (Master Device to NS300 Module)

7	6	5	4	3	2	1	0
		Destination node number					
0	Service code (0x1C)						
Object number (0x67)							
Instance number							
Lower byte of address							
Upper byte of address							
Number of bytes to read							

Response (NS300 Module to Master Device)

7	6	5	4	3	2	1	0
		Destination node number					
1	Service code (0x1C)						
Upper byte of data							
Lower byte of data							
:							
Upper byte of data							
Lower byte of data							

Read data (200 bytes max.)

Note: 1. The maximum number of bytes that can be read is 200.

2. Even if the start address plus the number of bytes exceeds the number of items (2,000 bytes for data trace 1 or 2 and 126 bytes for I/O trace 1 or 2), an error will not occur and the number of bytes that can be read will be returned.
Example: If an address of 1000 and 10 bytes are specified, only 2 bytes of data for the address of 1000 bytes will be read.

Error Responses

Response (NS300 Module to Master Device)

7	6	5	4	3	2	1	0
		Destination node number					
1	Service code (0x14)						
Error code							
Error code							

Word Data Read

Command (Master Device to NS300 Module)

7	6	5	4	3	2	1	0
		Destination node number					
0	Service code (0x1D)						
Object number (0x67)							
Instance number							
Lower byte of address							
Upper byte of address							
Number of words to read							

Response (NS300 Module to Master Device)

7	6	5	4	3	2	1	0
		Destination node number					
1	Service code (0x1D)						
Lower byte of data							
Upper byte of data							
:							
Lower byte of data							
Upper byte of data							

Read data (200 bytes max.)

Note: 1. The maximum number of words that can be read is 200.

2. Even if the start address plus the number of words exceeds the number of items (2,000 words for data trace 1 or 2 and 63 words for I/O trace 1 or 2), an error will not occur and the number of words that can be read will be returned.
Example: If an address of 1000 and 10 words are specified, only one word of data for address 1000 bytes will be read.

Error Responses

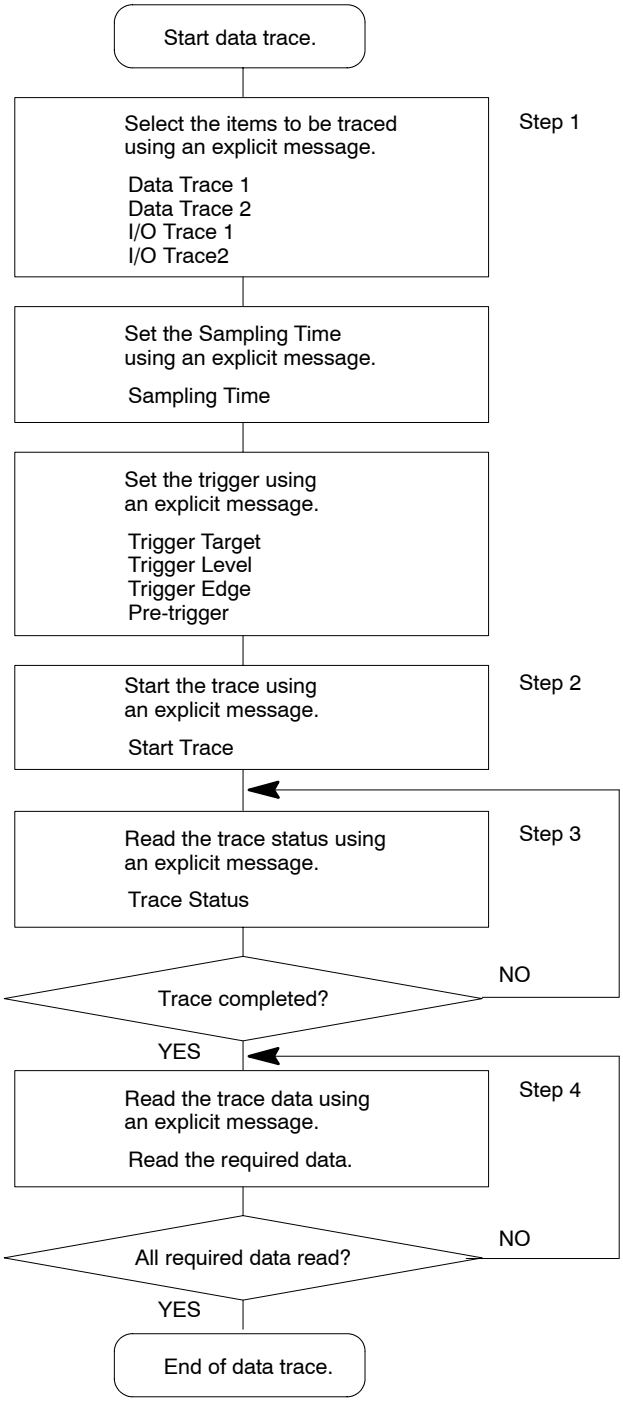
Response (NS300 Module to Master Device)

7	6	5	4	3	2	1	0
		Destination node number					
1	Service code (0x14)						
Error code							
Error code							

5.7.3 Executing Data Traces

Use the following procedure to execute a data trace from the host controller.

1. Select the items to be traced and other parameters.
2. Start the trace.
3. Read the trace status.
4. Read the trace data.



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6

Parameter Settings

This chapter describes parameters and standard settings for I/O signals (CN1) when an NS300 Module is mounted.

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6.1 Parameters and Standard Settings for NS300 Modules

6.1.1 Automatically Set Parameters

When an NS300 Module is mounted on an SGDH SERVOPACK and it is used for DeviceNet communications, the following parameters are automatically set. The following parameters will be treated as "reserved for system use," so do not change them. The SGDH SERVOPACK will be set for position control. It is not necessary to set parameters for speed and torque control, so do not change the settings.

Pn No.	Digit	Parameter Name	Set Value	Description
Pn000	1	Select control method	1	Position control
Pn004	1	Reserved	0	---
Pn200	1	Clear signal status	0	Clear the error counter with an H-level signal.
	2	Clear motion	1	Error counter is not cleared.
Pn202	---	Electronic Gear Ratio (Numerator)	1	Electronic gear on SGDH SERVOPACK is not used.
Pn203	---	Electronic Gear Ratio (Denominator)	1	Electronic gear on SGDH SERVOPACK is not used.
Pn204	---	Position command acceleration/deceleration time constant	0	Time constant = 0
Pn207	0	Select position command filter	0	Acceleration/deceleration filter
	1	Position control option	0	Not used
Pn50A	---	Select input signal 1	8881	Not used
Pn50B	---	Select input signal 2	□□88	Not used
Pn50C	---	Select input signal 3	8888	Not used
Pn50D	---	Select input signal 4	8888	Not used
Pn511	0	Select input signal 5	8	Not used



These parameters are set automatically the first time the power to the SERVOPACK is turned ON after the NS300 Module has been mounted. Startup will take approximately six seconds when these parameters are being set.

6.1.2 Standard Settings for CN1 I/O Signals

The standards settings for CN1 I/O signals when the NS300 Module is mounted are described below. To use the standard settings, change the parameters to the standard setting as shown below. The input signal setting from the NS300 Module will be force-changed, so the user cannot change this setting.

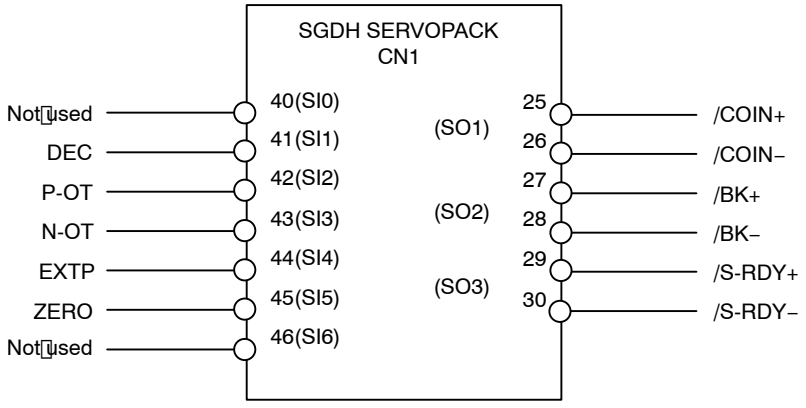


Figure 6.1 Standard CN1 I/O Signal Settings

Table 6.1 Factory Settings and Standard Settings for I/O Signals

Parameter	Description	Factory Setting	Standard Setting
Pn50E	Output signal selections 1	3211	3001
Pn50F	Output signal selections 2	0000	0200
Pn510	Output signal selections 3	0000	0000

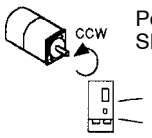
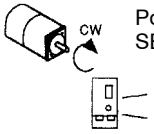
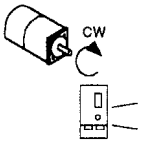
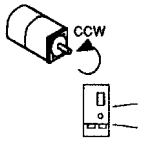
6.2 Settings According to Equipment Characteristics

This section describes the procedure for setting parameters according to the dimensions and performance of the equipment used.

6.2.1 Switching Servomotor Rotation Direction

The SERVOPACK has a Reverse Rotation Mode that reverses the direction of servomotor rotation without rewiring. Forward rotation in the standard setting is defined as counterclockwise as viewed from the load.

With the Reverse Rotation Mode, the direction of servomotor rotation can be reversed without changing other items. The direction (+, –) of shaft motion is reversed. There are no other changes.

	Standard Setting	Reverse Rotation Mode
Forward Reference		
Reverse Reference		

■ Setting Reverse Rotation Mode

Use parameter Pn000.0.

Pn000.0	Direction Selection	Factory Setting: 0	Position Control

Use the following settings to select the direction of servomotor rotation.

Setting	Description	
0	Forward rotation is defined as counterclockwise (CCW) rotation as viewed from the load.	(Standard setting)
1	Forward rotation is defined as clockwise (CW) rotation as viewed from the load.	(Reverse Rotation Mode)

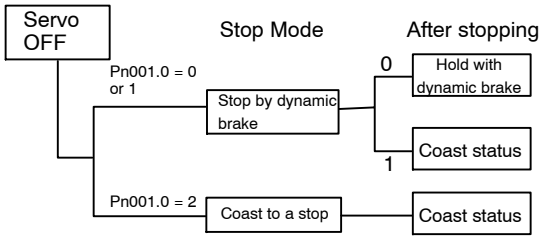
6.2.2 Stop Mode Selection at Servo OFF

The SGDH SERVOPACK turns OFF under the following conditions:

- The SV_OFF command is transmitted.
- A servo alarm occurs.
- Power is turned OFF.

Specify the Stop Mode if any of these occurs during servomotor operation.

Pn001.0	Servo OFF Stop Mode	Factory Setting: 0	Position Control



The dynamic brake electrically applies a brake by using a resistor to consume servomotor rotation energy.

Refer to *6.5.1 Using the Dynamic Brake.*

Parameter	Setting	Item
Pn001.0	0 (Factory setting)	Uses the dynamic brake to stop the servomotor, and maintains dynamic brake status after stopping.
	1	Uses the dynamic brake to stop the servomotor, and cancels dynamic brake status after stopping to go into coast status.
	2	Coasts the servomotor to a stop. The servomotor is turned OFF and stops due to equipment friction.

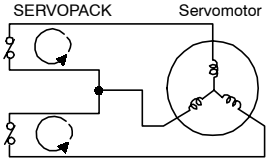
Note If the servomotor is stopped or rotating at extremely low speed when the item above is set to 0 (dynamic brake status after stopping with the dynamic brake), then braking power is not generated and the servomotor will coast to a stop the same as in coast status.

6

TERMS

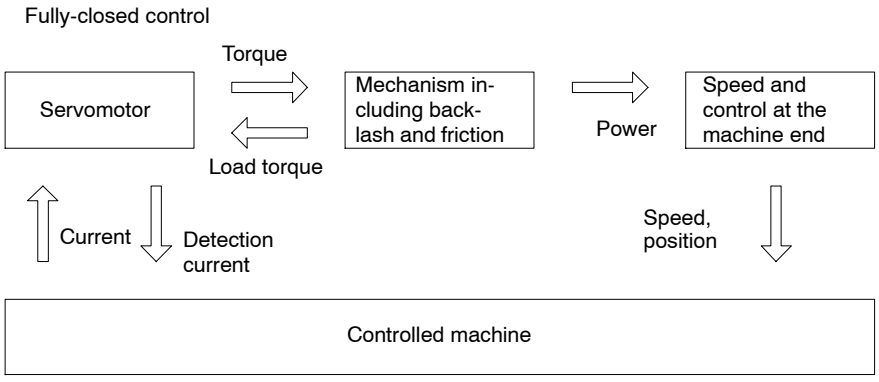
◆ Dynamic brake (DB)

The dynamic brake is a common way of suddenly stopping a servomotor. Built into the SERVOPACK, the dynamic brake suddenly stops a servomotor by electrically shorting its electrical circuit.



6.2.3 Fully-closed Control

A fully-closed loop can be formed using the parameter settings on the SGDH SERVOPACK. In previous SERVOPACKs, a semi-closed method was used to control the motor, but with this function even more precise control is achieved because control involves the detection of the position and speed of actual machine operation.



Parameters must be set when using fully-closed control. Refer to *6.2.5 Parameter Settings* for details.

6.2.4 Fully-closed System Specifications

This section describes the fully-closed system specifications of the SGDH SERVOPACK when an NS300 Module is mounted.

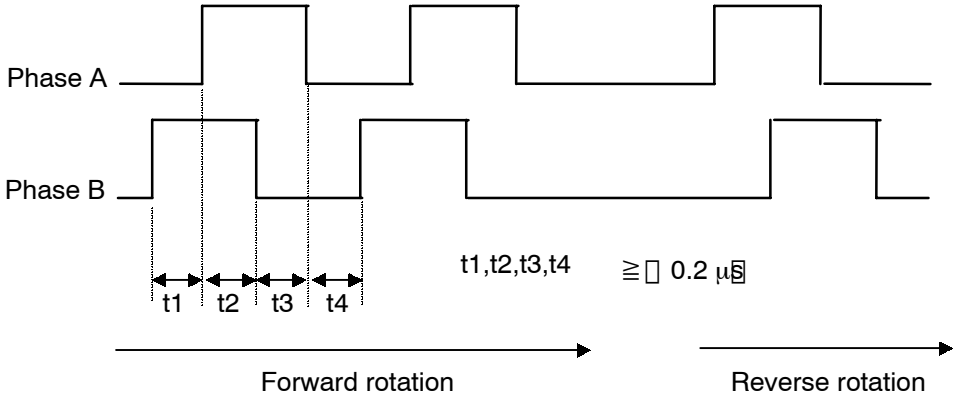
■ Fully-closed Encoder Pulse Output Form

5-V Differential line driver output (complies with EIA Standard RS-422A)

■ Fully-closed Encoder Pulse Signal Form

90° Phase difference 2-phase differential pulse: phase A, phase B

Maximum receivable frequency for SERVOPACK: 1 Mbps



6.2.5 Parameter Settings for the Fully-closed System

This section describes the parameters that must be set when using an NS300 Module.

■ Overflow Level

For information on parameter contents, refer to *6.2.1 Servo Gain Settings* of the *∑-II Series SGM□H/SGDH User's Manual : Design and Maintenance* (SIE-S800-32.2). The factory setting is made to minimize the chance of the motor going out of control due to wiring errors or other causes. After performing a trial operation at a low speed, change the setting to a higher value if necessary.

■ Fully-closed Encoder

Set the method for using the fully-closed encoder.

Pn002.3	Fully-closed Encoder Usage Method	Factory Setting: 0	Position Control

The setting details are as follows:

Parameter	Setting	Meaning
Pn002.3	0 (Factory setting)	Fully-closed encoder is not used.
	1	Fully-closed encoder is used without phase C.
	2	Fully-closed encoder is used with phase C.
	3	Fully-closed encoder is used in Reverse Rotation Mode without phase C.
	4	Fully-closed encoder is used in Reverse Rotation Mode with phase C.

When changes have been made to this parameter, turn OFF the power once. The set value will become effective when the power is turned ON again.

■ Number of Fully-closed Encoder Pulses

Set the number of fully-closed encoder pulses for each motor rotation.

When the number of fully-closed encoder pulses per motor rotation is not an integer, set the closest integer.

Error will occur in the speed monitor for position loop gain, feed forward, and reference pulse, but no position displacement will occur. Set the number of pulses with a multiplication factor of 1.

Pn206	Number of Fully-closed Encoder Pulses	Unit P/R	Setting Range: 513 to 65535	Factory Setting: 16384	Position Control

When changes have been made to this parameter, turn OFF the power once. The set value will become effective when the power is turned ON again.

6.3 Settings According to Host Controller

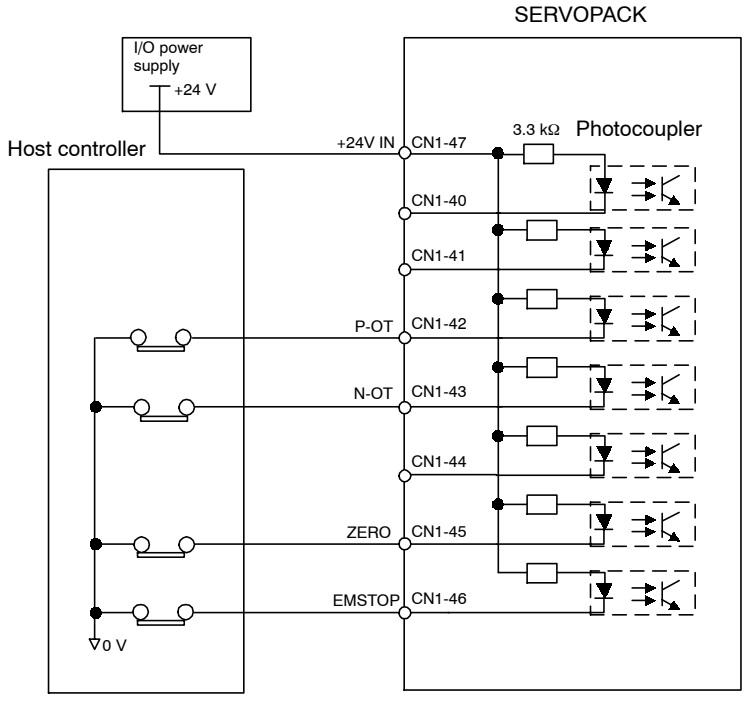
This section describes the procedure for connecting the SERVOPACK to the host controller and provides details on related parameters.

6.3.1 Sequence I/O Signals

Sequence I/O signals are used to control SERVOPACK operation. Connect these signal terminals as required.

■ Input Signal Connections

Connect the sequence input signals as shown below (standard settings).



IMPORTANT

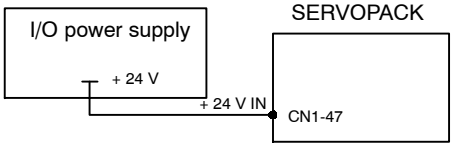
Provide an external input power supply; the SERVOPACK does not have an internal 24-V power supply.

- Sequence input signal power supply specifications: 24 ± 1 VDC, 50 mA min.

Yaskawa recommends using the same external power supply as that used for output circuits. The allowable voltage range for the 24-V sequence input circuit power supply is 11 to 25 V. Although a 12-V power supply can be used, contact faults can easily occur for relays and other mechanical contacts under low currents. Confirm the characteristics of relays and other mechanical contacts before using a 12-V power supply.

→ Input +24V IN CN1-47	24 V External I/O Power Supply Input	Position Control

The external power supply input terminal is common to sequence input signals.

