MITSUBISHI ELECTRIC

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MITSUBISHI CNC

70 Series

Maintenance Training Manual

IB-1500364(ENG)-A

Introduction of <CNC 70 Series Maintenance Training> Course

Course name : CNC 70 Series maintenance
Maximum number of trainees : 5
Aim of the course : to learn about maintenance of CNC 70 Series
Intended trainees : Engineers in charge of NC machine tool maintenance
Textbook to use : CNC 70 Series Maintenance Course
NC model to use : CNC 70 Series

Curriculum (One-day course)

Date	Time	Contents	
Day ( ) Month ( )	9:15 to 12:00	Orientation	The entry of participation record
		NC system hardware configuration	
		Maintenance and diagnosis screens	
		Data input/output operation and practice	
	13:00 to 16:30	NC alarms and part replacement practice	
		NC setup and practice	
		Drive system maintenance and part replacement practice	
		Drive system alarms and their remedies	

Preface

This textbook is designed to be used in "CNC 70 Series maintenance training course". Operations and procedures described in this textbook are basically standard ones. Therefore, they may be different from yours, depending on your NC model, machine tool builder, machine type, and so on. Before you carry out actual maintenance such as part replacement, we recommend you to consult with our service center.

As this textbook has been written based mostly on the following manuals, please refer to them for the details.

- 700/70 Series Instruction Manual IB-1500041
- 700/70 Series Setup Manual IB-1500123
- 70 Series Connection Manual IB-1500253
- MDS-D/DH Series Instruction Manual IB-1500024
- MDS-D-SVJ3/SPJ3 Series Instruction Manual IB-1500192

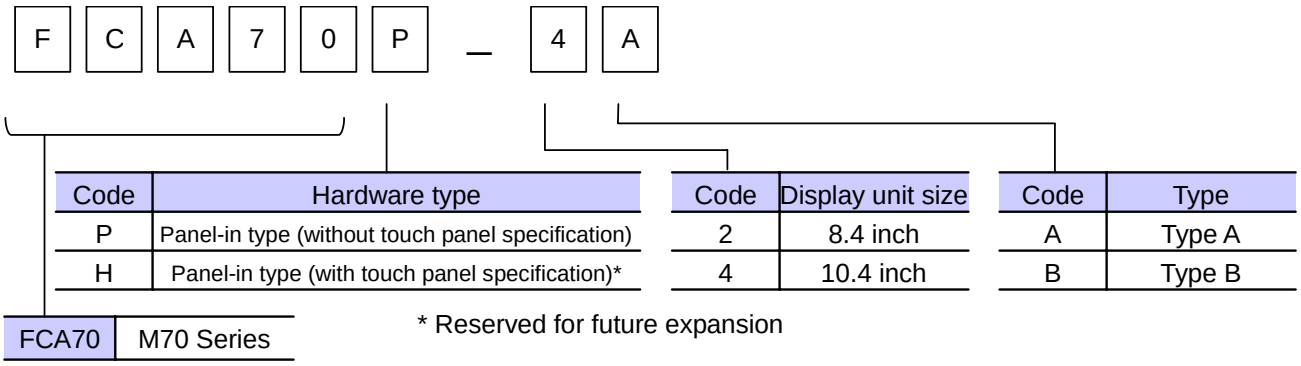
Contents

1. 70 Series System Configuration

1.1 NC Configuration

70 Series configuration

	System model name	Display size	Control unit name	Display unit name	Machine type	System #
MITSUBISHI CNC 70 Type A	FCA70P-2A	8.4" LCD	FCU7-MU522	FCU7-DU120-12	Common to M/L	BND-1009W000
	FCA70P-4A	10.4" LCD		FCU7-DU140-12		
	FCA70H-4A	10.4" LCD		FCU7-DU140-32		
MITSUBISHI CNC 70 Type B	FCA70P-2B	8.4" LCD	FCU7-MU521	FCU7-DU120-12		
	FCA70P-4B	10.4" LCD		FCU7-DU140-12		
	FCA70H-4B	10.4" LCD		FCU7-DU140-32		

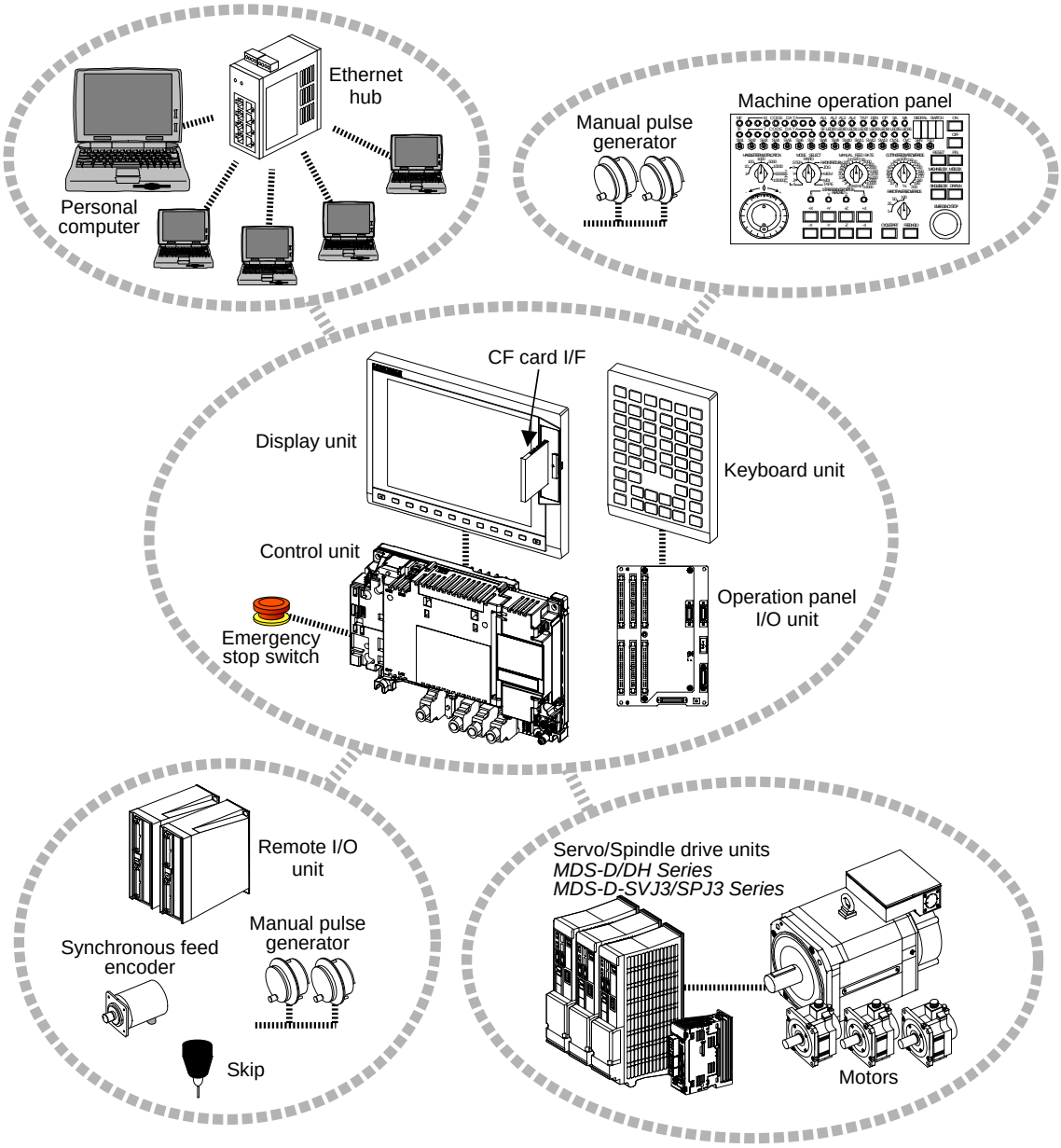


* Reserved for future expansion

There are six types of M70 H/W configurations

1.2 System Configuration

1.2.1 System Basic Configuration Drawing



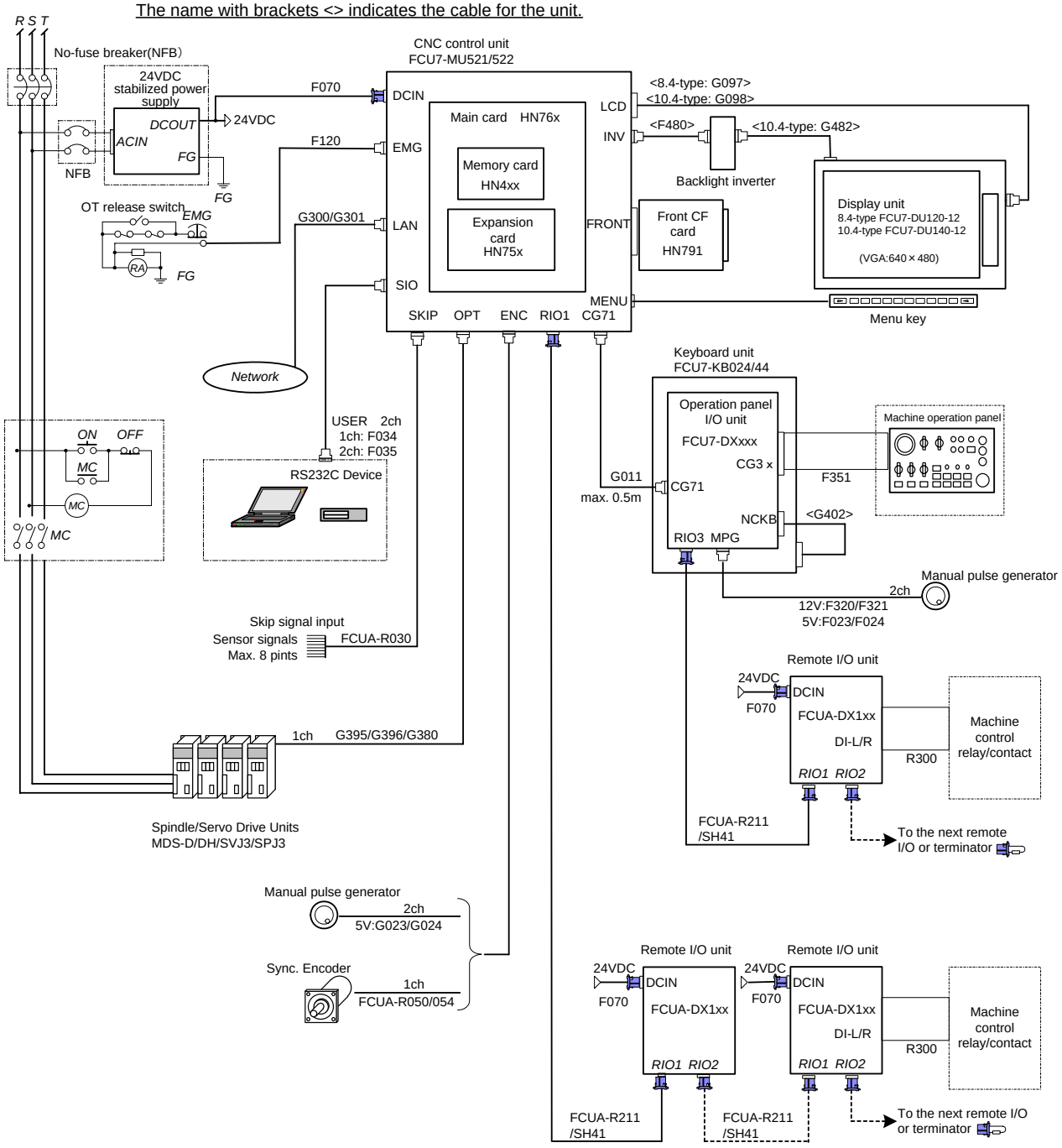
(Note 1) Control unit is mounted on the back side of the display unit.
(Note 2) Operation panel I/O unit is mounted on the back side of the keyboard unit.

1.2.2 General Connection Diagram

(1) Without Touch Panel

Dotted lines indicate the sections prepared by machine tool builder.

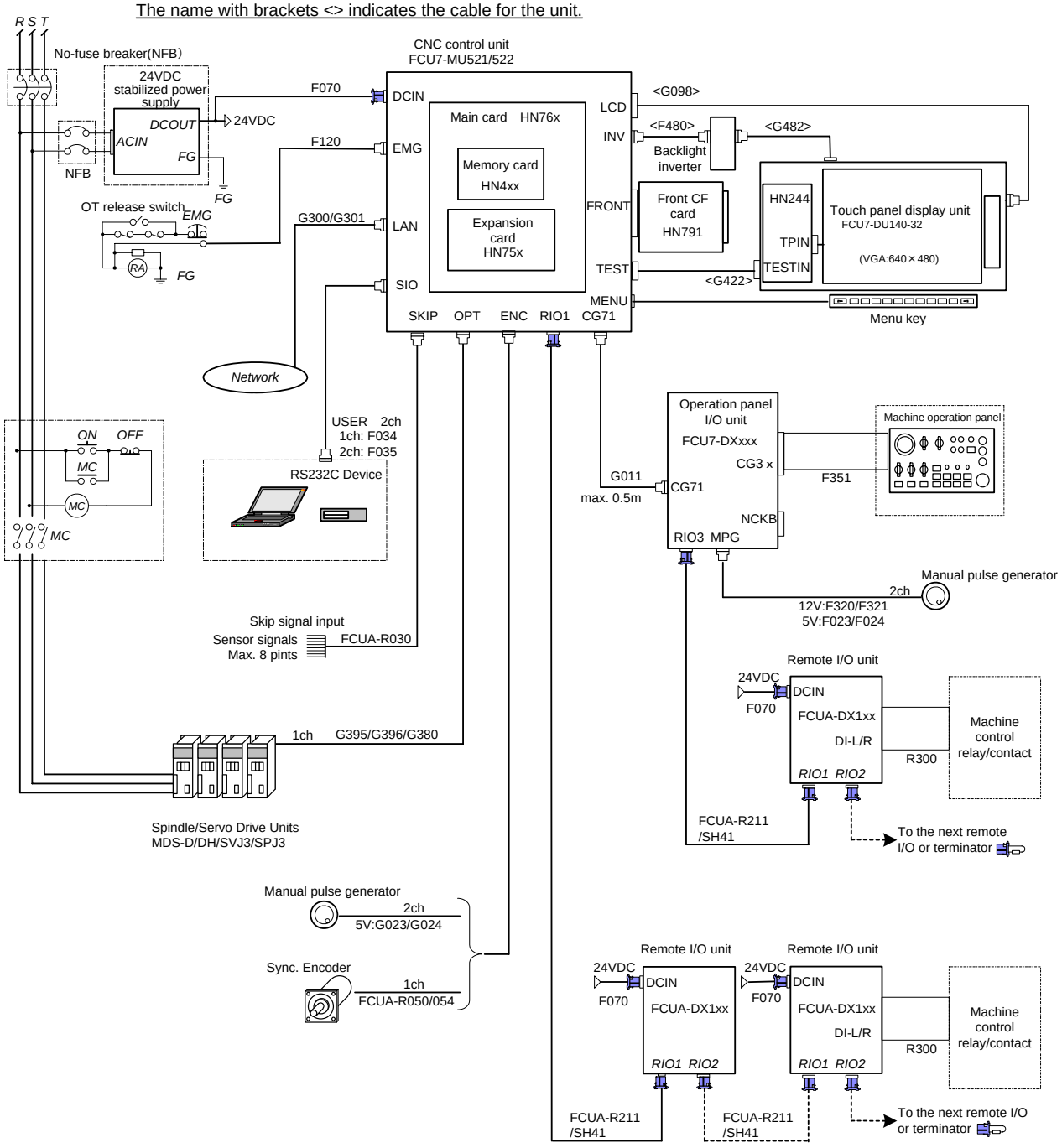
The name with brackets <> indicates the cable for the unit.



(2) With Touch Panel

Dotted lines indicate the sections prepared by machine tool builder.

The name with brackets <> indicates the cable for the unit.



1.2.3 List of Configuration Units

1.2.3.1 Control Unit: FCU7-MU521/FCU7-MU522

Type	Function	Configuration element	Details
FCU7-MU521	NC functions and display controller	Main control card (HN761) Memory card (HN451) CF I/F Card (HN791)	Export Trade Control Ordinance and Foreign Trade Ordinance noncompliant unit
FCU7-MU522	NC functions and display controller	Main control card (HN761) Memory card (HN451) Expansion card (HN751) CF I/F Card (HN791)	Export Trade Control Ordinance and Foreign Trade Ordinance noncompliant unit

1.2.3.2 Display Unit: FCU7-DU120-12/FCU7-DU140-12/FCU7-DU140-32

Type	Function	Configuration element	Details
FCU7-DU120-12	8.4-type color TFT	LCD panel Backlight inverter (84PW031) Menu keys G097 cable	CF card I/F is normally equipped with the control unit.
FCU7-DU140-12	10.4-type color TFT	LCD panel Backlight inverter (104PW161) Menu keys G098 cable G482 cable	CF card I/F is normally equipped with the control unit.
FCU7-DU140-32	10.4-type color TFT touch panel	LCD panel Backlight inverter (104PW161) Menu keys Touch panel Touch panel control card (HN244) G098 cable G422 cable G482 cable	CF card I/F is normally equipped with the control unit.

1.2.3.3 Operation Panel I/O Unit: FCU7-DX7xx

Type	Function	Configuration element	Details
FCU7-DX710	DI/DO Sink/source input DO sink output	Base card (HN341) Terminator (R-TM)	DI/DO = 64 points/64 points + MPG 2ch
FCU7-DX711	DI/DO Sink/source input DO source output	Base card (HN351) Terminator (R-TM)	DI/DO = 64 points/64 points + MPG 2ch
FCU7-DX720	DI/DO Sink/source input DO sink output	Base card (HN341) Terminator (R-TM)	DI/DO = 64 points/64 points + MPG 2ch
		Add-on card (HN361)	DI/DO = 32 points/16 points + AO 1ch
FCU7-DX721	DI/DO Sink/source input DO source output	Base card (HN351) Terminator (R-TM)	DI/DO = 64 points/64 points + MPG 2ch
		Add-on card (HN371)	DI/DO = 32 points/16 points + AO 1ch
FCU7-DX730	DI/DO Sink/source input DO sink output	Base card (HN341) Terminator (R-TM)	DI/DO = 64 points/64 points + MPG 2ch
		Add-on card (HN362)	DI/DO = 32 points/32 points
FCU7-DX731	DI/DO Sink/source input DO source output	Base card (HN342) Terminator (R-TM)	DI/DO = 64 points/64 points + MPG 2ch
		Add-on card (HN372)	DI/DO = 32 points/32 points

(Note 1) Operation panel I/O unit is mounted on the back side of the keyboard unit FCU7-KB024/KB026/KB044.
(Note 2) Operation panel I/O unit for 700 Series is not available.

1.2.3.4 Keyboard Unit: FCU7-KB024/ FCU7-KB044

Type	Function	Configuration element	Details
FCU7-KB024	8.4-type display keyboard Sheet keys	Escutcheon, key switch G402 cable	Connect with G011 cable from control unit. Mounting method: Mount on front panel
FCU7-KB026	8.4-type display keyboard Clear keys	Escutcheon, key switch G402 cable	Connect with G011 cable from control unit. Mounting method: Mount on front panel
FCU7-KB044	10.4-type display keyboard Sheet keys	Escutcheon, key switch G402 cable	Connect with G011 cable from control unit. Mounting method: Mount on front panel

1.2.3.5 Remote I/O Unit: FCUA-DX100/FCUA-DX110/FCUA-DX120/FCUA-DX140/FCUA-DX101/FCUA-DX111/ FCUA-DX121/FCUA-DX141

Type	Function	Configuration element	Details
FCUA-DX100	Sink/source input + sink output	RX311	DI/DO = 32 points/32 points
FCUA-DX110	Sink/source input + sink output	RX311+RX321-1	DI/DO = 64 points/48 points
FCUA-DX120	Sink/source input + sink output + analog output	RX311+RX321	DI/DO = 64 points/48 points + analog output 1 point
FCUA-DX140	Sink/source input + sink output + analog input/output	RX311+RX341	DI/DO = 32 points/32 points + analog input 4 points + analog output 1 point
FCUA-DX101	Sink/source input + source output	RX312	DI/DO = 32 points/32 points
FCUA-DX111	Sink/source input + source output	RX312+RX322-1	DI/DO = 64 points/48 points
FCUA-DX121	Sink/source input + source output + analog output	RX312+RX322	DI/DO = 64 points/48 points + analog output 1 point
FCUA-DX141	Sink/source input + source output + analog input/output	RX312+RX341	DI/DO = 32 points/32 points + analog input 4 points + analog output 1 point

1.2.3.6 Scan I/O Card: HR357/HR347

Type	Function	Configuration element	Details
HR357	Scan I/O (source)	HR357	Scan DI/DO = 64 points/64 points DI/DO = 32 points/32 points
HR347	Scan I/O (sink)	HR347	Scan DI/DO = 64 points/64 points DI/DO = 32 points/32 points

1.2.3.7 Card-sized I/O Card: HR361/HR371/HR381/HR383

Type	Function	Configuration element	Details
HR361	DI16 (sink/source) +DO16 (sink)	HR361	DI/DO = 16 points/16 points
HR371	DI32 (sink/source) +DO16 (source)	HR371	DI/DO = 16 points/16 points
HR381	AO x 1	HR381	AO x 1
HR383	AI x 4+AO x 1	HR383	AI x 4+AO x 1

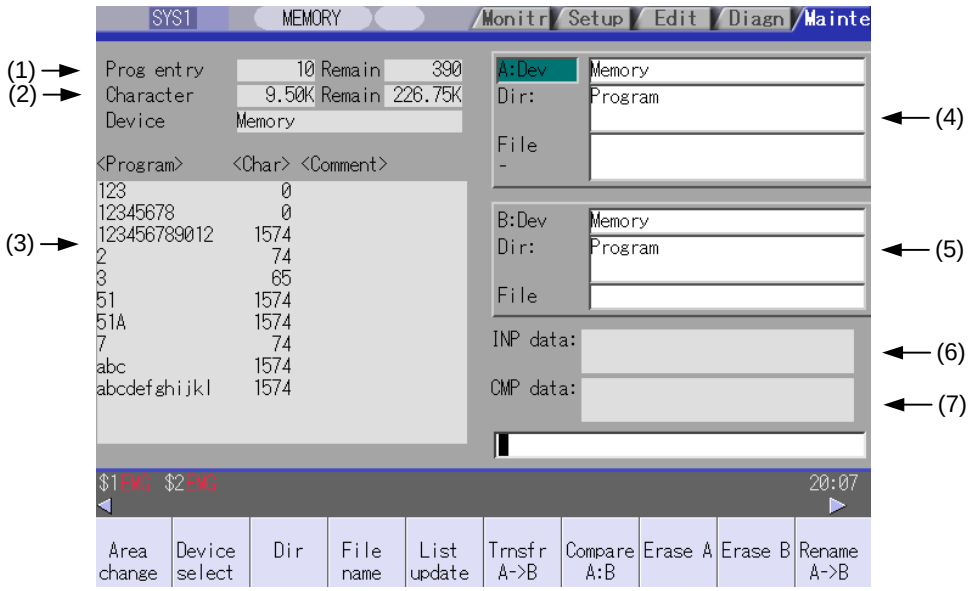
1.2.3.8 External Power Supply Unit: PD25/PD27

Type	Function	Configuration element	Details
PD25	External power supply with power supply ON/OFF function	Power supply card Case set	Input 200VAC Output 24VDC (3A)
PD27	External power supply with power supply ON/OFF function	Power supply card Case set	Input 200V to 400VAC Output 24VDC (8A)

2. Maintenance Screens

2.1 Input/Output Screen

The Input/Output screen is used to carry out NC data input/output between the NC internal memory and the external input/output devices.
Here, the hard disk built into the NC device is also treated as external devices.
In 70 series, only "Memory", "Memory card", "Serial", "Ethernet" and "Anshin-net server" can be used.



Display items

Display item	Details
(1) Number of programs registered and remainder **(Note 1)**	This displays the registration information of machining program of the selected device. Number of programs registered : This displays the number of programs previously registered as user machining programs. Remainder : This displays the remaining number of programs that can be registered. When "Memory" is selected as the device, the total of the number of programs registered and the remainder is the maximum number of registrations set in the specifications.
(2) Number of memory characters and remainder **(Note 1)**	This displays the number of characters of the machining program of the selected device. Number of memory characters : This displays the number of characters previously registered as user machining programs. Remainder : This displays the remaining number of characters that can be registered. The total of the number of memory characters and the remainder is the maximum number of memory characters set in the specifications.

Display items	Details
(3) List **(Note 2)**	This displays a contents list (directory and file name) of the directory in the setting column (file setting column A or B) where the cursor is currently located. Program : When "Memory" is selected for the device, this displays the file name (program No.) of the machining programs already registered. The file names are displayed in order from the smallest number, from 1 to 99999999. When a device other than memory is selected, this displays the file name and directory to be included in the directory that is set in the current setting column. When the number of characters exceeds 12, the excess is indicated as "*". Character : The size of each file (when memory is selected for the device, the number of characters in the machining program). When directory is selected, this displays "DIR". Comment : This displays the comment (up to 17 alphanumeric characters and symbols) of each file. The date which the file is updated is displayed for the HD, FD, memory card, DS or Ethernet. When the number of characters exceeds 17, the excess is not displayed.
(4) File setting column A	This sets the device, directory, and file name of the target file for transfer, compare, erasing, etc., operations. When transferring, the file name of the transfer origin file is set. When renaming, the file name before renaming is set. When erasing, the erasing range is set. When the number of characters exceeds 28, the excess is not displayed.
(5) File setting column B	
(6) Input data	This displays the data being transferred.
(7) Comparison data	This displays the data being compared. If an error occurs during comparison, the block with the error is displayed.

(Note 1) Depending on the device, some items are not displayed.

Device / Display item	Memory	HD	Serial	Memory card	DS	Ethernet	FD	Anshin-net server
Number of programs registered	○	○	×	○	○	○	○	×
Remainder	○	×	×	×	×	×	×	×
Number of memory characters	○	○	×	○	○	○ *	○	×
Remainder	○	○	×	○	○	×	○	×
List	○	○	×	○	○	○	○	×

○ : Displayed × : Not displayed

* : When the Ethernet parameter "#97*1 Host n no total siz" is set to 1, the number of host memory characters will not appear.

(Note 2) The list does not appear when using serial.

Menus

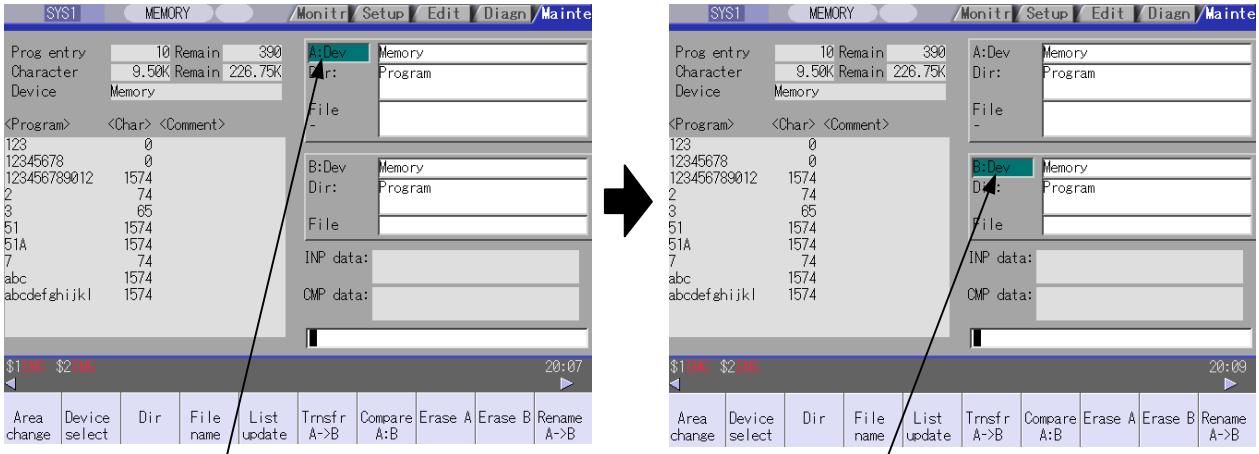
Menu	Details	Type	Reference
Area change	This changes the setting area to file setting column A (transfer origin) or file setting column B (transfer destination). The display of the valid area (A or B) is highlighted.	C	2.1.1 Changing the Valid Area
Device select	This displays the submenu of the machining program storage area. When the submenu is selected, the device is confirmed, and if a directory exists it is set in the root. The memory is selected as the default.	A	2.1.2 Selecting a Device, Directory, and File
Dir	This menu sets the directory that carries out input/ output operations, and is on standby for input. Note that when memory is selected for the device, the directory can be selected from the submenu.	A	
File name	This menu sets the file name that carries out input/ output operations, and is on standby for input. When memory is selected for the device, setting is not necessary if the directory is not the program.	A	
List update	This updates the list. The list of the directly selected in the currently valid file setting column (A/B) is updated.	C	-
Transfr A→B	This copies the file in file setting column A (transfer origin) to the file setting column B (transfer destination). (The transfer origin file is not changed.) A message appears during transfer and when the transfer is completed.	B	2.1.3 Transferring a File
Compare A:B	This compares the files in file setting column A (transfer origin) and file setting column B (transfer destination).	C	2.1.4 Comparing Files (Compare)
Erase A	This erases the file in file setting column A. **(Note)** The NC memory (excluding programs), serial and Ethernet (host file) cannot be erased.	B	
Erase B	This erases the file in file setting column B. **(Note)** The NC memory (excluding programs), serial and Ethernet (host file) cannot be erased.	B	
Rename A→B	This changes the name of the file in file setting column A (transfer origin) to the name of the file in file setting column B (transfer destination). **(Note)** The same device must be selected for A and B. The NC memory (excluding programs) and serial cannot be renamed.	B	
Comment nondisp	This changes whether to show or hide the comment field.	B	
Dir create	This creates a new directory in the directory of the currently valid file setting column (A/B). The directory can be created when HD, FD, memory card or DS is selected for the device.	A	
Merge B→A	The file contents in the file setting column B are added to the file in the file setting column A. (The file in the file setting column B is not changed.) **(Note)** The NC memory (excluding programs), serial and Ethernet (host file) cannot be merged.	B	
FD format	This formats the FD. This menu is only for 700 series.	A	2.1.5 Formatting an External Device
MemCrd format	The formats the front IC card.	A	
DS format	This formats the NC compact flash memory. This menu is only for 700 series.	A	
Warning cancel	This cancels a warning from network service.	C	
Stop	This interrupts the process (transfer, compare, etc.) during execution.	C	-

2.1.1 Changing the Valid Area

When setting the file setting field A or B device, directory and file name on this screen, the area containing these must be valid.

The display area can be changed by pressing the menu key (Area change) or the cursor key ↑ and ↓.

After changing, the data setting operation is valid in that area.



File setting field A is valid.

File setting field B is valid.

Changing the valid file setting field

When file setting field A (top) is valid

(1) Press the menu Area change. → The file setting field B (bottom) is validated.

This can also be changed with the cursor key ↓.

2.1.2 Selecting a Device, Directory and File

File selection sequence

Designate the device where the target file is located. → Select from the sub menu.
↓
Designate the directory with a full path. → Input the full path or select from the list.
↓
Designate the file name. → Input the file name or select from the list.

Menu used

Device select menu's submenus

Menu	Details	Type	Reference
Memory	This selects the NC memory (program, parameter, user PLC, NC data).	C	-
HD	This selects the hard disk. This menu is only for 700 series.	C	-
Serial	This selects the RS-232C device (PC, tape, etc.).	C	-
Memory card	This selects the front IC card.	C	-
DS	This selects the NC compact flash memory. This menu is only for 700 series.	C	-
Ethernet	This selects the Ethernet-connected host computer.	C	-
FD	This selects the floppy disk. This menu is only for 700 series.	C	-
Anet server	This selects the Anshin-net server.	C	

Dir (other than memory) and File name menu submenus

Menu	Details	Type	Reference
From list	The cursor appears in the list display. The list contents can be selected with the INPUT key. When a directory is selected, the contents of the selected directory are displayed in the list. Continued selection is possible. When a file name is selected, the file name is temporarily displayed in the input area. When the INPUT key is pressed again, it is fixed.	A	-

Selecting methods for device, directory, and file name

Device	Designation target file	Designation method		
		Device	Directory	File name
NC memory	• Machining program • User macro • Fixed cycle	Select from the submenu	- (Default)	Key input in the input area, and press INPUT
				Select from the list
	Other than the machining program	Select from the submenu	Key input in the input area, and press INPUT	- (Fixed)
			Select from the submenu	
Other than the NC memory	All	Select from the submenu	Key input in the input area, and press INPUT	Key input in the input area, and press INPUT
			Select from the list	Select from the list

The device can be selected from the submenu. (The devices that can be used will differ depending on the specifications.)
One of the following methods can be used to designate the directory (for devices other than the NC memory) and file name.

- Set the directory path (full path) or file name in the input area, and press the INPUT key.
- Press submenu From list of the menu Dir or File name. Move the cursor to the target directory or file name, and press the INPUT key.

A wild card (*) can be used when selecting a file name.

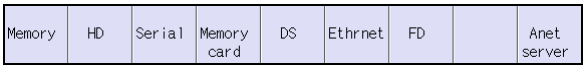
Notes when selecting a file

(1) During directory and file name setting, the designated directory, path or file name will be set, even if it does not actually exist. This will not cause an error. Note that the previously set directory is overwritten.
(2) When a file in the NC memory other than a machining program is designated, it is not necessary to set the file name. (The file name is fixed.)
(3) When a file name is selected from the menu, it first is displayed in the input area. However, at this time the file name has not yet been fixed. Press the INPUT key again to fix the file name.
(4) When the ◁ key is pressed when setting a file name, the file name in the input area is erased.
(5) When a fixed cycle program is designated, the basic common parameters "#1166 fixpro" must be set. Select "Memory" for the device, and "Program" for the directory.

Selecting an NC memory program

(1) Press the menu [Device select].

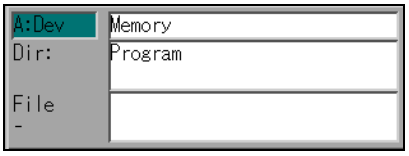
The following menu appears.



(When specifications of all devices is valid.)

(2) Press the menu [Memory].

"Memory" appears in the device name, and the default "Program" appears in the directory.

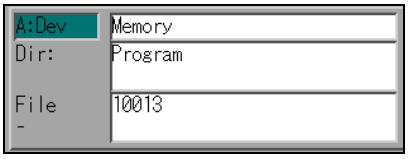


(3) Press the menu [File name].

The following menu appears.

<When inputting the file name from the input area>

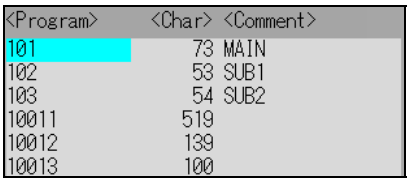
(4) Input the file name
10013 [INPUT]



<When selecting the file name from the list>

(4)-1 Press the menu [From list].

The cursor appears in the list.

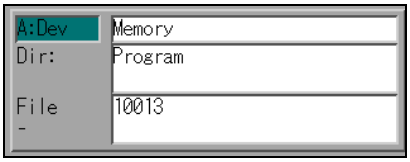


(4)-2 Move the cursor to file name to be selected, and fix.
[↑], [↓], [INPUT]

The selected file name appears in the input area.

(4)-3 Press the [INPUT] key.

The selected file name appears.

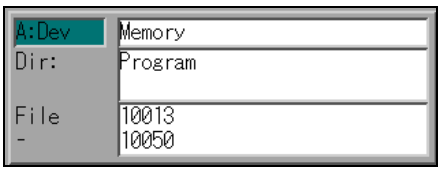


Designating multiple files

(1) Designating multiple serial files

Multiple serial files can be transferred, compared and erased in the file setting column A. Set as follows in this case.

File : First file name
\- : Last file name

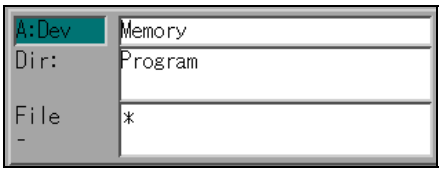


(2) Using a wild card

A wild card (*) can be used in the file name.
(Note) When serial or Anshin-net server is used, multiple files cannot be compared.

File : *
\-

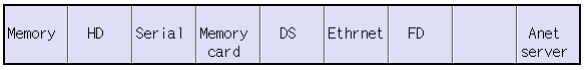
All files will be selected.



Selecting an NC memory file other than a program

(1) Press the menu [Device select].

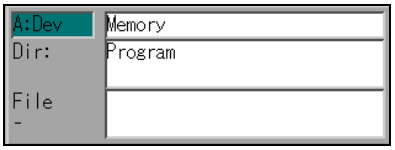
The following menu appears.



(When specifications of all devices is valid.)

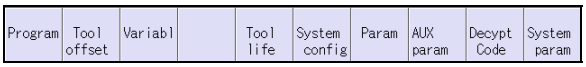
(2) Press the menu [Memory].

"Memory" appears in the device name, and "Program" appears as the default in the directory.



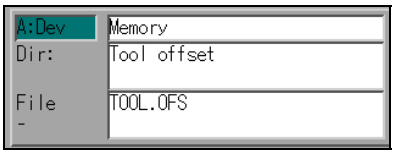
(3) Select the menu [Dir].

The following menu appears.



(4) Press the menu [Tool offset].

The directory and file name appear.

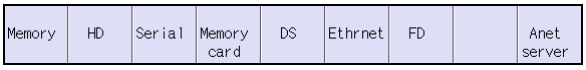


(Note) The file name for each directory is fixed. Refer to "2.1.6 List of file names" for the file names.

Selecting a device file other than the NC memory

(1) Press the menu [Device select].

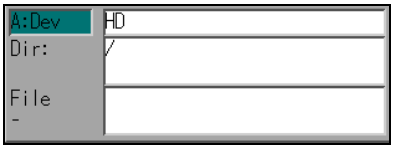
The following menu appears.



(When specifications of all devices is valid.)

(2) Select a device.

The device name appears. The root directory is selected as the default.

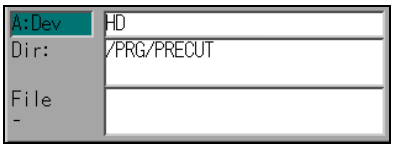


(3) Designate the directory.
Select the menu [Dir]

The mode changes to the mode for inputting the directory name.
The following menu appears.

<When inputting the directory from the input area>

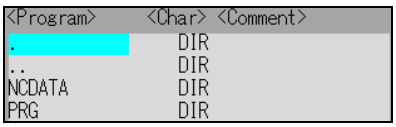
(4) Input the directory path as a full path.
/PRG/PRECUT [INPUT]



<When selecting the directory from the list >

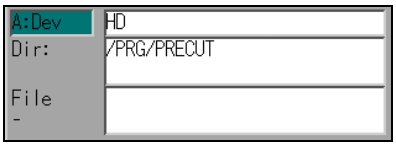
(4)-1 Press the menu [From list]

The cursor appears in the list.



(4)-2 Move the cursor to directory to be selected, and fix.
[↑], [↓], [INPUT]

The selected directory appears in the data setting column.
The contents of the selected directory appear in the list.



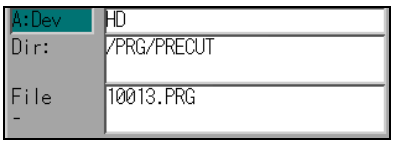
Repeat this operation until the target directory is reached.
When the target directory is reached, press the [◁] key and quit the mode for inputting the directory.

(5) Designate the file name.
Press the menu [File name]

The mode changes to the mode for inputting the file name.
The following menu appears.

<When inputting the file name from the input area>

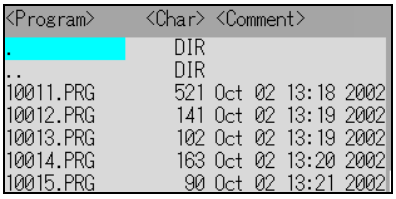
(6) Input the file name
10013.PRG [INPUT]



<When selecting the file name from the list>

(6)-1 Press the menu [From list].

The cursor appears in the list.

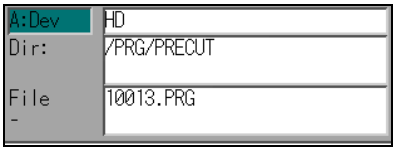


(6)-2 Move the cursor to file name to be selected, and fix.
[↑], [↓], [INPUT]

The selected file name appears in the input area.

(6)-3 Press the [INPUT] key.

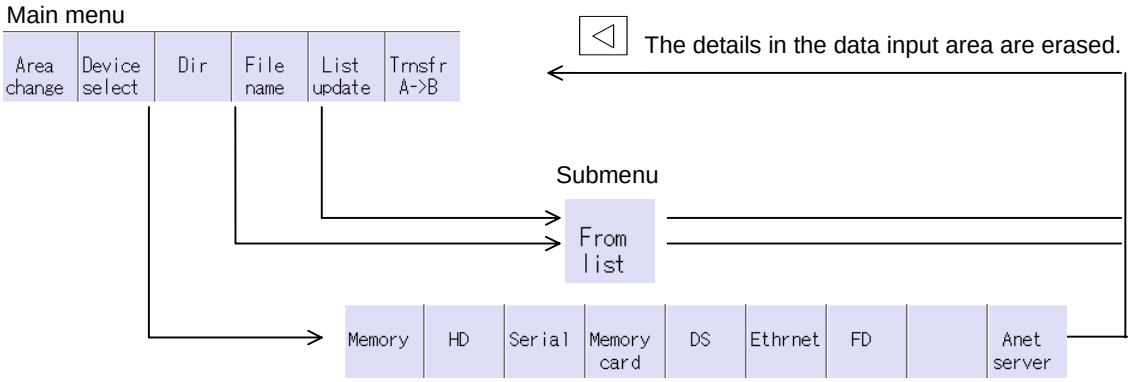
The selected file name appears.



Canceling the input mode

(1) Press the Device Select , Dir or File name.
To cancel the data input at this time, press the ◁ key.
➡ The submenu appears.

(2) Press the ◁ key.
➡ The details in the input area are erased, and the main menu appears.



(When specifications of all devices is valid.)

2.1.3 Transferring a File

Operating method

(1) Press the menu [Area change] , and select file setting column A.

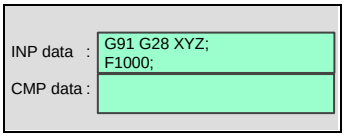
(2) Designate the transfer origin device, directory and file name. ➡ The designated file appears.
Multiple files can be designated in the file setting column A. Designate the first and last file name of the target range. A wildcard "*" can be designated for the file name.

(3) Press the menu [Area change], and select file setting column B.

(4) Designate the transfer destination device, directory and file name. ➡ The designated file appears.

(5) Press the menu [Trnsfr A ->B]. ➡ A message appears to confirm the transfer.

(6) Press [Y] or [INPUT]. ➡ The file transfer starts. The data being transferred appears in the input data display column.
A message appears when the transfer is completed.



⚠ Caution

⚠ " ; ", "EOB", "%", and “EOR” are symbols used for explanation. The actual codes for ISO are "CR, LF" ("LF") and "%".
The programs created on the Edit screen are stored in the NC memory in a "CR, LF" format, however, the programs created with external devices such as the FD or RS-232C may be stored in an "LF" format.
The actual codes for EIA are "EOB (End of Block)" and "EOR (End of Record)".

❗ To prevent the influence of data loss and data transformation over the line, always carry out data comparison after transferring a machining program.

Notes

(1) Notes related to transferring in general

(a) Depending on the type of file, some data cannot be transferred during automatic operation. Do not transfer during automatic operation.
(b) When the capacity of the transfer destination is reached during file transfer, only the data transferred up to that point is registered as a file, and an error will result.
(c) During input to the NC memory or comparison, if the file format size on the NC memory side differs from the other side file format size (when the maximum number of registrations differs between the NC memory and the other side), processing is carried out matched to the smaller size.
(Ex. 1) If a format size of 200 files is input for a format size of 1000 NC files, 200 files are registered.
(Ex. 2) If a format size of1000 files is input for a format size of 200 NC files, the files up to the 200th file are registered and an error message appears. (The remaining files are not registered.)
(d) Up to 223 files, including the directory, can be registered in the FD's root directory.

(2) Notes when transferring machining program files

(a) For the serial, always set feed (Null) at both ends of the "EOR" code at the head and end. If "EOB" etc., is directly after "EOR", the operation may not execute normally due to the input buffer influence during the next input operation.
(b) The transfer speed is slower if there are many registrations.
(c) The size of one block of the machining program should be 250 characters or less.
(d) When using tape, carry out parity V adjustment to improve the reliability of the tape format. Then use with the input/output parameter "Parity V" validated.
(e) When the machine tool builder macro and fixed cycle program are input to NC memory, change the program type with the parameter "#1166 fixpro". Also, set in the Input/Output screen as follows.
Device: Memory, Directory: Program
(f) Transferring or verifying the multiple files between the external device connected serially and that other than the serial connection.
(g) With machining program created before the MELDAS500 Series, "EOB" is registered as "LF". However, when these programs are stored in the 700/70 Series NC memory, "EOB" will be converted to "CR LF", and the number of characters will increase. Thus, when all of the machining programs output from an MELDAS500 Series or earlier NC, having the same specifications as the maximum memory capacity, are stored in the 700/70 Series NC memory, the memory capacity may be exceeded.
(h) When the file to be transferred (input) is running or in "program restarting" mode, the operation message "Executing automatic operation" or "Program restarting" is displayed and file will not be transferred (input).

(3) Notes when transferring tool offset data files

(a) If an error occurs during offset data transfer, an error message appears on the screen, and the transfer operation is interrupted.

(4) Notes when transferring parameter files

(a) In the same manner as when setting in the Parameter screen, there are parameters validated immediately after input, and parameters validated after a restart. Restart when a parameter file has been transferred to the NC memory.
(b) When a parameter file is transferred to the NC memory, the setting value of the input/output parameters is also changed. Before transferring next time, set the input/output parameters again.
(c) System parameters can be transferred from the NC memory to an external device, but cannot be transferred from an external device to the NC memory.

(5) Notes when transferring common variable data files

(a) If the variable value is 100000 or more or less than 0.0001 when transferring common variable data, it is expressed with an exponential expression.

(6) Notes when transferring tool life data files

(a) When tool life data is output from the NC memory, the file information is inserted at the first and last of the file.
First file information: Number of registered tools (P No.) and the maximum number of possible registrations (T No.)
Last file information: Finish code

(7) Notes when transferring auxiliary axis parameter files (700 series only)

(a) When the auxiliary axis parameters are input to the NC memory, the same parameter data is simultaneously transferred to the drive unit. If transferred errors by some causes occur, the parameter data may be not matched between NC memory data and drive unit.

(8) Notes when transferring sampling data file

(a) When the output form is set as 8-digit hexadecimal number and the parameter "#1004 ctrlunit" is set to "E (1nm)", accurate data can be output just within 1m.
When the output data length exceeds 1m, lower 32 bits of the sampling data will be output.

2.1.4 Comparing Files (Compare)

Operation method

(1) Press the menu [Area change], and select file setting column A.

(2) Designate the device, directory and file name to be compared. ➡ The designated file name appears.

(3) Press the menu [Area change], and select file setting column B.

(4) Designate the other side device, directory and file name to be compared. ➡ The designated file name appears.

(5) Press the menu [Compare A:B]. ➡ The file comparison starts. The data being compared appears in the comparison data display column.
A message appears when the comparison is completed.
If a comparison error occurs, the block with the error is displayed in the comparison data display column on the screen.

(Note) Files that can be compared are text files only.
Correct outcome will not be obtained through binary file comparison.

2.1.5 Formatting an External Device

Operation method (Formatting an FD) [700 series only]

(1) Insert a floppy disk in the FD drive, and press [FD format] . → A message confirming the formatting appears.

(2) Press [Y] or [INPUT]. → The FD is formatted.
A message appears when the formatting is completed.

(Note 1) The FD is formatted with FAT (1.44MB).
(Note 2) The volume label is set when formatting the FD.

Operation method (Formatting a memory card)

(1) Press the menu [MemCrd format]. → A message confirming the formatting appears.

(2) Press [Y] or [INPUT]. → The memory card is formatted.
A message appears when the formatting is completed.

(Note 1) The memory card is formatted with FAT16.
(Note 2) The volume label is set when the memory card is formatted.

Operation method (Formatting a DS) [700 series only]

First, press the menu [DS format]. Refer to "Formatting a memory card" for following operations.

(Note 1) The DS is formatted with FAT16.
(Note 2) Only the DS formatted with FAT16 can be used. The DS with NTFS cannot be used.
(Note 3) As for the DS formatted with NTFS, reformat it with FAT formatted by Windows to use. (NC cannot convert NTFS partition to FAT formatted.)
(Note 4) The volume label is not set even when the DS is formatted.

