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MITSUBISHI

General Purpose AC Servo

MELSERVO-J2S-S061

Built-In Positioning Function
Specifications and Instruction Manual

For Engineering Sample

MITSUBISHI ELECTRIC

BCN-B11127-479*

Table of Contents

1. FUNCTIONS AND CONFIGURATION

1.1 Overview

The MR-J2S-□□A-S061 AC servo amplifier with built-in positioning functions is the MR-J2S-A general-purpose AC servo amplifier which incorporate single-axis positioning functions. These functions perform positioning operation by merely setting the position data (target positions), motor speeds, acceleration and deceleration time constants, etc. to point tables as if setting them in parameters. The servo amplifier is the most appropriate to configure a program-free, simple positioning system or to simplify a system, for example.

There are up to 31 points. You can choose a configuration suitable for your purpose, e.g. simple positioning system using external I/O signals (DI/O), operation using DI/O and RS-422 serial communication, or multi drop operation using RS-422 serial communication.

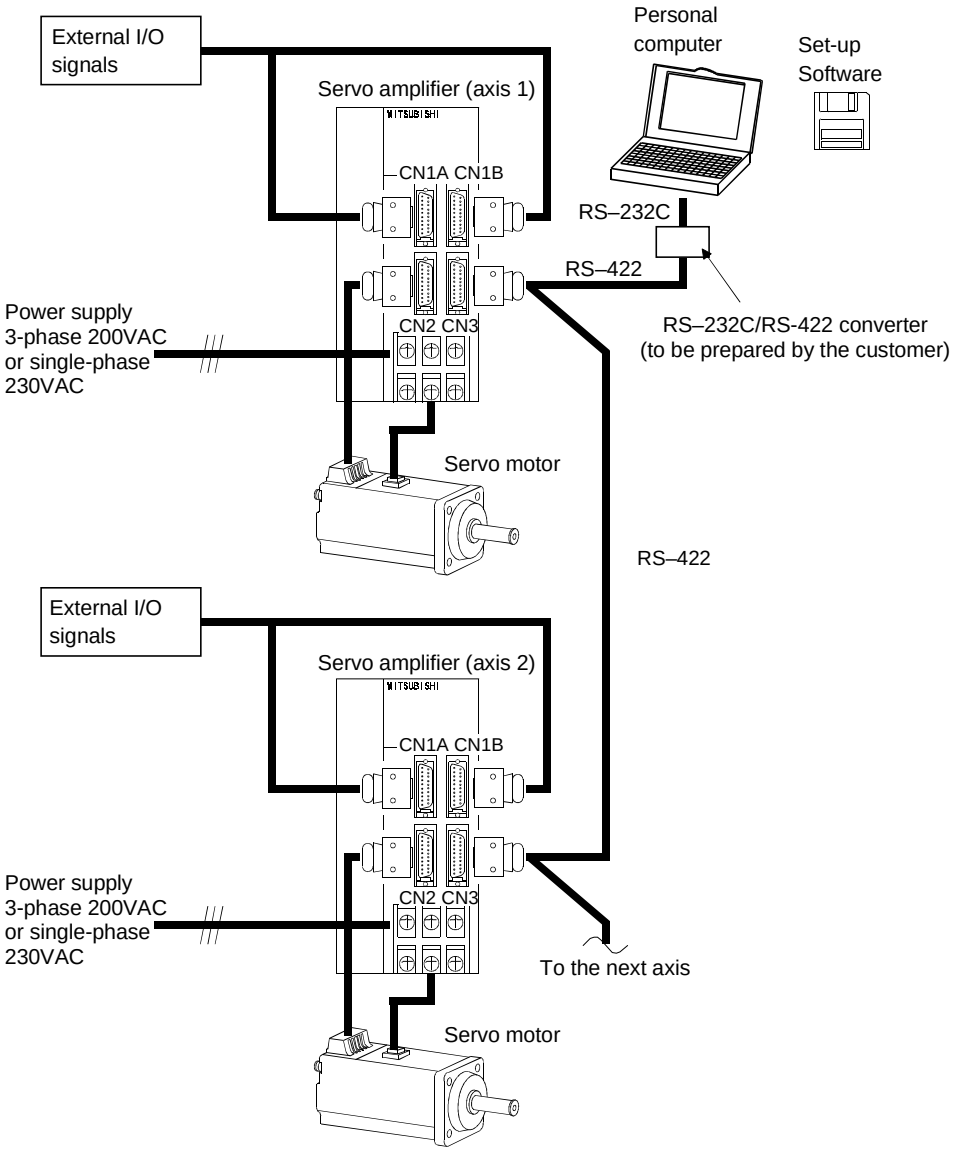
All servo motors are equipped with an absolute position encoder as standard. An absolute position detection system can be configured by merely adding a battery to the servo amplifier. Once the home position has been set, zeroing is not required at power on, alarm occurrence, etc.

1.2 Features

(1) Up to 31 point tables
(2) Stopper type zeroing operation
(3) Point table output function

1.3 System configuration

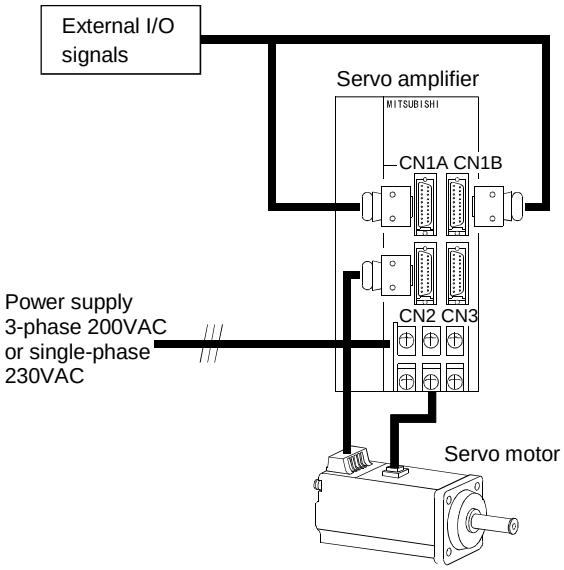
1) Several (up to 32) servo amplifiers are connected with the personal computer by RS-422.



Communication data

PC to Servo amplifier	Servo amplifier to PC
- Positioning data to point table - Control signals - Parameter data	- Status monitor - Parameter data - Alarm information and so on

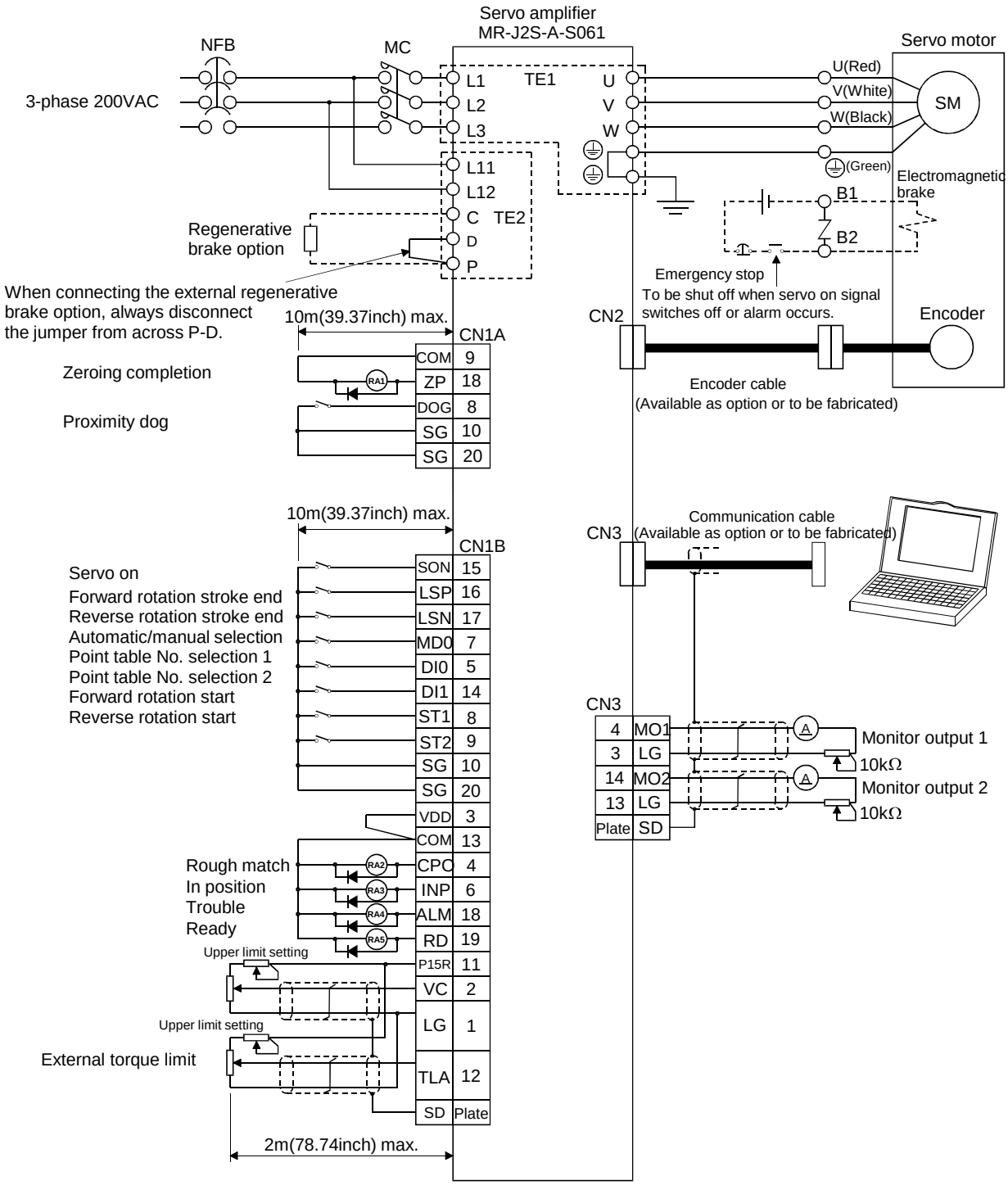
2) The following configuration uses external I/O signals. The external input signals are used to control all signals (devices) that response delay is less than 15msec.



3) Function list

Contents			Description
Command type	Point block # input	Operation specification	- Positioning up to 31 point via point block #
		Position command input	- Setting at point block - Setting range for positioning: +/- 1 [um] to +/- 999.999 [um]
		Speed command input	- Setting at point block - Set at the point block for acc. / dec. time - Parameter # 14 is for S-Curve acc. / dec. time constant
		System	- Absolute value command with sign or incremental value command
	Position data input	Operation specification	- Positioning via RS-422(232C) communication
		Position command input	- Setting via RS-422(232C) communication - Setting range for positioning : +/- 1 [um] to +/- 999.999 [um]
		Speed command input	- Setting via RS-422(232C) communication - Set the acc. / dec. time via RS-422(232C) communication - Parameter # 14 is for S-Curve acc. / dec. time constant
		System	- Absolute value command with sign or incremental value command
Operation mode	Automatic mode		- Select the required ones from among 31 preset point blocks and perform operation in accordance with the set value (Position block # input, Position data input)
	Manual mode	JOG	- Jogging operation among preset jog speed via RS-422(232C) communication or external input
	Manual zeroing	Stopper type zeroing	- Stopper type zeroing Capable set the zero address at parameter setting
Function on positioning control			- Absolute position detection system - Backlash compensation - External stroke limit function - Software stroke limit function - Teaching function - Roll feeding function (equivalent)

2. Wiring Diagram



Note: 1. To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth (PE) of the control box.

2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will be faulty and will not output signals, disabling the emergency stop and other protective circuits.

3. CN1A, CN1B, CN2 and CN3 have the same shape. Wrong connection of the connectors will lead to a fault.

4. The sum of currents that flow in the external relays should be 80mA max. If it exceeds 80mA, supply interface power from external.

5. When starting operation, always connect the forward/reverse rotation stroke end signal (LSN/LSP) with SG. (Normally closed contacts)

6. Trouble (ALM) is connected with COM in normal alarm-free condition.

7. The pins with the same signal name are connected in the servo amplifier.

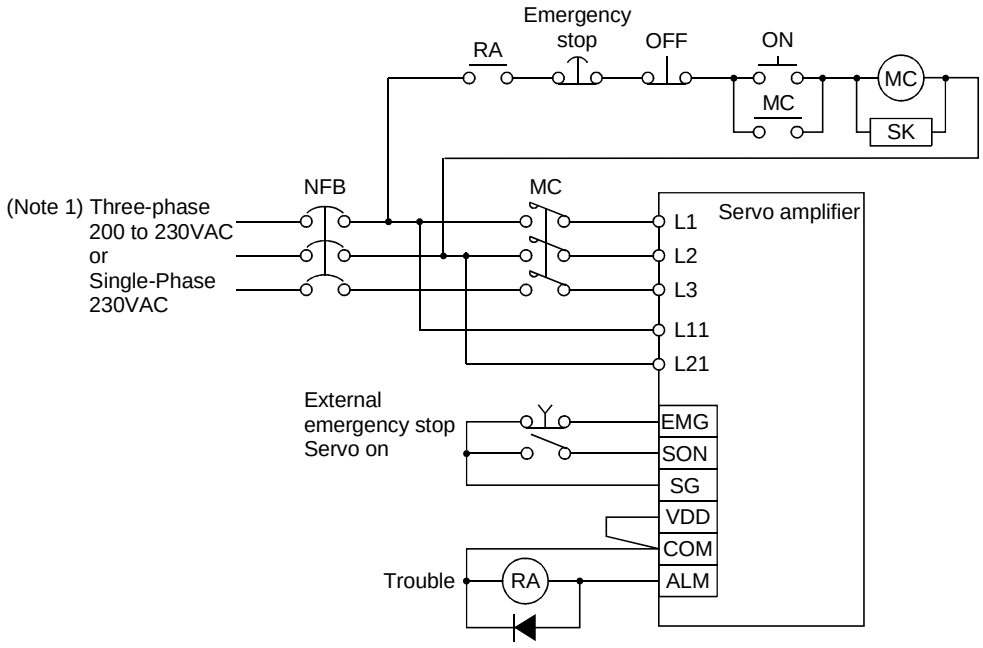
3. Terminals

3.1 Terminal blocks

<table>
<tr><th>Symbol</th><th>Signal</th><th>Description</th></tr>
<tr><td>L_1, L_2, L_3</td><td>Main circuit power supply</td><td>Main circuit power input terminals
1) 200V Class
Supply L_1, L_2 and L_3 with the following power.
For a single-phase 230VAC power supply, connect the power supply to L1 and L2 and keep L3 open:
<table>
<tr><th>Servo amplifier / Power supply</th><th>MR-J2-10A to 70A</th><th>MR-J2-100A to 700A</th></tr>
<tr><td>3-phase 200 to 230VAC, 50/60Hz</td><td colspan="2">$L_1 \cdot L_2 \cdot L_3$</td></tr>
<tr><td>Single-phase 230VAC, 50/60Hz</td><td>$L_1 \cdot L_2$</td><td></td></tr>
</table>
Cannot be used for combination with the servo motor HC-SFS52•53.
2) 100V Class
Supply L1, L2 with the single-phase 100 to 120V 50/60Hz power.</td></tr>
<tr><td>U, V, W</td><td>Servo motor output</td><td>Servo motor power output terminalss
Connect to the servo motor power supply terminals (U, V, W).</td></tr>
<tr><td>L_{11}, L_{21}</td><td>Control circuit power supply</td><td>Control circuit power input terminals
1) 200V Class
Supply L11 and L21 with single-phase 200-230VAC, 50/60Hz power.
2) 100V Class
Supply L11 and L21 with single-phase 100-120VAC, 50/60Hz power.</td></tr>
<tr><td>P, C, D</td><td>Regenerative brake option</td><td>Regenerative brake option connection terminals
C and D are factory-connected.
When using the regenerative brake option, always remove wiring from across P-D and connect the regenerative brake option across P-C.</td></tr>
<tr><td>N</td><td></td><td>Do not connect.</td></tr>
<tr><td>  </td><td>Protective earth (PE)</td><td>Ground terminal
Connect this terminal to the protective earth (PE) terminals of the servo motor and control box for grounding.</td></tr>
</table>

3.2 Connection example

Wire the power supply and main circuits as shown below. A no-fuse breaker (NFB) must be used with the input cables of the power supply.
Design the circuit so that the servo on signal also turns off as soon as the power is shut off on detection of alarm occurrence.



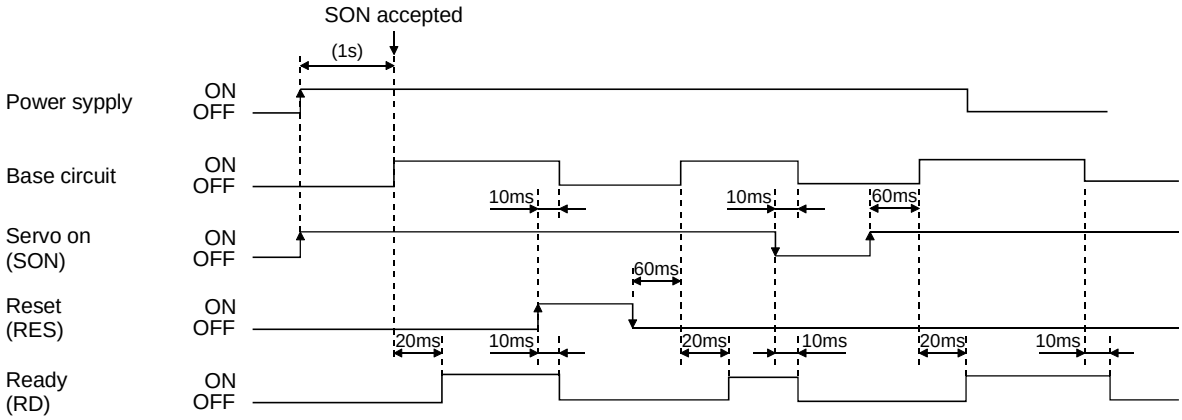
Note : For a single-phase 230VAC power supply, connect the power supply to L1 and L2 and keep L3 open.

3.3 Power-on sequence

(1) Power-on procedure

1) Always wire the power supply as shown in above Section 3.7.1 using the magnetic contactor with the main circuit power supply (three-phase 200V: L_1, L_2, L_3, single-phase 230V: L_1, L_2). Configure up an external sequence to switch off the magnetic contactor as soon as an alarm occurs.
2) Switch on the control circuit power supply L_{11}, L_{21} simultaneously with the main circuit power supply or before switching on the main circuit power supply. If the main circuit power supply is not on, the display shows the corresponding warning. However, by switching on the main circuit power supply, the warning disappears and the servo amplifier will operate properly.
3) The servo amplifier can accept the servo-on signal (SON) about 1 second after the main circuit power supply is switched on. Therefore, when SON is switched on simultaneously with the three-phase power supply, the base circuit will switch on in about 1 second, and the ready signal (RD) will switch on in further about 20ms, making the servo amplifier ready to operate.
4) When the reset signal (RES) is switched on, the base circuit is shut off and the servo motor shaft coasts.

(2) Timing chart



3.4 Signal explanations

1) CN1A

<table>
<tr><th>Signal Name</th><th>Symbol</th><th>Pin No.</th><th>Description</th><th>I/O Division</th></tr>
<tr><td>Digital I/F power supply input</td><td>COM</td><td>9</td><td>Used to input 24VDC±10% for input interface.
Driver power input terminal for digital interface.
COM of each connector is connected in the servo amplifier.
When using an external power supply, connect a power supply of 24VDC, 200mA or more to this terminal.</td><td></td></tr>
<tr><td>Open collector power input</td><td>OPC</td><td>11</td><td>When using a manual pulse generator, supply 24VDC to this terminal.</td><td></td></tr>
<tr><td>Digital I/F common</td><td>SG</td><td>10, 20</td><td>Common terminal for VDD and COM and isolated from LG.</td><td></td></tr>
<tr><td>DC15V power supply</td><td>P15R</td><td>4</td><td>Used to output 15VDC. Power supply terminal for VC and TLA.</td><td></td></tr>
<tr><td>Control common</td><td>LG</td><td>1</td><td>Common terminal for VC, TLA, MO1, MO2 and P15R.</td><td></td></tr>
<tr><td>Proximity dog</td><td>DOG</td><td>8</td><td>When terminals DOG-SG are shorted, the proximity dog signal is detected. The polarity of dog detection input can be changed with the parameter.
<table>
<tr><th>Parameter No.8</th><th>Polarity of Proximity Dog Detection Input</th></tr>
<tr><td>□0□□</td><td>DOG-SG are opened.</td></tr>
<tr><td>□1□□(initial value)</td><td>DOG-SG are shorted.</td></tr>
</table></td><td>DI-1</td></tr>
<tr><td>Zeroing completion</td><td>ZP</td><td>18</td><td>ZP-SG are connected on completion of zeroing.
In the absolute position system, ZP-SG are connected when the servo amplifier is ready to operate but are disconnected if:
1) SON-SG are opened;
2) EMG-SG are opened;
3) RES-SG are shorted;
4) Alarm occurs;
5) Limit switch opens;
6) Zeroing has not been made after the purchase of the product;
7) Zeroing has not been made after the occurrence of absolute position erasure (A. 25) or absolute position counter warning (A. E3);
8) Zeroing has not been made after the changing of the electronic gear value;
9) Zeroing has not been made after the absolute position system was made valid; or
10) The ST1 coordinate system (000 □ in parameter No.1) has been changed.</td><td>DO-1</td></tr>
<tr><td></td><td></td><td>19</td><td>Empty</td><td>DI-1
DO-1</td></tr>
<tr><td>Shield</td><td>SD</td><td>Plate</td><td>Connect one end of the shielded cable.</td><td></td></tr>
</table>

2) CN1B

<table>
<tr><th>Signal Name</th><th>Symbol</th><th>Pin No.</th><th>Description</th><th>I/O Division</th></tr>
<tr><td>I/F Internal power supply</td><td>VDD</td><td>3</td><td>Used to output +24V±10% to across VDD-COM.
When using this power supply for digital interface, connect it with COM.
Permissible current: 80mA</td><td></td></tr>
<tr><td>Digital I/F power supply input</td><td>COM</td><td>13</td><td>Used to input 24VDC±10% for input interface.
Driver power input terminal for digital interface.
COM of each connector is connected in the servo amplifier.
When using an external power supply, connect a power supply of 24VDC, 200mA or more to this terminal.</td><td></td></tr>
<tr><td>DC15V power supply</td><td>P15R</td><td>11</td><td>Used to output +15VDC to across P15R-LG. Used for VC/TLA power supply.</td><td></td></tr>
<tr><td>Digital I/F Common</td><td>SG</td><td>10, 20</td><td>+24VDC common terminal for VDD, COM, etc. and isolated from LG.</td><td></td></tr>
<tr><td>Control common</td><td>LG</td><td>1</td><td>Common terminal for VC, TLA, MO1, MO2 and P15R.</td><td></td></tr>
<tr><td>Servo on</td><td>SON</td><td>15</td><td>When SON-SG are shorted, the base circuit is switched on and the servo amplifier is ready to operate.
When they are opened, the base circuit is shut off and the servo motor coasts.</td><td>DI-1</td></tr>
<tr><td>Forward rotation stroke end</td><td>LSP</td><td>16</td><td rowspan="2">To start operation, short LSP-SG or LSN-SG. When they are opened, the servo motor is stopped suddenly and servo-locked.
<table>
<tr><th rowspan="2">Across LSP-SG</th><th rowspan="2">Across LSN-SG</th><th colspan="2">Operation</th></tr>
<tr><th>CCW direction</th><th>CW direction</th></tr>
<tr><td>1</td><td>1</td><td>○</td><td>○</td></tr>
<tr><td>0</td><td>1</td><td></td><td>○</td></tr>
<tr><td>1</td><td>0</td><td>○</td><td></td></tr>
<tr><td>0</td><td>0</td><td></td><td></td></tr>
</table>
Note. 0:Open,1:Short</td><td>DI-1</td></tr>
<tr><td>Reverse rotation stroke end</td><td>LSN</td><td>17</td><td>DI-1</td></tr>
<tr><td>Forward rotation start</td><td>ST1</td><td>8</td><td>This signal serves as a forward rotation start signal for the incremental value command system.
In automatic operation mode, the servo motor rotates in the forward rotation direction as soon as ST1-SG are shorted.
In zeroing mode, zeroing starts as soon as ST1-SG are shorted.
In jog operation mode, the servo motor rotates in the forward rotation direction while ST1-SG are shorted.
Forward rotation denotes the direction in which the address is incremented.