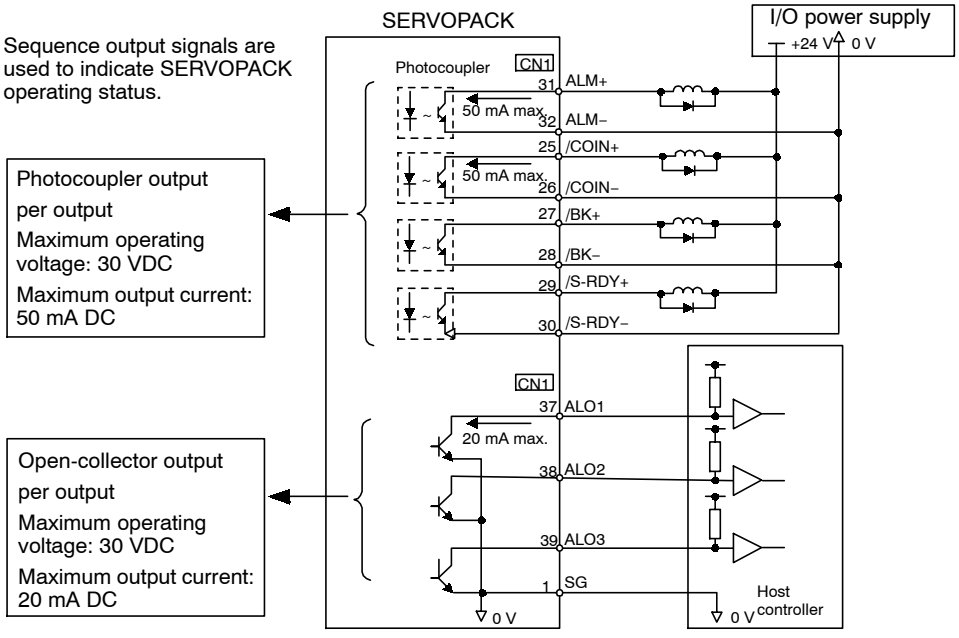


Connect an external I/O power supply.

Contact input signals: DEC (CN1-41)
P-OT (CN1-42)
N-OT (CN1-43)
EXTP (CN1-44)
ZERO (CN1-45)

■ Output Signal Connections

Connect the sequence output signals as shown in the following figure (standard settings).



IMPORTANT

Provide a separate external I/O power supply; the SERVOPACK does not have an internal 24-V power supply. Yaskawa recommends using the same type of external power supply as that used for input circuits.

Function allocations for some sequence output signal circuits can be changed.

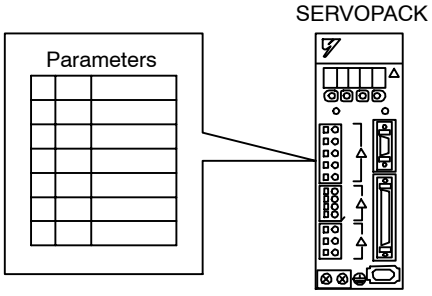
Refer to *6.4.3 Output Circuit Signal Allocations* for more details.

6.4 Setting Up the SERVOPACK

This section describes the procedure for setting parameters to operate the SERVOPACK.

6.4.1 Parameters

The Σ-II Series SERVOPACK provides many functions and has parameters that allow the user to specify functions and perform fine adjustments.



A Panel Operator, hand-held Digital Operator, or Device-Net commands is used to set parameters.

Parameters are divided into the following three groups.

Parameter	Function
Pn000 to Pn819	Specify SERVOPACK functions, set servo gains, etc.
Fn000 to Fn013	Execute auxiliary functions such as FEED operations and zero point searches.
Un000 to Un00D	Monitor the motor speed and torque reference value on the panel display.

6.4.2 Input Circuit Signal Allocation

The allocation of the sequence input signal circuit when the NS300 Module is mounted on the SGDH SERVOPACK is not changed. It will be as follows:

Terminal Numbers	Input Terminal Name	Symbol	Name
40	SI0	---	---
41	SI1	DEC	Deceleration limit switch
42	SI2	P-OT	Forward run prohibited
43	SI3	N-OT	Reverse run prohibited
44	SI4	EXTP	External signal positioning
45	SI5	ZERO	Zero point signal
46	SI6	---	---

6.4.3 Output Circuit Signal Allocations

Output signal functions can be allocated to the sequence signal output circuits shown below.

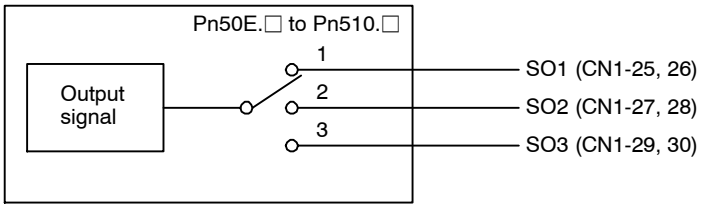
In general, allocate signals according to the standard settings in the following table.

CN1 Connector Terminal Numbers	Output Terminal Name	Factory Setting		Standard Setting	
		Symbol	Name	Symbol	Name
25	SO1	/COIN+	Positioning completed	/COIN+	Positioning completed
26		/COIN−		/COIN−	
27	SO2	/TGON+	Rotation detection	/BK+	Brake interlock
28		/TGON−		/BK−	
29	SO3	/S-RDY+	Servo ready	/S-RDY+	Servo ready
30		/S-RDY−		/S-RDY−	

The following table shows the output signal selection parameters and their factory settings and standard settings.

Pn50E	**Output Signal Selections 1**	**Factory Setting: 3211**	**Standard Setting: 3001**
Pn50F	**Output Signal Selections 2**	**Factory Setting: 0000**	**Standard Setting: 0200**
Pn510	**Output Signal Selections 3**	**Factory Setting: 0000**	**Standard Setting: 0000**

Select the CN1 connector terminals that will output the signals.



Output Signal	Parameter		Description
	Number	Setting	
Positioning Completed (/COIN)	Pn50E.0	0	Disabled (Not used for the output signal on the left.)
		1	Outputs the signal on the left from the SO1 (CN1-25 and 26) output terminal.
		2	Outputs the signal on the left from the SO2 (CN1-27 and 28) output terminal.
		3	Outputs the signal on the left from the SO3 (CN1-29 and 30) output terminal.
Speed Coincidence Detection (/V-CMP)	Pn50E.1	0 to 3	Same as Pn50E.0*
Rotation Detection (/TGON)	Pn50E.2	0 to 3	Same as Pn50E.0
Servo Ready (/S-RDY)	Pn50E.3	0 to 3	Same as Pn50E.0
Torque Limit Detection (/CLT)	Pn50F.0	0 to 3	Same as Pn50E.0
Speed Limit Detection (/VLT)	Pn50F.1	0 to 3	Same as Pn50E.0
Brake Interlock (/BK)	Pn50F.2	0 to 3	Same as Pn50E.0
Warning (/WARN)	Pn50F.3	0 to 3	Same as Pn50E.0
Near (/NEAR)	Pn510.0	0 to 3	Same as Pn50E.0
Phase C Detection (/C-PULS)	Pn510.1	0 to 3	Same as Pn50E.0

***** Always OFF when an NS300 Module is mounted.

Note "Same as Pn50E.0" means output signals are disabled or allocated to output terminals SO1 to SO3 through parameter settings 0 to 3.



Signals are output with OR logic when multiple signals are allocated to the same output circuit. Signals that are not detected are invalid.

■ Output Signal Reversal

The following parameter can be used to reverse the signals output on output terminals SO1 to SO3.

Pn512	Output Signal Reversal Settings	Factory Setting: 0000	Position Control

The settings specify which of the connector CN1 output signals are to be reversed.

Output Terminals	Parameter		Description
	Number	Setting	
SO1 (CN1-25, 26)	Pn512.0	0	Output signal not reversed.
		1	Output signal reversed.
SO2 (CN1-27, 28)	Pn512.1	0	Output signal not reversed.
		1	Output signal reversed.
SO3 (CN1-29, 30)	Pn512.2	0	Output signal not reversed.
		1	Output signal reversed.
Reserved	Pn512.3	---	---

6.4.4 Analog Monitors

The analog monitors can be changed by changing the PN003.0 and Pn003.1 parameter settings.

Pn003.0	**Analog Monitor 1**	**Factory Setting: 2**	**Position Control**
Pn003.1	**Analog Monitor 2**	**Factory Setting: 0**	**Position Control**

The monitor signals and units and the observation gains when observing using the analog monitor (CN5) are shown on the following table.

Pn003.0 and Pn003.1 Settings	Monitor Signal	Analog Monitor (CN5) Observed Gain
0	Servomotor speed	1 V/1000 min^{-1}
1	Speed reference	1 V/1000 min^{-1}
2	Torque reference	1 V/100 % rated torque
3	Position error	0.05 V/1 reference units
4	Position error	0.05 V/100 reference units
5	Reference pulse frequency (Servomotor speed conversion)	1 V/1000 min^{-1}
6	Servomotor speed	1 V/250 min^{-1}
7	Servomotor speed	1 V/125 min^{-1}
8 to F	Reserved motor signal	–



Refer to *6.5 Analog Monitors* in the *Σ-II Series SGM□H/SGDH User's Manual: Design and Maintenance (*SIE-S800-32.2*)* for information on monitoring methods of analog monitors.

6.5 Setting Stop Functions

This section describes the procedure used to stably stop the SERVOPACK.

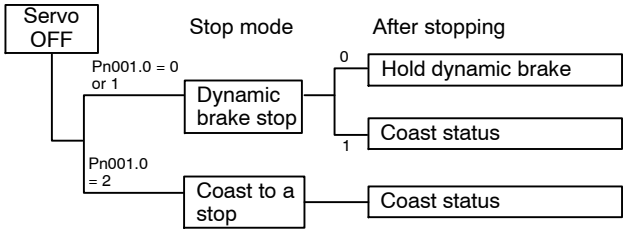
6.5.1 Using the Dynamic Brake

To stop the servomotor by applying the dynamic brake (DB), set the desired mode in the following parameter. The servomotor will stop due to equipment friction if the dynamic brake is not applied.

Pn001.0	Servo OFF or Alarm Stop Mode	Factory Setting: 0	Position Control

The SERVOPACK turns OFF under the following conditions:

- When the SV_OFF command is sent.
- A servo alarm occurs.
- Power is turned OFF.



Specify the Stop Mode if any of these occurs during servomotor operation.

Pn001.0 Setting	Description
0	Uses the dynamic brake to stop the servomotor. Maintains dynamic brake after the servomotor stops. *1
1	Uses the dynamic brake to stop the servomotor. Releases dynamic brake after the servomotor stops, and the servomotor coasts to a stop.
2	Coasts the servomotor to a stop. *2 The servomotor is turned OFF and stops due to equipment friction.

* 1. If the servomotor is stopped or moving at extremely low speed, it will coast to a stop.

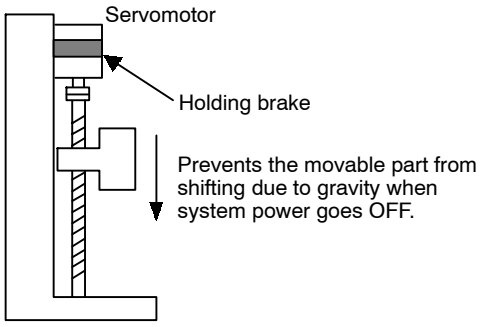
* 2. A dynamic brake is used when the control power and main power are turned OFF.

IMPORTANT

The dynamic brake is an emergency stop function. Do not repeatedly start and stop the servomotor using the SV_ON/SV_OFF command or by repeatedly turning power ON and OFF.

6.5.2 Using the Holding Brake

The holding brake is used when a Servodrive controls a vertical axis. In other words, a servomotor with brake prevents the movable part from shifting due to gravity when system power goes OFF.

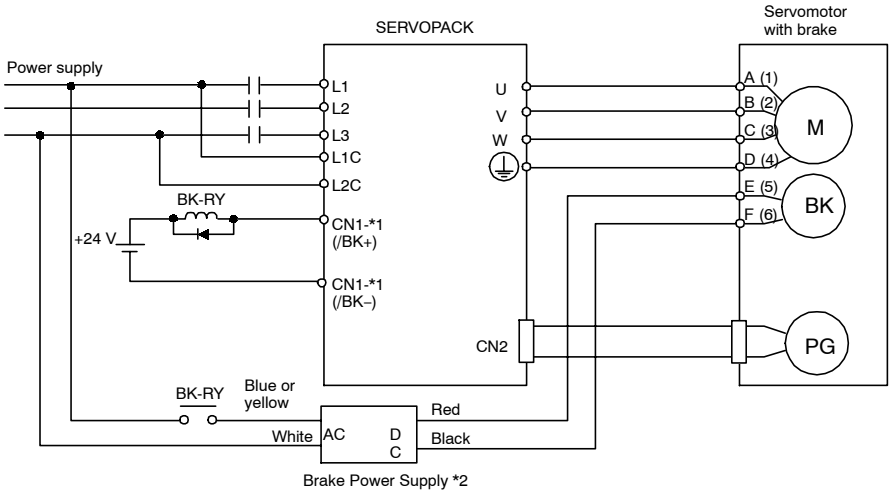


IMPORTANT

The brake built into the SGM□H servomotor with brakes is a de-energization brake, which is used only to hold and cannot be used for braking. Use the holding brake only to hold a stopped motor. Brake torque is at least 120% of the rated servomotor torque.

■ Wiring Example

Use the SERVOPACK sequence output signal /BK and the brake power supply to form a brake ON/OFF circuit. The following diagram shows a standard wiring example.



BK-RY: Brake control relay

*1: The output terminal signal is allocated with Pn50F.2

*2: Brake power supplies are available in 200-V and 100-V models.

Output to /BK	Brake Interlock Output	Position Control

This output signal controls the brake when using a servomotor with a brake and does not have to be connected when using a servomotor without a brake.

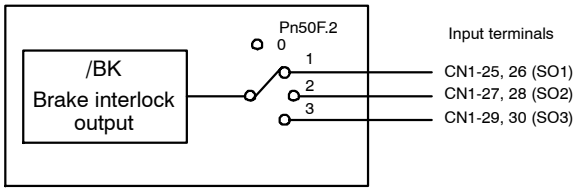
ON: Closed or low level	Releases the brake.
OFF: Open or high level	Applies the brake.

Related Parameters

Pn005	Brake operation
Pn506	Time Delay from Brake Reference until Servo OFF
Pn507	Speed Level for Brake Reference Output during Motor Operation
Pn508	Timing for Brake Reference Output during Motor Operation

The output signal in the following parameter must be selected when the /BK signal is used.

Pn50F	Output Signal Selection 2	Factory Setting: 0000	Position Control



Select the /BK output terminal.

Parameter	Setting	Output Terminal (CN1)	
		*1	*2
Pn50F.2	0	---	---
	1	25	26
	2	27	28
	3	29	30

Note Signals are output with OR logic when multiple signals are allocated to the same output circuit. Set other output signals to a value other than that allocated to the /BK signal in order to output the /BK signal alone. Refer to *6.4.3 Output Circuit Signal Allocation.*

■ Brake Operation

Set whether the brake is applied using the SERVOPACK parameter.

Pn005.0	Brake Operation	Factory Setting: 0	Position Control

Pn005.0 Setting	Description
0	Performs brake operation using the SERVOPACK parameter.
1	Does not perform brake operation using the SERVOPACK parameter.

IMPORTANT

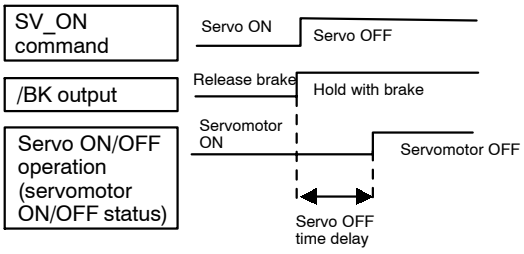
When setting the Pn005.0 to 1, the SERVOPACK's parameters (Pn506, Pn507, Pn508) settings will be ignored.

■ Brake ON Timing

If the equipment moves slightly due to gravity when the brake is applied, set the following parameter to adjust brake ON timing.

Pn506	Time Delay from Brake Reference until Servo OFF	Unit: 10 ms	Setting Range: 0 to 50	Factory Setting: 0	Position Control

This parameter is used to set the output time from the brake control output signal /BK until the servo OFF operation (servomotor output stop) when a servomotor with a brake is used.



With the standard setting, the servo is turned OFF when the /BK signal (brake operation) is output. The equipment may move slightly due to gravity depending on equipment configuration and brake characteristics. If this happens, use this parameter to delay servo OFF timing.

This setting sets the brake ON timing when the servomotor is stopped. Use Pn507 and 508 for brake ON timing during operation.

IMPORTANT

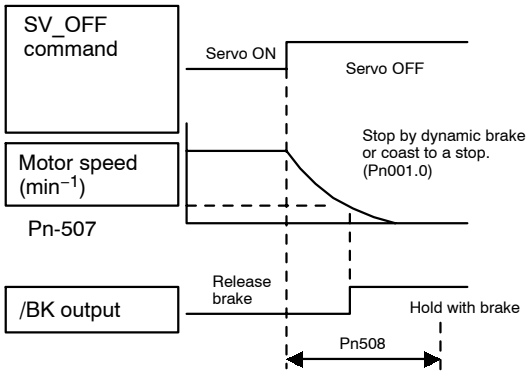
The servomotor will turn OFF immediately if an alarm occurs. The equipment may move due to gravity in the time it takes for the brake to operate.

■ Holding Brake Setting

Set the following parameters to adjust brake ON timing so the holding brake is applied when the servomotor stops.

Pn507	**Brake Reference Output Speed Level during Motor Operation**	**Unit:** min^{-1}	**Setting Range:** 0 to 10000	**Factory Setting:** 100	**Position Control**
Pn508	**Timing for Brake Reference Output during Motor Operation**	**Unit:** 10 ms	**Setting Range:** 10 to 100	**Factory Setting:** 50	**Position Control**

Set the brake timing used when the servo is turned OFF by the SV_OFF command or when an alarm occurs during servomotor with brake operation.



Brake ON timing when the servomotor stops must be adjusted properly because servomotor brakes are designed as holding brakes. Adjust the parameter settings while observing equipment operation.

/BK Signal Output Conditions During Servomotor Operation

The circuit is open under either of the following conditions:

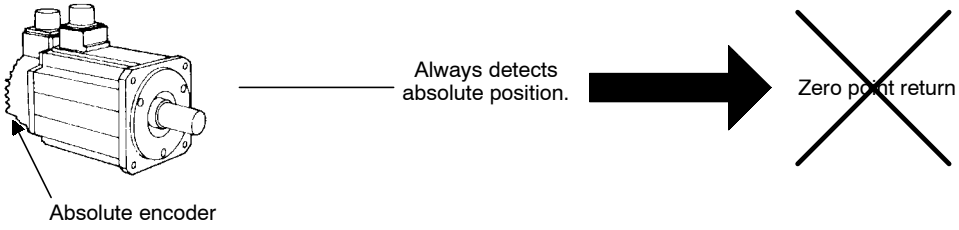
1	Motor speed drops below the setting at Pn507 after servo OFF.
2	The time set at Pn508 has elapsed since servo OFF.

The actual setting will be the maximum speed if Pn507 is set higher than the maximum speed.

6.6 Absolute Encoders

If a servomotor with an absolute encoder is used, a system to detect the absolute position can be made in the host controller. Consequently, operation can be performed without performing a zero point return immediately after the power is turned ON.

Motor□SGM□H-□□□1□···With 16-bit absolute encoder
SGM□H-□□□2□···With 17-bit absolute encoder



6.6.1 Selecting an Absolute Encoder

Select the absolute encoder usage with the following parameter.

Pn002.2	Absolute Encoder Usage	Factory Setting: 0	Position Control

"0" in the following table must be set to enable the absolute encoder.