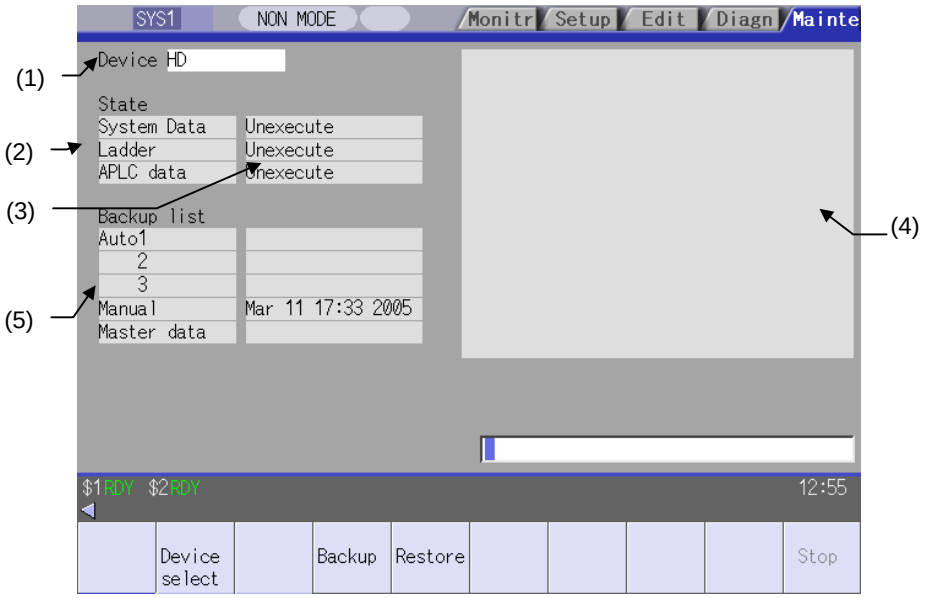
2.1.6 List of File Names

There is a directory for each type of data in the NC memory.
Each directory and file name (fixed) in the NC memory is shown below.
Do not change the extensions (.XXX) when storing in a device other than the NC memory.

Data type	NC memory directory path	Fixed file name
Machining program	/PRG/USER	(Program No.)
Fixed cycle program	/PRG/FIX	(Program No.)
Parameters Parameters [User, machine] (Text format) Auxiliary axis parameter (700 series only)	/PRM	 ALL.PRM AUXAXIS.PRM
User PLC	/LAD	USERPLC.LAD
NC data Tool compensation amount data Tool life management data Common variable data SRAM data	/DAT	 TOOL.OFS TLIFE.TLF COMMON.VAR SRAM.BIN
System configuration data	/DGN	ASSEMBLY.INF
Decryption code	/RLS	PASSCODE.DAT
Sampling data	/LOG	NCSAMP.CSV
Machine data	/DGN	COMPO.STA

2.2 All Backup Screen

This screen is used to perform batch backups of NC memory data to an external device, and batch restoration of that data to the NC memory.
Data backed up by the automatic backup function can also be restored.
Data which has been automatically backed up can be selected only when the device set by the "#8919 Auto backup device" parameter setting is selected.



Display items

	Display item	Details
(1)	Device name	This displays the selected device name.
(2)	Data name	This displays the data name being backed up/restored. System data, ladder, and APLC data are displayed.
(3)	Execution status	This displays the processing execution status. Processing is executed in the system data, ladder, and APLC data order. **(Note 1)**
(4)	Warning message	This displays messages at the start and end of backup/restore processing.
(5)	Backup list	This displays the backup date list. This date is the system data time stamp. The above data can be selected at restore processing. **(Note 2)**

Backup area	Explanation	Backup format
Auto 1 2 3	Data that was automatically backed up. Display in the backup date descending order. The latest three generations of data are displayed.	Auto
Manual	Data that was backed up on this screen.	Manual
Master data	Data that was backed up on this screen. Generally, this is the factory settings data.	Manual

(Note 1) "APLC data" cannot be backed up/restored if the optional "APLC" is disabled.
(Note 2) The "Auto 1 to 3" data display when the device set by the "#8919 Auto backup device" parameter is selected.

Menus

Menu	Detail	Type	Reference
Device select	This displays the sub-menu for "Device" selection.	C	
Backup	This executes backup processing.	A	2.2.1 Performing a Backup Operation
Restore	This executes restore processing.	A	2.2.2 Performing a Restore Operation
Stop	This stops processing.	C	

2.2.1 Performing a Backup Operation

Operation methods

(1)	Press the menu [Backup].	The menu is highlighted. An operation message "Select directory to backup" appears.
(2)	Move the cursor to select the area. Press the [INPUT] key.	An operation message "OK? (Y/N)" appears. (Note) Auto 1 to 3 cannot be selected.
(3)	Press [Y] or [INPUT] key.	Backup operation begins. An operation message "Backupping" appears. When the backup is completed without error, an operation message "Backup complete" appears.

2.2.2 Performing a Restore Operation

Operation methods

(1)	Press the menu [Restore].	The menu is highlighted. An operation message "Select directory to restore" appears.
(2)	Move the cursor to select the file. Press the [INPUT] key.	An operation message "OK? (Y/N)" appears.
(3)	Press [Y] or [INPUT] key.	Restore operation begins. An operation message "Restoring" appears. When the restoration is completed without error, an operation message "Restore complete" appears.

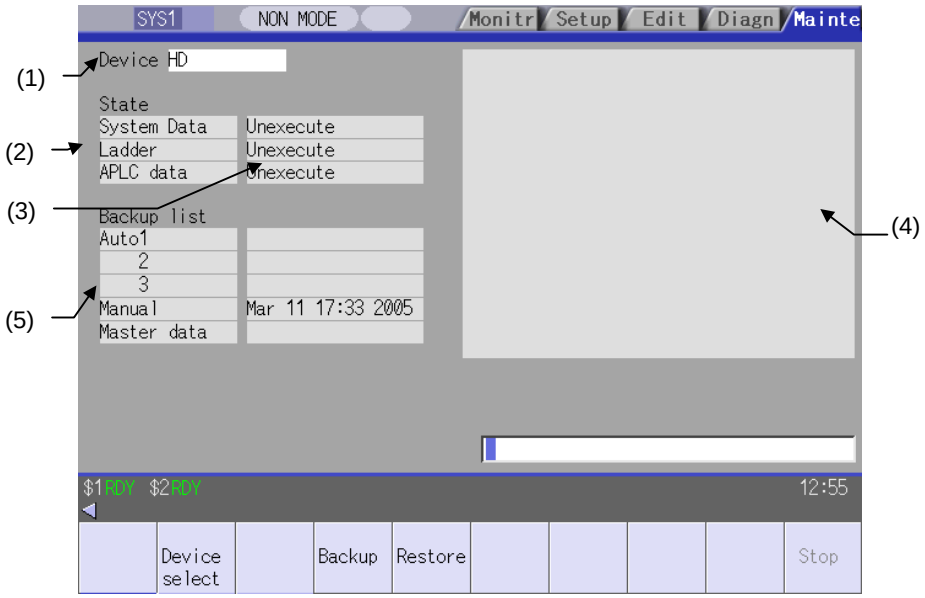
2.2.3 Setting Automatic Backup

When you validate automatic back up function, NC memory data can be backed up automatically.

(1) Parameter setting

By setting the below parameters on operation parameter screen, the automatic back up function will be validated.

#	Item	Contents	Setting range (unit)
8915	Auto backup day 1	When the NC power is ON after the designated date was passed over, the automatic backup is executed. When -1 is set to "Auto backup day 1", the automatic backup is executed every turning NC power ON. When 0 is set to all on "Auto backup day 1" to "4", the automatic backup is not executed. It is possible to specify the designated date up to 4 days for a month.	-1 to 31 (-1 can be set for "Auto backup day 1" only.)
8916	Auto backup day 2		
8917	Auto backup day 3		
8918	Auto backup day 4		
8919	Auto backup device	This sets the automatic backup target device.	0: DS 1: HD 2: Memory card



(5) Backup list	This displays the backup date list. This date is the system data time stamp.

Backup area	Explanation	Backup format
Auto 1 2 3	Data that was automatically backed up. Display in the backup date descending order. The latest three generations of data are displayed.	Auto

2.2.4 Backing up the SRAM

(1) Press the menu [SRAM backup].

➡ A message appears to confirm the backup execution.

(2) Press [Y] or [INPUT].

Press a key other than [Y] or [INPUT] to cancel the backup.

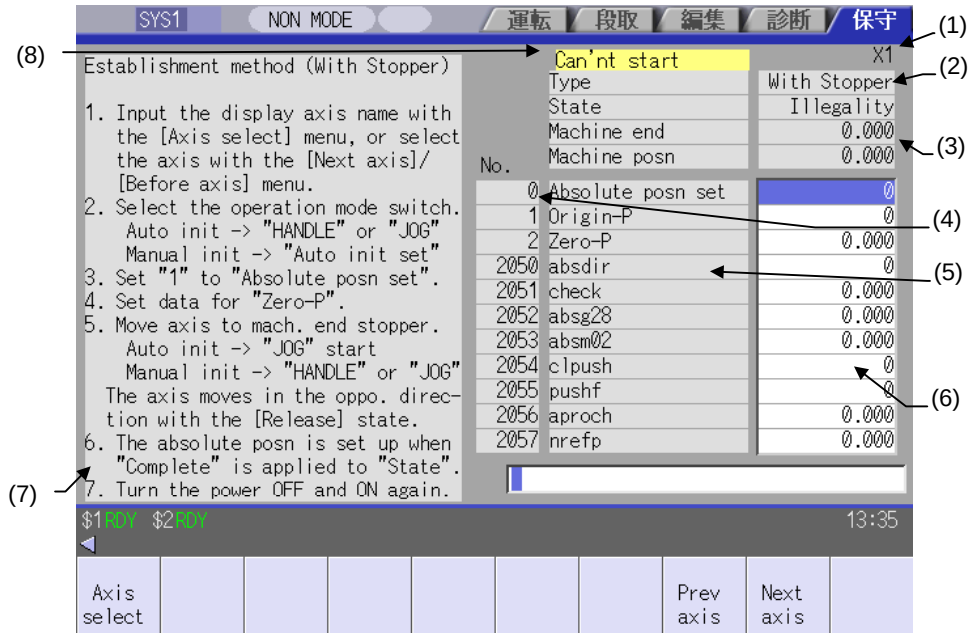
➡ The backup is executed.
<700 series>
The data is backed up into "D:¥ NCFILE ¥ SRAM.BIN" on the HD.
(If SRAM.BIN already exists, the original file will be saved as SRAM.BAK.)
<70 series>
The data is backed up into the memory card.

Menus

Menu	Details	Type	Reference
Psswd input	This changes the screen related to the maintenance by setting the password.	A	
PLC stop	This forcible stops the PLC ladder process. If this menu key is pressed in the stopped state, the stop is canceled.	C	
All backup	This backs up (saves) or restores (reloads) the file such as SRAM etc. to designated device.	C	
System setup	This automatically executes necessary parameter setting for driving servomotor only by setting necessary minimum item.	C	
Adjust S-ana	This changes the screen to that for adjusting the spindle analog output.	C	
To Abs pos	This sets the absolute position for servo axis (arbitrary NC axis, PLC axis).	C	
AUX test	This carries out absolute position setting or test operation by the auxiliary axis forward run/reverse run. This menu is only for 700 series.	C	
Collect set	This executes the followings. Setting to collect the diagnosis data Confirming the diagnosis data collection status Starting/Stopping to collect the diagnosis data Clearing the diagnosis data	C	
Format	This formats the NC memory.	B	
T-life format	This formats the tool life management data.	B	
Serial No.Set	This changes the NC serial No.	A	
Console exec	The console is executed. The MS-DOS window will appear.	C	
To In/out	This changes the screen to the Data Input/Output screen.	C	
To param	This changes the screen to the Parameter screen.	C	
SRAM backup	<700 series> This backs up the NC SRAM information on the HD. <70 series> This backs up the NC SRAM information on the memory card.	B	
HMI Quit	This quits the screen operation.	B	

2.3 Absolute Position Setting Screen

The Absolute position setting screen is used to set the data for the absolute position of servo axes including arbitrary NC axes and PLC axes.



Display items

Display item		Details
(1)	Axis name	This displays the axis name set with the parameter "#1022 axname2". The axis name can be switched by Axis select, Next axis, or Prev axis.
(2)	Type of zero point initialization	This displays the type of zero point initialisation for the selected axis. The shortened expression of the zero point initialization method selected with the parameter "#2049 type (type of absolute position detection system)".

	Displayed expression	Type of zero point initialization for absolute position		Setting value
1	Inc.	Incremental position detection system		Other than 1,2,3,4,
2	With Stopper	Dogless-type absolute position detection system	Machine end stopper method	1
3	No Stopper		Marked point alignment method	2
4			Marked point alignment method II	4
5	Dog-type	Dog-type absolute position detection system		3

(3)	Progress state	
	State	This displays the progress state of zero point initialisation. **(Note)**
	Machine end	This displays the distance from the mechanical basic position to the first grid point.
	Machine posn	This displays the current machine position. "Not passed" will appear until the axis passes a grid point for the first time.
(4)	Data No.	This displays the No., name, and data used to establish the absolute position. • 0 to 2 : Internal data • 2050 to 2059 : Absolute position parameters These can be set also in Absolute position parameter screen. Refer to "Setup Manual" for explanation and setting range of the parameters #2050 to #2059.
(5)	Name	
(6)	Data	

Display items	Details
(7) Procedures	This shows the procedures to establish the coordinate system by zero point initialization. The contents differ depending on the type of zero point initialisation.
(8) Initialization message	This displays a message with the background yellow if an illegal value has been set for the zero point initialization. Refer to the section "10. Appendix" for details.

(Note) [Type of zero point initialization] indicates the progress state of zero point initialization as shown below.

1.Dogless-type absolute position detection system
Machine end stopper method (manual initialization)

Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Stopper	From when the menu "Abs pos set" is pressed to when the axis pushes against the machine end stopper.
3	Release	From when the axis pushes against the machine end stopper to when axis starts to move in the counter direction.
4	Ret. Ref. P.	From when the axis moves in the counter direction to when it reaches the grid point immediately before the stopper.
5	Complete	The axis has reached the grid point immediately before the stopper. The absolute position has been established.

2. Dogless-type absolute position detection system
Machine end stopper method (automatic initialization)

Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Jog Start	From when the menu "Abs pos set" is pressed to when a value is set in "Zero-P".
3	Stopper1	From when JOG operation starts to when the axis pushes against the machine end stopper.
4	Zero-P. Rel.	From when the axis pushes against the machine end stopper to when axis reaches the approach point.
5	Stopper2	From when the axis reaches the grid point immediately before the stopper to when it pushes against the machine end stopper.
6	Ret. Ref. P.	From when the axis pushes against the machine end stopper second time to when axis reaches the grid point immediately before the stopper.
7	Complete	The axis has reached the grid point immediately before the stopper. The absolute position has been established.

3. Dogless-type absolute position detection system
Marked point alignment method

Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Origin Set	From when the menu "Abs pos set" is pressed to when "1" is set in "Origin-P".
3	Ret. Ref. P.	While moving in the direction designated with the absolute position parameter #2050.
4	Complete	The axis has reached the grid point immediately before the marked point. The absolute position has been established.

4. Dogless-type absolute position detection system
Marked point alignment method II

Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Origin Set	From when the menu "Abs pos set" is pressed to when "1" is set in "Origin-P".
3	Complete	With the sequence above, the absolute position is established.

5. Dog-type absolute position detection system

Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Zero-P. Rel.	After dog-type manual or automatic reference position return is started.
3	Complete	Axis has returned to the reference position.

Menus

Menu	Details	Type	Reference
Axis select	After selecting this menu, set the axis name, and press the INPUT key to display the axis name and related data.	A	2.3.1 Selecting an Axis
Prev axis	This switches the data display to the previous axis' data When the first data is displayed, the last axis data will be displayed.	A	
Next axis	This switches the data display to the next axis' data When the last data is displayed, the first axis data will be displayed.	C	

2.3.1 Selecting the Axis

Procedures

(1) Press the menu Axis select. ➡ The menu is highlighted.
The cursor appears in the input area.

(2) Set the axis name (which was set with "#1022 axname2") and press INPUT key. ➡ The axis name and data change.
Procedures displays according to the selected initialization type.

2.3.2 Carrying Out Dogless-type Zero Point Initialization

Procedures (Machine end stopper method : manual method)

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	1 (machine end stopper method is selected)
#2054 clpush (current limit)	0 to 100
#2059 zerbas (zero point return parameter)	1 (on the grid point immediately before the stopper)

The parameters other than "#2049 type" can be set in the "Zero point set" screen.

(1) Select the axis that "#2049 type" is "1". ➡ Refer to "2.3.1 Selecting the Axis" for procedures to select the axis.

(2) Select the HANDLE mode or JOG mode.

(3) Input "1" to "Absolute posn set". ➡ The input value appears at "Absolute posn set".

(4) Input an arbitrary value to "#2 Zero-P". ➡ The input value appears at "#2 Zero-P".

(5) Move the axis toward the machine end stopper.
-> a ➡ State : [Stopper]
Machine end : Distance between stopper and grid point
Machine posn : [Not passed] -> current machine position

(6) Hit against the machine end stopper.
-> b ➡ State : [Stopper]

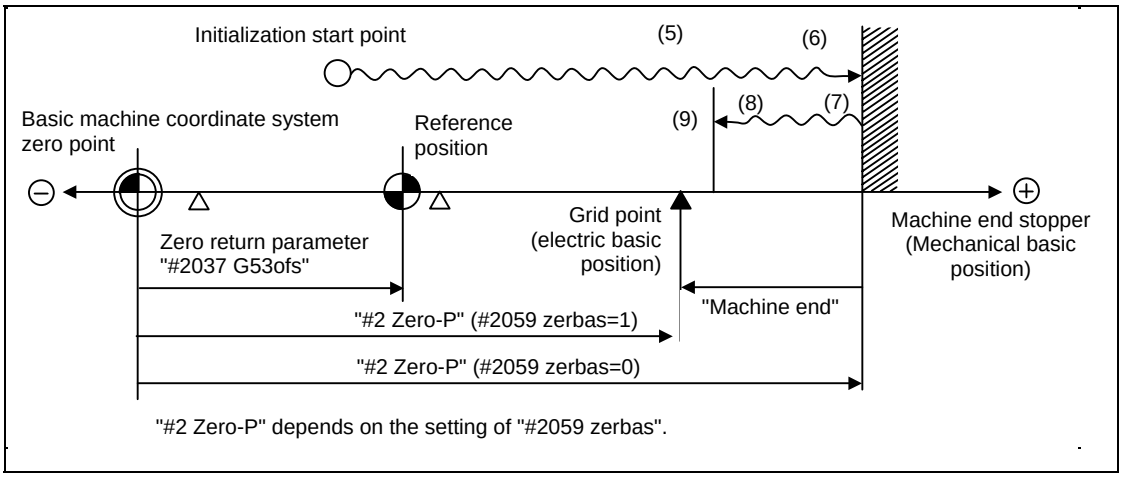
The current has reached its limit for given time.
-> c ➡ State : [Release]

(7) Move the axis in the counter direction.
-> d ➡ State : [Ret. Ref. P.]

The axis has reached the grid point immediately before the stopper.
-> e ➡ State : [Complete]

This completes zero point initialization. Turn the power OFF and ON after the initialization for all axes.

If "#2059 zerbas" is "0" (absolute position origin point = mechanical basic position), axis will stop automatically at this point without moving in the opposite direction and "Complete" appears at [State] and "0.000" at [Machine end].



(Note1) To change just the basic machine coordinate zero point, set "#0 Absolute posn set" and "#2 Zero-P", and then turn the power OFF and ON.

(Note2) If pressing against the machine end is attempted without passing the grip point once after turning the power ON, the operation message "Not passed on grid" will appear. Return to a point before the last grid, and then repeat from step of pressing against the machine end stopper.

(Note3) If the first grid point is covered by the grid mask (#2028 grmask) as a result of return to the electric basic position, the axis stops at the next grid point.
Note that zero-point shift amount (#2027 G28sft) is invalid.

Procedures (Machine end stopper method : automatic method)

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	1 (machine end stopper method is selected)
#2054 clpush (current limit)	0 to 100
#2055 pushf (push speed)	1 to 999
#2056 aproch (approach point)	0 to 999.999
#2059 zerbas (zero point return parameter)	1 (on the grid point immediately before the stopper)

The parameters other than "#2049 type" can be set in the "Zero point set" screen.

(1) Select the axis that "#2049 type" is "1". ➡ Refer to "2.3.1 Selecting the Axis" for procedures to select the axis.

(2) Select the "Auto init set" mode.

(3) Input "1" to "Absolute posn set". ➡ The input value appears at "Absolute posn set".

(4) Input an arbitrary value to "#2 Zero-P". ➡ The input value appears at "#2 Zero-P".

(5) Start JOG operation. ➡ State : [Stopper1]
Machine posn : [Not passed] -> current machine position

The axis moves toward the machine end stopper at the push speed (#2055).
-> a ➡ State : [Stopper1]

The axis pushes against the machine end stopper. After the current reached its limit for given time, the axis returns toward the approach point at the "push speed".
-> b ➡ State : [Zero-P. Rel.]

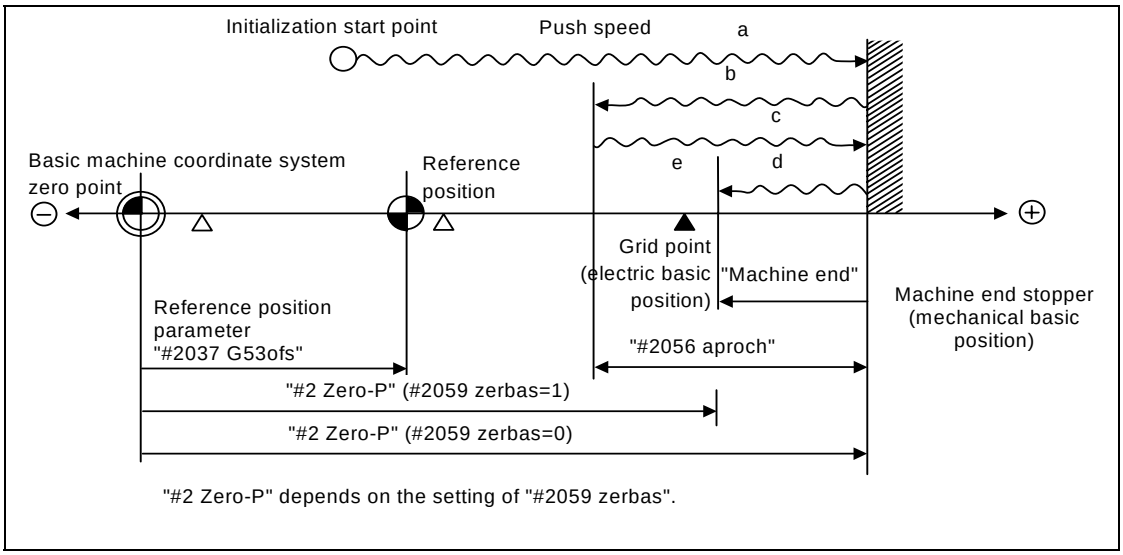
After arrived at the approach point, the axis moves toward the machine end stopper at the "push speed".
-> c ➡ State : [Stopper2]

The axis pushes against the machine end stopper. After the current reached its limit for given time, the axis returns toward the grid point immediately before the stopper at the "push speed".
-> d ➡ State : [Ret. Ref. P.]

The axis has reached the grid point immediately before the stopper.
-> e ➡ State : [Complete]
Machine end : Distance between stopper and grid point

This completes zero point initialization. Turn the power OFF and ON after the initialization for all axes.

If "#2059 zerbas" is "0" (absolute position origin point = mechanical basic position), axis will stop automatically at this point without moving in the opposite direction and "Complete" appears at [State] and "0.000" at [Machine end].



(Note1) To change just the basic machine coordinate zero point, set "#0 Absolute posn set" and "#2 Zero-P", and then turn the power OFF and ON.

(Note2) If pressing against the machine end is attempted without passing the grip point once after turning the power ON, the operation message "Not passed on grid" will appear. Return to a point before the last grid, and then repeat from step of pressing against the machine end stopper.

(Note3) If the first grid point is covered by the grid mask (#2028 grmask) as a result of return to the electric basic position, the axis stops at the next grid point.
Note that zero-point shift amount (#2027 G28sft) is invalid.

(Note4) Acceleration/deceleration during movement at the specified push speed is performed in smoothing-off (step feed) mode.

(Note5) If "0" is specified for "#2056 aproch" of the absolute position parameters, the machine zero point is regarded as the approach point.

(Note6) Automatic initialization is interrupted if one of the following events occurs. If it is interrupted, [State] indicates "Jog Start" (after selecting the "Auto init set" mode if it is caused by mode change), so restart operation from the step of JOG-start.

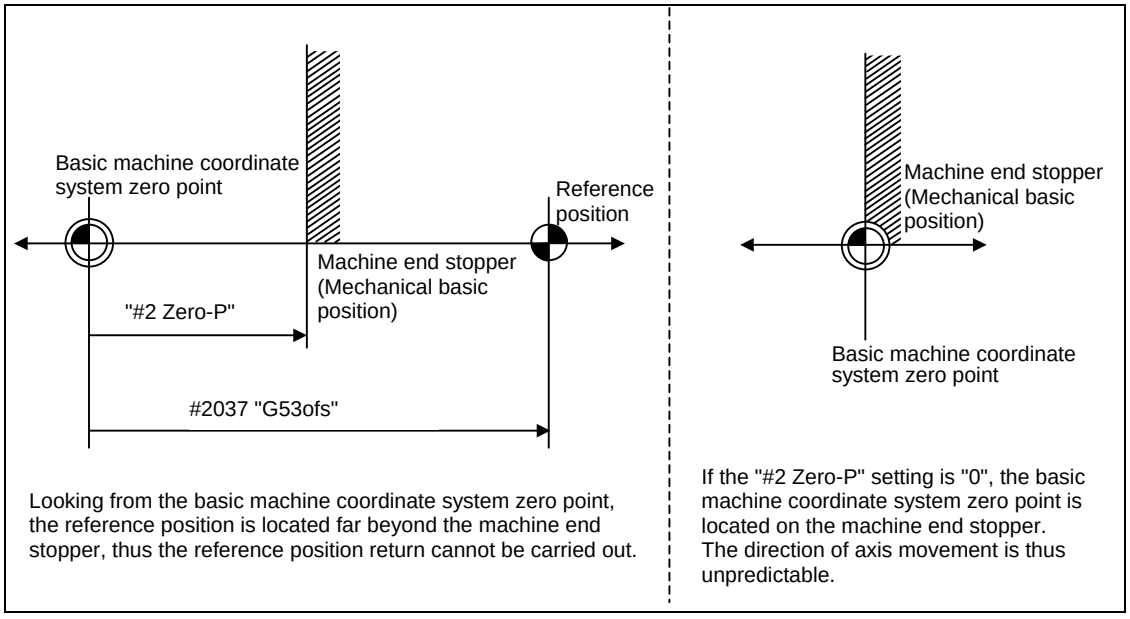
- An absolute position detection alarm occurs.
- Operation preparation signal turns OFF.
- The mode is changed.
- The system is reset.

If [State] is "Complete" before automatic initialization is started, "State" returns to "Complete" when power is turned OFF and ON again without restarting the operation.

(Note7) Automatic initialization cannot be started in the following cases. The operation message "Can't start" will appear if starting is attempted.

- When "#0 Absolute posn set" is not set.
- When the "#2 Zero-P" setting is inappropriate.
- When "#2055 pushf" is not set.
- When "Z71 Abs encoder failure 0005" has occurred.

In the above cases, if the "#2 Zero-P" setting is inappropriate, this means that the relation of "#2 Zero-P" and "#2037 G53ofs" is inappropriate. That is, if "#2 Zero-P" is smaller than the "#2037 G53ofs", the machine end stopper will be located between the basic machine coordinate system zero point and reference position; this disables automatic initialization. (Refer to the following left figure.) If "#2 Zero-P " is set to "0", the machine end stopper direction is unpredictable; this also disables automatic initialization. (Refer to the following right figure.)



Looking from the basic machine coordinate system zero point, the reference position is located far beyond the machine end stopper, thus the reference position return cannot be carried out.

If the "#2 Zero-P" setting is "0", the basic machine coordinate system zero point is located on the machine end stopper. The direction of axis movement is thus unpredictable.

Procedures (Marked point alignment method)

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	2 (marked point alignment method is selected)
#2050 absdir (basic Z - direction)	0/1

The parameters can be set in the "Zero point set" screen.

(1) Select the axis that "#2049 type" is "2". ➡ Refer to "2.3.1 Selecting the Axis" for procedures to select the axis.

(2) Select the HANDLE mode, HANDLE-AX mode, or JOG mode.

(3) Input "1" to "#0 Absolute posn set". ➡ The input value appears at "#0 Absolute posn set".

(4) Input an arbitrary value to "#2 Zero-P". ➡ The input value appears at "#2 Zero-P".

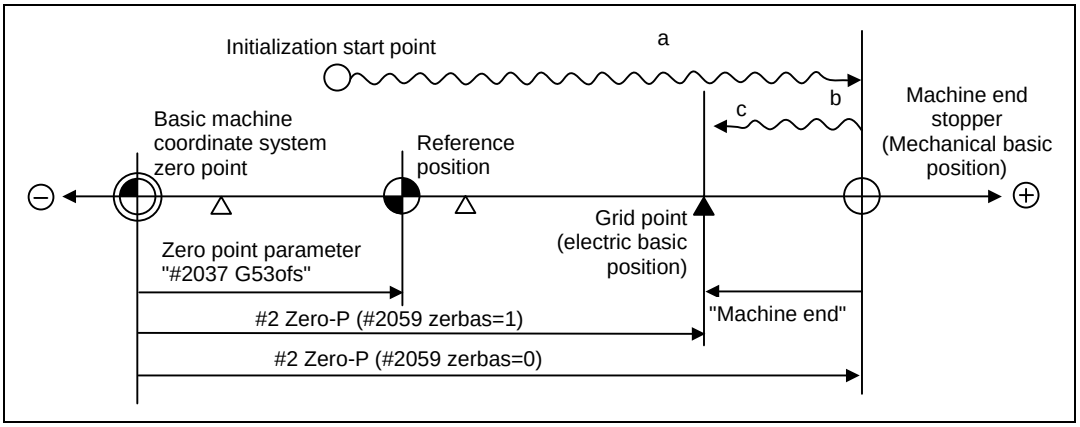
(5) Move the axis toward the mechanical basic position and align it to the marked point.
-> a ➡ State : [Origin Set]
Machine posn : [Not passed] -> current machine position

(6) Input "1" to "#1 Origin-P". ➡ The input value appears at "#1 Origin-P".

(7) Move the axis in the direction designated with the parameter "#2050 absdir".
-> b ➡ State : [Ret. Ref. P.]
Machine end : Distance between machine basic point (marked point) and the first grid point

The axis reaches the first grid point.
-> c ➡ State : [Complete]

This completes zero point initialization. Turn the power OFF and ON after the initialization for all axes.



(Note 1) To change just the basic machine coordinate zero point, set "#0 Absolute posn set" and "#2 Zero-P", and then turn the power OFF and ON.

(Note 2) If aligning axis on the marked point is attempted without passing the grip point once after turning the power ON, the operation message "Not passed on grid" will appear. Return to a point before the last grid, and then repeat from step of aligning the axis on the marked point.

(Note 3) If the first grid point is covered by the grid mask (#2028 grmask) as a result of return to the electric basic position, the axis stops at the next grid point.
Note that zero-point shift amount (#2027 G28sft) is invalid.

(Note 4) Reconfirm the "absdir" setting if the machine does not move in the direction of "#2050 absdir". The machine will move only in the positive direction when set to “0”, and the negative direction when set to "1".

Procedures (Marked point alignment method II)

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	4 (marked point alignment method II is selected)

The parameters other than "#2049 type" can be set in the "Zero point set" screen.

(1) Select the axis that "#2049 type" is "4". ➡ Refer to "2.3.1 Selecting the Axis" for procedures to select the axis.

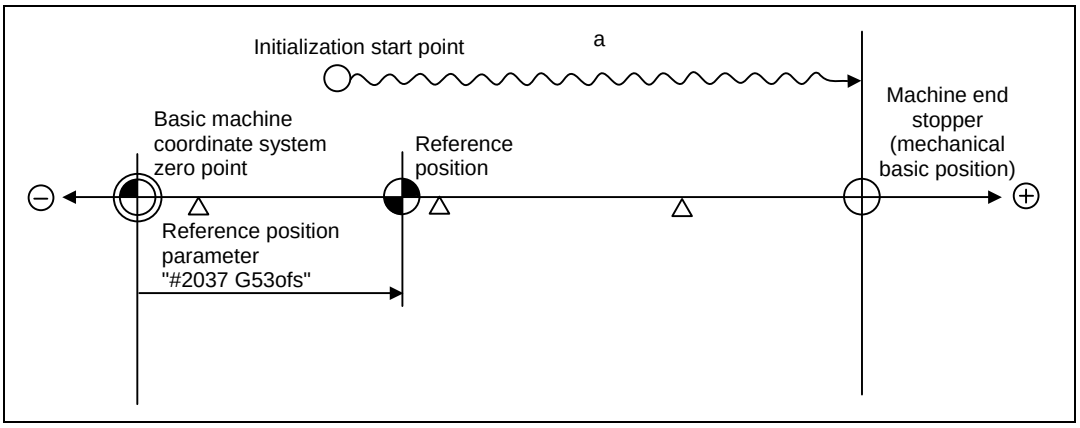
(2) Select the HANDLE mode, HANDLE FEED AXIS SELECT mode, or JOG mode.

(3) Input "1" to "#0 Absolute posn set". ➡ The input value appears at "#0 Absolute posn set".

(4) Input an arbitrary value to "#2 Zero-P". ➡ The input value appears at "#2 Zero-P".

Move the axis toward the mechanical basic position and align it to the marked point.
-> a ➡ State : [Origin Set]

Input "1" to "#1 Origin-P". ➡ The input value appears at "#1 Origin-P".
State : [Complete]
Machine end : 0.000
Machine posn : The value set in "#2 ZERO"



(Note1) To change just the basic machine coordinate zero point, set "#0 Absolute posn set" and "#2 Zero-P", and then turn the power OFF and ON.

(Note2) If aligning axis on the marked point is attempted without passing the grip point once after turning the power ON, the operation message "Not passed on grid" will appear. Return to a point before the last grid, and then repeat from step of aligning the axis on the marked point.

(Note3) If the first grid point is covered by the grid mask (#2028 grmask) as a result of return to the electric basic position, the axis stops at the next grid point.
Note that zero-point shift amount (#2027 G28sft) is invalid.

2.3.3 Carrying Out Dog-type Zero Point Initialization

Procedures (Marked point alignment method II)

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	3 (dog-type method is selected)

(1) Select the axis that "#2049 type" is "3". ➡ Refer to "2.3.1 Selecting the Axis" for procedures to select the axis.

(2) Carry out the manual or automatic dog-type reference position return. ➡ State : [Zero-P. Rel.]
Machine posn : Current machine position

Reference position return completes.
State : [Complete]
Machine end : 0.000
This completes zero point initialization. Turn the power OFF and ON after the initialization for all axes.

(Note1) If the dog-type reference position return is interrupted by resetting, the previous state ("Complete" or "Illegality") will display in the [State] column.
(Note2) With dog-type zero point return, reference position return can be executed again even if the [State] is "Complete".

2.3.4 Precautions

Precautions common for the initialization operation

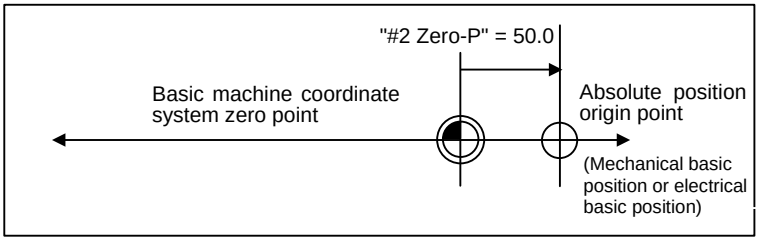
(1) The "#0 Absolute posn set" parameter (axis for which zero point is to be initialized) can be set simultaneously for all axes or individually for each axis.
(2) The "#0 Absolute posn set" parameter cannot be turned OFF with the keys. It is turned OFF when the power is turned ON again.
(3) "#2 ZERO-P" can be set at any time as long as "#0 Absolute posn set" is set to "1".
(4) The grid point must be passed at least once after turning the power ON before initializing the zero point. If the grid point has not been passed, the operation message "Not passed on grid" will appear at the "Machine posn".
(5) When the absolute position is established, the required data will be stored in the memory.

Precautions common for the dogless-type absolute position detector

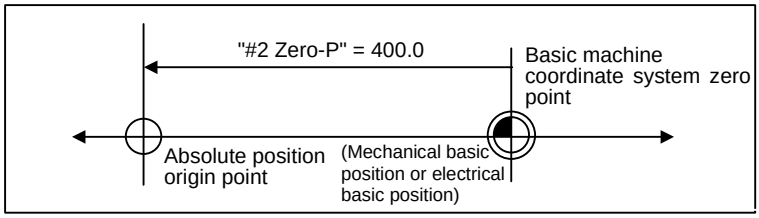
(1) Example of setting "#2 Zero-P" parameter

For the "#2 Zero-P" parameter, set the coordinate value of the absolute position origin point (mechanical basic position or electrical basic position" looking from the basic machine coordinate system zero point.

(Example 1) To set the zero point at 50.0mm before absolute position origin point on + end

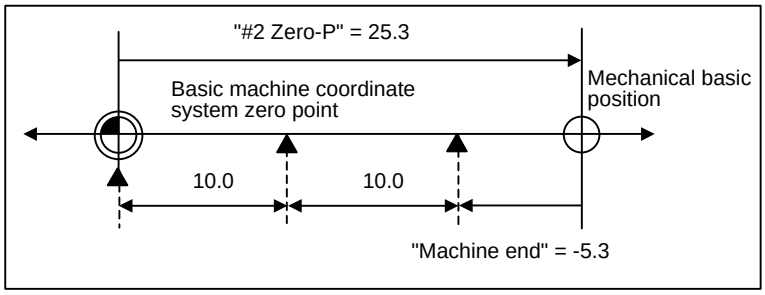


(Example 2) To set the zero point at 400.0mm before the machine basic position or absolute position origin point on - end.



(Example 3) To set the basic machine coordinate system zero point on the grid point, calculate the "#2 Zero-P" parameter setting value as shown below using the value displayed at "Machine end". "Machine end" shows the distance from the mechanical basic position to the previous grid point.
(Note that when setting the electrical basic position coordinate value in "#2 Zero-P", the "Machine end" value does not need to be considered.)

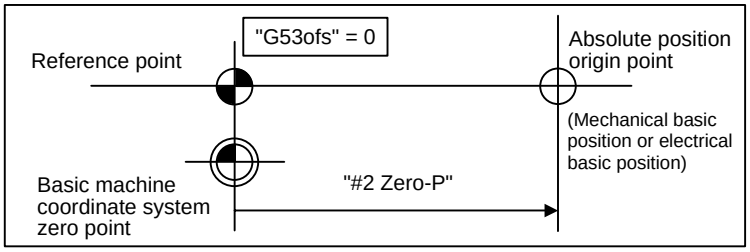
To set the third gird point as the zero point when the "Machine end" display is -5.3 at the + end basic position. (Example of 10.0mm grid interval.)



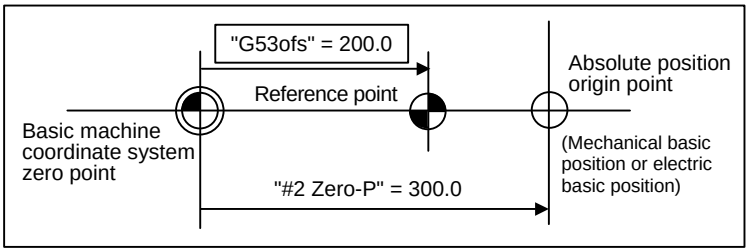
(2) Setting the reference point

The reference point can be set as shown below by setting the "#2037 G53ofs".

(Example 1) To set the reference point to the same position as the basic machine coordinate system zero point.



(Example 2) To set the reference point at a position 200.0mm to the + side from the basic machine coordinate zero point.
(To set the basic machine coordinate system zero point 300.0mm front of the absolute position origin point.)

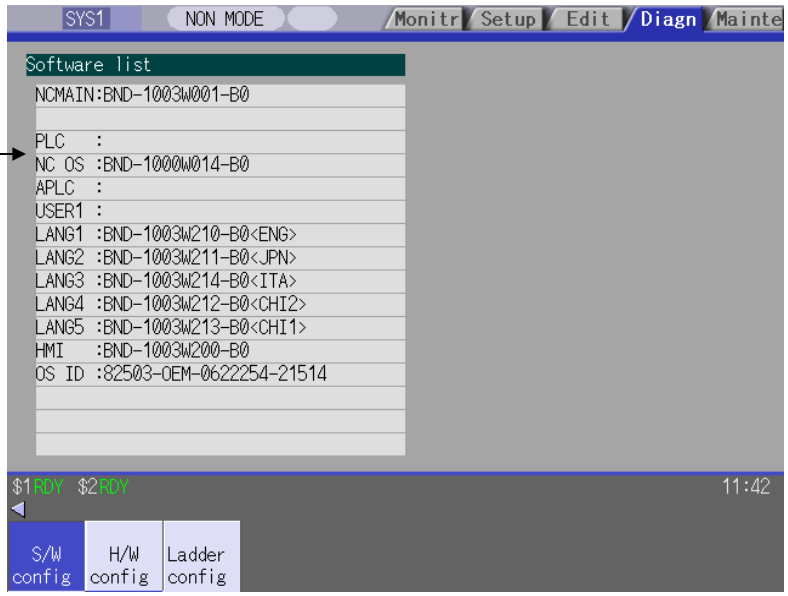


3. Diagnosis Screens

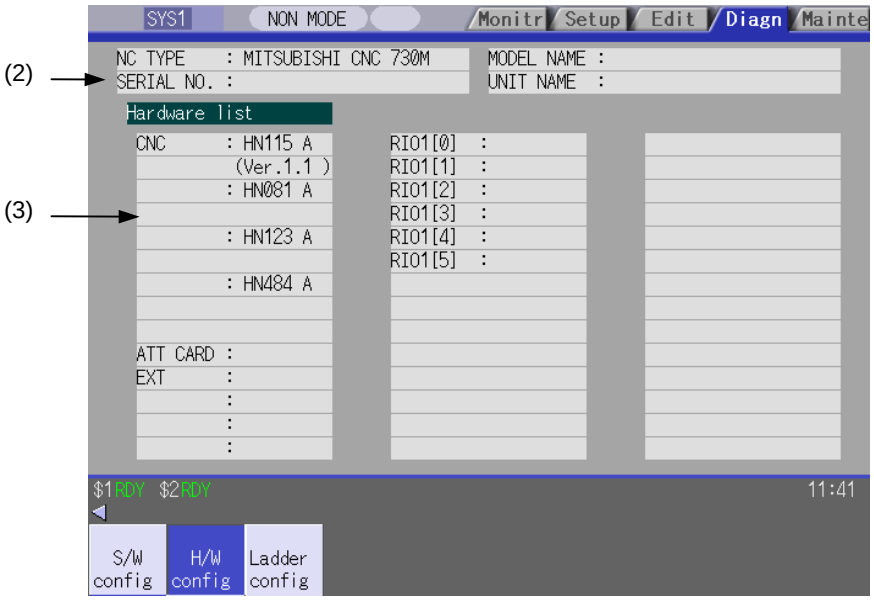
3.1 System Configuration Screen

The hardware configuration (card name and sub-number), software configuration (software number and sub-number), and PLC program configuration (file name, file label, and execution type) are displayed in this screen.

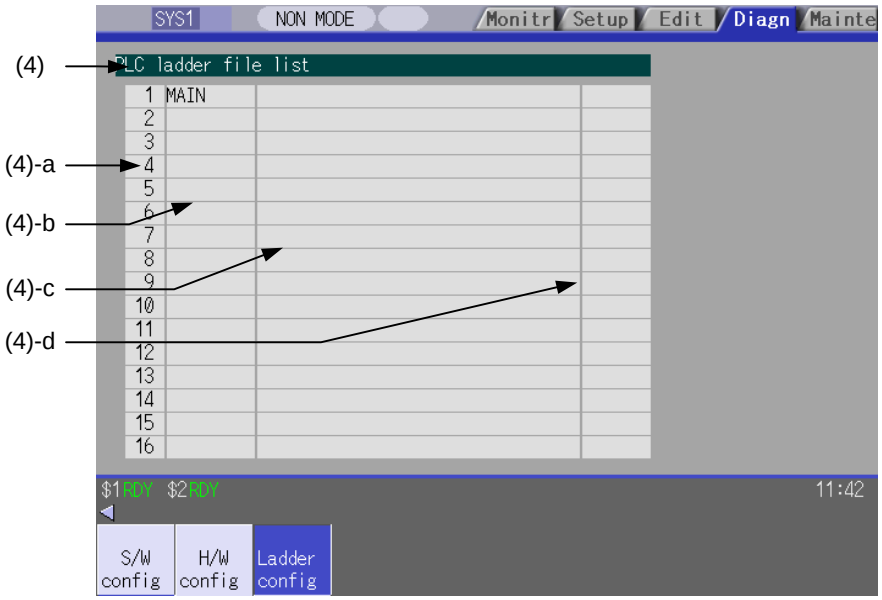
■Software configuration



■Hardware configuration



■PLC program configuration



Display items

Display item		Details	
(1) Software list		This displays a list of the software being used.	
(2) NC serial No.		This displays the NC model name, serial No, model type, and unit type.	
		NC TYPE: MITSUBISHI CNC 7***	NC type
		MODEL NAME: FCA730	Model name
		SERIAL NO.: M7123456789	Serial No.
		UNIT NAME: FCU7-MU011	Unit type
(3) Hardware list		This displays each hardware name.	
	70 Series	CNC : HN761 : HN451	CPU card Memory card
		EXT : HR751	PLC card (for type A) (Blank for type B)
		RI01[n] : RI02[n] : RI03[n] :	Remote IO unit 1 (n= 0 to 7) Remote IO unit 2 (n= 0 to 7) Remote IO unit 3 (n= 0 to 7) There are up to three channels. The 7th and 8th station of the RIO3 channel is fixed for use with the handle I/F and is not displayed.

Display item		Details	
(3) Hardware list			
	700 Series	CNC (Note) : HN115A : HN081A : HN116/122 : HN482/484	Main card with LANCPU Power card CPU card (Differs between M720, M730, M750) Memory card (Differs between M720, M730, M750) The CNC unit is composed of four PCBs. Bus connections are used with all cards.
		ATT CARD :	Currently unused.
		EXT : EX891 : HR553 : HR577	Back panel Extension unit Extension unit The extension unit is a hardware option. The PLC high-speed engine or PROFIBUS card, etc. is connected. The back panel + up to three cards are displayed.
		RI01[n] : RI02[n] : RI03[n] :	Remote IO unit 1 (n= 0 to 7) Remote IO unit 2 (n= 0 to 7) Remote IO unit 3 (n= 0 to 7) There are up to three channels. The 7th and 8th station of the RIO3 channel is fixed for use with the handle I/F and is not displayed.
(4) PLC ladder file list		This displays the file name, file label, execution type for each PLC ladder program. Use ↑ , ↓ keys to change the pages and refer it.	
		(a) Registration No.	This displays the registration No. of each PLC program file. Registration size is max. 32 files. The target file to be executed is max. 20 files.
		(b) File name	This displays the file name of PLC program file. (data of GX Developer) Max. 8 characters.
		(c) File label	This displays this file label of PLC program file. (data of GX Developer) Max. 32 characters.
		(d) Execution type	This displays the execution type of PLC program.

Display	Meaning
HIGH	High-speed PLC program
MIDDLE	Middle-speed PLC program
INTIAL	Initial state of PLC program
WAIT	Standby PLC program
LOW	Low-speed PLC program
(blank)	Not the target of the execution.

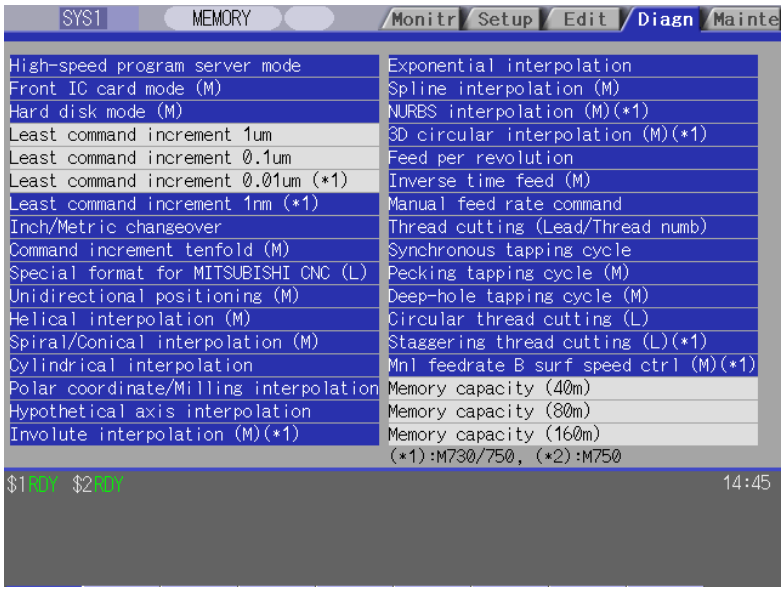
Menus

Menu	Details	Type	Reference
S/W config	This displays the software list.	C	
H/W config	This displays the hardware list.	C	
Ladder config	This displays the PLC program list (file name, file label, and execution type	C	

3.2 Option Display Screen

The contents of the options registered in the NC are displayed in this screen.
The option items are displayed by name. If all of the options cannot be seen in one screen, the rest of options can be displayed by pressing the page changeover key.