This signal serves as a start signal for the absolute value command system. In automatic operation mode, operation starts as soon as ST1-SG are shorted.
In zeroing mode, zeroing starts as soon as ST1-SG are shorted.
In jog operation mode, the servo motor rotates in the forward rotation direction while ST1-SG are shorted.
Forward rotation denotes the direction in which the address is incremented.</td><td>DI-1</td></tr>
<tr><td>Reverse rotation start</td><td>ST2</td><td>9</td><td>In automatic operation mode, the servo motor rotates in the reverse rotation direction as soon as ST2-SG are shorted. (Incremental value command only)
In jog operation mode, the servo motor rotates in the reverse rotation direction while ST2-SG are shorted.
Reverse rotation denotes the direction in which the address is decremented.</td><td>DI-1</td></tr>
</table>

Signal Name	Symbol	Pin No.	Description	I/O Division
Automatic/manual selection	MDO	7	Short MDO-SG to choose the automatic operation mode, or open them to choose the manual operation mode.	DI-1
Point table No. selection	DI0 DI1	5 14	The following table lists the point table numbers which may be chosen by the combinations of DI0 and DI1: DI1 / DI0 / Selected Point Table No. 0 / 0 / Manual zeroing 0 / 1 / Point table No.1 1 / 0 / Point table No.2 1 / 1 / Point table No.3 Note: 0: DI1/DI0-SG open 1: DI1/DI0-SG shorted	DI-1
Rough match	CPO	4	CPO-SG are connected when the remaining command distance falls within the parameter-set rough match output range. This signal is not output while the base circuit is off.	DO-1
In position	INP	6	INP-SG are connected when the droop pulses fall within the parameter-set in-position range. This signal is not output while the base circuit is off.	DO-1
Trouble	ALM	18	ALM-SG are disconnected when the protective circuit is activated to shut off the base circuit at power off. They are connected in normal condition at power off.	DO-1
Ready	RD	19	RS-SG are connected when the servo amplifier is ready to operate without failure after servo-on.	DO-1
Override	VC	2	−10 to +10V is applied to across VC-LG to limit the servo motor speed. Apply −10[V] for 0[%] override, 0[V] for 100[%], or 10[V] for 200[%].	Analog input
External torque limit	TLA	12	0 to +10V is applied to across TLA-LG to limit the servo motor-generated torque. Apply 0[V] for 0 torque or 10[V] for max. torque.	Analog input
Shield	SD	Plate	Connect one end of the shielded cable.	

3) CN3

Signal Name	Symbol	Pin No.	Description	I/O Division
Analog monitor 1	MO1	4	Used to output the data set in parameter No.17 to across MO1-LG in terms of voltage. Resolution 8 bits	Analog output
Analog monitor 2	MO2	14	Used to output the data set in parameter No.17 to across MO2-LG in terms of voltage. Resolution 8 bits	Analog output
RS-422 I/F	SDP	9	RS-422 communication terminal RS-422 and RS-232C functions cannot be used together. Short "15" and "10" at the last axis.	
	SDN	19		
	RDP	5		
	RDN	15		
	TRE	10		
RS-232C I/F	RXD	2	RS-232C communication terminal Use parameter No.16 for selection.	
	TXD	12		
Monitor common	LG	1, 3, 11, 13	Monitoring common for control common	
Ground	SD	Plate	Connect one end of the shielded cable.	

3.5 Additional function devices

By parameter setting, you can assign the signals given in this section to the pins of connectors CN1A and CN1B, in addition to the signals in Section 3.2.

(1) Pins which accept different signals

Pin Type	Connector Pin No.	Device in Initial Status	Device Symbol
Input-only pins	CN1B-5	Point table No. selection 1	DI0
	CN1B-14	Point table No. selection 2	DI1
	CN1A-8	Proximity dog	DOG
	CN1B-15	Servo on	SON
	CN1B-16	Forward rotation stroke end	LSP
	CN1B-17	Reverse rotation stroke end	LSN
	CN1B-7	Automatic/manual selection	MDO
	CN1B-8	Forward rotation start	ST1
	CN1B-9	Reverse rotation start	ST2
I/O pin	CN1A-19	Empty	
Output-only pins	CN1B-4	Rough match	CPO
	CN1B-6	In position	INP
	CN1B-18	Trouble	ALM
	CN1B-19	Ready	RD
	CN1A-18	Zeroing completion	ZP

(2) Assignable devices

1) Input devices

Device Name	Symbol	Description	I/O Division
No assigned function		No function is assigned.	
Emergency stop	EMG	When EMG-SG are opened, the servo amplifier is placed in the emergency stop status, the servo switches off, and the dynamic brake is operated to bring the servo motor to a sudden stop. Short EMG-SG in the emergency stop status to cancel the emergency stop status.	DI-1
Alarm reset	RES	Short RES-SG to deactivate the alarm. If RES-SG are shorted in no alarm status, the base circuit is not shut off. Set □0□□ in parameter No. 55 to shut off the base circuit. Some alarms cannot be deactivated by the reset signal. Since this device is not designed for stopping, do not switch it on during operation.	DI-1
Point table No. selection	DI2 DI3 DI4	Valid in the automatic mode. The following table lists the point table numbers that may be chosen by the combinations of DI0, DI1, DI2, DI3 and DI4:	DI-1

DI4	DI3	DI2	DI1	DI0	Selected point table No.
0	0	0	0	0	Zeroing operation
0	0	0	0	1	Point table No.1
0	0	0	1	0	Point table No.2
0	0	0	1	1	Point table No.3
:	:	:	:	:	:
1	1	1	0	1	Point table No.28
1	1	1	0	1	Point table No.29
1	1	1	1	0	Point table No.30
1	1	1	1	1	Point table No.31

Note:0: DI3/DI2/DI1/DI0-SG open
1: DI3/DI2/DI1/DI0-SG shorted

External torque limit selection	TL0	Short TL0-SG to make external analog torque limit valid.	DI-1
Internal torque limit selection	TL1	Open TL1-SG to make the torque limit value set in parameter No.28 (TL1) valid, or short them to make the value set in parameter No.29 (TL2) valid.	DI-1

Device Name	Symbol	Description	I/O Division
Proportion control	PC	Short PC-SG to switch the speed amplifier from proportional integral type to proportional type.	DI-1
Temporary stop/Restart	STP	Short STP-SG during automatic operation to make a temporary stop. Short STP-SG again to make a restart. Shorting the forward/reverse rotation start signal during a temporary stop is ignored. Switching from automatic mode to manual mode during a temporary stop clears the remaining moving distance. During zeroing and jog operation, the temporary stop/restart input is ignored.	DI-1
Gain changing	CDP	Gain changing device Short CDP-SG to switch the gain that changing condition depends on the setting in parameter No. 68	DI-1

2) Output devices

<table>
<tr><th>Device Name</th><th>Symbol</th><th>Description</th><th>I/O Division</th></tr>
<tr><td>No assigned function</td><td></td><td>No function is assigned.</td><td></td></tr>
<tr><td>Electromagnetic brake interlock</td><td>MBR</td><td>Used to output the interlock signal for electromagnetic brake.
MBR-SG are disconnected at servo-off or alarm occurrence.</td><td>DO-1</td></tr>
<tr><td>Dynamic brake interlock</td><td>DBR</td><td>Dynamic brake interlock output device.</td><td>DO-1</td></tr>
<tr><td>Position range</td><td>POT</td><td>POT-SG are connected when the actual current position is within the parameter-set range.
The output is open when zeroing is incomplete or the base circuit is off.</td><td>DO-1</td></tr>
<tr><td>Warning</td><td>WNG</td><td>WNG-SG are connected when warning occurs.
Open in normal condition.</td><td>DO-1</td></tr>
<tr><td>Battery warning</td><td>BWNG</td><td>BWNG-SG are connected when the open battery cable warning (A. 92) or battery warning (A. 9F) occurs.
Open in normal condition.</td><td>DO-1</td></tr>
<tr><td>Limiting torque</td><td>TLC</td><td>TLC-SG are connected when the internally or externally set torque limit value is reached.</td><td>DO-1</td></tr>
<tr><td>Temporary stop</td><td>PUS</td><td>PUS-SG are connected when deceleration to a stop is started by the temporary stop signal. PUS-SG is disconnected when operation is resumed by making the temporary stop signal valid again.</td><td>DO-1</td></tr>
<tr><td>Moving completion</td><td>MEND</td><td>MEND-SG are connected when the in-position and rough match signal turned on</td><td>DO-1</td></tr>
<tr><td>Point table No. output</td><td>PT0
PT1
PT2
PT3
PT4</td><td>The following table lists the point block numbers that may be chosen by the combinations of PT0, PT1, PT2,TP3 and PT4 after positioning complete:
<table>
<tr><th>PT4</th><th>PT3</th><th>PT2</th><th>PT1</th><th>PT0</th><th>Point block No.</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td></td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>Point block No.1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>Point block No.2</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>Point block No.3</td></tr>
<tr><td colspan="6">⋮</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>Point block No.28</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>Point block No.29</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>Point block No.30</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Point block No.31</td></tr>
</table>
These signals will be turned off while Powered off, Servo off, In zeroing operation and after zeroing complete.
It will be hold previous status if changed operation mode, in manual operation and in fast zeroing</td><td>DO-1</td></tr>
</table>

(4) Device setting of control mode

Signal \ Operation mode		Automatic operation		Manual drive	Manual zeroing
		Absolute command	Incremental command		
Automatic/Manual	MD0	ON	ON	OFF	ON
Point block No.	DI0 to DI4	1 to 31	1 to 31		0
Forward rotation start	ST1	≥5ms	≥5ms	ON (FWD. JOG)	≥5ms
Reverse rotation start	ST2		≥5ms	ON (REV. JOG)	

Note: The start signal will respond within 3 ms.
Servo motor will be stopped and cleared moving remain distance when Automatic/Manual signal changed in positioning.

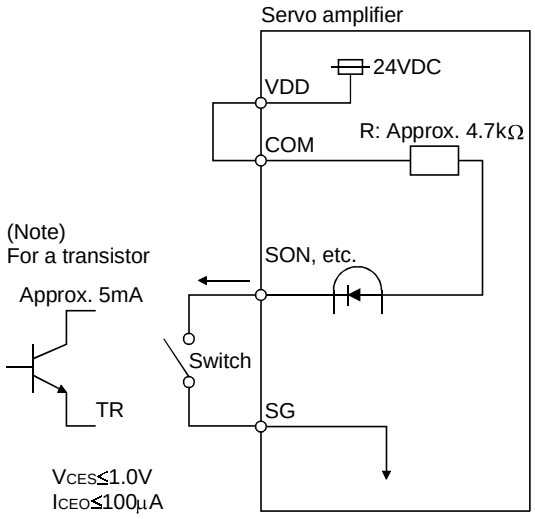
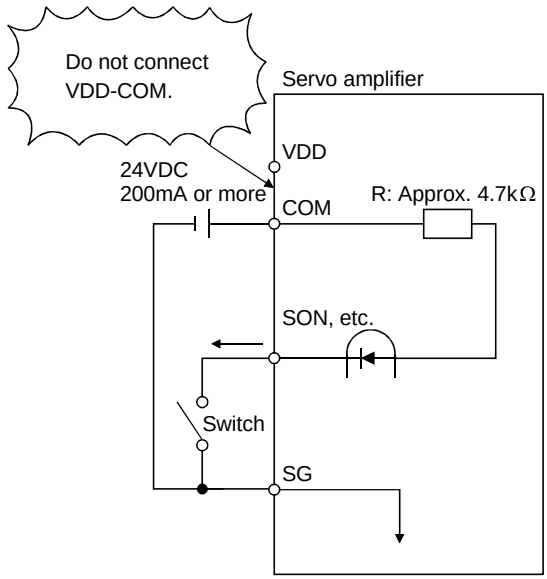
4. Interfaces

This section gives the details of the I/O signal interfaces.

(1) Digital input interface DI-1

Give a signal with a relay or open collector transistor.

Source input is also possible. Refer to (5) in this section.

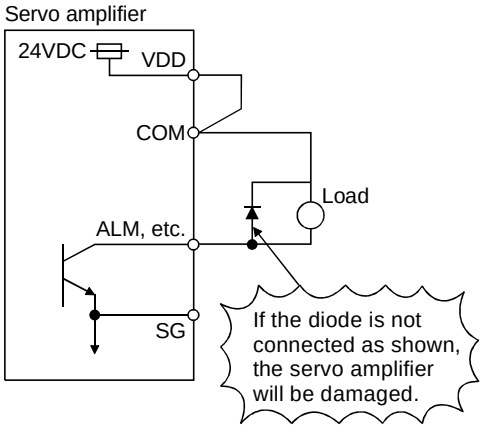
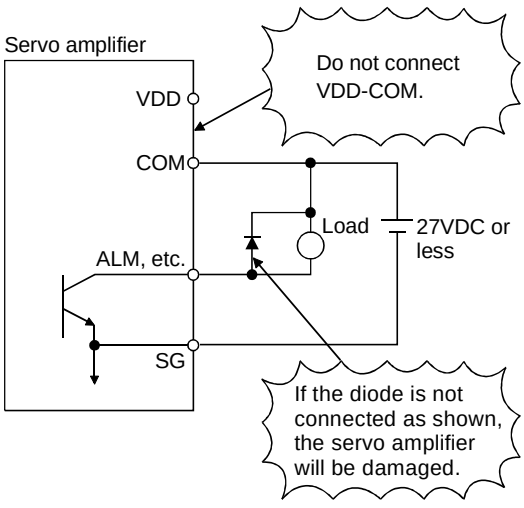
For use of internal power supply	For use of external power supply
	

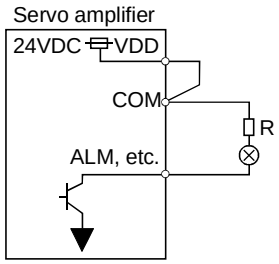
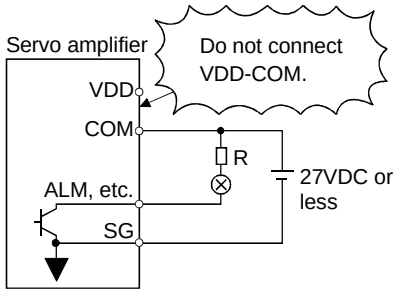
Note: This also applies to the use of the external power supply.

(2) Digital output interface DO-1

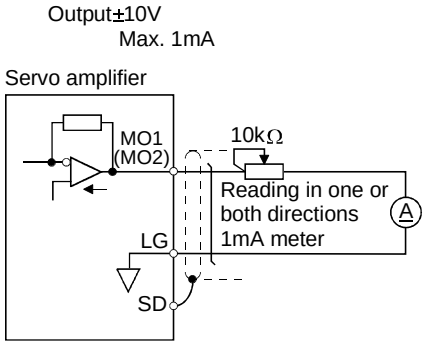
A lamp, relay or photocoupler can be driven. Provide a diode (D) for an inductive load, or an inrush current suppressing resister (R) for a lamp load. (Permissible current: 40mA or less, inrush current: 100mA or less)

1) Inductive load

For use of internal power supply	For use of external power supply
	

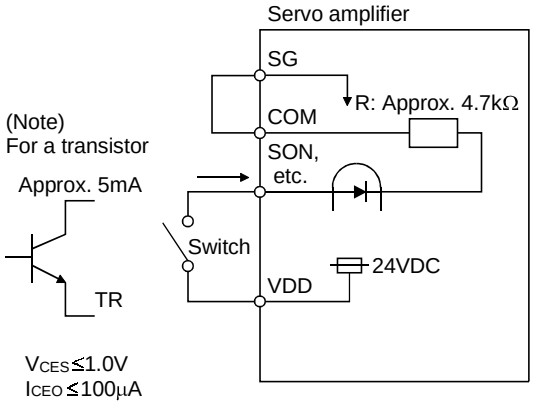
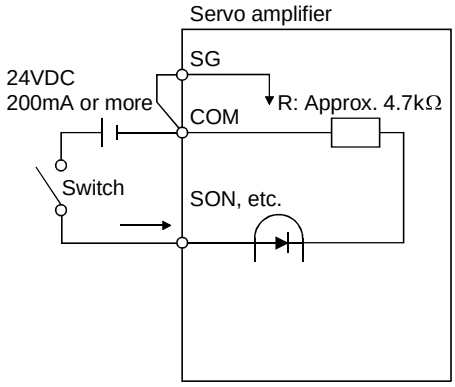
For use of internal power supply	For use of external power supply
	

(3) Analog output



(5) Source input interface

When using the input interface of source type, all DI-1 input signals are of source type. Source output cannot be provided.

For use of internal power supply	For use of external power supply
	

Note: This also applies to the use of the external power supply.

5. Automatic Operation Mode

5.1 Positioning via point table with digital input

(1) Parameter setting

Set the following parameters to perform automatic operation:

(a) Command mode selection (parameter No.0)

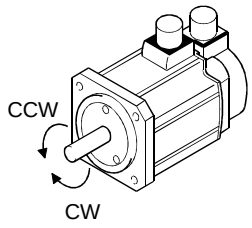
Select the absolute value command system or incremental value command system.

Parameter No. 0 Setting	Positioning System
□□0□	Absolute value command
□□1□	Incremental value command

(b) Operation system selection (parameter No.1)

Choose the servo motor rotation direction at the time when the forward rotation start (ST1) signal or reverse rotation start (ST2) signal is switched on.

Parameter No. 1 Setting	Servo Motor Rotation Direction When Forward Rotation Start (ST1) Is Switched On
□□□0	CCW rotation with + position data CW rotation with − position data
□□□1	CW rotation with + position data CCW rotation with − position data



(c) Feed length multiplication selection (parameter No.1)

Set the unit multiplication factor (STM) of position data. The actual moving distance is the result of multiplying the entered position data by the unit multiplication factor.

Parameter No.1 Setting	Feed Length Multiplication STM [Times]
□□0□	Position data × 1
□□1□	Position data × 10
□□2□	Position data × 100
□□3□	Position data × 1000

(2) Point table

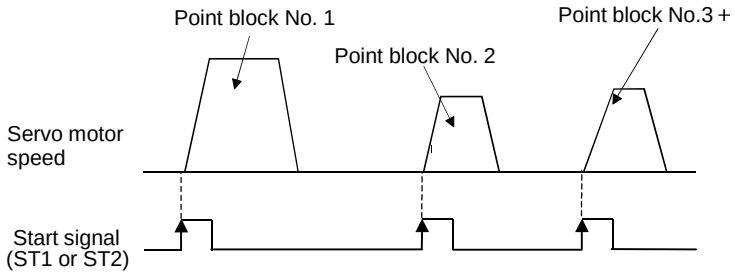
(a) Point table setting

Up to 31 point tables may be set. The following table lists what to set:

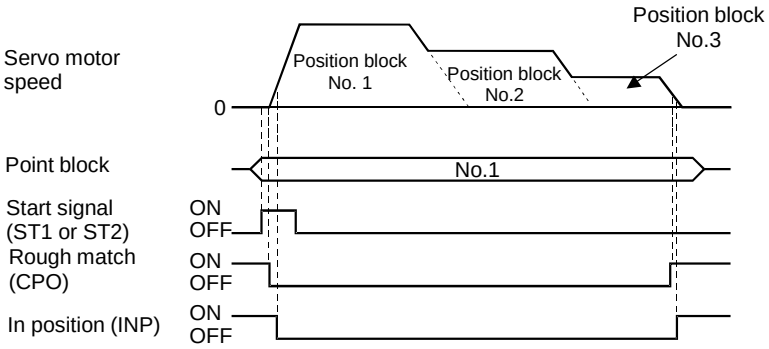
Name	Setting Range	Unit	Description
Position data	−999999 to 999999	[$\times 10^{STM}\mu m$]	In the absolute value command system, motion is made to the set address. In the incremental value command system, motion is made over the set distance. Use the parameter to select the incremental value command or absolute value command. A negative value cannot be set to the incremental value command.
Motor speed	0 to permissible speed	r/min	Set the command speed of the servo motor for execution of positioning. The setting should be equal to or less than the instantaneous permissible speed of the servo motor.
Acceleration time constant	0 to 20000	ms	Set the acceleration time constant. Set the time until the rated speed of the servo motor is reached.
Deceleration time constant	0 to 20000	ms	Set the deceleration time constant. Set the time until the servo motor running at rated speed comes to a stop.
Dwell time	0 to 20000	ms	Set the dwell time. Set "0" in the auxiliary function to make the dwell time invalid. Set "1" in the auxiliary function and 0 in the dwell time to perform continuous operation. When the dwell time is set, the position command of the selected point table is completed, and after the set dwell time has elapsed, the position command of the next point table is started.
Auxiliary function	0 • 1		Set the auxiliary function. Set "1" to execute point tables consecutively without a stop. 0: Automatic operation is performed in accordance with a single point table chosen. 1: Operation is performed in accordance with consecutive point tables without a stop. When a different rotation direction is set, smoothing zero (command output) is confirmed and the rotation direction is then reversed. Setting "1" in point table No.15 results in an error. For full information, refer to Section 4.2.5.