Pn002.2 Setting	Description
0	Use the absolute encoder as an absolute encoder.
1	Use the absolute encoder as an incremental encoder.

Note This parameter setting goes into effect when the power is turned OFF and ON again after the change has been made.

6.6.2 Absolute Encoder Setup

Perform the setup operation for the absolute encoder in the following circumstances:

- When starting the machine for the first time
- When an encoder backup alarm is generated
- When the SERVOPACK's power supply is turned OFF and the encoder's cable is removed

Perform the setup operation in one of the following ways.

- Perform the operation by the absolute encoder (Fn008) using the Digital Operator. (Refer to the *Σ-II Series SGM□H/SGDH User's Manual.*)
- Perform the operation by personal computer monitor software.



The absolute encoder setup operation is only possible when the servo is OFF. After the setup processing is finished, turn the power OFF and then ON again.

IMPORTANT

If the following absolute encoder alarms are displayed, the alarms must be cleared using the method described above for the setup operation. They cannot be cleared using the Alarm Reset Command.

- Encoder backup alarm (A.81)
- Encoder checksum alarm (A.82)

In addition, if a monitoring alarm is generated in the encoder, release the alarm by turning OFF the power.

6.6.3 Multiturn Limit Setting

When implementing absolute position detection systems for machines that turn m times in response to n turns in the load shaft, such as round tables, it is convenient to reset the multiturn data from the encoder to 0 every m turns. The Multiturn Limit Setting allows the value m to be set for the encoder.

Select the absolute encoder usage with the following parameter.

Pn002.2	Absolute Encoder Usage	Factory Setting: 0	Position Control

Set Pn002.2 to 0 to enable the absolute encoder.

Pn002.2 Setting	Description
0	Uses the absolute encoder as an absolute encoder.
1	Uses the absolute encoder as an incremental encoder.

The multiturn limit is set in the SERVOPACK using the following parameter.

Pn205	Multiturn Limit Setting	Unit: rev	Setting Range: 0 to 65535	Factory Setting: 65535	Position Control

If the Multiturn Limit Setting is set to 65535 (factory setting), the multiturn data will vary from –32768 to 32767. If any other value is set, the multiturn data will vary from 0 to the setting of Pn205.

If the servomotor rotates in the negative direction from 0, the multiturn data will change to the value set for Pn205. If the servomotor rotates in the positive direction from the value set in Pn205, the multiturn data will change to 0. Set Pn205 to m – 1.

INFO Turn the power OFF and then ON after changing the setting of parameter Pn002.2 or Pn205.

The multiturn limit value in the encoder is factory set to 65535, the same as the SERVOPACK. If the multiturn limit value in the SERVOPACK is changed with Pn205 and then the SERVOPACK power is turned OFF and ON, the following alarm will occur.

Alarm Name: Multiturn Limit Disagreement

Alarm Display	Alarm Code Outputs			Description of Alarm
	ALO1	ALO2	ALO3	
A.CC	ON	OFF	ON	The multiturn limit value is different in the encoder and SERVOPACK.

Note ON signals are low level; OFF signals are high level.

When this alarm occurs, the multiturn limit in the encoder must be changed. This operation is performed in one of the following ways.

- Refer to the Σ-*II Series SGM□H/SGDH User's Manual: Design and Maintenance (*SIE-S800-32.2*)* for details on changing the multiturn limit setting (Fn013) using a Digital Operator.
- Setup can also be performed using the personal computer monitor software.

INFO The multiturn limit setting in the encoder can be changed only when the Multiturn Limit Disagreement alarm has occurred. After changing the setting, turn the power supply OFF and then ON.

WARNING The multiturn limit value must be changed only for special applications. Changing it inappropriately or unintentionally can be dangerous.

WARNING If the Multiturn 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.

TERMS

◆ Multiturn limit

The upper limit of multiturn data. The multiturn data will vary between 0 and the value of Pn205 (multiturn limit setting) when Pn002.2 is set to 0.

6.7 Digital Operator

6.7.1 Connecting the Digital Operator

There are two types of Digital Operator. One is a built-in operator incorporating a panel indicator and switches located on the front panel of the SERVOPACK. This type of Digital Operator is also called a Panel Operator. The other one is a Hand-held Digital Operator (i.e., the JUSP-OP02A-2 Digital Operator), which can be connected to the SERVOPACK through connector CN3 of the SERVOPACK.

There is no need to turn OFF the SERVOPACK to connect the Hand-held Digital Operator to the SERVOPACK. For details on how to use the Hand-held Digital Operator, refer to the Σ-*II Series SGM□H/SGDH User's Manual: Design and Maintenance (*SIE-S800-32.2*)*.

6.7.2 Limitations in Using a Hand-held Digital Operator

When an NS300 Module is mounted, the Hand-held Digital Operator has the following limitations.



Disconnect the Hand-held Digital Operator during normal operation.

During Normal Operation

If the following command is sent via DeviceNet with a Hand-held Digital Operator connected to the SERVOPACK during normal operation, the following commands are not executed.

- Writing SGDH parameters
- SGDH parameters reading out
- Module reset
- Servo ON

6.7.3 Panel Operator Indicators

The Panel Operator indicators (LED) will not be lit in any of the following circumstances.

1. The indicators will not be lit for approximately 3 seconds when the power is turned ON.
2. The indicator will not be lit when the Hand-held Digital Operator is connected.
   It will be lit when the Hand-held Digital Operator is disconnected.
3. The indicator will not be lit momentarily when the following commands are received via DeviceNet or from a setup tool.
   - Writing SGDH parameters
   - Reading SGDH parameters

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7

Using the NSxxx Setup Tool

This chapter describes how to set parameters and monitor basic operation of the NS300 Module using the NSxxx Setup Tool.

7.1 Connection and Installation . . . . . 7 -2
7.1.1 Connecting the NS300 Module . . . . . 7 -2
7.1.2 Installing the Software . . . . . 7 -2
7.2 How to Use . . . . . 7 -3
7.2.1 Screen Configuration at Startup . . . . . 7 -3
7.2.2 Functions Configuration . . . . . 7 -6

7.1 Connection and Installation

7.1.1 Connecting the NS300 Module

■ Connector Cables

Connect the CN11 port on the NS300 Module and the RS-232C port on the personal computer using the following cable.

Model	Name
DE9404559	SGD Monitor Cable

■ Cable Wiring

Wire the cables as follows:

CN11 Pin number	Symbol	Details	Personal computer pin number (9 pins)
1	TXD (red)	Serial data output	2
2	RXD (white)	Serial data input	3
3	GND (black)	Ground	5
4	GND (black)	Ground	5

7.1.2 Installing the Software

The following files are stored on the floppy disk for the NSxxx Setup Tool.

- NS_MMI.EXE (Execution module)
- ParmDef.CFG (Data files)
- RES_JPN.DLL (DLL in Japanese)
- RES_ENG.DLL (DLL in English)
- ParmDef(Jpn).CFG (Data files in Japanese)
- ParmDef(Eng).CFG (Data files in English)

Copy these files to any directory on the personal computer.

IMPORTANT To use the files in English, copy ParmDef(Eng).CFG to ParmDef.CFG.

7.2 How to Use

7.2.1 Screen Configuration at Startup

Start the Setup Tool as follows:

1. Double-click the ***NS_MMI.exe*** file. The following communications setting screen will be displayed.

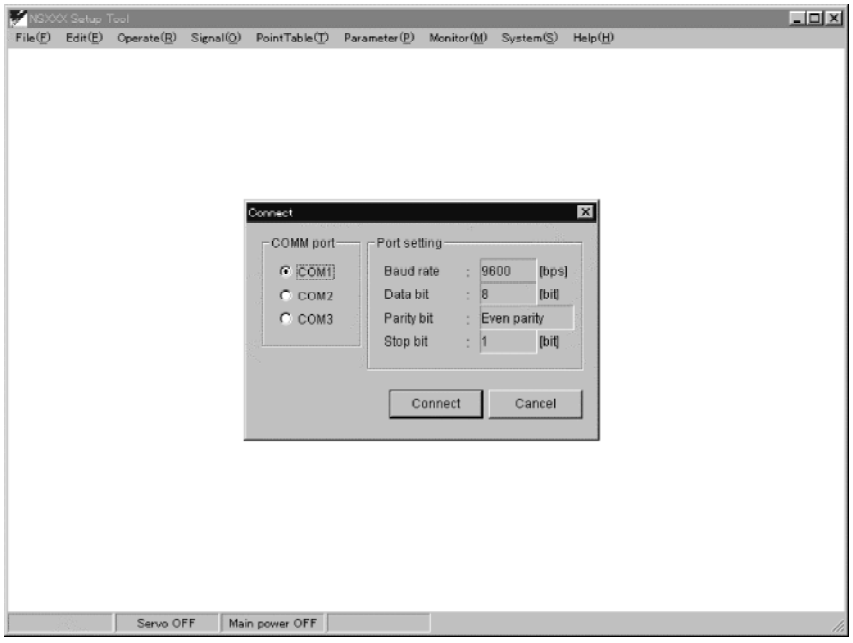


Figure 7.1 Communications setting screen

2. Perform one of the following operations.
   - If using any COM port other than COM1 on the personal computer, change the COMM PORT setting.
   - To use COM1, just click the ***Connect*** Button directly.

   Next, check the following:

   a) The communications power supply is being supplied via the SGDH control power supply to the NS300 Module.

   b) The CN11 port on the NS300 Module is connected to the personal computer via a communications cable.

The following startup screen will be displayed.

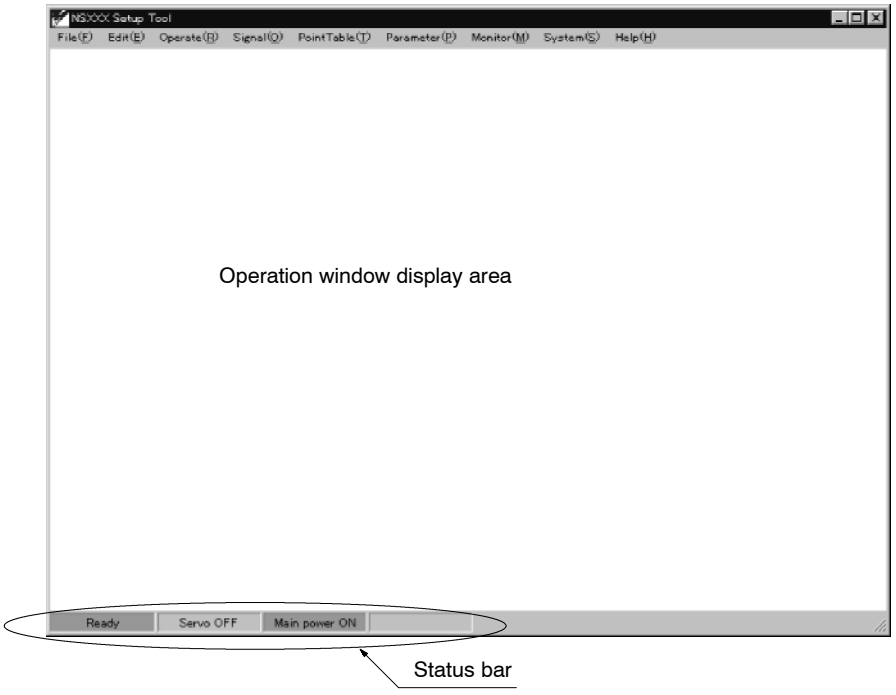
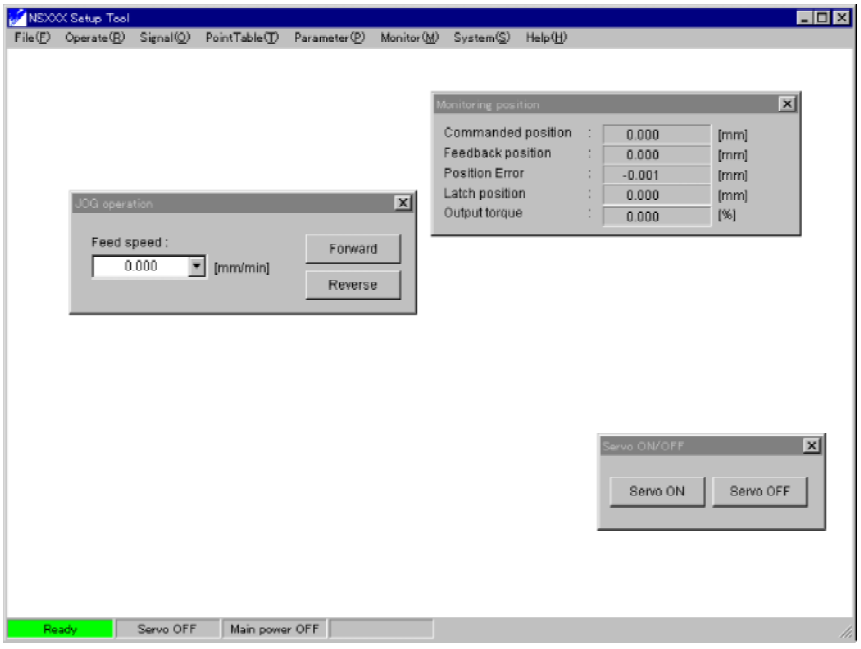


Figure 7.2 Startup Screen

The following information is normally displayed on the status bar.

- Ready
  Displays whether or not the NS300 Module is ready.
  If the Module is ready, this icon will be lit green.
- Servo ON/OFF
  Displays if the SGDH servo is ON or OFF.
  If the servo is ON, this icon will be lit green.
- Main Power ON
  Displays if the main power supply to the SGDH is ON.
  If the main power supply is being supplied normally, this icon will be lit green.
- Alarm
  Displays if an alarm has occurred in the NS300 Module or SGDH.
  If an alarm has occurred, this icon will be lit red.

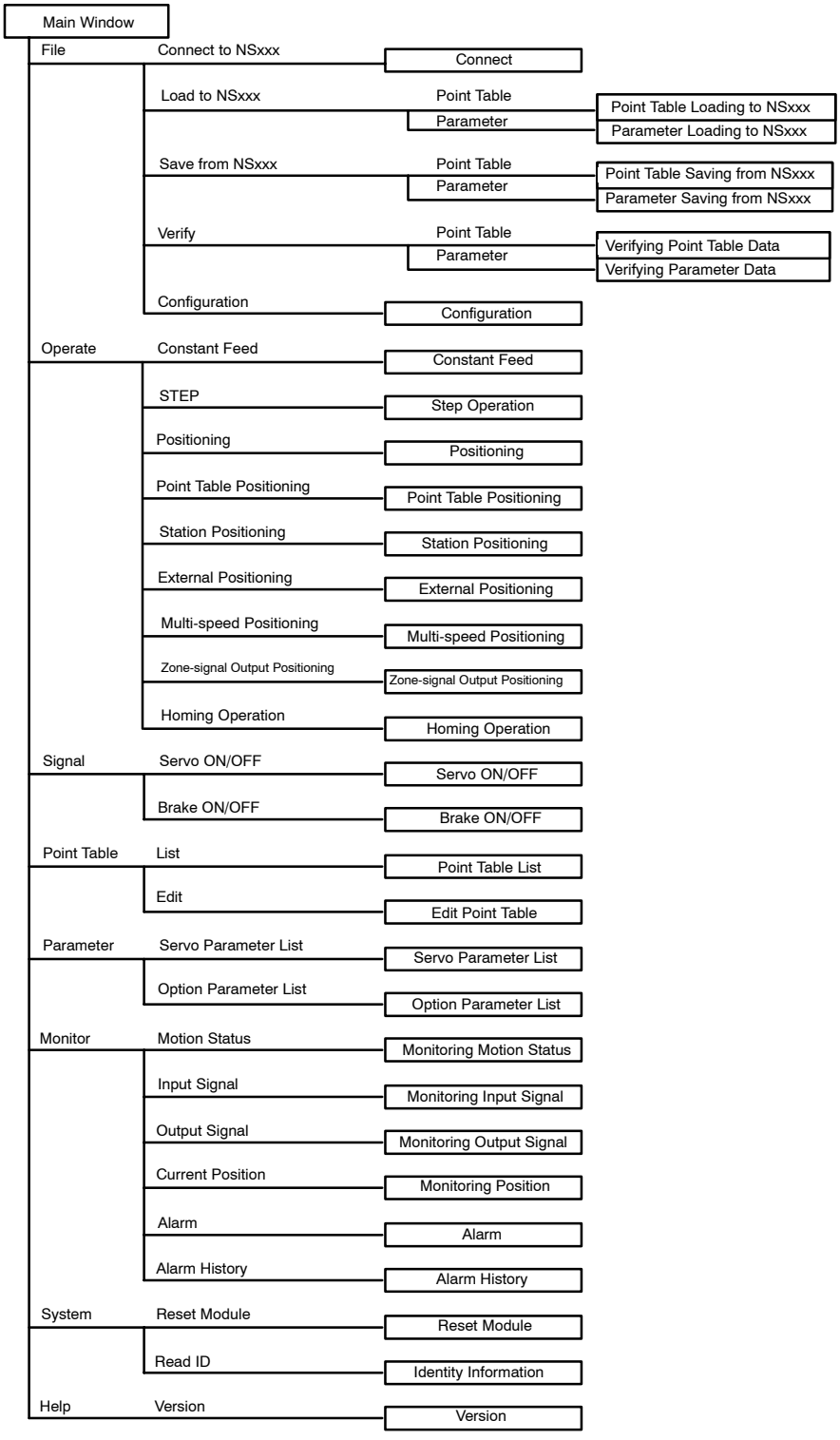
Select an item from the menu bar and make NS300 Module settings or perform simple operation, as shown below



7

7.2.2 Functions Configuration

The functional configuration of the Setup Tool is shown in the following diagram.



■ File Menu

1. Connect to NSxxx

   Starts communications with the NS300 Module.

2. Load to NSxxx

   Loads the parameter file stored in the personal computer to the NS300 Module.

3. Save from NSxxx

   Saves the parameter data or point table data within the NS300 Module in the personal computer.

4. Verify

   Compares the data stored in the personal computer and the data in the NS300 Module.

5. Configuration

   Sets the units and other settings.

■ Operate Menu

1. Constant Feed

   Performs constant feed speed.

2. STEP

   Performs step operation.

3. Positioning

   Sets the target position and performs positioning.

4. Point Table Positioning

   Performs positioning based on the specified data in the point table.

5. Station Positioning

   Performs positioning to the specified station.

6. External Positioning

   Sets the target position and performs positioning. If the external signal changes, the axis moves the distance set in the parameter and then stops.

7. Multi-speed Positioning

   Performs multi-speed positioning based on the set parameters.

8. Zone-signal Output Positioning

   Performs positioning while making notch outputs based on the set parameters.

9. Homing Operation

   Performs the zero point return.

■ Signal Menu

1. Servo ON/OFF

   Turns ON and OFF the SGDH servo.

2. Brake ON/OFF

   Turns ON and OFF the SGDH brake signal.

■ Point Table Menu

1. List

   Displays a list of the point table currently registered.

2. Edit

   Edits the point table.

■ Parameter Menu

1. Servo Parameter List

   Displays a table of SGDH parameters, which can be edited using the cursor.

2. Option Parameter List

   Displays a table of NS300 Module parameters, which can be edited using the cursor.

■ Monitor Menu

1. Motion Status

   Displays the current execution status.

2. Input Signal

   Displays the status of the external input signals connected to the CN1 port on the SGDH and the CN4 port on the NS300 Module.

3. Output Signal

   Displays the status of the external output signals connected to the CN1 port on the SGDH and the CN4 port on the NS300 Module.

4. Current Position

   Displays the current position of the servomotor in reference units.