(1) →



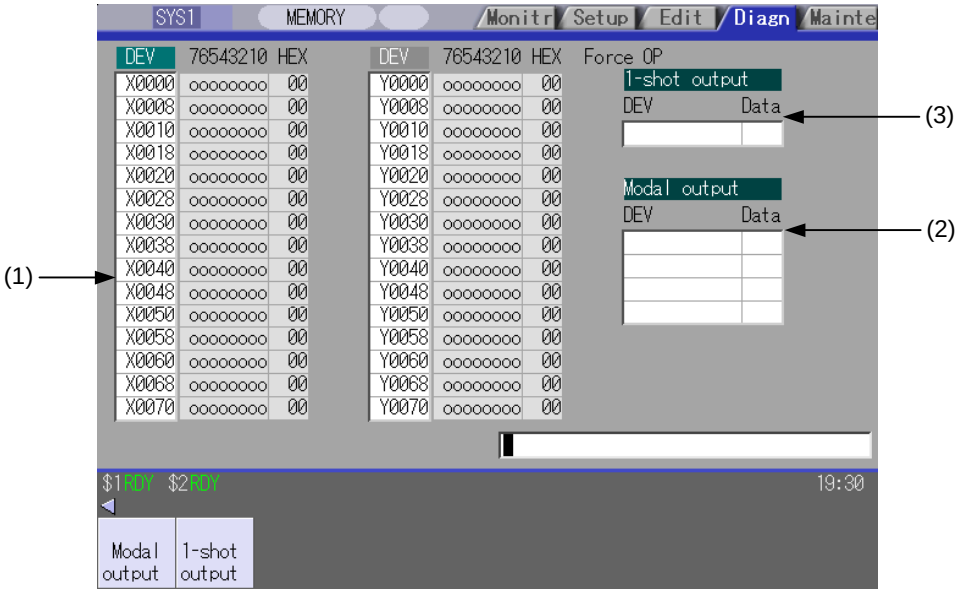
Display items

Display item	Details
(1) Option items	The list of currently usable options are displayed. As for the currently usable options, the background color is displayed in blue. The option set when the power supply was turned ON can be currently used.

3.3 I/F Diagnosis Screen

The various input/output signals for the PLC (Programmable Logic Controller) control can be displayed and set in this screen.
These signals can be used in confirmation of the machine sequence operation during PLC development, and in confirmation and forced output, etc., of the input/output data between the NC and PLC.

(Note) Pay close attention to the sequence operation when using these functions during machine operation.



Display items

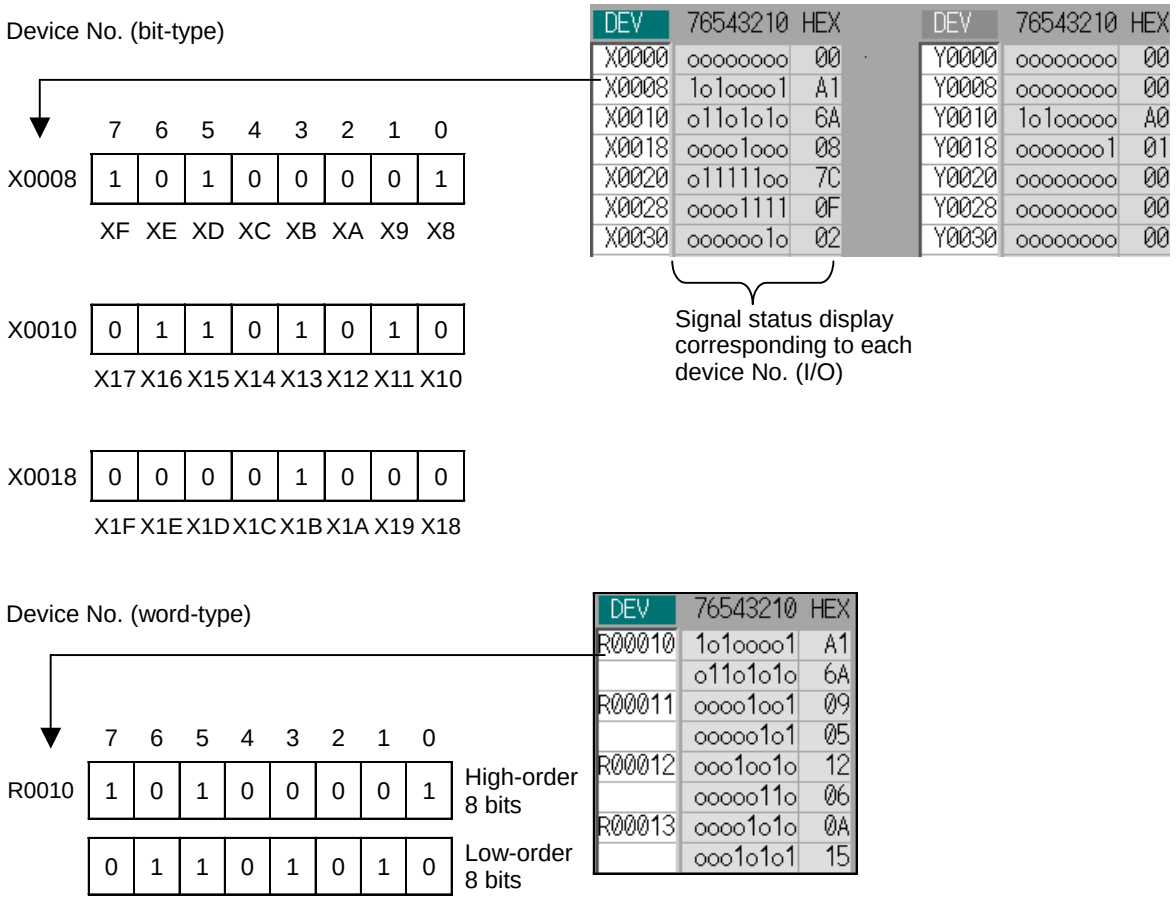
Display item	Details
(1) Device No. and input/ output signal value (binary/ hexadecimal display)	This displays the data from the device Nos. designated in the setting area in numerical order. The data is displayed as binary (bit units) and hexadecimal values. Individual device Nos. can be displayed separately in the left area and right area. Select the valid area with theand ← key when → operations such as display changeover and data setting are carried out. Each X, Y, M, F, L, SM, TI, TO, TS, TA, STI, STO, STS, STA, CI, CO, CS, CA, D, R, SB, B, V, SW, SD, W, P, K, and H data is the target data.
(2) Modal output	This displays the data and device to carry out modal output. The details to be defined are set here when carrying out the modal type forced output of PLC interface signals. Refer to "3.3.2 Carrying Out Modal Output" for details.
(3) 1-shot output	This displays the data and device to carry out one-shot output. The details to be defined are set here when carrying out the one-shot type forced output of PLC interface signals. Refer to "3.3.3 Carrying Out One-shot Output" for details.

Menus

Menu	Details	Type	Reference
Modal output	This changes the setting area to an input standby status. The signal is forcibly output (modal).	A	3.3.2 Carrying out modal output
1-shot output	This changes the setting area to an input standby status. The signal is forcibly output (one-shot).	A	3.3.3 Carrying out one-shot output

How to read the device No. and display data

A device is an address for classifying a signal handled in the PLC. A device No. is a series of numbers attached to that device.



List of devices for PLC uses

Device	Device No.	No. of points	Units	Details
X (*)	X0 to X1FFF	8192	1-bit	Input signals to the PLC. Machine input, etc.
Y	Y0 to Y1FFF	8192	1-bit	Output signals to the PLC. Machine output, etc.
M	M0 to M10239	10240	1-bit	For temporary memory
F	F0 to F1023	1024	1-bit	For temporary memory. Alarm message interface.
L	L0 to L511	512	1-bit	Latch relay (Backup memory)
SM (*)	SM0 to SM127	128	1-bit	Special relay
TI	TI0 to TI703	704	1-bit	Timer contact
TO	TO0 to TO703	704	1-bit	Timer output
TS	TS0 to TS703	704	16-bit	Timer setting value
TA	TA0 to TA703	704	16-bit	Timer current value
STI	STI0 to STI63	64	1-bit	Integrated timer contact
STO	STO0 to STO63	64	1-bit	Integrated timer output
STS	STS0 to STS63	64	16-bit	Integrated timer setting value
STA	STA0 to STA63	64	16-bit	Integrated timer current value
CI	CI0 to CI255	256	1-bit	Counter contact
CO	CO0 to CO255	256	1-bit	Counter output
CS	CS0 to CS255	256	16-bit	Counter setting value
CA	CA0 to CA255	256	16-bit	Counter current value
D	D0 to D2047	2048	16-bit	Data register
R (*)	R0 to R13311	13312	16-bit	File register
SB	SB0 to SB1FF	512	1-bit	MELSEC NET/10 link special relay
B	B0 to B1FFF	8192	1-bit	MELSEC NET/10 link relay
V	V0 to V255	256	1-bit	MELSEC NET/10 edge relay
SW	SW0 to SW1FF	512	16-bit	MELSEC NET/10 link special register
SD	SD0 to SD127	128	16-bit	MELSEC NET/10 special register
W	W0 to W1FFF	8192	16-bit	MELSEC NET/10 link register

(Note) The use of devices marked with a * mark in the device column has been determined.
Do not use devices other than those corresponding to the input/output signals with the machine side (input/output signals of the remote I/O unit), even if it is an undefined vacant device.

3.3.1 Displaying the PLC Device Data

The various status signals and register data used in the PLC can be monitored and displayed.
When this screen is first selected, the respective 16-byte amounts of input/output data are displayed from device "X0000" on the left display area, and from device "Y0000" on the right side.
This screen constantly monitors and displays the PLC signal statuses. Consequently, when signals are changed in the PLC, the display is changed according to the changes.
Note that because time differences occur between the PLC signal change and the signal display, there may be a delay in the display. The machine may also not be able to correspond to extremely brief signal changes.

Displaying the data of a arbitrary device No. "X0020"

(1) Press the menu tab key [←], [→], and select the area to display the data.

(2) Set the device No. (X0020), and press the [INPUT] key. ➡ The device "X0020" appears at the head of the valid display area.

DEV	76543210	HEX	DEV	76543210	HEX
X0020	11111111	FF	Y0000	oooooooo	00
X0028	o1oooooo	40	Y0008	ooooooo1	01
X0030	oooo111o	0E	Y0010	oooooooo	00
X0038	oooooooo	00	Y0018	oooooooo	00

(Note) When setting the device No., an error will occur if a number exceeding the specifications or an illegal address is set.

Changing the display with the page keys

The valid area device Nos. change in page units when [↑]/[↓] is pressed. Changing of the pages stops within the range of device numbers of which the device has.

(1) Press the [↓] key. ➡ The data is displayed from the next number currently displayed.

DEV	76543210	HEX	DEV	76543210	HEX
X0000	1ooooo01	81	Y0000	oooooooo	00
X0008	oooooo1o	02	Y0008	ooooooo1	01
X0010	oooo1111	0F	Y0010	oooooooo	00
X0018	1oo11111	9F	Y0018	oooooooo	00

↓

DEV	76543210	HEX	DEV	76543210	HEX
X0080	11111111	FF	Y0000	oooooooo	00
X0088	o1oooooo	40	Y0008	ooooooo1	01
X0090	oooo1111	0F	Y0010	oooooooo	00
X0098	oooooooo	00	Y0018	oooooooo	00

3.3.2 Carrying Out Modal Output

Modal type forced output of PLC interface signals is carried out. Once set, this data is held until cancelled, the power is turned ON/OFF, or other data is overwritten. There are four sets of devices that modally output. If this number is exceeded, the previously existing data is overwritten.

Menus used in modal output

Menu	Details	Type	Reference
Modal clear	This releases the modal output for the device at the cursor position in the modal output area. The released data is erased from this area.	C	"Releasing the modal output"

Modally outputting data "1" to device "X0048"

(1) Press the menu key [Modal output]. ➡ The modal output mode is entered, and the cursor appears at the modal output area.

(2) Using the [↑] and [↓] keys, move the cursor to the setting position.

(3) Set the device and data, and press the [INPUT] key.

X0048/1 [INPUT] ➡ Modal output is executed, and the cursor disappears. The data that was in the cursor position is overwritten by the input data, and is invalidated. The modal output mode is cancelled by pressing the [◁] key.

(Note 1) The data of the modally output device is displayed in order in the selected area. This modal output is held until the output is cancelled or the power is turned OFF.

(Note 2) When no data is set (Ex."X0048/","X0048"), the operation message "Setting Data not found" is displayed.

Releasing the modal output

(1) Press the menu key [Modal output]. ➡ The modal output mode is entered, and the cursor appears at the modal output area.

(2) Using the [↑] and [↓] keys, move the cursor to the data to be released.

(3) Press the menu key [Modal clear] . ➡ The data that was in the cursor position is released from modal output. The "DEV" and "Data" columns become blank. The modal output mode is cancelled by pressing the [◁] key.

⚠ Caution

⚠ Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen during machine operation.

3.3.3 Carrying Out One-shot Output

The one-shot type PLC interface signal forced output is forcibly output only once during the screen operations. Thus, it may not be possible to confirm the PLC interface signals updated with the PLC on the screen.

One-shot outputting data "1" to device "X0042"

(1) Press the menu key [1-shot output].

➡ The one-shot output mode is entered, and the cursor appears at the one-shot output area.

(2) Set the device and data, press the [INPUT] key.

X0042/1 [INPUT]

➡ The input data is overwritten in the one-shot output area, and is one-shot output. The cursor in the one-shot output area disappears.
The data of the one-shot output device is displayed in order in the selected area.
The one-shot output mode is cancelled by pressing the [◁] key.

(Note 1) Because the input signal (X, etc.) to the PLC is updated at the head of each PLC cycle, the machine immediately returns to the normal state, even if one-shot type forced output is carried out.

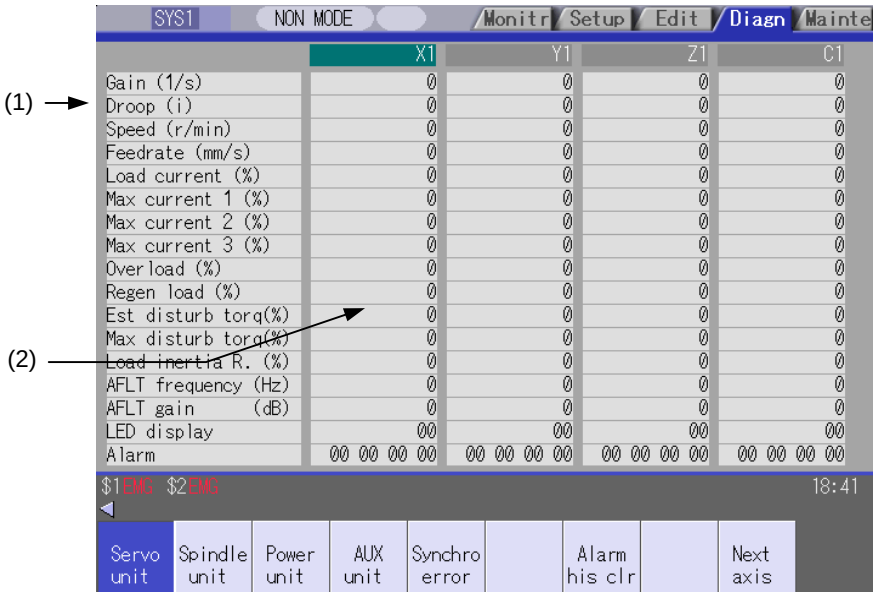
(Note 2) When no data is set (Ex.: "X0048/","X0048"), the operation message "Setting Data not found" is displayed.

⚠ Caution

⚠ Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen during mach

3.4 Drive Monitor Screen

The diagnosis information from the drive section can be monitored with this screen.
Servo axis unit, spindle unit, power supply unit and synchronous error information is displayed.



Display items

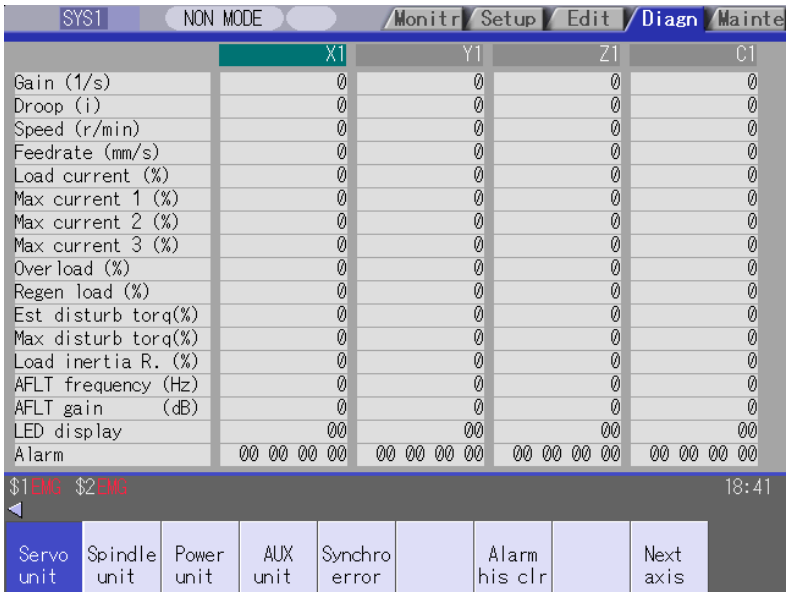
Display item	Details
(1) Monitoring items	This displays each item being monitored. The display is changed using the page changeover keys.
(2) Data of each axis and unit	This displays the data of each axis or each unit being monitored.

Menus

Menu	Details	Type	Reference
Servo unit	This displays the diagnosis information of the servo unit in the data display area.	B	3.4.1 Servo axis unit display items
Spindle unit	This displays the diagnosis information of the spindle unit in the data display area.	B	3.4.2 Spindle unit display items
Power unit	This displays the diagnosis information of the power supply unit in the data display area.	B	3.4.3 Display items for the power supply unit
AUX unit	This monitors the various data related to the auxiliary axis (MR-J2-CT) servo control. The menu appears and operation is possible only when there is one or more valid auxiliary axes in the auxiliary axis control. This menu is only for 700 series.	B	
Synchro error	This displays the diagnosis information of the synchronous error in the data display area. The menu appears and operation is possible only when the synchronous control axis option is valid.	B	3.4.4 Display items for the synchronous error
Alarm his clr	This clears the diagnosis information alarm history.	A	3.4.5 Clearing the alarm history
Next axis	This displays the data for the next four axes. The menu appears and operation is possible only when diagnosis information for five or more axes is displayed.	C	

3.4.1 Servo Axis Unit Display Items

The various data related to the servo axis (NC axis, PLC axis) is monitored.
To reference, change the display items using the ▲ key and ▼ key.



The axis name set in the base axis specification parameter "#1022 axname2" appears at the axis name.

Display items

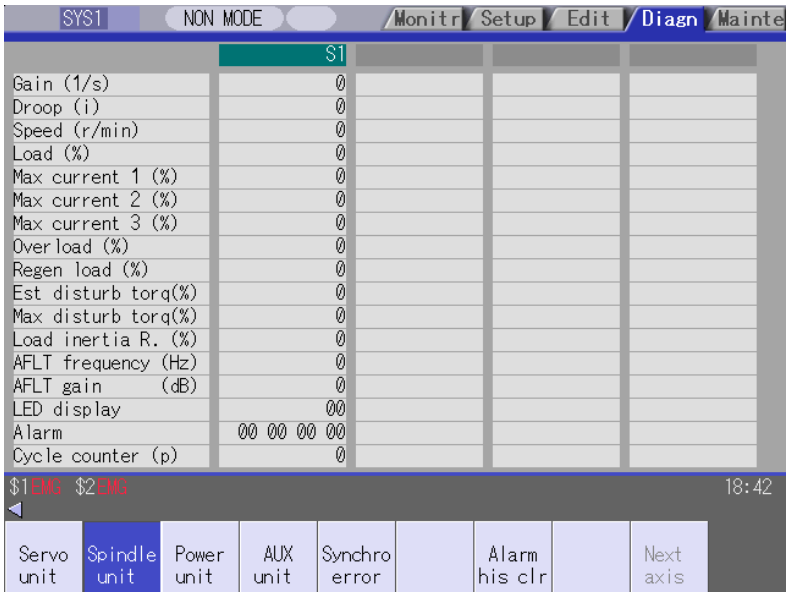
Display item		Details
Gain	(1/s)	This displays the position loop gain. Position loop gain : $\frac{\text{Feedrate (mm/s)}}{\text{Tracking delay error (mm)}}$
Droop	(i)	The error of the actual machine position to the command position is called droop. This error is proportional to command speed value.
Speed	(r/min)	This displays the actual rotation speed of motor.
Feedrate	(mm/s)	This displays the feedrate detected by the detector mounted on the machine end.
Load current	(%)	This displays the FB value of the motor current in terms of continuous current during stalling.
Max current 1	(%)	This displays the motor current command in terms of continuous current during stalling. An absolute value of the current command peak value sampled after the power ON is displayed.
Max current 2	(%)	This displays the motor current command in terms of continuous current during stalling. An absolute value of the current command peak value sampled in most recent 2 seconds is displayed.
Max current 3	(%)	This displays the FB value of the motor current in terms of continuous current during stalling. An absolute value of the current FB peak value sampled in most recent 2 seconds is displayed.
Overload	(%)	This is the data used to monitor the motor overload.
Regen Load	(%)	This is the data used to monitor the resistance overload state when the resistance regenerative power supply is connected.
Est disturb torq	(%)	This displays the estimated disturbance torque in terms of stall rated torque when the disturbance observer is valid.

Display item	Details
Max disturb torq (%)	This displays the estimated disturbance torque in terms of stall rated torque when the collision detection function is adjusted. An absolute value of the estimated disturbance torque peak value sampled in most recent 2 seconds is displayed.
Load inertia R. (%)	This displays the estimated load inertia ratio when the collision detection function is adjusted.
AFLT frequency (Hz)	This displays the present operation frequency of the adaptive filter.
AFLT gain (dB)	This displays the present filter depth of the adaptive filter.
LED display	This displays the 7-segment LED of the driver.
Alarm	This displays the alarms and warnings other than the LED display (displayed on drive unit side).
Cycle counter (p)	This displays the position within one rotation of the encoder detector. The position is displayed as a grid point value as "0", within one rotation in the range of "0" to "RNG (movement units) × 1000".
Grid space	This displays the grid space for the reference position return. (Command unit)
Grid amnt	This displays the distance from the dog-off point to the grid point when the dog-type reference position return is displayed. The grid mask amount is not included. (Command unit)
Machine posn	This displays the NC basic machine coordinate system position. (Command unit)
Motor end FB	This displays the feedback value of the speed detector. (Command unit)
Machine end FB	This displays the feedback position of the machine end position detector. (Command unit)
FB error (i)	This displays the error of the motor end FB and machine end FB.
DFB compen amnt (i)	This displays the compensation pulse amount during dual feedback control.
Remain command	The remaining movement distance of one block is displayed. (Command unit)
Currnt posn (2)	The value of the tool compensation amount subtracted from the current position is displayed. (Command unit)
Man int amt	The amount of interrupt movement in the manual absolute OFF state is displayed. (Command unit)
Abs pos command	This displays the coordinates of absolute position excluding the machine error compensation amount. (Command unit)
Mach err comp val	This displays the machine error compensation amount. (Command unit)
Control input 1L 1H : 6L 6H	This indicates the control signal input from NC. This is used by the system.
Control output 1L 1H : 6L 6H	This indicates the control signal output to NC. This is used by the system.
Detection system	This displays the detector type symbol of the absolute position detection system. ES : Semi-closed encoder EC : Ball screw end encoder LS : Linear scale MP : MP scale ESS : Semi-closed high-speed serial encoder ECS : Ball screw end high-speed serial encoder INC : Incremental

Display item	Details
Power OFF posn	This displays the coordinate at NC power OFF in the basic machine coordinate system. (Command unit)
Power ON posn	This displays the coordinate at NC power ON in the basic machine coordinate system. (Command unit)
Current posn	This displays the current coordinate in the basic machine coordinate system. (Command unit)
R0	This displays the multi-rotation counter value of the detector stored in the memory during basic point setting.
P0	This displays the position within one rotation of the detector stored in the memory during basic point setting.
E0	This displays the absolute position error stored in the memory during basic point setting.
Rn	This displays the multi-rotation counter value of the current detector.
Pn	This displays the position within one rotation of the detector.
En	This displays the absolute position error during NC power OFF.
ABS0	This displays the absolute position reference counter.
ABSn	This displays the current absolute position.
MPOS	This displays the offset amount of the MP scale when the power is turned ON.
Unit type	This displays the servo driver type.
Unit serial No.	This displays the servo driver serial No.
Software version	This displays the servo side software version.
Control method	SEMI : Semi-closed loop CLOSED : Closed loop DUAL : Dual feedback
Motor end detector	This displays the motor end detector type.
Motor end detect No	This displays the motor end detector serial No.
Machine end detector	This displays the machine end detector type. The type is displayed when the control method is CLOSED or DUAL. * is displayed when the method is SEMI.
Mach. end detect No	This displays the machine end detector serial No.
Motor	This displays the motor type.
Work time	This displays the READY ON work time. (Units: 1hr)
Alarm hist 1: Time 1: Alarm : 8: Time 8: Alarm	This displays servo alarms that occurred in latest order with the following formats. Time : Work time when the alarm occurred. Alarm No. : Number of the servo alarms that occurred.
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
Maint status	This displays the maintenance status.

3.4.2 Spindle Unit Display Items

The various data related to the spindle is monitored.
Change the display items using the ▲ key and ▼ key to refer to the data.



Display items

Display items		Details
Gain	(1/s)	This displays the position loop gain. Position loop gain : $\frac{\text{Feedrate (mm/s)}}{\text{Tracking delay error (mm)}}$
Droop	(i)	The error of the actual machine position to the command position is called droop. This error is proportional to command speed value.
Speed	(r/min)	This displays the actual rotation speed of motor.
Load	(%)	This displays the motor load.
Max current 1	(%)	This displays the motor current command in terms of continuous current during stalling. An absolute value of the current command peak value sampled after the power ON is displayed.
Max current 2	(%)	This displays the motor current command in terms of continuous current during stalling. An absolute value of the current command peak value sampled in most recent 2 seconds is displayed.
Max current 3	(%)	This displays the FB value of the motor current in terms of continuous current during stalling. An absolute value of the current FB peak value sampled in most recent 2 seconds is displayed.
Overload	(%)	This is the data used to monitor the motor overload.
Regen load	(%)	This is the data used to monitor the resistance overload state when the resistance regenerative power supply is connected.
Est disturb torq	(%)	This displays the estimated disturbance torque in terms of stall rated torque when the disturbance observer is valid.
Max disturb torq	(%)	This displays the estimated disturbance torque in terms of stall rated torque when the collision detection function is adjusted. An absolute value of the estimated disturbance torque peak value sampled in most recent 2 seconds is displayed.
Load inertia R.	(%)	This displays the estimated load inertia ratio when the collision detection function is adjusted.

Display items		Details
AFLT frequency	(Hz)	This displays the current operation frequency of the adaptive filter.
AFLT gain	(dB)	This displays the current filter depth of the adaptive filter.
LED display		This displays the 7-segment LED of the driver.
Alarm		This displays the alarms and warnings other than the LED display.
Cycle counter	(p)	This displays the position within one rotation of the encoder detector. The position is displayed within one rotation in the range of "0" to "RNG (movement units) × 1000" using the grid point value as "0".
Grid space		This displays the grid space for the reference position return. (Command unit)
Grid amnt		This displays the distance from the dog-off point to the grid point when the dog-type reference position return is displayed. The grid mask amount is not included. (Command unit)
Machine posn		This displays the NC basic machine coordinate system position. (Command unit)
Motor end FB		This displays the feedback value of the speed detector. (Command unit)
FB error	(i)	This displays the error of the motor end FB and machine end FB.
DFB compen amnt	(i)	This displays the compensation pulse amount during dual feedback control.
Sync tap err	(mm)	This displays the synchronous error width between the spindle and the drilling axis during the synchronous tapping. (mm) (Note 1) (When the parameter "#1041 I_Inch" is set to "1", "Sync tap err (inch)" is displayed.)
Sync tap err	(deg)	This displays the synchronous error angle between the spindle and the drilling axis during the synchronous tapping. (degree) (Note 1)

(Note) Synchronous tapping error
This displays the maximum values of the synchronous tapping error that occur during the synchronous tapping.
The synchronous tapping error means the motor tracking delay for the commanded positions of the spindle and the tapping axis.
The positive synchronous tapping error means that the tapping axis is delayed responding to the spindle, and the negative synchronous tapping error means that the spindle is delayed responding to the tapping axis.

Data name	Details
Synchronous tapping error width (Max value)	• This outputs the data of which absolute value is the largest among the synchronous tapping error width (-99999.999 to 99999.999 mm) during the synchronous tapping modal. • This data will be initialized to "0" when entering the synchronous tapping modal or restoring the power. Other than that, the data continues to display the maximum value.
Synchronous tapping error angle (Max value)	• This outputs the data of which absolute value is the largest among the synchronous tapping error angle (-99999.999 to 99999.999 °) during the synchronous tapping modal. • This data will be initialized to "0" when entering the synchronous tapping modal or restoring the power. Other than that, the data continues to display the maximum value.

<table>
<tr><th>Display item</th><th>Details</th></tr>
<tr><td>Control input 1L
Control input 1H</td><td>This displays the control input signals from the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">1L</td><td>0</td><td>READY ON command</td></tr>
<tr><td>1</td><td>Servo ON command</td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td>Alarm reset command</td></tr>
<tr><td rowspan="8">1H</td><td>8</td><td>Torque limit selection command 1</td></tr>
<tr><td>9</td><td>Torque limit selection command 2</td></tr>
<tr><td>A</td><td>Torque limit selection command 3</td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td></td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
<tr><td>Control input 2L
Control input 2H</td><td>This displays the control input signals from the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">2L</td><td>0</td><td></td></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">2H</td><td>8</td><td></td></tr>
<tr><td>9</td><td>Speed observation command valid</td></tr>
<tr><td>A</td><td>Door closed (controller)</td></tr>
<tr><td>B</td><td>Door closed (all drive units)</td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td></td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Display item</th><th>Details</th></tr>
<tr><td>Control input 3L
Control input 3H</td><td>This displays the control input signals from the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">3L</td><td>0</td><td></td></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">3H</td><td>8</td><td></td></tr>
<tr><td>9</td><td></td></tr>
<tr><td>A</td><td></td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td></td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
<tr><td>Control input 4L
Control input 4H</td><td>This displays the control input signals from the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">4L</td><td>0</td><td rowspan="3">Spindle control mode selection command 1, 2, 3</td></tr>
<tr><td>1</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td>Gear selection command 1</td></tr>
<tr><td>6</td><td>Gear selection command 2</td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">4H</td><td>8</td><td></td></tr>
<tr><td>9</td><td></td></tr>
<tr><td>A</td><td></td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td>M-coil switch command</td></tr>
<tr><td>D</td><td>L-coil switch command</td></tr>
<tr><td>E</td><td>Sub-motor selection command</td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Display item</th><th>Details</th></tr>
<tr><td>Control input 5L
Control input 5H</td><td>This displays the control input signals from the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">5L</td><td>0</td><td></td></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">5H</td><td>8</td><td></td></tr>
<tr><td>9</td><td></td></tr>
<tr><td>A</td><td></td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td>Spindle holding force up</td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
<tr><td>Control input 6L
Control input 6H</td><td>This displays the control input signals from the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">6L</td><td>0</td><td></td></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">6H</td><td>8</td><td></td></tr>
<tr><td>9</td><td></td></tr>
<tr><td>A</td><td></td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td></td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Display item</th><th>Details</th></tr>
<tr><td>Control output 1L
Control output 1H</td><td>This displays the control output signals to the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">1L</td><td>0</td><td>In READY ON</td></tr>
<tr><td>1</td><td>In Servo ON</td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td>In alarm occurrence</td></tr>
<tr><td rowspan="8">1H</td><td>8</td><td>In torque limit selection 1</td></tr>
<tr><td>9</td><td>In torque limit selection 2</td></tr>
<tr><td>A</td><td>In torque limit selection 3</td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td>In-position</td></tr>
<tr><td>D</td><td>In torque limitation</td></tr>
<tr><td>E</td><td></td></tr>
<tr><td>F</td><td>In warning occurrence</td></tr>
</table></td></tr>
<tr><td>Control output 2L
Control output 2H</td><td>This displays the control output signals to the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">2L</td><td>0</td><td>Z-phase passed</td></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td>In zero speed</td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td>In external emergency stop</td></tr>
<tr><td rowspan="8">2H</td><td>8</td><td></td></tr>
<tr><td>9</td><td>In speed observation</td></tr>
<tr><td>A</td><td>Door closed (controller)</td></tr>
<tr><td>B</td><td>Door closed (local drive units)</td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td></td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
</table>

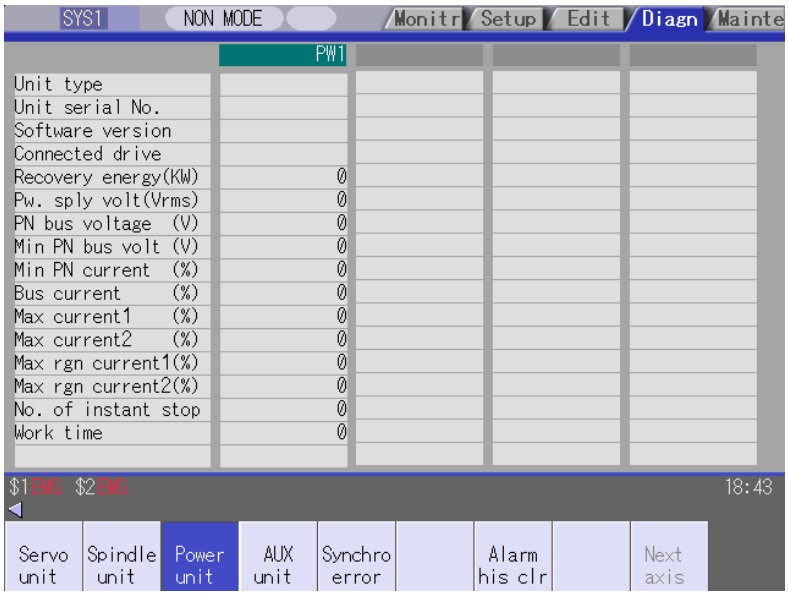
<table>
<tr><th>Display item</th><th>Details</th></tr>
<tr><td>Control output 3L
Control output 3H</td><td>This displays the control output signals to the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">3L</td><td>0</td><td></td></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">3H</td><td>8</td><td></td></tr>
<tr><td>9</td><td></td></tr>
<tr><td>A</td><td></td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td></td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
<tr><td>Control output 4L
Control output 4H</td><td>This displays the control output signals to the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">4L</td><td>0</td><td rowspan="3">Spindle control mode selected 1, 2, 3</td></tr>
<tr><td>1</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td>Gear selected 1</td></tr>
<tr><td>6</td><td>Gear selected 2</td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">4H</td><td>8</td><td></td></tr>
<tr><td>9</td><td></td></tr>
<tr><td>A</td><td></td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td>M-coil switched</td></tr>
<tr><td>D</td><td>L- coil switched</td></tr>
<tr><td>E</td><td>Sub-motor selected</td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Display item</th><th>Details</th></tr>
<tr><td>Control output 5L
Control output 5H</td><td>This displays the control output signals to the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">5L</td><td>0</td><td>Current detection</td></tr>
<tr><td>1</td><td>Speed detection</td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td>In coil changeover</td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">5H</td><td>8</td><td>1-amplifire 2-motor switching</td></tr>
<tr><td>9</td><td>2nd speed detection</td></tr>
<tr><td>A</td><td></td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td>In spindle holding force up</td></tr>
<tr><td>F</td><td>2nd in-position</td></tr>
</table></td></tr>
<tr><td>Control output 6L
Control output 6H</td><td>This displays the control output signals to the NC.
<table>
<tr><th></th><th>Bit</th><th>Details</th></tr>
<tr><td rowspan="8">6L</td><td>0</td><td></td></tr>
<tr><td>1</td><td></td></tr>
<tr><td>2</td><td></td></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td></td></tr>
<tr><td>7</td><td></td></tr>
<tr><td rowspan="8">6H</td><td>8</td><td></td></tr>
<tr><td>9</td><td></td></tr>
<tr><td>A</td><td></td></tr>
<tr><td>B</td><td></td></tr>
<tr><td>C</td><td></td></tr>
<tr><td>D</td><td></td></tr>
<tr><td>E</td><td></td></tr>
<tr><td>F</td><td></td></tr>
</table></td></tr>
</table>

Display item	Details
Unit type	This displays the spindle type.
Unit serial No.	This displays the spindle serial No.
Software version	This displays the software No. and version on the spindle side.
Motor end detect No	This displays the motor end detector serial No.
Mach. end detect No	This displays the machine end detector serial No.
Work time	This displays the READY ON cumulative time. (Units: 1hr)
Alarm hist 1: Time 1: Alarm : 8: Time 8: Alarm	This displays servo alarms that occurred in latest order with the following formats. Time : Work time when the alarm occurred. Alarm No. : Number of the servo alarms that occurred.
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
Maint status	This displays the maintenance status.

3.4.3 Display Items for the Power Supply Unit

The various data related to the power supply is monitored.
Change the display items using the ▲ key and ▼ key to refer to the data.



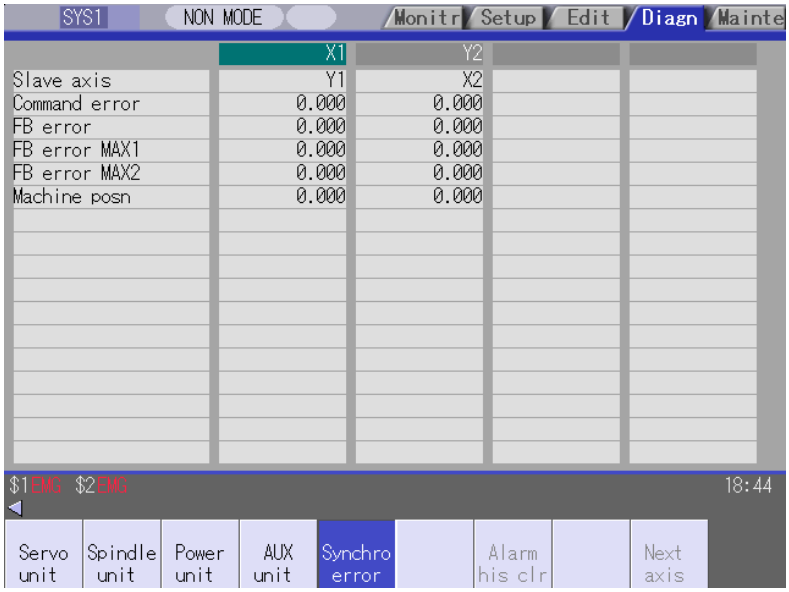
Display items

Display item	Details
Unit type	This displays the power supply unit type.
Unit serial No.	This displays the serial No. of the power supply unit.
Software version	This displays the software version.
Connected drive	This displays the I/F channel No. (mcp_no, smcp_no) of the drive unit connected to each power supply unit.
Recovery energy(KW)	This displays the regenerative power every two seconds. (0 to 999kW)
Pw. sply volt (Vrms)	This displays the effective value of the power supply voltage. (0 to 999Vrms)
PN bus voltage (V)	This displays PN bus voltage. (0 to 999V)
Min PN bus volt (V)	This displays the minimum PN bus voltage after the NC power ON. (0 to 999V)
Min PN current (%)	This displays the bus current when PN bus voltage is at minimum. (driving: +、regenerative: -) (0 to 999%)
Bus current (%)	This displays the bus current. (driving: +、regenerative: -) (0 to 999%)
Max current1 (%)	This displays the maximum driving current after the NC power ON. (0 to 999%)
Max current2 (%)	This displays the maximum driving current in most recent 2 seconds. (0 to 999%)
Max rgn current1(%)	This displays the maximum regenerative current after the NC power ON. (0 to 999%)
Max rgn current2(%)	This displays the maximum regenerative current in most recent 2 seconds. (0 to 999%)
No. of instant stop	This displays the number of instantaneous stop exceeding 1 cycle of the power. (0 to 9999 times)
Work time	This displays the READY ON cumulative time. (Units: 1hr)

Display item	Details
Alarm hist 1: Time 1: Alarm : 8: Time 8: Alarm	This displays servo alarms that occurred in latest order with the following formats. Time : Work time when the alarm occurred Alarm No. : Number of the servo alarms that occurred
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
Maint status	This displays the maintenance status.

3.4.4 Display Items for the Synchronous Error

The "Synchronous error" appears only when the synchronous control axis option is valid.
The various data related to the synchronous error is monitored.



Display items

Display item	Details
Slave axis	This displays the slave axis name which is controlled following the master axis. The axis name corresponding to the axis No. set in the axis specification parameter "#1068 slavno (slave axis No.)" is displayed. The name set in the base axis specification parameter "#1022 axname2 (2nd axis name)" is displayed for the slave axis.
Command error	This is the deviation of the slave axis machine position in respect to the master axis. The error of the commanded position to the servo control section before pitch error compensation, relative position compensation and backlash compensation is displayed. If this error occurs, the parameters that should be the same for the synchronous axes are different. Command error = Command s - command m -Δ Command s : Slave axis commanded position Command m : Master axis commanded position Δ : Command s - command m at start of synchronous control
FB error	This is the deviation of the slave axis feedback position in respect to the feedback position from the master axis servomotor. The actual error of the machine position is displayed. The synchronous error check is carried out on this error. FB error = FBs - FBm - Δ FBs : Slave axis feedback position FBm : Master axis feedback position Δ : FBs - FBm at start of synchronous control
FB error MAX1	This displays the maximum FB error after the start of the synchronous control.
FB error MAX2	This displays the maximum FB error approx. every 30 seconds after the start of the synchronous control.
Machine posn	This displays the commanded machine position for the master axis.

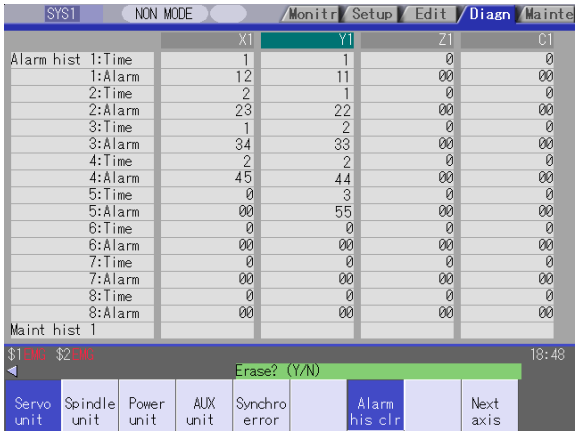
3.4.5 Clearing the Alarm History

Operation method

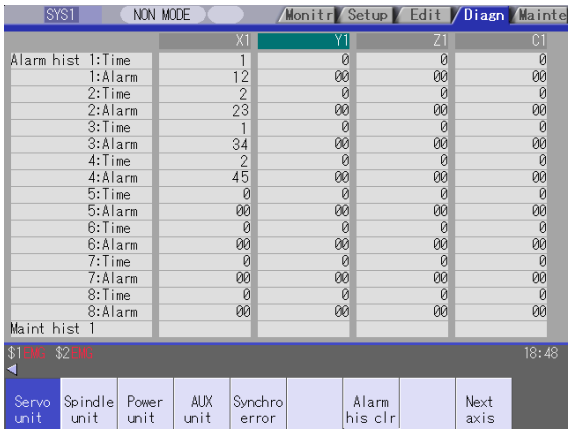
(1) Press the menu [Servo unit] or [Spindle unit].

(2) Using the menu [Next axis], tab keys [←] and [→|], select the axis (device) from which to clear the alarm history.

(3) Press the menu [Alarm his clr]. ➡ The menu is highlighted, and a message appears to confirm the erasing.
The alarm history1: Time appears at the head.

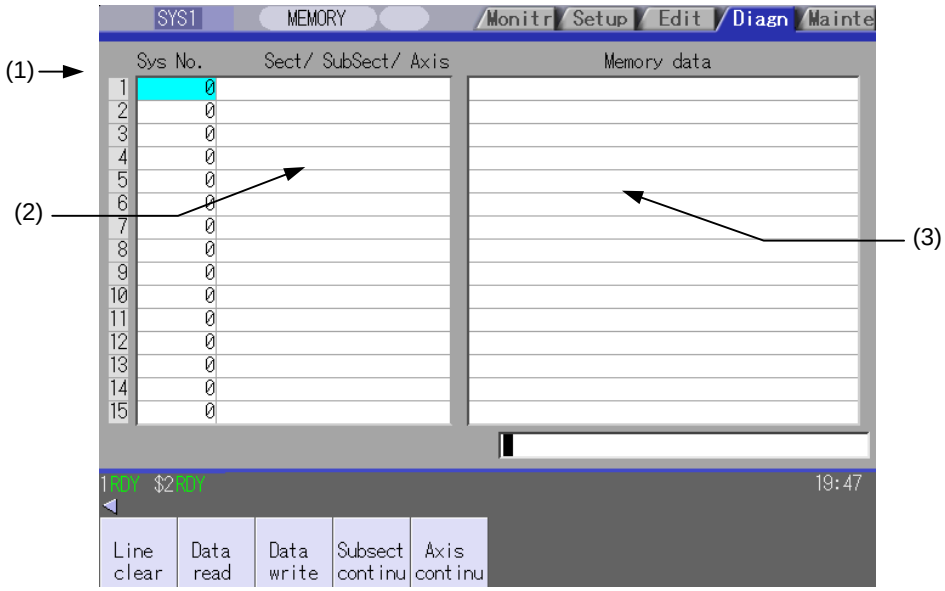


(4) Press the [Y] key. ➡ The alarm history data for the selected axis (device) is cleared to zero.



3.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

The NC internal data can be displayed and rewritten on the screen. The custom API library's NC data read/write interface is used to display and rewrite the NC's internal data. The contents of the NC data can be displayed by designating the part system No., section No., sub-section No. and axis No. on this screen.



Display items

Display item	Details
(1) Index No.	This displays the registration No. of the NC memory data. When one of the "2. Data contents" is set, the number is highlighted indicating that the normal display of the data contents has stopped.
(2) Data contents	Part system No.: Designate the part system No. Designate "0" to designate the data common for the part systems. Section/sub-section/axis: Designate the section No., sub-section No. and axis No. of the data to be set and displayed. The setting format is, section No./sub-section No./axis No. **(Note)** The axis No. "1" is handled as the first axis. Designate "0" for the data which does not require an axis designation.
(3) Memory data	This displays the contents of the data.

Menus

Menu	Details	Type	Reference
Line clear	This erases the information in the line where the cursor is. (One entire line becomes blank.) The cursor does not move at this time.	C	
Data read	The contents of the set address data (Part system No, Section/sub-section/axis) for all the lines are constantly displayed. The Index No. highlight (indicating data is being set) is released. The cursor appears in "Part system No" of that line.	C	3.5.1 Writing/Reading the Data Using the NC Data Designation
Data write	This writes the data (Note) in the setting area to the NC memory indicated by address data at the cursor position. The Data No. highlight (indicating data is being set) is released, and constant display is started. After writing, the cursor moves to "Part system No" of the next line.	A	
Subsect continu	Based on the data of the address data where the cursor is, this displays the continuous data to which the sub-section No. has been added to the address data from the line where the cursor is. The cursor moves to "Part system No " of that line.	C	
Axis continu	Based on the data of the address data where the cursor is, this displays the continuous data to which the axis No. has been added to the address data from the line where the cursor is. The cursor moves to "Part system No " of that line.	C	

(Note) Decimal, hexadecimal, floating point data and character string data writing is possible.
Note that hexadecimal, floating point data and character strings may not be settable depending on the data.

Decimal : Integers without decimal points ..... (Example) -1234
Hexadecimal : An "H" is necessary at the end ..... (Example) 1234H
Floating point data : Data with a decimal point ..... (Example) -12.3
Character string data : Character string ..... (Example) X

3.5.1 Writing/Reading the Data Using the NC Data Designation

When reading the Process parameter "#8007 Auto corner override", the following data is set.

(Example) Part system No. : 1
Section No. : 126
Sub-section No. : 8007
Axis name : 0

Setting the data

(1) Using the menu cursor keys, move the cursor to the "Part system No." position. ➡ The cursor moves to the "Part system No." position.

(2) Set the part system No.
1 [INPUT] ➡ The index No. is highlighted, and the set value is displayed.
The cursor moves to the right item position.