(b) Descriptions of auxiliary function

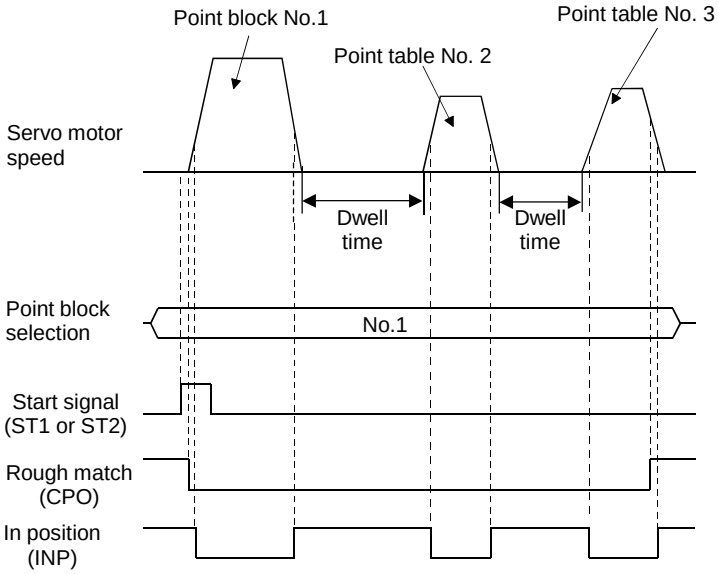
a) Auxiliary function setting “0”



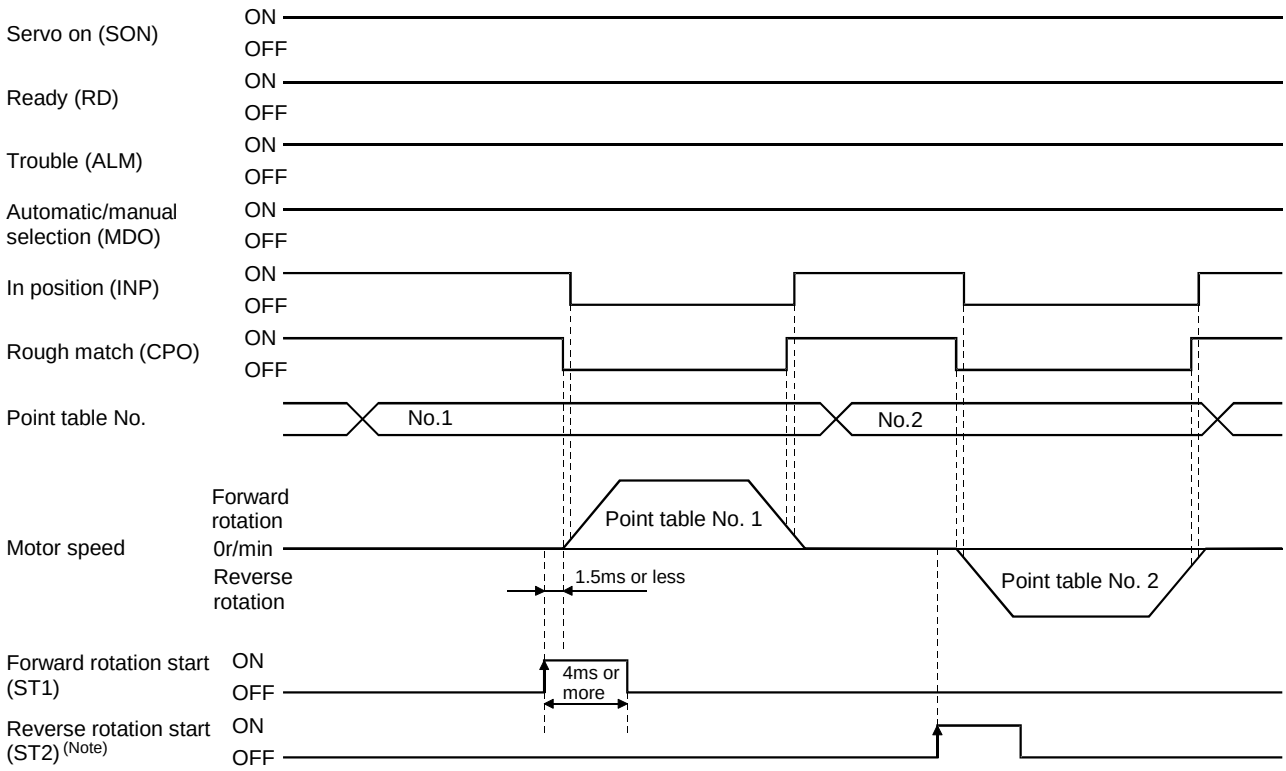
b) Auxiliary function setting “1” and dwell time is “0”



c) Auxiliary function setting “1” and dwell time is not “0”



(3) Timing chart



Note: Reverse rotation start (ST2) is invalid for absolute value command system.

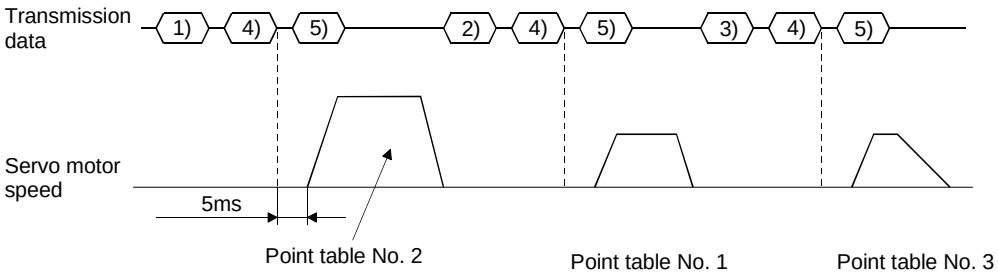
5.2 Positioning operation in accordance with point tables

By selecting the point table No. and switching on the start signal (ST1, ST2) using the communication function, positioning operation in accordance with point tables can be started.

(1) Selection of point tables

Using the device forced output from the controller (command [9][2], data No. [6][0]), choose point tables from among No.1 to 31

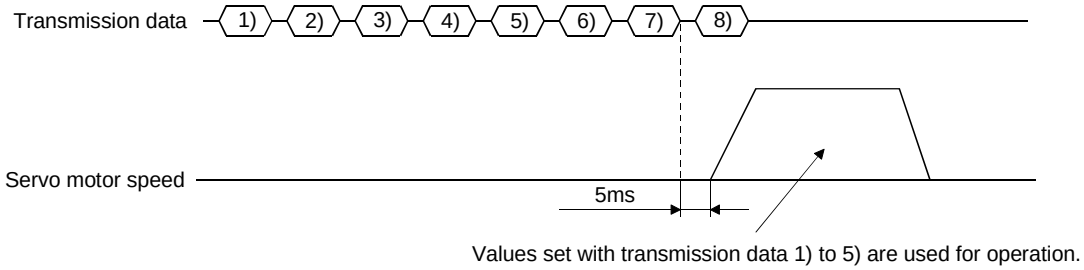
(2) Timing chart



No.	Transmission Data	Command	Data No.
1)	Point table No.2 selection	[9] [2]	[6] [0]
2)	Point table No.1 selection	[9] [2]	[6] [0]
3)	Point table No.3 selection	[9] [2]	[6] [0]
4)	Forward rotation start (ST1) ON	[9] [2]	[6] [0]
5)	Forward rotation start (ST1) OFF	[9] [2]	[6] [0]

5.3 Positioning operation via communication

Positioning operation can be performed by changing the point table settings and making a start. For example, positioning operation can be performed by writing the data of point table No.1, then specifying point table No.1, and making a start.



Values set with transmission data 1) to 5) are used for operation.

No.	Transmission Data	Command	Data No.
1)	Point table No.1 position data write	[C] [0]	[0] [1]
2)	Point table No.1 speed	[C] [6]	[0] [1]
3)	Point table No.1 acceleration time constant	[C] [7]	[0] [1]
4)	Point table No.1 deceleration time constant	[C] [8]	[0] [1]
5)	Point table No.1 auxiliary function	[C] [B]	[0] [1]
6)	Point table No.1 selection	[9] [2]	[6] [0]
7)	Forward rotation start (ST1) ON	[9] [2]	[6] [0]
8)	Forward rotation start (ST1) OFF	[9] [2]	[6] [0]

5.4 Manual operation mode

For machine adjustment, home position matching, etc., jog operation or a manual pulse generator may be used to make a motion to any position.

5.4.1 Jog operation

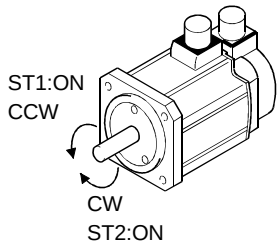
(1) Setting

Set the input signal and parameters as follows according to the purpose of use. In this case, the point table No. selection 1 to 5 signals (DI0 to DI4) are invalid:

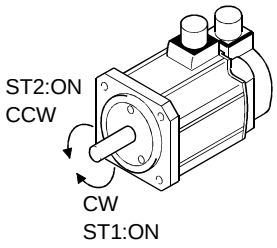
Item	Setting Method	Description
Manual operation mode selection	Automatic/manual selection signal (MDO)	Open MDO-SG (OFF).
Servo motor rotation direction	Parameter No.1	Refer to (2) in this section.
Jog speed	Parameter No.13	Set the speed of the servo motor.
Acceleration/deceleration time constant	Point table No.1	Use the acceleration/deceleration time constants in point table No.1.

(2) Servo motor rotation direction

Parameter No. 1 Setting	Servo Motor Rotation Direction	
	Forward Rotation Start (ST1) ON	Reverse Rotation Start (ST2) ON
□□□0	CCW rotation	CW rotation
□□□1	CW rotation	CCW rotation



Parameter No. 1 □□□0

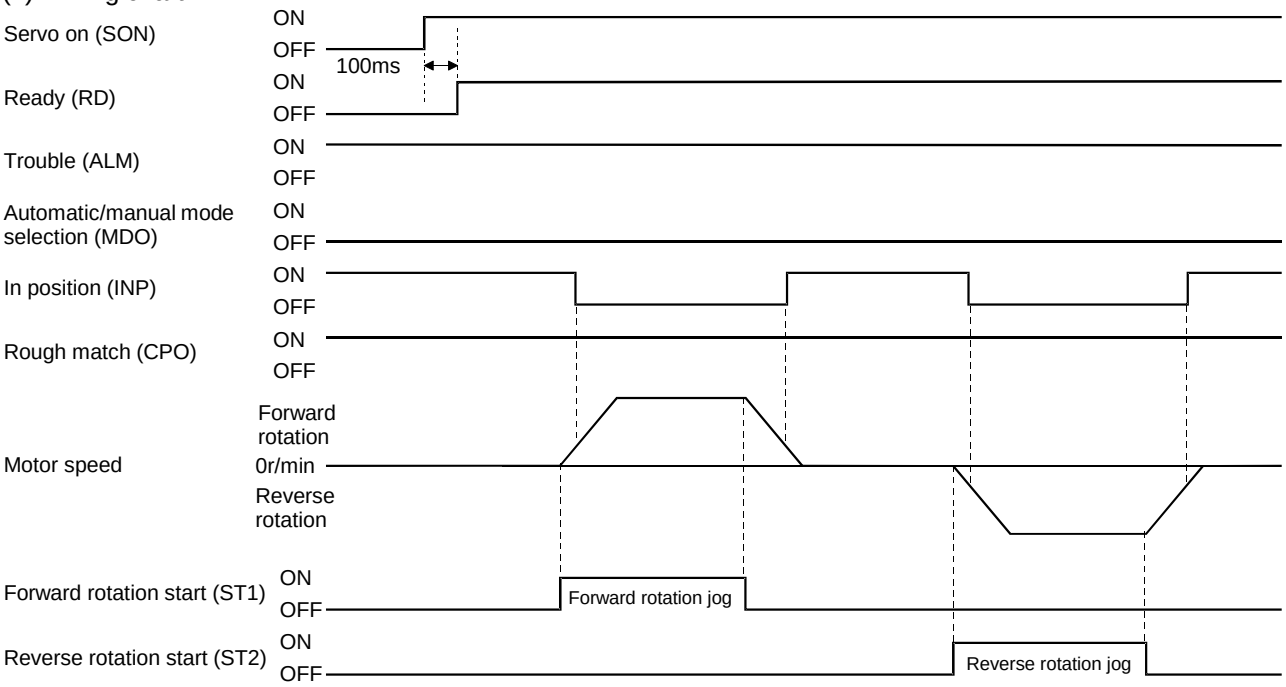


Parameter No. 1 □□□1

(3) Operation

By shorting ST1-SG, operation is performed under the conditions of the jog speed set in the parameter and the acceleration and deceleration time constants in set point table No.1. For the rotation direction, refer to (2) in this section. By shorting ST2-SG, the servo motor rotates in the reverse direction to ST1.

(4) Timing chart



5.5 Zeroing

5.5.1 Stopper type zeroing

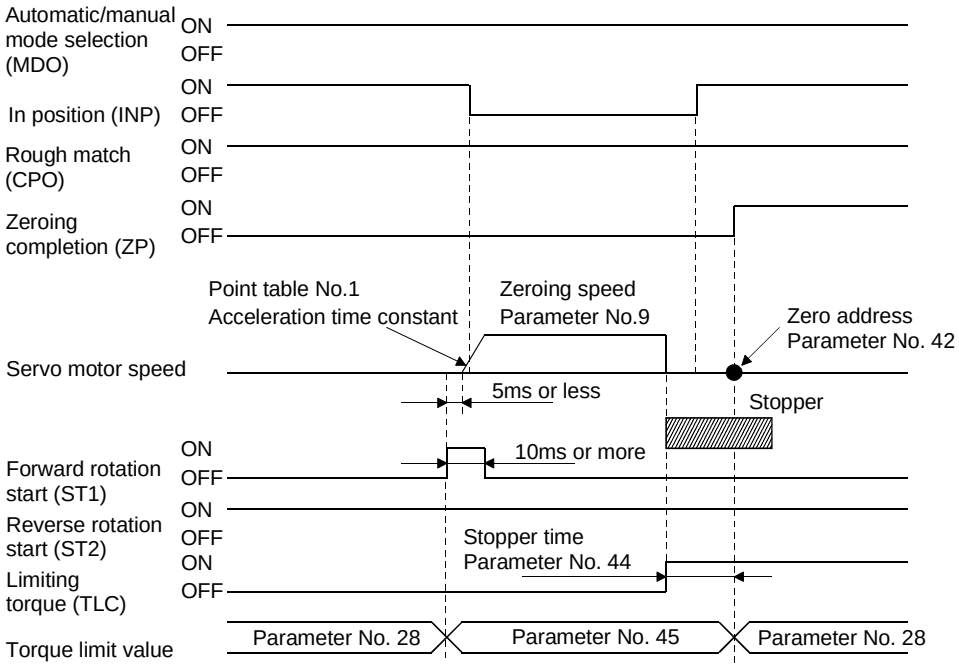
In stopper type zeroing, a machine part is pressed against a stopper or the like by jog operation, manual pulse generator operation or the like to make a home position return and that position is defined as a home position.

(1) Signals, parameters

Set the input signals and parameters as follows:

Item	Device/Parameter Used	Description
Manual zeroing mode selection	Automatic/manual selection signal (MDO)	Short MDO-SG (ON).
	Point table No. selection 1 (DI0)	Open DI0-SG (OFF).
	Point table No. selection 2 (DI1)	Open DI1-SG (OFF).
Stopper type zeroing	Parameter No.8	□□□3:Stopper type zeroing is selected.
Zeroing direction	Parameter No.8	Refer to the parameter No.8
Zeroing speed	Parameter No.9	Set the speed till contact with the stopper.
Zeroing position data	Parameter No.42	Used to set the current position on completion of zeroing
Stopper time	Parameter No.44	Time from when the part makes contact with the stopper to when zeroing data is obtained to output zeroing completion (ZP)
Stopper type zeroing torque limit	Parameter No.45	Set the servo motor torque limit value for execution of stopper type zeroing.
Zeroing acceleration time constant	Point table No.1	Use the acceleration time constant of point table No.1.

(2) Timing chart



The address on completion of zeroing is the value automatically set in parameter No.42 (zeroing position data).

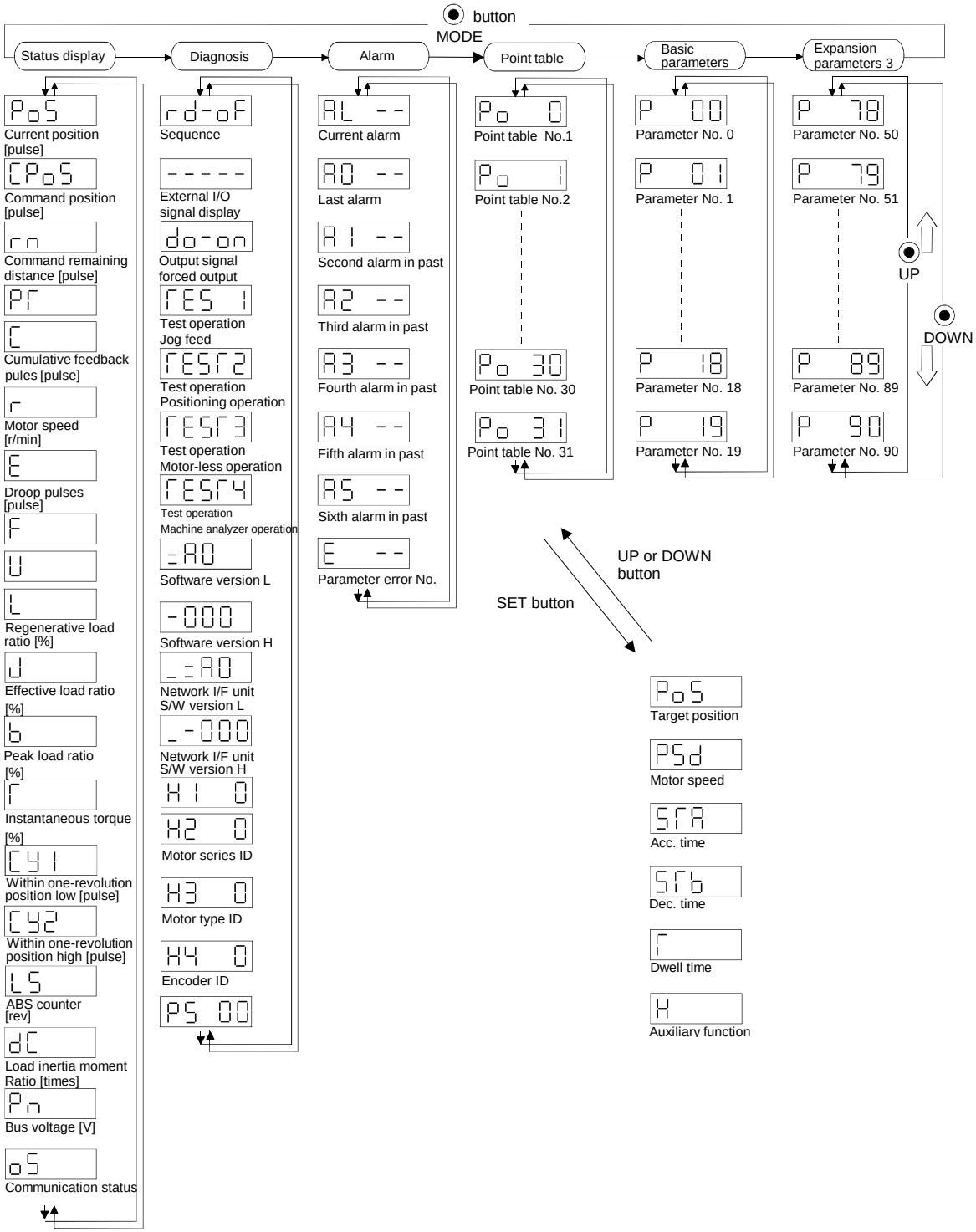
Parameter No.14 (STC) will be disabled during zeroing.

6. Display and Operation

6.1 Display flowchart

Use the display (5-digit, 7-segment LED) on the front panel of the servo amplifier for status display, parameter setting, etc. Set the parameters before operation, diagnose an alarm, confirm external sequences, and/or confirm the operation status. Press the "MODE" "UP" or "DOWN" button once to move to the next screen.

To refer to or set the expansion parameters, make them valid with parameter No. 19 (parameter write disable).



7. Parameters

For any parameter whose symbol is preceded by *, set the parameter value and switch power off once, then switch it on again to make that parameter setting valid.
For details of the parameters, refer to the corresponding items.

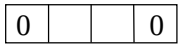
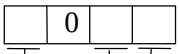
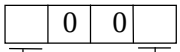
(1) Item list

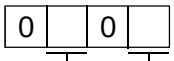
Class	No.	Symbol	Name and Function	Initial Value	Unit	Customer Setting
Basic parameters	0	*STY	Control mode, regenerative brake option selection	0010		
	1	*FTY	Feeding function selection	0000		
	2	*OP1	Function selection 1	0002		
	3	AUT	Auto tuning	0105		
	4	*CMX	Electronic gear numerator	1		
	5	*CDV	Electronic gear denominator	1		
	6	INP	Movement completion output range	100	pulse	
	7	PG1	Position loop gain 1	36	rad/s	
	8	ZTY	Zeroing type	0013		
	9	ZRF	Zeroing speed	500	r/min	
	10	CRF	Creep speed	10	r/min	
	11	ZST	Zero shift distance	0	Um	
	12	CRP	Rough match output range	0	$\times 10^{STM}\mu m$	
	13	JOG	JOG speed	100	r/min	
	14	*STC	S-Curve acceleration/deceleration time constant	0	Ms	
	15	*SNO	Station number setting	0	station	
	16	*BPS	Alarm history clear	0000		
	17	MOD	For manufacture setting	0100		
	18	*DMD	Status display selection	0000		
	19	*BLK	Parameter block	0000		

Class	No.	Symbol	Name and Function	Initial Value	Unit	Customer Setting
Expansion parameters	20	*OP2	Function selection 2	0000		
	21	*OP3	Function selection 3	0000		
	22	*OP4	Function selection 4	0000		
	23	*SIC	Serial communications time-out selection	0	Sec	
	24	FFC	Feed forward gain	0	%	
	25	VCO	Override offset	0	mV	
	26	TLO	Torque limit offset	0	mV	
	27	*ENR	For manufacturer setting	4000		
	28	TL1	Internal torque limit 1	100	%	
	29	TL2	Internal torque limit 2	100	%	
	30	*BKC	Backlash compensation	0	pulse	
	31	MO1	Analog monitor ch1 offset	0	mV	
	32	MO2	Analog monitor ch2 offset	0	mV	
	33	MBR	Electromagnetic brake sequence output	100	ms	
	34	DG2	Ratio of load inertia moment to motor inertia moment	70	×0.1 times	
	35	PG2	Position loop gain 2	35	rad/s	
	36	VG1	Speed loop gain 1	177	rad/s	
	37	VG2	Speed loop gain 2	817	rad/s	
	38	VIC	Speed integral compensation	48	ms	
	39	VDC	Speed differential compensation	980		
	40	OVA	For manufacture setting	0		
	41	DSS		0		
	42	*ZPS	Zeroing position data	0	$\times 10^{STM}\mu m$	
	43	DCT	Moving distance after proximity dog	1000	$\times 10^{STM}\mu m$	
	44	ZTM	Stopper type zeroing stopper time	100	ms	
	45	ZTT	Stopper type zeroing torque limit value	30	%	
	46	*LMP	Software limit +	0	$\times 10^{STM}\mu m$	
	47			0		
	48	*LMN	Software limit -	0	$\times 10^{STM}\mu m$	
	49			0		
	50	*LPP	Position range output address +	0	$\times 10^{STM}\mu m$	
	51			0		
	52	*LNP	Position range output address -	0	$\times 10^{STM}\mu m$	
	53			0		

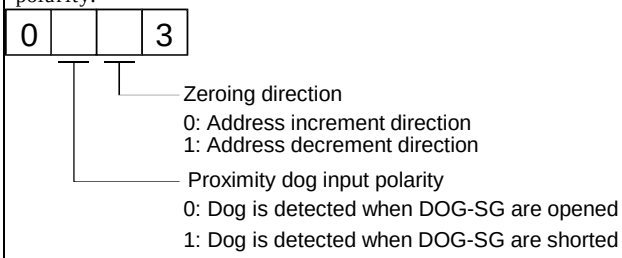
Class	No.	Symbol	Name and Function	Initial Value	Unit	Customer Setting
	54	*OP5	Function selection 5	0000		
	55	*OP6	Function selection 6	0000		
	56	*OP7	Function selection 7	0000		
	57	*OP8	Function selection 8	0000		
	58	*OP9	Function selection 9	0000		
	59	*OPA	Function selection A	0000		
	60		For manufacturing setting	0000		
	61	NH1	Machine resonance suppression filter 1	0000		
	62	NH2	Machine resonance suppression filter 2	0000		
	63	LPF	Low-pass filter, adaptive vibration suppression control	0000		
	64	GD2B	Ratio of load inertia moment to Servo motor inertia moment 2	70	× 0.1 time	
	65	PG2B	Position control gain 2 changing ratio	100	%	
	66	VG2B	Speed control gain 2 changing ratio	100	%	
	67	VICB	Speed integral compensation changing ratio	100	%	
	68	*CDP	Gain changing selection	0000		
	69	CDS	Gain changing condition	10		
	70	CDT	Gain changing time constant	1		
	71	VPI	For manufacturing setting	0	ms	
	72	VLI		10000	pulse	
	73	ERZ		10	rev	
	74	ER2		10	rev	
	75	SRT		100	r/min	
	76	TRT		100	ms	
	77	DBT		100	ms	
	78	*DI0	Input/Output device selection (CN1A-19)	0001		
	79	*DI1	Input device selection 1 (CN1A-19,8)	0009		
	80	*DI2	Input device selection 2 (CN1B-5,7)	080A		
	81	*DI3	Input device selection 3 (CN1B-8,9)	0706		
	82	*DI4	Input device selection 4 (CN1A-14,15)	020B		
	83	*DI5	Input device selection 5 (CN1B-16,17)	0504		
	84	*DI6	Input device selection 6 (Automatic ON)	0002		
	85	*DI7	Input device selection 7 (Automatic ON)	0000		
	86	*DO1	Output device selection 1 (CN1A-18,19)	0005		
	87	*DO2	Output device selection 2 (CN1B-4,6)	0304		
	88	*DO3	Output device selection 3 (CN1B-18,19)	0102		
	89		For manufacturing setting	0		
	90			0		

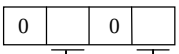
(2) Detail list

Class	No	Symbol	Name and function	Initial Value	Unit	Setting Rnge
Basic parameters	0	*STY	Control mode, Regenerative brake option selection Use to select regenerative brake option.  Selection of command mode 0: Absolute value command 1: Incremental value command Selection of regenerative brake option 0: Not used 1: Spare (do not set) 2: MR-RB032 3: MR-RB12 4: MR-RB32 5: MR-RB30 6: MR-RB50 7: Spare (do not set)	0000		0000h to 0710h
	1	*FTY	Feeding system selection Used to set the feed length multiplication factor and External pulse multiplication factor.  ST1 coordinate system selection 0: Address is incremented in CCW direction 1: Address is incremented in CW direction Feed length multiplication factor (STM) 0: 1 time 1: 10 times 2: 100 times 3: 1000 times SON-off, EMG-off follow-up for absolute value Command in incremental system 0: Invalid 1: Valid	0000		0000h to 1013h
	2	*OP1	Function selection 1 Used to select the input filter and absolute position detection system.  Input filter If external input signal causes chattering due To noise, etc., input filter is used to suppress it. 0: None 1: 0.888msec 2: 1.777msec 3: 2.666msec 4: 3.555msec 5: 4.444msec 6: 5.333msec Selection of absolute position detection system 0: Incremental system 1: Absolute position detection system	0002		0000h to 1006h

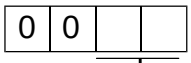
<table>
<tr><th>Class</th><th>No.</th><th>Symbol</th><th>Name and Function</th><th>Initial Value</th><th>Unit</th><th>Setting Range</th></tr>
<tr><td rowspan="2">Basic parameters</td><td>3</td><td>ATU</td><td>Auto tuning
Used to set the response level, etc. for execution of auto tuning.
 