5. Alarm

   Displays any alarms that are currently occurring. You can also clear the alarms using this function.

6. Alarm History

   Displays to a maximum of 10 the most recent alarms that have occur. You can also clear the alarm history using this function.

■ System Menu

1. Reset Module

Resets the NS300 Module and the SGDH.

When you reset the Module, the parameters that have been changed will be stored in flash ROM.

2. Read ID

Displays version information for the NS300 Module, SGDH, and so on.

■ Help Menu

- Version

Displays version information for the Setup Tool.

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8

Ratings, Specifications, and Dimensions

This chapter provides the ratings, specifications, and dimensions of SGDH SERVOPACKs.

8.1 Ratings and Specifications . . . . . 8 -2
8.2 Dimensional Drawings . . . . . 8 -3
8.2.1 NS300 Module . . . . . 8 -3

8.1 Ratings and Specifications

The following table lists the rating and specifications of NS300 Module.

Table 8.1 NS300 Module Ratings and Specifications

Item		Details
Applicable SERVOPACK		All SGDH-□□□E models
Installation Method		Mounted on the SGDH SERVOPACK
Basic Specifications	**Power Supply Method**	Supplied from the SGDH control power supply.
	Power Consumption	1.3 W
	Consumption Current	250 mA
	External Dimensions [mm]	20 x 142 x 128 (W x H x D)
	Approx. Mass [kg] (lb)	0.2 (0.441)
DeviceNet Communications	**Baud Rate Setting**	Select from 125 Kbps, 250 Kbps, or 500 Kbps using a rotary switch.
	Node Address Setting	Select the address from 0 to 63 using the rotary switches.
	Communications Power Supply	24 VDC (11 VDC to 25 VDC)
	Consumption Current	20 mA or less
Command Format	**Operation Specifications**	Positioning using DeviceNet communications
	Reference Input	DeviceNet communications Commands: Motion commands (position, speed), and reading and writing parameters
Position Control Functions	**Acceleration/ Deceleration Method**	Linear single/double-step, asymmetric, exponential, S-curve
	Fully-closed Control	Possible
Input Signals	**Fixed Allocation to CN1 Connector**	Forward/reverse run prohibited, zero point signal, emergency stop signal

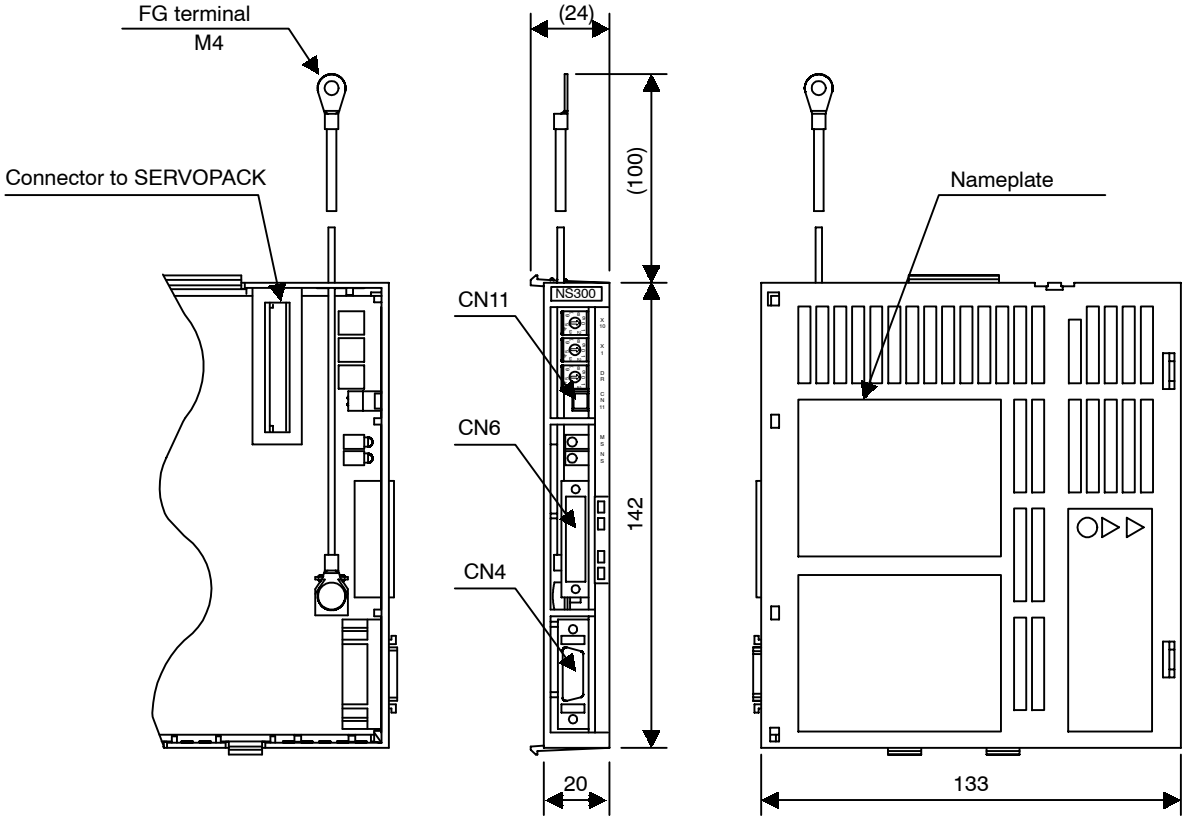
Item		Details
Internal Functions	**Position Data Latch Function**	Position data latching is possible using phase C, zero point signals, and external signals.
	Protection	Parameters damage, parameter setting errors, communications errors, etc.
	LED Indicators	MS: Module Status NS: Network Status

8.2 Dimensional Drawings

Dimensional drawings of the NS300 Module and SERVOPACKs are shown below.

8.2.1 NS300 Module

Dimensions of the NS300 Module are shown below.



Approx.. mass: 0.2 kg (0.661 lb)

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9

Error Diagnosis and Troubleshooting

This chapter describes error diagnosis and troubleshooting.
In addition, troubleshooting procedures are described for problems which cause an alarm display and for problems which result in no alarm display.

9.1 Troubleshooting with Alarm Displays . . . . . 9 -2
9.2 Troubleshooting Problems with No Alarm Display . . . . . 9 -36
9.3 Alarm Display Table . . . . . 9 -38
9.4 Warning Codes . . . . . 9 -41

9.1 Troubleshooting with Alarm Displays

Problems that occur in the Servodrives are displayed on the panel operator as "A.□□" or "CPF-□□". "A.– –", however, does not indicate an alarm. Refer to the following sections to identify the cause of an alarm and the action to be taken.

Contact your Yaskawa representative if the problem cannot be solved by the described procedures.

■ A.02

A.02: Parameter Breakdown

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm

At power ON — **A, B, C**

Cause		Remedy
A	Power turned OFF during parameter write. Alarm occurred at the next power ON.	• Initialize parameters using Fn005 and reinput user settings. • Replace SERVOPACK.
B	Circuit board (1PWB) is defective.	Replace SERVOPACK.
C	The NS300 Module is defective.	Replace the NS300 Module.

■ A.03

A.03: Main Circuit Encoder Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	Circuit board (1PWB or 2PWB) is defective.	Replace SERVOPACK.

■ A.04

A.04: Parameter Setting Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	An out-of-range parameter was previously set or loaded.	• Reset all parameters in range. • Otherwise, re-load the correct parameter.
B	Circuit board (1PWB) is defective.	Replace SERVOPACK.
C	The NS300 Module is defective.	Replace the NS300 Module.

■ A.05

A.05: Combination Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm

At power ON — **A, B**

Cause		Remedy
A	The range of servomotor capacities that can be combined has been exceeded.	Replace the servomotor so that a suitable combination is achieved.
B	Encoder parameters have not been written properly.	Replace the servomotor.

■ A.10

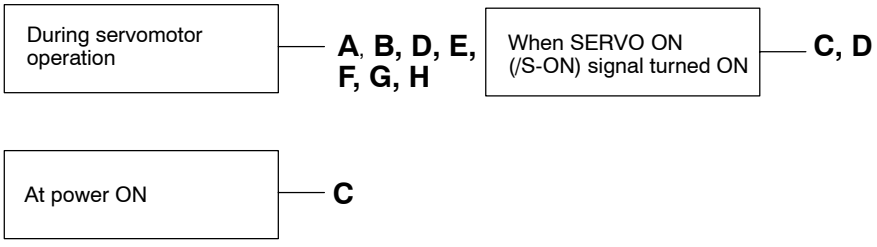
A.10: Overcurrent or Heat Sink Overheated

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	Wiring shorted between SERVOPACK and servomotor.	Check and correct wiring.
B	Servomotor phase U, V, or W shorted.	Replace servomotor.
C	• Circuit board (1PWB) is defective. • Power transistor is defective.	Replace SERVOPACK.
D	Current feedback circuit, power transistor, DB relay, or circuit board defective.	Replace SERVOPACK.
E	The ambient temperature of the SERVOPACK exceeded 55°C.	Alter conditions so that the ambient temperature goes below 55°C.
F	The air flow around the heat sink is bad.	Follow the installation method and provide sufficient space as specified.
G	Fan stopped.	Replace SERVOPACK.
H	SERVOPACK is operating under an overload.	Reduce load.

Note: E to H can occur with all 400-V SERVOPACK models and 200-V SERVOPACK models for 1.5 to 5 kW.

■ A.30

A.30: Regenerative Error Detected

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

During servomotor operation — **A, B**

Occurred when the control power turned ON — **D**

Occurred approximately 1 second after the main circuit power ON — **A, B, C**

Cause		Remedy
A	Regenerative transistor is abnormal.	Replace SERVOPACK.
B	Disconnection of the regenerative resistor.	Replace SERVOPACK or regenerative resistor.
C	Regenerative unit disconnected (for an external regenerative resistor).	Check wiring of the external regenerative resistor.
D	SERVOPACK is defective.	Replace SERVOPACK.

■ A.32

A.32: Regenerative Overload

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

During servomotor operation — **A, B**

Cause		Remedy
A	Regenerative power exceeds the allowable value.	Use an external regenerative resistor that matches the regenerative power capacity.
B	Alarm occurs although an external regenerative resistor is used and the temperature rise of the regenerative resistor is small.	Reset the incorrect Pn600 parameter setting.

■ A.40

A.40: Main Circuit DC Voltage Error Detected: overvoltage

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

During servomotor operation — **A, B, C, D**

Occurred when the control power turned ON — **E**

Occurred when main circuit power turned ON — **A, D**

Cause		Remedy
A	The power supply voltage is not within the range of specifications.	Check power supply.
B	Load exceeds capacity of the Regenerative unit.	Check specifications of load inertia moment and overhanging load.
C	Regenerative transistor is abnormal.	Replace SERVOPACK.
D	Rectifying diode is defective.	
E	SERVOPACK is defective.	

■ A.41

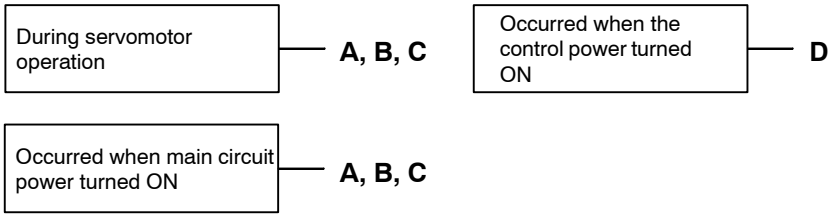
A.41: Main Circuit Voltage Error Detected: Undervoltage

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	The power supply voltage is not within the range of specifications.	Check power supply voltage.
B	Fuse blown.	Replace SERVOPACK.
D	Rectifying diode is defective.	
E	SERVOPACK is defective.	

■ A.51

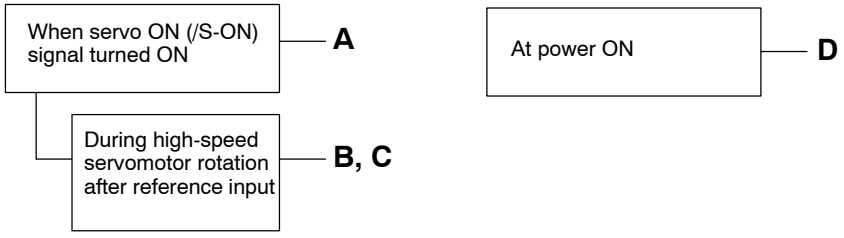
A.51: Overspeed

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	OFF	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	Servomotor wiring is incorrect.	Check and correct wiring. (Check phase-U, -V, and -W motor wiring errors.)
B	Position or speed reference input is too large.	Lower the reference input values.
C	Incorrect reference input gain settings.	Check and correct the parameter settings.
D	Circuit board (1PWB) is defective.	Replace SERVOPACK.

■ A.71

A.71: Overload: Instantaneous Maximum Load

The alarm output, the status when LEDs are lit, and the remedy procedure are identical to those of A.72 below.

■ A.72

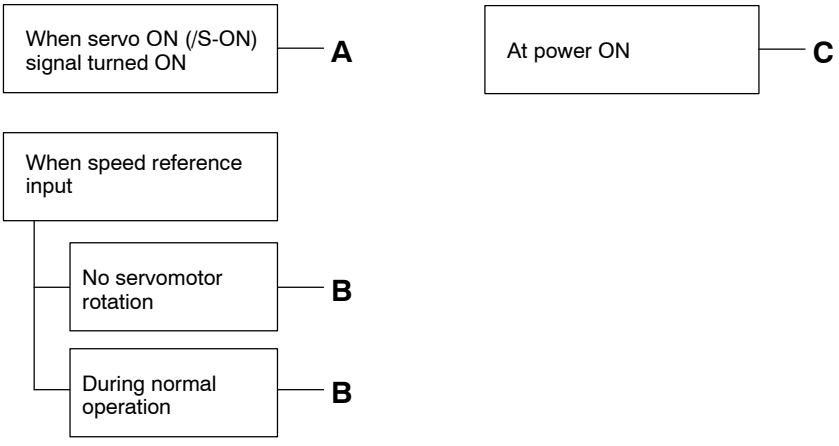
A.72: Overload: Continuous Maximum Load

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	Servomotor wiring is incorrect or disconnected	Check wiring and connectors at servomotor.
B	Load greatly exceeds rated torque.	Reduce load torque and moment of inertia. Otherwise, replace with larger capacity servomotor.
C	Circuit board (1PWB) is defective.	Replace SERVOPACK.

■ A.73

A.73: Dynamic Brake Overload

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

When servo OFF signal turned ON — A

At power ON — B

Cause		Remedy
A	The product of the square of rotational motor speed and the combined moment of inertia of the motor and load (rotation energy) exceeds the capacity of the dynamic brake resistor built into SERVOPACK.	• Lower the rotational speed. • Lower the load moment of inertia. • Do not frequently use dynamic braking.
B	Circuit board (1PWB) is defective.	Replace SERVOPACK.

■ A.74

A.74: Overload of Surge Current Limit Resistor

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

When main circuit power turned ON or OFF — A

At power ON — B

Cause		Remedy
A	Frequently turning the main circuit power ON/OFF.	Do not repeatedly turn ON/OFF the main circuit power.
B	Circuit board (1PWB) is defective.	Replace SERVOPACK.

■ A.7A

A.7A: Heat Sink Overheated

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	The ambient temperature of the SERVOPACK exceeds 55°C.	Alter conditions so that the ambient temperature goes below 55°C.
B	The air flow around the heat sink is bad.	Follow installation method and provide sufficient surrounding space as specified.
C	Fan stopped.	Replace SERVOPACK.
D	SERVOPACK is operating under overload.	Reduce load.
E	SERVOPACK is defective.	Replace SERVOPACK.

Note: This alarm display tends to occur only with a SERVOPACK of 30 W to 1,000 W.

■ A.81

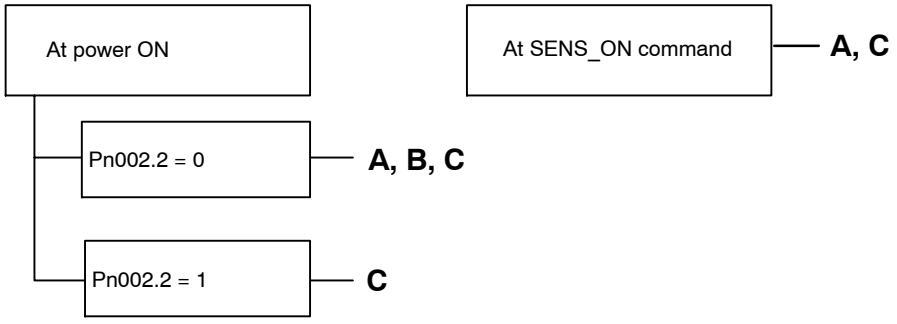
A.81: Absolute Encoder Backup Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	The following power supplies to the absolute encoder all failed: • +5 V supply (supplied from SERVOPACK) • Battery	Follow absolute encoder set-up procedure.
B	Absolute encoder malfunctioned	Replace servomotor.
C	Circuit board (1PWB) is defective.	Replace SERVOPACK.

■ A.82

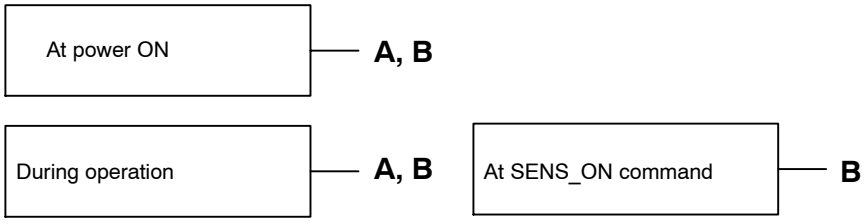
A.82: Absolute Encoder Checksum Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	Error during encoder memory check	• Follow absolute encoder setup procedure. • Replace servomotor if error occurs frequently.
B	Circuit board (1PWB) is defective.	Replace SERVOPACK.

■ A.83

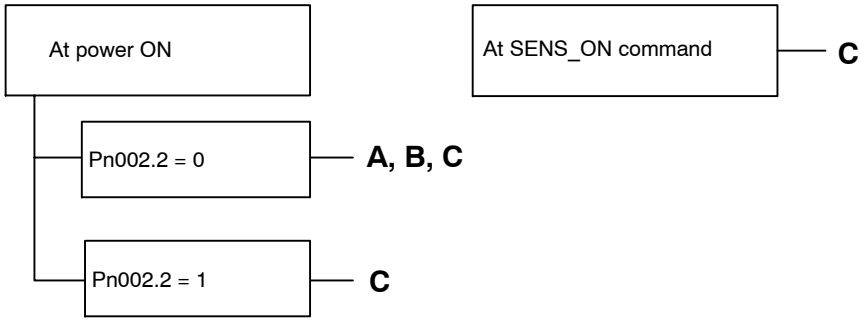
A.83: Absolute Encoder Battery Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	• Battery is not connected. • Battery connection is defective.	Check and correct battery connection.
B	Battery voltage below specified value. Specified value: 2.7 V	Install a new battery while the control power to SERVOPACK is ON. After replacement, turn the power OFF and ON.
C	Circuit board (1 PWB) is defective.	Replace SERVOPACK.

Note: No alarm will occur at the SERVOPACK if the battery error occurs during operation.

■ A.84

A.84: Encoder Data Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	Encoder is defective.	Replace the servomotor if the error occurs frequently.
B	Operational error in encoder caused by external noise.	Check and correct wiring around the encoder as follows: • Grounding of the servomotor • Separation between the encoder cable and the servomotor power cable • Insertion of toroidal cores onto cables

■ A.85

A.85: Absolute Encoder Overspeed

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	Absolute encoder turned ON at a speed exceeding 200 min^{-1}.	Turn ON power supply again with the servomotor stopped.
B	Circuit board (1PWB) is defective.	Replace SERVOPACK.