	Sys No.	Sect/ SubSect/ Axis
1	1	37/ 1/ 1
2	1	37/ 1/ 2
3	1	
4	0	
5	0	

(3) Separate the section No., sub-section No., axis No. with a "/", and set.
126/8007/0 [INPUT] ➡ The set value appears.
The cursor moves to the right item position.

(4) Press the menu key [Data write].

(5) Set the data, and press the [INPUT] key. ➡ Write processing is executed.
The Index No. highlight returns to normal.

Reading the data

(1) Set the part system No., section No., sub-section No., axis No. in the same way as step “Setting the data”.

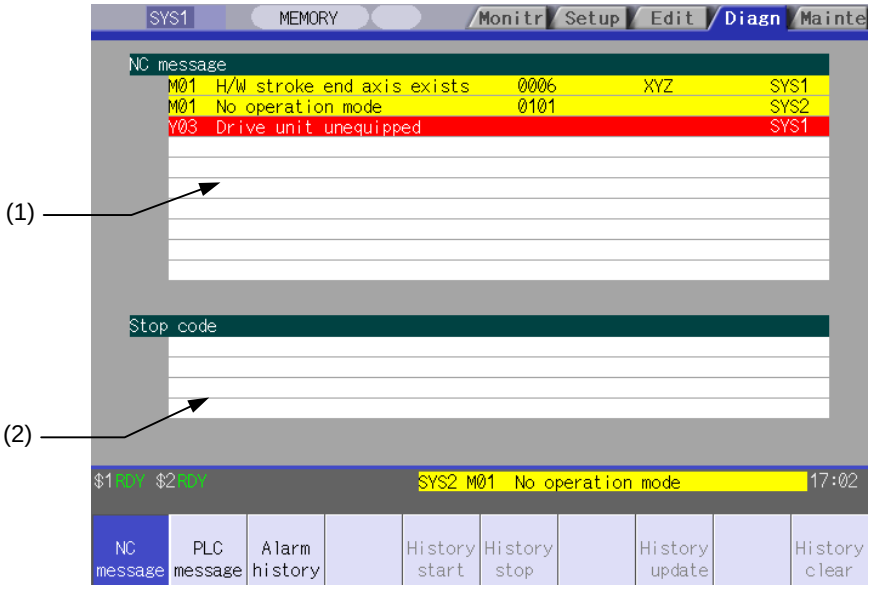
(2) Press the menu key [Data read] . ➡ The index No. highlight is released, and the normal display of the memory data starts.
The data format (data size, display format) of the data displayed in the memory data differs according to the data type to be displayed.

(Note) The cursor is constantly displayed. Using the cursor keys, the cursor can be moved to the part system No. area, section/sub-section/axis area.

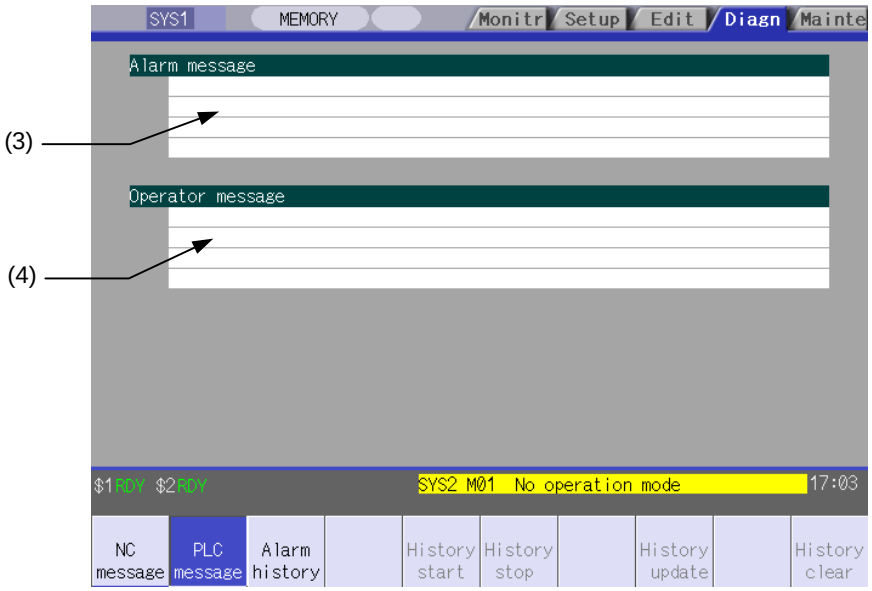
3.6 Alarm Screen

A list of currently occurring alarms or messages can be displayed on this screen.
The displayed messages include the NC alarms, stop codes, alarm messages, operator messages, etc.
A history of alarm information can be displayed also.

■ NC message



■ PLC message



Display items

Display item	Details
(1) NC alarm	This displays the operation alarms, program errors, MCP alarms, servo alarms, system alarms, etc. Up to 10 messages are displayed in order of priority.
(2) Stop code	This displays the automatic operation status or stop status during automatic operation. Up to 4 messages are displayed in order of priority.
(3) Alarm message	Using the PLC programs, this displays messages such as details of machine abnormalities. Up to 4 messages are displayed.
(4) Operator message	Using the PLC programs, this displays operator information messages. Macro alarm messages are also displayed in this field. Up to 4 messages are displayed.

Message display colors

The messages are color-coded in the following manner.

Message type		Character color	Background color
NC message	Alarm	White	Red
	Warning	Black	Yellow
Stop code		Black	Yellow
Alarm message		White	Red
Operator message		Black	Yellow

Axis name display

The axis name is displayed in messages for each axis. The axis name is displayed as shown below according to the axis type.

Axis type	Axis name display	Display example	Remarks
NC axis	Control axis name (Name of axis in part system)	XYZ	If the same message occurs for each part system, several NC axes are displayed together.
Spindle	'S' + spindle No.	S1S2	If the same message occurs, several spindles are displayed together.
PLC axis	'P' + PLC axis No.	P1P2	If the same message occurs, several PLC axes are displayed together.
Auxiliary axis	'A' + auxiliary axis No.	A1A2	If the same message occurs, several auxiliary axes are displayed together.

If the same message occurs for different axis types, they will appear as separate messages.

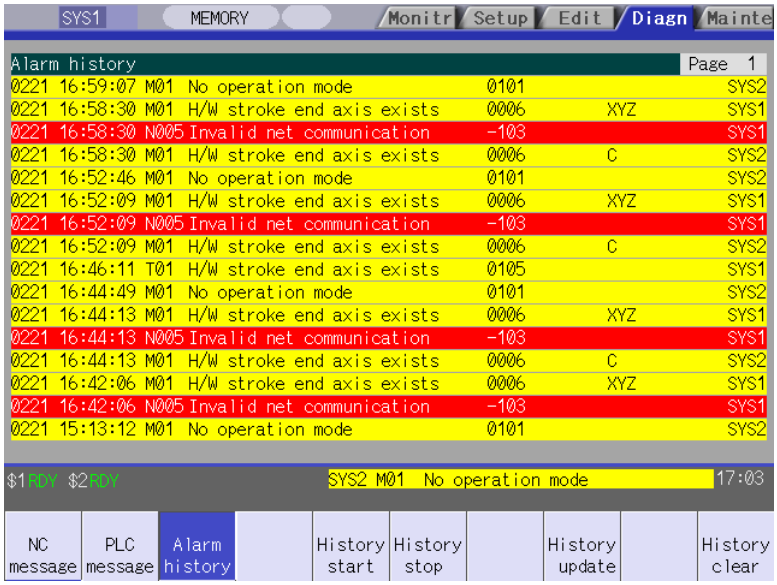
Part system display

The part system name is also displayed if the message is output for each part system. The part system name set in "#1169 system name" is displayed. The part system name does not appear for the 1-part system.

3.6.1 Alarm History

When an alarm occurs, the alarm information is recorded. When the NC power is ON, an alarm is automatically recorded in alarm history. Alarm information is recorded from the latest alarm to 512. Alarm information recorded in the history is NC message and a stop code displayed on "NC message" screen. The range etc. of record are shown as follows.

Record condition : When an alarm occurs (Up to five at the same time)
With multi-part system, 1st part system is given priority and recorded. (Following 2nd part system, 3rd part system...)
Number of history : 512 alarms (Whole)
Range of record : NC alarm (alarm, warning), stop code



Menus

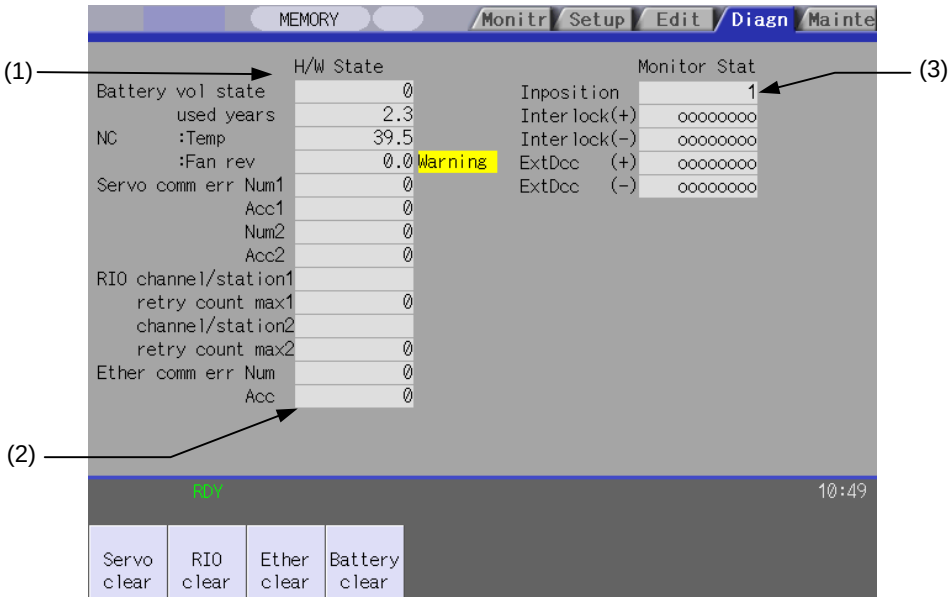
Menu	Details	Type	Reference
Alarm history	This displays the first page of the alarm history. The history sequentially displays 16 alarms per page from the latest alarm. If there are two or more NC alarms of same day and time, the alarms are sequentially displayed from the alarm and warning of 1st part system. Page is changed by ▲, and older histories are displayed. Page is changed by ▼, and newer histories are displayed.	B	
History start	The data collection of the alarm history is started. The operation message "The collection begin? (Y/N)" appears. When the Y or INPUT key is pressed, the data collection is started after the operation message "The collection begin" appears. Press the N or other than INPUT key when the data collection will be not started/restarted.	C	
History stop	The data collection of the alarm history is stopped. The operation message "The collection stop? (Y/N)" appears. When the Y or INPUT key is pressed, the data collection is started after the operation message " The collection stop" appears. Press the N or other than INPUT key when the data collection will be not stopped.	C	
History update	The alarm information of history is updated. When the history is updated, the page with latest alarm information (first page) is displayed. The history is updated even if changing to another screen, and returning to the alarm history screen.	C	
History clear	The alarm information of history is cleared. The operation message "Execute the collection data clear?(Y/N)" appears. When the Y or INPUT key is pressed, the alarm information of history is cleared after the operation message "Data clear complete" appears. The first page is displayed when the history is cleared.	C	

(Note 1) History start, History stop, History update and History clear menus are valid when the alarm history function is valid and Alarm history menu is selected.

(Note 2) When the alarm history function is used for the first time, clear the alarm history contents by pressing History clear menu. Unnecessary data may be recorded in the alarm history.

3.7 Self Diagnosis Screen

The H/W state and NC operation state can be confirmed on this screen.



Display items

<table>
<tr><th>Display item</th><th>Details</th></tr>
<tr><td>(1) H/W state
(common for part systems)</td><td>This displays H/W state of NC unit and display unit.
As for the NC unit, the contents are as follows.
<table>
<tr><th colspan="2">Display item</th><th colspan="2">Details</th></tr>
<tr><td colspan="4">NC</td></tr>
<tr><td></td><td>Battery vol state</td><td colspan="2">This displays the current state of the battery voltage as 0 to 3 below.</td></tr>
<tr><td></td><td></td><td>Condition</td><td>Classification</td></tr>
<tr><td></td><td></td><td>0 (normal state)</td><td>--</td></tr>
<tr><td></td><td></td><td>1 (battery drop)</td><td>Cautions (gray)</td></tr>
<tr><td></td><td></td><td>2 (detector error)
3 (no battery)</td><td>Warning (yellow)</td></tr>
<tr><td></td><td>used years</td><td colspan="2">This displays approximate time of the battery used from the last replacement.</td></tr>
<tr><td></td><td></td><td>Condition</td><td>Classification</td></tr>
<tr><td></td><td></td><td>Recommended battery use (5 years)
≤ Time for the battery used</td><td>Warning (yellow)</td></tr>
<tr><td></td><td>NC :Temp</td><td colspan="2">This displays the current temperature of the control unit.</td></tr>
<tr><td></td><td></td><td>Condition</td><td>Classification</td></tr>
<tr><td></td><td></td><td>-8°C<Control unit temp.≤-3°C</td><td rowspan="2">Cautions (gray)</td></tr>
<tr><td></td><td></td><td>63°C≤ Control unit temp.<68°C</td></tr>
<tr><td></td><td></td><td>Control unit temp.≤-8°C</td><td rowspan="2">Warning (yellow)</td></tr>
<tr><td></td><td></td><td>68°C≤ Control unit temp.</td></tr>
<tr><td></td><td></td><td>:Fan rev</td><td colspan="2">This displays the current fan rotation speed of the control unit.</td></tr>
<tr><td></td><td></td><td>Condition</td><td>Classification</td></tr>
<tr><td></td><td></td><td>Fan rot. speed ≤ 4000 r/min</td><td>Warning (yellow)</td></tr>
</table>
(Continues to the next page)</td></tr>
</table>

Display item	Details	
(Continued from the previous page)	Communication between NC unit and display unit	
	Servo comm err Num1	This displays the count of occurrence for "Y02 SV commu er: Recv frame No. 0051 xx04" after the power ON.
	Acc1	This displays the cumulated count of occurrence for " Y02 SV commu er: Recv frame 0051 xx04". Press the [Servo clear] menu to clear the cumulated count to "0".
	Servo comm err Num2	This displays the count of occurrence for "Y02 SV commu er: Data ID error 0051 xx03" after the power ON.
	Acc2	This displays the cumulated count of occurrence for "Y02 SV commu er: Data ID error 0051 xx03". Press the [Servo clear] menu to clear the cumulated count to "0".
	RIO channel/station1	This displays the Channel No./Station No. of occurrence for continuous error after the power ON.
	retry count max1	This displays the maximum value of the continuous error after the power ON.
	RIO channel/station2	This displays the Channel No./Station No. held even if the power OFF. Press the [RIO clear] menu to clear the Channel No./Station No. to "0/0".
	retry count max2	This displays the count held even if the power OFF. Press the [RIO clear] menu to clear the count to "0".
	Ether comm err Num	This displays the count of occurrence for "Ether communication error" after the power ON.
	Acc	This displays the cumulated count of occurrence for " Ether communication error ". Press the [Ether clear] menu to clear the cumulated count to "0".

<table>
<tr><th>Display item</th><th>Details</th></tr>
<tr><td>(2) Operation state
(Depends on part system)</td><td>This displays the state when the operation seems to be stopped in spite that the alarm does not occur. The following state can be confirmed.
<table>
<tr><th>State</th><th>Details</th></tr>
<tr><td>In-position</td><td>This displays "1" (in-position state) when the following conditions are satisfied for even one axis.
• No acceleration/deceleration delay for all axes
• Within the in-position width set in the parameter for all axes</td></tr>
<tr><td>Interlock(+)</td><td>When the auto interlock +n-th axis signal or the manual interlock +n-th axis signal is OFF, "1" appears for the n-th axis.
（Explanation of the display） o o o o o o 1 o
8th axis … 1st axis
In the above case, the 2nd axis is interlocked.
Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.</td></tr>
<tr><td>Interlock(-)</td><td>When the auto interlock -n-th axis signal or the manual interlock -n-th axis signal is OFF, "1" appears for the n-th axis.
The explanation of the display is same as for the "Interlock (+)".</td></tr>
<tr><td>ExtDcc (+)</td><td>When the control axis is moving in (+) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed.
（Explanation of the display） o o o o o 1 o 1
8th axis … 1st axis
In the above case, the 1st axis and the 3rd axis are in external deceleration speed.
Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.</td></tr>
<tr><td>ExtDcc (-)</td><td>When the control axis is moving in (-) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed.
The explanation of the display is same as for the "ExtDcc" (+).</td></tr>
</table></td></tr>
<tr><td>(3) Credit system</td><td>This displays the valid term by the credit system when the credit system is valid.
This does not display when the credit system specification is invalid.</td></tr>
</table>

Menus

Menu	Details	Type	Reference
Servo clear	This clears the cumulated count of the servo communication error 1 and 2 to "0".	A	Clearing the cumulated counter to zero
RIO clear	This clears the cumulated count of the RIO communication error to "0".	A	
Ether clear	This clears the cumulated count of the Ether communication error to "0".	A	
Battery clear	This clears the time the battery has been used to "0".	A	

Clearing the cumulated counter to zero

(Example) Clearing the cumulated count of the servo communication error

(1) Press the menu [Servo clear]. ➡ A confirmation message will be displayed.

(2) Press [Y] or [INPUT]. ➡ The cumulated count of the servo communication error 1 and 2 will be cleared to "0".
When other keys are pressed, it will not clear to "0".

This also applies to [RIO clear], [Ether clear] and [Battery clear] menu.
When using the multi-part system specification, switch the displayed part system by [Next system] menu or the part system switching key [$⇔$].

4. NC's Maintenance Check and Replacement Procedure

4.1 Maintenance Items

Maintenance is categorized into daily maintenance items (items to be carried at set intervals) and periodic maintenance items (replacement of parts when life is reached).
Some parts will not function in a hardware manner when the life is reached, so these should be replaced before the life is reached.

Class	Name	Life	Inspection/replacement	Remarks
Daily maintenance	Escutcheon		Once/two months (Accordingly when dirty)	
Periodic maintenance	Battery (lithium battery)	Cumulative data holding time: 45,000 hr	When battery voltage drop caution alarm occurs (Guideline: approx. 5 years)	Refer to "Control unit battery" in "4.2.1 Durable Parts"
	Cooling fan (700 Series only)	Control unit: 60,000 hr Display unit: 50,000 hr	Refer to left.	
	Back light	8.4-type: 700 Series: 30,000 hr 70 Series: 50,000 hr 10.4-type: 50,000 hr	Refer to left.	
	Hard disk unit (700 Series only)	20,000 hr or 5 years (Shorter one is applied.)	Refer to left.	
Other consumable parts	Operation board	10^6 punches	Refer to left.	

4.1.1 Escutcheon

(1) Cleaning the escutcheon

(a) Prepare the rear side of the escutcheon to clean.
(b) Wipe the escutcheon with a soft, clean, dry cloth. If cleaning is still required, put some neutral detergent on a cloth and wipe. Do not use alcohol, thinner, etc.

4.1.2 LCD Panel

(1) Handling the LCD panel

(a) Precautions for use

- The polarizing plate (display surface) of the LCD panel surface can be easily scratched, so be careful during handling.
- Glass is used in the LCD panel. Be careful not to drop the LCD panel or allow it to hit hard objects, as the glass may chip or break.
- The polarizing plate may be stained or discolored if drops of water, etc., adhere to it for long periods, so be sure to wipe off any moisture immediately.
- Wipe off any dirt, dust, etc., on the polarizing plate using absorbent cotton or other soft cloth.
- A CMOS LSI is used in the LCD panel, so be careful of static electricity when handling.
- Never disassemble the LCD panel. Doing so will damage the panel.

(b) Precautions for storage

- Do not store the LCD panel in locations having a high temperature or humidity. (Store within the storage temperature range.)
- When storing the LCD panel as an individual unit, be sure that other objects do not touch or hit the polarizing plate (display surface).
- When storing the LCD panel for long periods, be sure to store in a dark place away from exposure to direct sunlight or fluorescent light.

(2) Other precautions for use

(a) Backlight life

The life of the backlight is as follows. (ambient temperature 25C°)

8.4-type : 30,000 hours (for 700 Series) or 50,000 hours (for 70 Series)
10.4-type : 50,000 hours

These are the time for luminance to drop to 50% of the initial value.

The backlight life is dependent on the temperature. The life tends to be shorter when used continuously at lower temperatures.

(b) Luminance start

Due to the characteristics of the backlight, the luminance could drop slightly at lower temperatures. It will take approx.10 to 15 minutes for the luminance to reach the rated value after the power is turned ON.

(c) Unevenness, luminescent spots and irregularities

Uneven brightness, small luminescent spots or small dark spots may appear on LCD panel, but this is not a fault.

4.1.3 Compact Flash/IC card

(1) Handling the compact flash/IC card

The general handling methods for the compact flash/IC card are described below.
Refer to the instruction manual of the compact flash/IC card used for details.

(a) Precautions for use

- Insert the card in the correct direction.
- Do not touch the connector area with hands or metal.
- Do not apply excessive force to the connector area.
- Do not subject the card to bending or strong impacts.
- Do not open the cover or disassemble the card.
- Do not use the card in dusty locations.

(b) Precautions for storage

- Do not store the card in locations having a high temperature or humidity.
- Do not store the card in dusty locations.

4.2. H/W Replacement Methods

4.2.1 Durable Parts

4.2.1.1 Control unit battery

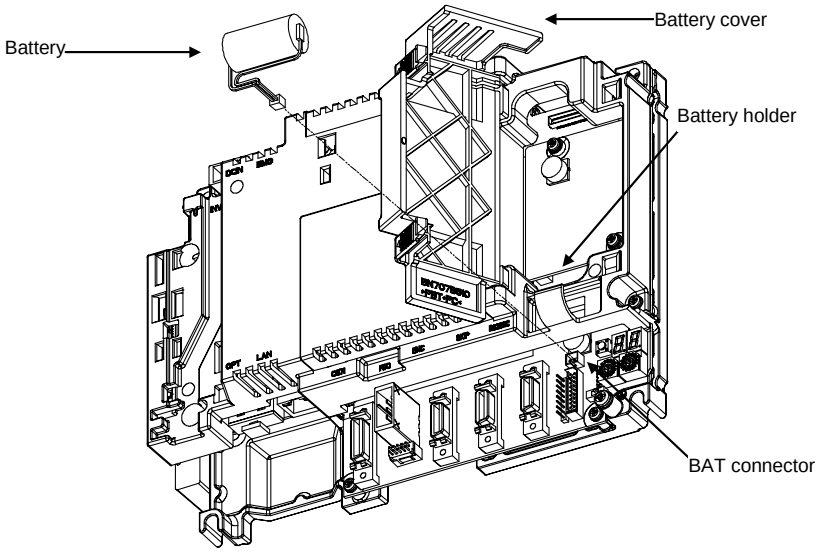
All data, such as the parameters and machining programs that need to be backed up when the power is turned OFF, are saved by a lithium battery installed in the control unit's battery holder.

Battery	Q6BAT BKO-C10811H03 (SANYO CR17335SE-R with Mitsubishi specifications)
Battery cumulative data holding time	45,000 hours (At room temperature. The life will be shorter if the temperature is high.))
Battery life	Approx. 5 years (from date of battery manufacture)

(Note) Replace the battery when the alarm "Z52 Battery drop 0001" appears on the NC screen.
The internal data could be damaged if the alarm "Z52 Battery drop 0003" appears.

[Replacement procedures]
Always replace the battery with the control unit (machine) power turned OFF.
Complete the replacement within 30 minutes after turning the power OFF. (If the battery is not connected within 30 minutes, the data being backed up might be destroyed.)

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Confirm that the control unit LED, 7-segment display, etc., are all OFF.
(3) Open the battery cover of the control unit. Pull the right side of the battery cover toward front.
(4) Pull the connector connected to the battery out from the BAT connector.
(5) Remove the battery from the battery holder.
(6) Fit the new battery into the battery holder.
(7) Insert the connector connected to the new battery into the BAT connector. Pay attention to the connector orientation, being careful not to insert backwards.
(8) Close the front cover of the control unit. At this time, confirm that the cover is closed by listening for the "click" sound when the latch catches.



[Precautions for handling battery]

(1) Always replace the battery with the same type.
(2) Do not disassemble the battery.
(3) Do not place the battery in flames or water.
(4) Do not pressurize and deform the battery.
(5) This is a primary battery so do not charge it.
(6) Dispose of the spent battery as industrial waste.

⚠ CAUTION

- ❗ If the battery low warning is issued, save the machining programs, tool data and parameters in an input/output device, and then replace the battery. When the battery alarm is issued, the machining programs, tool data and parameters may be destroyed. Reload the data after replacing the battery.
- ⚠ Do not short circuit, charge, overheat, incinerate or disassemble the battery.
- ⚠ Dispose the spent battery according to the local laws.

4.2.1.2 Backlight

● 8.4-type

Inverter	65PWB31
Backlight for replacement	84LHS01
Backlight life	50,000 hours (Duration of time until luminance drops to 50% of the initial value.)

● 10.4-type

Inverter	104PW161
Backlight for replacement	104LHS35
Backlight life	50,000 hours (ambient temperature 25°C) (Duration of time until luminance drops to 50% of the initial value.)

Backlight life is estimated on the assumption that it is used under 25°C environment. Keep in mind that the value above is not a guaranteed value.

[Replacement procedures]
Always replace the backlight for LCD panel with the control unit (machine) power turned OFF.

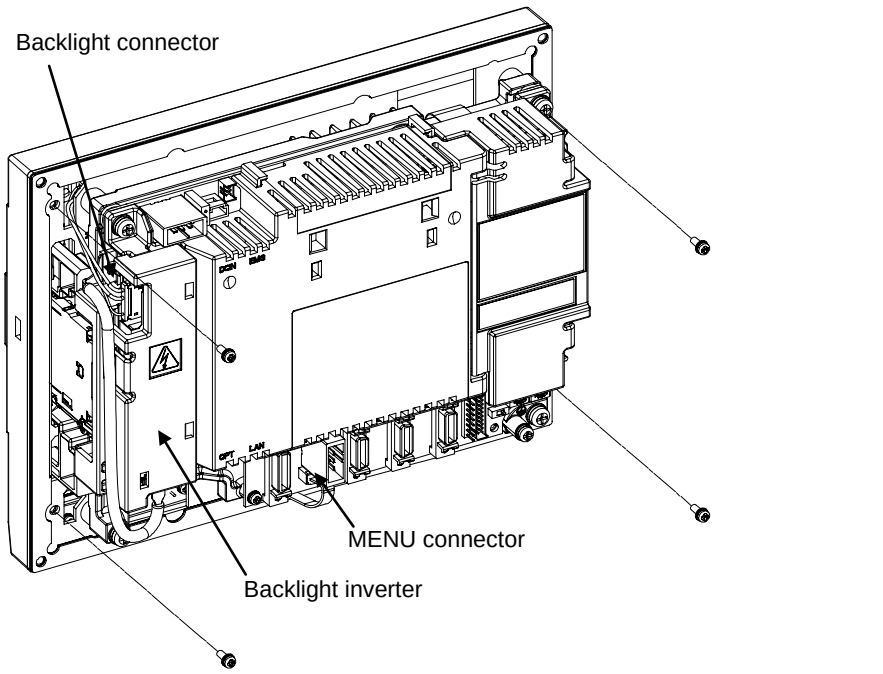
(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Pull the connector connected to the backlight out from the backlight inverter (one for top).
(3) Disconnect the MENU connector.
(4) Remove the escutcheon fixing screws (at 4 places) and take the escutcheon off.
(5) Pull out the backlight installed on the left side of the LCD panel. (The backlights have locking claws on the front. Hold these claws down while pulling the backlight out.)
(6) Insert the new backlight into the upper and lower sections at the left end of the LCD panel. (Press in until the locking claws click.)
(7) Mount the escutcheon with 4 fixing screws (1 each for 4 sections).
(8) Connect the backlight connection connector to the backlight inverter.
(9) Confirm that all the cables are correctly connected and close the electric cabinet door.
(10) Connect the MENU connector.

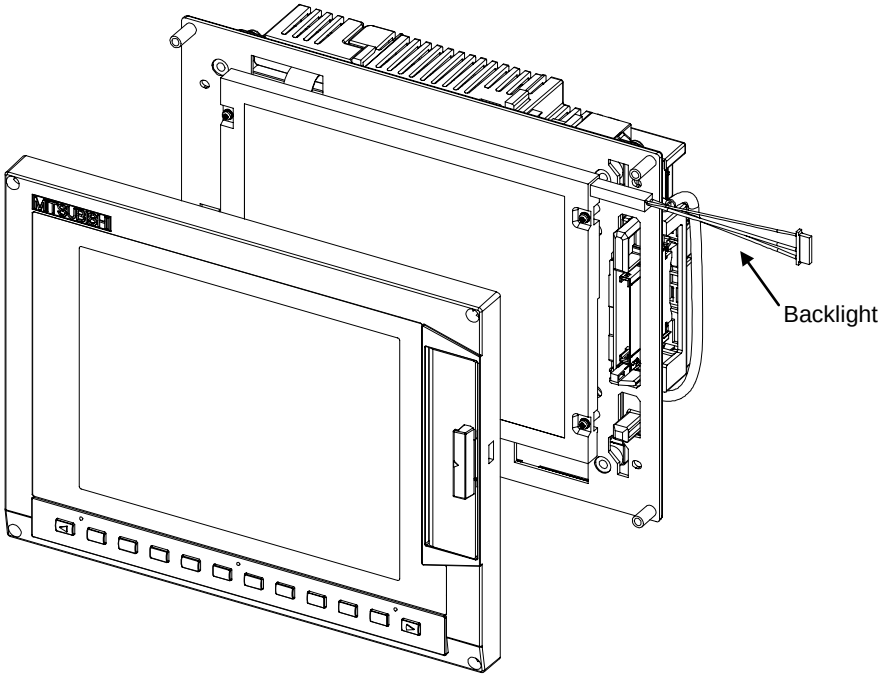
[Precautions for using LCD panel]
(1) Depending on the ambient temperature, response time, brightness and color may differ.
(2) Depending on the display contents, nonuniformity of brightness, flickers and streaks may be observed on LCD display.
(3) Because cold cathod-tube is used for LCD display, optical characteristics (nonuniformity of brightness and display) change according to the operation time. (Especially in low temperature.)
(4) Screen display color may be differed depending on the angle to view it.

⚠ CAUTION

- ⚠ Do not replace the backlight while the power is ON.
- ⚠ Dispose the replaced backlight according to the local laws.
- ⚠ Do not touch the backlight while the power is ON. Failure to observe this could result in electric shocks due to high voltage.
- ⚠ Do not touch the backlight while the LCD panel is in use. Failure to observe this could result in burns.
- ⚠ Do not apply impact or pressure on the LCD panel or backlight. Failure to observe this could result in breakage as they are made of glass.

[8.4-type/10.4-type display unit]





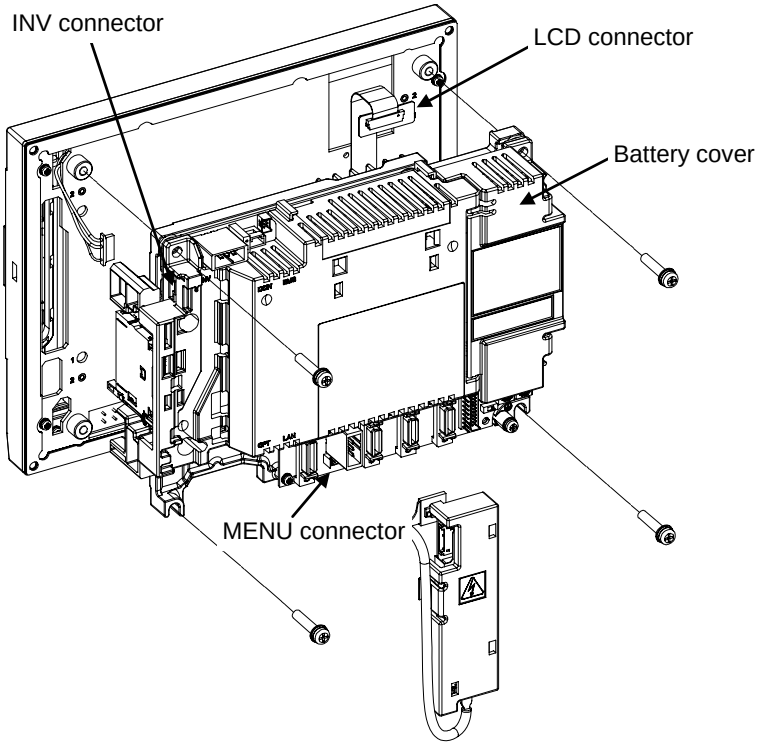
4.2.2 Unit

4.2.2.1 Control Unit

<<Introduction (important)>>
This section explains the procedure of replacing control units only physically.
For setup after the actual replacement at end users, some special operations are required. Therefore, customers are not able to replace.
Please contact your nearby service center before replacement.
(Please use the contents of this section only for information purpose.)

[Replacement procedures]
Always replace the control unit with the control unit (machine) power turned OFF.

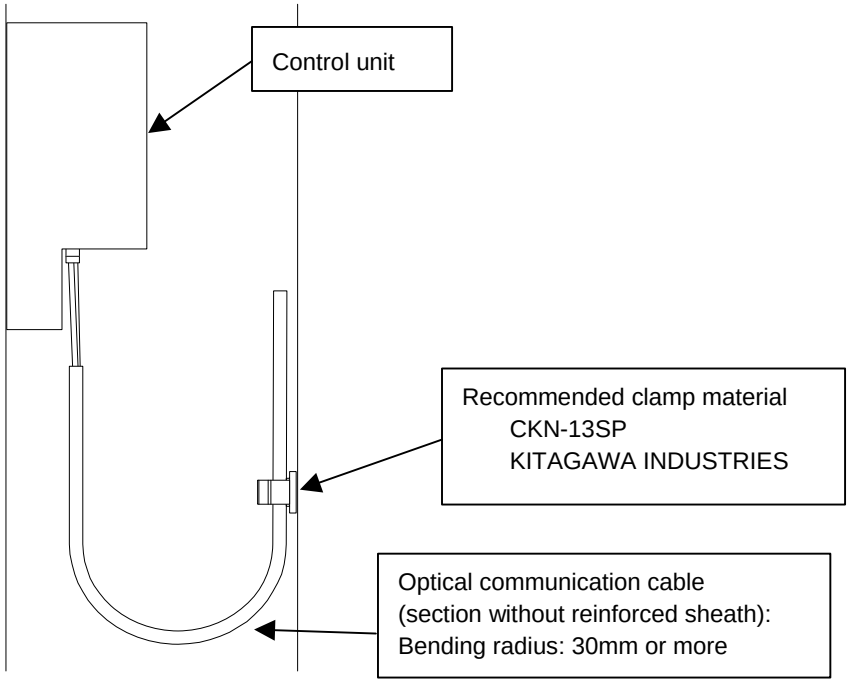
(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Disconnect all the external cables connected to the control unit.
(3) Remove all the internal cables connected to the control unit. (MENU/INV/LCD connector)
(Note) Open the battery cover to remove LCD connector.
(4) Remove the screws fixing the control unit, and remove the control unit from the control unit installation fitting. (Loosen the two lower fixing screws first, and then remove one upper fixing screw while supporting the control unit with a hand. Then lift the control unit upward and take it off. The two lower fixing screws do not need to be removed.)
(5) Replace with a new control unit, and fix the control unit onto control unit installation fitting with the fixing screws.
(6) Connect all the cables back to the control unit. (Connect the cables to the designated connectors.)
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.



⚠ CAUTION

- ⚠ Incorrect connections may damage the devices, so connect the cables to the specified connectors.
- ⚠ Do not replace the control unit while the power is ON.
- ⚠ Do not connect or disconnect the connection cables between each unit while the power is ON.

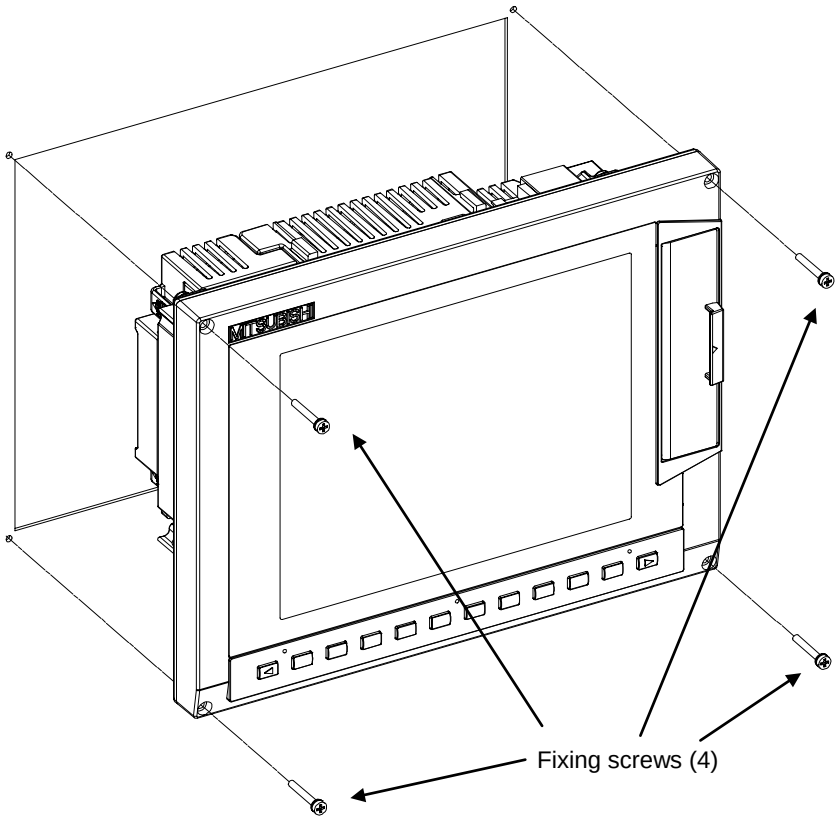
(Note) Wire the control unit optical cable as shown below.



4.2.2.2 Display Unit

[Replacement procedures]
Always replace the display unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the display unit.
(4) Remove the screws fixing the display unit (at 4 places) and take the display unit off.
(5) Replace with a new display unit, and fix the display unit with the fixing screws.
(6) Connect all the cables connected to the display unit. (Connect the cables to the designated connectors.)
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.



⚠ CAUTION

- ⚠ Incorrect connections may damage the devices, so connect the cables to the specified connectors.
- ⚠ Do not replace the display unit while the power is ON.
- ⚠ Do not connect or disconnect the connection cables between each unit while the power is ON.

4.2.2.3 Keyboard unit

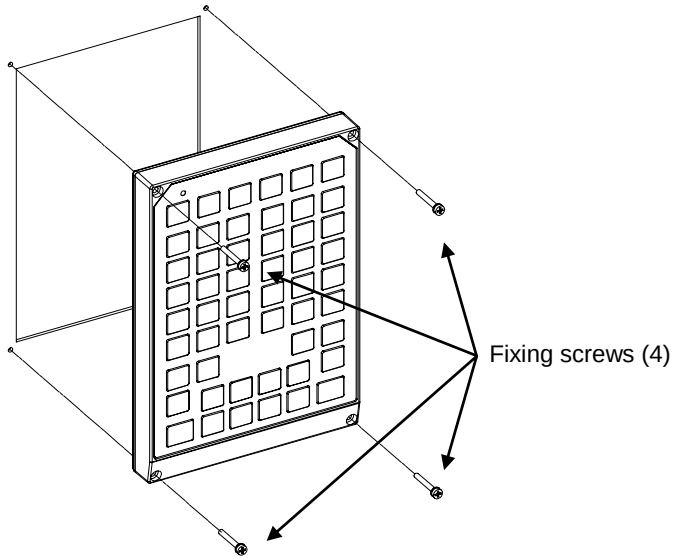
[Replacement procedures]
Always replace the keyboard unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the keyboard unit.
(4) Remove the screws fixing the keyboard unit and take the keyboard unit off.
(5) Replace with a new keyboard unit, and fix the keyboard unit with the fixing screws.
(6) Connect all the cables connected to the keyboard unit. (Connect the cables to the designated connectors.)
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.

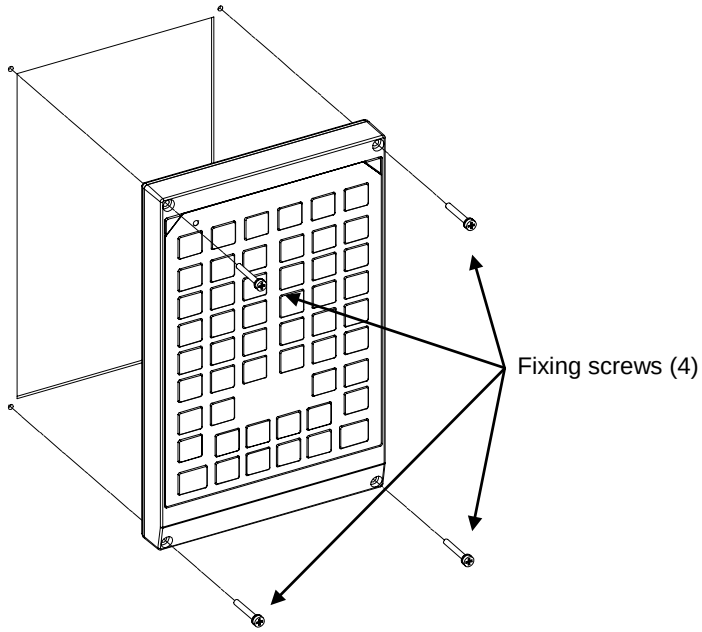
⚠ CAUTION

- Incorrect connections may damage the devices, so connect the cables to the specified connectors.
- Do not replace the keyboard unit while the power is ON.
- Do not connect or disconnect the connection cables between each unit while the power is ON.

[8.4-type Keyboard unit]



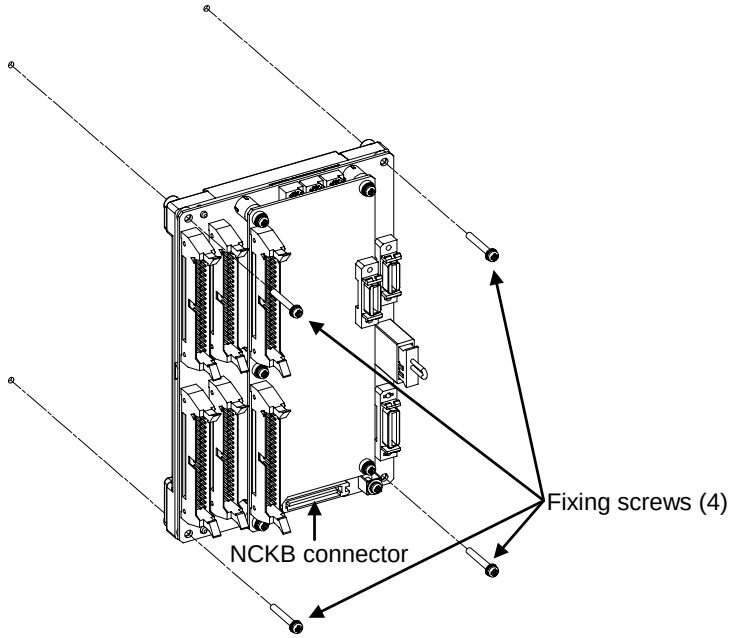
[10.4-type Keyboard unit]



4.2.2.4 DX Unit

[Replacement procedures]
Always replace the DX unit with the control unit (machine) power turned OFF.

(1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
(2) Open the electric cabinet door.
(3) Disconnect all the cables connected to the DX unit.
(4) Remove the screws fixing the DX unit and take the DX unit off.
(5) Replace with a new DX unit, and fix the DX unit onto the control unit with the fixing screws.
(Fix so that the NCKB connector slot is placed at the lower part.)
(6) Connect all the cables connected to the DX unit. (Connect the cables to the designated connectors.)
NCKB cable can be easily inserted by fitting the Δ1st pin position with the connector.
(7) Confirm that all the cables are correctly connected and close the electric cabinet door.



⚠ CAUTION

⚠ Incorrect connections may damage the devices, so connect the cables to the specified connectors.
⚠ Do not replace the DX unit while the power is ON.
⚠ Do not connect or disconnect the connection cables between each unit while the power is ON.

4.2.3 Compact Flash

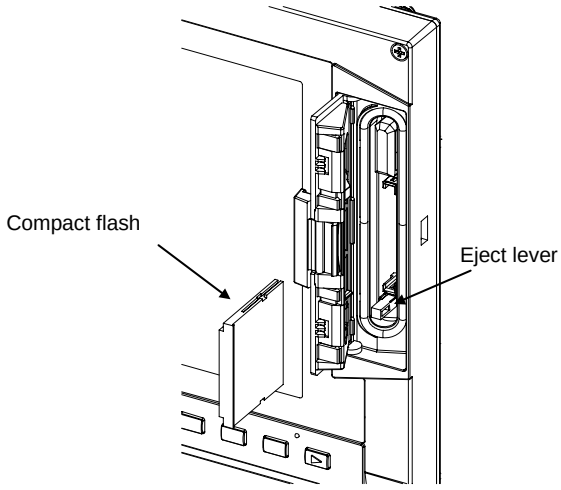
4.2.3.1 Front Compact Flash

[Card insertion procedures]

(1) Open the card slot door located on the display unit right end.
(2) Insert the compact flash. (The surface is faced on the observers' right.)

[Card ejecting procedures]

(1) Open the card slot door located on the display unit right end.
(2) Press the eject lever twice to eject the compact flash.



(Note 1) Do not eject a compact flash during the data reading/writing.
(Note 2) There may be a compatibility problem with non-recommended compact flashes, which may lead illegal operations.

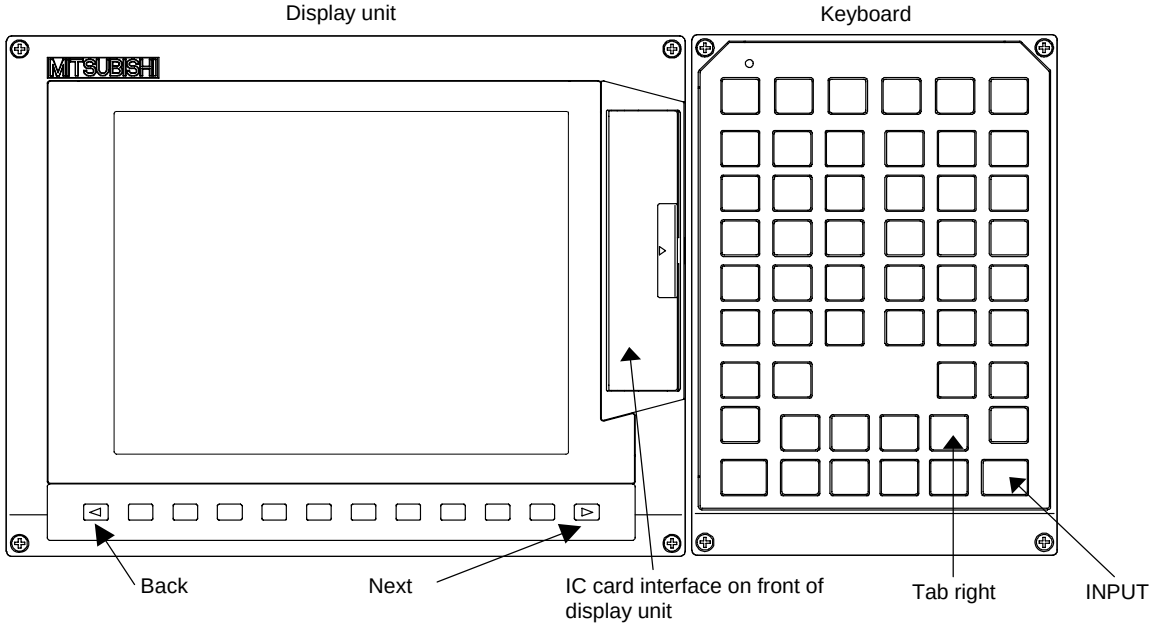
5. NC Setup Procedures

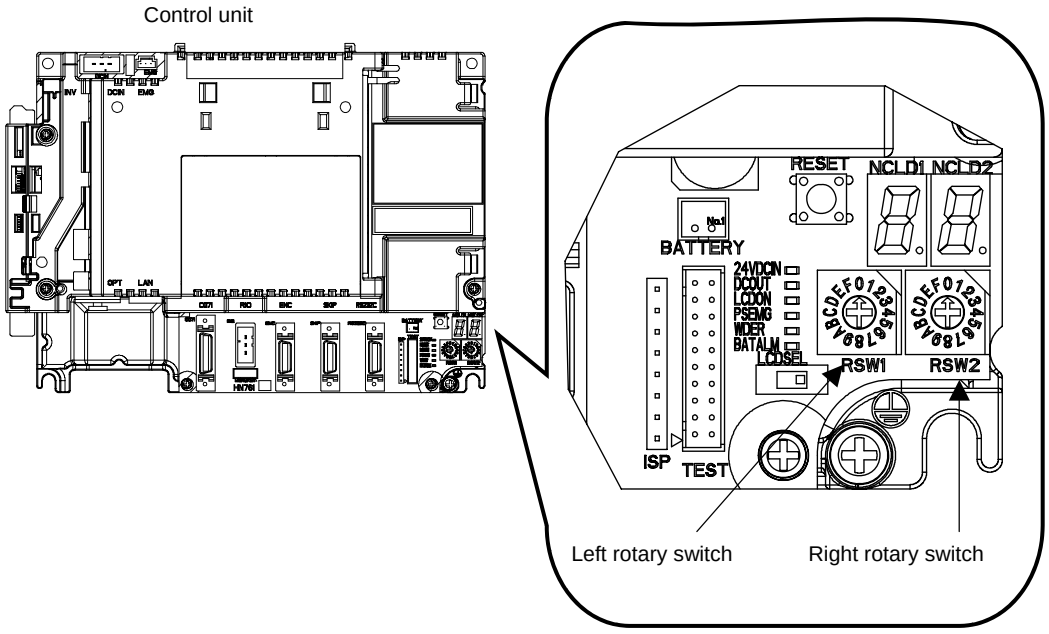
5.1 Setup Procedure after SRAM Clear

This section explains the basic procedure for when SRAM data has to be cleared for any trouble of MITSUBISHI CNC 70 Series.
Follow this procedure to start up after SRAM clear.