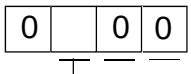
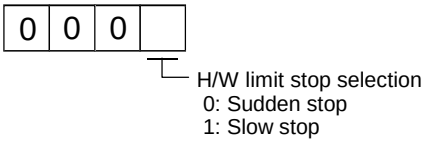
Auto tuning response level setting
<table><tr><th>Set value</th><th>Response level</th><th>Machine resonance Frequency guideline</th></tr><tr><td>1</td><td rowspan="16">Low Response
↕
Middle response
↕
High response</td><td>15Hz</td></tr><tr><td>2</td><td>20Hz</td></tr><tr><td>3</td><td>25Hz</td></tr><tr><td>4</td><td>30Hz</td></tr><tr><td>5</td><td>35Hz</td></tr><tr><td>6</td><td>45Hz</td></tr><tr><td>7</td><td>55Hz</td></tr><tr><td>8</td><td>70Hz</td></tr><tr><td>9</td><td>85Hz</td></tr><tr><td>A</td><td>105Hz</td></tr><tr><td>B</td><td>130Hz</td></tr><tr><td>C</td><td>160Hz</td></tr><tr><td>D</td><td>200Hz</td></tr><tr><td>E</td><td>240Hz</td></tr><tr><td>F</td><td>300Hz</td></tr></table>· If the machine hunts or generates large gear sound, decrease the set value.
· To improve performance, e.g. shorten the settling time, increase the set value.
Gain adjustment mode selection
(For more information, refer to Section 7.1.1.)
<table><tr><th>Set Value</th><th>Gain adjustment mode</th><th>Description</th></tr><tr><td>0</td><td>Interpolation mode</td><td>Fixes position control gain 1</td></tr><tr><td>1</td><td>Auto tuning mode 1</td><td>Ordinary auto tuning.</td></tr><tr><td>2</td><td>Auto tuning mode 2</td><td>Ordinary auto tuning.
Fixes the load inertia moment ratio set in parameter No. 34.
Response level setting can be changed.</td></tr><tr><td>3</td><td>Manual mode 1</td><td>Simple manual adjustment.</td></tr><tr><td>4</td><td>Manual mode 2</td><td>Manual adjustment of all gains.</td></tr></table></td><td>0105</td><td></td><td>0001h
to
042Fh</td></tr>
<tr><td>4</td><td>*CMX</td><td>Electronic gear numerator
Note: Set in the range of $\frac{1}{20}<\frac{CMX}{CDV}<20$.
If $\frac{1}{100}<\frac{CMX}{CDV}<100$ is exceeded, a parameter error will occur.</td><td>1</td><td></td><td>1 to 65535</td></tr>
</table>

Class	No.	Symbol	Name and Function	Initial Value	Unit	Setting Range
Basic parameters	5	*CDV	Electronic gear denominator Setting example Roll diameter: 50mm Reduction ratio: 3/7 Number of pulses: 16384 pulses $\frac{\text{Number of pulses (CMX)}}{\text{Moving distance (CDV)}} = \frac{16384}{50 \times \pi \times 3/7 \times 1000}$ $= \frac{7168}{9375\pi}$ $= \frac{7168}{29452}$ Hence, set 7168 to CMX and 29452 to CDV. Note: When there is a fraction, perform a carry within the setting range and round off that fraction.	1		1 to 65535
	6	INP	Movement completion output rang Used to set the droop pulse range when the movement completion (INP) signal is output.	100	pulse	0 to 10000
	7	PG1	Position loop gain 1 Used to set the gain of position loop 1. Increase the gain to improve tracking performance in response to the position command.	35	rad/s	4 to 2000
	8	*ZTY	Zeroing type Used to set the zeroing system, zeroing direction and proximity dog input polarity. 	0013		0000h to 0117h
	9	ZRF	Zeroing speed Used to set the motor speed for zeroing.	500	r/min	0 to Max. speed
	10	CRF	Creep speed Used to set the creep speed after proximity dog detection.	10	r/min	0 to Max. speed
	11	ZST	Zero shift distance Used to set the shift distance starting at the Z-phase pulse detection position inside the encoder.	0	um	0 to Max. speed

<table>
<tr><th>Class</th><th>No.</th><th>Symbol</th><th>Name and Function</th><th>Initial Value</th><th>Unit</th><th>Setting Range</th></tr>
<tr><td></td><td>12</td><td>CRP</td><td>Rough match output range
Used to set the command remaining distance range where the rough match (CPO) signal is output.</td><td>0</td><td>×10STM
μm</td><td>0
to
65535</td></tr>
<tr><td></td><td>13</td><td>JOG</td><td>Jog speed
Used to set the jog speed command.</td><td>100</td><td>r/min</td><td>0
to
Max. speed</td></tr>
<tr><td></td><td>14</td><td>*STC</td><td>S-pattern acceleration/deceleration time constant
Set when inserting an S-pattern time constant into the acceleration/deceleration time constant of the point table.
This time constant is invalid for zeroing.</td><td>0</td><td>ms</td><td>0
to
100</td></tr>
<tr><td></td><td>15</td><td>*SNO</td><td>RS-485 station number setting
Used to specify the station number for RS-485 multidrop communication.
Always set one station to one axis of servo amplifier. If one station number is set to two or more stations, normal communication cannot be made.</td><td>0</td><td>station</td><td>0
to
31</td></tr>
<tr><td></td><td>16</td><td>*BPS</td><td>Alarm history clear
Used to alarm history clear.
 
RS-422/RS-232C baudrate selection
0: 9600 [bps]
1: 19200 [bps]
2: 38400 [bps]
3: 57600 [bps]
4: 4800 [bps] (for MR-DP60)
Alarm history clear
0: Invalid (not cleared)
1: Valid (cleared)
When alarm history clear is made valid, the Alarm history is cleared at next power-on.
After the alarm history is cleared, the setting is automatically made invalid (reset to 0)
Serial communication I/F selection
0: RS-232C
1: RS-422
Communication response delay time
0: Invalid, reply sent in less than 400us
1: Valid, reply sent in 888us or more</td><td>0000</td><td></td><td>0000h
to
1214h</td></tr>
<tr><td></td><td>17</td><td>MOD</td><td>For manufacturer setting
 

<table><tr><th>Setting</th><th colspan="2">Analog Monitor Output Selection</th></tr><tr><th></th><th>Ch2</th><th>Ch1</th></tr><tr><td>0</td><td colspan="2">Servo motor sped (+/- 8V/max. speed)</td></tr><tr><td>1</td><td colspan="2">Generated torque (+/- 8V/max. torque)</td></tr><tr><td>2</td><td colspan="2">Motor speed (+8V/max. torque)</td></tr><tr><td>3</td><td colspan="2">Generated torque (+8V/max. torque)</td></tr><tr><td>4</td><td colspan="2">Current command (+/- 8V/max. current command)</td></tr><tr><td>5</td><td colspan="2">Speed command (+/- 8V/max. speed)</td></tr><tr><td>6</td><td colspan="2">Droop pulses (+/-10V/128 pulses)</td></tr><tr><td>7</td><td colspan="2">Droop pulses (+/- 10V/2048 pulses)</td></tr><tr><td>8</td><td colspan="2">Droop pulses (+/- 10V/8192 pulses)</td></tr><tr><td>9</td><td colspan="2">Droop pulses (+/- 10V/32768 pulses)</td></tr><tr><td>A</td><td colspan="2">Droop pulses (+/- 10V/131072 pulses)</td></tr><tr><td>B</td><td colspan="2">Bus voltage (+8V / 400V)</td></tr></table></td><td>0100</td><td></td><td>0000h
to
4B4Bh</td></tr>
</table>

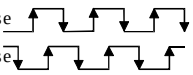
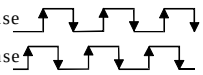
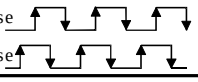
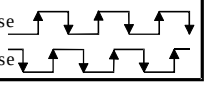
<table>
<tr><th>Class</th><th>No.</th><th>Symbol</th><th>Name and Function</th><th>Initial Value</th><th>Unit</th><th>Setting Range</th></tr>
<tr><td rowspan="2">Basic parameters</td><td>18</td><td>*DMD</td><td>Status display selection
Used to select the status display shown at power-on .
 
Status display shown at power-on
00: Current position
01: Command position
02: Command remaining distance
03: Point table No.
04: Cumulative feedback pulses
05: Motor speed
06: Droop pulses
07: Override voltage
08: Limiting torque voltage
09: Regenerative load ratio
0A: Effective load ratio
0B: Peak load ratio
0C: Instantaneous torque
0D: Within one-revolution position (low)
0E: Within one-revolution position (high)
0F: ABS counter
10: Load inertia moment ratio
11: Bus voltage</td><td>0000</td><td></td><td>0000h
to
1F1Fh</td></tr>
<tr><td>19</td><td>*BLK</td><td>Parameter block
Used to select the reference and write ranges of the parameters.
<table><tr><th rowspan="2">Set Value</th><th rowspan="2">Operation</th><th colspan="4">Parameter No.</th></tr><tr><th>#00 to #18</th><th>#19</th><th>#20 to #53</th><th>#54 to #90</th></tr><tr><td rowspan="2">0000 (Initial value)</td><td>Reference</td><td>○</td><td>○</td><td>×</td><td>×</td></tr><tr><td>Write</td><td>○</td><td>○</td><td>×</td><td>×</td></tr><tr><td rowspan="2">000A</td><td>Reference</td><td>×</td><td>○</td><td>×</td><td>×</td></tr><tr><td>Write</td><td>×</td><td>○</td><td>×</td><td>×</td></tr><tr><td rowspan="2">000B</td><td>Reference</td><td>○</td><td>○</td><td>○</td><td>×</td></tr><tr><td>Write</td><td>○</td><td>○</td><td>×</td><td>×</td></tr><tr><td rowspan="2">000C</td><td>Reference</td><td>○</td><td>○</td><td>○</td><td>×</td></tr><tr><td>Write</td><td>○</td><td>○</td><td>○</td><td>×</td></tr><tr><td rowspan="2">000E</td><td>Reference</td><td>○</td><td>○</td><td>○</td><td>○</td></tr><tr><td>Write</td><td>○</td><td>○</td><td>○</td><td>○</td></tr></table></td><td>0000</td><td></td><td>0000h
to
FFFFh</td></tr>
</table>

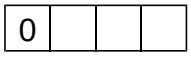
Class	No.	Symbol	Name and Function	Initial Value	Unit	Setting Range
Expansion parameters	20	*OP2	Function selection 2 Used to select slight vibration suppression control.  	0000		0000h to 1111h
	21	*OP3	For manufacturer setting	0002		
	22	*OP4	Function selection 4  	0000		0000h to 0001h
	23	*SIC	Serial communication time-out selection Used to choose the time-out period of communication protocol 0 means not time-out check.	0	s	0 to 60
	24	FFC	Feed forward gain Used to set the feed forward gain. When it is set to 100%, droop pulses will not be generated in constant speed operation. Note that sudden acceleration/deceleration will increase overshoot.	0	%	0 to 100
	25	VCO	Override offset Used to set the offset voltage to analog override.	0	mV	-999 to 999
	26	TL0	Torque limit offset Used to set the offset voltage to analog torque limit.	0	mV	-999 to 999
	27	*ENR	Encoder output pulses Used to set the encoder pulses (A-phase, B-phase) output by the servo amplifier. Set the value 4 times greater than the A-phase or B-phase pulses. You can use parameter No. 58 to choose the output pulse setting or output division ratio setting. The number of A/B-phase pulses actually output is 1/4 times greater than the preset number of pulses. The maximum output frequency is 1.3Mpps (after multiplication by 4). Use this parameter within this range.	4000	pulse	1 to 65535

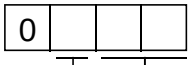
Class	No.	Symbol	Name and Function	Initial Value	Unit	Setting Range
	28	TL1	Internal torque limit 1 Used to limit servo motor-generated torque on the assumption that the maximum torque is 100%. When 0 is set, torque is not produced. This setting value will be 8V for torque monitor in monitor output.	100	%	0 to 100
	29	TL2	Internal torque limit 2 Used to limit servo motor-generated torque on the assumption that the maximum torque is 100%. When 0 is set, torque is not produced. Made valid by switching on the internal torque limit selection signal.	100	%	0 to 100
	30	*BKC	Backlash compensation Used to set the backlash compensation made when the command direction is reversed. This function compensates for the number of backlash pulses in the opposite direction to the zeroing direction. In the absolute position detection system, this function compensates for the backlash pulse count in the direction opposite to the operating direction at power-on.	0	pulse	0 to 1000
	31	MO1	Analog monitor ch1 offset Used to set the offset voltage of the analog monitor ch1 output (MO1).	0	mV	-999 to 999
	32	MO2	Analog monitor ch2 offset Used to set the offset voltage of the analog monitor ch2 output (MO2)	0	mV	-999 to 999
	33	MBR	Electromagnetic brake sequence output Used to set the delay time between when the electromagnetic brake interlock signal (MBR) switches off and when the base circuit is shut off.	100	ms	0 to 1000
	34	GD2	Ratio of load inertia moment to motor inertia moment: Used to set the ratio of the load inertia moment to the servo motor shaft inertia moment. When auto tuning is selected, the result of auto tuning is automatically set.	70	×0.1 times	0 to 3000
	35	PG2	Position loop gain 2 Used to set the gain of the position loop. Set this parameter to increase the position response level to load disturbance. Higher setting increases the response level but is liable to generate vibration and/or noise. When auto tuning is selected, the result of auto tuning is automatically set.	35	rad/s	1 to 1000
	36	VG1	Speed loop gain 1 Normally this parameter setting need not be changed. Higher setting increases the response level but is liable to generate vibration and/or noise. When auto tuning is selected, the result of auto tuning is automatically set.	177	rad/s	20 to 8000
	37	VG2	Speed loop gain 2 Set this parameter when vibration occurs on machines of low rigidity or large backlash. Higher setting increases the response level but is liable to generate vibration and/or noise. When auto tuning is selected, the result of auto tuning is automatically set.	817	rad/s	20 to 20000
	38	VIC	Speed integral compensation Used to set the integral time constant of the speed loop. When auto tuning is selected, the result of auto tuning is automatically set.	48	ms	1 to 1000
	39	VDC	Speed differential compensation Used to set the differential compensation. Made valid when the proportion control signal is switched on.	980		0 to 1000

Class	No.	Symbol	Name and Function	Initial Value	Unit	Setting Range
	40	OVA	For manufacturing setting	0		
	41			0		
	42	*ZPS	Zeroing position data Used to set the current position on completion of zeroing.	0	$\times 10^{S}$ TMμm	−32768 to 32767
	43	DCT	Moving distance after proximity dog Used to set the moving distance after proximity dog in count type zeroing.	1000	$\times 10^{S}$ TMμm	0 to 65535
	44	ZTM	Stopper type zeroing stopper time In stopper type zeroing, used to set the time from when the machine part is pressed against the stopper and the torque limit set in parameter No.45(ZTT) is reached to when the home position is set.	100	ms	5 to 1000
	45	ZTT	Stopper type zeroing torque limit Used to set the torque limit value relative to the max. torque in [%] in stopper type zeroing.	15	%	1 to 100
	46 47	＊LMP	Software limit + Used to set the address increment side software stroke limit. The software limit is made invalid if this value is the same as in "software limit −". Set the same sign to parameters No.46 and 47. Setting of different signs will result in a parameter error. Set address:□□□□□□ Upper 3 digits / Lower 3 digits Parameter No. 47 Parameter No. 46	0	$\times 10^{ST}$ Mμm	−999999 to 999999
	48 49	＊LMN	Software limit − Used to set the address decrement side software stroke limit. The software limit is made invalid if this value is the same as in "software limit +". Set the same sign to parameters No.48 and 49. Setting of different signs will result in a parameter error. Set address: □□□□□□ Upper 3 digits / Lower 3 digits Parameter No. 49 Parameter No. 48	0	$\times 10^{ST}$ Mμm	−999999 to 999999
	50 51	＊LPP	Position range output address + Used to set the address increment side position range output address. Set the same sign to parameters No.50 and 51. Setting of different signs will result in a parameter error. Set address:□□□□□□ Upper 3 digits / Lower 3 digits Parameter No. 51 Parameter No. 50	0	$\times 10^{ST}$ Mμm	−999999 to 999999

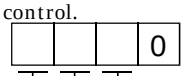
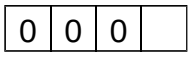
<table>
<tr><th>Class</th><th>No.</th><th>Symbol</th><th>Name and Function</th><th>Initial Value</th><th>Unit</th><th>Setting Range</th></tr>
<tr><td></td><td>52
53</td><td>∗LNP</td><td>Position range output address −
Used to set the address decrement side position range output address. Set the same sign to parameters No.52 and 53. Setting of different signs will result in a parameter error.
Set address:□□□□□□
Upper 3 digits
Lower 3 digits
Parameter No. 53
Parameter No. 52</td><td>0</td><td>×10STM
μm</td><td>−999999
to
999999</td></tr>
<tr><td></td><td>54</td><td>*OP5</td><td>For manufacturer setting</td><td>0000</td><td></td><td></td></tr>
<tr><td></td><td>55</td><td>*OP6</td><td>Optional function 6
Servo on response in alarm reset operation.
Used to select the operation to be performed when the alarm reset signal switches on.
0 _ 0 0
Operation to be performed when the alarm reset signal switches on
0: Base circuit not switched off
1: Base circuit switched off</td><td>0000</td><td></td><td>0000h
to
1111h</td></tr>
<tr><td></td><td>56</td><td>*OP7</td><td>Optional function 7
Used to select the current position display mode.
_ _ 0 0
Electric gear cal. error clear selection
0: Invalid
1: Valid
Current position / Commanded position display selection
0: Display of positioning
1: Display of role feeding
<table>
<tr><th colspan="2">Item</th><th>Display of positioning</th><th>Display of role feeding</th></tr>
<tr><td rowspan="2">Automatic operation mode</td><td>Current position</td><td>Display actual position from machine home position</td><td>Display actual position from power on</td></tr>
<tr><td>Commanded position</td><td>Display commanded position from machine home position</td><td>Display target position in stop motion.
Count start from 0 at start signal turned on.
And display commanded position till target position</td></tr>
<tr><td rowspan="2">Manual operation</td><td>Current position</td><td>Display commanded position from machine home position</td><td>Display target position in stop motion.
Count start from 0 at start signal turned on.
And display commanded position till target position</td></tr>
<tr><td>Commanded position</td><td>Display commanded position from machine home position</td><td>Display target position in stop motion.
And display selected position data at start signal turned on.</td></tr>
</table></td><td>0000</td><td></td><td>0000h
to
1111h</td></tr>
</table>

<table>
<tr><th>Class</th><th>No.</th><th>Symbol</th><th>Name and Function</th><th>Initial Value</th><th>Unit</th><th>Setting Range</th></tr>
<tr><td rowspan="4">Expansion parameters</td><td>57</td><td>*OP8</td><td>Function selection 8
Used to select the protocol of serial communication.
0 _ _ 0
Protocol checksum selection
0: Yes (checksum added)
1: No (checksum not added)
Protocol checksum selection
0: With station numbers
1: No station numbers</td><td>0000</td><td></td><td>0000h
to
1112h</td></tr>
<tr><td>58</td><td>*OP9</td><td>Function selection 9
Use to select the command pulse rotation direction, encoder output pulse direction and encoder pulse output setting.
_ _ 0 _
Servo motor rotation direction changing
Changes the servo motor rotation direction for the input pulse train.
<table><tr><th rowspan="2">Set value</th><th colspan="2">Servo motor rotation direction</th></tr><tr><th>At forward rotation pulse input (Note)</th><th>At reverse rotation pulse input (Note)</th></tr><tr><td>0</td><td>CCW</td><td>CW</td></tr><tr><td>1</td><td>CW</td><td>CCW</td></tr></table>Encoder pulse output phase changing
Changes the phases of A, B-phase encoder pulses output .
<table><tr><th rowspan="2">Set value</th><th colspan="2">Servo motor rotation direction</th></tr><tr><th>CCW</th><th>CW</th></tr><tr><td>0</td><td>  </td><td>  </td></tr><tr><td>1</td><td>  </td><td>  </td></tr></table>Encoder output pulse setting selection (refer to parameter No. 27)
0: Output pulse setting
1: Division ratio setting</td><td>0000</td><td></td><td>0000h
to
1101h</td></tr>
<tr><td>59</td><td>*OPA</td><td>Function selection A
Alarm code output function selection
_ 0 0 0
Alarm code output
0: Invalid
1: Valid</td><td>0000</td><td></td><td>0000h
to
0211h</td></tr>
<tr><td>60</td><td></td><td>For manufacture setting</td><td>0000</td><td></td><td></td></tr>
</table>

<table>
<tr><th>Class</th><th>No.</th><th>Symbol</th><th>Name and function</th><th>Initial value</th><th>Unit</th><th>Setting range</th></tr>
<tr><td></td><td>61</td><td>NH1</td><td>Machine resonance suppression filter 1
Used to selection the machine resonance suppression filter.
 