■ A.86

A.86: Absolute Encoder Overheated

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	The ambient temperature of the servomotor is high.	Alter conditions so that the ambient temperature goes below 40°C.
B	Servomotor is operating under overload.	Reduce load.
C	Circuit board (1PWB) is defective.	Replace SERVOPACK.
D	Encoder is defective.	Replace servomotor.

■ A.94

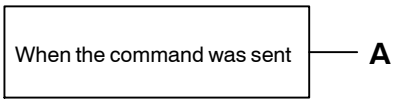
A.94: Parameter Setting Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	OFF	ON

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	A value outside the DeviceNet communications setting range was set.	Reset correctly.

■ A.95

A.95: Command Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	OFF	ON

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

When the command was sent — **A, B**

Cause		Remedy
A	Presently unable to receive the command that has been sent.	Adjust conditions to match the command. Refer to the specifications for each command.
B	Unsupported command.	Do not send unsupported commands.

■ A.96

A.96: DeviceNet Communications Warning

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	OFF	OFF	ON

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

During DeviceNet communications — **A, B**

Cause		Remedy
A	Contact between the cable and the connector is faulty.	Correct the connector wiring.
B	Malfunction due to noise.	Take noise prevention measures.

■ A.98

A.98: Main Power OFF

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	ON	ON

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

When main power supply OFF — **A, B**

Cause		Remedy
A	Contact between the power supply cable and the connector is faulty.	Correct the connector wiring.
B	Power Supply Unit is defective.	Check the Power Supply Unit.

■ A.9A

A.9A: Not Completed within the Time Set in Pn851

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	OFF	ON	ON

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

During servomotor operation — **A, B**

Cause		Remedy
A	Positioning Completed Timeout setting is too small.	Correct the Positioning Completed Timeout setting.
B	Positioning Loop Gain or Speed Loop Gain setting is too small.	Correct the Positioning Loop Gain or Speed Loop Gain setting.

■ A.b1

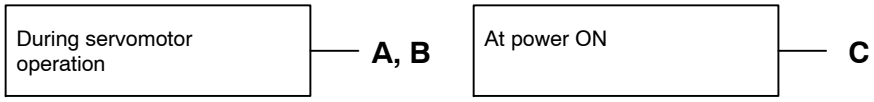
A.b1: Reference Speed Input Read Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	Error in reference read-in unit (A/D convertor, etc.)	Reset alarm and restart operation.
B	Reference read-in unit is defective. (A/D convertor, etc.)	Replace SERVOPACK.
C	Circuit board (1PWB) is defective.	Replace SERVOPACK.

■ A.b6

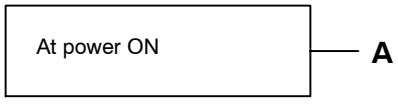
A.b6: Communications LSI Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).

Status and Remedy for Alarm



Cause		Remedy
A	The NS300 Module is defective.	Replace the NS300 Module.

■ A.C6

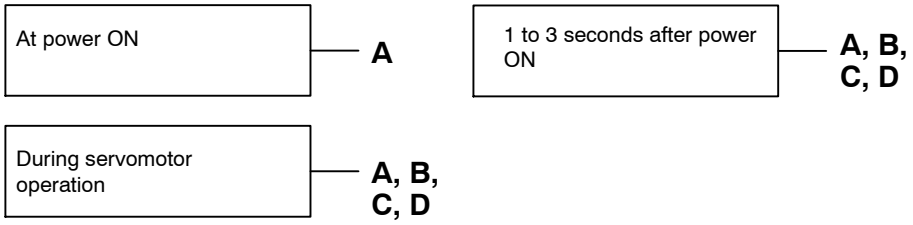
A.C6: Fully-closed Encoder Phase-A, -B Disconnection

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	OFF	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	Circuit board (1PWB) is defective.	Replace SERVOPACK.
B	Encoder wiring error or faulty contact.	Check the wiring and check that the connector is fully inserted on the encoder.
C	There is noise in the encoder wiring.	Separate the encoder wiring from the main circuit.
D	Encoder is defective.	Replace servomotor.

■ A.C7

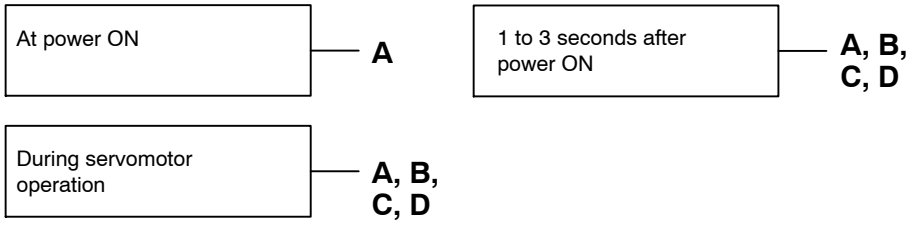
A.C7: Fully-closed Encoder Phase-C Disconnection

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	OFF	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	Circuit board (1PWB) is defective.	Replace SERVOPACK.
B	Encoder wiring error or faulty contact.	Check the wiring and check that the connector is fully inserted on the encoder.
C	There is noise in the encoder wiring.	Separate the encoder wiring from the main circuit.
D	Encoder is defective.	Replace servomotor.

■ A.CC

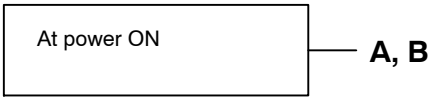
A.CC: Multiturn Limit Disagreement.

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	OFF	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	The setting of the Multiturn Limit Setting (Pn205) parameter in the SERVOPACK is incorrect.	Change parameter Pn205.
B	The multiturn limit has not been set in the encoder.	Check that the Multiturn Limit Setting (Pn205) parameter in the SERVOPACK is correct, and then execute the encoder multiturn limit setting change (Fn013) when a Multiturn Limit Disagreement (A.CC) occurs.

■ A.d0

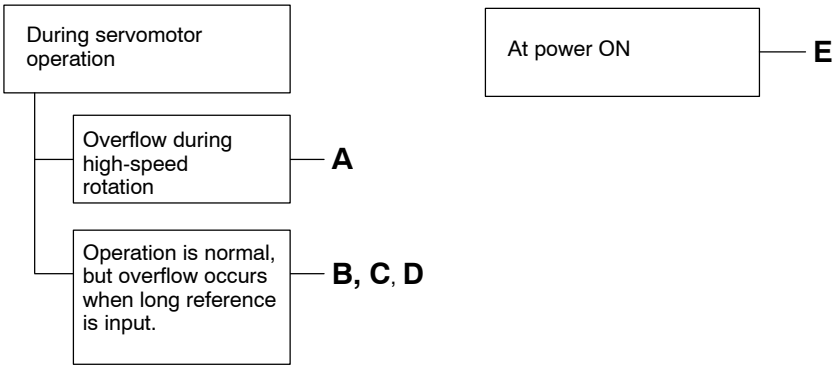
A.d0: Position Error Pulse Overflow

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
ON	ON	OFF	OFF

Note: OFF: Output transistor is OFF (alarm state).ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	Servomotor wiring is incorrect or connection is poor.	Check wiring at servomotor.
B	SERVOPACK was not correctly adjusted.	Increase speed loop gain (Pn100) and position loop gain (Pn102).
C	Motor load was excessive.	Reduce load torque or moment of inertia. If problem not corrected, replace with a motor with larger capacity.
D	Position reference is too high.	• Reduce the acceleration/deceleration rate. • Change electronic gear ratio.

■ A.E0

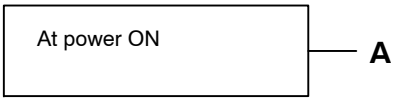
A.E0: No NS300 Module

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	The NS300 Module is defective.	Replace the NS300 Module.

■ A.E1

A.E1: NS300 Module Timeout

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	The NS300 Module is defective.	Replace the NS300 Module.

■ A.E2

A.E2: Watchdog Counter Error in NS300 Module

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	The NS300 Module is defective.	Replace the NS300 Module.

■ A.E6

A.E6: DeviceNet Duplicate MAC ID Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	Duplicate node address	Check node addresses of all Modules on the DeviceNet network.

■ A.E7

A.E7: NS300 Module Detection Error when SGDH power is ON

A.E7 occurs when the SGDH is used without the NS300 Module after it has been used with the NS300 Module.

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

NS300 Module detection error — **A, B**

Cause		Remedy
A	The NS300 Module is not mounted properly.	Check that NS300 Module mounted correctly.
B	The NS300 Module is not mounted.	Execute Fn014 from Digital Operator.

■ A.E8

A.E8: Rotary Switch Setting Error on NS300 Module Front Panel

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm

Rotary switch setting error when power is turned ON — **A, B**

Cause		Remedy
A	Baud rate setting is incorrect.	Be sure the setting is between 0 and 2.
B	Node address setting is incorrect.	Be sure the setting is between 0 and 63.

■ A.E9

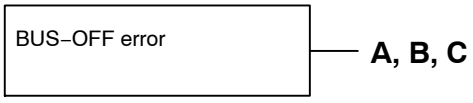
A.E9: DeviceNet BUS-OFF Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	There is no terminating resistance in the network.	Check that a terminator is mounted to both ends of the DeviceNet network.
B	There is noise in network wiring.	Separate the network wiring from the power supply circuit.
C	The baud rate is incorrect.	Check the communications settings of the rotary switches mounted on the front panel of the NS300 Module.

■ A.EA

A.EA: SERVOPACK Malfunction

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.



Status and Remedy for Alarm

Cause		Remedy
A	SERVOPACK is defective.	Replace SERVOPACK.

■ A.EB

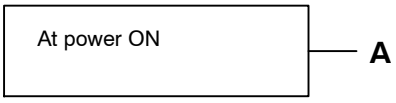
A.EB: SERVOPACK Initial Access Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	SERVOPACK is defective.	Replace SERVOPACK.

■ A.EC

A.EC: SERVOPACK WDC Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	SERVOPACK is defective.	Replace SERVOPACK.
B	DeviceNet communications interrupted.	Turn the power ON again.

■ A.ED

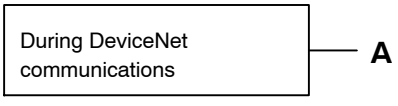
A.ED: NS300 Module Error

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	ON	ON	OFF

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

Status and Remedy for Alarm



Cause		Remedy
A	Command was interrupted.	Do not connect a Hand-held Digital Operator or start communications with a personal computer during command execution.

■ CPF00

CPF00: Digital Operator Transmission Error 1

This alarm is not stored in the alarm trace-back function memory.

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
Not specified			

Status and Remedy for Alarm

At power ON. Digital Operator connected before SERVOPACK power turned ON. — **A**, **B**, **C**, **D**

Digital Operator connected to SERVOPACK while power turned ON. — **A**, **B**, **C**, **D**

Cause		Remedy
A	Cable defective or poor contact between Digital Operator and SERVOPACK	• Check connector connections. • Replace cable.
B	Malfunction due to external noise	Separate Digital Operator and cable from noise source.
C	Digital Operator is defective.	Replace Digital Operator.
D	SERVOPACK is defective.	Replace SERVOPACK.

■ CPF01

CPF01: Digital Operator Transmission Error 2
This alarm is not stored in the alarm trace-back function memory.

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
Not specified			

Status and Remedy for Alarm

During operation — **A**, **B**, **C**, **D**

Cause		Remedy
A	Cable defective or poor contact between Digital Operator and SERVOPACK	• Check connector connections. • Replace cable.
B	Malfunction due to external noise	Separate Digital Operator and cable from noise source.
C	Digital Operator is defective.	Replace Digital Operator.
D	SERVOPACK is defective.	Replace SERVOPACK.

■ A.– –

A.– –: Normal Operation
This is not an alarm display.

Display and Outputs

Alarm Outputs			
Alarm Code Outputs			ALM Output
ALO1	ALO2	ALO3	
OFF	OFF	OFF	ON

Note: OFF: Output transistor is OFF (alarm state). ON: Output transistor is ON.

9.2 Troubleshooting Problems with No Alarm Display

Refer to the tables below to identify the cause of a problem which causes no alarm display and take the remedy described.

Turn OFF the servo system power supply before commencing the shaded procedures.

Contact your Yaskawa representative if the problem cannot be solved by the described procedures.

Table 9.1 Troubleshooting Table with No Alarm Display

Symptom	Cause	Inspection	Remedy
Servomotor does not start.	Power not connected	Check voltage between power supply terminals.	Correct the power circuit.
	Loose connection	Check terminals of connectors (CN1, CN2).	Tighten any loose parts.
	Connector (CN1) external wiring incorrect	Check connector (CN1) external wiring.	Refer to connection diagram and correct wiring.
	Servomotor or encoder wiring disconnected	–	Reconnect wiring.
	Overloaded.	Run under no load.	Reduce load or replace with larger capacity servomotor.
	Encoder type differs from parameter setting.	Check the type of encoder being used.	Set parameter Pn002.2 to the encoder type being used.
	P-OT and N-OT inputs are turned OFF.	Refer to *6.3*.	Turn P-OT and N-OT input signals ON.
	Software limit reached	Refer to *4.3.3*.	Operate the servomotor within software limits.
Servomotor does not run.	Motion commands have not been sent.	Check using DeviceNet communications or the DeviceNet monitor.	Send the motion commands.
			Send Servo ON command.
Servomotor moves instantaneously, then stops.	Servomotor or encoder wiring incorrect.	–	Refer to *Chapter 3 Connectors* and correct wiring.
Servomotor speed unstable	Wiring connection to motor is defective.	Check connection of phase-U, -V, and -W power leads encoder connectors.	Tighten any loose terminals or connectors.

Symptom	Cause	Inspection	Remedy
Servomotor vibrates at approximately 200 to 400 Hz.	Speed loop gain value is too high.	–	Reduce speed loop gain (Pn100) preset value.
High rotation speed overshoot on starting and stopping	Speed loop gain value is too high.	–	Reduce speed loop gain (Pn100) preset value. Increase integration time constant (Pn101).
	Speed loop gain value too low compared to position loop gain value.	–	Increase speed loop gain (Pn100) preset value. Reduce the integration time constant (Pn101).
Servomotor overheated	Ambient temperature is too high.	Measure servomotor ambient temperature.	Reduce ambient temperature to 40°C max.
	Servomotor surface is dirty.	Visual check	Clean dust and oil from motor surface.
	Overloaded	Run under no load.	Reduce load or replace with larger capacity servomotor.
Abnormal noise	Mechanical mounting is incorrect.	Check if servomotor mounting screws loose.	Tighten mounting screws.
		Check if coupling not centered.	Center coupling.
		Check if coupling unbalanced.	Balance coupling.
	Bearing is defective.	Check noise and vibration near bearing.	Consult your Yaskawa representative if defective.
	Machine causing vibrations	Check foreign object intrusion, damage or deformation of driving parts of machine.	Consult with machine manufacturer if defective.

9.3 Alarm Display Table

Table 9.2 Alarm Display Table

Alarm Display	Alarm Code Outputs			ALM Output	Alarm Name	Description
	ALO 1	ALO 2	ALO 3			
A.02	OFF	OFF	OFF	OFF	Parameter Breakdown*2	EEPROM data of SERVOPACK is abnormal.
A.03					Main Circuit Encoder Error	Detection data for power circuit is abnormal.
A.04					Parameter Setting Error*2	The parameter setting is out of the allowable setting range.
A.05					Combination Error	SERVOPACK and servomotor capacities do not match each other.
A.10	ON	OFF	OFF	OFF	Overcurrent or Heat Sink Overheated*2	An overcurrent flowed through the IGBT. Heat sink of SERVOPACK was overheated.
A.30	ON	ON	OFF	OFF	Regeneration Error	• Regenerative resistor is defective. • Regenerative transistor is defective.
A.32					Regenerative Overload	Regenerative energy exceeds regenerative resistor capacity.
A.40	OFF	OFF	ON	OFF	Overvoltage *3	Main circuit DC voltage is excessively high.
A.41					Undervoltage *3	Main circuit DC voltage is excessively low.
A.51	ON	OFF	ON	OFF	Overspeed	Rotational speed of the motor is excessively high.
A.71	ON	ON	ON	OFF	Overload for Instantaneous Maximum Load	The motor was operating for several seconds to several tens of seconds under a torque largely exceeding ratings.
A.72					Overload for Continuous Maximum Load	The motor was operating continuously under a torque largely exceeding rating.
A.73					Dynamic Brake Overload	When the dynamic brake was applied, rotational energy exceeded the capacity of dynamic brake resistor.
A.74					Overload of Surge Current Limit Resistor	The main circuit power was frequently turned ON and OFF.
A.7A					Heat Sink Overheated*1	The heat sink of SERVOPACK is overheated.

Alarm Display	Alarm Code Outputs			ALM Output	Alarm Name	Description
	ALO 1	ALO 2	ALO 3			
A.81	OFF	OFF	OFF	OFF	Absolute Encoder Backup Error*2	All the power supplies for the absolute encoder have failed and position data was cleared.
A.82					Absolute Encoder Checksum Error*2	The checksum results of the absolute encoder memory are abnormal.
A.83					Absolute Encoder Battery Error	Battery voltage for the absolute encoder has dropped.
A.84					Encoder Data Error*2	Data in the encoder is abnormal.
A.85					Absolute Encoder Overspeed	The absolute encoder was rotating at high speed when the power was turned ON.
A.86					Encoder Overheated	The internal temperature of encoder is too high.
A.b1					Reference Speed Input Read Error	The A/D converter for reference speed input is defective.
A.b2					Reference Torque Input Read Error	The A/D converter for reference torque input is defective.
A.b6					Gate Array Error	Communications LSI error
A.bF					System Alarm *2	A system error occurred in the SERVOPACK.
A.C1	ON	OFF	ON	OFF	Servo Overrun Detected	The servomotor ran out of control.
A.C6					Fully-closed Loop Phase-A/B Disconnected	Phase A or B of the fully closed encoder was disconnected.
A.C7					Fully-closed Loop Phase-C Disconnected	Phase C of the fully closed encoder was disconnected.
A.C8					Absolute Encoder Clear Error and Multi-turn Limit Setting Error *2	The multi-turn for the absolute encoder was not properly cleared or set.
A.C9					Encoder Communications Error *2	Communications between SERVOPACK and encoder is not possible.
A.CA					Encoder Parameter Error *2	Encoder parameters are incorrect.
A.Cb					Encoder Echoback Error *2	Contents of communications with encoder are incorrect.
A.CC					Multi-turn Limit Disagreement	Different multi-turn limits have been set in the encoder and SERVOPACK.
A.d0	ON	ON	OFF	OFF	Position Error Pulse Overflow	Position error pulse exceeded parameter (Pn505).

Alarm Display	Alarm Code Outputs			ALM Output	Alarm Name	Description
	ALO 1	ALO 2	ALO 3			
A.E0	OFF	ON	ON	OFF	No NS300 Module *2	No NS300 Module installed.
A.E1					NS300 Module Timeout *2	No response from the NS300 Module.
A.E2					Watchdog Counter Error of NS300 Module *2	WDC error in the NS300 Module
A.E6					DeviceNet Duplicate MAC ID Error	Same node address already exists on the DeviceNet network.
A.E7					NS300 Module Detection Error	No NS300 Module was detected when was power supplied to the SGDH.
A.E8					Rotary Switch Setting Error	Module rotary switch setting error
A.E9					DeviceNet BUS-OFF Error	Fatal communications error has occurred in DeviceNet communications.
A.EA					SERVOPACK Malfunction*2	SERVOPACK is defective.
A.EB					SERVOPACK Initial Access Error *2	Initial processing failed.
A.EC					SERVOPACK WDC Error	SERVOPACK WDC error
A.ED					NS300 Module Error	Command was interrupted.
A.F1	OFF	ON	OFF	OFF	Power Line NS300 Phase	One phase in the 3-phase main power supply is not connected.
CPF00	Not specified				Hand-held Digital Operator Transmission Error	Communications not possible between Hand-held Digital Operator (JUSP-OP02A-2) and the SERVOPACK (CPU error)
CPF01						
A.– –	OFF	OFF	OFF	ON	Not an error	Normal operation status.