5.1.1 Outline of Hardware Configuration

The names of the hardware used in this section's explanations are explained below.

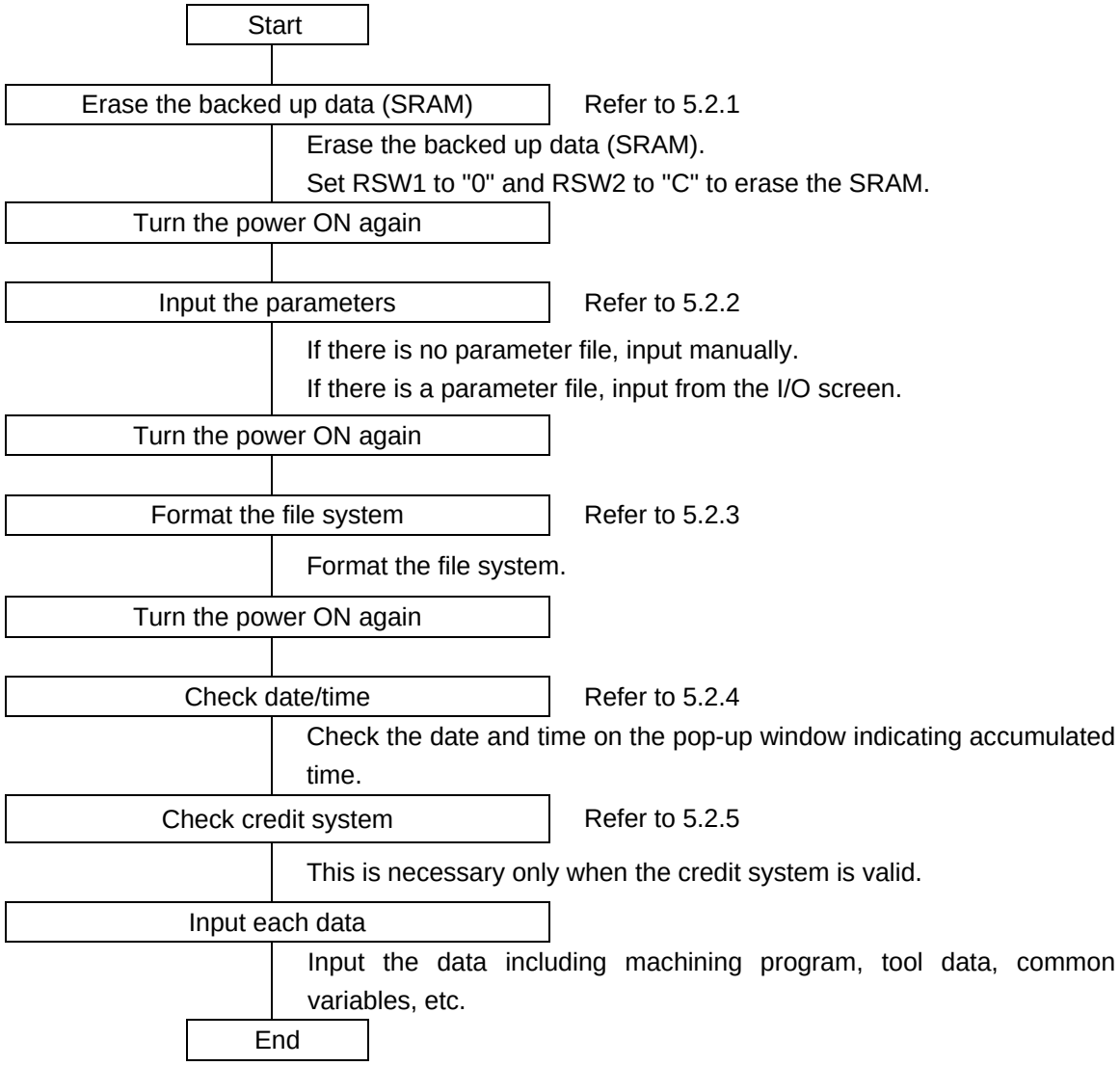




5.1.2 Outline of Setup Procedures

The procedures for setting up after SRAM clear are explained with a flow chart.

(1) When there is no all backup data

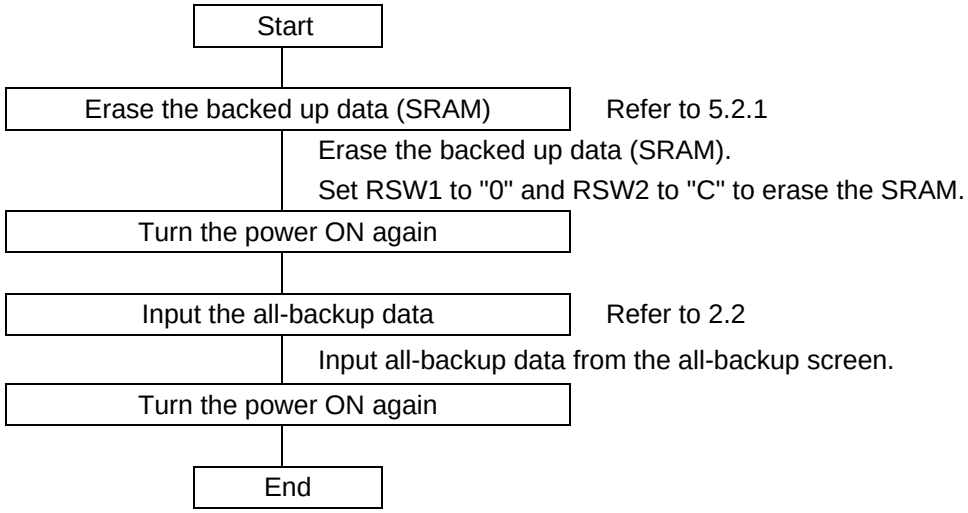


Carry out the procedures below if necessary.

1	Absolute position detection system	Refer to 5.2.6
2	PLC switch function	Refer to 5.2.7
3	All data back up	Refer to 2.2

(2) When there is all-backup data

[Caution!]
Use the all-backup data that has been obtained under normal operation. Do not use the data that has been obtained under abnormal condition, such as system alarm (this may prevent normal system startup and operation).



Carry out the procedures below if necessary.

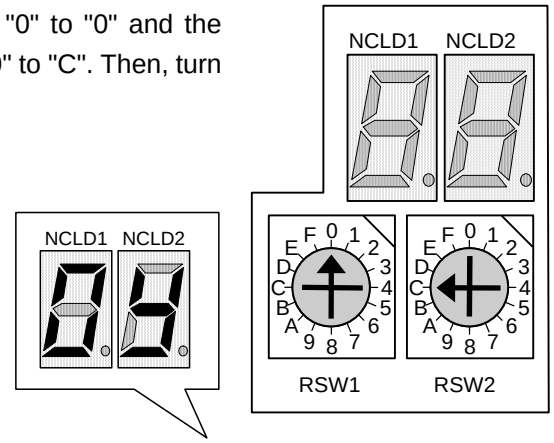
1	Absolute position detection system	Refer to 5.2.6
2	PLC switch function	Refer to 5.2.7
3	All data back up	Refer to 2.2

5.2 Setup Details

5.2.1 Erasing the backed up data (SRAM)

Use the following procedure if the backed up data (SRAM) needs to be cleared. (There is no influence on the option parameters even if the backup data is deleted.)

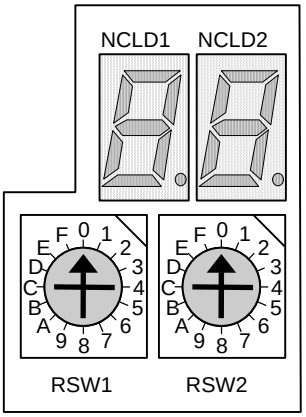
(a) With the NC power OFF, set the left rotary switch (RSW1) on the control unit from "0" to "0" and the right rotary switch (RSW2) from "0" to "C". Then, turn the power ON.



(b) The LED display will change from "08." → "00" → "01" ... "08". The process is completed when "0Y" is displayed. (Required time: 8 seconds)

(c) Turn the NC power OFF.

(d) Set the right rotary switch (RSW2) to "0".



(e) After turning the power OFF and ON, do nothing, and then turn the power OFF and ON again.

5.2.2 Inputting the Parameters

5.2.2.1 When There is No Parameter File

If there is no parameter file (ALL.PRM), obtain the parameter setting list from the machine tool builder, and then input the parameters by manual input operation.

(1) Parameter input by manual input operation

a) Select "MAINTENANCE (Mainte)" → "Mainte" → "Psswd input", and input "MPARA". Then press INPUT.

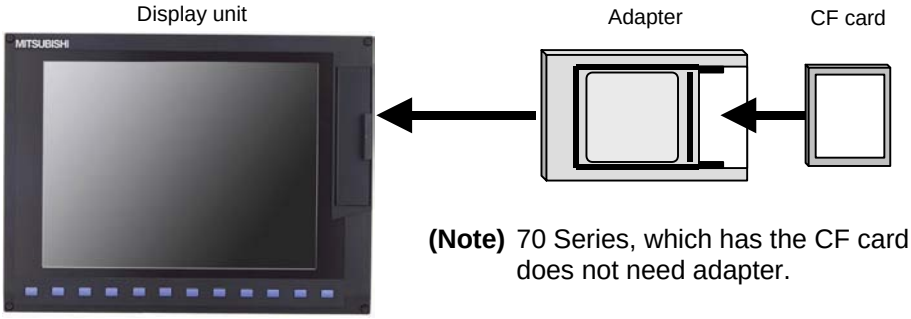
b) Select the "Retn" menu ◁ → "Param", and manually input all the parameters following the parameter setting list.

5.2.2.2 When a Parameter File is Available

If a parameter file is available, input the parameters using the input/output function.

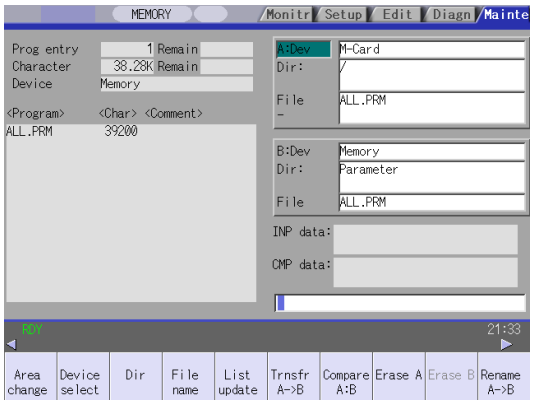
(Example) When files are available on a compact flash (CF) card

(1) Insert the CF card into the IC card interface on the front of the display unit.



(Note) 70 Series, which has the CF card interface, does not need adapter.

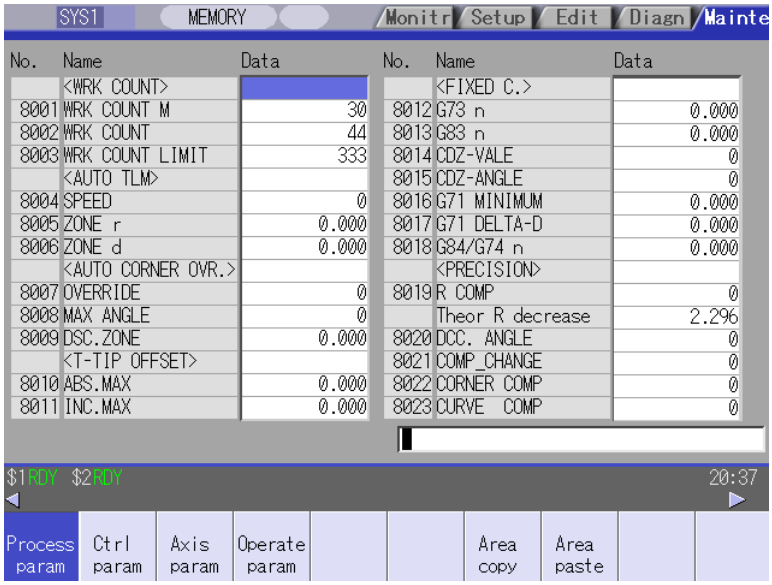
(2) Select "MAINTENANCE (EDIT)" → "Input/Output".
(3) Confirm that device A is selected, and then select "Device select" → "Memory card".
(4) Select "File name" → "From list" → "ALL.PRM", and then press INPUT.
(5) Press "Area change", and select device B.
(6) Select "Device select" → "Memory".
(7) Select "Dir" → "Param".
* "ALL.PRM" is directly input as the file name.
(8) Press "Transfr A → B", and execute parameter input.



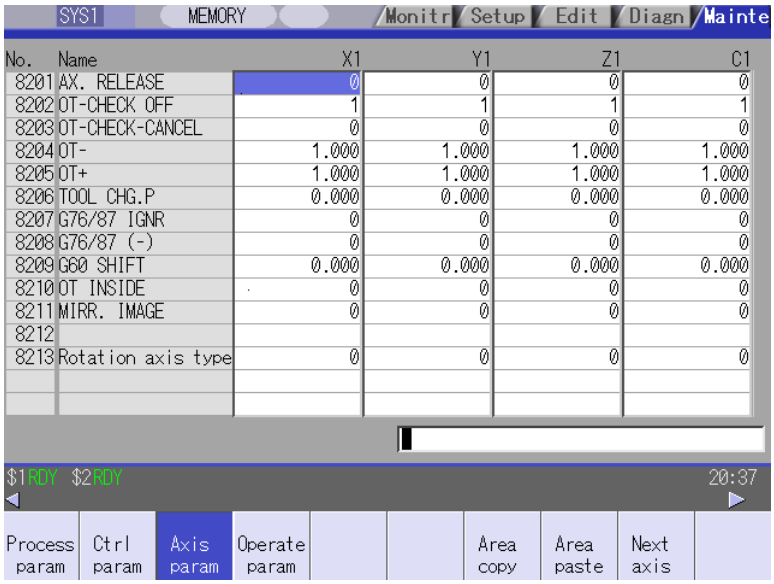
5.2.2.3 Parameter Screens

The various parameters can be displayed and set on this screen.
The configuration of the all parameter screens is applied to one of the following five patterns.

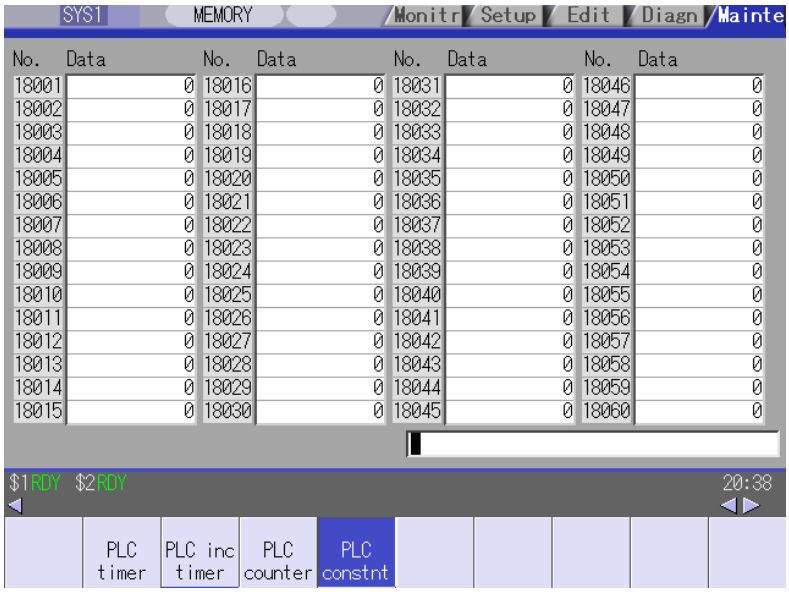
<Pattern 1> This is the screen for setting the common parameters for the axis, device, etc. (Process param, etc.)



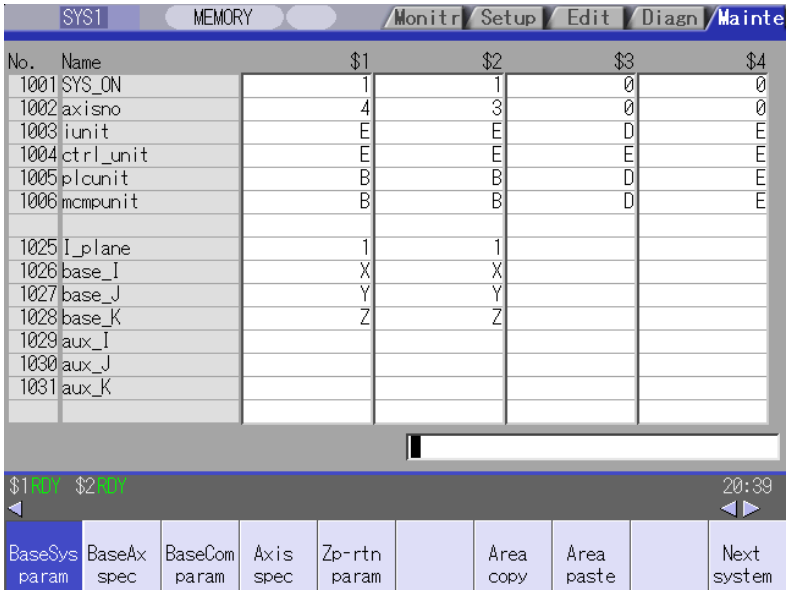
<Pattern 2> This is the screen for setting the parameters having an array structure for each axis (Axis param, etc.)



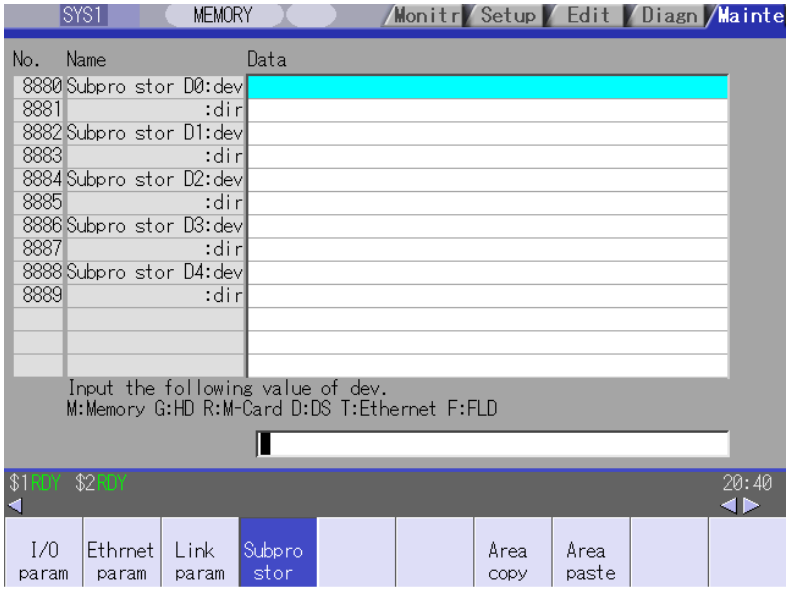
<Pattern 3> This is the screen for setting parameters common for the axis and device, etc.
The parameter names are not displayed
(Machine error data, PLC constant, etc.)



<Pattern 4> This is the screen for setting parameters having an array structure for each part system
(Base system parameters, etc.)



<Pattern 5> This is the screen for setting the subprogram storage destination parameters



Menus

Menu	Details	Type	Reference
Param No.	A arbitrary parameter No. can be selected. When the parameter No. is set and the INPUT key is pressed, the parameters will appear with that No. at the head. The cursor will also move to that No.	A	(2) Selecting the Parameter No.
Area copy	This copies the parameter setting values in the designated range. The range is designated with numbers.	A	(3) Copying/Pasting Parameters
Area paste	This pastes the range of parameters designated in area copy. They are pasted in a parameter corresponding to the axis or part system where the cursor is. Once copied, a parameter can be pasted any number of times until a new parameter is copied.	B	
Next axis	This can be selected when there are five or more display axes in the selected part system. This is used in the screen for the parameters having an array structure for each axis.	C	-
Next system	This can be selected when there are two or more screen display part systems. Use this with the parameter screen for each parameter.	C	-
	This can always be selected when the base part system parameter screen is open. The display changes to the PLC axis display when this menu is pressed.		-
Process param Control param Axis param Operate param Barrier data I/O param Ethernet param Link param Subpro stor	This changes the screen to the user parameter screen. **(Note)** The barrier data is displayed only for the L specifications.	C	(4) User Parameters

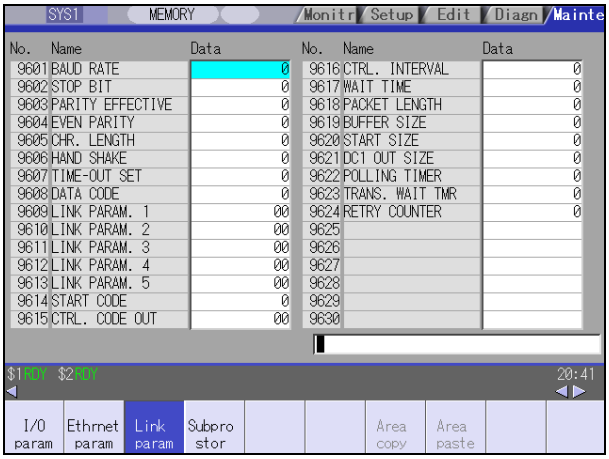
Menu	Details	Type	Reference
BaseSys param BaseAx spec BaseCom param Axis spec Zp-rtn param Abs pos param Servo param Spindle spec Spindle param RotAxis param PLC timer PLC inc timer PLC counter PLC constnt Bit select Er Comp param Er Comp data Macro list Posn switch AUX param Open param1 Open param2 CC-Link param1 CC-Link param2	This changes the screen to the Machine parameter screen. **(Note 1)** Normally, the machine parameters can be referred to, but cannot be set. **(Note 2)** The "RotAxis param", "AUX param", "Open param 1" and "Open param 2" menus are displayed only when these options are valid. **(Note 3)** The "AUX param" is displayed for 700 series only.	C	-

(1) Changing the Parameter Display

Changing to the computer link parameters

(1) Press the menu change key until the menu Link param appears. → The menu Link param appears.

(2) Press the menu Link param. → The computer link parameters appears.
The menu Link param is highlighted.



(2) Setting the Parameters
The method of setting the parameters is explained in this section.
Press the menu key to select the parameter screen, and select the data to be set with the cursor key.

"8201 Axis removal" Setting Y1 axis to "1"

(1) Press the menu Axis param.

(2) Use the ↓, ↑, ← and → keys to move the cursor to the position to be set. → The cursor moves to the position of the setting target data.

The cursor can also be moved with the menu Param No.
Refer to "6.2.2 Selecting the parameter No.".

No.	Name	X1	Y1
8201	AX. RELEASE	0	0
8202	OT-CHECK OFF	1	1
8203	OT-CHECK-CANCEL	0	0
8204	OT-	1.000	1.000
8205	OT+	1.000	1.000
8206	TOOL CHG.P	0.000	0.000

The current setting value is displayed in the input area.

(3) Input the value.

1 INPUT → The setting value appears, and the cursor moves.

No.	Name	X1	Y1
8201	AX. RELEASE	0	1
8202	OT-CHECK OFF	1	1
8203	OT-CHECK-CANCEL	0	0
8204	OT-	1.000	1.000
8205	OT+	1.000	1.000
8206	TOOL CHG.P	0.000	0.000

"8205 OT+" Setting X1 axis to "100.0" and Z1 axis to "200.0"

(1) Press the menu [Axis param].

(2) Use the [↑] and [↓] keys to move the cursor to the position to be set.
(The row does not need to be designated with the [←] and [→] keys.)

➡ The cursor moves to the position of the setting target data.

No.	Name	X1	Y1	Z1
8201	AX. RELEASE	0	1	0
8202	OT-CHECK OFF	1	1	1
8203	OT-CHECK-CANCEL	0	0	0
8204	OT-	1.000	1.000	1.000
8205	OT+	1.000	1.000	1.000
8206	TOOL CHG.P	0.000	0.000	0.000

The current setting value is displayed in the input area.

(3) Input the value.
(Format: 1st row/2nd row/3rd row/4th row)
100//200 [INPUT]

➡ The setting value appears, and the cursor moves.

No.	Name	X1	Y1	Z1
8201	AX. RELEASE	0	1	0
8202	OT-CHECK OFF	1	1	1
8203	OT-CHECK-CANCEL	0	0	0
8204	OT-	1.000	1.000	1.000
8205	OT+	100.000	1.000	1.000
8206	TOOL CHG.P	0.000	0.000	0.000

(Note 1) If [PR] appears at the lower right of the screen when the parameter value is changed, the parameter value will be validated when the power is turned ON again.
(Note 2) If the [INPUT] key is pressed without inputting a value, the cursor will move without changing the parameter setting value.
(Note 3) If a character string, such as an axis name or input/output device name, is set in the parameter, the setting will be cleared when 0 is input and the [INPUT] key is pressed.
(Note 4) Parameters for up to four rows, which are as currently displayed, can be set at once.
(Note 5) If the parameter value for several rows is input simultaneously, the values will be set from the currently displayed left end no matter which row the cursor is currently at.

(3) Copying/Pasting Parameters

Designating the cursor position and copying

(1) Move the cursor to the parameter to be copied.

(2) Press the menu [Area copy] and [INPUT].

➡ The menu is highlighted.
The setting value of the parameter at the cursor position highlighted.

No.	Name	X1
8201	AX. RELEASE	0
8202	OT-CHECK OFF	1
8203	OT-CHECK-CANCEL	0
8204	OT-	1.000
8205	OT+	100.000
8206	TOOL CHG.P	0.000

(Note) When the screen has an array structure for each axis or each part system, an error will occur if different rows (axis or part system) are designated for the copy start position and end position.

Copying by designating the parameter No. with key inputs

(1) Move the cursor to the display area of the axes or part system to be copied.

(2) Press the menu [Area copy]. → The menu is highlighted.

(3) Designate the copy range.
Format: First No./Last No.

8203/8205 [INPUT] → The copy target range is highlighted.
The menu highlight returns to normal.

If the last No. to be copied is the last No. of the currently displayed parameter type, "E" can be designated. **(Example)** 8201/E
If only one parameter is being copied, input only the No. of the parameter to copy, and then press the [INPUT] key.

No.	Name	X1
8201	AX. RELEASE	0
8202	OT-CHECK OFF	1
8203	OT-CHECK-CANCEL	0
8204	OT-	1.000
8205	OT+	100.000
8206	TOOL CHG.P	0.000

(Note 1) The copy target range highlight returns to the normal display by pasting. The copy target range is valid until the parameter type display is changed.

(Note 2) Only the currently displayed parameter types can be copied.
(Example) If the parameter numbers #1001 to #1028 of the base system parameter are designated as the copy target range, the base axis specification parameters #1013 to #1024 cannot be copied.

Pasting the copied data

(1) Move the cursor to the display area of the axes or part system where the data will be pasted.

(2) Press the menu key [Area paste]. → The menu is highlighted, and a message confirming the operation appears.

(3) Press [Y] or [INPUT]. → The copied data is written to the parameter with the same number as when copied, in the area where the cursor is.
The menu highlight returns to normal.

The copied data will not be written in when the [N] key is pressed.

(Note) If the corresponding parameter is changed after the copy target range is designated, the changed value will be pasted.

(4) User Parameters
The user parameter configuration is as shown below.

Parameter type	Parameter No.	Next axis menu	Next system menu	Area copy Area paste menu
Process Parameter	8001 to 8094 8621 to 8627 8701 to 8712 19425 to 19428	-	Δ (Note 3)	Δ (Note 3)
Control Parameter	8101 to 8124	-	-	-
Axis Parameter	8201 to 8215	Δ (Note 1)	-	Δ (Note 2)
Operation Parameter	8901 to 8921	-	-	-
Barrier data (Note 5)	8300 to 8319	-	Δ (Note 3)	○
Input/Output Parameter	9001 to 9530	-	-	-
Ethernet Parameter	9701 to 9781	-	-	-
Computer Link Parameter	9601 to 9630	-	-	-
Sub-program storage destination parameter	8880 to 8889	-	Δ (Note 3)	Δ (Note 3)

(Note 1) This is valid only when the total number of valid NC axes and PLC axes in the entire part system is five or more.
(Note 2) This is valid only when the total number of valid NC axes and PLC axes in the entire part system is two or more.
(Note 3) This is valid only when the number of valid part systems is two or more.
(Note 4) The barrier data appears only for the L specifications.

Operation methods (Subprogram storage destination parameters) Example 1

Setting the device (Example: Assign FD to D1)

(1) Set the cursor to the "#8882 Subpro stor DI: dev" (D1 device).

(2) Input [F], and press the [INPUT] key. ➡ "FD" appears at "#8882 D1: dev". The cursor moves down one line.

(Note) Input the following values for the device name.
M: Memory, G: HD, R: Memory card, D: DS (Data server), T: Ethernet, F: FD
(In 70 series, only "Memory", "Memory card" and "Ethernet" can be used.)

Operation methods (Sub program storage destination parameter) Example 2

Setting the directory (Example: Setting "/TEMP1/TEMP12/TEMP123" to D1)

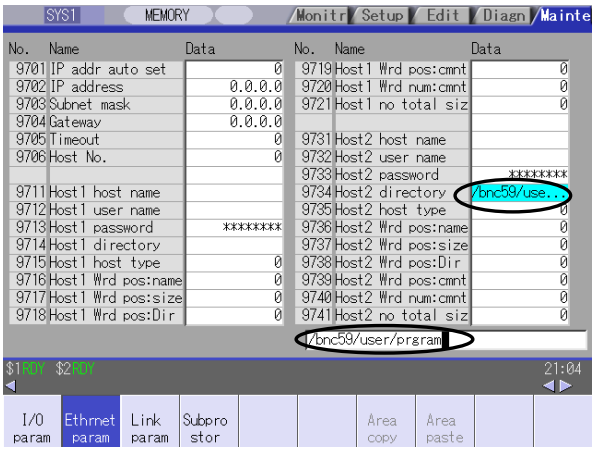
(1) Set the cursor to "#8883 dir" (D1 directory) ➡ The current "#8883 D1: dir" contents are echoed back to the input area.

(2) Set "/TEMP1/TEMP12/TEMP123", and press the [INPUT] key. ➡ The value is set, and the cursor moves down one line.

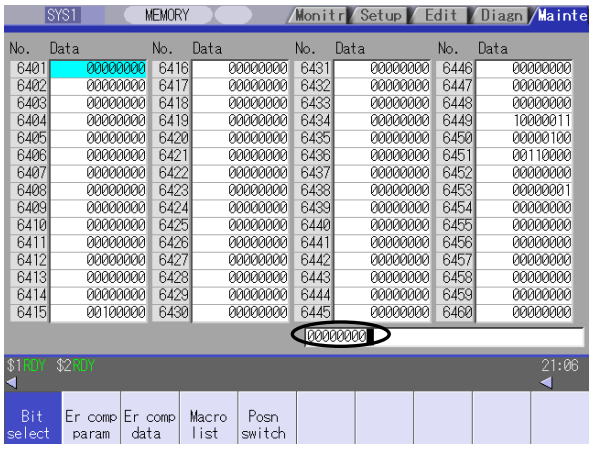
(5) Echo Back
If more than 14 characters can be set for the parameter, or for bit-related parameters, the parameter setting value at the cursor position appears at the input area. If more than 14 characters are set in the parameter, "..." will appear in the data field.

< Target parameters>

Parameter screen name	Parameter No., parameter name
Base Common Param	#1217 aux01 to #1228 aux12 #1229 set01 to #1240 set12 #1265 ext01 to #1300 ext36 #1926 IP address #1927 Sub-net mask #1928 Gateway #1930 Host Address #1934 Local IP address #1935 Local Subnet mask #11005 PC IP address
Base System Param	#1204 TmirS2 #1210 RstGmd #1573 Ret1 #1574 Ret2
Bit Selection Param	#6401 to #6596
Ethernet Param	#9702 IP address #9703 Sub-net mask #9704 Gateway #9711 Host 1 host name #9712 Host 1 user name #9714 Host 1 directory * These also apply for hosts 2 to 4.
Sub-pro Storage Destination Param	#8881 Subpro stor D0:dir * This also applies for devices 1 to 4.



Parameters for which 14 or more characters can be set



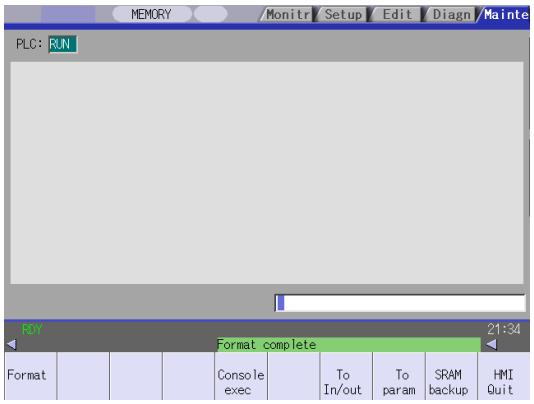
Bit-related parameters

5.2.3 Formatting the File System

The base specification parameters "#1007 System type select" and "#1037 cmdtyp" must be set before the file system is formatted.

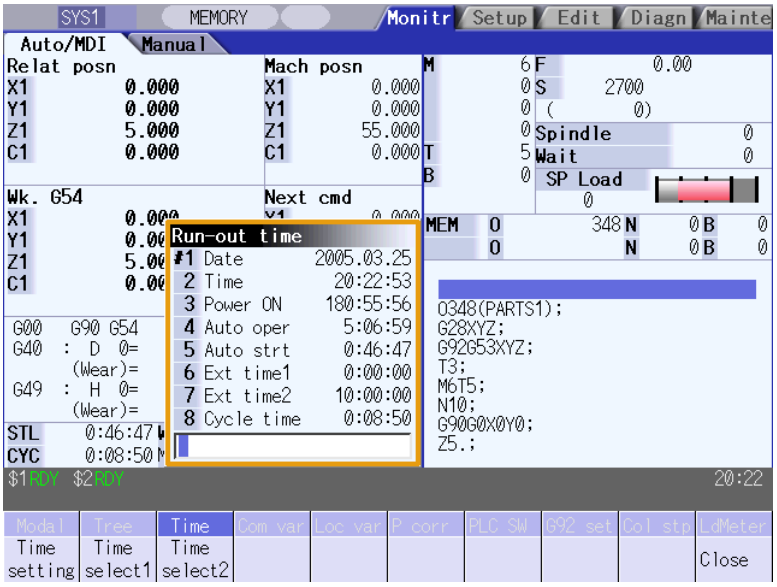
M System specifications (when #1007 is set to 0)	: Set #1037 to 1 or 2 according to the tool compensation type.
L System specifications (when #1007 is set to 1)	: Select from 3 to 8 according to the G code list, and set it in #1037.

(1) Select "MAINTENANCE (Mainte)" → "NEXT" menu ◁ → "Format".
(2) The message "Format NC memory (Y/N)?" will appear. Press "Y".
(3) When the memory is correctly formatted, the message "Format complete" will appear.



5.2.4 Integrated Time Display

The integrated time (date, time, power ON time, automatic operation time, automatic start time, external integrated time 1, external integrated time 2, cycle time) controlled by the NC can be set and displayed.
Note that the cycle time cannot be set. (Cycle time is display only.)
The integrated times displayed in cycle time display area on "Auto/MDI" tag can be set.



Display items

Display item	Details
(1) #1 Date	The current date set in the NC is displayed. Year: 4 digits, Month: 2 digit, Date: 2 digit (YYYY.MM.DD)
(2) 2 Time	The current time set in the NC is displayed with the 24-hour system. (HH:MM:SS)
(3) 3 Power ON	This displays the total integrated time of the time from NC power ON to OFF. (HHHH:MM:SS)
(4) 4 Auto oper	This displays the total integrated time of the work time from automatic start button pressing in the memory (tape) mode to M02/M30 or reset button pressing (HHHH:MM:SS)
(5) 5 Auto strt	This displays the total integrated time during automatic starting from automatic start button pressing in the memory (tape) mode or MDI to feed hold stop, block stop, or reset button pressing. (HHHH:MM:SS)
(6) 6 Ext time1	This content differs depending on machine tool builder specification. (HHHH:MM:SS)
(7) 7 Ext time2	This content differs depending on machine tool builder specification. (HHHH:MM:SS)
(8) 8 Cycle time	This displays the time that automatic operation is started from when the automatic start button is pressed in the memory (tape) mode or MDI to when feed hold stop or block stop is applied or the reset button is pressed.

(Note) When the #3 Power ON to #8 Cycle time displays reach the maximum value (9999:59:59), the count stops, and the maximum value remains displayed.

Menus

Menu	Details	Type	Reference
Time setting	This sets the integrated time.	A	5.2.4.1 Setting the Integrated Time
Time select1	The time that is displayed in upper line on cycle time display area is selected.	C	5.2.4.2 Setting the Time Display Selection
Time select2	The time that is displayed in bottom line on cycle time display area is selected.	C	
Close	This closes the pop-up window and quits this function	C	

5.2.4.1 Setting the Integrated Time

Operation method

(1) Press the menu [Time setting]. → The time setting mode is entered. The cursor appears at the "#1 Date" position in the integrated time display.

(2) Input today's date.
(Example) 2003/8/19 [INPUT] → "2003.08.19" appears at "#1 Date", and the cursor moves to "#2 Time".

(3) Set the data for each item, and press the [INPUT] key. → When "#7 External integrated time 2" has been set, the cursor disappears, and the time setting menu highlight is turned OFF.

If the item does not need to be set, press the [↓] key and move the cursor.
Note that #8 Cycle time cannot be set, so the cursor will not move.

(Note 1) The data delimiters are as shown below.

Item	Valid delimiters during setting	Delimiters in display
#1 Date	" . " or " / "	" . "
#2 Time to #7 Ext time2	" : " or " / "	" : "
#8 Cycle time		" : "

(Note 2) If the [Time setting menu] or [◁] key is pressed again during the time setting mode, the time setting mode will be canceled.

Setting range

Display item	Range
#1 Date	1980.1.1 to 2069.12.31
2 Time	00:00:00 to 23:59:59
3 Power ON	00:00:00 to 59999:59:59
4 Auto oper	
5 Auto strt	
6 Ext time 1	
7 Ext time 2	

5.2.4.2 Setting the Time Display Selection

The displayed time is set on cycle time display area.

Operation method

(1) Press the menu "Time select1" → The time selection mode is activated, and the following menu appears.

Date	Time	Power ON	Auto oper	Auto strt	Ext time1	Ext time2	Cycle time

(2) Press the time type for the mode to display.
(Example) "Auto oper" → The automatic operation time is displayed in upper line on cycle time display area. The menu display returns to integrated time sub-menu.

(3) Press the menu "Time select2" → The time selection mode is activated, and the following menu appears.

Date	Time	Power ON	Auto oper	Auto strt	Ext time1	Ext time2	Cycle time

(4) Press the time type for the mode to display.
(Example) "Power ON" → The automatic operation time is displayed in bottom line on cycle time display area. The menu display returns to integrated time sub-menu.

(Note 1) The displayed time is held even after the power is turned OFF and ON.

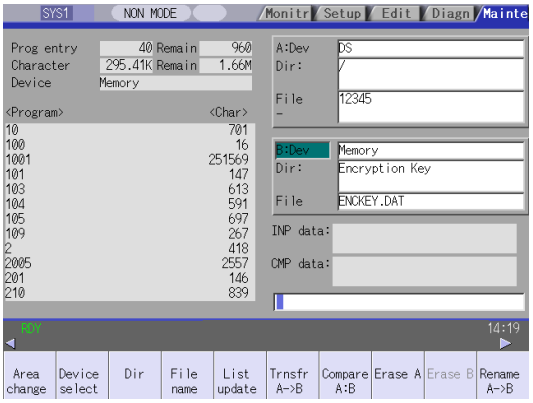
5.2.5 Credit System

Encryption key and decryption code need to be set in order to validate credit system.

(1) Enter code key in the input/output screen.

(a) Set the device name, directory and file name in [A:Dev].
(b) Set "Memory" in device section and "/CRE" in directory section of [B:Dev].

➡ Contens in directory section/file name section will be written over.
Directroy section "Encryption Key"
File name section "ENCKEY.DAT"

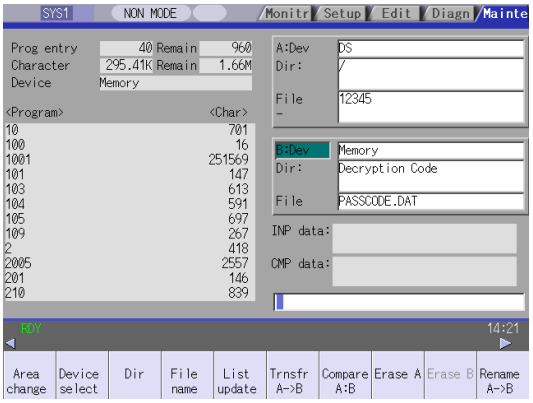


(c) Press the menu key [Trnsfr A→B].

(2) Enter cancel code in the input/output screen.

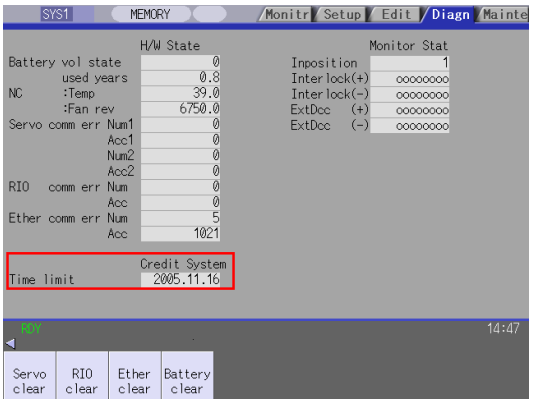
(a) Set the device name, directory and file name in [A:Dev].
(b) Set "Memory" in device section and "/RLS" in directory section of [B:Dev].

➡ Contens in directory section/file name section will be written over.
Directory section "Decryption Code"
File name section "PASSCODE.DAT"



(c) Press the menu key [Trnsfr A→B].

(3) Turn the power ON again. ➡ Confirm that the expiration date (time limit) is indicated in [DIAGN]-[Self diag] screen.



5.2.6 Absolute Position Detection System

The absolute position detection function detects the machine movement amount while the power is OFF. This allows automatic operation to be started without carrying out reference position return after the power is turned ON. This function is extremely reliable as it carries out a mutual check of the feedback amount from the detector, and checks the absolute position unique to the machine, etc.
To carry out the absolute position detection, the machine zero point must be determined, and the absolute position must be established. Following two methods are available depending on how the absolute position is established.

(1) Dogless-type absolute position detection

The absolute position is established by setting an arbitrary coordinate at an arbitrary position without using the dog.
The absolute position basic point can be determined with the following three methods.

- ・Machine end stopper method
- ・Marked point alignment method
- ・Marked point alignment method II

For the machine end stopper method, the manual initialization and automatic initialization methods can be used.

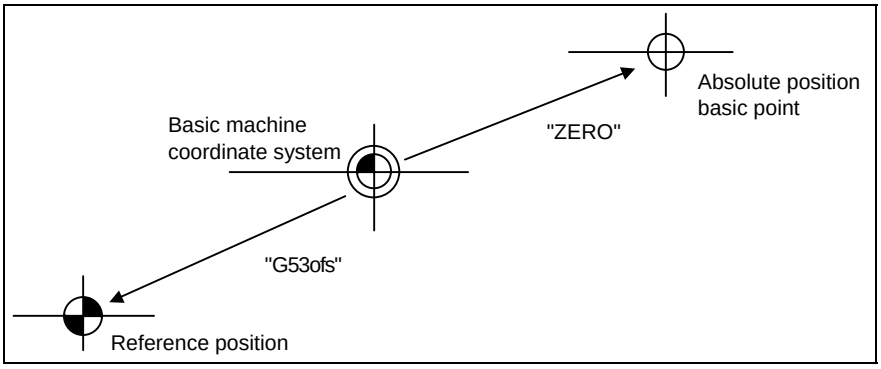
(2) Dog-type absolute position detection

The absolute position is established by executing dog-type reference position return.

The validity and method of the absolute position detection system can be selected with parameters for each axis. Note that the servo drive unit and detector must have the specifications compatible for the absolute position detection.

5.2.6.1 Dog-type Reference Position Return Operation

Using the mechanical basic position (machine end or marked point) or the electrical basic position (grid point immediately before the machine end or marked point) as the absolute position basic point, the basic machine coordinate system zero point will be set at the position "ZERO" value far from the absolute position basic point in the direction of reversed “ZERO” sign.
The reference position is set at the position "G53ofs" value far from the basic machine coordinate system's zero point.



Dogless absolute position coordinate system

ZERO : Coordinate position of absolute position basic point looking from basic machine coordinate system zero point. (ABS. POSITION PARAMETER screen "#2 ZERO")
G53ofs : Coordinate position of reference position looking from basic machine coordinate system zero point. (axis specifications parameter "#2037 G53ofs")

(Note) Select with the parameter "#2059 zerbas" whether to use the mechanical basic position or electrical basic position as the absolute position basic point for the machine end stopper method.

5.2.6.2 Starting up the Absolute Position Detection System

The zero point initialization should be carried out before the absolute position detection system is started up. The coordinate system is established and operation is enabled by zero point initialization.
In this section, only the outline is introduced. Refer to 2.3 for the details.

Operation when absolute position is not established

If the zero point has not been initialized even once or if the absolute position is lost, the following alarm and non-initialized axis will be output. The coordinate system is unstable in this point, so the limitations given in following table will be applied to each mode. Initialize the zero point and establish the coordinate system. Refer to 2.3 for the details.

Alarm: Z70 (Absolute position data error)
Z71 (Absolute position encoder failure)

Operation in each mode

Operation mode	Absolute position detection method	
	Dogless-type	**Dog-type**
Memory/MDI	Movement command invalid **(Note 1)** (Including G28)	Movement command invalid **(Note 1)** (G28 is valid)
JOG feed	Valid	Valid
Rapid traverse	Valid	Valid
Handle	Valid	Valid
Step	Valid	Valid
Zero point return	Starting not possible **(Note 2)**	Starting possible

(Note 1) The program error (P430) will occur.
(Note 2) If the axis before the absolute position establish is started, the error "M01 OPERATION ERROR 0024" will occur.
(This mode is valid for an axis for which the absolute position has been established.)

Selecting the zero point initialization method

Select the zero point initialization method with the following parameter.
#2049 type 1: Dogless type Machine end stopper method
2: Dogless type Marked point alignment method
3: Dog type
4: Dogless type Marked point alignment method II

Dogless-type zero point initialization

The zero point is initialized using the ABS POSITION SET screen and JOG or handle.
The operation methods differ according to the zero point initialization method. Refer to 2.3 for the details.

(1) Machine end stopper method

The machine end stopper method includes the manual initialization and automatic initialization methods.

(a) Manual initialization

With this method, the axis is pushed against the machine end stopper using handle or JOG.

(b) Automatic initialization

With this method, the axis is pushed against the machine end stopper, and can be used when the "INIT-SET" mode is selected. This method has the following features compared to the manual initialization method.

・The axis is pushed with the same conditions (feedrate, distance) each time, so inconsistencies in the zero point position can be reduced.

・Part of the operations is automated to simplify the zero point initialization.

(2) Marked point alignment method

With this method, the axis is aligned to the machine's basic point (marked point) using handle or JOG. The first grid point where the axis reaches upon retraction in the opposite direction after alignment to the marked point is regarded as the basic point.