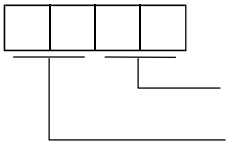
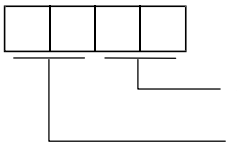
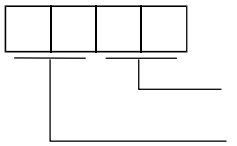
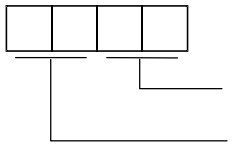
<table><tr><th>Setting value</th><th>Frequency</th><th>Setting value</th><th>Frequency</th><th>Setting value</th><th>Frequency</th><th>Setting value</th><th>Frequency</th></tr><tr><td>00</td><td>Invalid</td><td>08</td><td>562.5</td><td>10</td><td>281.3</td><td>18</td><td>187.5</td></tr><tr><td>01</td><td>4500</td><td>09</td><td>500</td><td>11</td><td>264.7</td><td>19</td><td>180</td></tr><tr><td>02</td><td>2250</td><td>0A</td><td>450</td><td>12</td><td>250</td><td>1A</td><td>173.1</td></tr><tr><td>03</td><td>1500</td><td>0B</td><td>409.1</td><td>13</td><td>236.8</td><td>1B</td><td>166.7</td></tr><tr><td>04</td><td>1125</td><td>0C</td><td>375</td><td>14</td><td>225</td><td>1C</td><td>160.1</td></tr><tr><td>05</td><td>900</td><td>0D</td><td>346.2</td><td>15</td><td>214.3</td><td>1D</td><td>155.2</td></tr><tr><td>06</td><td>750</td><td>0E</td><td>321.4</td><td>16</td><td>204.5</td><td>1E</td><td>150</td></tr><tr><td>07</td><td>642.9</td><td>0F</td><td>300</td><td>17</td><td>195.7</td><td>1F</td><td>145.2</td></tr></table>Notch depth selection
<table><tr><th>Setting value</th><th>Depth</th><th>Gain</th></tr><tr><td>0</td><td rowspan="4">Deep
to
Shallow</td><td>−40dB</td></tr><tr><td>1</td><td>−14dB</td></tr><tr><td>2</td><td>−8dB</td></tr><tr><td>3</td><td>−4dB</td></tr></table></td><td>0000</td><td></td><td>.0000h
to
031Fh</td></tr>
<tr><td></td><td>62</td><td>NH2</td><td>Machine resonance suppression filter 2
Used to set the machine resonance suppression filter.
 

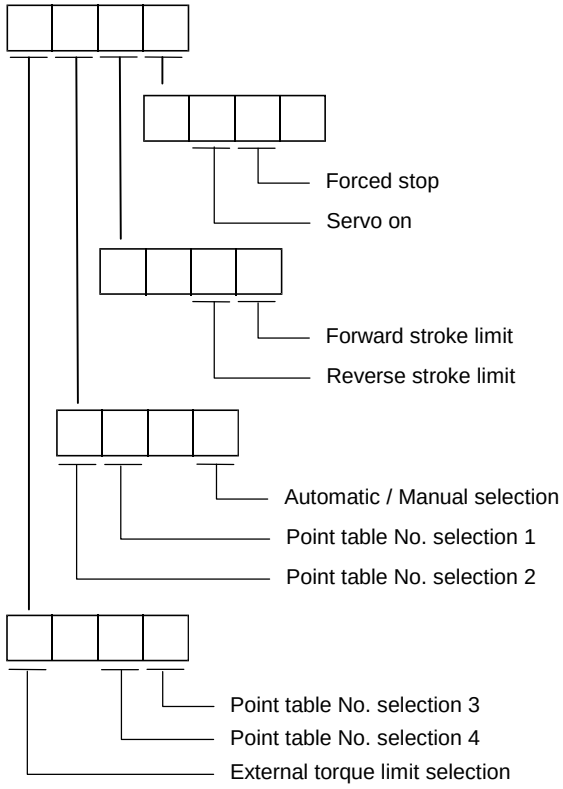
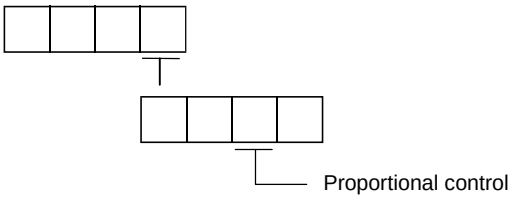
Notch frequency
Same setting as in parameter No. 61
However, you need not set "00" if you have set adaptive vibration suppression control to be "valid" or "held".
Notch depth
Same setting as in parameter No. 61</td><td>0000</td><td></td><td>0000h
to
031Fh</td></tr>
</table>

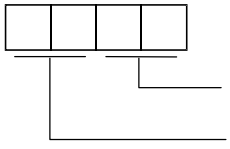
Class	No.	Symbol	Name and function	Initial value	Unit	Setting range
	63	LPF	Low-pass filter/adaptive vibration suppression control Used to selection the low-pass filter and adaptive vibration suppression control.  Low-pass filter selection 0: Valid (Automatic adjustment) 1: Invalid When you choose "valid", $\frac{\text{VG2 setting} \times 10}{2\pi(1+\text{GD2 setting} \times 0.1)}$ [Hz] bandwidth filter is set automatically. Adaptive vibration suppression control selection Choosing "valid" or "held" in adaptive vibration suppression control selection makes the machine resonance control filter 1 (parameter No. 58) invalid. 0: Invalid 1: Valid Machine resonance frequency is always detected and the filter is generated in response to resonance to suppress machine vibration. 2: Held The characteristics of the filter generated so far are held, and detection of machine resonance is stopped. Adaptive vibration suppression control sensitivity selection Used to set the sensitivity of machine resonance detection. 0: Normal 1: Large sensitivity	0000		0000h to 1217h
	64	GD2B	Ratio of load inertia moment to servo motor inertia moment 2 Used to set the ratio of load inertia moment to servo motor inertia moment when gain changing is valid.	70	×0.1 times	0 to 3000
	65	PG2B	Position control gain 2 changing ratio Used to set the ratio of changing the position control gain 2 when gain changing is valid. Made valid when auto tuning is invalid.	100	%	10 to 200
	66	VG2B	Speed control gain 2 changing ratio Used to set the ratio of changing the speed control gain 2 when gain changing is valid. Made valid when auto tuning is invalid.	100	%	10 to 200
	67	VICB	Speed integral compensation changing ratio Used to set the ratio of changing the speed integral compensation when gain changing is valid. Made valid when auto tuning is invalid.	100	%	50 to 1000
	68	*CDP	Gain changing selection Used to select the gain changing condition.  Gain changing selection Gains are changed in accordance with the settings of parameters No. 64 to 67 under any of the following conditions: 0: Invalid 1: Gain changing (CDP) signal is ON 2: Command frequency is equal to higher than parameter No. 69 setting 3: Droop pulse value is equal to higher than parameter No. 69 setting 4: Servo motor speed is equal to higher than parameter No. 69 setting	0000		0000h to 0004h

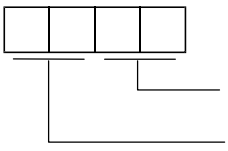
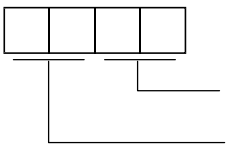
Class	No.	Symbol	Name and function	Initial value	Unit	Setting range
	69	CDS	Gain changing condition Used to set the value of gain changing condition (command frequency, droop pulses, servo motor speed) selected in parameter No. 68.The set value unit changes with the changing condition item.	10	kpps pulse r/min	0 to 9999
	70	CDT	Gain changing time constant Used to set the time constant at which the gains will change in response to the conditions set in parameters No. 68 and 69.	1	ms	0 to 100
	71	VPI	For manufacture setting	100		
	72	VLI		10000		
	73	ERZ		10		
	74	ER2		10		
	75	SRT		100		
	76	TRT		100		
	77	DBT		100		
	78	*DI0	Input / Output device selection Used to select the CN1A-19 pin to output or input device 0 0 0 [ ] CN1A-19 pin 0: Output device 1: Input device	0000		0000h to 0001h
	79	*DI1	Input device selection 1 Used to select the function of CN1A-8 pin and CN1A-19 pin [ ] [ ] [ ] [ ] Set to the function of CN1A-8 pin Set to the function of CN1A-19 pin	0009		0000h to 1F1Fh

Setting	Input function	Setting	Input function
00	No function	17	Gain changing selection
01	Forced stop	18	
02	Servo on	19	
03	Alarm reset	1A	
04	FWD stroke limit	1B	
05	REV stroke limit	1C	
06	FWD rotation start	1D	
07	REV rotation start	1E	
08	Auto. / Manu.	1F	
09		20	
0A	Point table # selection 1	21	
0B	Point table # selection 2	22	
0C	Point table # selection 3	23	
0D	Point table # selection 4	34	
0E		25	
0F	External torque limit	26	
10	Internal torque limit	27	
11	Proportional control	28	
12	Temp. stop / Restart	29	
13		2A	
14		2B	
15	Point table # selection 5	2C	
16		2D	

Class	No.	Symbol	Name and Function	Initial Value	Unit	Setting Range
	80	*DI2	Input device selection 2 Used to select the function of CN1B-5 pin and CN1B-7 pin  	080A		0000h to 1F1Fh
	81	*DI3	Input device selection 3 Used to select the function of CN1B-8 pin and CN1B-9 pin  	0706		0000h to 1F1Fh
	82	*DI4	Input device selection 4 Used to select the function of CN1B-14 pin and CN1B-15 pin  	020B		0000h to 1F1Fh
	83	*DI5	Input device selection 5 Used to select the function of CN1B-16 pin and CN1B-17 pin  	0504		0000h to 1F1F

Class	No.	Symbol	Name and Function	Initial Value	Unit	Setting Range
	84	*DI6	Input device selection 6 Used to set automatically ON of function device  	0002		0000h to FFFFh
	85	*DI7	Input device selection 7 Used to set automatically ON of function device  	0000		0000h to FFFFh

<table>
<tr><th>Class</th><th>No.</th><th>Symbol</th><th>Name and Function</th><th>Initial Value</th><th>Unit</th><th>Setting Range</th></tr>
<tr><td></td><td>86</td><td>*DO1</td><td>Output device selection 1
Used to select the function of CN1A-18 pin and CN1A-19 pin
 

<table><tr><th>Setting</th><th>Input function</th><th>Setting</th><th>Input function</th></tr><tr><td>00</td><td>No function</td><td>15</td><td></td></tr><tr><td>01</td><td>Ready</td><td>16</td><td></td></tr><tr><td>02</td><td>Trouble</td><td>17</td><td></td></tr><tr><td>03</td><td>In position</td><td>18</td><td></td></tr><tr><td>04</td><td>Rough mach</td><td>19</td><td></td></tr><tr><td>05</td><td>Zeroing complete</td><td>1A</td><td></td></tr><tr><td>06</td><td>Electro magnetic brake</td><td>1B</td><td></td></tr><tr><td>07</td><td>Dynamic brake interlock</td><td>1C</td><td></td></tr><tr><td>08</td><td>Position range output</td><td>1D</td><td></td></tr><tr><td>09</td><td>Warning output</td><td>1E</td><td></td></tr><tr><td>0A</td><td>Battery warning</td><td>1F</td><td></td></tr><tr><td>0B</td><td>In torque limit</td><td>20</td><td></td></tr><tr><td>0C</td><td>In temporally stop</td><td>21</td><td></td></tr><tr><td>0D</td><td>Moving complete</td><td>22</td><td></td></tr><tr><td>0E</td><td>Point table # output 1</td><td>23</td><td></td></tr><tr><td>0F</td><td>Point table # output 2</td><td>24</td><td></td></tr><tr><td>10</td><td>Point table # output 3</td><td>25</td><td></td></tr><tr><td>11</td><td>Point table # output 4</td><td>26</td><td></td></tr><tr><td>12</td><td>Point table # output 5</td><td>27</td><td></td></tr><tr><td>13</td><td></td><td>28</td><td></td></tr><tr><td>14</td><td></td><td>29</td><td></td></tr></table></td><td>0005</td><td></td><td>0000h
to
1F1Fh</td></tr>
<tr><td></td><td>87</td><td>*DO2</td><td>Output device selection 2
Used to select the function of CN1B-6 pin and CN1B-4 pin
 
</td><td>0304</td><td></td><td>0000h
to
0F0Fh</td></tr>
<tr><td></td><td>88</td><td>*DO3</td><td>Output device selection 3
Used to select the function of CN1B-18 pin and CN1B-19 pin
 
</td><td>0102</td><td></td><td>0000h
to
0F0Fh</td></tr>
<tr><td></td><td>89</td><td></td><td>For manufacture setting</td><td>0</td><td></td><td></td></tr>
<tr><td></td><td>90</td><td></td><td></td><td>0</td><td></td><td></td></tr>
</table>

8. Communication Functions

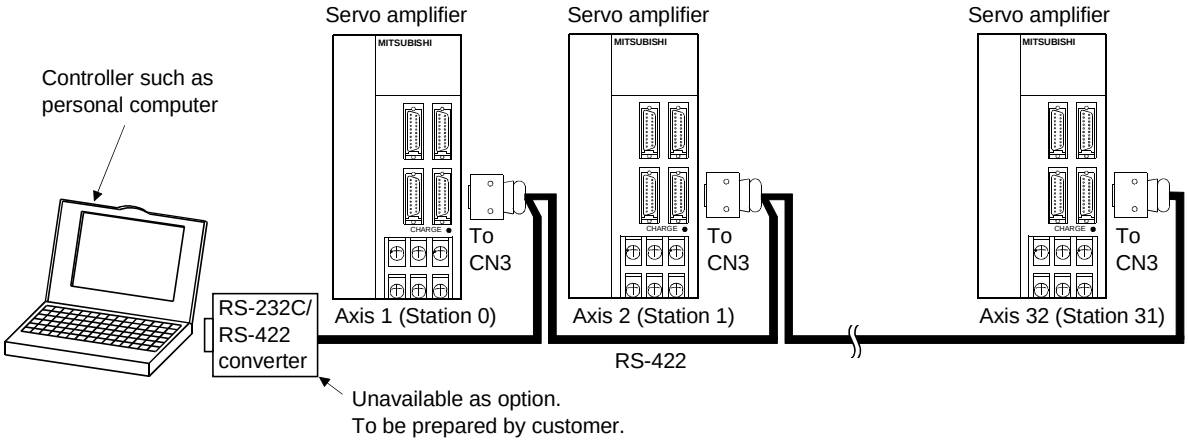
The MR-J2S-A-S061 has the RS-422 and RS-232C serial communication functions. These functions can be used to perform servo operation, parameter changing, monitor function, etc.
However, the RS-422 and RS-232C communication functions cannot be used together. Select between RS-422 and RS-232C with parameter No.16.

8.1 Configuration

8.1.1 RS-422 configuration

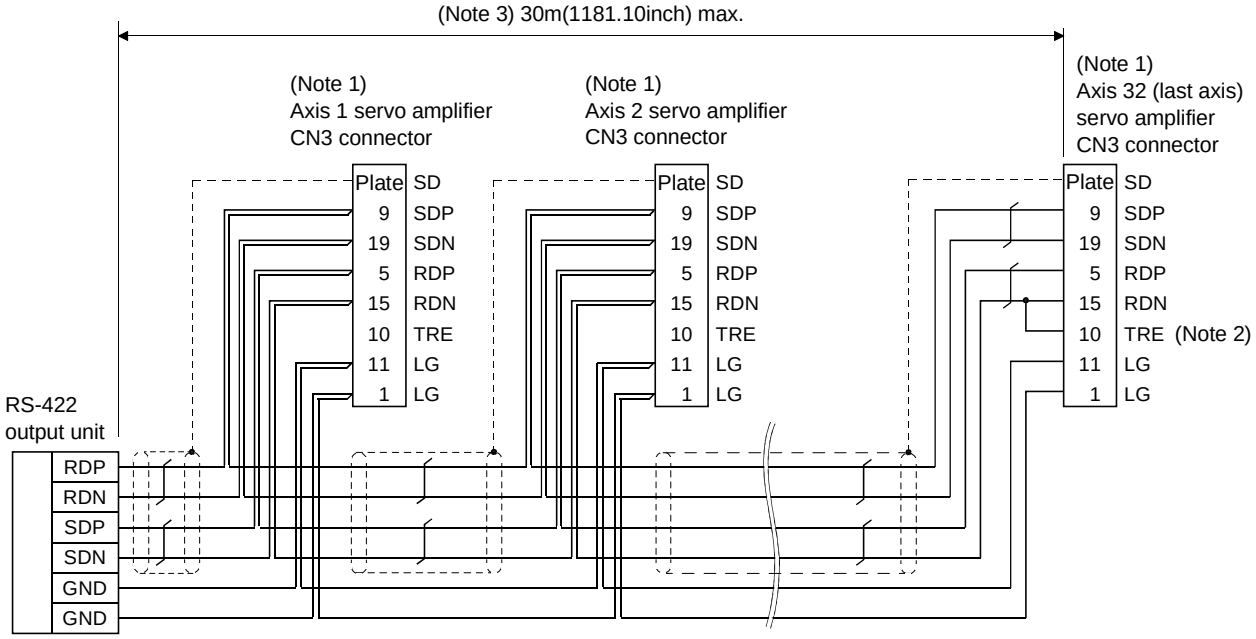
(1) Outline

Up to 32 axes of servo amplifiers from stations 0 to 31 can be operated on the same bus.



(2) Cable connection diagram

Wire as shown below:

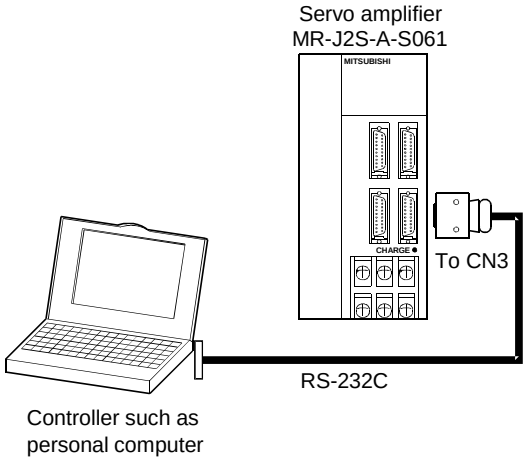


Note: 1. 3M's CN3 connector
Connector: 10120-3000VE
Shell kit: 10320-52F0-008
2. In the last axis, connect TRE and RDN.
3. 30m(1181.10inch) max. in environment of little noise.

8.1.2 RS-232C configuration

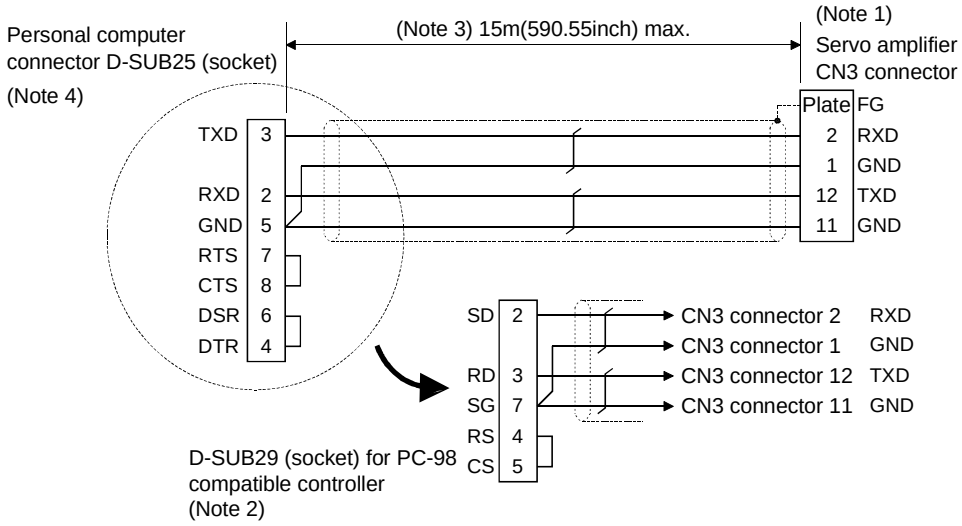
(1) Outline

A single axis of servo amplifier is operated.



(2) Cable connection diagram

Wire as shown below. The communication cable for connection with the personal computer (MR-CPCATCBL3M) is available.



Note: 1. 3M's CN3 connector

Connector: 1020-3000VE

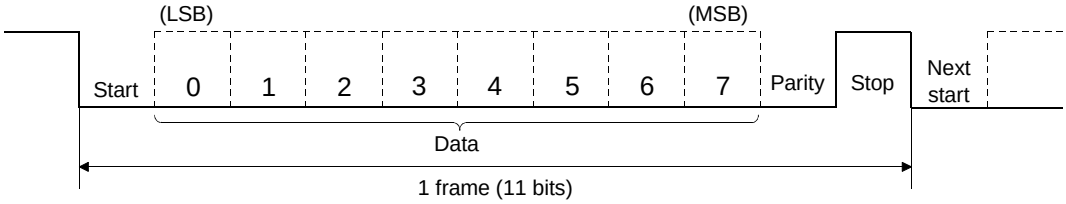
Shell kit: 10320-52F0-008

2. For the PC-98 series. The PC-98 series also has the half-pitch type.
3. 15m (590.55inch) max. in environment of little noise.
4. For the PC-AT compatible.

8.2 Communication specifications

The MELSERVO-J2S series is designed to send a reply on receipt of an instruction. The device which gives this instruction (e.g. personal computer) is called a master station and the device which sends a reply in response to the instruction (e.g. MR-J2S-A-S061 servo amplifier) is called a slave station. When fetching data successively, the master station repeatedly commands the slave station to send data.

Item	Description
Baudrate	9.6k/19.2k/38.4k/57.6k asynchronous system
Transfer code	Start bit : 1 bit Data bit : 8 bits Parity bit : 1 bit (even) Stop bit : 1 bit
Transfer protocol	Character system, half-duplex communication system



8.2.1 Parameter setting

When the RS-422/RS-232C communication function is used to operate the servo, choose the communication specifications with parameter No.16.

(1) Communication baudrate

Choose the communication speed. Match this value to the communication speed of the sending end (master station).

(2) Checksum

The checksum added to data can be deleted. When the checksum is not needed for the communication specifications of the master station, delete the checksum at parameter No.57

(3) RS-422/RS-232C serial interface selection

Select the RS-422 or RS-232C communication standard. RS-422 and RS-232C cannot be used together.

Parameter No. 16

—		—	—

RS-422/RS-232C communication standard selection
0: RS-422 used
1: RS-232C used

(4) Communication delay time

Set the time from when the servo amplifier (slave station) receives communication data to when it sends back data. Set "0" to send back data in less than 888μs or "1" to send back data in 888μs or more.

Parameter No. 16

	—	—	—

Communication delay time
0: Invalid, reply sent in less than 888μs
1: Valid, reply sent in 888μs or more

(5) Serial communication time-out

No communication for a given period of time between the master and slave stations may be judged as a communication cable or master station fault to stop the servo motor.