Note: OFF: Output transistor is OFF (high). ON: Output transistor is ON (low).

* 1. This alarm display appears only within the range of 30 W to 1,000 W.

* 2. These alarms are not reset for the Alarm Reset Command. Eliminate the cause of the alarm and then turn OFF the power supply to reset the alarms.

* 3. For SERVOPACKs with a capacity of 6.0 kw or more, A.40 indicates a main circuit voltage error alarm. This means that either an overvoltage or an undervoltage has occurred at some stage.

9.4 Warning Codes

The warning codes and the relationship between ON/OFF warning code outputs are shown on the following table.

Normally, warning codes are not output. However, if the parameters are set for warning codes to be output, those outputs will be as indicated in table 9.3.

Table 9.3 Warning Codes and Warning Code Outputs

Warning Code	Warning Code Output			Servo Alarm Output	Warning Name	Description
	ALO1	ALO2	ALO3			
A.91	OFF	ON	ON	ON	Overload	This warning occurs before the overload alarms (A.71 or A.72) occur. If the warning is ignored and operation continues, an overload alarm may occur.
A.92	ON	OFF	ON	ON	Regenerative Overload	This warning occurs before the regenerative overload alarm (A.32) occurs. If the warning is ignored and operation continues, a regenerative overload alarm may occur.
A.94	ON	ON	OFF	ON	Parameter Setting Warning	A value outside the setting range was set using DeviceNet communications.
A.95	OFF	ON	OFF	ON	Command Warning	A command not supported in the product specifications was issued. The command reception conditions were not met.
A.96	ON	OFF	OFF	ON	Communications Warning	A DeviceNet communications error occurred (once).
A.98	ON	ON	ON	ON	Main Power OFF	The main power supply is not being supplied.
A.9A	ON	OFF	ON	ON	Not Completed within the Time Set in Pn851	Positioning was not completed within the set time.

Note: OFF: Output transistor is OFF (high). ON: Output transistor is ON (low).

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A

DeviceNet Object Model

A.1 DeviceNet Object Model . . . . . A -2

A.1 DeviceNet Object Model

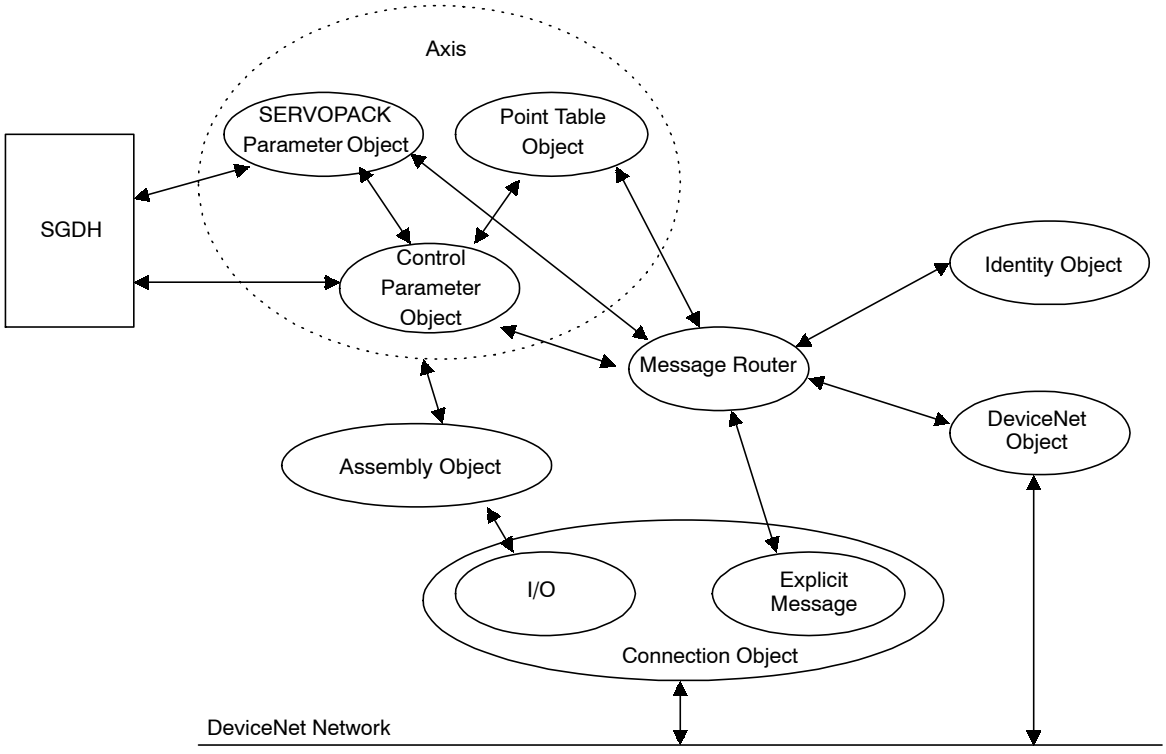


Figure A.1 DeviceNet Object Model

Object Class	Class Code	Instance No.	Function
Identity	0x01	1	Manages ID information, such as the device type, serial number, vendor, and ID.
Message Router	0x02	1	Routes explicit messages to the appropriate object.
DeviceNet	0x03	1	Manages the physical connection to the DeviceNet, and performs Master/ Slave connection set and release demands.
Assembly	0x04	1	Manages I/O output messages for Slave to Master.
		2	Manages I/O input messages from Master to Slave.
Connection	0x05	1	Manages explicit messages attributes.
		2	Manages I/O message (polled I/O) attributes.
Control Parameter	0x64	1	Manages position controller engine parameters.
Point Table	0x65	1	Manages point table data.
Servo Parameter	0x66	1	Manages parameters within SGDH SERVOPACK.

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B

DeviceNet Attributes

This appendix lists the objects and attributes that can be used in DeviceNet.

B.1 Identity Object (0x01) . . . . . B -2
B.2 Message Router Object (0x02) . . . . . B -3
B.3 DeviceNet Object (0x03) . . . . . B -4
B.4 Assembly Object (0x04) . . . . . B -5
B.5 Connection Object (0x05) . . . . . B -6
B.6 Control Parameter Object (0x64) . . . . . B -9
B.7 Point Table Object (0x65) . . . . . B -17
B.8 SERVOPACK Parameter Object (0x66) . . B -22

B.1 Identity Object (0x01)

■ Class

Attributes: Not supported
Services: Not supported

■ Instances

B

Attributes

No	Access	Name	Data Type	Description	Value
1	Get	Vendor ID	UINT	Identification of each vendor by number	0x44
2	Get	Device Type	UINT	Identification of general type of product	0x00
3	Get	Product Code	USINT	Identification of a particular product of an individual vendor	0x50
4	Get	Revision	---	Revision of the item the Identity Object represents	1.0
5	Get	Status	WORD	Summary status of NS300 Module	---
6	Get	Serial Number	UDINT	Serial number of NS300 Module	Each module
7	Get	Product Name	STRING	Human readable identification	JUSP-NS300

Services

Service Code	Service	Description
0x05	Reset	Invokes the Reset Service for the NS300 Module.
0x0E	Get_Attribute_Single	Returns the contents of the specified attribute.

B.2 Message Router Object (0x02)

■ **Class**

Attributes: Not supported
Services: Not supported

■ **Instances**

Attributes: Not supported
Services: Not supported

B.3 DeviceNet Object (0x03)

■ Class

Attributes: Not supported
Services: Not supported

■ Instances

Attributes

No.	Access	Name	Data Type	Description	Value
1	Get	MAC ID	USINT	Node address	Range 0 to 63
2	Get	Baud Rate	USINT	Baud rate	Range 0 to 2
3	Get	BOI	BOOL	BUS-OFF interrupt	0x00
4	Get	Bus-Off Counter	USINT	Number of times CAN went to the BUS-OFF state	Range 0 to 255
5	Get	Allocation Information	Structure including byte and USINT	---	---
---	---	Allocation Choice Byte	Byte	Connection type for Master/Slave connection	---
---	---	Master's MAC ID	USINT	Node address of Master	Range 0 to 63

Services

Service Code	Name	Description
0x0E	Get_Attribute_Single	Returns the contents of the specified attribute.
0x4B	Allocate_Master/Slave_ Connection_Set	Requests the use of the Predefined Master/Slave Connection Set.
0x4C	Release_Master/Slave_ Connection_Set	Opens the Master/Slave connection.

B.4 Assembly Object (0x04)

■ Class

Attributes: Not supported
Services: Not supported

■ Instances

Attributes

No.	Access	Name	Data Type	Description	Value
3	Get/Set	Data	Array	I/O data	---

Services

Service Code	Name	Description
0x0E	Get_Attribute_Single	Returns the contents of the specified attribute.

B.5 Connection Object (0x05)

■ Class

Attributes: Not supported
Services: Not supported

■ Instances

Attributes, Instance 1: Explicit Message

No.	Access	Name	Data Type	Description	Value
1	Get	State	USINT	Defines the state of the object.	---
2	Get	Instance_type	USINT	Defines either I/O or messaging connection.	0x0000
3	Get	TransportClass_ Trigger	Byte	Defines behavior of the connection.	0x8300
4	Get/Set	Produced_ Connection_ID	UINT	Placed in CAN Identifier Field when the connection transmits	---
5	Get/Set	Consumed_ Connection_ID	UINT	CAN Identifier Field value that denotes message to be received	---
6	Get/Set	Initial_Comm_ Characteristics	USINT	Defines the message group across which productions and consumption associated with this connection occur.	0x2100
7	Get	Produced_ Connection_Size	UINT	Maximum number of bytes transmitted across this connection	0xff00
8	Get	Consumed_ Connection_Size	UINT	Maximum number of bytes received across this connection	0xff00
9	Get/Set	Expected_Packet_ Rate	UINT	Defines timing associated with this connection.	---
12	Get	Watchdog_ Timeout_Action	USINT	Defines how to handle timeouts.	0x0100
13	Get	Produced_ Connection_Path_ Length	UINT	Number of bytes in the produced connection path attribute	0x0000
14	Get	Produced_ Connection_Path	USINT Array	Specified the application object whose data is to be sent by this connection object	---

No.	Access	Name	Data Type	Description	Value
15	Get	Consumed_ Connection_Path_ Length	UINT	Number of bytes in the consumed connection path attribute	0x0000
16	Get	Consumed_ Connection_Path	USINT Array	Specified the application object that are to receive the data received by this connection object	---

Attributes, Instance 2: Polled I/O

No.	Access	Name	Data Type	Description	Value
1	Get	State	USINT	Defines the state of the object.	---
2	Get	Instance_type	USINT	Defines either I/O or messaging connection.	0x0001
3	Get	Transport_Class_ Trigger	Byte	Defines behavior of the connection.	0x8200
4	Get/Set	Produced_ Connection_ID	UINT	Placed in CAN Identifier Field when the connection transmits	---
5	Get/Set	Consumed_ Connection_ID	UINT	CAN Identifier Field value that denotes message to be received	---
6	Get/Set	Initial_Comm_ Characteristics	USINT	Defines the message group across which productions and consumption associated with this connection occur.	0x0100
7	Get	Produced_ Connection_Size	UINT	Maximum number of bytes transmitted across this connection	0x0800
8	Get	Consumed_ Connection_Size	UINT	Maximum number of bytes received across this connection	0x0800
9	Get/Set	Expected_Packet_ Rate	UINT	Defines timing associated with this connection.	---
12	Get	Watchdog_ Timeout_Action	USINT	Defines how to handle timeouts.	0x0100
13	Get	Produced_ Connection_Path_ Length	UINT	Number of bytes in the produced connection path attribute	0x0000
14	Get	Produced_ Connection_Path	USINT Array	Specified the application object whose data is to be sent by this connection object	00_00_ 00_00_ 00_00_

No.	Access	Name	Data Type	Description	Value
15	Get	Consumed_ Connection_Path Length	UINT	Number of bytes in the consumed connection path attribute	0x0000
16	Get	Consumed_ Connection_Path	USINT Array	Specified the application object that are to receive the data received by this connection object	00_00_ 00_00_ 00_00_

Services

Service Code	Name	Description
0x05	Reset	Resets the specified instance.
0x0E	Get_Attribute_Single	Returns the contents of the specified attribute.
0x10	Set_Attribute_Single	Modifies the contents of the specified attribute.

B.6 Control Parameter Object (0x64)

■ Class

Attributes: Not supported
Services: Not supported

■ Instances

Attributes

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
10	Get/Set	Zero Point Return Mode	UINT	Sets the type of zero point return.	0 to 3	0
11	Get/Set	Zero Point Return Function Selection	UINT	Sets the function selection for zero point return. Bit 0: Direction of zero point return Bit 1: Zero point limit switch reversal Bit 2: Zero point pulse polarity selection	0 to 7	1
12	Get/Set	Feed Speed for Zero Point Return	DINT	Sets the feed speed for zero point return. Unit: 1000 reference units/min	1 to 240,000	10,000
13	Get/Set	Approach Speed	DINT	Sets the approach speed for zero point return. Unit: 1000 reference units/min	1 to 240,000	1,000
14	Get/Set	Creep Speed	DINT	Sets the creep speed for zero point return. Unit: 1000 reference units/min	1 to 240,000	500
15	Get/Set	Final Travel Distance	DINT	Sets the final travel distance for zero point return. Unit: Reference units	0 to 99,999,999	0
16	Get/Set	Zero Position Output Width	DINT	Sets the output width of the zero point. Unit: Reference units	0 to 32,767	100
17	Get/Set	Zero Position Offset	DINT	Sets the offset from the encoder coordinate system. Unit: Reference units	–99,999,999 to +99,999,999	0

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
18	Get/Set	Acceleration/ Deceleration Time Constant for Zero Point Return	DINT	Sets the acceleration/deceleration for zero point return. Unit: ms	1 to 10,000	100
30	Get/Set	Electric Gear (Numerator)	DINT	Sets the numerator of electric gear.	1 to 10,000,000	1
31	Get/Set	Electric Gear (Denominator)	DINT	Sets the denominator of electric gear.	1 to 10,000,000	1
32	Get/Set	Coordinate Type	BOOL	Sets the coordinate type. 0: Linear axis; 1: Rotary axis	0, 1	0
33	Get/Set	Command Resolution/R	DINT	Sets the reference unit per one machine rotation for rotary axis. Unit: Reference units	0 to 1,500,000	360,000
34	Get/Set	Backlash Compensation	UINT	Sets the compensated value for backlash. Unit: Reference units	0 to 32,767	0
35	Get/Set	Backlash Compensation Direction	UINT	Sets the direction for backlash compensation.	0, 1	0
36	Get/Set	Positive Software Limit	DINT	Sets the limit position for positive direction. Unit: Reference units	–99,999,999 to +99,999,999	99,999,999
37	Get/Set	Negative Software Limit	DINT	Sets the limit position for negative direction. Unit: Reference units	–99,999,999 to +99,999,999	–99,999,999
38	Get/Set	Function Selection	UINT	Bit 0 0: Software Limit is disabled. 1: Software Limit is enabled. Bit 1 0: Backlash Compensation is disabled. 1: Backlash Compensation is enabled.	0 to 3	0
39	Get/Set	Hardware Limit Selection	UINT	B0: Hardware Limit Enable 0: Disable 1: Enable B1:Hardware Limit Input Logic 0: Active low 1: Active high	0 to 3	0
40	Get/Set	Hardware Limit Action	UINT	Sets the action when using hardware limit.	0 to 3	0

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
41	Get/Set	Emergency Stop Selection	UINT	Sets the polarity and other settings for the emergency stop signal.	0 to 3	0
42	Get/Set	Emergency Stop Action	UINT	Sets the action when emergency stop.	0, 1	0
51	Get/Set	Feed Speed	DINT	Sets the feed speed for positioning. Unit: 1000 reference units/min	1 to 240,000	24,000
52	Get/Set	Acceleration/ Deceleration Time Constant	UINT	Sets the acceleration/deceleration time for positioning. Unit: ms	1 to 10,000	100
53	Get/Set	Deceleration Time Constant for Asymmetric	UINT	Sets the deceleration time for asymmetric acceleration/deceleration. Unit: ms	1 to 10,000	100
54	Get/Set	Switch Speed	DINT	Sets the switch speed for positioning second acceleration/deceleration time. Unit: 1000 reference units/min	1 to 240,000	12,000
55	Get/Set	Second A/D Time Constant	UINT	Sets the acceleration/deceleration time of second acceleration/deceleration for positioning. Unit: ms	1 to 10,000	200
56	Get/Set	Profile Type	UINT	Sets acceleration/deceleration type before interpolation. 0: None 1: Single-step linear 2: Double-step linear 3: Asymmetric linear	0 to 3	0
57	Get/Set	Feed Speed for External Positioning	DINT	Sets the feed speed for external positioning. Unit: 1000 reference units/min	1 to 240,000	10,000
58	Get/Set	Filter	UINT	Sets the type of filter. 0: None 1: Exponent 2: Exponent with bias 3: Travelling average	0 to 3	0
59	Get/Set	FEED Function Selection	UINT	Sets the reference unit for the speed setting for FEED.	0, 1	0
60	Get/Set	Feed Speed for FEED	DINT	Sets the constant feed speed for FEED. Unit: 1000 reference units/min	1 to 240,000	24,000
61	Get/Set	Acceleration/ Deceleration Time Constant For FEED	UINT	Sets the acceleration/deceleration time for the constant feeding. Unit: ms	1 to 10,000	100

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
62	Get/Set	Deceleration Time Constant for FEED	UINT	Sets the deceleration time for asymmetric acceleration/deceleration for the constant feeding. Unit: ms	1 to 10,000	100
63	Get/Set	Switch Speed for FEED	DINT	Sets the switch speed for second acceleration/deceleration for the constant feeding. Unit: 1000 reference units/min	1 to 240,000	24,000
64	Get/Set	Second AD Time Constant for FEED	UINT	Sets the acceleration/deceleration time for the second acceleration/deceleration for the constant feeding. Unit: ms	1 to 10,000	200
65	Get/Set	Profile Type for FEED	UINT	Sets the pre-interpolation acceleration/deceleration type for the constant feeding. 0: None 1: Single-step linear 2: Double-step linear 3: Asymmetric linear	0 to 3	0
70	Get/Set	Time Constant for Exponential Curve	UINT	Sets the time constant of exponential acceleration/deceleration. Unit: ms	4 to 1,000	25
71	Get/Set	Bias Speed	DINT	Sets the bias speed of exponential acceleration/deceleration. Unit: 1000 reference units/min	0 to 240,000	0
72	Get/Set	Time Constant of Moving Average	UINT	Sets the time constant of travelling average. Unit: ms	4 to 1,000	25
73	Get/Set	Maximum Feed Speed	DINT	Sets the maximum feed speed. Unit: 1000 reference units/min	1 to 240,000	24,000
74	Get/Set	Step Distance 1	DINT	Sets step distance 1 for STEP operation. Unit: Reference units	0 to 99,999,999	1
75	Get/Set	Step Distance 2	DINT	Sets step distance 2 for STEP operation. Unit: Reference units	0 to 99,999,999	10
76	Get/Set	Step Distance 3	DINT	Sets step distance 3 for STEP operation. Unit: Reference units	0 to 99,999,999	100
77	Get/Set	Step Distance 4	DINT	Sets step distance 4 for STEP operation. Unit: Reference units	0 to 99,999,999	1,000