(3) Marked point alignment method II

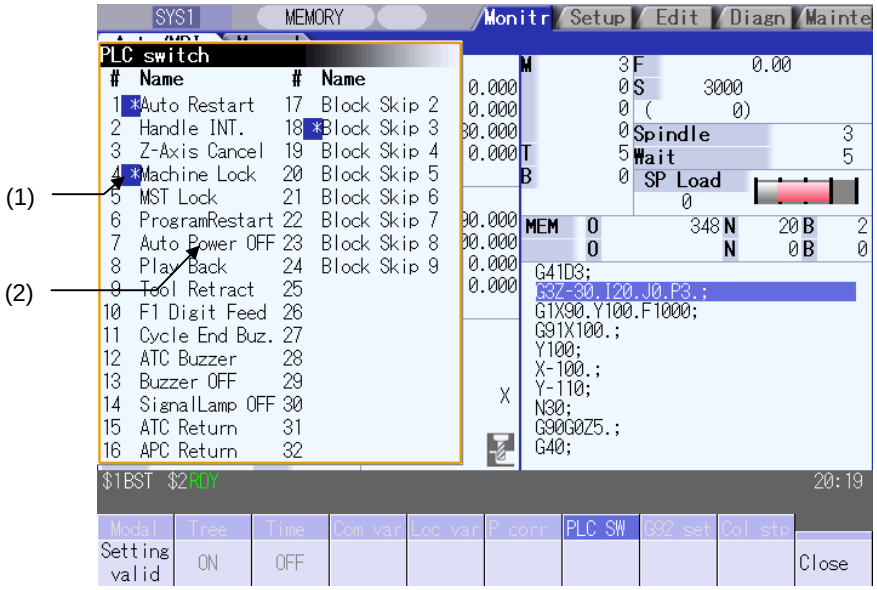
With this method, the axis is aligned to the machine's basic point (marked point) using handle or JOG. The machine’s basic position (marked point) is regarded as the basic point.

Dog-type zero point initialization

By executing dog-type reference position return with the manual reference position return mode or automatic reference position return command (G28), the zero point will be initialized.

5.2.7 PLC Switch Function

The various control signals for NC operation can be turned ON and OFF.
Refer to the instruction manual issued by the machine tool builder for details.



Display items

Display item	Details
(1) Mark indicating switch ON	This is displayed for switches that are turned ON
(2) Switch name	The display contents differ depending on machine tool builder specification.

Menus

Menu	Details	Type	Reference
Setting valid	Setting of the PLC switch is started.	A	5.2.7.1 Turning PLC Switches ON/OFF
ON	This turns ON the switch currently indicated by the cursor.	C	
OFF	This turns OFF the switch currently indicated by the cursor.	C	
Close	This closes the pop-up window and quits this function.	C	

5.2.7.1 Turning PLC Switches ON/OFF

Operation method (To turn switch "#6 Program restart" ON)

(1) Press the menu [Setting valid] .

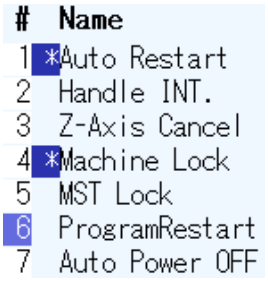
The menu Setting valid will be highlighted.
A message confirming the start of PLC switch setting will appear.

(2) Press "Y" or [INPUT]

The PLC switch setting mode will be entered.
The cursor will appear at the PLC switch No. position.
The menu keys [ON] and [OFF] will appear normally.

(3) Press the cursor keys [↑] and [↓] to move the cursor to "#6".

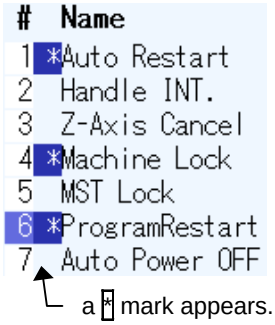
The #6 number is highlighted.



(4) Press the menu key [ON].

To turn OFF, press the menu key OFF.

The "#6 Program restart" switch turns ON, and a [*] mark appears.



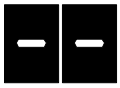
(Note 1) If the [Setting valid] menu or [◁] key is pressed again during the PLC switch setting mode, the PLC switch setting mode will be canceled.
(Note 2) The PLC switch setting mode is canceled when the PLC switch's pop-up window is closed.
(Note 3) The cursor will not appear in modes other than the PLC switch setting mode.

5.3 7-segment LED's Alarm/Status Indication

5.3.1 Outline

The 7-segment LEDs mounted on the operation board I/O can display NC status.
When alarms occur, an alarm with the highest priority within each part system will be shown.

5.3.2 Status Display

In normal state, the 7-segment LEDs display  while flashing.

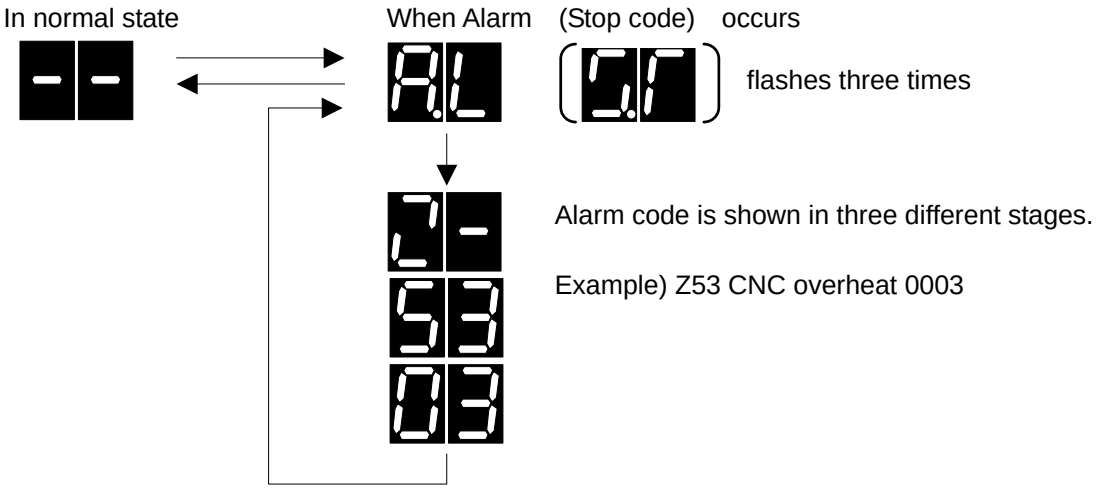
5.3.3 Alarm Display

If an alarm occurs, these LEDs show both the occurrence and the meaning of the alarm in two stages.

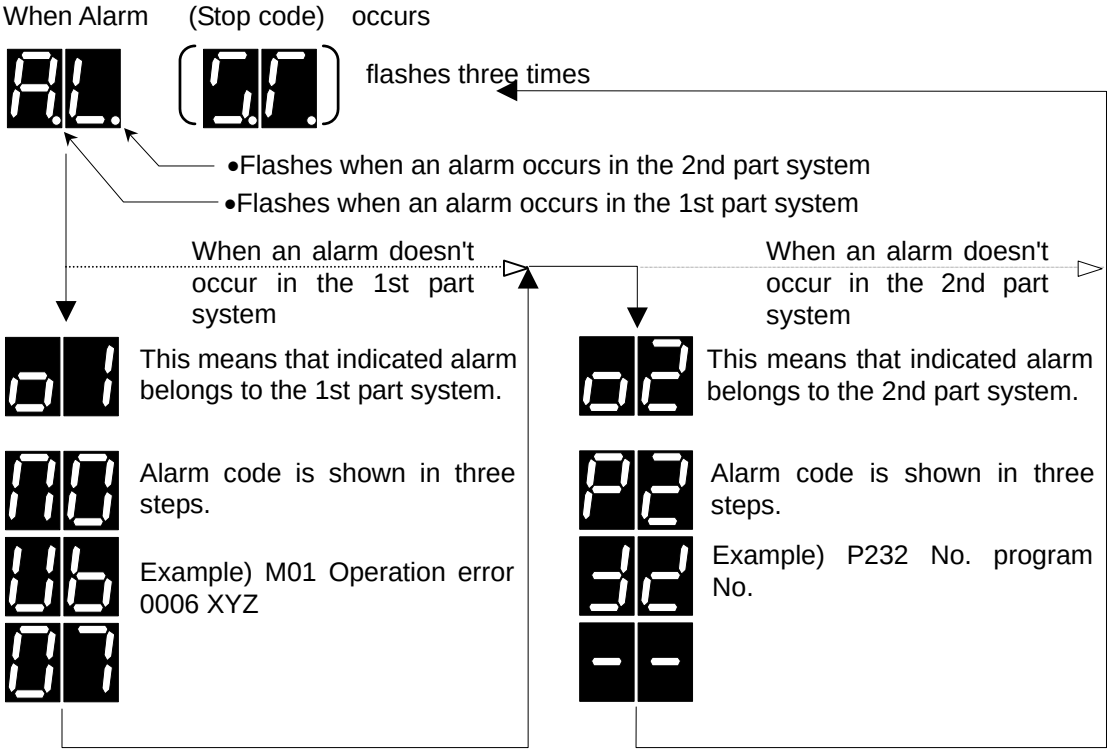
At first,  flashes three times. In the case of stop code,  is shown instead.

Then, the meaning of the alarm is indicated in three different stages.

[Transition of 7-segment LED display]



[Example of alarm display for 2-part systems]



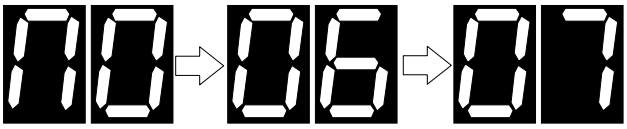
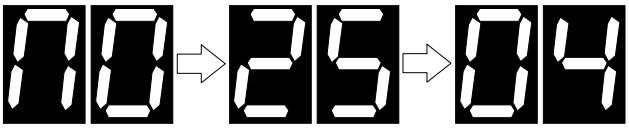
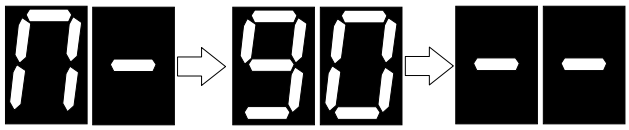
5.3.4 Notes

When only any of the following alarms occur, LED shows the normal indication.
(1) Emergency stop EXIN
(2) Emergency stop WAIT
(3) M01 Operation error 0110 Cutting block start interlock
(4) M01 Operation error 0120 Cutting block interlock

Supplement)
Alarm display samples are shown In the next section and later.

5.3.5 Example of alarm display

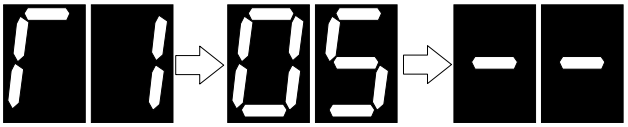
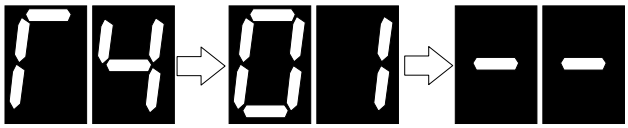
[Operation error]

Alarm/Warning code						Displays of 7-segment LED (transition)
						1L 1R 2L 2R 3L 3R
M01 Operation error 0006 XYZ						
1L	1R	2L	2R	3L	3R	
Operation error	Error # (lower 3 digits)			Axis bit		
M01 Operation error 0006 XYZ						
1L	1R	2L	2R	3L	3R	
Operation error	Error # (lower 3 digits)			No meaning		
M00 Auxiliary axis OP error 0025 0004						
1L	1R	2L	2R	3L	3R	
Auxiliary axis OP error	Error # (lower 3 digits)			Axis bit		
M01 Auxiliary axis OP error 0060 0002						
1L	1R	2L	2R	3L	3R	
Auxiliary axis OP error	Error # (lower 3 digits)			Axis bit		
M90 Parameter set mode						
1L	1R	2L	2R	3L	3R	
Parameter set mode				No meaning		

* Note

- Spindle bit in error won't be displayed.
- The error indications of [M01 Operation error], [M00 Auxiliary axis OP error] and [M01 Auxiliary axis OP error] are overlapped.
- The error indications of ”0001 to 0099” of [M01 Operation error] overlap those of ”1000 to 1099”, and likewise ”0100 to 0199” and ”1100 to 1199” are overlapped.

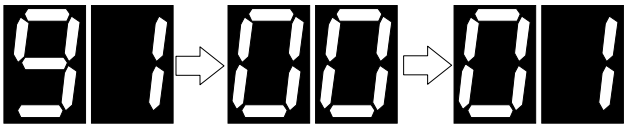
[Stop code]

Alarm/Warning code						Displays of 7-segment LED (transition)
T01 Cycle start prohibit 0105						
1L	1R	2L	2R	3L	3R	
Stop code		Error # (lower 2 digits)		No meaning		
T02 Feed hold 0202						
1L	1R	2L	2R	3L	3R	
Stop code		Error # (lower 2 digits)		No meaning		
T03 Block stop 0301						
1L	1R	2L	2R	3L	3R	
Stop code		Error # (lower 2 digits)		No meaning		
T04 Collation stop 0401						
1L	1R	2L	2R	3L	3R	
Stop code		Error # (lower 2 digits)		No meaning		
T10 Fin wait 0001						
1L	1R	2L	2R	3L	3R	
Stop code		Error # (lower 2 digits)		No meaning		

* Note

- Among the causes of [T10 Fin wait], "In dwell execution" and "Unclamp signal wait" won't be indicated.

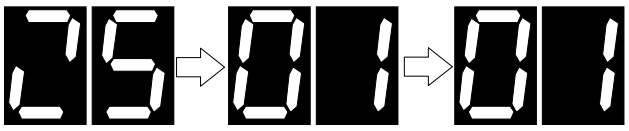
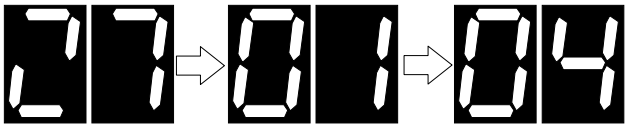
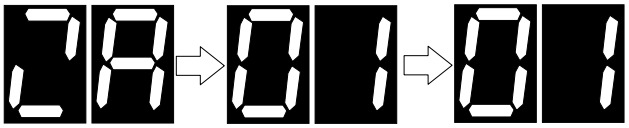
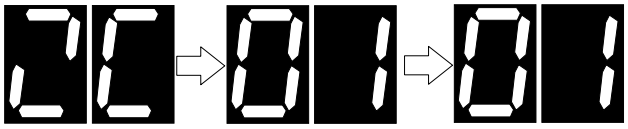
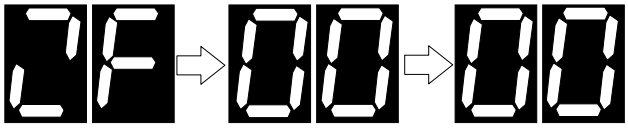
[Emergency stop]

EMG Emergency stop STOP						
1L	1R	2L	2R	3L	3R	
Emergency stop		R69 (upper 2 digits)		R69 (lower 2 digits)		

[Program error]

P273 Macro call nesting over						
1L	1R	2L	2R	3L	3R	
Program error	Error #			No meaning		

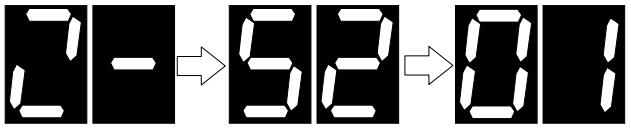
[System alarm]

Alarm/Warning code						Displays of 7-segment LED (transition)
Z70 Abs data error 0001 X						
1L	1R	2L	2R	3L	3R	
Abs data error		Error #		Axis bit		
Z71 Abs encoder failure 0002 X						
1L	1R	2L	2R	3L	3R	
Abs encoder failure		Error #		Axis bit		
Z72 Position check error 0001 Z						
1L	1R	2L	2R	3L	3R	
Position check error		Error #		Axis bit		
Z73 Absolute position data warning 0003 XYZ						
1L	1R	2L	2R	3L	3R	
Absolute position data warning		Error #		Axis bit		
Z70 Aux ax abs position error 0001 0001						
1L	1R	2L	2R	3L	3R	
Aux ax abs position error		Error #		Axis bit		
Z71 Aux ax drop voltage 0001 0001						
1L	1R	2L	2R	3L	3R	
Aux ax drop voltage		Error #		Axis bit		
Z73 Aux ax system warning 0001 0001						
1L	1R	2L	2R	3L	3R	
Aux ax system warning		Error #		Axis bit		
Z40 Format mismatch						
1L	1R	2L	2R	3L	3R	
Format mismatch		No meaning				

* Note

- The error meaning indications of [Z70 Abs data error] "0001" and "0101" are overlapped.

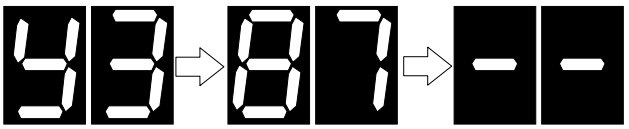
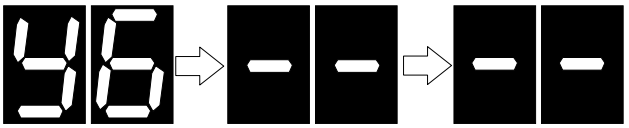
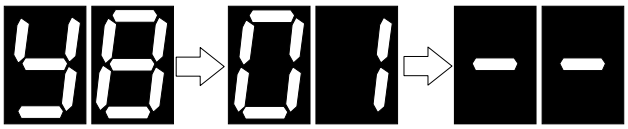
[System warning]

Alarm/Warning code						Displays of 7-segment LED (transition)
Z51 E2PROM error 0001						
1L	1R	2L	2R	3L	3R	
System warning		Warning code		type		
Z52 Battery fault 0001						
1L	1R	2L	2R	3L	3R	
System warning		Warning code		No meaning		
Z53 CNC overheat 0003						
1L	1R	2L	2R	3L	3R	
System warning		Warning code		Unit bit		
Z55 RIO communication stop 0007						
1L	1R	2L	2R	3L	3R	
System warning		Warning code		Unit bit		
Z57 System warning 0010						
1L	1R	2L	2R	3L	3R	
System warning		Warning code		Type		
Z58 ROM write not completed						
1L	1R	2L	2R	3L	3R	
System warning		Warning code		No meaning		
Z59 Acc/dec time cnst too large						
1L	1R	2L	2R	3L	3R	
System warning		Warning code		No meaning		

* Note

- Remote I/O 2nd part sytem and Remote I/O 3rd part system won't be displayed in the case of [Z55 RIO communication stop].

[MCP alarm]

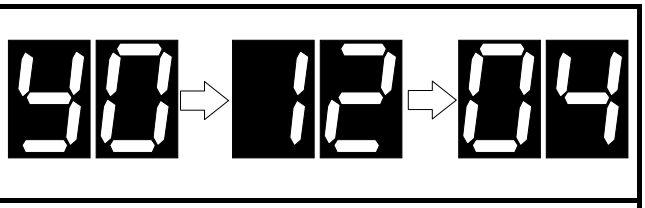
<table>
<tr><th colspan="6">Alarm/Warning code</th><th>Displays of 7-segment LED (transition)</th></tr>
<tr><td colspan="6">Y02 System alarm
0051 0004</td><td rowspan="3">  </td></tr>
<tr><td>1L</td><td>1R</td><td>2L</td><td>2R</td><td>3L</td><td>3R</td></tr>
<tr><td colspan="2">System alarm</td><td colspan="2">Error # (lower 2 digits)</td><td colspan="2">Error code</td></tr>
<tr><td colspan="6">Y03 Drive unit unequipped
XYZS</td><td rowspan="3">  </td></tr>
<tr><td>1L</td><td>1R</td><td>2L</td><td>2R</td><td>3L</td><td>3R</td></tr>
<tr><td colspan="2">Drive unit unequipped</td><td colspan="2">Axis bit</td><td colspan="2">No meaning</td></tr>
<tr><td colspan="6">Y05 Initial parameter error
1039</td><td rowspan="3">  </td></tr>
<tr><td>1L</td><td>1R</td><td>2L</td><td>2R</td><td>3L</td><td>3R</td></tr>
<tr><td colspan="2">Initial parameter error</td><td colspan="2">parameter # (lower 2 digits)</td><td colspan="2">No meaning</td></tr>
<tr><td colspan="6">Y06 mcp_no setting error</td><td rowspan="3">  </td></tr>
<tr><td>1L</td><td>1R</td><td>2L</td><td>2R</td><td>3L</td><td>3R</td></tr>
<tr><td colspan="2">mcp_no setting error</td><td colspan="2">No meaning</td><td colspan="2">No meaning</td></tr>
<tr><td colspan="6">Y02 Auxiliary axis MCP alarms
0051 0004</td><td rowspan="3">  </td></tr>
<tr><td>1L</td><td>1R</td><td>2L</td><td>2R</td><td>3L</td><td>3R</td></tr>
<tr><td colspan="2">mcp_no setting error</td><td colspan="2">No meaning</td><td colspan="2">No meaning</td></tr>
<tr><td colspan="6">Y03 Aux ax drive unit unequipped
0001</td><td rowspan="3">  </td></tr>
<tr><td>1L</td><td>1R</td><td>2L</td><td>2R</td><td>3L</td><td>3R</td></tr>
<tr><td colspan="2">mcp_no setting error</td><td colspan="2">No meaning</td><td colspan="2">No meaning</td></tr>
</table>

* Note

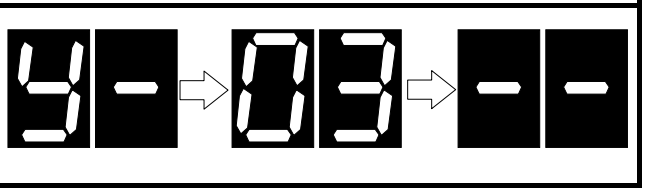
- Spindle bit in error won't be displayed.
- When Data ID error or Received frame No. error of [Y02 System alarm 0051] or [Y02 Auxiliary axis system alarm 0051] occurs, the No. of axis in error won't be indicated.

[MCP warning]

Y51 Parameter error 0012 Z					
1L	1R	2L	2R	3L	3R
Parameter error		Error # (lower 2 digits)		Axis bit	



Y90 No spindle signal 0003					
1L	1R	2L	2R	3L	3R
No spindle signal		Open-phase bit		No meaning	



* Note
  - Spindle bit in error won't be displayed.

[Servo alarm]

Alarm/Warning code	Displays of 7-segment LED (transition)
S01 Servo alarm : PR 0031 X 1L 1R | 2L 2R | 3L 3R Servo alarm : PR | Error # (lower 2 digits) | Axis bit	
S02 Initial parameter error 3225 S 1L 1R | 2L 2R | 3L 3R Initial parameter error | Error # (lower 2 digits) | Axis bit	
S03 Servo alarm : NR 0052 Y 1L 1R | 2L 2R | 3L 3R Servo alarm : NR | Error # (lower 2 digits) | Axis bit	
S04 Servo alarm : AR 006F Y 1L 1R | 2L 2R | 3L 3R Servo alarm : AR | Error # (lower 2 digits) | Axis bit	
S01 Aux ax servo alarm 0016 0004 1L 1R | 2L 2R | 3L 3R Aux ax servo alarm | Error # (lower 2 digits) | Axis bit	
S02 Aux ax servo alarm 0020 0001 1L 1R | 2L 2R | 3L 3R Aux ax servo alarm | Error # (lower 2 digits) | Axis bit	
S03 Aux ax servo alarm 0031 0002 1L 1R | 2L 2R | 3L 3R Aux ax servo alarm | Error # (lower 2 digits) | Axis bit	

* Note
- Spindle bit in error won't be displayed.

[Servo warning]

S51 Parameter error

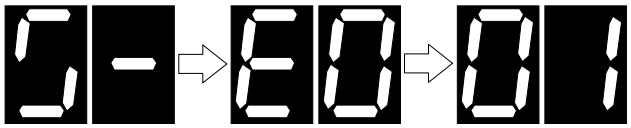
2205 Z

1L	1R	2L	2R	3L	3R
Parameter error		Error # (lower 2 digits)		Axis bit	

S52 Servo warning

E0 X

1L	1R	2L	2R	3L	3R
Servo warning		Error #		Axis bit	



S52 Aux ax servo warning

0092 0001

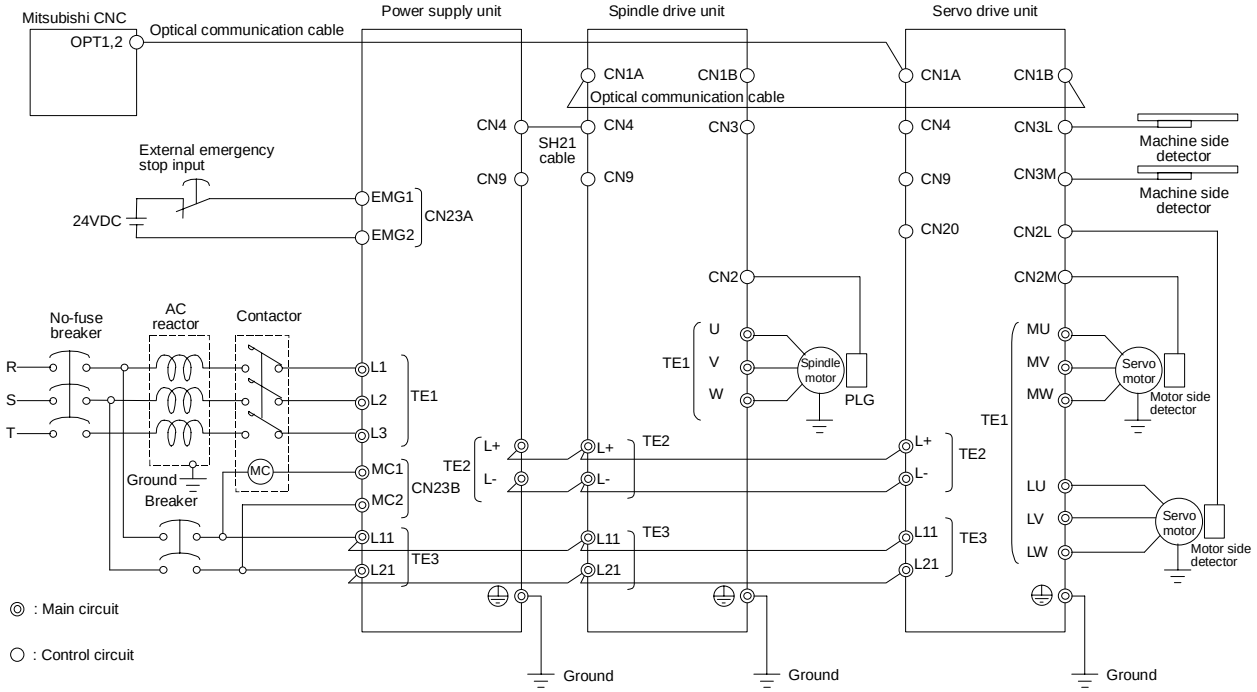
1L	1R	2L	2R	3L	3R
Aux ax servo warning		Error #		Axis bit	

* Note
  - Spindle bit in error won't be displayed.
  - Only the lower 2 digits of the parameter number are shown for [S51 Parameter error].
  - The error indication of [S52 Servo warning] overlaps that of [S52 Aux ax servo warning].

6. Drive Unit Maintenance

6.1 MDS-D/DH Series

6.1.1 Part system connection diagram



(Note 1) The total length of the optical communication cable from the NC must be within 30m and the minimum-bending radius within 80mm.
(Note 2) The connection method will differ according to the used motor.
(Note 3) Battery for the detector back up is built-in the drive unit. (An external battery is available as an option.)
(Note 4) The main circuit (◎) and control circuit (○) are safely separated.

6.1.2 Maintenance

⚠ WARNING

1. Before starting maintenance or inspections, turn the main circuit power and control power both OFF. Wait at least fifteen minutes for the CHARGE lamp to turn OFF, and then using a tester, confirm that the input and output voltage are zero. Failure to observe this could lead to electric shocks.
2. Inspections must be carried out by a qualified technician. Failure to observe this could lead to electric shocks. Contact your nearest service center for repairs and part replacement.

⚠ CAUTION

1. Never perform a megger test (measure the insulation resistance) of the servo drive unit. Failure to observe this could lead to faults.
2. The user must never disassemble or modify this product.

6.1.2.1 Inspections

Periodic inspection of the following items is recommended.

[1] Are any of the screws on the terminal block loose? If loose, tighten them.
[2] Is any abnormal noise heard from the servomotor bearings or brake section?
[3] Are any of the cables damaged or cracked? If the cables move with the machine, periodically inspect the cables according to the working conditions.
[4] Is the core of the load coupling shaft deviated?

6.1.2.2 Service parts

A guide to the part replacement cycle is shown below. Note that these will differ according to the working conditions or environmental conditions, so replace the parts if any abnormality is found. Contact service center for repairs or part replacements.

Part name		Standard replacement time	Remarks
Servo drive unit	Smoothing capacitor	10 years	The standard replacement time is a reference. Even if the standard replacement time is not reached, the part must be replaced if any abnormality is found.
	Cooling fan	10,000 to 30,000 hours (2 to 3 years)	
	Battery	6,000 hours (for FCU6-BTBOX)	
		10,000 hours (for ER6V-C119B)	
Servomotor	Bearings	20,000 to 30,000 hours	
	Detector	20,000 to 30,000 hours	
	Oil seal, V-ring	5,000 hours	

[1] Power smoothing capacitor : The characteristics of the power smoothing capacitor will deteriorate due to the effect of ripple currents, etc. The capacitor life is greatly affected by the ambient temperature and working conditions. However, when used continuously in a normal air-conditioned environment, the service life will be ten years.
[2] Relays : Contact faults will occur due to contact wear caused by the switching current. The service life will be reached after 100,000 cumulative switches (switching life) although this will differ according to the power capacity.
[3] Servomotor bearings : The motor bearings should be replaced after 20,000 to 30,000 hours of rated load operation at the rated speed. This will be affected by the operation state, but the bearings must be replaced when any abnormal noise or vibration is found in the inspections.
[4] Servomotor oil seal, V-ring : These parts should be replaced after 5,000 hours of operation at the rated speed. This will be affected by the operation state, but these parts must be replaced if oil leaks, etc., are found in the inspections.

6.1.2.3 Adding and replacing units and parts

⚠ CAUTION

1. Correctly transport the product according to its weight. Failure to do so could result in injury.
2. Do not stack the product above the indicated limit.
3. Installation directly on or near combustible materials could result in fires.
4. Install the unit as indicated at a place which can withstand the weight.
5. Do not get on or place heavy objects on the unit. Failure to observe this could result in injury.
6. Always use the unit within the designated environment condition range.
7. Do not allow conductive foreign matter such as screws or metal chips, or combustible foreign matter such as oil enter the servo drive or servomotor.
8. Do not block the intake or exhaust ports of the servo drive of servomotor. Failure to observe this could result in faults.
9. The servo drive and servomotor are precision devices. Do not drop them or apply strong impacts.
10. Do not install or operate a servo drive or servomotor which is damaged or missing parts.
11. When the unit has been stored for a long time, contact the Service Center or Service Station.

6.1.2.3.1 Replacing the drive unit

(1) Arrangement of replacing parts

Contact service center for an order or a replacement of the drive unit.
Place an order for the same type of a drive unit as the one to be replaced.

(2) Replacement procedure

Replace the drive unit with the following procedures.

Procedures

[1] Turn the breaker for the input power OFF. Make sure the CHARGE lamp of the power supply unit is turned OFF.
[2] Disconnect all the connecters and the wires connected to the drive unit.
[3] Remove the two (four) screws fixing the drive unit onto the control panel. Remove the drive unit from the control panel.
[4] Make a same setting for the rotary switch and the dip switch of the new drive unit as those of the uninstalled drive unit.
[5] Install a new drive unit by following the removal procedure in reverse.

6.1.2.3.2 Replacing the unit fan

(1) Replacing parts

Unit fan type

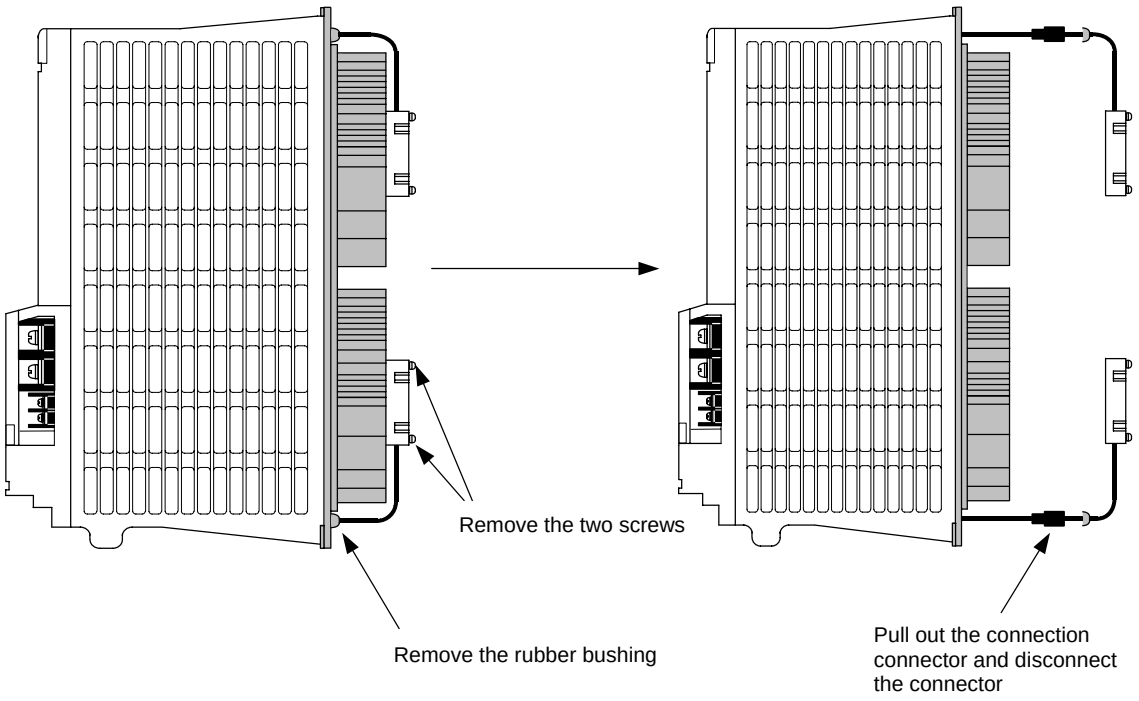
Type	Size
109P0424H3D13	□40mm (For MDS-D-CV)
MMF-04C24DS-RCA	□40mm (Other than MDS-D-CV)
MMF-06F24ES-RM5	□60mm
MMF-09D24TS-RM5	□90mm
MMF-12D24PS-RM5	□120mm

(2) Replacement procedure

Replace the unit fan with the following procedures.

Procedures

[1] Turn the breaker for the input power OFF, and wait for the CHARGE lamp on the power supply unit to turn OFF before removing the unit.
[2] Remove the fan guard from the back of the drive unit, and remove the two fan mounting screws.
[3] Remove the rubber bushing for the fan power cable, and pull out the connection connector.
[4] Disconnect the connection connector, and replace the fan.



6.1.2.3.3 Replacing the battery

(1) Replacing parts

<Replacing a battery equipped with the spindle/servo drive unit or the battery unit, FCU6-BTBOX>

When the battery voltage is low (warning F9), place an order for the same type of a battery as the one currently equipped with the unit.

Battery type 2CR5 is commercially available as a lithium battery 2CR5. The battery may be purchased and replaced by the user.

Battery type

Type	Battery equipped unit
ER6V-C119B	Spindle/servo drive unit
2CR5	Battery unit, FCU6-BTBOX

(Note) Two 2CR5 batteries are needed for per battery unit, FCU6-BTBOX.

<Replacing the battery unit MDS-A-BT>

The battery unit itself must be replaced because the battery is built into the unit.

When the battery voltage is low (warning F9), place an order for the same type of the battery unit as the one to be replaced.

⚠ CAUTION

1. When the battery voltage is low (warning 9F), do not shut OFF the power of the drive unit until replacement of the battery to protect the data
2. Replace the FCU6-BTBOX battery with new batteries (2CR5) that is within the recommended service period.

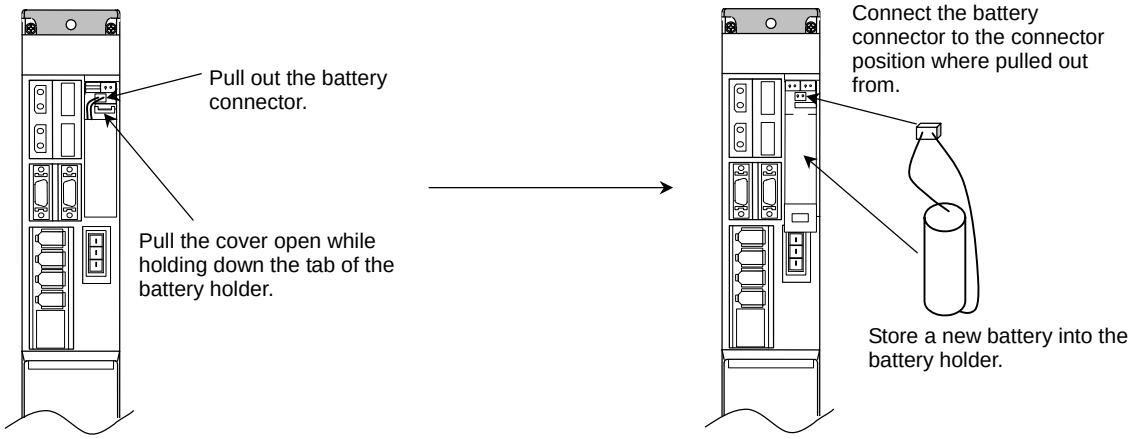
(2) Replacement procedure

Replace the battery with the following procedures.

> **⚠ CAUTION**
> 1. The power of the drive unit must be turned ON for 30min. or longer before replacing the battery.
> 2. Replace the battery within one hour.

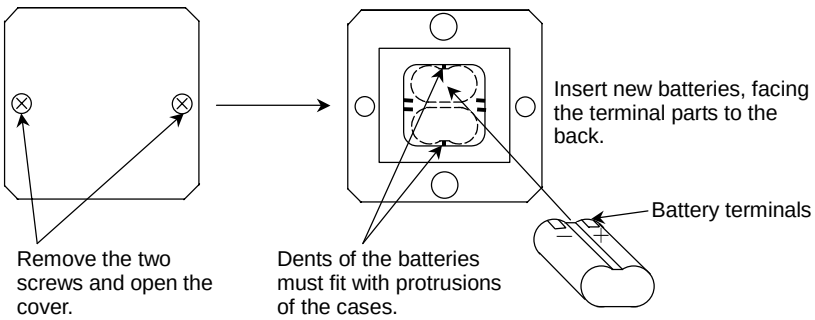
<Replacement procedure for the cell battery ER6V-C119B>

[1] Turn the breaker for the input power OFF. Make sure the power of the replacing drive unit is turned OFF.
[2] Open the battery holder cover located at the upper front of the drive unit.
[3] Pull out the battery connector connected with the drive unit. Remove the battery.
[4] Connect a new battery connector to the connector position where the old battery connector was pulled out from in step [2].
[5] Store a new battery into the battery holder and close the cover.



<Replacement procedure for the battery unit FCU6-BTBOX>

[1] Turn the breaker for the input power OFF. Make sure the power of the replacing drive unit is turned OFF.
[2] Remove the two mounting screws fixed on the cover of FCU6-BTBOX. Open the cover and remove the old batteries.
[3] Insert new batteries, facing the terminal parts to the back of FCU6-BTBOX.
(Two 2CR5 lithium batteries must be inserted.)
[4] Close and screw the cover of FCU6-BTBOX with the two mounting screws.



<Replacement procedure for the battery unit MDS-A-BT>

[1] Turn the breaker for the input power OFF. Make sure the power of the replacing drive unit is turned OFF.
[2] Disconnect the connector, and remove the battery unit from the control panel.
[3] Install a new battery unit by following the removal procedure in reverse.

6.1.2.3.4 Replacing the fuse

(1) Replacing parts

Fuse type

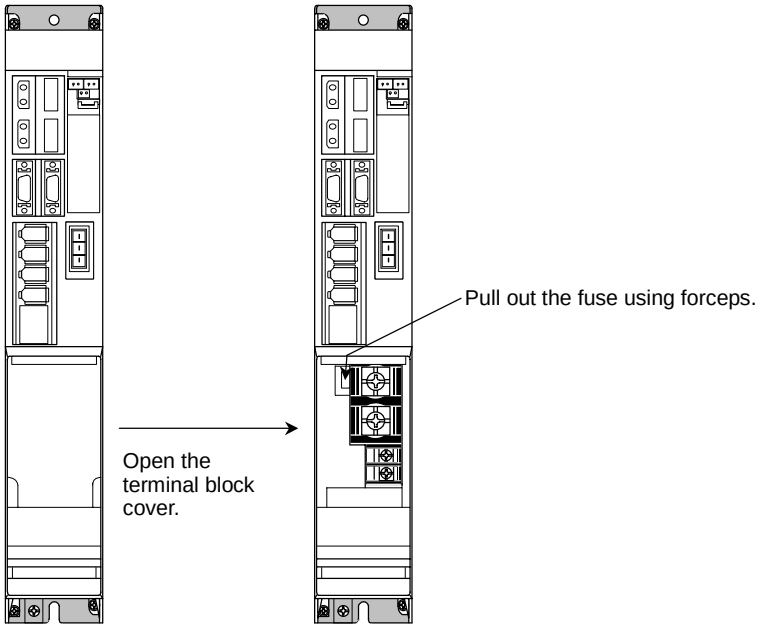
Type	Fuse equipped unit
HM32	MDS-D series
HM16	MDS-DH series

(2) Replacement procedure

Replace the fuse with the following procedures.

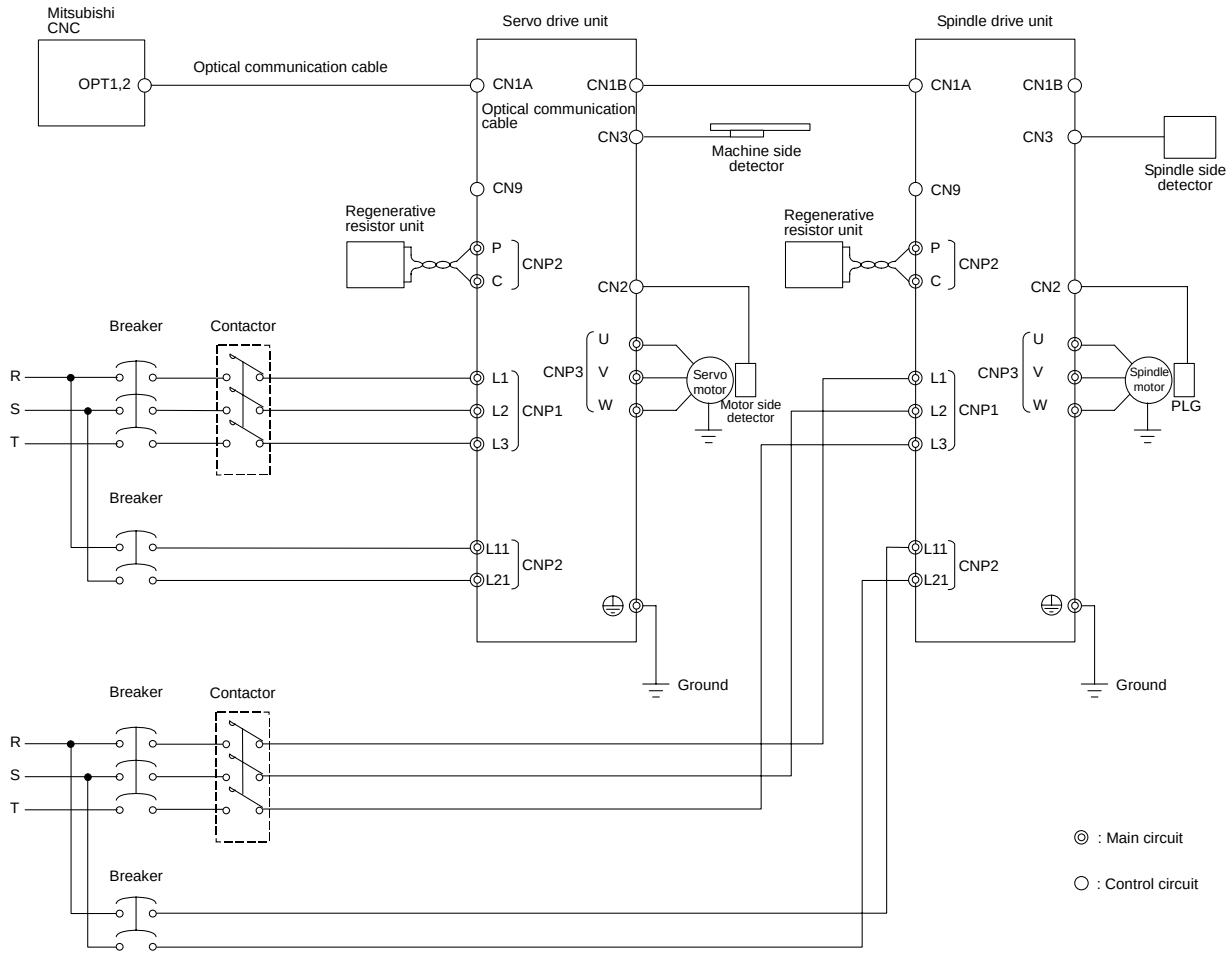
Procedures

[1] Turn the breaker for the input power OFF. Make sure the power of the replacing drive unit is turned OFF.
[2] Open the terminal block cover located at the front of the drive unit.
[3] Pull out the fuse and replace it by a new fuse.



6.2 MDS-D-SVJ3/SPJ3 Series

6.2.1 Part system connection diagram



(Note 1) The total length of the optical communication cable from the NC must be within 30m and the minimum-bending radius within 80mm.
(Note 2) The connection method will differ according to the used motor.
(Note 3) Battery for the detector back up is built-in the drive unit. (An external battery is available as an option.)
(Note 4) The main circuit (◎) and control circuit (○) are safely separated.

6.2.2 Maintenance

> **⚠ WARNING**
>
> 1. Before starting maintenance or inspections, turn the main circuit power and control power both OFF. Wait at least fifteen minutes for the CHARGE lamp to turn OFF, and then using a tester, confirm that the input and output voltage are zero. Failure to observe this could lead to electric shocks.
> 2. Inspections must be carried out by a qualified technician. Failure to observe this could lead to electric shocks. Contact your nearest service center for repairs and part replacement.

> **⚠ CAUTION**
>
> 1. Never perform a megger test (measure the insulation resistance) of the servo drive unit. Failure to observe this could lead to faults.
> 2. The user must never disassemble or modify this product.

6.2.2.1 Inspections

Periodic inspection of the following items is recommended.

[1] Are any of the screws on the terminal block loose? If loose, tighten them.
[2] Is any abnormal noise heard from the servomotor bearings or brake section?
[3] Are any of the cables damaged or cracked? If the cables move with the machine, periodically inspect the cables according to the working conditions.
[4] Is the core of the load coupling shaft deviated?

6.2.2.2 Service parts

A guide to the part replacement cycle is shown below. Note that these will differ according to the working conditions or environmental conditions, so replace the parts if any abnormality is found. Contact service center for repairs or part replacements.

Part name		Standard replacement time	Remarks
Servo drive unit	Smoothing capacitor	10 years	The standard replacement time is a reference. Even if the standard replacement time is not reached, the part must be replaced if any abnormality is found.
	Cooling fan	10,000 to 30,000 hours (2 to 3 years)	
	Battery	10,000 hours (for MR-J3BAT)	
Servomotor	Bearings	20,000 to 30,000 hours	
	Detector	20,000 to 30,000 hours	
	Oil seal, V-ring	5,000 hours	

[1] Power smoothing capacitor : The characteristics of the power smoothing capacitor will deteriorate due to the effect of ripple currents, etc. The capacitor life is greatly affected by the ambient temperature and working conditions. However, when used continuously in a normal air-conditioned environment, the service life will be ten years.

[2] Relays : Contact faults will occur due to contact wear caused by the switching current. The service life will be reached after 100,000 cumulative switches (switching life) although this will differ according to the power capacity.

[3] Servomotor bearings : The motor bearings should be replaced after 20,000 to 30,000 hours of rated load operation at the rated speed. This will be affected by the operation state, but the bearings must be replaced when any abnormal noise or vibration is found in the inspections.

[4] Servomotor oil seal, V-ring : These parts should be replaced after 5,000 hours of operation at the rated speed. This will be affected by the operation state, but these parts must be replaced if oil leaks, etc., are found in the inspections.

6.2.2.3 Adding and replacing units and parts

⚠ CAUTION

1. Correctly transport the product according to its weight. Failure to do so could result in injury.
2. Do not stack the product above the indicated limit.
3. Installation directly on or near combustible materials could result in fires.
4. Install the unit as indicated at a place which can withstand the weight.
5. Do not get on or place heavy objects on the unit. Failure to observe this could result in injury.
6. Always use the unit within the designated environment condition range.
7. Do not allow conductive foreign matter such as screws or metal chips, or combustible foreign matter such as oil enter the servo drive or servomotor.
8. Do not block the intake or exhaust ports of the servo drive of servomotor. Failure to observe this could result in faults.
9. The servo drive and servomotor are precision devices. Do not drop them or apply strong impacts.
10. Do not install or operate a servo drive or servomotor which is damaged or missing parts.
11. When the unit has been stored for a long time, contact the Service Center or Service Station.