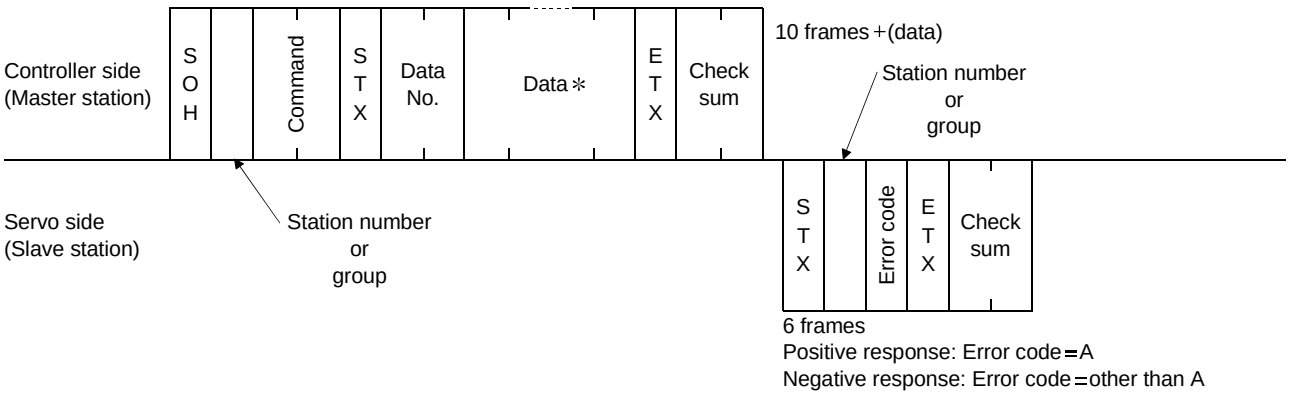
Setting	Description
0	No time-out check
1 to 60	Time-out check period setting Check period = setting (S)

8.3 Protocol

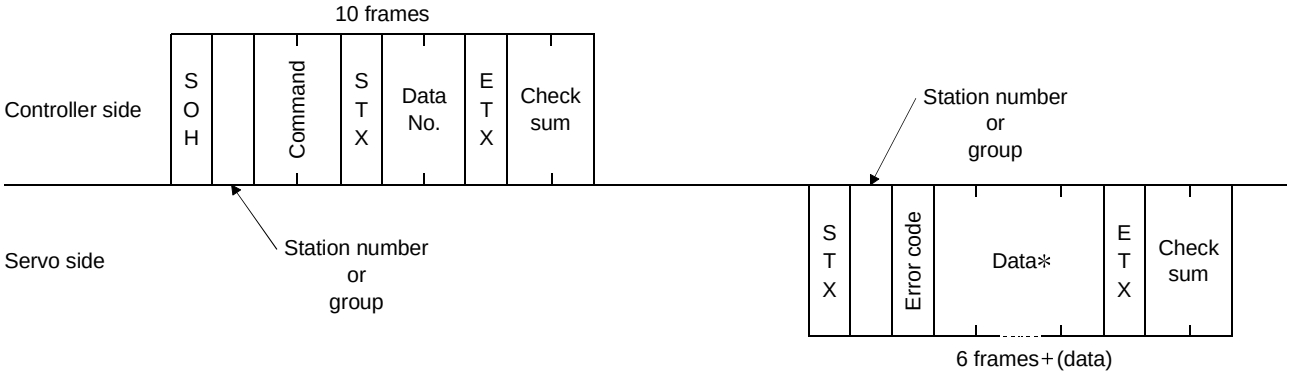
Since up to 32 axes may be connected to the bus, add a station number or group to the command, data No., etc. to determine the destination servo amplifier of data communication. Set the station number to each servo amplifier using the parameter and set the group to each station using the communication command. Transmission data is valid for the servo amplifier of the specified station number or group.

When "*" is set as the station number added to the transmission data, the transmission data is made valid for all servo amplifiers connected. However, when return data is required from the servo amplifier in response to the transmission data, set "0" to the station number of the servo amplifier which must provide the return data.

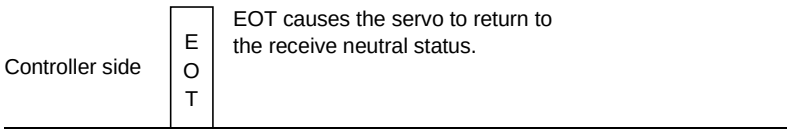
(1) Transmission of data from the controller to the servo



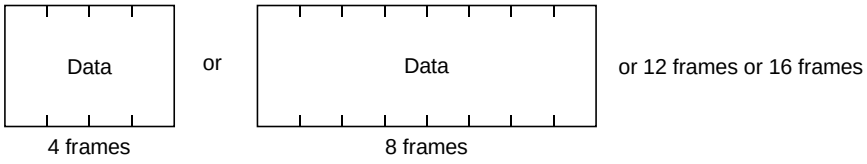
(2) Transmission of data request from the controller to the servo



(3) Recovery of communication status by time-out



∗ Data: Choose the data length from among 4, 8, 12 and 16 frames (data length depends on the command).



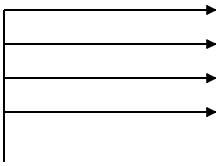
8.4 Character codes

(1) Control codes

Code Name	Hexadecimal (ASCII code)	Description	Personal Computer Terminal Key Operation (General)
SOH	01H	start of head	ctrl + A
STX	02H	start of text	ctrl + B
ETX	03H	end of text	ctrl + C
EOT	04H	end of transmission	ctrl + D

(2) Codes for data

JIS8 unit codes are used.



b_8	0	0	0	0	0	0	0	0
b_7	0	0	0	0	1	1	1	1
b_6	0	0	1	1	0	0	1	1
b_5	0	1	0	1	0	1	0	1

b_8 to b_5	b_4	b_3	b_2	b_1	C / R	0	1	2	3	4	5	6	7
	0	0	0	0	0	NUL	DLE	Space	0	@	P	`	p
	0	0	0	1	1	SOH	DC_1	!	1	A	Q	a	q
	0	0	1	0	2	STX	DC_2	"	2	B	R	b	r
	0	0	1	1	3	ETX	DC_3	#	3	C	S	c	s
	0	1	0	0	4			$	4	D	T	d	t
	0	1	0	1	5			%	5	E	U	e	u
	0	1	1	0	6			&	6	F	V	f	v
	0	1	1	1	7			'	7	G	W	g	w
	1	0	0	0	8			(	8	H	X	h	x
	1	0	0	1	9			)	9	I	Y	i	y
	1	0	1	0	10			*	:	J	Z	j	z
	1	0	1	1	11			+	;	K	[	k	{
	1	1	0	0	12			,	<	L	¥	l	|
	1	1	0	1	13			-	=	M	]	m	}
	1	1	1	0	14			.	>	N	^	n	¯
	1	1	1	1	15			/	?	O	_	o	DEL

(3) Station numbers

You may set 32 station numbers from station 0 to station 31 and the JIS8 unit codes are used to specify the stations.

Station number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
JIS8 code	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Station number	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JIS8 code	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V

For example, "30H" is transmitted in hexadecimal when the station number is "0" (first axis).

(4) Group

Group	a	b	c	d	e	f	All group
JIS8 code	a	b	c	d	e	f	*

For example, "61H" is transmitted in hexadecimal for group a.

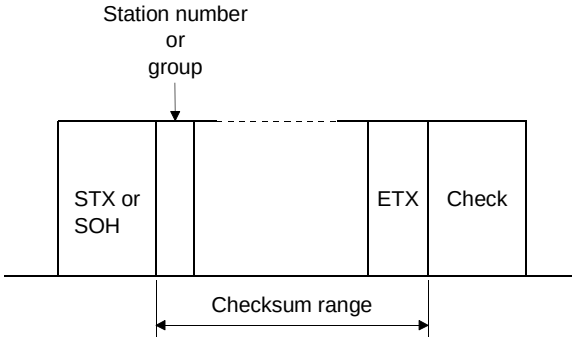
8.5 Error codes

Error codes are used in the following cases and an error code of single-code length is transmitted.
On receipt of data from the master station, the slave station sends the error code corresponding to that data to the master station. The code transmitted in uppercase indicates that the servo is normal and the one in lowercase indicates that an alarm has occurred.

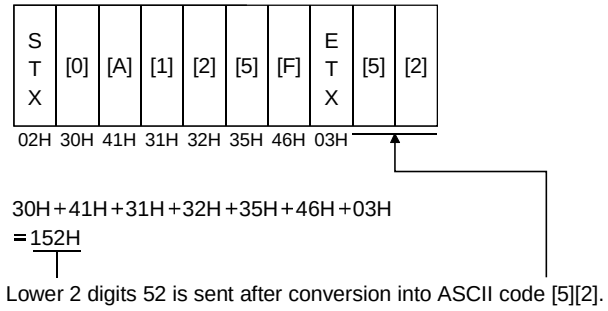
Error Code		Error Name	Description	Remarks
Servo normal	Servo alarm			
[A]	[a]	Normal operation	Data transmitted was processed properly.	Positive response
[B]	[b]	Parity error	Parity error occurred in the transmitted data.	Negative response
[C]	[c]	Checksum error	Checksum error occurred in the transmitted data.	
[D]	[d]	Character error	Character not existing in the specifications was transmitted.	
[E]	[e]	Command error	Command not existing in the specifications was transmitted.	
[F]	[f]	Data No. error	Data No. not existing in the specifications was transmitted.	

8.6 Checksum

Checksum range

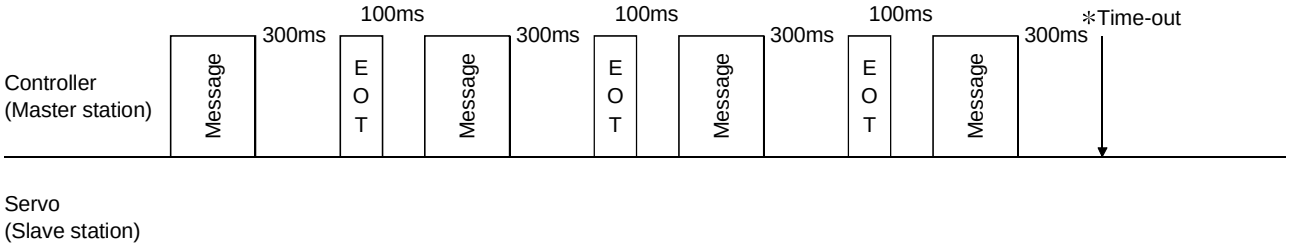


The checksum is sent as a JIS8-coded hexadecimal code representing the lower two digits of the sum of JIS8-coded hexadecimal values up to ETX, with the exception of the first control code (STX or SOH).



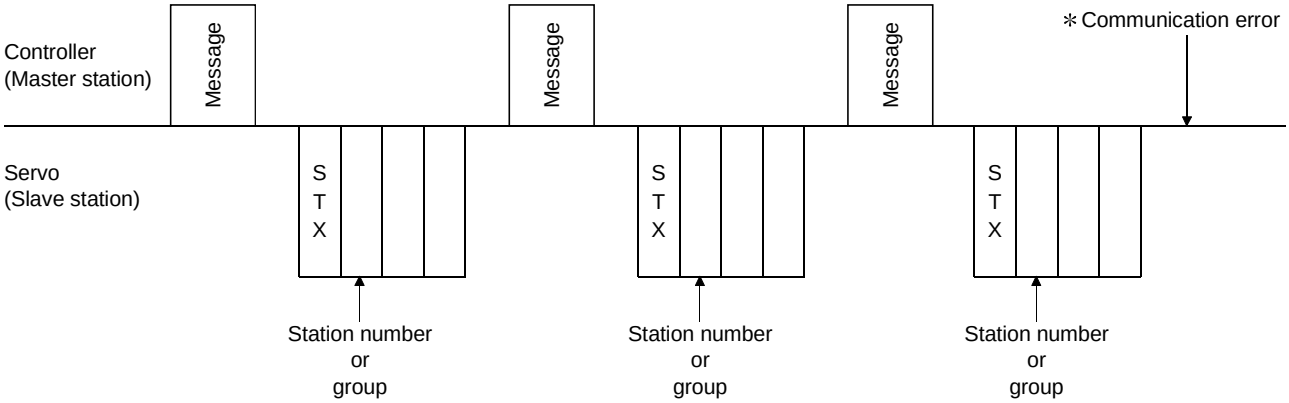
8.7 Time-out operation

The master station transmits EOT when the slave station does not start reply operation (STX is not received) 300[ms] after the master station has ended communication operation. 100[ms] after that, the master station retransmits the message. Time-out occurs if the slave station does not answer after the master station has performed the above operation three times. (Communication error)



8.8 Retry operation

When a fault occurs in communication between the master and slave stations, the error code in the response data from the slave station is a negative response code ([B] to [F], [b] to [f]). In this case, the master station retransmits the message which was sent at the occurrence of the fault (Retry operation). A communication error occurs if the above operation is repeated and results in the error three or more consecutive times.



Similarly, when the master station detects a fault (e.g. checksum, parity) in the response data from the slave station, the master station retransmits the message which was sent at the occurrence of the fault. A communication error occurs if the retry operation is performed three times.

8.9 Initialization

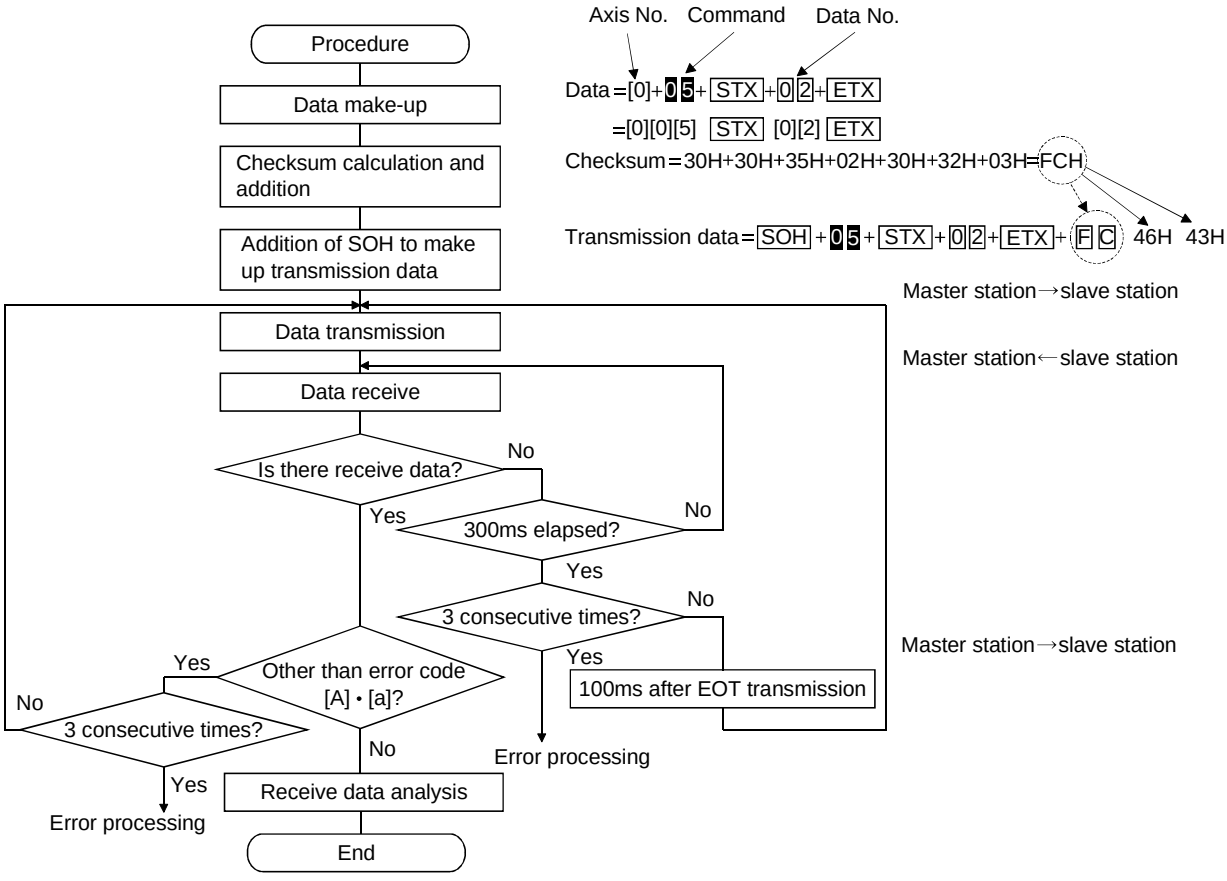
After the slave station is switched on, it cannot reply to communication until the internal initialization processing terminates. Hence, at power-on, ordinary communication should be started after:

1) 1s or more time has elapsed after the slave station is switched on; and
2) Making sure that normal communication can be made by reading the parameter or other data which does not pose any safety problems.

8.10 Communication procedure example

The following example reads the set value of parameter No.2 "function selection 1" from the servo amplifier of station 0:

Data Item	Value	Description
Station number	0	Servo amplifier station 0
Command	05	Read command
Data No.	02	Parameter No.2



8.11 Command and data No. list

8.11.1 Read commands

(1) Status display (Command [0][1])

Command	Data No.	Description	Display Item	Frame Length
[0][1]	[8][0]	Status display data value and processing information	Current position	12
[0][1]	[8][1]		Command position	12
[0][1]	[8][2]		Command remaining distance	12
[0][1]	[8][3]		Point table No.	12
[0][1]	[8][4]		Cumulative feedback pulses	12
[0][1]	[8][5]		Motor speed	12
[0][1]	[8][6]		Droop pulses	12
[0][1]	[8][7]		Override	12
[0][1]	[8][8]		Torque limit voltage	12
[0][1]	[8][9]		Regenerative load ratio	12
[0][1]	[8][A]		Effective load ratio	12
[0][1]	[8][B]		Peak load ratio	12
[0][1]	[8][C]		Instantaneous torque	12
[0][1]	[8][D]		Within one-revolution position	12
[0][1]	[8][E]		ABS counter	12
[0][1]	[8][F]		Load inertia moment ratio	12
[0][1]	[9][0]		Bus voltage	12

(2) Parameter (Command [0][5])

Command	Data No.	Description	Frame Length
[0][5]	[0][0] to [5][A]	Current value of each parameter (Decimal number of data No. corresponds to the parameter number.)	8

(3) External I/O signals (Command [1][2])

Command	Data No.	Description	Frame Length
[1][2]	[0][0]	Input device statuses	8
[1][2]	[4][0]	External input pin statuses	8
[1][2]	[6][0]	Statuses of input devices switched on through communication	8
[1][2]	[8][0]	Output device statuses	8
[1][2]	[C][0]	External output pin statuses	8

(4) Alarm history (Command [3][3])

Command	Data No.	Description	Alarm Occurrence Sequence	Frame Length
[3][3]	[1][0]	Alarm number in alarm history	Most recent alarm	4
[3][3]	[1][1]		First alarm in past	4
[3][3]	[1][2]		Second alarm in past	4
[3][3]	[1][3]		Third alarm in past	4
[3][3]	[1][4]		Fourth alarm in past	4
[3][3]	[1][5]		Fifth alarm in past	4
[3][3]	[2][0]	Alarm occurrence time in alarm history	Most recent alarm	8
[3][3]	[2][1]		First alarm in past	8
[3][3]	[2][2]		Second alarm in past	8
[3][3]	[2][3]		Third alarm in past	8
[3][3]	[2][4]		Fourth alarm in past	8
[3][3]	[2][5]		Fifth alarm in past	8

(5) Current alarm (Command [0][2]•[3][5])

Command	Data No.	Description	Frame Length
[0][2]	[0][0]	Current alarm number	4

Command	Data No.	Description	Status Display Item	Frame Length
[3][5]	[8][0]	Status display data value and processing information at alarm occurrence	Current position	12
[3][5]	[8][1]		Command position	12
[3][5]	[8][2]		Command remaining distance	12
[3][5]	[8][3]		Point table No.	12
[3][5]	[8][4]		Cumulative feedback pulses	12
[3][5]	[8][5]		Motor speed	12
[3][5]	[8][6]		Droop pulses	12
[3][5]	[8][7]		Override	12
[3][5]	[8][8]		Torque limit voltage	12
[3][5]	[8][9]		Regenerative load ratio	12
[3][5]	[8][A]		Effective load ratio	12
[3][5]	[8][B]		Peak load ratio	12
[3][5]	[8][C]		Instantaneous torque	12
[3][5]	[8][D]		Within one-revolution position	12
[3][5]	[8][E]		ABS counter	12
[3][5]	[8][F]		Load inertia moment ratio	12
[3][5]	[9][0]		Bus voltage	12

(6) Point table/position data (Command [4][0])

Command	Data No.	Description	Point table No.	Frame Length
[4][0]	[0][1]	Position data read	Point table No.1	8
[4][0]	[0][2]		Point table No.2	8
[4][0]	[0][3]		Point table No.3	8
[4][0]	[0][4]		Point table No.4	8
[4][0]	[0][5]		Point table No.5	8
[4][0]	[0][6]		Point table No.6	8
[4][0]	[0][7]		Point table No.7	8
[4][0]	[0][8]		Point table No.8	8
[4][0]	[0][9]		Point table No.9	8
[4][0]	[0][A]		Point table No.10	8
[4][0]	[0][B]		Point table No.11	8
[4][0]	[0][C]		Point table No.12	8
[4][0]	[0][D]		Point table No.13	8
[4][0]	[0][E]		Point table No.14	8
[4][0]	[0][F]		Point table No.15	8
[4][0]	[1][0]		Point table No.16	8
:	:		:	:
[4][0]	[1][F]		Point table No.31	8

(7) Point table/speed data (Command [5][0])

Command	Data No.	Description	Point table No.	Frame Length
[5][0]	[0][1]	Speed data read	Point table No.1	8
[5][0]	[0][2]		Point table No.2	8
[5][0]	[0][3]		Point table No.3	8
[5][0]	[0][4]		Point table No.4	8
[5][0]	[0][5]		Point table No.5	8
[5][0]	[0][6]		Point table No.6	8
[5][0]	[0][7]		Point table No.7	8
[5][0]	[0][8]		Point table No.8	8
[5][0]	[0][9]		Point table No.9	8
[5][0]	[0][A]		Point table No.10	8
[5][0]	[0][B]		Point table No.11	8
[5][0]	[0][C]		Point table No.12	8
[5][0]	[0][D]		Point table No.13	8
[5][0]	[0][E]		Point table No.14	8
[5][0]	[0][F]		Point table No.15	8
[5][0]	[1][0]		Point table No.16	8
:	:		:	:
[5][0]	[1][F]		Point table No.31	8

(8) Point table/acceleration time constant (Command [5][4])

Command	Data No.	Description	Point table No.	Frame Length
[5][4]	[0][1]	Acceleration time constant read	Point table No.1	8
[5][4]	[0][2]		Point table No.2	8
[5][4]	[0][3]		Point table No.3	8
[5][4]	[0][4]		Point table No.4	8
[5][4]	[0][5]		Point table No.5	8
[5][4]	[0][6]		Point table No.6	8
[5][4]	[0][7]		Point table No.7	8
[5][4]	[0][8]		Point table No.8	8
[5][4]	[0][9]		Point table No.9	8
[5][4]	[0][A]		Point table No.10	8
[5][4]	[0][B]		Point table No.11	8
[5][4]	[0][C]		Point table No.12	8
[5][4]	[0][D]		Point table No.13	8
[5][4]	[0][E]		Point table No.14	8
[5][4]	[0][F]		Point table No.15	8
[5][4]	[1][0]		Point table No.16	8
:	:		:	:
[5][4]	[1][F]		Point table No.31	8

(9) Point table/deceleration time constant (Command [5][8])

Command	Data No.	Description	Point table No.	Frame Length
[5][8]	[0][1]	Deceleration time constant read	Point table No.1	8
[5][8]	[0][2]		Point table No.2	8
[5][8]	[0][3]		Point table No.3	8
[5][8]	[0][4]		Point table No.4	8
[5][8]	[0][5]		Point table No.5	8
[5][8]	[0][6]		Point table No.6	8
[5][8]	[0][7]		Point table No.7	8
[5][8]	[0][8]		Point table No.8	8
[5][8]	[0][9]		Point table No.9	8
[5][8]	[0][A]		Point table No.10	8
[5][8]	[0][B]		Point table No.11	8
[5][8]	[0][C]		Point table No.12	8
[5][8]	[0][D]		Point table No.13	8
[5][8]	[0][E]		Point table No.14	8
[5][8]	[0][F]		Point table No.15	8
[5][8]	[1][0]		Point table No.16	8
:	:		:	:
[5][8]	[1][F]		Point table No.31	8

(10) Point table/dwell time (Command [6][0])

Command	Data No.	Description	Point table No.	Frame Length
[6][0]	[0][1]	Dwell time read	Point table No.1	8
[6][0]	[0][2]		Point table No.2	8
[6][0]	[0][3]		Point table No.3	8
[6][0]	[0][4]		Point table No.4	8
[6][0]	[0][5]		Point table No.5	8
[6][0]	[0][6]		Point table No.6	8
[6][0]	[0][7]		Point table No.7	8
[6][0]	[0][8]		Point table No.8	8
[6][0]	[0][9]		Point table No.9	8
[6][0]	[0][A]		Point table No.10	8
[6][0]	[0][B]		Point table No.11	8
[6][0]	[0][C]		Point table No.12	8
[6][0]	[0][D]		Point table No.13	8
[6][0]	[0][E]		Point table No.14	8
[6][0]	[0][F]		Point table No.15	8
[6][0]	[1][0]		Point table No.16	8
:	:		:	:
[6][0]	[1][F]		Point table No.31	8

(11) Point table/auxiliary function (Command [6][4])