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
90	Get/Set	Positioning Deadband	UINT	Sets the positioning completion range. Unit: Reference units	0 to 10,000	5
91	Get/Set	Positioning Timeout	UINT	Sets the timeout value when positioning is completed. Unit: ms	0 to 65535	0
92	Get/Set	Near Signal	UINT	Sets the width for the positioning proximity signal. Unit: Reference units	0 to 32767	10
93	Get/Set	Direction	BOOL	Sets the direction of rotation for station positioning.	0, 1	0
94	Get/Set	Approach Speed for External Positioning	DINT	Sets the approach speed for external positioning. Unit: 1000 reference units/min	1 to 240,000	24,000
95	Get/Set	Final Travel Distance for External Positioning	DINT	Sets the final travel distance for external positioning. Unit: Reference units	0 to 99,999,999	0
100	Get/Set	Stations	UINT	Sets the number of stations.	1 to 32767	1
111	Get/Set	Point Speed Switch Point	UINT	Sets the number of speed switching points.	0 to 16	0
112	Get/Set	Initial Speed	DINT	Sets the initial speed for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
113	Get/Set	Position 1 for Multi-speed	DINT	Sets speed-switching position 1 for multi-speed. Unit: Reference units	0 to 99,999,999	0
114	Get/Set	Position 2 for Multi-speed	DINT	Sets speed-switching position 2 for multi-speed. Unit: Reference units	0 to 99,999,999	0
115	Get/Set	Position 3 for Multi-speed	DINT	Sets speed-switching position 3 for multi-speed. Unit: Reference units	0 to 99,999,999	0
116	Get/Set	Position 4 for Multi-speed	DINT	Sets speed-switching position 4 for multi-speed. Unit: Reference units	0 to 99,999,999	0
117	Get/Set	Position 5 for Multi-speed	DINT	Sets speed-switching position 5 for multi-speed. Unit: Reference units	0 to 99,999,999	0

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
118	Get/Set	Position 6 for Multi-speed	DINT	Sets speed-switching position 6 for multi-speed. Unit: Reference units	0 to 99,999,999	0
119	Get/Set	Position 7 for Multi-speed	DINT	Sets speed-switching position 7 for multi-speed. Unit: Reference units	0 to 99,999,999	0
120	Get/Set	Position 8 for Multi-speed	DINT	Sets speed-switching position 8 for multi-speed. Unit: Reference units	0 to 99,999,999	0
121	Get/Set	Position 9 for Multi-speed	DINT	Sets speed-switching position 9 for multi-speed. Unit: Reference units	0 to 99,999,999	0
122	Get/Set	Position 10 for Multi-speed	DINT	Sets speed-switching position 10 for multi-speed. Unit: Reference units	0 to 99,999,999	0
123	Get/Set	Position 11 for Multi-speed	DINT	Sets speed-switching position 11 for multi-speed. Unit: Reference units	0 to 99,999,999	0
124	Get/Set	Position 12 for Multi-speed	DINT	Sets speed-switching position 12 for multi-speed. Unit: Reference units	0 to 99,999,999	0
125	Get/Set	Position 13 for Multi-speed	DINT	Sets speed-switching position 13 for multi-speed. Unit: Reference units	0 to 99,999,999	0
126	Get/Set	Position 14 for Multi-speed	DINT	Sets speed-switching position 14 for multi-speed. Unit: Reference units	0 to 99,999,999	0
127	Get/Set	Position 15 for Multi-speed	DINT	Sets speed-switching position 15 for multi-speed. Unit: Reference units	0 to 99,999,999	0
128	Get/Set	Position 16 for Multi-speed	DINT	Sets speed-switching position 16 for multi-speed. Unit: Reference units	0 to 99,999,999	0
129	Get/Set	Speed 1 for Multi-speed	DINT	Sets speed 1 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
130	Get/Set	Speed 2 for Multi-speed	DINT	Sets speed 2 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
131	Get/Set	Speed 3 for Multi-speed	DINT	Sets speed 3 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
132	Get/Set	Speed 4 for Multi-speed	DINT	Sets speed 4 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
133	Get/Set	Speed 5 for Multi-speed	DINT	Sets speed 5 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
134	Get/Set	Speed 6 for Multi-speed	DINT	Sets speed 6 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
135	Get/Set	Speed 7 for Multi-speed	DINT	Sets speed 7 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
136	Get/Set	Speed 8 for Multi-speed	DINT	Sets speed 8 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
137	Get/Set	Speed 9 for Multi-speed	DINT	Sets speed 9 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
138	Get/Set	Speed 10 for Multi-speed	DINT	Sets speed 10 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
139	Get/Set	Speed 11 for Multi-speed	DINT	Sets speed 11 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
140	Get/Set	Speed 12 for Multi-speed	DINT	Sets speed 12 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
141	Get/Set	Speed 13 for Multi-speed	DINT	Sets speed 13 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
142	Get/Set	Speed 14 for Multi-speed	DINT	Sets speed 14 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
143	Get/Set	Speed 15 for Multi-speed	DINT	Sets speed 15 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
144	Get/Set	Speed 16 for Multi-speed	DINT	Sets speed 16 for multi-speed. Unit: 1000 reference units/min	1 to 240,000	24,000
160	Get/Set	Increment for Notch Output	UINT	Sets notch output position. 0: Specifies absolute value 1: Specifies relative value	0, 1	0
161	Get/Set	Notch Signal	UINT	Sets notch output polarity reversal. Bit 0: Set to 1 to enable notch output 0 Bit 1: Set to 1 to enable notch output 1	0 to 3	0

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
162	Get/Set	Notch Position 00	DINT	Sets notch output position 1. Unit: Reference units	–99,999,999 to 99,999,999	0
163	Get/Set	Notch Position 01	DINT	Sets notch output position 2. Unit: Reference units	–99,999,999 to 99,999,999	0
164	Get/Set	Notch Position 10	DINT	Sets notch output position 3. Unit: Reference units	–99,999,999 to 99,999,999	0
165	Get/Set	Notch Position 11	DINT	Sets notch output position 4. Unit: Reference units	–99,999,999 to 99,999,999	0

Services

Service Code	Name	Description
0x0E	Get_Attribute_Single	Returns the specified attribute.
0x10	Set_Attribute_Single	Modifies the specified attribute.

B.7 Point Table Object (0x65)

■ Class

Attributes: Not supported
Services: Not supported

■ Instances

Attributes

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
50	Get/Set	Position 1	DINT	Target position 1 Unit: Reference units	–99,999,999 to 99,999,999	0
51	Get/Set	Position 2	DINT	Target position 2 Unit: Reference units	–99,999,999 to 99,999,999	0
52	Get/Set	Position 3	DINT	Target position 3 Unit: Reference units	–99,999,999 to 99,999,999	0
53	Get/Set	Position 4	DINT	Target position 4 Unit: Reference units	–99,999,999 to 99,999,999	0
54	Get/Set	Position 5	DINT	Target position 5 Unit: Reference units	–99,999,999 to 99,999,999	0
55	Get/Set	Position 6	DINT	Target position 6 Unit: Reference units	–99,999,999 to 99,999,999	0
56	Get/Set	Position 7	DINT	Target position 7 Unit: Reference units	–99,999,999 to 99,999,999	0
57	Get/Set	Position 8	DINT	Target position 8 Unit: Reference units	–99,999,999 to 99,999,999	0
58	Get/Set	Position 9	DINT	Target position 9 Unit: Reference units	–99,999,999 to 99,999,999	0
59	Get/Set	Position 10	DINT	Target position 10 Unit: Reference units	–99,999,999 to 99,999,999	0
60	Get/Set	Position 11	DINT	Target position 11 Unit: Reference units	–99,999,999 to 99,999,999	0
61	Get/Set	Position 12	DINT	Target position 12 Unit: Reference units	–99,999,999 to 99,999,999	0
62	Get/Set	Position 13	DINT	Target position 13 Unit: Reference units	–99,999,999 to 99,999,999	0
63	Get/Set	Position 14	DINT	Target position 14 Unit: Reference units	–99,999,999 to 99,999,999	0
64	Get/Set	Position 15	DINT	Target position 15 Unit: Reference units	–99,999,999 to 99,999,999	0
65	Get/Set	Position 16	DINT	Target position 16 Unit: Reference units	–99,999,999 to 99,999,999	0

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
66	Get/Set	Position 17	DINT	Target position 17 Unit: Reference units	–99,999,999 to 99,999,999	0
67	Get/Set	Position 18	DINT	Target position 18 Unit: Reference units	–99,999,999 to 99,999,999	0
68	Get/Set	Position 19	DINT	Target position 19 Unit: Reference units	–99,999,999 to 99,999,999	0
69	Get/Set	Position 20	DINT	Target position 20 Unit: Reference units	–99,999,999 to 99,999,999	0
70	Get/Set	Position 21	DINT	Target position 21 Unit: Reference units	–99,999,999 to 99,999,999	0
71	Get/Set	Position 22	DINT	Target position 22 Unit: Reference units	–99,999,999 to 99,999,999	0
72	Get/Set	Position 23	DINT	Target position 23 Unit: Reference units	–99,999,999 to 99,999,999	0
73	Get/Set	Position 24	DINT	Target position 24 Unit: Reference units	–99,999,999 to 99,999,999	0
74	Get/Set	Position 25	DINT	Target position 25 Unit: Reference units	–99,999,999 to 99,999,999	0
75	Get/Set	Position 26	DINT	Target position 26 Unit: Reference units	–99,999,999 to 99,999,999	0
76	Get/Set	Position 27	DINT	Target position 27 Unit: Reference units	–99,999,999 to 99,999,999	0
77	Get/Set	Position 28	DINT	Target position 28 Unit: Reference units	–99,999,999 to 99,999,999	0
78	Get/Set	Position 29	DINT	Target position 29 Unit: Reference units	–99,999,999 to 99,999,999	0
79	Get/Set	Position 30	DINT	Target position 30 Unit: Reference units	–99,999,999 to 99,999,999	0
80	Get/Set	Position 31	DINT	Target position 31 Unit: Reference units	–99,999,999 to 99,999,999	0
81	Get/Set	Position 32	DINT	Target position 32 Unit: Reference units	–99,999,999 to 99,999,999	0
82	Get/Set	Position 33	DINT	Target position 33 Unit: Reference units	–99,999,999 to 99,999,999	0
83	Get/Set	Position 34	DINT	Target position 34 Unit: Reference units	–99,999,999 to 99,999,999	0
84	Get/Set	Position 35	DINT	Target position 35 Unit: Reference units	–99,999,999 to 99,999,999	0
85	Get/Set	Position 36	DINT	Target position 36 Unit: Reference units	–99,999,999 to 99,999,999	0
86	Get/Set	Position 37	DINT	Target position 37 Unit: Reference units	–99,999,999 to 99,999,999	0
87	Get/Set	Position 38	DINT	Target position 38 Unit: Reference units	–99,999,999 to 99,999,999	0

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
88	Get/Set	Position 39	DINT	Target position 39 Unit: Reference units	–99,999,999 to 99,999,999	0
89	Get/Set	Position 40	DINT	Target position 40 Unit: Reference units	–99,999,999 to 99,999,999	0
90	Get/Set	Position 41	DINT	Target position 41 Unit: Reference units	–99,999,999 to 99,999,999	0
91	Get/Set	Position 42	DINT	Target position 42 Unit: Reference units	–99,999,999 to 99,999,999	0
92	Get/Set	Position 43	DINT	Target position 43 Unit: Reference units	–99,999,999 to 99,999,999	0
93	Get/Set	Position 44	DINT	Target position 44 Unit: Reference units	–99,999,999 to 99,999,999	0
94	Get/Set	Position 45	DINT	Target position 45 Unit: Reference units	–99,999,999 to 99,999,999	0
95	Get/Set	Position 46	DINT	Target position 46 Unit: Reference units	–99,999,999 to 99,999,999	0
96	Get/Set	Position 47	DINT	Target position 47 Unit: Reference units	–99,999,999 to 99,999,999	0
97	Get/Set	Position 48	DINT	Target position 48 Unit: Reference units	–99,999,999 to 99,999,999	0
98	Get/Set	Position 49	DINT	Target position 49 Unit: Reference units	–99,999,999 to 99,999,999	0
99	Get/Set	Position 50	DINT	Target position 50 Unit: Reference units	–99,999,999 to 99,999,999	0
150	Get/Set	Speed 1	DINT	Target speed 1 Unit: 1000 reference units/min	1 to 240,000	24,000
151	Get/Set	Speed 2	DINT	Target speed 2 Unit: 1000 reference units/min	1 to 240,000	24,000
152	Get/Set	Speed 3	DINT	Target speed 3 Unit: 1000 reference units/min	1 to 240,000	24,000
153	Get/Set	Speed 4	DINT	Target speed 4 Unit: 1000 reference units/min	1 to 240,000	24,000
154	Get/Set	Speed 5	DINT	Target speed 5 Unit: 1000 reference units/min	1 to 240,000	24,000
155	Get/Set	Speed 6	DINT	Target speed 6 Unit: 1000 reference units/min	1 to 240,000	24,000
156	Get/Set	Speed 7	DINT	Target speed 7 Unit: 1000 reference units/min	1 to 240,000	24,000
157	Get/Set	Speed 8	DINT	Target speed 8 Unit: 1000 reference units/min	1 to 240,000	24,000
158	Get/Set	Speed 9	DINT	Target speed 9 Unit: 1000 reference units/min	1 to 240,000	24,000
159	Get/Set	Speed 10	DINT	Target speed 10 Unit: 1000 reference units/min	1 to 240,000	24,000

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
160	Get/Set	Speed 11	DINT	Target speed 11 Unit: 1000 reference units/min	1 to 240,000	24,000
161	Get/Set	Speed 12	DINT	Target speed 12 Unit: 1000 reference units/min	1 to 240,000	24,000
162	Get/Set	Speed 13	DINT	Target speed 13 Unit: 1000 reference units/min	1 to 240,000	24,000
163	Get/Set	Speed 14	DINT	Target speed 14 Unit: 1000 reference units/min	1 to 240,000	24,000
164	Get/Set	Speed 15	DINT	Target speed 15 Unit: 1000 reference units/min	1 to 240,000	24,000
165	Get/Set	Speed 16	DINT	Target speed 16 Unit: 1000 reference units/min	1 to 240,000	24,000
166	Get/Set	Speed 17	DINT	Target speed 17 Unit: 1000 reference units/min	1 to 240,000	24,000
167	Get/Set	Speed 18	DINT	Target speed 18 Unit: 1000 reference units/min	1 to 240,000	24,000
168	Get/Set	Speed 19	DINT	Target speed 19 Unit: 1000 reference units/min	1 to 240,000	24,000
169	Get/Set	Speed 20	DINT	Target speed 20 Unit: 1000 reference units/min	1 to 240,000	24,000
170	Get/Set	Speed 21	DINT	Target speed 21 Unit: 1000 reference units/min	1 to 240,000	24,000
171	Get/Set	Speed 22	DINT	Target speed 22 Unit: 1000 reference units/min	1 to 240,000	24,000
172	Get/Set	Speed 23	DINT	Target speed 23 Unit: 1000 reference units/min	1 to 240,000	24,000
173	Get/Set	Speed 24	DINT	Target speed 24 Unit: 1000 reference units/min	1 to 240,000	24,000
174	Get/Set	Speed 25	DINT	Target speed 25 Unit: 1000 reference units/min	1 to 240,000	24,000
175	Get/Set	Speed 26	DINT	Target speed 26 Unit: 1000 reference units/min	1 to 240,000	24,000
176	Get/Set	Speed 27	DINT	Target speed 27 Unit: 1000 reference units/min	1 to 240,000	24,000
177	Get/Set	Speed 28	DINT	Target speed 28 Unit: 1000 reference units/min	1 to 240,000	24,000
178	Get/Set	Speed 29	DINT	Target speed 29 Unit: 1000 reference units/min	1 to 240,000	24,000
179	Get/Set	Speed 30	DINT	Target speed 30 Unit: 1000 reference units/min	1 to 240,000	24,000
180	Get/Set	Speed 31	DINT	Target speed 31 Unit: 1000 reference units/min	1 to 240,000	24,000
181	Get/Set	Speed 32	DINT	Target speed 32 Unit: 1000 reference units/min	1 to 240,000	24,000

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
182	Get/Set	Speed 33	DINT	Target speed 33 Unit: 1000 reference units/min	1 to 240,000	24,000
183	Get/Set	Speed 34	DINT	Target speed 34 Unit: 1000 reference units/min	1 to 240,000	24,000
184	Get/Set	Speed 35	DINT	Target speed 35 Unit: 1000 reference units/min	1 to 240,000	24,000
185	Get/Set	Speed 36	DINT	Target speed 36 Unit: 1000 reference units/min	1 to 240,000	24,000
186	Get/Set	Speed 37	DINT	Target speed 37 Unit: 1000 reference units/min	1 to 240,000	24,000
187	Get/Set	Speed 38	DINT	Target speed 38 Unit: 1000 reference units/min	1 to 240,000	24,000
188	Get/Set	Speed 39	DINT	Target speed 39 Unit: 1000 reference units/min	1 to 240,000	24,000
189	Get/Set	Speed 40	DINT	Target speed 40 Unit: 1000 reference units/min	1 to 240,000	24,000
190	Get/Set	Speed 41	DINT	Target speed 41 Unit: 1000 reference units/min	1 to 240,000	24,000
191	Get/Set	Speed 42	DINT	Target speed 42 Unit: 1000 reference units/min	1 to 240,000	24,000
192	Get/Set	Speed 43	DINT	Target speed 43 Unit: 1000 reference units/min	1 to 240,000	24,000
193	Get/Set	Speed 44	DINT	Target speed 44 Unit: 1000 reference units/min	1 to 240,000	24,000
194	Get/Set	Speed 45	DINT	Target speed 45 Unit: 1000 reference units/min	1 to 240,000	24,000
195	Get/Set	Speed 46	DINT	Target speed 46 Unit: 1000 reference units/min	1 to 240,000	24,000
196	Get/Set	Speed 47	DINT	Target speed 47 Unit: 1000 reference units/min	1 to 240,000	24,000
197	Get/Set	Speed 48	DINT	Target speed 48 Unit: 1000 reference units/min	1 to 240,000	24,000
198	Get/Set	Speed 49	DINT	Target speed 49 Unit: 1000 reference units/min	1 to 240,000	24,000
199	Get/Set	Speed 50	DINT	Target speed 50 Unit: 1000 reference units/min	1 to 240,000	24,000

Services

Service Code	Name	Description
0x0E	Get_Attribute_Single	Returns the specified attribute.
0x10	Set_Attribute_Single	Modifies the specified attribute.