6.2.2.3.1 Replacing the drive unit

(1) Arrangement of replacing parts

Contact service center for an order or a replacement of the drive unit.
Place an order for the same type of a drive unit as the one to be replaced.

(2) Replacement procedure

Replace the drive unit with the following procedures.

Procedures

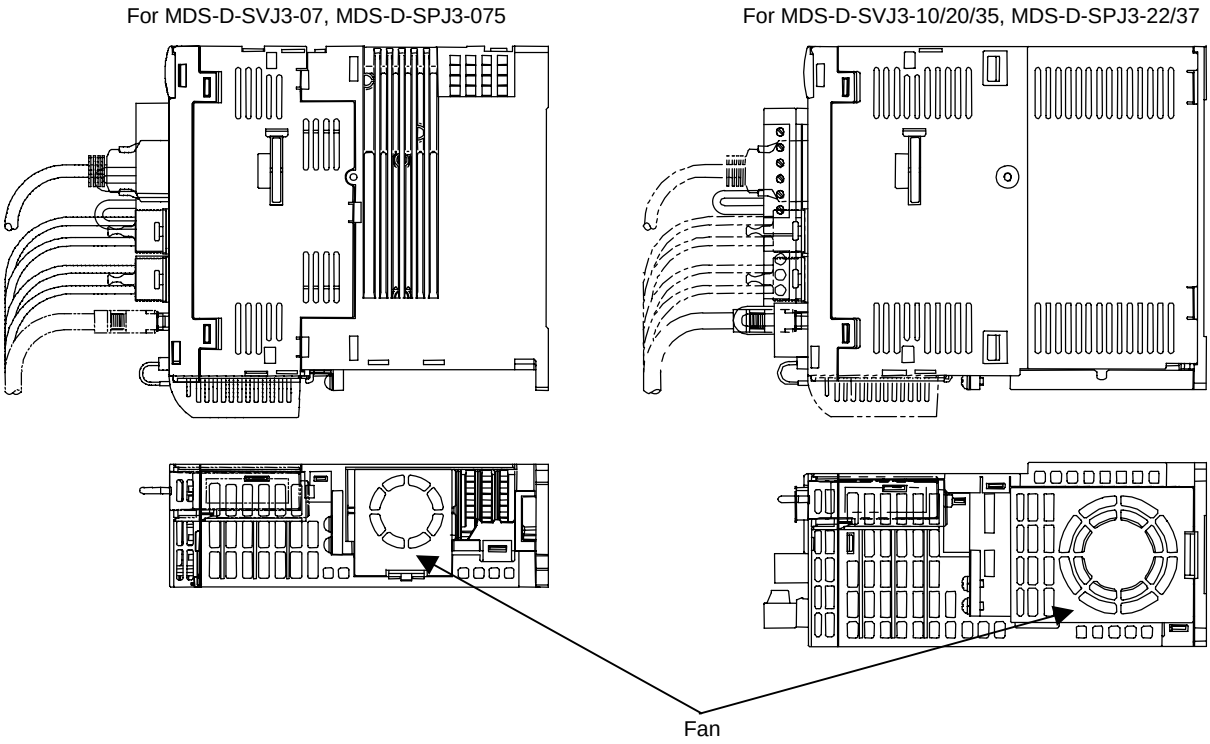
[1] Turn the breaker for the input power OFF. Make sure the CHARGE lamp of the power supply unit is turned OFF.
[2] Disconnect all the connecters and the wires connected to the drive unit.
[3] Remove the two (four) screws fixing the drive unit onto the control panel. Remove the drive unit from the control panel.
[4] Make a same setting for the rotary switch of the new drive unit as those of the uninstalled drive unit.
[5] Install a new drive unit by following the removal procedure in reverse.

6.2.2.3.2 Replacing the unit fan

Replace the fan with the following procedures.

Procedures

[1] Turn the breaker for the input power OFF, and wait for the CHARGE lamp on the power supply unit to turn OFF before removing the unit.
[2] Remove the fan guard from bottom of the drive unit(top of the drive unit for MDS-D-SPJ3-55 /75/110).
[3] Pull out the connection connector of the fan power cable.
[4] Disconnect the connection connector, and replace the fan.



6.2.2.3.3 Replacing the battery

(1) Replacing parts

<Replacing a battery equipped with the servo drive unit>

When the battery voltage is low (warning F9), place an order for the same type of a battery as the one currently equipped with the unit.

Battery type

Type	Battery equipped unit
MR-J3BAT	Servo drive unit

<Replacing the battery unit MR-J3BAT>

The battery unit itself must be replaced because the battery is built into the unit.
When the battery voltage is low (warning F9), place an order for the same type of the battery unit as the one to be replaced.

⚠ CAUTION When the battery voltage is low (warning 9F), do not shut OFF the power of the drive unit until replacement of the battery to protect the data.

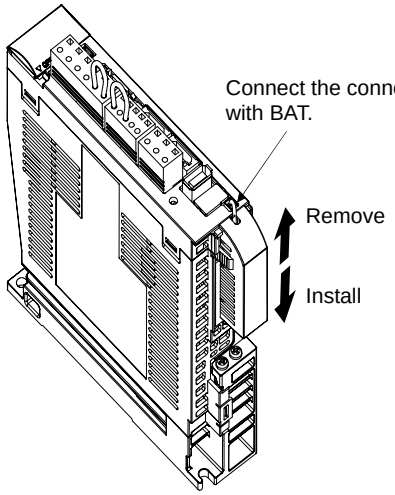
(2) Replacement procedure

Replace the battery with the following procedures.

⚠ CAUTION
1. The power of the drive unit must be turned ON for 30min. or longer before replacing the battery.
2. Replace the battery within one hour.

<Replacement procedure for the cell battery MR-J3BAT>

[1] Turn the breaker for the input power OFF. Make sure the power of the replacing drive unit is turned OFF.
[2] Pull out the battery connector connected with the connector BAT of the drive unit.
[3] Slide the battery and remove it while holding the tab on the battery side face .
[4] Connect a new battery connector to the connector BAT of the drive unit.
[5] Install the battery into the drive unit.



7. Servo System Maintenance

7.1 D/A output specifications for servo drive unit

7.1.1 MDS-D/DH Series

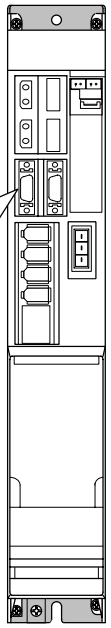
The MDS-D/DH-V1/V2 servo drive unit has a function to D/A output the various control data.
The servo adjustment data required for setting the servo parameters to match the machine can be D/A output.
Measure using a hi-coder, oscilloscope, etc.

7.1.1.1 D/A output specifications

Item	Explanation
No. of channels	2ch
Output cycle	0.8ms (min. value)
Output precision	12bit
Output voltage range	0V to 2.5V (zero) to +5V
Output magnification setting	-32768% to +32767% (1% scale)
Output pin (CN9 connector)	MO1 = Pin 9 MO2 = Pin 19 GND = Pins 1, 11
Others	The D/A output for the 2-axis unit (MDS-D/DH-V2) is also 2ch. When using the 2-axis unit, set -1 for the output data (SV061, 62) of the axis that is not to be measured.

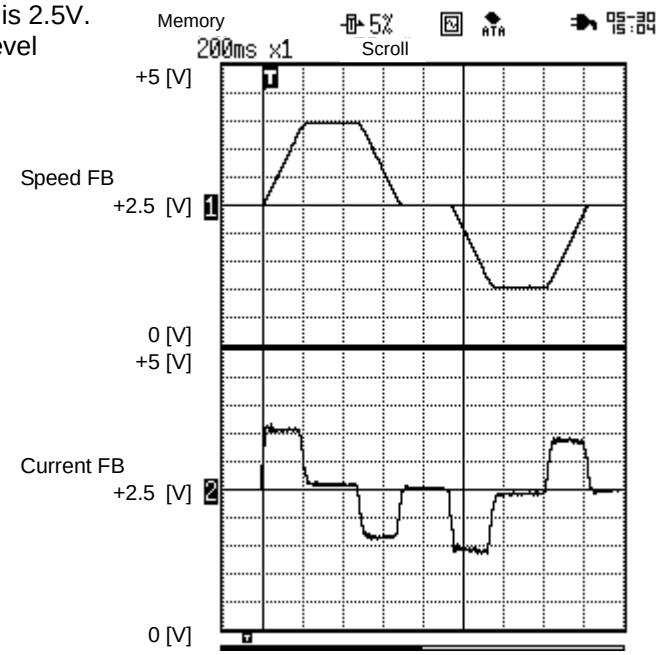
CN9 connector

Pin	Name	Pin	Name
1	LG	11	LG
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9	MO1	19	MO2
10		20	



MDS-D/DH-V2

When the output data is 0, the offset voltage is 2.5V.
If there is an offset voltage, adjust the zero level position in the measuring instrument side.



Example of D/A output waveform

7.1.1.2 Setting the output data

<Standard output>

No.	Abbrev.	Parameter name	Explanation
SV061	DA1NO	D/A output channel 1 data No.	Input the No. of the data to be output to each D/A output channel.
SV062	DA2NO	D/A output channel 2 data No.	

No.	Output data	Standard output unit		Output cycle
		Linear axis	Rotary axis	
-1	**D/A output not selected**	For 2-axis drive unit (MDS-D/DH-V2). Set the parameters to another axis in the drive unit that is not D/A output.		
0	**Commanded rotation speed**	1000(r/min)/V		0.8ms
1	**Motor rotation speed**	1000(r/min)/V		0.8ms
2	**Torque command**	100%/V		0.8ms
3	**Torque feedback**	100%/V		0.8ms
8	**Machine vibration frequency**	500Hz/V		0.8ms
30	**Collision detection estimated torque**	100%		0.8ms
31	**Collision detection disturbance estimated torque**	100%		0.8ms
32[*1]	**Estimated load inertia ratio or moving sections gross weight**	100% or 100kg		0.8ms
50	**Position droop**	1μm/V	1/1000° /V	0.8ms
51	**Position command**	1μm/V	1/1000° /V	0.8ms
52	**Position feedback**	1μm/V	1/1000° /V	0.8ms
53	**Position F⊿T**	1μm/s/V	1/1000° /s/V	0.8ms
54	**Deviation from ideal position (considering servo tracking delay)**	1μm/V	1/1000° /V	0.8ms
60	**Position droop**	1mm/V	1° /V	0.8ms
61	**Position command**	1mm/V	1° /V	0.8ms
62	**Position feedback**	1mm/V	1° /V	0.8ms
63	**Position F⊿T**	1mm/s/V	1° /s/V	0.8ms
64	**Deviation from ideal position (considering servo tracking delay)**	1mm/V	1° /V	0.8ms
70	**Position droop**	1m/V	1000° /V	0.8ms
71	**Position command**	1m/V	1000° /V	0.8ms
72	**Position feedback**	1m/V	1000° /V	0.8ms
73	**Position F⊿T**	1m/s/V	1000° /s/V	0.8ms
74	**Deviation from ideal position (considering servo tracking delay)**	1m/V	1000° /V	0.8ms
126	**Saw tooth wave**	0V to 5V		0.8ms
127	**2.5V test data**	2.5V		0.8ms

*1 The estimated load inertia ratio (unit: 100%) is applied for the rotary motor, and the moving sections gross weight (unit: 100kg) for the linear motor.

< Servo control signal >

Servo control input (NC to V1/V2)

No.	Details	
16384	Servo control input 1-0	READY ON command
16385	Servo control input 1-1	Servo ON command
16391	Servo control input 1-7	Alarm reset command
16409	Servo control input 2-9	Speed monitor command valid
16410	Servo control input 2-A	In door closed (controller)
16411	Servo control input 2-B	In door closed (all drive units)
16416	Servo control input 3-0	Control axis detachment command

Servo control output (V1/V2 to NC)

No.	Details	
16480	Servo control output 1-0	In READY ON
16481	Servo control output 1-1	In servo ON
16487	Servo control output 1-7	In alarm
16492	Servo control output 1-C	In in-position
16493	Servo control output 1-D	In current limit
16494	Servo control output 1-E	In absolute position data loss
16495	Servo control output 1-F	In warning
16496	Servo control output 2-0	Z phase passed
16499	Servo control output 2-3	In zero speed
16503	Servo control output 2-7	In external emergency stop
16505	Servo control output 2-9	In speed monitor
16506	Servo control output 2-A	In door closed (controller)
16507	Servo control output 2-B	In door closed (self drive unit)
16512	Servo control output 3-0	In control axis detachment

7.1.1.3 Setting the output magnification

Set when outputting other than the standard output unit. When "0" is set, the magnification will be the same as "100".

(Example 1) When SV061=1 and SV063=50

The motor rotation speed is output at 2000(r/min)/V.

(Example 1) When SV062=3 and SV064=50

The torque feedback is output to D/A output channel 2 with 200%/V unit.

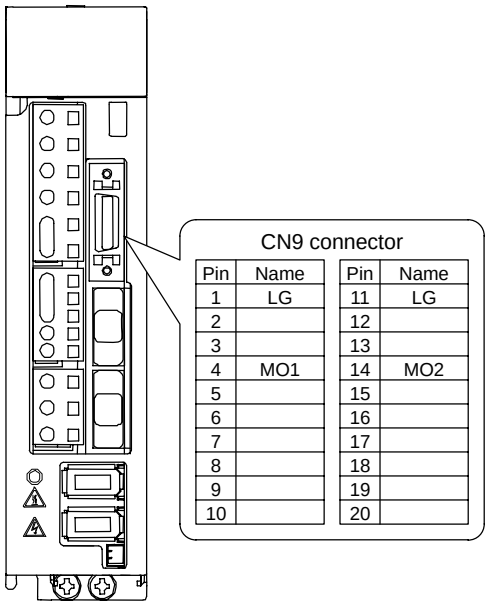
No.	Abbrev.	Parameter name	Explanation	Setting range
SV063	DA1MPY	D/A output channel 1 output scale	Set the scale with a 1/100 unit. When "0" is set, the magnification is the same as when set to "100".	-32768 to 32767 (1/100-fold)
SV064	DA2MPY	D/A output channel 2 output scale		

7.1.2 MDS-D-SVJ3 Series

The MDS-D-SVJ3 servo drive unit has a function to D/A output the various control data.
The servo adjustment data required for setting the servo parameters to match the machine can be D/A output.
Measure using a hi-coder, oscilloscope, etc.

7.1.2.1 D/A output specifications

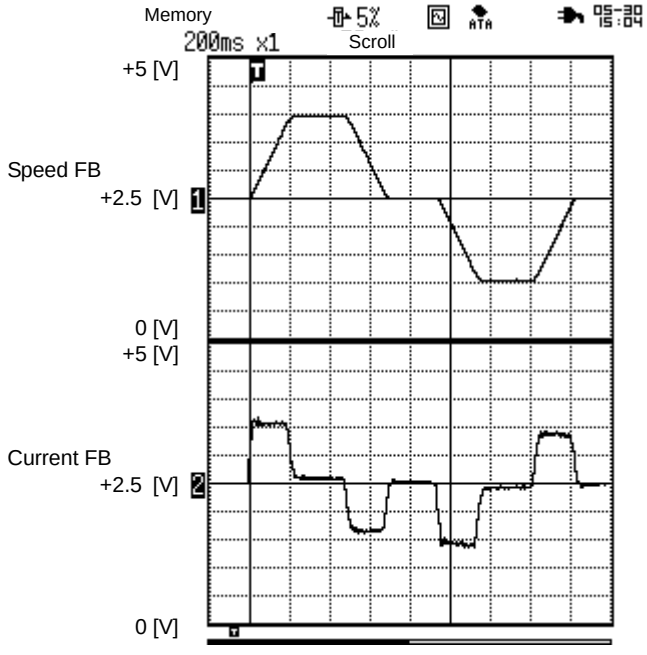
Item	Explanation
No. of channels	2ch
Output cycle	0.8ms (min. value)
Output precision	10bit
Output voltage range	0V to 2.5V (zero) to +5V
Output magnification setting	-32768% to +32767% (1% scale)
Output pin (CN9 connector)	MO1 = Pin 4 MO2 = Pin 14 GND = Pins 1, 11



Pin	Name	Pin	Name
1	LG	11	LG
2		12	
3		13	
4	MO1	14	MO2
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

MDS-D-SVJ3

When the output data is 0, the offset voltage is 2.5V.
If there is an offset voltage, adjust the zero level position in the measuring instrument side.



Example of D/A output waveform

7.1.2.2 Setting the output data

<Standard output>

No.	Abbrev.	Parameter name	Explanation
SV061	DA1NO	D/A output channel 1 data No.	Input the No. of the data to be output to each D/A output channel.
SV062	DA2NO	D/A output channel 2 data No.	

No.	Output data	Standard output unit		Output cycle
		Linear axis	Rotary axis	
0	**Commanded rotation speed**	1000(r/min)/V		0.8ms
1	**Motor rotation speed**	1000(r/min)/V		0.8ms
2	**Torque command**	Motor stall rated ratio 100%/V		0.8ms
3	**Torque feedback**	Motor stall rated ratio 100%/V		0.8ms
8	**Machine vibration frequency**	500Hz/V		0.8ms
30	**Collision detection estimated torque**	Motor stall rated ratio 100%		0.8ms
31	**Collision detection disturbance estimated torque**	Motor stall rated ratio 100%		0.8ms
32[*1]	**Estimated load inertia ratio or moving sections gross weight**	100% or 100kg		0.8ms
35	**Disturbance observer estimated disturbance torque**	Motor stall rated ratio 100%		0.8ms
50	**Position droop**	1μm/V	1/1000° /V	0.8ms
51	**Position command**	1μm/V	1/1000° /V	0.8ms
52	**Position feedback**	1μm/V	1/1000° /V	0.8ms
53	**Position F⊿T**	1μm/s/V	1/1000° /s/V	0.8ms
54	**Deviation from ideal position (considering servo tracking delay)**	1μm/V	1/1000° /V	0.8ms
60	**Position droop**	1mm/V	1° /V	0.8ms
61	**Position command**	1mm/V	1° /V	0.8ms
62	**Position feedback**	1mm/V	1° /V	0.8ms
63	**Position F⊿T**	1mm/s/V	1° /s/V	0.8ms
64	**Deviation from ideal position (considering servo tracking delay)**	1mm/V	1° /V	0.8ms
70	**Position droop**	1m/V	1000° /V	0.8ms
71	**Position command**	1m/V	1000° /V	0.8ms
72	**Position feedback**	1m/V	1000° /V	0.8ms
73	**Position F⊿T**	1m/s/V	1000° /s/V	0.8ms
74	**Deviation from ideal position (considering servo tracking delay)**	1m/V	1000° /V	0.8ms
126	**Saw tooth wave**	0V to 5V		0.8ms
127	**2.5V test data**	2.5V		0.8ms

*1 The estimated load inertia ratio (unit: 100%) is applied for the rotary motor, and the moving sections gross weight (unit: 100kg) for the linear motor.

< Servo control signal >

Servo control input (NC to SVJ3)

No.	Details	
16384	Servo control input 1-0	READY ON command
16385	Servo control input 1-1	Servo ON command
16388	Servo control input 1-4	Position loop gain changeover command
16390	Servo control input 1-6	Excessive error detection width changeover command
16391	Servo control input 1-7	Alarm reset command
16392	Servo control input 1-8	Current limit selection command
16409	Servo control input 2-9	Speed monitor command valid
16410	Servo control input 2-A	In door closed (controller)
16411	Servo control input 2-B	In door closed (all drive units)
16416	Servo control input 3-0	Control axis detachment command

Servo control output (SVJ3 to NC)

No.	Details	
16480	Servo control output 1-0	In READY ON
16481	Servo control output 1-1	In servo ON
16484	Servo control output 1-4	In position loop gain changeover
16486	Servo control output 1-6	In excessive error detection width changeover
16487	Servo control output 1-7	In alarm
16488	Servo control output 1-8	In current limit selection
16492	Servo control output 1-C	In in-position
16493	Servo control output 1-D	In current limit
16494	Servo control output 1-E	In absolute position data loss
16495	Servo control output 1-F	In warning
16496	Servo control output 2-0	Z phase passed
16499	Servo control output 2-3	In zero speed
16503	Servo control output 2-7	In external emergency stop
16505	Servo control output 2-9	In speed monitor
16506	Servo control output 2-A	In door closed (controller)
16507	Servo control output 2-B	In door closed (self drive unit)
16512	Servo control output 3-0	In control axis detachment

7.1.2.3 Setting the output magnification

Set when outputting other than the standard output unit. When "0" is set, the magnification will be the same as "100".

(Example 1) When SV061=1 and SV063=50

The motor rotation speed is output at 2000(r/min)/V.

(Example 1) When SV062=3 and SV064=50

The torque feedback is output to D/A output channel 2 with 200%/V unit.

No.	Abbrev.	Parameter name	Explanation	Setting range
SV063	DA1MPY	D/A output channel 1 output scale	Set the scale with a 1/100 unit. When "0" is set, the magnification is the same as when set to "100".	-32768 to 32767 (1/100-fold)
SV064	DA2MPY	D/A output channel 2 output scale		

7.2 Vibration Suppression

If vibration (machine resonance) occurs, the vibration can be supporessed by lowering the speed loop gain 1 (VGN1), however, cutting accuracy and cycle time will be deteriorated. See below for how to suppress vibration without lowering VGN1, using the vibration suppression function.

<Example of vibration>

-When touching the machine, small vilbration is felt/Humming noise is heard

-Vibration or noise occurs during rapid traverse

7.2.1 Notch filte

This servo drive unit has five notch filters. At shipping, the notch filters are set in order to avoid vibration. After installation, if vibration occurs for some cause, setting the notch filter can suppress the vibration as below.

On the servo monitor screen the resonance frequency is displayed. Set the friquency in parameter.

If vibration cannot be suppressed with the notch filter, contact your machine tool builder or our service center.

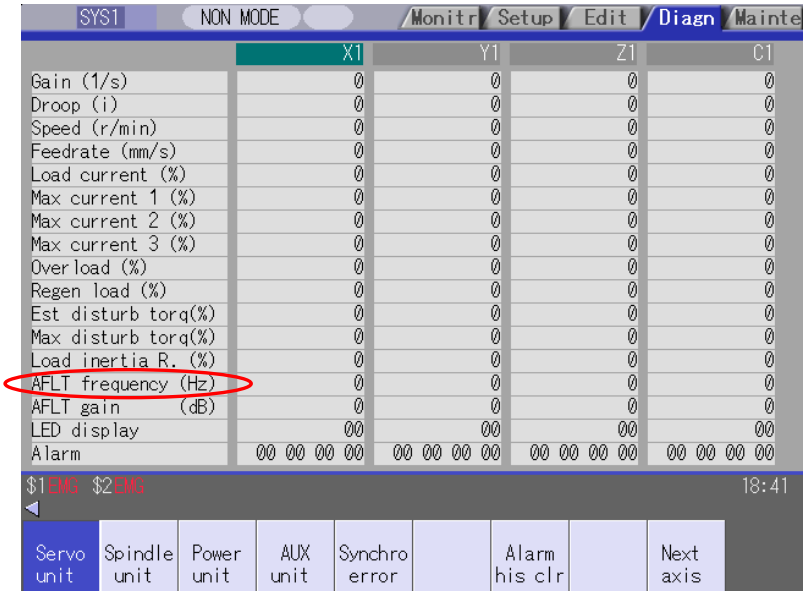
Notch filter 3 (SV033-4bit) is the fixed filter for the frequency 1125Hz, and it doesn't have the depth compensation.

<How to set>

[1] Check the resonance frequency on the servo monitor screen when vibration is occurring, and write down the frequency.

[2] If there is a notch filter whose setting is “0” among the currently used notch filters 1, 2, 4 and 5, change “0” to the frequency written down in [1].

No.	Abbrev.	Parameter name	Explanation	Setting range
SV038	FHz1	Notch filter frequency 1	Set the vibration frequency to suppress if machine vibration occurs. (Valid at 80 or more) When not using, set to "0".	0 to 2250 (Hz)
SV046	FHz2	Notch filter frequency 2	If the machine vibrates, set the vibration frequency to be suppressed. (Valid when set to 80 or more.) When not using, set to "0".	0 to 2250 (Hz)
SV087	FHz4	Notch filter frequency 4	Set the vibration frequency to suppress if machine vibration occurs. (Valid at 80 or more) When not using, set to "0".	0 to 2250 (Hz)
SV088	FHz5	Notch filter frequency 5		0 to 2250 (Hz)



8. Spindle System Maintenance

8.1 D/A output specifications for spindle drive unit

8.1.1 MDS-D/DH Series

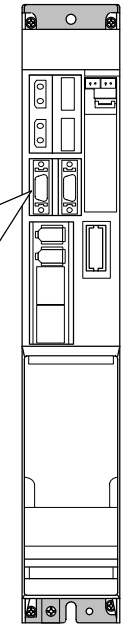
The MDS-D/DH-SP spindle drive unit has a function to D/A output each control data. The spindle adjustment data required to set the spindle parameters matching the machine can be D/A output. The data can be measured with a hi-corder or oscilloscope, etc.

8.1.1.1 D/A output specifications

Item	Explanation
No. of channels	2ch
Output cycle	0.8ms (min. value)
Output precision	12bit
Output voltage range	0V to 2.5V (zero) to +5V
Output magnification setting	±32768
Output pin (CN9 connector)	MO1 = Pin 9 MO2 = Pin 19 LG = Pin 1, 11

CN9 connector

Pin	Name	Pin	Name
1	LG	11	LG
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9	MO1	19	MO2
10		20	



MDS-D/DH-SP

When the output data is 0, the offset voltage is 2.5V.
If there is an offset voltage, adjust the zero level position in the measuring instrument side.

8.1.1.2 Setting the output data

<Standard output>

No.	Abbrev.	Parameter name	Explanation
SP125	DA1NO	D/A output channel 1 data No.	Input the No. of the data to be output to each D/A output channel.
SP126	DA2NO	D/A output channel 2 data No.	

No.	Output data	Output unit for standard setting	Output cycle
-1	**D/A output stop**	-	
0	**Commanded motor rotation speed**	1000(r/min)/V	0.8ms
1	**Motor rotation speed**	1000(r/min)/V	0.8ms
2	**Torque current command**	100%/V	0.8ms
3	**Torque current feedback**	100%/V	0.8ms
50	**Position droop**	1/1000°/V	0.8ms
60	**Position droop**	1°/V	0.8ms
127	**2.5V test data output**	2.5V	0.8ms

< Spindle control signal>

Spindle control input (NC to SP)

No.	Details	
16384	Spindle control input 1-0	READY ON command
16385	Spindle control input 1-1	Servo ON command
16391	Spindle control input 1-7	Alarm reset command
16392	Spindle control input 1-8	Torque limit 1 selection command
16393	Spindle control input 1-9	Torque limit 2 selection command
16394	Spindle control input 1-A	Torque limit 3 selection command
16409	Spindle control input 2-9	Speed monitor command valid
16410	Spindle control input 2-A	In door closed (controller)
16411	Spindle control input 2-B	In door closed (all drive units)
16432	Spindle control input 4-0	Spindle control mode selection command 1
16433	Spindle control input 4-1	Spindle control mode selection command 2
16434	Spindle control input 4-2	Spindle control mode selection command 3
16437	Spindle control input 4-5	Gear selection command 1
16438	Spindle control input 4-6	Gear selection command 2
16444	Spindle control input 4-C	M coil selection command
16445	Spindle control input 4-D	L coil selection command
16446	Spindle control input 4-E	Sub-motor selection command
16462	Spindle control input 5-E	Spindle holding force up

Spindle control output (SP to NC)

No.	Details	
16480	Spindle control output 1-0	In ready ON
16481	Spindle control output 1-1	In servo ON
16487	Spindle control output 1-7	In alarm
16488	Spindle control output 1-8	In torque limit 1 selection
16489	Spindle control output 1-9	In torque limit 2 selection
16490	Spindle control output 1-A	In torque limit 3 selection
16492	Spindle control output 1-C	In in-position
16493	Spindle control output 1-D	In torque limit
16495	Spindle control output 1-F	In warning
16496	Spindle control output 2-0	Z phase passed
16499	Spindle control output 2-3	In zero speed
16503	Spindle control output 2-7	In external emergency stop
16505	Spindle control output 2-9	In speed monitor
16506	Spindle control output 2-A	In door closed (controller)
16507	Spindle control output 2-B	In door closed (self drive unit)
16528	Spindle control output 4-0	In spindle control mode selection 1
16529	Spindle control output 4-1	In spindle control mode selection 2
16530	Spindle control output 4-2	In spindle control mode selection 3
16533	Spindle control output 4-5	In gear selection 1
16534	Spindle control output 4-6	In gear selection 2
16540	Spindle control output 4-C	In M coil selection
16541	Spindle control output 4-D	In L coil selection
16542	Spindle control output 4-E	In sub-motor selection
16544	Spindle control output 5-0	Current detection
16545	Spindle control output 5-1	Speed detection
16550	Spindle control output 5-6	In coil changeover
16552	Spindle control output 5-8	In 1 drive unit 2 motor changeover
16553	Spindle control output 5-9	2nd speed detection
16558	Spindle control output 5-E	In spindle holding force up
16559	Spindle control output 5-F	In 2nd in-position

8.1.1.3 Setting the output magnification

(1) Internal data output (Data No. -1 to 3, 50, 60, 127)

Set when outputting data other than in standard output increments. When "0" is set, the magnification will be the same as when "100" is set.

(Example 1)

When SP125=0, SP127=1000:

Commanded motor rotation speed is output to D/A output channel 1 in increments of 100r/min/V.

(Example 2)

When SP126=2, SP128=50:

The torque axis current command is output to D/A output channel 2 in increments of 200%/V.

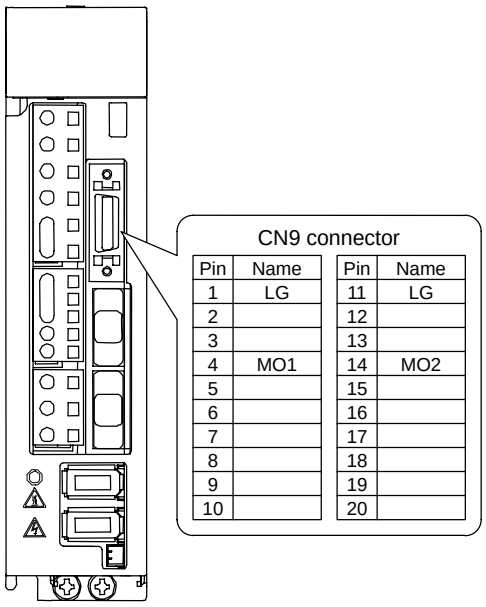
No.	Abbr.	Parameter name	Details	Setting range	Standard
SP127	DA1MPY	D/A output channel 1 output scale	Set the output scale with Output magnification $= \frac{100}{SP127(SP128)}$ (-fold) The same scale as "100" is applied when "0" is set.	-32768 to 32767 (1/100-fold)	100
SP128	DA2MPY	D/A output channel 2 output scale			100

8.1.2 MDS-SPJ3 Series

The MDS-D-SPJ3 spindle drive unit has a function to D/A output each control data. The spindle adjustment data required to set the spindle parameters matching the machine can be D/A output. The data can be measured with a hi-corder or oscilloscope, etc.

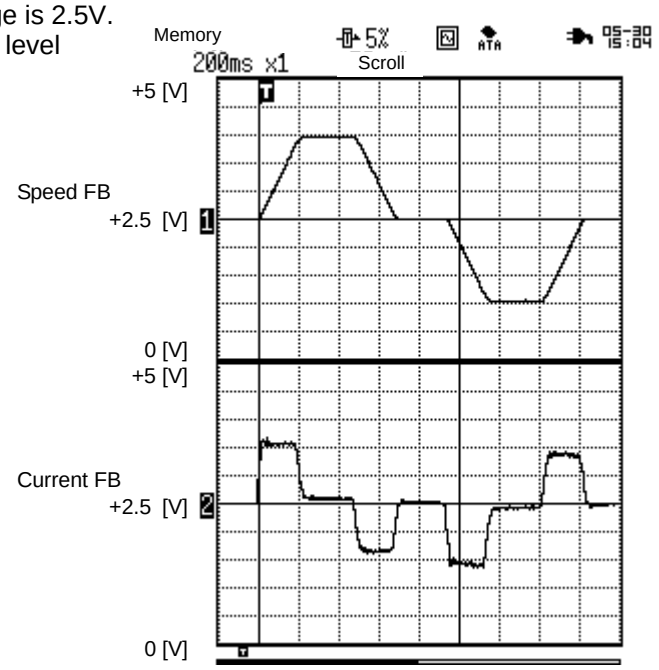
8.1.2.1 D/A output specifications

Item	Explanation
No. of channels	2ch
Output cycle	0.8ms (min. value)
Output precision	10bit
Output voltage range	0V to 2.5V (zero) to +5V
Output magnification setting	±32768
Output pin (CN9 connector)	MO1 = Pin 4 MO2 = Pin 14 GND = Pins 1, 11



MDS-D-SPJ3

When the output data is 0, the offset voltage is 2.5V. If there is an offset voltage, adjust the zero level position in the measuring instrument side.



Example of D/A output waveform

8.1.2.2 Setting the output data

<Standard output>

No.	Abbrev.	Parameter name	Explanation
SP125	DA1NO	D/A output channel 1 data No.	Input the No. of the data to be output to each D/A output channel.
SP126	DA2NO	D/A output channel 2 data No.	

No.	Output data	Output unit for standard setting	Output cycle
0	**Commanded motor rotation speed**	1000(r/min)/V	0.8ms
1	**Motor rotation speed**	1000(r/min)/V	0.8ms
2	**Torque current command**	Short time rated ratio 100%/V	0.8ms
3	**Torque current feedback**	Short time rated ratio 100%/V	0.8ms
35	**Disturbance observer estimated disturbance torque**	Short time rated torque current value ratio 100%/V	0.8ms
50	**Position droop**	1/1000°/V	0.8ms
51	**Position command**	1/1000° /V	0.8ms
52	**Position feedback**	1/1000° /V	0.8ms
53	**Position F⊿T**	1/1000° /s/V	0.8ms
54	**Deviation from ideal position (considering spindle tracking delay)**	1/1000° /V	0.8ms
60	**Position droop**	1°/V	0.8ms
61	**Position command**	1° /V	0.8ms
62	**Position feedback**	1° /V	0.8ms
63	**Position F⊿T**	1° /s/V	0.8ms
64	**Deviation from ideal position (considering spindle tracking delay)**	1° /V	0.8ms
70	**Position droop**	1000° /V	0.8ms
71	**Position command**	1000° /V	0.8ms
72	**Position feedback**	1000° /V	0.8ms
73	**Position F⊿T**	1000° /s/V	0.8ms
74	**Deviation from ideal position (considering spindle tracking delay)**	1000° /V	0.8ms
126	**Saw tooth wave**	0V to 5V	0.8ms
127	**2.5V test data output**	2.5V	0.8ms

< Spindle control signal>

Spindle control input (NC to SPJ3)

No.	Details	
16384	Spindle control input 1-0	READY ON command
16385	Spindle control input 1-1	Servo ON command
16391	Spindle control input 1-7	Alarm reset command
16392	Spindle control input 1-8	Torque limit 1 selection command
16393	Spindle control input 1-9	Torque limit 2 selection command
16394	Spindle control input 1-A	Torque limit 3 selection command
16409	Spindle control input 2-9	Speed monitor command valid
16410	Spindle control input 2-A	In door closed (controller)
16411	Spindle control input 2-B	In door closed (all drive units)
16432	Spindle control input 4-0	Spindle control mode selection command 1
16433	Spindle control input 4-1	Spindle control mode selection command 2
16434	Spindle control input 4-2	Spindle control mode selection command 3
16436	Spindle control input 4-4	Gear changeover command
16437	Spindle control input 4-5	Gear selection command 1
16438	Spindle control input 4-6	Gear selection command 2
16445	Spindle control input 4-D	L coil selection command
16458	Spindle control input 5-A	Phase synchronization suppression command
16459	Spindle control input 5-B	Minimum excitation rate 2 changeover request
16460	Spindle control input 5-C	Speed gain set 2 changeover request
16461	Spindle control input 5-D	Zero point re-detection request
16462	Spindle control input 5-E	Spindle holding force up

Spindle control output (SPJ3 to NC)

No.	Details	
16480	Spindle control output 1-0	In ready ON
16481	Spindle control output 1-1	In servo ON
16487	Spindle control output 1-7	In alarm
16488	Spindle control output 1-8	In torque limit 1 selection
16489	Spindle control output 1-9	In torque limit 2 selection
16490	Spindle control output 1-A	In torque limit 3 selection
16492	Spindle control output 1-C	In in-position
16495	Spindle control output 1-F	In warning
16496	Spindle control output 2-0	Z phase passed
16499	Spindle control output 2-3	In zero speed
16503	Spindle control output 2-7	In external emergency stop
16505	Spindle control output 2-9	In speed monitor
16506	Spindle control output 2-A	In door closed (controller)
16507	Spindle control output 2-B	In door closed (self drive unit)
16528	Spindle control output 4-0	In spindle control mode selection 1
16529	Spindle control output 4-1	In spindle control mode selection 2
16530	Spindle control output 4-2	In spindle control mode selection 3
16532	Spindle control output 4-4	In gear changeover command
16533	Spindle control output 4-5	In gear selection 1
16534	Spindle control output 4-6	In gear selection 2
16541	Spindle control output 4-D	In L coil selection
16545	Spindle control output 5-1	Speed detection
16550	Spindle control output 5-6	In coil changeover
16554	Spindle control output 5-A	In phase synchronization suppression
16555	Spindle control output 5-B	In minimum excitation rate 2 selection
16556	Spindle control output 5-C	In speed gain set 2 selection
16557	Spindle control output 5-D	Zero point re-detection complete
16558	Spindle control output 5-E	In spindle holding force up
16559	Spindle control output 5-F	In 2nd in-position

8.1.2.3 Setting the output magnification

(1) Internal data output (Data No. -1 to 3, 50, 60, 127)

Set when outputting data other than in standard output increments. When "0" is set, the magnification will be the same as when "100" is set.

(Example 1)

When SP125=0, SP127=1000:
Commanded motor rotation speed is output to D/A output channel 1 in increments of 100r/min/V.

(Example 2)

When SP126=2, SP128=50:
The torque axis current command is output to D/A output channel 2 in increments of 200%/V.

No.	Abbr.	Parameter name	Details	Setting range	Standard
SP127	DA1MPY	D/A output channel 1 output scale	Set the output scale with Output magnification $= \frac{100}{SP127(SP128)}$ (-fold) . The same scale as "100" is applied when "0" is set.	-32768 to 32767 (1/100-fold)	100
SP128	DA2MPY	D/A output channel 2 output scale			100

8.2 Diagnostic Procedure When Vibration/Noise Occurs

8.2.1 How to judge whether the cause is on machine side or control unit side

(1) Judge by freerun

(a) Run the spindle at the maximum speed.

(b) Exit from the MHI screen.

(i) Select [Mainte]→[Mainte]→[Psswd input], and input the machine tool builder password "MPARA" and push INPUT.

(ii) Push ◁ menu key → [HMI Quit] and input the "Y" key.

(c) Turn OFF the spindle drive unit.

(d) If vibration or noise occurs in spindle freerun, it is highly possible that cause is on the machine side. In such a case, check the machine or spindle motor. If no vibration or noise occurs during freerun, check the control unit side.

8.2.2 How to judge PLG trouble

(1) Turn ON the spindle drive unit and NC, and set the spindle parameter SP018 bit 1 to "1". (Open-loop operation validated.) E.g. SP018=0000→0002

(2) Turn OFF the NC and spindle drive unit, and again turn them ON. (In order to validate the parameter you set.)

(3) Accelerate the spindle gradually (by 10 to 50r/min at a time), and if vibration or noise doesn't occur, it is highly possible that the cause is on the PLG side. In such a case, check the PLG.

[Note] In open-loop operation, rapid acceleration may limit the speed below the target speed.

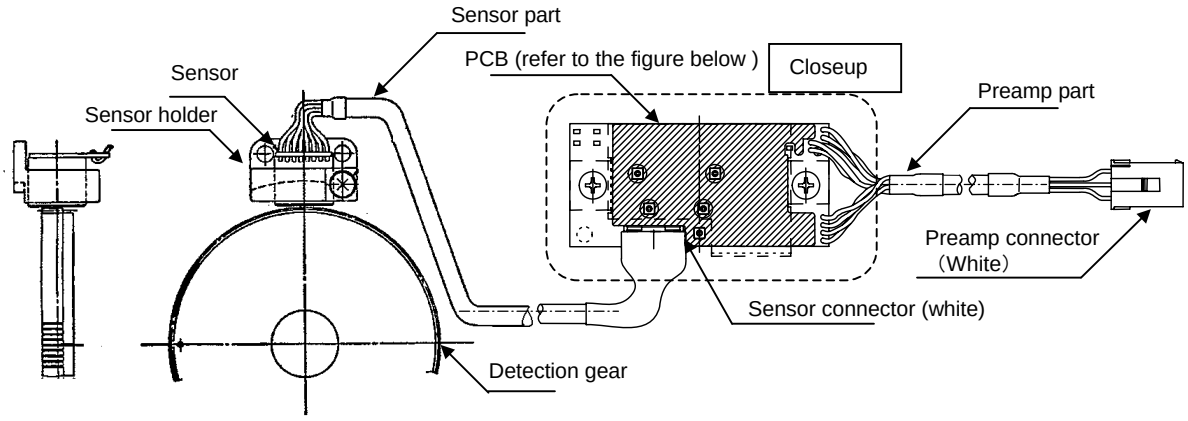
(4) After checking, stop the motor to bring the emergency stop state, and return the setting of SP018 bit 1 back to "0". Then turn OFF the NC and spindle drive unit, and turn them ON again.

8.2.3 How to check PLG waveform

8.2.3.1 Configuration of serial detector TS5691

(1) The serial detector TS5691 is composed of the sensor, preamp, and detection gear. The entire composition and the closeup of PCB are shown in Figure 1, the function of each volume in Table 1, and the function of each check pin in Table 2.

Entire configuration drawing



Printed wiring board closeup figure

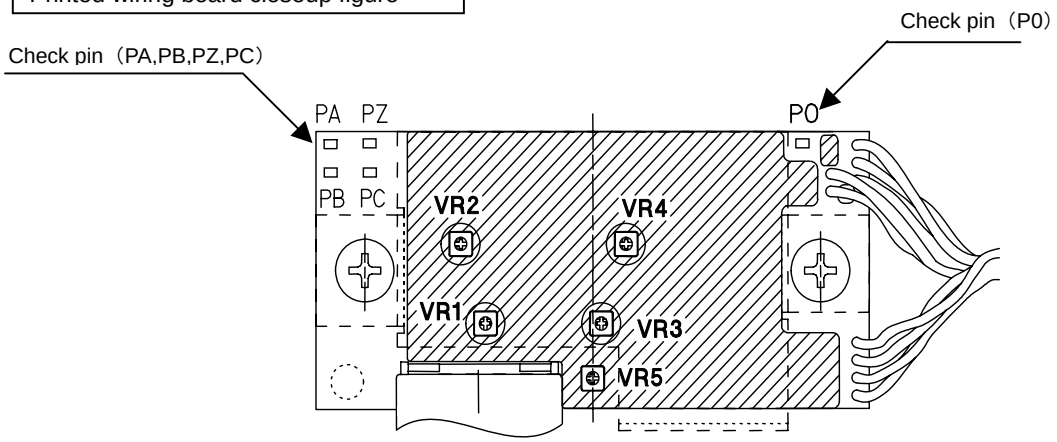


Figure 1. Closeup of PCB and the configuration of the entire detector

Table 1. Function of volumes

Volume	Function
VR1	A phase offset adjustment
VR2	A phase gain adjustment
VR3	B phase offset adjustment
VR4	B phase gain adjustment
VR5	(Z phase width adjustment)

Table 2. Function of check pin

Pin name	Function	Pin name	Function
PA	A phase signal	PB	B phase signal
PZ	Z phase signal	PC	Middle point voltage
P0	Ground (0v)		

← **Basically, unnecessary to adjust.**

(2) In this detector, A phase, B phase, and Z phase are output from the sensor to the preamp as analogue signal. It is output from the preamp to control drive unit (MDS-D/DH-SP) as serial signal.

(3) Make sure to use the sensor and preamp of the same serial number.

(4) To avoid damage on the device, pay full attention to handle it.

8.2.3.2 Adjust A and B phase signals

（1）<In the case of IM motor (SP017 is 0xxx or 2xxx)>
Turn ON the power of NC and spindle drive unit, and set a spindle parameter SP018 bit 1 to “1”.
(Open-loop operation will be available.)
Then turn OFF the power of NC and spindle drive unit.
<In the case of IPM motor (SP017 is 1xxx or 3xxx)>
Turn ON the power of NC and spindle drive unit, and set a spindle parameter SP018 bit 1 to “1”.
(Open-loop operation will be available.) Set SP113 to “10” (according to the speed, between 10 and 20).
Then turn OFF the power of NC and spindle drive unit.

（2）Prepare a 2ch oscilloscope and probes. First, fine-adjust the probes with the oscilloscope’s CAL signal (pulse waveform). (CAL signal’s specification is different depending on the oscilloscope.)

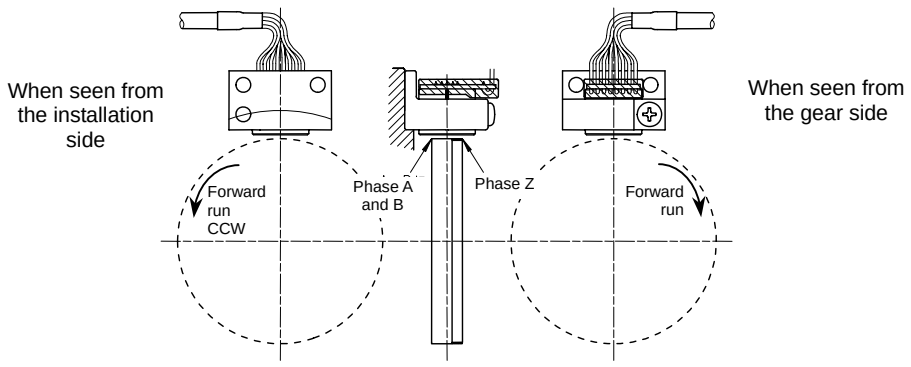
≪Caution!≫
If your oscilloscope's power line has ground terminal, do not connect this to the ground. In addition, pay attention so that the oscilloscope won’t touch the machine or other ground parts during adjusting the waveform.

（3）Set the measure range of the oscilloscope’s CH1 and CH2 to 0.5VDC/div (when 1:1 probe).
In addition, connect each channel’s probe’s ground to “P0 terminal” of the PCB, and the signal side to “PC terminal”.
(To avoid short circuit of the probes’ grounds connected to the P0 terminal, bind them with a clip, and connect to the P0 terminal.)

（4）Turn ON the power of only spindle drive unit, and adjust the oscilloscope’s CH1 and CH2 with the 0V volume so that they will be the center of the screen. (As each signal has 2.5V of offset.) Then turn OFF the spindle drive unit’s power, and connect the probe’s CH1 to “PA terminal”, and CH2 to “PB terminal”.

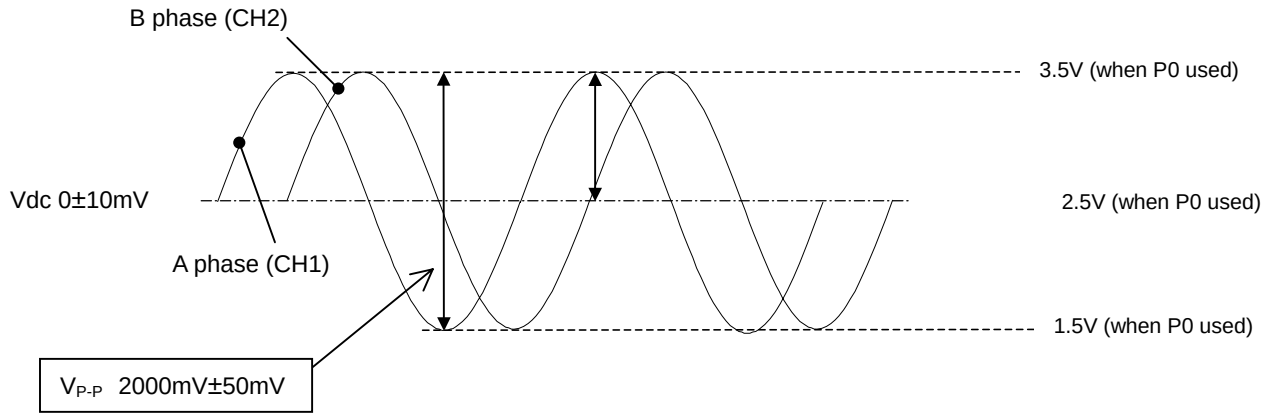
（5）Turn ON the power of NC and spindle drive unit, and issue the forward run command to run the motor at the standard speed. (Forward means the CW direction when seen from the gear.) (For the base speed, refer to “How to find the standard speed” on the next page.)

Rotation direction
As in the figure below, when the sensor is seen from the installation side, define the CCW direction as forward rotation. Thus, when seen from the opposite side, forward rotation is the CW direction.