Command	Data No.	Description	Point table No.	Frame Length
[6][4]	[0][1]	Auxiliary function read	Point table No.1	8
[6][4]	[0][2]		Point table No.2	8
[6][4]	[0][3]		Point table No.3	8
[6][4]	[0][4]		Point table No.4	8
[6][4]	[0][5]		Point table No.5	8
[6][4]	[0][6]		Point table No.6	8
[6][4]	[0][7]		Point table No.7	8
[6][4]	[0][8]		Point table No.8	8
[6][4]	[0][9]		Point table No.9	8
[6][4]	[0][A]		Point table No.10	8
[6][4]	[0][B]		Point table No.11	8
[6][4]	[0][C]		Point table No.12	8
[6][4]	[0][D]		Point table No.13	8
[6][4]	[0][E]		Point table No.14	8
[6][4]	[0][F]		Point table No.15	8
[6][4]	[1][0]		Point table No.16	8
:	:		:	:
[6][4]	[1][F]		Point table No.31	8

(12) Group setting (Command [1][F])

Command	Data No.	Description	Frame Length
[1][F]	[0][0]	Reading of group setting value	4

8.11.2 Write commands

(1) Status display (Command [8][1])

Command	Data No.	Description	Setting Range	Frame Length
[8][1]	[0][0]	Status display data clear	1EA5	4

(2) Parameter (Command [8][4])

Command	Data No.	Description	Setting Range	Frame Length
[8][4]	[0][0] to [5[A	Each parameter write (Decimal number of data No. corresponds to the parameter number.)	Depends on the parameter.	8

(3) External I/O signal (Command [9][2])

Command	Data No.	Description	Setting Range	Frame Length
[9][2]	[6][0]	Communication input device signal		8

(4) Alarm history (Command [8][2])

Command	Data No.	Description	Setting Range	Frame Length
[8][2]	[2][0]	Alarm history clear	1EA5	4

(5) Current alarm (Command [8][2])

Command	Data No.	Description	Setting Range	Frame Length
[8][2]	[0][0]	Alarm reset	1EA5	4

(6) Point table/position data (Command [C][0])

Command	Data No.	Description	Point table No.	Setting Range	Frame Length
[C][0]	[0][1]	Position data write	Point table No.1		8
[C][0]	[0][2]		Point table No.2		8
[C][0]	[0][3]		Point table No.3		8
[C][0]	[0][4]		Point table No.4		8
[C][0]	[0][5]		Point table No.5		8
[C][0]	[0][6]		Point table No.6		8
[C][0]	[0][7]		Point table No.7		8
[C][0]	[0][8]		Point table No.8		8
[C][0]	[0][9]		Point table No.9		8
[C][0]	[0][A]		Point table No.10		8
[C][0]	[0][B]		Point table No.11		8
[C][0]	[0][C]		Point table No.12		8
[C][0]	[0][D]		Point table No.13		8
[C][0]	[0][E]		Point table No.14		8
[C][0]	[0][F]		Point table No.15		8
[C][0]	[1][0]		Point table No.16		8
:	:		:		:
[C][0]	[1][F]		Point table No. 31		8

(7) Point table/speed data (Command [C][6])

Command	Data No.	Description	Point table No.	Setting Range	Frame Length
[C][6]	[0][1]	Speed data write	Point table No.1		8
[C][6]	[0][2]		Point table No.2		8
[C][6]	[0][3]		Point table No.3		8
[C][6]	[0][4]		Point table No.4		8
[C][6]	[0][5]		Point table No.5		8
[C][6]	[0][6]		Point table No.6		8
[C][6]	[0][7]		Point table No.7		8
[C][6]	[0][8]		Point table No.8		8
[C][6]	[0][9]		Point table No.9		8
[C][6]	[0][A]		Point table No.10		8
[C][6]	[0][B]		Point table No.11		8
[C][6]	[0][C]		Point table No.12		8
[C][6]	[0][D]		Point table No.13		8
[C][6]	[0][E]		Point table No.14		8
[C][6]	[0][F]		Point table No.15		8
[C][6]	[1][0]		Point table No.16		8
:	:		:		:
[C][6]	[1][F]		Point table No. 31		8

(8) Point table/acceleration time constant (Command [C][7])

Command	Data No.	Description	Point table No.	Setting Range	Frame Length
[C][7]	[0][1]	Acceleration time constant write	Point table No.1		8
[C][7]	[0][2]		Point table No.2		8
[C][7]	[0][3]		Point table No.3		8
[C][7]	[0][4]		Point table No.4		8
[C][7]	[0][5]		Point table No.5		8
[C][7]	[0][6]		Point table No.6		8
[C][7]	[0][7]		Point table No.7		8
[C][7]	[0][8]		Point table No.8		8
[C][7]	[0][9]		Point table No.9		8
[C][7]	[0][A]		Point table No.10		8
[C][7]	[0][B]		Point table No.11		8
[C][7]	[0][C]		Point table No.12		8
[C][7]	[0][D]		Point table No.13		8
[C][7]	[0][E]		Point table No.14		8
[C][7]	[0][F]		Point table No.15		8
[C][7]	[1][0]		Point table No.16		8
:	:		:		:
[C][7]	[1][F]		Point table No.31		8

(9) Point table/deceleration time constant (Command [C][8])

Command	Data No.	Description	Point table No.	Setting Range	Frame Length
[C][8]	[0][1]	Deceleration time constant write	Point table No.1		8
[C][8]	[0][2]		Point table No.2		8
[C][8]	[0][3]		Point table No.3		8
[C][8]	[0][4]		Point table No.4		8
[C][8]	[0][5]		Point table No.5		8
[C][8]	[0][6]		Point table No.6		8
[C][8]	[0][7]		Point table No.7		8
[C][8]	[0][8]		Point table No.8		8
[C][8]	[0][9]		Point table No.9		8
[C][8]	[0][A]		Point table No.10		8
[C][8]	[0][B]		Point table No.11		8
[C][8]	[0][C]		Point table No.12		8
[C][8]	[0][D]		Point table No.13		8
[C][8]	[0][E]		Point table No.14		8
[C][8]	[0][F]		Point table No.15		8
[C][8]	[1][0]		Point table No.16		8
:	:		:		:
[C][8]	[1][F]		Point table No.31		8

(10) Point table/dwell time (Command [C][A])

Command	Data No.	Description	Point table No.	Setting Range	Frame Length
[C][A]	[0][1]	Dwell time write	Point table No.1		8
[C][A]	[0][2]		Point table No.2		8
[C][A]	[0][3]		Point table No.3		8
[C][A]	[0][4]		Point table No.4		8
[C][A]	[0][5]		Point table No.5		8
[C][A]	[0][6]		Point table No.6		8
[C][A]	[0][7]		Point table No.7		8
[C][A]	[0][8]		Point table No.8		8
[C][A]	[0][9]		Point table No.9		8
[C][A]	[0][A]		Point table No.10		8
[C][A]	[0][B]		Point table No.11		8
[C][A]	[0][C]		Point table No.12		8
[C][A]	[0][D]		Point table No.13		8
[C][A]	[0][E]		Point table No.14		8
[C][A]	[0][F]		Point table No.15		8
[C][A]	[1][0]		Point table No.16		8
:	:		:		:
[C][A]	[1][F]		Point table No.31		8

(11) Point table/auxiliary function (Command [C][B])

Command	Data No.	Description	Point table No.	Setting Range	Frame Length
[C][B]	[0][1]	Auxiliary function write	Point table No.1		8
[C][B]	[0][2]		Point table No.2		8
[C][B]	[0][3]		Point table No.3		8
[C][B]	[0][4]		Point table No.4		8
[C][B]	[0][5]		Point table No.5		8
[C][B]	[0][6]		Point table No.6		8
[C][B]	[0][7]		Point table No.7		8
[C][B]	[0][8]		Point table No.8		8
[C][B]	[0][9]		Point table No.9		8
[C][B]	[0][A]		Point table No.10		8
[C][B]	[0][B]		Point table No.11		8
[C][B]	[0][C]		Point table No.12		8
[C][B]	[0][D]		Point table No.13		8
[C][B]	[0][E]		Point table No.14		8
[C][B]	[0][F]		Point table No.15		8
[C][B]	[1][0]		Point table No.16		8
:	:		:		:
[C][B]	[1][F]		Point table No.31		8

(12) Operation mode selection (Command [8][B])

Command	Data No.	Description	Setting range	Frame length
[8][B]	[0][0]	Operation mode changing 0000: Exit from test operation mode 0001: Jog operation 0002: Positioning operation 0003: Motor-less operation 0004: Output signal (DO) forced output	0000 to 0004	4

(13) External input signal disable (Command [9][0])

Command	Data No.	Description	Setting range	Frame length
[9][0]	[0][0]	Turns off the external input signals (DI), external analog input signals and pulse train inputs with the exception of EMG, LSP and LSN, independently of the external ON/OFF statuses.	1EA5	4
[9][0]	[0][3]	Changes the external output signals (DO) into the value of command [8][B] or command [A][0] + data No. [0][1].	1EA5	4
[9][0]	[1][0]	Enables the disabled external input signals (DI), external analog input signals and pulse train inputs with the exception of EMG, LSP and LSN.	1EA5	4
[9][0]	[1][3]	Enables the disabled external output signals (DO).	1EA5	4

(14) Data for test operation mode (Command [9][2] · [A][0])

Command	Data No.	Description	Setting range	Frame length
[9][2]	[0][0]	Input signal for test operation		8
[9][2]	[A][0]	Forced output from signal pin		8

Command	Data No.	Description	Setting range	Frame length
[A][0]	[1][0]	Writes the speed of the test operation mode (jog operation, positioning operation).	0000 to 7FFF	4
[A][0]	[1][1]	Writes the acceleration/deceleration time constant of the test operation mode (jog operation, positioning operation).	00000000 to 7FFFFFFF	8
[A][0]	[1][2]	Clears the acceleration/deceleration time constant of the test operation mode (jog operation, positioning operation).	1EA5	4
[A][0]	[1][3]	Writes the moving distance (in pulses) of the test operation mode (jog operation, positioning operation).	80000000 to 7FFFFFFF	8
[A][0]	[1][5]	Temporary stop command of the test operation mode (jog operation, positioning operation)	1EA5	4

(15) Group setting (Command [9][F])

Command	Data No.	Description	Setting range	Frame length
[9][F]	[0][0]	Setting of group		4

8.12 Detailed explanations of commands

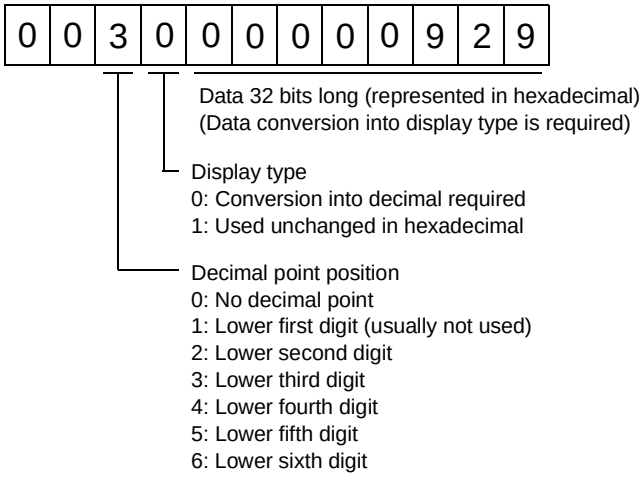
8.12.1 Data processing

When the command + data number or the command + data number + data are sent from the master station to a slave station, a reply or data is returned from the servo amplifier according to the purpose.
In these send data and receive data, numerical values are represented in decimal, hexadecimal, etc.
Hence, data must be processed to meet their purposes.
Follow the corresponding explanation since whether data must be processed or not and how to process them changes with monitoring, parameters, etc.
How to process send/receive data when reading and writing data will be described below.

(1) Processing read data

For the display type of 0, eight-character data is converted from a hexadecimal number to a decimal number and a decimal point is provided from the decimal point information.
For the display type of 1, eight-character data is used as-is.

How to process receive data "003000000929" to show the status is explained here by way of example.
Receive data is as follows:

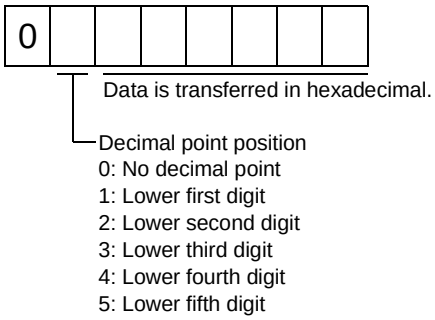


As the display type is "0" in this case, the hexadecimal data is converted into a decimal number.
00000929H→2345
Since the decimal point position is "3", the decimal point is put in the third lower digit.
Hence, "23.45" appears.

(2) Writing processed data

When written data is handled as a decimal number, the decimal point position must be specified. If it is not specified, data cannot be written. When data is handled as a hexadecimal number, specify "0" for the decimal point position.

The data to be sent is as follows:



How to process set data to the value of "15.5" is explained here by way of example.

Since the decimal point position is the second digit, the decimal point data is "2".

As the data to be transmitted is a hexadecimal number, the decimal data is converted into a hexadecimal number.

115→9B

Hence, "0200009B" is sent.

8.12.2 Status display

(1) Status display data read

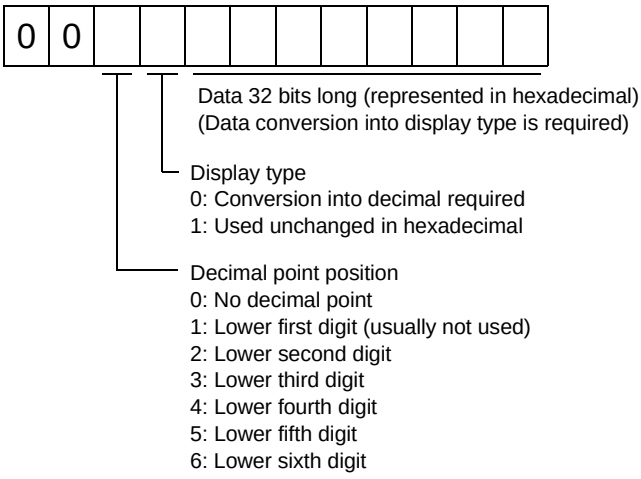
When the master station transmits the data No. (refer to the following table for assignment) to the slave station, the slave station sends back the data value and data processing information.

(a) Transmission

Transmit command [0][1] and the data No. corresponding to the status display item to be read.

(b) Reply

The slave station sends back the status display data requested.



(2) Status display data clear

The cumulative feedback pulse data of the status display is cleared. Send this command immediately after reading the status display item. The data of the status display item transmitted is cleared to zero.

Command	Data No.	Data
[8][1]	[0][0]	1EA5

For example, after sending command [0][1] and data No. [8][0] and receiving the status display data, send command [8][1], data No. [0][0] and data [1EA5] to clear the cumulative feedback pulse value to zero.

8.12.3 Parameter

(1) Parameter read

Read the parameter setting.

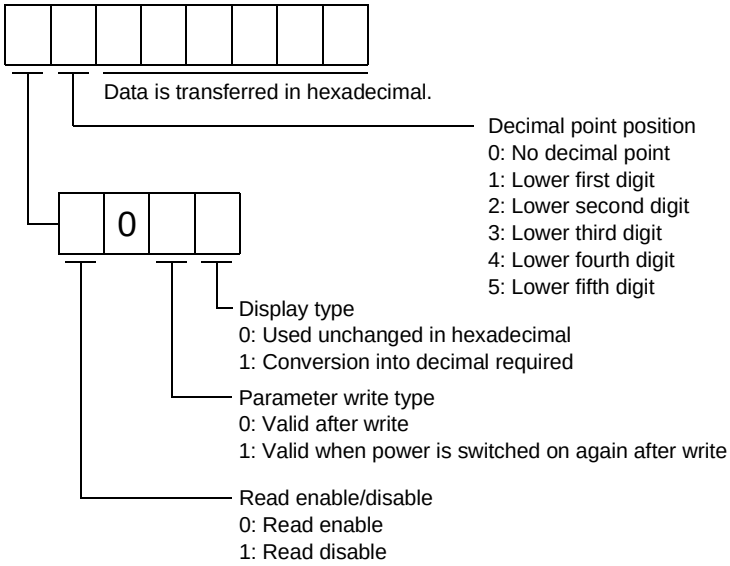
1) Transmission

Transmit command [0][5] and the data No. corresponding to the parameter No.

Command	Data No.	Data No. Definition
[0][5]	[0][0] to [5][A]	Corresponds to the parameter No.

2) Reply

The slave station sends back the data and processing information of the requested parameter No.



Enable/disable information changes according to the setting of parameter No.19 "parameter write inhibit". When the enable/disable setting is read disable, ignore the parameter data part and process it as unreadable.

(2) Parameter write

Write the parameter setting.

Write the value within the setting range.

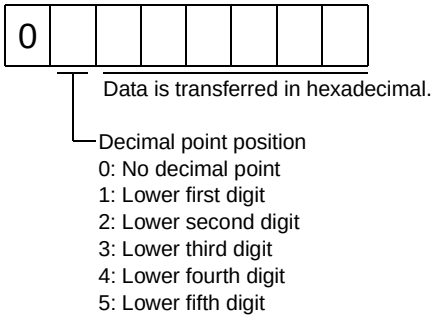
Transmit command [8][4], the data No., and the set data.

The data number is represented in hexadecimal. The decimal value converted from the data number value corresponds to the parameter number. Refer to (1)(a) in this section.

When the data to be written is handled as decimal, the decimal point position must be specified. If it is not specified, data cannot be written. When the data is handled as hexadecimal, specify 0 as the decimal point position.

Write the data after making sure that it is within the upper/lower limit value range. Read the parameter data to be written, confirm the decimal point position, and create transmission data to prevent error occurrence. On completion of write, read the same parameter data to verify that data has been written correctly.

Command	Data No.	Set Data
[8][4]	[0][0] to [5][A]	See below.



8.12.4 External I/O signal statuses

(1) Reading of input device statuses

Read the statuses of the input devices.

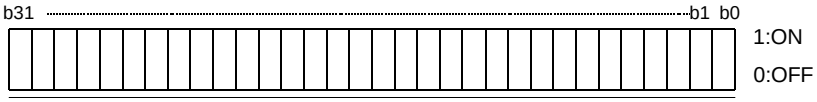
(a) Transmission

Transmit command [1][2] and data No. [0][0].

Command	Data No.
[1][2]	[0][0]

(b) Reply

The slave station sends back the statuses of the input pins.



Command of each bit is transmitted to the master station as hexadecimal data.

bit	Signal Name
0	Servo on (SON)
1	Forward rotation stroke limit (LSP)
2	Reverse rotation stroke limit (LSN)
3	External torque limit selection (TL)
4	Internal torque limit selection (TL2)
5	Proportion control selection (PC)
6	Alarm reset (RES)
7	
8	
9	

bit	Signal Name
10	
11	Forward rotation start (ST1)
12	Reverse rotation start (ST2)
13	
14	
15	
16	Emergency stop (EMG)
17	Automatic/manual selection (MDO)
18	Proximity dog (DOG)
19	Point table selection 1 (DI0)

bit	Signal Name
20	Point table selection 2 (DI1)
21	Point table selection 3 (DI2)
22	Point table selection 4 (DI3)
23	
24	Temporary stop/restart (STP)
25	
26	
27	Gain changing (CDP)
28	
29	Point table selection 5 (DI4)

(2) External input pin status read

Read the ON/OFF statuses of the external output pins.

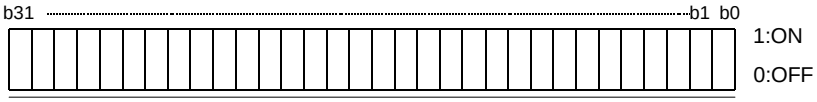
(a) Transmission

Transmit command [1][2] and data No. [4][0].

Command	Data No.
[1][2]	[4][0]

(b) Reply

The ON/OFF statuses of the input pins are sent back.



Command of each bit is transmitted to the master station as hexadecimal data.

bit	External Input Pin
0	CN1B-16
1	CN1B-17
2	CN1B-15
3	CN1B-5
4	CN1B-14

bit	External Input Pin
5	CN1A-8
6	CN1B-7
7	CN1B-8
8	CN1B-9
9	CN1A-19

(3) Read of the statuses of input devices switched on through communication

Read the ON/OFF statuses of the input devices switched on through communication.

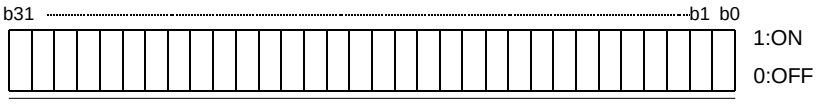
(a) Transmission

Transmit command [1][2] and data No. [6][0].

Command	Data No.
[1][2]	[6][0]

(b) Reply

The slave station sends back the statuses of the input pins.



Command of each bit is transmitted to the master station as hexadecimal data.

bit	Signal Name
0	Servo on (SON)
1	Forward rotation stroke limit (LSP)
2	Reverse rotation stroke limit (LSN)
3	External torque limit selection (TL)
4	Internal torque limit selection (TL2)
5	Proportion control selection (PC)
6	Alarm reset (RES)
7	
8	
9	

bit	Signal Name
10	
11	Forward rotation start (ST1)
12	Reverse rotation start (ST2)
13	
14	
15	
16	Emergency stop (EMG)
17	Automatic/manual selection (MDO)
18	Proximity dog (DOG)
19	Point table selection 1 (DI0)

bit	Signal Name
20	Point table selection 2 (DI1)
21	Point table selection 3 (DI2)
22	Point table selection 4 (DI3)
23	
24	Temporary stop/restart (STP)
25	
26	
27	Gain changing (CDP)
28	
29	Point table selection 5 (DI4)

(4) External output pin status read

Read the ON/OFF statuses of the external output pins.

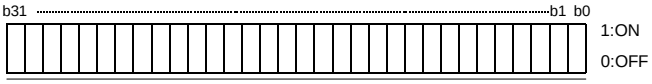
(a) Transmission

Transmit command [1][2] and data No. [C][0].

Command	Data No.
[1][2]	[C][0]

(b) Reply

The slave station sends back the ON/OFF statuses of the output pins.



Command of each bit is transmitted to the master station as hexadecimal data.

bit	External output Pin
0	CN1A-19
1	CN1A-18
2	CN1B-19
3	CN1B-6
4	CN1B-4

bit	External output Pin
5	CN1B-18
6	CN1A-14

(5) Read of the statuses of output devices

Read the ON/OFF statuses of the output devices.

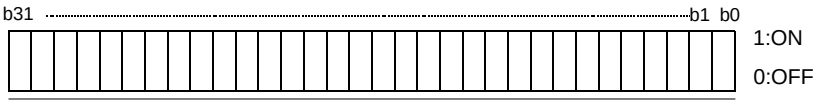
(a) Transmission

Transmit command [1][2] and data No. [8][0].

Command	Data No.
[1][2]	[8][0]

(b) Reply

The slave station sends back the statuses of the output devices.



Command of each bit is transmitted to the master station as hexadecimal data.

bit	Signal Name
0	Ready (RD)
1	
2	
3	Limiting torque (TLC)
4	
5	In position (INP)
6	
7	Warning (WNG)
8	Trouble (ALM)
9	
10	Electromagnetic brake (MBR)

bit	Signal Name
11	Dynamic brake (DBR)
12	
13	
14	
15	Battery warning (BWNG)
16	Rough match (CPO)
17	Zeroing completion (ZP)
18	Position range output (POT)
19	Temporary stop (PUS)
20	Point table No. output 1 (PT0)
21	Point table No. output 2 (PT1)

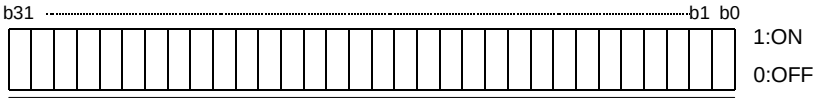
bit	Signal Name
22	Point table No. output 3 (PT2)
23	Point table No. output 4 (PT3)
24	Point table No. output 5 (PT4)
25	
26	
27	
28	Moving complete (MEND)
29	
30	
31	
32	

8.12.5 Device ON/OFF

Each input device can be switched on/off. However, when the device to be switched off exists in the external input signal, also switch off that input signal.