B.8 SERVOPACK Parameter Object (0x66)

■ Class

Attributes: Not supported
Services: Not supported

■ Instances

Attributes

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
10	Get/Set	Basic Function Selection	UINT	Sets function selection basic switches.	---	0000
11	Get/Set	Application Switch 1	UINT	Sets function selection application switches 1.	---	0000
12	Get/Set	Application Switch 2	UINT	Sets function selection application switches 2.	---	0000
13	Get/Set	Application Switch 3	UINT	Sets function selection application switches 3.	---	0002
14	Get/Set	Application Switch 4	UINT	Sets function selection application switches 4.	---	0000
15	Get/Set	Application Switch 5	UINT	Sets function selection application switches 5.	---	0000
30	Get/Set	Bias Acceleration Width *2	UINT	Sets the bias acceleration width. Unit: Reference units	0 to 250	7
50	Get/Set	Speed Loop Gain	UINT	Sets the speed loop gain. Unit: Hz	1 to 2000	40
51	Get/Set	Integral Time Constant for Speed Loop	UINT	Sets the integral time constant for speed loop. Unit: 0.01ms	15 to 51200	2000
52	Get/Set	Position Loop Gain	UINT	Sets the position loop gain. Unit: 1/s	1 to 2000	40
53	Get/Set	Inertia Ratio	UINT	Sets the inertia ratio. Unit: %	0 to 10000	0
54	Get/Set	Second Speed Loop Gain	UINT	Sets the second speed loop gain. Unit: Hz	1 to 2000	40
55	Get/Set	Integral Time Constant for Second Speed Loop	UINT	Sets the integral time constant for second speed loop. Unit: 0.01ms	15 to 51200	2000

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
56	Get/Set	Second Position Loop Gain	UINT	Sets the second position loop gain. Unit: 1/s	1 to 2000	40
57	Get/Set	Bias *1	UINT	Sets the bias. Unit: min^{-1}	0 to 450	0
58	Get/Set	Bias Width Addition	UINT	Sets the bias width addition. Unit: pulse	0 to 250	7
59	Get/Set	Feedforward	UINT	Sets the feed forward. Unit: %	0 to 100	0
60	Get/Set	Feedforward Filter Time Constant	UINT	Sets the feed forward filter time constant. Unit: 0.01 ms	0 to 6400	0
61	Get/Set	Gain-related Application Switch	UINT	Sets the gain-related application switch.	---	0000
62	Get/Set	Mode Switch Torque Reference	UINT	Sets the mode switch torque reference. Unit: %	0 to 800	200
63	Get/Set	Mode Switch Speed Reference *1	UINT	Sets the mode switch speed reference. Unit: min^{-1}	0 to 10000	0
64	Get/Set	Mode Switch Acceleration *1	UINT	Sets the mode switch acceleration. Unit: 10 min^{-1}/s	0 to 3000	0
65	Get/Set	Mode Switch Error Pulse	UINT	Sets the mode switch error pulse. Unit: pulse	0 to 10000	0
66	Get/Set	Online Autotuning	UINT	Sets the online autotuning switches.	---	10
67	Get/Set	Speed Feedback Compensation	UINT	Sets the speed feedback compensation. Unit: %	0 to 500	100
68	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: %	0 to 1000	100
69	Get/Set	Fixed Parameter	UINT	Fixed parameter	0 to 1000	1000
70	Get/Set	Fixed Parameter	UINT	Fixed parameter	0 to 1000	200
71	Get/Set	Fixed Parameter	UINT	Fixed parameter	0 to 65535	32
72	Get/Set	Fixed Parameter	UINT	Fixed parameter	0 to 65535	16
73	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: %	20 to 100	100

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
74	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: %	20 to 100	100
75	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: 1/s	1 to 2000	50
76	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: 0.1%	1 to 2000	1000
77	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: Hz	1 to 150	50
78	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: Hz	1 to 150	70
79	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: %	0 to 150	100
80	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: %	0 to 150	100
81	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: ms	0 to 2000	0
82	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: 0.01 ms	0 to 51200	0
83	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: Hz	10 to 250	50
84	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: Hz	0 to 250	0
85	Get/Set	Fixed Parameter	UINT	Fixed parameter Unit: %	0 to 100	0
90	Get/Set	Bias *2	UINT	Sets the bias. Unit: mm/s	0 to 450	0
91	Get/Set	Mode Switch (Speed Reference) *2	UINT	Sets the mode switch for speed reference. Unit: mm/s	0 to 5000	0
92	Get/Set	Mode Switch (Acceleration) *2	UINT	Sets the mode switch for acceleration. Unit: mm/s^2	0 to 3000	0

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
100	Get/Set	Position Control Reference Switches	UINT	Sets the position control reference selection switches.	---	0000
101	Get/Set	PG Divider *1	UINT	Sets the PG divider. Unit: p/r	16 to 16384	16384
102	Get/Set	Numerator Gear Ratio	UINT	Sets the electric gear ratio numerator.	1 to 65535	4
103	Get/Set	Denominator Gear Ratio	UINT	Sets the electric gear ratio denominator.	1 to 65535	1
104	Get/Set	Position A/D Constant	UINT	Sets the position reference acceleration/deceleration time constant. Unit: 0.01 ms	0 to 6400	0
105	Get/Set	Multi–turn Limit *1	UINT	Sets the multi-turn limit setting. Unit: rev	0 to 65535	65535
106	Get/Set	Fixed Parameter *1	UINT	Fixed parameter Unit: P/rev	513 to 65535	16384
107	Get/Set	Position Control Switches	UINT	Sets the position control function switches.	---	0000
108	Get/Set	Position Move Average Time	UINT	Sets the position reference travelling average time. Unit: 0.01 ms	0 to 6400	0
112	Get/Set	Linear Scale Pitch *2	UINT	Sets the linear scale pitch. Unit: μm	0 to 65535	0
113	Get/Set	Encoder Resolution *2	UINT	Sets the encoder resolution. Unit: Pulse/Scale Pitch	1 to 256	20
120	Get/Set	Speed Reference Input Gain	UINT	Sets the speed reference input gain. Unit: 0.01 V/rated speed	150 to 3000	600
121	Get/Set	Speed 1 *1	UINT	Sets the internal speed 1. Unit: min^{-1}	0 to 10000	100
122	Get/Set	Speed 2 *1	UINT	Sets the internal speed 2. Unit: min^{-1}	0 to 10000	200
123	Get/Set	Speed 3 *1	UINT	Sets the internal speed 3. Unit: min^{-1}	0 to 10000	300
124	Get/Set	FEED Speed *1	UINT	Sets the FEED speed. Unit: min^{-1}	0 to 10000	500
125	Get/Set	Soft Start Accel Time	UINT	Sets the soft start acceleration time. Unit: ms	0 to 10000	0

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
126	Get/Set	Soft Start Decel Time	UINT	Sets the soft start deceleration time. Unit: ms	0 to 10000	0
127	Get/Set	Speed Reference Time Constant	UINT	Sets the speed reference filter time constant. Unit: 0.01 ms	0 to 65535	40
128	Get/Set	Speed Feedback Time Constant	UINT	Sets the speed feedback filter time constant. Unit: 0.01 ms	0 to 65535	0
132	Get/Set	Internal Setting Speed 1 *2	UINT	Sets the internal setting speed 1. Unit: mm/s	0 to 5000	10
133	Get/Set	Internal Setting Speed 2 *2	UINT	Sets the internal setting speed 2. Unit: mm/s	0 to 5000	20
134	Get/Set	Internal Setting Speed 3 *2	UINT	Sets the internal setting speed 3. Unit: mm/s	0 to 5000	30
135	Get/Set	Jog Speed *2	UINT	Sets the jog speed. Unit: mm/s	0 to 5000	50
140	Get/Set	Torque Reference Input Gain	UINT	Sets the torque reference input gain. Unit: 0.01 V/rated speed	10 to 100	30
141	Get/Set	Torque Reference Time Constant	UINT	Sets the torque reference filter time constant. Unit: 0.01 ms	0 to 65535	100
142	Get/Set	Forward Torque Limit *1	UINT	Sets the forward torque limit. Unit: %	0 to 800	800
143	Get/Set	Reverse Torque Limit *1	UINT	Sets the reverse torque limit. Unit: %	0 to 800	800
144	Get/Set	Forward External Torque Limit	UINT	Sets the forward external torque limit. Unit: %	0 to 800	100
145	Get/Set	Reverse External Torque Limit	UINT	Sets the reverse external torque limit. Unit: %	0 to 800	100
146	Get/Set	Emergency Stop Torque	UINT	Sets the emergency stop torque. Unit: %	0 to 800	800
147	Get/Set	Speed Limit *1	UINT	Sets the speed limit during torque control. Unit: min^{-1}	0 to 10000	10000
148	Get/Set	Torque Function Switches	UINT	Sets the torque function switches.	---	0000

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
149	Get/Set	Notch Filter Frequency	UINT	Sets the notch filter frequency. Unit: Hz	50 to 2000	2000
152	Get/Set	Speed Limit During force Control *2	UINT	Sets the speed limit during force control. Unit: mm/s	0 to 5000	5000
153	Get/Set	Polarity Detection Speed Loop Gain *2	UINT	Sets the polarity detection speed loop gain. Unit: Hz	1 to 2000	40
154	Get/Set	Integral Time Constant for Polarity Detection Speed Loop Gain *2	UINT	Sets the integral time constant for polarity detection speed loop gain. Unit: 0.01ms	15 to 51200	3000
155	Get/Set	Forward Forse Limit *2	UINT	Sets the forward forse limit. Unit: %	0 to 800	30
156	Get/Set	Reverse Forse Limit *2	UINT	Sets the reverse forse limit. Unit: %	0 to 800	30
161	Get/Set	Zero Clamp Level *1	UINT	Sets the zero clamp level. Unit: min^{-1}	0 to 10000	10
162	Get/Set	Rotation Detection Level *1	UINT	Sets the rotation detection level. Unit: min^{-1}	0 to 10000	20
163	Get/Set	Speed Coincidence Signal Width *1	UINT	Sets the speed coincidence signal detection width. Unit: min^{-1}	0 to 100	10
165	Get/Set	Overflow Level	UINT	Sets the overflow level. Unit: 0.256 mm	1 to 32767	1024
166	Get/Set	Brake Reference Servo Off Delay Time	UINT	Sets the brake signal servo off delay time. Unit: 10 ms	0 to 50	0
167	Get/Set	Brake Reference Output Speed Level *1	UINT	Sets the brake signal output speed level. Unit: min^{-1}	0 to 10000	100
168	Get/Set	Wait Time for Brake	UINT	Sets the waiting time for servo-OFF brake reference. Unit: 10 ms	10 to 100	50
169	Get/Set	Hold Time	UINT	Sets the momentary hold time. Unit: ms	20 to 1000	20
170	Get/Set	Input Signal 1	UINT	Sets the input signal selection 1.	---	2100
171	Get/Set	Input Signal 2	UINT	Sets the input signal selection 2.	---	6543

No.	Access	Name	Data Type	Description	Setting Range	Default Setting
172	Get/Set	Input Signal 3	UINT	Sets the input signal selection 3.	---	8888
173	Get/Set	Input Signal 4	UINT	Sets the input signal selection 4.	---	8888
174	Get/Set	Output Signal 1	UINT	Sets the output signal selection 1.	---	3211
175	Get/Set	Output Signal 2	UINT	Sets the output signal selection 2.	----	0000
176	Get/Set	Output Signal 3	UINT	Sets the output signal selection 3.	---	0000
177	Get/Set	Fixed Parameter	UINT	Fixed parameter	---	8888
178	Get/Set	Output Signal Reversal Setting	UINT	Sets the output signal reversal settings.	---	0000
184	Get/Set	Zero Clamp Level *2	UINT	Sets the zero clamp level. Unit: mm/s	0 to 5000	10
185	Get/Set	Zero Speed Level *2	UINT	Sets the zero speed level. Unit: mm/s	1 to 5000	20
186	Get/Set	Speed Coincidence Signal Output Band *2	UINT	Sets the speed coincidence signal output band. Unit: mm/s	0 to 100	100
187	Get/Set	Barke Command Output Speed Level *2	UINT	Sets barke command output speed level. Unit: mm/s	0 to 5000	100
190	Get/Set	Regenerative Register Capacity	UINT	Sets the regenerative register capacity. Unit: 10 W	---	0
191	Get/Set	Fixed Parameter	UINT	Fixed parameter	---	0

Services

Service Code	Name	Description
0x0E	Get_Attribute_Single	Returns the specified attribute.
0x10	Set_Attribute_Single	Modifies the specified attribute.

* 1. These parameters are for the exclusive use of the rotary motor system.

* 2. These parameters are for the exclusive use of the linear motor system.

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C

Alarm and Warning Codes

This appendix lists the alarm and warning codes within DeviceNet.

C.1 Alarm Codes . . . . . C -2
C.2 Warning Codes . . . . . C -5

C.1 Alarm Codes

Alarm codes are displayed on the front of the SGDH and, at the same time, can also be read as response message data at the host device connected via DeviceNet. Alarms are also displayed using the MS and NS indicators on the NS300 Module.

The MS indicator is the module status; the NS indicator is the network status. The required indicator responses are shown in the table.

The alarm codes are shown below.

Table C.1. Alarm Codes

Code	MS	NS	Alarm Name	Description
A.02	Flashes Red.	–	Parameter Breakdown	EEPROM data of SERVOPACK is abnormal.
A.03	Lit Red.	–	Main Circuit Encoder Error	Detection data for power circuit is abnormal.
A.04	Flashes Red.	–	Parameter Setting Error	The parameter setting is out of the allowable setting range.
A.05	Flashes Red.	–	Combination Error	SERVOPACK and servomotor capacities do not match each other.
A.10	Flashes Red.	–	Overcurrent or Heat Sink Overheated	An overcurrent flowed through the IGBT. Heat sink of SERVOPACK was overheated.
A.30	Lit Red.	–	Regeneration Error	• Regenerative resistor is defective. • Regenerative transistor is defective.
A.32	Flashes Red.	–	Regenerative Overload	Regenerative energy exceeds regenerative resistor capacity.
A.40	Flashes Red.	–	Overvoltage	Main circuit DC voltage is excessively high.
A.41	Flashes Red.	–	Undervoltage	Main circuit DC voltage is excessively low.
A.51	Flashes Red.	–	Overspeed	Rotational speed of the motor is excessively high.
A.71	Flashes Red.	–	Overload for Instantaneous Maximum Load	The motor was operating for several seconds to several tens of seconds under a torque largely exceeding ratings.
A.72	Flashes Red.	–	Overload for Continuous Maximum Load	The motor was operating continuously under a torque exceeding ratings.
A.73	Flashes Red.	–	Dynamic Brake Overload	When the dynamic brake was applied, rotational energy exceeded the capacity of dynamic brake resistor.
A.74	Flashes Red.	–	Overload of Surge Current Limit Resistor	The main circuit power was frequently turned ON and OFF.
A.7A	Flashes Red.	–	Heat Sink Overheated	The heat sink of SERVOPACK is overheated.
A.81	Flashes Red.	–	Absolute Encoder Backup Error	All the power supplies for the absolute encoder have failed and position data was cleared.
A.82	Flashes Red.	–	Absolute Encoder Checksum Error	The checksum results of the absolute encoder memory are abnormal.
A.83	Flashes Red.	–	Absolute Encoder Battery Error	Battery voltage for the absolute encoder has dropped.

Code	MS	NS	Alarm Name	Description
A.84	Lit Red.	–	Encoder Data Error	Data in the encoder is abnormal.
A.85	Flashes Red.	–	Absolute Encoder Overspeed	The absolute encoder was rotating at high speed when the power was turned ON.
A.86	Flashes Red.	–	Encoder Overheated	The internal temperature of encoder is too high.
A.B1	Flashes Red.	–	Reference Speed Input Read Error	The A/D converter for reference speed input is defective.
A.B2	Flashes Red.	–	Reference Torque Input Read Error	The A/D converter for reference torque input is defective.
A.B6	Flashes Red.	–	Gate Array Error	Communications LSI error
A.BF	Flashes Red.	–	System Alarm	A system error occurred in the SERVOPACK.
A.C1	Flashes Red.	–	Servo Overrun Detected	The servomotor ran out of control.
A.C6	Flashes Red.	–	Fully-closed Loop Phase-A/B Disconnected	Phase A or B of the fully-closed encoder was disconnected.
A.C7	Flashes Red.	–	Fully-closed Loop Phase-C Disconnected	Phase C of the fully-closed encoder was disconnected.
A.C8	Lit Red.	–	Absolute Encoder Clear Error and Multi-turn Limit Setting Error	The multi-turn for the absolute encoder was not properly cleared or set.
A.C9	Flashes Red.	–	Encoder Communications Error	Communications between SERVOPACK and encoder is not possible.
A.CA	Lit Red.	–	Encoder Parameter Error	Encoder parameters are incorrect.
A.CB	Flashes Red.	–	Encoder Echoback Error	Contents of communications with encoder are incorrect.
A.CC	Flashes Red.	–	Multi-turn Limit Disagreement	Different multi-turn limits have been set in the encoder and SERVOPACK.
A.D0	Flashes Red.	–	Position Error Pulse Overflow	Position error pulse exceeded parameter (Pn505).
A.E0	–	–	No NS300 Module	No NS300 Module installed.
A.E1	–	–	NS300 Module Timeout	No response from the NS300 Module.
A.E2	–	–	Watchdog Counter Error of NS300 Module	WDC error in the NS300 Module
A.E6	–	Lit Red.	DeviceNet Duplicate MAC ID Error	Same node address already exists on the DeviceNet network.
A.E7	–	Lit Red.	NS300 Module Detection Error	No NS300 Module was detected when was power supplied to the SGDH.
A.E8	Flashes Red.	–	Rotary Switch Setting Error	Module rotary switch setting error
A.E9	–	Lit Red.	DeviceNet BUS-OFF Error	Fatal communications error has occurred in DeviceNet communications.
A.EA	Flashes Red.	–	SERVOPACK Malfunction	SERVOPACK is defective.
A.EB	Flashes Red.	–	SERVOPACK Initial Access Error	Initial processing failed.
A.EC	Flashes Red.	–	SERVOPACK WDC Error	SERVOPACK WDC error
A.ED	Lit Red.	–	NS300 Module Error	Command was interrupted.

Code	MS	NS	Alarm Name	Description
A.EE	Flashes Red.	–	Option Parameter Error	The parameters of the NS300 Module contain abnormalities.
A.F1	Flashes Red.	–	Power Line Open Phase	One phase in the 3-phase main power supply is not connected.

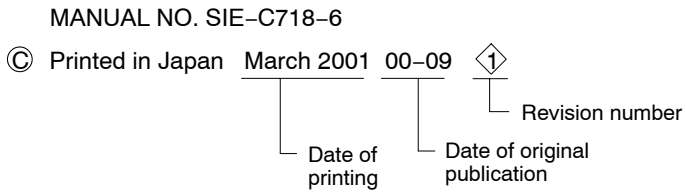
C.2 Warning Codes

The warning codes are shown below.

Warning Code	MS LED	NS LED	Warning Name	Description
A.91	Flashes Red.	–	Overload	This warning occurs before the overload alarms (A.71 or A.72) occur. If the warning is ignored and operation continues, an overload alarm may occur.
A.92	Flashes Red.	–	Regenerative Overload	This warning occurs before the regenerative overload alarm (A.32) occurs. If the warning is ignored and operation continues, a regenerative overload alarm may occur.
A.94	Flashes Red.	–	Parameter Setting Warning	A value outside the setting range was set using DeviceNet communications.
A.95	Flashes Red.	–	Command Warning	A command not supported in the product specifications was issued. The command reception conditions were not met.
A.96	Flashes Red.	–	Communications Warning	A DeviceNet communications error occurred (once).
A.98	Flashes Red.	–	Main Power OFF	The main power supply is not being supplied.
A.9A	Flashes Red.	–	Not Completed within the Time Set in Pn851	Positioning was not completed within the set time.

Revision History

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



Date of Printing	Rev. No.	Section	Revised Content
September 2000	–	–	First edition
March 2001	◇1	All chapters	Completely revised
November 2002	◇2	Back cover	Revision: Address
June 2003	◇3	All chapters	Revision: Option Unit changed to Application Module, NS300 Unit changed to NS300 Module, and Steps changed to Reference units.
		4.3.4	Revision: Section on speed, acceleration, and deceleration
		5.3.4	Addition: Section on setting the zero point
		5.7	Addition: Section on data trace function
		B.8	Addition: Attribute No. 30, 90, 91, 92, 112, 113, 132, 133, 134, 135, 152, 153, 154, 155, 156, 184, 185, 186, and 187.
		Revision History	Addition: At the end of this manual
		Back cover	Revision: Address

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