Send command [9][2], data No. [6][0] and data.

Command	Data No.	Set Data
[9][2]	[6][0]	See below.



Command of each bit is transmitted to the slave station as hexadecimal data.

bit	Signal Name
0	Servo on (SON)
1	Forward rotation stroke limit (LSP)
2	Reverse rotation stroke limit (LSN)
3	External torque limit selection (TL)
4	Internal torque limit selection (TL2)
5	Proportion control selection (PC)
6	Alarm reset (RES)
7	
8	
9	

bit	Signal Name
10	
11	Forward rotation start (ST1)
12	Reverse rotation start (ST2)
13	
14	
15	
16	Emergency stop (EMG)
17	Automatic/manual selection (MDO)
18	Proximity dog (DOG)
19	Point table selection 1 (DI0)

bit	Signal Name
20	Point table selection 2 (DI1)
21	Point table selection 3 (DI2)
22	Point table selection 4 (DI3)
23	
24	Temporary stop/restart (STP)
25	
26	
27	Gain changing (CDP)
28	
29	Point table selection 5 (DI4)

8.12.6 Alarm history

(1) Alarm No. read

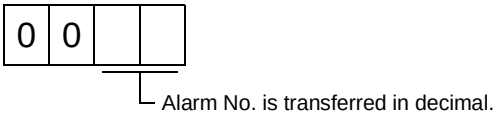
Read the alarm No. which occurred in the past. The alarm numbers and occurrence times of No.0 (last alarm) to No.5 (sixth alarm in the past) are read.

(a) Transmission

Send command [3][3] and data No. [1][0] to [1][5].

(b) Reply

The alarm No. corresponding to the data No. is provided.



For example, "0032" means A.32 and "00FF" A._ (no alarm).

(2) Alarm occurrence time read

Read the occurrence time of alarm which occurred in the past.

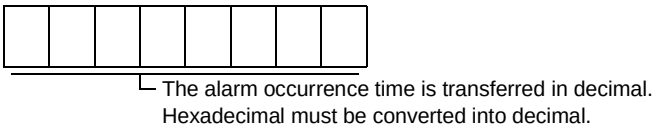
The alarm occurrence time corresponding to the data No. is provided in terms of the total time beginning with operation start, with the minute unit omitted.

(a) Transmission

Send command [3][3] and data No. [2][0] to [2][5].

Refer to Section 8.11.1.

(b) Reply



For example, data [0][1][F][5] indicates that the alarm occurred 501 hours after start of operation.

(3) Alarm history clear

Erase the alarm history.

Send command [8][2] and data No. [2][0].

Command	Data No.	Data
[8][2]	[2][0]	[1][E][A][5]

8.12.7 Current alarm

(1) Current alarm read

Read the alarm No. which is occurring currently.

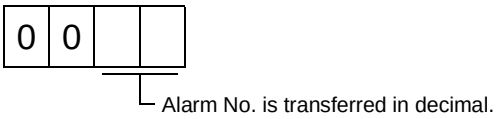
(a) Transmission

Send command [0][2] and data No. [0][0].

Command	Data No.
[0][2]	[0][0]

(b) Reply

The slave station sends back the alarm currently occurring.



For example, "0032" means A.32 and "00FF" A._ (no alarm).

(2) Read of the status display at alarm occurrence

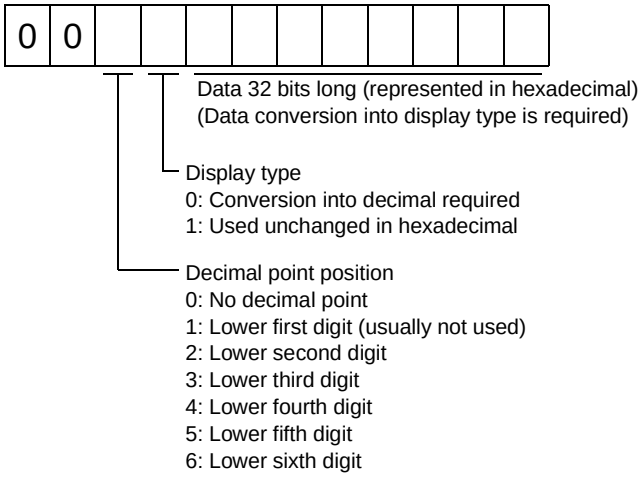
Read the status display data at alarm occurrence. When the data No. corresponding to the status display item is transmitted, the data value and data processing information are sent back.

(a) Transmission

Send command [3][5] and any of data No. [8][0] to [8][E] corresponding to the status display item to be read. Refer to Section 8.11.1.

(b) Reply

The slave station sends back the requested status display data at alarm occurrence.



(3) Current alarm clear

As by the entry of the RES signal, reset the servo amplifier alarm to make the servo amplifier ready to operate. After removing the cause of the alarm, reset the alarm with no command entered.

Transmission

Command	Data No.	Data
[8][2]	[0][0]	[1][E][A][5]

8.12.8 Point table

(1) Position data read

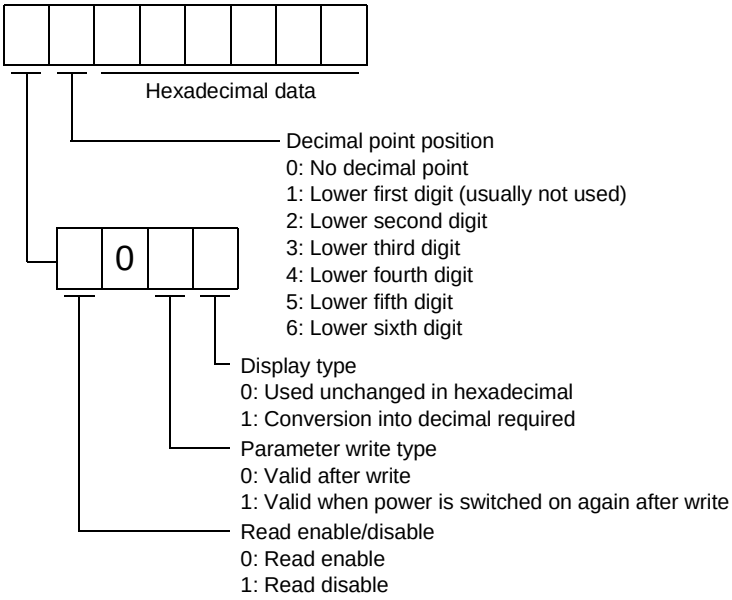
Read the position data of the point table.

(a) Transmission

Transmit command [4][0] and any of data No. [0][1] to [1][F] corresponding to the point table to be read. Refer to Section 8.11.1.

(b) Reply

The slave station sends back the position data of the requested point table.



When the enable/disable setting is read disable, ignore the data part and process it as unreadable.

(2) Speed data read

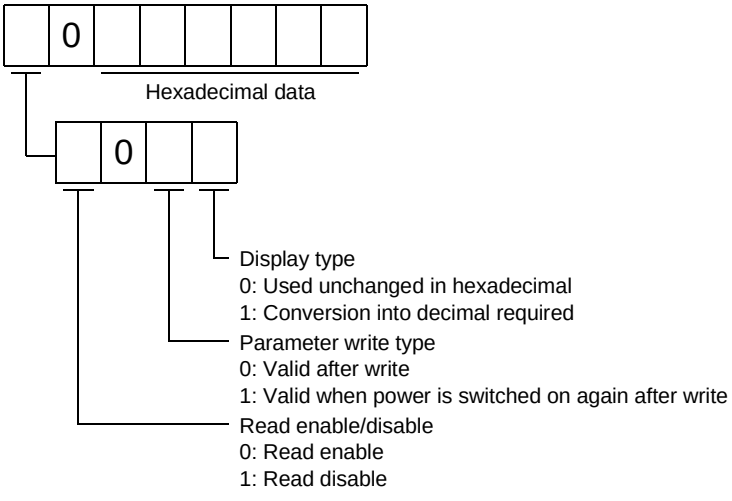
Read the speed data of the point table.

(a) Transmission

Transmit command [5][0] and any of data No. [0][1] to [1][F] corresponding to the point table to be read. Refer to Section 8.11.1.

(b) Reply

The slave station sends back the speed data of the requested point table.



When the enable/disable setting is read disable, ignore the data part and process it as unreadable.

(3) Acceleration time constant read

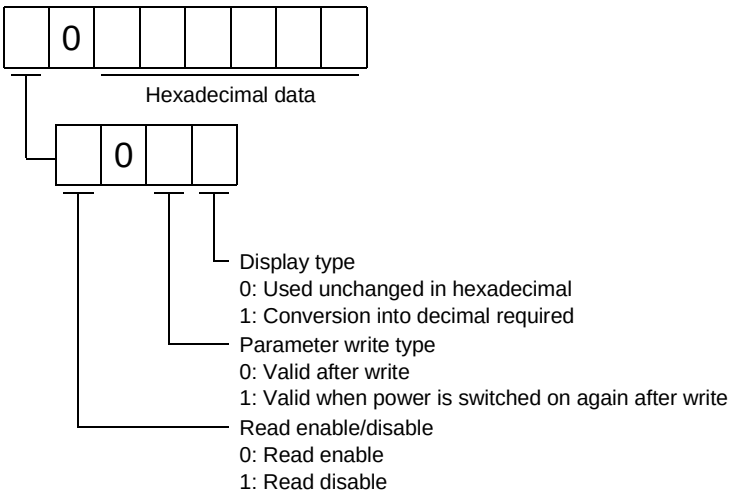
Read the acceleration time constant of the point table.

(a) Transmission

Transmit command [5][4] and any of data No. [0][1] to [1][F] corresponding to the point table to be read. Refer to Section 8.11.1.

(b) Reply

The slave station sends back the acceleration time constant of the requested point table.



When the enable/disable setting is read disable, ignore the data part and process it as unreadable.

(4) Deceleration time constant read

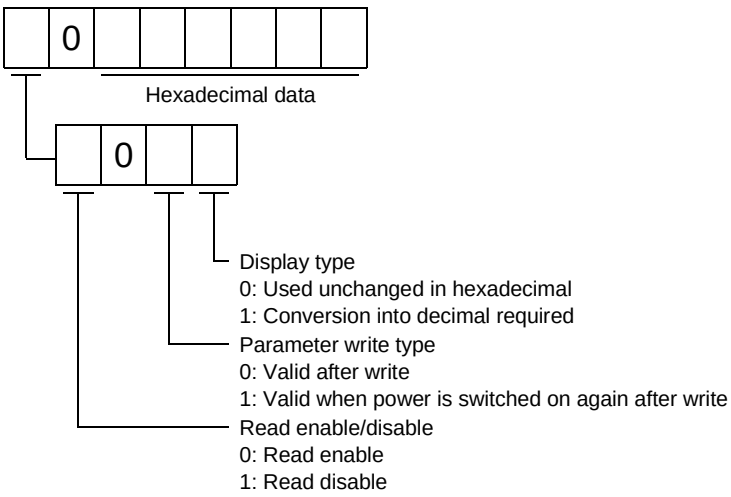
Read the deceleration time constant of the point table.

(a) Transmission

Transmit command [5][8] and any of data No. [0][1] to [1][F] corresponding to the point table to be read. Refer to Section 8.11.1.

(b) Reply

The slave station sends back the deceleration time constant of the requested point table.



When the enable/disable setting is read disable, ignore the data part and process it as unreadable.

(5) Dwell time read

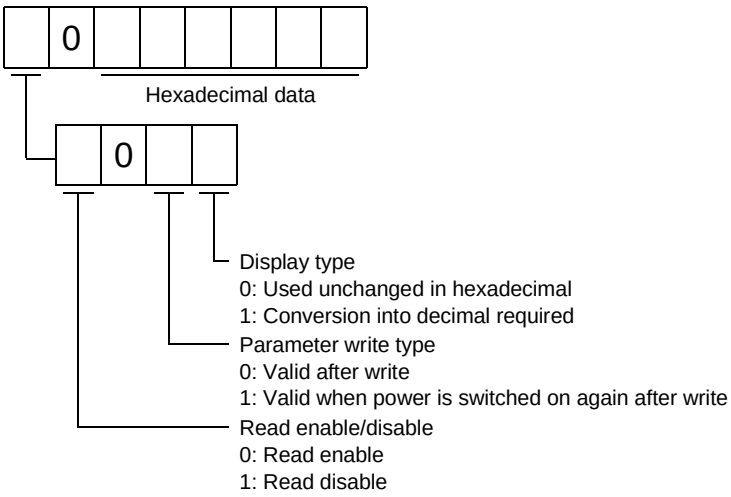
Read the dwell time of the point table.

(a) Transmission

Transmit command [6][0] and any of data No. [0][1] to [1][F] corresponding to the point table to be read. Refer to Section 8.11.1.

(b) Reply

The slave station sends back the dwell time of the requested point table.



When the enable/disable setting is read disable, ignore the data part and process it as unreadable.

(6) Auxiliary function read

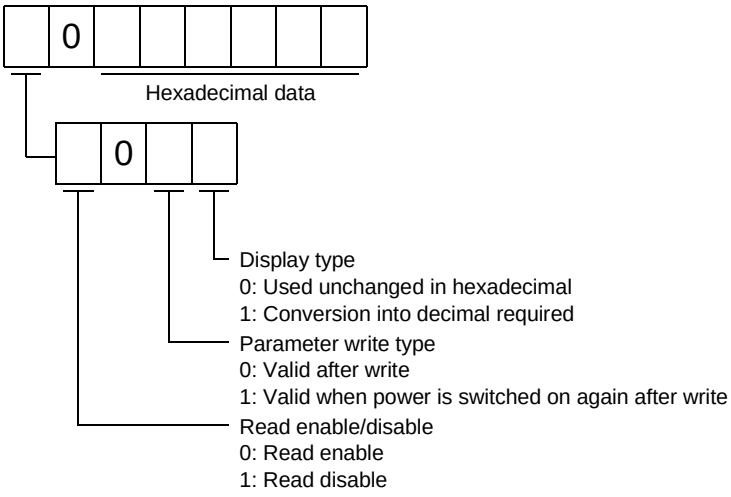
Read the auxiliary function of the point table.

(a) Transmission

Transmit command [6][4] and any of data No. [0][1] to [1][F] corresponding to the point table to be read. Refer to Section 8.11.1.

(b) Reply

The slave station sends back the auxiliary function of the requested point table.



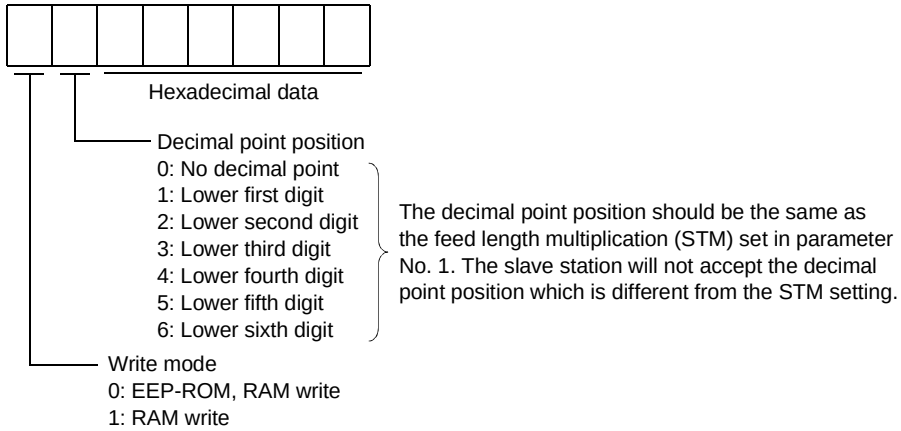
When the enable/disable setting is read disable, ignore the data part and process it as unreadable.

(7) Position data write

Write the position data of the point table.

Transmit command [C][0], any of data No. [0][1] to [1][F] corresponding to the point table to be written to, and the data. Refer to Section 8.11.2.

Command	Data No.	Data
[C][0]	[0][1] to [1][F]	See below.



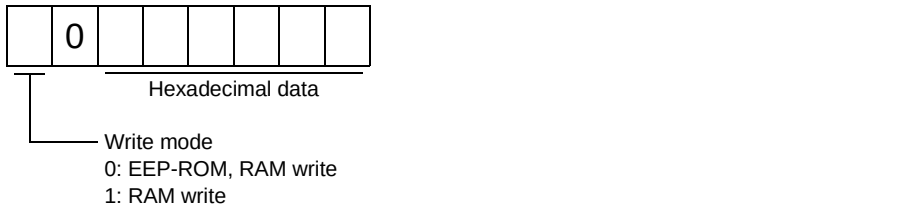
When the positioning address is changed frequently through communication, set "1" to the write mode to change only the RAM data in the servo amplifier.
If the EEP-ROM value is changed frequently, EEP-ROM fault will occur due to the excess of the permissible EEP-ROM write times.

(8) Speed data write

Write the speed data of the point table.

Transmit command [C][6], any of data No. [0][1] to [1][F] corresponding to the point table to be written to, and the data. Refer to Section 8.11.2.

Command	Data No.	Data
[C][6]	[0][1] to [1][F]	See below.



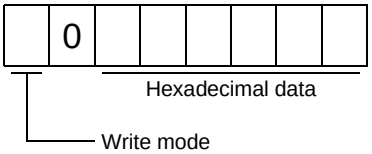
When the positioning address is changed frequently through communication, set "1" to the write mode to change only the RAM data in the servo amplifier.
If the EEP-ROM value is changed frequently, EEP-ROM fault will occur due to the excess of the permissible EEP-ROM write times.

(9) Acceleration time constant write

Write the acceleration time constant of the point table.

Transmit command [C][7], any of data No. [0][1] to [1][F] corresponding to the point table to be written to, and the data. Refer to Section 8.11.2.

Command	Data No.	Data
[C][7]	[0][1] to [1][F]	See below.



Write mode
0: EEP-ROM, RAM write
1: RAM write

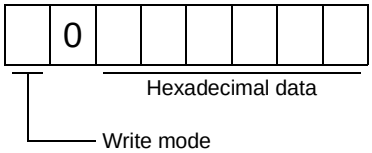
When the positioning address is changed frequently through communication, set "1" to the write mode to change only the RAM data in the servo amplifier.
If the EEP-ROM value is changed frequently, EEP-ROM fault will occur due to the excess of the permissible EEP-ROM write times.

(10) Deceleration time constant write

Write the deceleration time constant of the point table.

Transmit command [C][8], any of data No. [0][1] to [1][F] corresponding to the point table to be written to, and the data. Refer to Section 8.11.2.

Command	Data No.	Data
[C][8]	[0][1] to [1][F]	See below.



Write mode
0: EEP-ROM, RAM write
1: RAM write

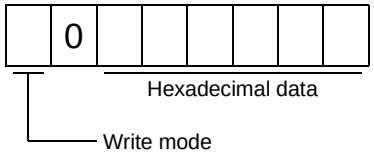
When the positioning address is changed frequently through communication, set "1" to the write mode to change only the RAM data in the servo amplifier.
If the EEP-ROM value is changed frequently, EEP-ROM fault will occur due to the excess of the permissible EEP-ROM write times.

(11) Dwell time write

Write the dwell time of the point table.

Transmit command [C][A], any of data No. [0][1] to [1][F] corresponding to the point table to be written to, and the data. Refer to Section 8.11.2.

Command	Data No.	Data
[C][A]	[0][1] to [1][F]	See below.



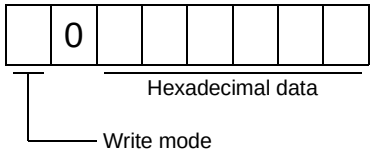
When the positioning address is changed frequently through communication, set "1" to the write mode to change only the RAM data in the servo amplifier.
If the EEP-ROM value is changed frequently, EEP-ROM fault will occur due to the excess of the permissible EEP-ROM write times.

(12) Auxiliary function write

Write the auxiliary function of the point table.

Transmit command [C][B], any of data No. [0][1] to [1][F] corresponding to the point table to be written to, and the data. Refer to Section 8.11.2.

Command	Data No.	Data
[C][B]	[0][1] to [1][F]	See below.



When the positioning address is changed frequently through communication, set "1" to the write mode to change only the RAM data in the servo amplifier.
If the EEP-ROM value is changed frequently, EEP-ROM fault will occur due to the excess of the permissible EEP-ROM write times.

8.12.9 Servo amplifier group designation

With group setting made to the slave stations, data can be transmitted simultaneously to two or more slave stations set as a group through RS-422 communication.

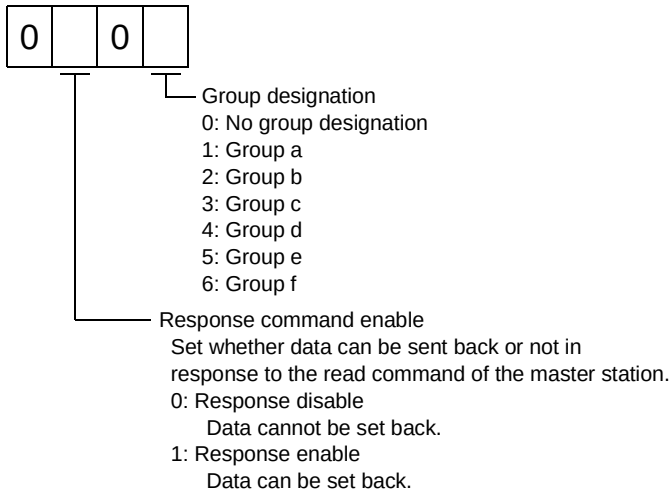
(1) Group setting write

Write the group designation value to the slave station.

Transmission

Transmit command [9][F], data No. [0][0] and data.

Command	Data No.	Data
[9][F]	[0][0]	See below.



(2) Group setting read

Read the set group designation value from the slave station.

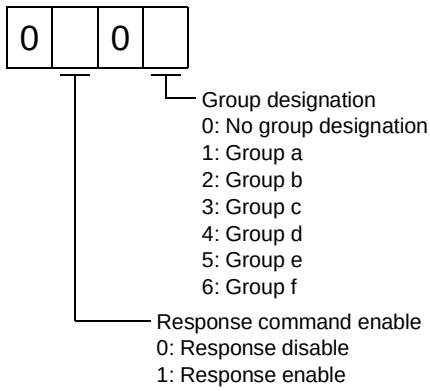
(a) Transmission

Transmit command [1][F] and data No. [0][0].

Command	Data No.
[1][F]	[0][0]

(b) Reply

The slave station sends back the group setting of the point table requested.



8.12.10 Other commands

(1) Servo motor end pulse unit absolute position

Read the absolute position in the servo motor end pulse unit.

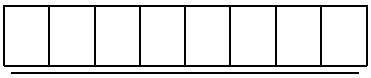
(a) Transmission

Send command [0][2] and data No. [9][0].

Command	Data No.
[0][2]	[9][0]

(b) Reply

The slave station sends back the requested servo motor end pulses.



Absolute value is sent back in hexadecimal in the servo motor end pulse unit.
(Must be converted into decimal)

For example, data "000186A0" is 100000 [pulse] in the motor end pulse unit.

(2) Command unit absolute position

Read the absolute position in the command unit.

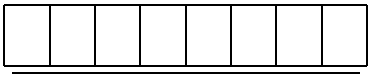
(a) Transmission

Send command [0][2] and data No. [9][1].

Command	Data No.
[0][2]	[9][1]

(b) Reply

The slave station sends back the requested command pulses.



Absolute value is sent back in hexadecimal in the command unit.
(Must be converted into decimal)

Fot example, data "000186A0" is 100000 [pulse] in the command unit.

REVISIONS

Print Date	Document #	Revision	Editor
‘02/01/09	BCN-B11127-479*	First edition	H.Ogi