（6）Check if your A and B phase waveforms are as described below.
①Peak value (waveform width) is 2000mV±50mV$_{P-P}$, and from 0V to each end of peak values is 1000mV±25mV each.
②When measured with the digital multimeter, the waveform’s DC component is 0V±10mV$_{DC}$.
③When measured with the digital multimeter, the measure value of the AC component is 707mV±4mV 1000mV±5mV/$\sqrt{2}$).

Oscilloscope's waveforms



How to find the standard speed

The calculation formula for the standard speed.

Standard speed(r/min)=200(r/min)*(256/PLG gear teeth number)

< Example > When PLG gear teeth number is 128 p/rev,

200x256/128=400r/min.

*In open-loop operation, increase the motor speed little by little (10 to 50r/min). If drastically accelerated, the motor may not reach the target speed.

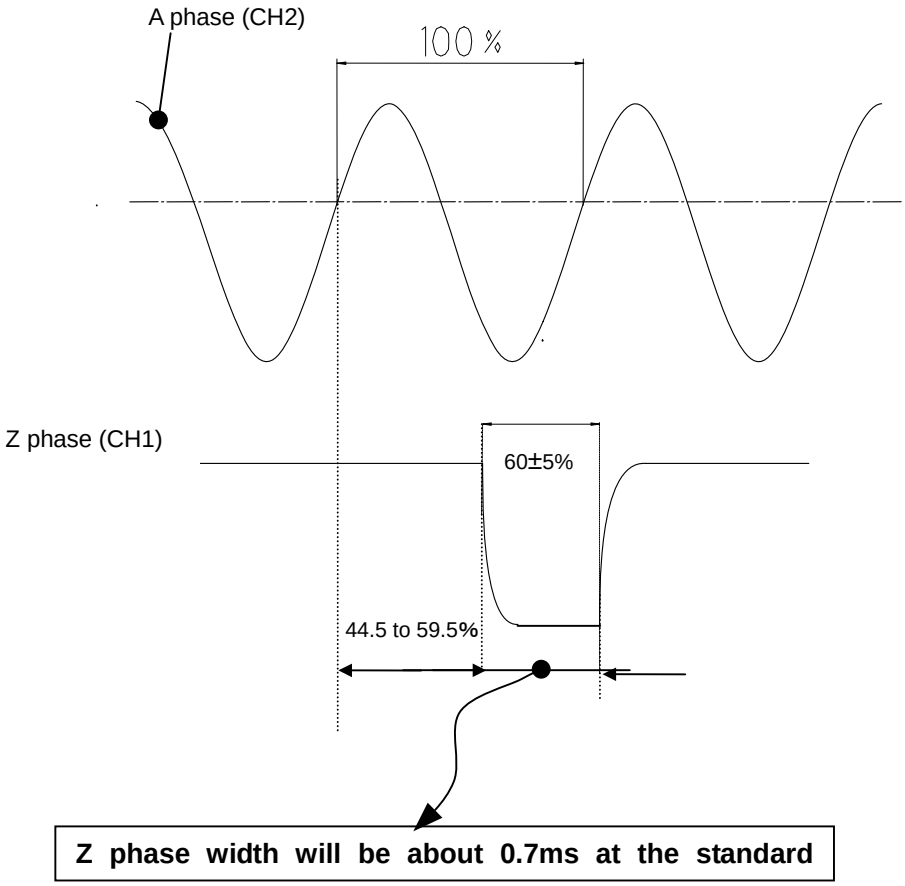
Reference: PLG gear teeth number and standard speed

Parameter SP020	PLG gear type(p/rev)	Standard speed(r/min)	Z phase adjustment width (Refer to the next page)
8000	512	100	0.7ms
6000	384	140	0.7ms
4000	256	200	0.7ms
2000	128	400	0.7ms

8.2.3.3 Check Z phase signal

(1) Next, check the Z phase's pulse width.
Connect the oscilloscope's CH1 to the PLG PCB's PZ terminal, and the probe's GND to the P0 terminal.
Then connect CH2 to the PCB's PA terminal, and the probe's GND to the P0 terminal.

(2) Run the motor in the CW direction at the standard speed, and check if CH1's pulse width is 60%±5 of one cycle of CH2.



Now the PLG waveform check is complete.
When it's complete, stop the motor, and press the emergency stop button. Then return the setting of SP018 bit 1 back to "1" (for IPM, return SP113's value back to "0" also). Next, turn OFF the power of NC and spindle unit, then turn them ON again.

8.3 Adjustment of Orientation Stop Position

If a position detector for orientation (encoder, magnet sensor, PLG, etc.) is replaced, it is necessary to readjust the orientation stop position.

[How to adjust]
Change the spindle specification parameter #3108 (ori_sft) to adjust the position.
*As stop position is different depending on the machine, check with your machine tool builder.

#	Abb.	Parameter name	Description	Setting range (Unit)
3108	ori_sft	In-position shift amount for orientation	Set the stop position for orientation.	0.00 to 35999 (0.01°)

9. Servo/Spindle's Troubleshooting

9.1 MDS-D/DH Series

9.1.1 Points of caution and confirmation

If an error occurs in the servo drive unit or spindle drive unit, the warning or alarm will occur. When a warning or alarm occurs, check the state while observing the following points, and inspect or remedy the unit according to the details given in this section.

<Points of confirmation>

[1] What is the alarm code display?
[2] Can the error or trouble be repeated? (Check alarm history)
[3] Is the motor and servo drive unit temperature and ambient temperature normal?
[4] Are the servo drive unit, control unit and motor grounded?
[5] Was the unit accelerating, decelerating or running at a set speed? What was the speed?
[6] Is there any difference during forward and backward run?
[7] Was there a momentary power failure?
[8] Did the trouble occur during a specific operation or command?
[9] At what frequency does the trouble occur?
[10] Is a load applied or removed?
[11] Has the drive unit been replaced, parts replaced or emergency measures taken?
[12] How many years has the unit been operating?
[13] Is the power supply voltage normal? Does the state change greatly according to the time band?

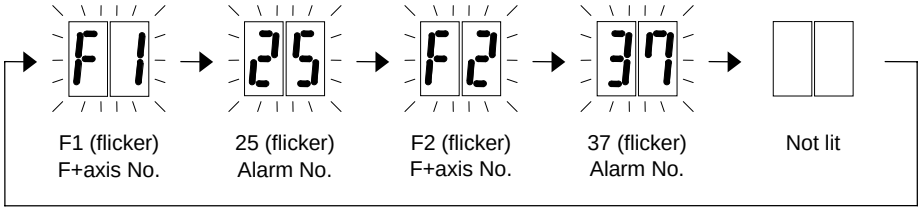
⚠ CAUTION

1. This power supply unit uses a large capacity electrolytic capacitor. When the CHARGE lamp on the front of the power supply unit is lit, voltage is still present at the PN terminal (TE2). Do not touch the terminal block in this state.
2. Before replacing the unit, etc., always confirm that there is no voltage at the PN terminal (TE2) with a tester or wait at least 15 minutes after turning the main power OFF.
3. The conductivity in the unit cannot be checked.
4. Never carry out a megger test on the drive unit or power supply unit as the unit could be damaged.

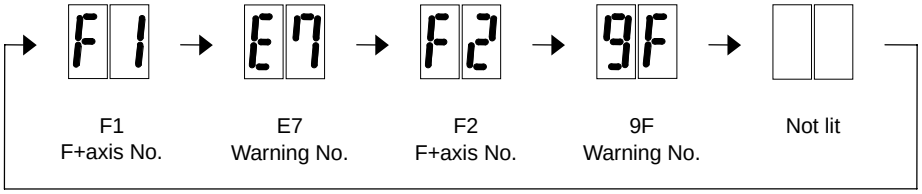
9.1.1.1 LED display when alarm or warning occurs

(1) Servo and spindle drive unit

The axis No. and alarm/warning No. alternate on the display. The display flickers when an alarm occurs.



LED display during servo alarm or spindle alarm



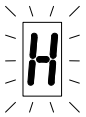
LED display during servo warning or spindle warning

Numbers displayed on LED

No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
LED display	0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F

(2) Power supply unit

The alarm/warning No. is converted into a symbol and displayed. Refer to section "6-2-1 List of alarms" and "6-2-2 List of warnings" for details. The display flickers when an alarm or a warning occurs.



Alarm 71 (flicker)

LED display during power supply alarm

Warning E9 (flicker)

LED display during power supply warning

9.1.2 Protective functions list of units

9.1.2.1 List of alarms

When an alarm occurs, the servo drive unit will make the motor stop by the deceleration control or dynamic brake. The spindle drive unit will coast to a stop or will decelerate to a stop. At the same time, the alarm No. will appear on the NC monitor screen and with the LEDs on the front of the drive unit. Check the alarm No., and remove the cause of the alarm by following this list.

Drive unit alarm

No.	Alarm name	SV	SP	Alarm details	Reset
11	Axis selection error	■	■	Setting of the axis No. selection switch is incorrect.	AR
12	Memory error 1	■	■	A CPU error or an internal memory error was detected during the power ON self-check.	AR
13	Software processing error 1	●	●	Software processing has not finished within the specified time.	PR
16	Magnetic pole position detection error	●	●	An error was detected in the magnetic pole detection for controlling the motor.	PR
17	A/D converter error	●	●	An error was detected in the A/D converter for detecting current FB.	PR
18	Motor side detector: Initial communication error	■	■	Initial communication with the motor side detector failed.	PR
1A	Machine side detector: Initial communication error	■		Initial communication with the linear scale or the ball screw side detector failed.	PR
1B	Machine side detector: Error 1	●		The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).	PR
1C	Machine side detector: Error 2	●			PR
1D	Machine side detector: Error 3	●			PR
1E	Machine side detector: Error 4	●			PR
1F	Machine side detector: Communication error	●		An error was detected in communication data with the linear scale or the ball screw side detector. Or the communication was interrupted.	PR

(Note 1) Motor stopping method applied when self-axis drive unit alarm occurs is indicated in SV for servo and in SP for spindle.
(Note 2) Servo (SV) alarm stopping method …○: Deceleration control (when SV048, SV055 or SV056 is set), ●: Dynamic brake stop, ■: Initial error (while motor is stopped)
(Note 3) Spindle (SP) alarm stopping method…○: Deceleration control (when SP038/bit0=1 is set), ●: Coast to a stop, ■: Initial error (while motor is stopped)

Resetting methods

NR：Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR：Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions.
When the control axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR：Reset by turning the servo drive unit power ON again.

Drive unit alarm

No.	Alarm name	SV	SP	Alarm details	Reset
21	Machine side detector: No signal	●	/	When an excessive error alarm occurred, no signal from the machine side detector was detected.	PR
23	Excessive speed error	/	●	A difference between the speed command and speed feedback was continuously exceeding 50 r/min for longer than the setting time.	NR
24	Grounding	■	■	The motor power cable is in contact with FG (Frame Ground).	PR
25	Absolute position data lost	■	/	The absolute position was lost, as the backup battery voltage dropped in the absolute position detector.	AR
26	Unused axis error	●	●	A power module error occurred in the axis whose axis No. selection switch was set to "F"(free axis).	PR
27	Machine side detector: Error 5	●	/	The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).	PR
28	Machine side detector: Error 6	●	/		PR
29	Machine side detector: Error 7	●	/		PR
2A	Machine side detector: Error 8	●	/		PR
2B	Motor side detector: Error 1	●	●	The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).	PR
2C	Motor side detector: Error 2	●	●		PR
2D	Motor side detector: Error 3	●	●		PR
2E	Motor side detector: Error 4	●	●		PR
2F	Motor side detector: Communication error	●	●	An error was detected in communication data with the motor side detector or with the linear scale of a linear servo system. Or the communication was interrupted.	PR
31	Overspeed	○	○	The motor was detected to rotate at a speed exceeding the allowable speed. (In the case of linear motor, it was detected to move at a speed exceeding the allowable speed.)	PR
32	Power module overcurrent	●	●	Overcurrent protection function in the power module has started its operation.	PR
34	NC-DRV communication: CRC error	○	○	An error was detected in the data received from the CNC.	PR
35	NC command error	○	○	The travel command data that was received from the CNC was excessive.	PR
36	NC-DRV communication: Communication error	○	○	The communication with the CNC was interrupted.	PR
37	Initial parameter error	■	■	An incorrect parameter was detected among the parameters received from the CNC at the power ON.	PR
38	NC-DRV communication: Protocol error 1	○	○	An error was detected in the communication frames received from the CNC.	PR
39	NC-DRV communication: Protocol error 2	○	○	An error was detected in the axis information data received from the CNC.	PR
3A	Overcurrent	●	●	Excessive current was detected in the motor drive current.	PR
3B	Power module overheat	●	●	Thermal protection function in the power module has started its operation.	PR

(Note 1) Motor stopping method applied when self-axis drive unit alarm occurs is indicated in SV for servo and in SP for spindle.
(Note 2) Servo (SV) alarm stopping method
○: Deceleration control (when SV048, SV055 or SV056 is set)
●: Dynamic brake stop
■: Initial error (while motor is stopped)
(Note 3) Spindle (SP) alarm stopping method
○: Deceleration control (when SP055 or SP056 is set)
●: Coast to a stop
■: Initial error (while motor is stopped)

Drive unit alarm

No.	Alarm name	SV	SP	Alarm details	Reset
42	Feedback error 1	●	●	An error was detected in the feedback signals of the position detector in a servo system, or in PLG's feedback signals in a spindle system.	PR
43	Feedback error 2	●	/	Excessive difference was detected in position data between the motor side detector and the machine side detector in a servo system. In a spindle system, an error was detected in the encoder feedback signals.	PR
45	Fan stop	○	○	A cooling fan built in the drive unit stopped, and overheat occurred in the power module.	PR
46	Motor overheat	○	○	Thermal protection function of the motor or in the detector, has started its operation.	NR
48	Motor side detector: Error 5	●	●	The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).	PR
49	Motor side detector: Error 6	●	●		PR
4A	Motor side detector: Error 7	●	●		PR
4B	Motor side detector: Error 8	●	●		PR
4E	NC command mode error	/	○	The mode outside the specification was input in spindle control mode selection.	NR
50	Overload 1	○	○	Overload detection level became over 100%. The motor or the drive unit is overloaded.	NR
51	Overload 2	○	○	Current command of more than 95% of the unit's max. current was being continuously given for longer than 1 second in a servo system. In a spindle system, current command of more than 95% of the motor's max. current was being continuously given for longer than 1 second.	NR
52	Excessive error 1	○	○	A difference between the actual and theoretical motor positions during servo ON exceeded the setting value.	NR
53	Excessive error 2	●	/	A difference between the actual and theoretical motor positions during servo OFF exceeded the setting value.	NR
54	Excessive error 3	●	●	When an excessive error 1 occurred, detection of the motor current failed.	NR
58	Collision detection 1: G0	○	/	When collision detection function was valid, the disturbance torque in rapid traverse (G0) exceeded the collision detection level.	NR
59	Collision detection 1: G1	○	/	When collision detection function was valid, the disturbance torque in cutting feed (G1) exceeded the collision detection level.	NR
5A	Collision detection 2	○	/	When collision detection function was valid, the command torque reached the max. motor torque.	NR
5B	Safety observation: Commanded speed error	○	○	In safety monitoring mode, the commanded speed was detected to exceed the safe speed.	PR
5D	Safety observation: Door state error	○	○	In safety monitoring mode, the door state signal from the NC and the same signal from the drive unit don't match. Otherwise, door open state was detected in normal mode.	PR
5E	Safety observation: Feedback speed error	○	○	In safety monitoring mode, the motor speed was detected to exceed the safe speed.	PR

(Note 1) Motor stopping method applied when self-axis drive unit alarm occurs is indicated in SV for servo and in SP for spindle.
(Note 2) Servo (SV) alarm stopping method
○: Deceleration control (when SV048, SV055 or SV056 is set)
●: Dynamic brake stop
■: Initial error (while motor is stopped)
(Note 3) Spindle (SP) alarm stopping method
○: Deceleration control (when SP055 or SP056 is set)
●: Coast to a stop
■: Initial error (while motor is stopped)

Power supply alarm

No.	LED display	Alarm name	CV	CR	Alarm details	Reset
61	1	Power supply: Power module overcurrent	●	●	Overcurrent protection function in the power module has started its operation.	PR
62	2	Power supply: Frequency error	●	●	The input power supply frequency increased above the specification range.	PR
67	7	Power supply: Phase interruption	●	●	An open-phase condition was detected in input power supply circuit.	PR
68	8	Power supply: Watchdog	●	●	The system does not operate correctly.	AR
69	9	Power supply: Grounding	●	●	The motor power cable is in contact with FG (Frame Ground).	PR
6A	A	Power supply: External contactor welding	●	●	A contact of the external contactor is welding.	PR
6B	b	Power supply: Rush relay welding	●	●	A resistor relay for rush short circuit fails to be OFF.	PR
6C	C	Power supply: Main circuit error	●	●	An error was detected in charging operation of the main circuit capacitor.	PR
6E	E	Power supply: Memory error/AD error	●	●	An error was detected in the internal memory or A/D converter.	AR
6F	F	Power supply error	●	●	No power supply is connected to the drive unit, or a communication error was detected.	AR
70	U	Power supply: External emergency stop error	●	●	A mismatch of the external emergency stop input and CNC emergency stop input continued for 30 seconds.	PR
71	H	Power supply: Instantaneous power interruption	●	●	The power was momentarily interrupted.	NR
72	I	Power supply: Fan stop	●	●	A cooling fan built in the power supply unit stopped, and overheat occurred in the power module.	PR
73	J	Power supply: Over regeneration	●	●	Over-regeneration detection level became over 100%. The regenerative resistor is overloaded. This alarm cannot be reset for 15 min from the occurrence. Leave the drive system energized for more than 15 min, then turn the power ON to reset the alarm.	NR
75	L	Power supply: Overvoltage	●	●	L+ and L- bus voltage in main circuit exceeded the allowable value. As the voltage between L+ and L- is high immediately after this alarm, another alarm may occur if this alarm is reset in a short time. Wait more than 5 min before resetting so that the voltage drops.	NR
76	n	Power supply: External emergency stop setting error	●	●	The rotary switch setting of external emergency stop is not correct, or a wrong external emergency stop signal is input.	AR
77	n	Power supply: Power module overheat	●	●	Thermal protection function in the power module has started its operation.	PR

(Note 1) If a power supply alarm (60 to 77) occurs, all servos will stop with the dynamic brakes, and all spindles will coast to a stop.
(Note 2) "b", "C" and "d" displayed on the power supply unit's LED as a solid light (not flickering) do not indicate an alarm.

Drive unit alarm

No.	Alarm name	SV	SP	Alarm details	Reset
88	Watchdog	●	●	The system does not operate correctly.	AR

(Note 1) Motor stopping method applied when self-axis drive unit alarm occurs is indicated in SV for servo and in SP for spindle.
(Note 2) Servo (SV) alarm stopping method
○: Deceleration control (when SV048, SV055 or SV056 is set)
●: Dynamic brake stop
■: Initial error (while motor is stopped)
(Note 3) Spindle (SP) alarm stopping method
○: Deceleration control (when SP055 or SP056 is set)
●: Coast to a stop
■: Initial error (while motor is stopped)

9.1.2.2 List of warnings

When a warning occurs, a warning No. will appear on the NC monitor screen and with the LEDs on the front of the drive unit. Check the warning No., and remove the cause of the warning by following this list.

Drive unit warnings

No.	Alarm name	Warning details	Reset
9E	Absolute position detector: Revolution counter error	An error was detected in the revolution counter of the absolute position detector. The absolute position data cannot be compensated.	*
9F	Battery voltage drop	The battery voltage that is supplied to the absolute position detector dropped. The absolute position data is retained.	*
A6	Fan stop warning	A cooling fan built in the drive unit stopped.	*
E1	Overload warning	Overload detection level exceeded 80%.	*
E4	Set parameter warning	An incorrect parameter was detected among the parameters received from the CNC.	*
E6	Control axis detachment warning	Control axis detachment was commanded.	*
E7	In NC emergency stop state	Emergency stop was input from the CNC.	*

(Note 1) Servo and spindle motor do not stop when the warning occurs.
(Note 2) When an emergency stop is input, servo and spindle motor decelerate to a stop.
(When SV048, SV055 or SV056 is set for servo and when SP055 or SP056 is set for spindle.)

Power supply warnings

No.	LED display	Alarm name	Warning details	Reset
E9		Instantaneous power interruption warning	The power was momentarily interrupted.	NR
EA		In external emergency stop state	External emergency stop signal was input.	*
EB		Power supply: Over regeneration warning	Over-regeneration detection level exceeded 80%.	*
EE		Power supply: Fan stop warning	A cooling fan built in the power supply unit stopped.	*

(Note) Servo and spindle motor do not stop when the warning occurs.

Resetting methods

* : Automatically reset once the cause of the warning is removed.
NR : Reset with the NC RESET button. This warning can also be reset with the PR and AR resetting conditions.
PR : Reset by turning the NC power ON again. This warning can also be reset with the AR resetting conditions.
When the control axis is removed, this warning can be reset with the NC RESET button. (Excluding warning 93.)

Separate table (1)

Alarm number when motor is connected		2B	2C	2D	2E	48	49	4A	4B
Alarm number when machine is connected		1B	1C	1D	1E	27	28	29	2A
Detector type	OSA105	CPU error	LED error	Data error	–	–	–	–	–
	OSA166	CPU error	LED error	Data error	–	–	–	–	–
	MDS-B-HR	CPU error	–	Data error	–	Connection error	–	–	Magnetic error
Meaning of data		A CPU initial error was detected.	Deterioration of the LED was detected.	An error was detected in the data.		An error was detected in the connection with the analog output linear scale.			An error was detected in the magnetic data for the linear servo system.

Alarm number when motor is connected		2B	2C	2D	2E	48	49	4A	4B
Alarm number when spindle is connected		1B	1C	1D	1E	27	28	29	2A
Detector type	TS5690	Initialization error	Waveform error	–	–	–	Overspeed	–	Relative position data error
	TS5691	Initialization error	Waveform error	–	–	–	Overspeed	–	Relative position data error
Meaning of data		An initialization error was detected when the power was turned ON.	An error was detected in the A, B, Z analog signal waveform.				The tolerable rotation speed was exceeded.		An error was detected in the relative position data.

Alarm number when motor is connected		2B	2C	2D	2E	48	49	4A	4B
Alarm number when machine is connected		1B	1C	1D	1E	27	28	29	2A
Detector type	**Manufacturer name**								
AT342	**Mitsutoyo**	Initialization error	EEPROM error	Photo-electric type, static capacity data mismatch	ROM/RAM error	CPU error	Photo-electric type overspeed	Static capacity type error	Photo-electric type error
AT343	**Mitsutoyo**	Initialization error	EEPROM error	Photo-electric type, static capacity data mismatch	ROM/RAM error	CPU error	Photo-electric type overspeed	Static capacity type error	Photo-electric type error
AT543	**Mitsutoyo**	Initialization error	EEPROM error	Photo-electric type, static capacity data mismatch	ROM/RAM error	CPU error	Photo-electric type overspeed	Static capacity type error	Photo-electric type error
LC191M	**Heidenhain**	Initialization error	EEPROM error	Relative/ absolute position data mismatch	ROM/RAM error	CPU error	Overspeed	Absolute position data error	Relative position data error
LC491M	**Heidenhain**	Initialization error	EEPROM error	Relative/ absolute position data mismatch	ROM/RAM error	CPU error	Overspeed	Absolute position data error	Relative position data error
RCN723	**Heidenhain**	Initialization error	EEPROM error	Relative/ absolute position data mismatch	ROM/RAM error	CPU error	Overspeed	Absolute position data error	Relative position data error
RCN223	**Heidenhain**	Initialization error	EEPROM error	Relative/ absolute position data mismatch	ROM/RAM error	CPU error	Overspeed	Absolute position data error	Relative position data error
MJ831	**Sony**	–	–	–	–	–	–	–	Encoder error
ADB-20J60	**Mitsubishi Heavy Industries**	Installation accuracy fault	–	Detection position deviance	Scale breaking	–	–	Gain fault	Phase fault
FMD	**Futaba Denshi Kogyo**	–	–	–	–	–	–	Waveform error	Overspeed or phase division signal decision error
ERM280	**Heidenhain**	Initialization error	EEPROM error	–	–	CPU error	Overspeed	–	Relative position data error

9.1.3 Troubleshooting

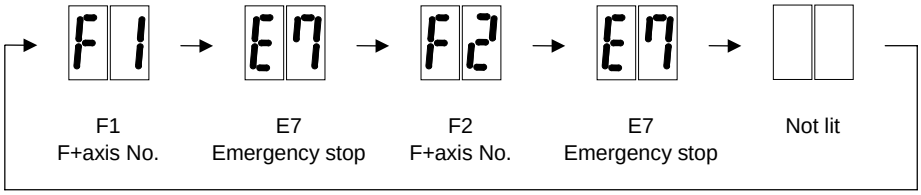
Follow this section to troubleshoot the alarms that occur during start up or while the machine is operating. If the state is not improved with the following investigations, the drive unit may be faulty. Exchange the unit with another unit of the same capacity, and check whether the state is improved.

9.1.3.1 Troubleshooting at power ON

If the NC system does not start up correctly and a system error occurs when the NC power is turned ON, the drive unit may not have been started up properly. Check the LED display on the drive unit, and take measures according to this section.

LED display	Symptom	Cause of occurrence	Investigation method	Remedy
AA	Initial communication with the CNC was not completed correctly.	The drive unit axis No. setting is incorrect.	Is there any other drive unit that has the same axis No. set?	Set correctly.
		The CNC setting is incorrect.	Is the No. of CNC controlled axes correct?	Set correctly.
		Communication with CNC is incorrect.	Is the connector (CN1A, CN1B) connected?	Connect correctly.
			Is the cable broken?	Replace the cable.
Ab	Initial communication with the CNC was not carried out.	The axis is not used, the setting is for use inhibiting.	Is the DIP switch set correctly?	Set correctly.
		Communication with CNC is incorrect.	Is the connector (CN1A, CN1B) connected?	Connect correctly.
			Is the cable broken?	Replace the cable.
12	An error was detected in the unit's memory and IC during the self-diagnosis at power ON.	The CPU peripheral circuit is abnormal.	Check the repeatability.	Replace the unit.
			Check whether there is any abnormality with the unit's surrounding environment, etc.	Improve the surrounding environment.

The drive unit has started up normally if the following type of emergency stop (E7) is displayed on the display unit's LED display.



Normal drive unit LED display at NC power ON (for 1st axis)

9.1.3.2 Troubleshooting for each alarm No.

Alarm No. 11	Axis selection error Setting of the axis No. selection switch is incorrect.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the setting of the axis selection switch (rotary switch) on the top of the unit.	The same axis No. is set for the L and M axes.	Correctly set the axis No. 0 = No. 1 axis, 1 = No. 2 axis, ...	○	○
		The value is duplicated with other axis.	Correctly set the axis No. 0 = No. 1 axis, 1 = No. 2 axis, ...		
		No abnormality is found in particular.	Replace the drive unit.		

Alarm No. 12	Memory error 1 A CPU error or an internal memory error was detected during the power ON self-check.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the servo or spindle software version was changed recently.	The version was changed.	There is a possibility that the spindle software was downloaded into servo, or the servo software was downloaded into spindle. Download servo/spindle software again.	○	○
		The version was not changed.	Check the investigation item No. 2.		
2	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 3.		
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 13	Software processing error 1 Software processing has not finished within the specified time.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the servo or spindle software version was changed recently.	The version was changed.	Change software version back to the original.	○	○
		The version was not changed.	Check the investigation item No. 2.		
2	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 3.		
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 16	Magnetic pole position detection error An error was detected in the magnetic pole detection for controlling the motor.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the parameters.	The parameters specified with the adjustment are not set.	Replace the drive unit.		○
		Correct parameters are set.	Check the investigation item No. 2.		
2	Check the repeatability.	The error is always repeated.	Replace the drive unit.		○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 3.		
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.			○

Alarm No. 17	A/D converter error An error was detected in the A/D converter for detecting current FB.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 2.		
2	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 18	Motor side detector: Initial communication error Initial communication with the motor side detector failed.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the servo parameter (SV025.ent) setting value. OSE104: 0, OSA104: 1 Are all others set to 2? (Excluding slave axis for synchronous control)	The value is not set correctly.	Correctly set SV025.		○
		The value is set correctly.	Check the investigation item No. 2.		
2	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 3.		
3	Turn the power OFF, and check the detector cable connection with a tester.	The connection is faulty.	Replace the detector cable.	○	○
		The connection is normal.	Check the investigation item No. 4.		
4	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the detector side.	Check the investigation item No. 5.		
5	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 1A	Machine side detector: Initial communication error Initial communication with the linear scale or the ball screw side detector failed.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the servo parameter (SV025.pen) setting value. Are the serial communication type detector parameters set for the pulse type detector?	The value is not set correctly.	Correctly set SV025.	○	
		The value is set correctly.	Check the investigation item No. 2.		
2	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	
		The connector is not disconnected.	Check the investigation item No. 3.		
3	Turn the power OFF, and check the detector cable connection with a tester.	The connection is faulty.	Replace the detector cable.	○	
		The connection is normal.	Check the investigation item No. 4.		
4	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	
		The alarm is on the detector side.	Check the investigation item No. 5.		
5	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	

Alarm No. 1B	Machine side detector: Error 1 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).

	Investigation details	Investigation results	Remedies	SV	SP
1	Check whether the servo axis has moved and the spindle has rotated when an alarm occurred.	The axis has operated.	Check the investigation item No. 3.	○	○
		The axis has not operated.	Check the investigation item No. 2.		
2	Check whether the operation at low speed is normal.	The operation is normal.	Check the investigation item No. 3.	○	○
		The operation is not normal.	Check the cautions at power ON. • Wiring check • Parameter check		
3	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 4.		
4	Turn the power OFF, and check the detector cable connection with a tester.	The connection is faulty.	Replace the detector cable.	○	○
		The connection is normal.	Check the investigation item No. 5.		
5	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the detector side.	Check the investigation item No. 6.		
6	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 1C	Machine side detector: Error 2 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the alarm No. "1B" items.			○	

Alarm No. 1D	Machine side detector: Error 3 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the alarm No. "1B" items.			○	

Alarm No. 1E	Machine side detector: Error 4 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the alarm No. "1B" items.			○	

Alarm No. 1F	Machine side detector: Communication error An error was detected in communication data with the linear scale or the ball screw side detector. Or the communication was interrupted.

	Investigation details	Investigation results	Remedies	SV	SP
1	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	
		The connector is not disconnected.	Check the investigation item No. 2.		
2	Is the detector cable wired in the same conduit as the motor's power cable, or are the two cables laid in parallel near each other?	The cables are wired near each other. (Noise is entering from the power cable.)	Improve the cable wiring.	○	
		The wires are sufficiently separated.	Check the investigation item No. 3.		
3	Is the motor FG wire connected only to the drive unit which drives it? (Is the motor grounded to one point?)	The motor FG wire is grounded on the motor side.	Ground the motor to one point, connecting the wires together on the drive unit side.	○	
		The motor is grounded to one point.	Check the investigation item No. 4.		
4	Turn the power OFF, and check the detector cable connection with a tester. (Is the cable shielded?)	The connection is faulty.	Replace the detector cable.	○	
		The connection is normal.	Check the investigation item No. 5.		
5	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	
		The alarm is on the detector side.	Check the investigation item No. 6.		
6	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	

Alarm No. 21	Machine side detector: No signal When an excessive error alarm occurred, no signal from the machine side detector was detected.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the servo parameter (SV025. pen) setting value. Are the pulse type detector parameters set for a serial communication type detector?	The value is not set correctly.	Correctly set SV025.	○	
		The value is set correctly.	Check the investigation item No. 3.		
2	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	
		The connector is not disconnected.	Check the investigation item No. 4.		
3	Turn the power OFF, and check the detector cable connection with a tester.	The connection is faulty.	Replace the detector cable.	○	
		The connection is normal.	Check the investigation item No. 5.		
4	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	
		The alarm is on the detector side.	Check the investigation item No. 6.		
5	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	

Alarm No. 23	Excessive speed error A difference between the speed command and speed feedback was continuously exceeding 50 r/min for longer than the setting time.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the U, V and W wiring between the spindle drive unit and spindle motor.	The wires are not correctly connected.	Correctly connect.		○
		The wires are correctly connected.	Check the investigation item No. 2.		
2	Check the spindle parameter (SP017, SP018, SP019, SP020, SP117 and SP129 or later) setting value.	The correct values are not set.	Correctly set.		○
		The correct values are set.	Check the investigation item No. 3.		
3	Measure the acceleration/ deceleration time up to the point where the spindle speed reaches its maximum. If the alarm occurs when forward run is changed to reverse run, measure the acceleration/ deceleration time from the forward run's maximum speed to reverse run's maximum speed.	12sec or more.	Increase the spindle acceleration/deceleration time constant setting value.		○
		Less than 12sec.	Check the investigation item No. 4.		
4	Check the load amount when the alarm occurred during cutting.	Load amount is 120% or more.	Reduce the load.		○
		Load amount is less than 120%.	Check the investigation item No. 5.		
5	Check the fluctuation of the input voltage into the power supply unit.	Voltage drop during acceleration does not satisfy the motor voltage.	Review the power supply capacity.		○
		Voltage drop during acceleration satisfies the motor voltage.	Check the investigation item No.6.		
6	Check the capacity of the drive unit.	The capacity does not satisfy the motor output.	Increase the capacity.		○
		The capacity satisfies the motor output.	Replace the unit.		

Alarm No. 24	Grounding The motor power cable is in contact with FG (Frame Ground).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Measure the insulation across the power cables (U,V,W) for connected motors and the ground. (Carry out a megger test.)	Less than 100kΩ.	The motor or power cable may be ground faulted.	○	○
		100kΩ or more.	Check the investigation item No. 2.		
2	Has oil come in contact with the motor or power cable?	Oil has come in contact.	Take measures so that oil does not come in contact. Check the motor's cannon connector and the inside of the terminal box, and clean as necessary.	○	○
		Oil has not come in contact.	Check the investigation item No. 3.		
3	Measure the insulation again.	Less than 1MΩ.	Replace the motor or cable.	○	○
		1MΩ or more.	Check the investigation item No. 2.		
4	Measure the resistance across the U, V, W phase terminals of the servo/spindle drive unit and the ground. (Do not measure the insulation as the unit could be damaged.)	Less than 100kΩ.	Replace the drive unit.	○	○
		100kΩ or more.	Replace the power supply unit.		

Alarm No. 25	Absolute position data lost The absolute position was lost, as the backup battery voltage dropped in the absolute position detector.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Is warning 9F occurring at the same time?	The warning is occurring.	Check the investigation item No. 2.	○	
		The warning is not occurring.	Check the investigation item No. 3.		
2	Measure the battery voltage with a tester.	Less than 3V.	Replace the battery, and establish the zero point.	○	
		3V or more.	Check the NC bus cable connection.		
3	Did alarm No.18 occur when the power was turned ON the last time?	Alarm No.18 occurred.	Turn the drive unit control power ON again, and establish the zero point.	○	
		Alarm No.18 did not occur.	Check the investigation item No. 4.		
4	Was the detector cable or battery cable left disconnected from the unit for a long time?	The unit was left disconnected for a long time. Guide at delivery : 20 hours or more After 5 years : 10 hours or more	Turn the drive unit control power ON again, and establish the zero point.	○	
		The cables were not left disconnected.	Check the investigation item No. 5.		
5	Check the detector cable or battery cable connection with a tester.	The connection is faulty.	Replace the cable.	○	
		The connection is normal.	Replace the drive unit.		

Alarm No. 26	Unused axis error A power module error occurred in the axis whose axis No. selection switch was set to "F"(free axis).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 2.		
2	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 27	Machine side detector: Error 5 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 28	Machine side detector: Error 6 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 29	Machine side detector: Error 7 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 2A	Machine side detector: Error 8 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 2B	Motor side detector: Error 1 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 2C	Motor side detector: Error 2 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 2D	Motor side detector: Error 3 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 2E	Motor side detector: Error 4 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 2F	Motor side detector: Communication error An error was detected in communication data with the motor side detector or with the linear scale of a linear servo system. Or the communication was interrupted.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 2.		
2	Is the detector cable wired in the same conduit as the motor's power cable, or are the two cables laid in parallel near each other?	The cables are wired near each other. (Noise is entering from the power cable.)	Improve the cable wiring.	○	○
		The wires are sufficiently separated.	Check the investigation item No. 3.		
3	Is the motor FG wire connected only to the drive unit which drives it? (Is the motor grounded to one point?)	The motor FG wire is grounded on the motor side.	Ground the motor to one point, connecting the wires together on the drive unit side.	○	○
		The motor is grounded to one point.	Check the investigation item No. 4.		
4	Turn the power OFF, and check the detector cable connection with a tester. (Is the cable shielded?)	The connection is faulty.	Replace the detector cable.	○	○
		The connection is normal.	Check the investigation item No. 5.		
5	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the detector side.	Check the investigation item No. 6.		
6	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 31	Overspeed The motor was detected to rotate at a speed exceeding the allowable speed. (In the case of linear motor, it was detected to move at a speed exceeding the allowable speed.)				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if the unit in which the alarm was detected is servo or spindle.	The alarm was detected in servo.	Check the investigation item No. 2.	○	○
		The alarm was detected in spindle.	Check the investigation item No. 3.		
2	Check the servo parameters SV001 (PC1), SV002 (PC2), SV018 (PIT) and SV025 (MTYP) settings.	The settings are incorrect.	Correctly set.	○	
		Correctly set.	Check the investigation item No. 5.		
3	Check the spindle parameter SP017 (TSP) setting.	The setting is incorrect. The alarm is detected at 115% of SP017.	Correctly set.		○
		Correctly set.	Check the investigation item No. 4.		
4	Check the PLG output waveform.	There is a problem.	Adjust the PLG output waveform.	○	○
		Normal.	Check the investigation item No. 5.		
5	Check whether the speed waveform is overshooting.	The waveform is overshooting.	Increase the acceleration/ deceleration time constant.	○	○
		The waveform is not overshooting.	Check if there is any abnormality in the unit's ambient environment. (Ex.: Ambient temperature, noise, grounding)		
			Check the investigation item No. 6.		
6	Check the repeatability.	The alarm occurs when the motor is stopped.	Replace the detector or detector cable.	○	○
		The alarm occurs at all time.	Check the investigation item No. 7.		

Alarm No. 32	Power module overcurrent Overcurrent protection function in the power module has started its operation.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Disconnect the power cable (U, V, W) from the unit's terminal block and motor, and check whether a short-circuit between the power cable or whether conduction at both end of wiring occurs with a tester.	Short-circuited or not conducted.	Replace the power cables (U, V, W).	○	○
		There is no problem.	Check the investigation item No. 2.		
2	Check the motor insulation with a (megger) tester under the condition of the investigation item No. 1. (between motor power and ground earth)	Less than 1MΩ. (Grounding)	Replace the motor.	○	○
		1MΩ or more. (Normal)	Check the investigation item No. 3.		
3	Check the parameter setting values. • Refer to the adjustment procedure.	The value is not set correctly.	Correctly set.	○	○
		The value is set correctly.	Check the investigation item No. 4.		
4	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 5.		
5	Turn the power OFF, and check the detector cable connection with a tester.	Connection is faulty.	Replace the detector cable.	○	○
		Connection is normal.	Check the investigation item No. 6.		
6	Check the repeatability.	The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 8.	○	○
		The error is always repeated.	Check the investigation item No. 7.		
7	Replace with another unit, and check whether the fault is on the drive unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the detector side.	Replace the detector.		
8	Check for any abnormalities in the unit's ambient environment. (Ex.: Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 34	NC-DRV communication: CRC error An error was detected in the data received from the CNC.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Manually shake the connection connectors between NC and drive unit, battery unit and drive unit, or among multiple drive units to check if they are disconnected. Also, check if an excessive force is not applied on them.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 2.		
2	Turn the power OFF, and check the connection of the communication cables indicated in item 1 with a tester. Or, replace with a correct cable.	The connection is faulty.	Replace the communication cable.	○	○
		The connection is normal.	Check the investigation item No. 3.		
3	Check whether the NC or drive unit software version was changed recently.	The version was changed.	Change software version back to the original.	○	○
		The version was not changed.	Check the investigation item No. 4.		
4	Replace with another drive unit, and check whether the fault is on the NC side or drive unit side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the unit connections.	Check the investigation item No. 5.		
5	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 35	NC command error The travel command data that was received from the CNC was excessive.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "34" items.			○	○

Alarm No. 36	NC-DRV communication: Communication error The communication with the CNC was interrupted.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "34" items.			○	○

Alarm No. 37	Initial parameter error An incorrect parameter was detected among the parameters received from the CNC at the power ON.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if the unit in which the alarm was detected is servo or spindle.	The alarm was detected in servo.	Check the investigation item No. 2.	○	○
		The alarm was detected in spindle.	Check the investigation item No. 3.		
2	An error parameter No. is displayed on the NC diagnosis screen. Check the servo parameter with the parameter adjustment procedure.	Wrong parameters were set. SV001 to SV005	Correct the parameter. Set the value within the designated setting range.	○	
		-1 The electronic gears are overflowing.	Check SV001, SV002 and SV018.		
		-2 The absolute position detection parameter is valid when OSE104 and OSE105 are connected. (Absolute position control cannot be used.)	In order to use the absolute position control function, an absolute position option is required.		
		Correct parameters were set.	Check the investigation item No. 4.		
3	An error parameter No. is displayed on the NC diagnosis screen. Check the servo parameter with the parameter adjustment procedure.	SP001 to SP384	Set the value within the designated setting range.		○
4	Check the alarm No. "34" items.			○	○

Alarm No. 38	NC-DRV communication: Protocol error 1 An error was detected in the communication frames received from the CNC.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "34" items.			○	○

Alarm No. 39	NC-DRV communication: Protocol error 2 An error was detected in the axis information data received from the CNC.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "34" items.			○	○

Alarm No. 3A	Overcurrent Excessive current was detected in the motor drive current.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether vibration is occurring.	Vibration is occurring.	• Set a filter. • Lower the speed loop gain (SV005/SP005).	○	○
		There is no vibration.	Check the investigation item No. 2.		
2	The speed loop gain setting is larger than the standard value. Servo: SV005 / Spindle: SP005	The setting is too large.	Set an appropriate value.	○	○
		The setting is approximately the same as the standard value.	Check the investigation item No. 3.		
3	Check the current loop gain. Servo: SV009,SV010,SV011,SV012 Spindle: SP081,SP082,SP083,SP084	The setting is incorrect.	Set the standard value.	○	○
		The standard value is set.	Check the investigation item No. 4.		
4	Disconnect the power cable (U,V,W) from the terminal block and the cannon plug from the motor. Check the insulation with a tester.	The power cable is short-circuited.	Replace the motor power cable.	○	○
		There is no problem.	Check the investigation item No. 5.		
5	Check the insulation between the motor power cable and FG.	There is a ground fault at the power cable.	Replace the motor power cable.	○	○
		There is no problem.	Check the investigation item No. 6.		
6	Connect the cannon plug, and check the insulation between the power cable and FG.	There is a ground fault in the motor.	Replace the motor. (With the absolute position system, the zero point must be established.)	○	○
		There is no problem.	Check the investigation item No. 7.		
7	Check if there is any abnormality in the motor's ambient environment. (Ex. Ambient temperature, cutting water)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 3B	Power module overheat Thermal protection function in the power module has started its operation.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check that the fan is rotating correctly.	Large amounts of cutting oil or cutting chips, etc., are adhered, or the rotation is slow.	Clean or replace the fan.	○	○
		The fan is rotating properly.	Check the investigation item No. 2.		
2	Check whether the heat dissipating fins are dirty.	Cutting oil or cutting chips, etc., are adhered, and the fins are clogged.	Clean the fins.	○	○
		The fins are normal.	Check the investigation item No. 3.		
3	Measure the drive unit's ambient temperature.	55°C or more.	Improve the ventilation and cooling for the power distribution panel.	○	○
		Less than 55°C.	Check the investigation item No. 4.		
4	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 42	Feedback error 1 An error was detected in the feedback signals of the position detector in a servo system, or in PLG's feedback signals in a spindle system.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check SP019 and SP020.	Parameter is set incorrectly.	Correctly set.		○
		Parameter is set correctly.	Check the investigation item No. 2.		
2	Check the alarm No. "2C" items.				○

Alarm No. 43	Feedback error 2 Excessive difference was detected in position data between the motor side detector and the machine side detector in a servo system. In a spindle system, an error was detected in the encoder feedback signals.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	
		The connector is not disconnected.	Check the investigation item No. 2.		
2	Is the detector cable wired in the same conduit as the motor's power cable, or are the two cables laid in parallel near each other?	The cables are wired near each other. (Noise is entering from the power cable.)	Improve the cable wiring.	○	
		The wires are sufficiently separated.	Check the investigation item No. 3.		
3	Is the motor FG wire connected only to the drive unit which drives it? (Is the motor grounded to one point?)	The motor FG wire is grounded on the motor side.	Ground the motor to one point, connecting the wires together on the drive unit side.	○	
		The motor is grounded to one point.	Check the investigation item No. 4.		
4	Turn the power OFF, and check the detector cable connection with a tester. (Is the cable shielded?)	The connection is faulty.	Replace the detector cable.	○	
		The connection is normal.	Check the investigation item No. 5.		
5	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	
		The alarm is on the detector side.	Check the investigation item No. 6.		
6	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	
7	Check SP019 and SP020.	Parameter is set incorrectly.	Correctly set.	○	
		Parameter is set correctly.	Check the investigation item No. 8.		
8	Check the alarm No. "1B" items.			○	

Alarm No. 45	Fan stop A cooling fan built in the drive unit stopped, and overheat occurred in the power module.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Turn the unit power ON again, and confirm the rotation of the fan. Note) Assure more than 10 seconds for the time from when the power is turned OFF till when it is turned ON. For the fan used for the drive unit, assuring more than 10 seconds for the time from when the power is turned OFF till when it is turned ON is required.	The fan is rotating, and an alarm did not occur again.	Continue to use. The power may be turned ON without assuring more than 10 seconds for the time from when the power is turned OFF till when it is turned ON. Leave for more than 10 seconds, and turn the power ON again.	○	○
		The fan did not rotate. Or, an alarm occurred again.	Check the investigation item No. 2.		
2	Check if the connector connected to a fan is disconnected.	The connector is disconnected.	Correctly connect the connector.	○	○
		The connector is not disconnected.	Check the investigation item No. 3.		
3	Check if oil or cutting chips are adhered to the fan.	Oil or cutting chips are adhered.	Improve the use environment and replace the drive unit.	○	○
		Oil or cutting chips are not adhered. The cable may be broken.	Replace the drive unit.		

Alarm No. 46	Motor overheat Thermal protection function of the motor or in the detector, has started its operation.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the repeatability.	The alarm occurs before operation.	Check the investigation item No. 2.	○	○
		The alarm occurs occasionally after operation is started.	Check the investigation item No. 5.		
2	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 3.		
3	Turn the power OFF, and check the detector cable connection with a tester. (Is the cable shielded?)	The connection is faulty.	Replace the cable.	○	○
		The connection is normal.	Check the investigation item No. 4.		
4	When using MDS-B-HR, check if the motor is validated even if a motor thermal is not provided?	SV034/bit2 = 0	Set SP034/bit2 to 1.	○	
		SV034/bit2 = 1	Check the investigation item No. 5.		
5	Check the overload % (servo) or load meter (spindle).	The load is large.	Servo : Check the investigation item No. 6. Spindle : Check the investigation item No. 8.	○	○
		The load is not large.	Check the investigation item No. 9.		
6	Is the unbalance torque high?	The constant load torque (friction + unbalance) is 60% or more.	Select the motor so that the constant load torque is 60% or less.	○	
		The constant load torque is less than 60%.	Check the investigation item No. 7.		
7	Was the overload alarm (50) forcibly reset by turning the drive unit power OFF?	The alarm was forcibly reset.	Do not turn the drive unit's power OFF when an overload alarm occurs. (The NC power can be turned OFF.)	○	○
		The alarm was not forcibly reset.	Check the investigation item No. 9.		
8	Check the parameter settings.	The parameter is not set correctly.	Correctly set.		○
		The parameter is set correctly.	Check the investigation item No. 9.		
9	Measure the motor temperature when the alarm occurs.	The motor is hot.	Check the investigation item No. 10.	○	○
		The motor is not hot.	Check the investigation item No. 12.		
10	When using a motor with fan, check whether the fan is stopped, or it is clogged with dust, etc.	The motor fan was stopped.	Check the investigation item No. 11.	○	○
		The motor fan wind flow is poor.	Clean the fan.		
11	Check the fan wiring.	There is no problem.	Check the investigation item No. 12.	○	○
		The cable is broken.	Replace the cable.		
		The cable is not broken.	Replace the fan.		
12	Replace the drive unit or motor with another drive unit or motor, and check whether the fault is on the drive unit side or motor side	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the motor side.	Replace the motor.		
13	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 48	Motor side detector: Error 5 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 49	Motor side detector: Error 6 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 4A	Motor side detector: Error 7 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 4B	Motor side detector: Error 8 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 4E	NC command mode error The mode outside the specification was input in spindle control mode selection.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the wiring and setting environment. 1) Correctly grounded? 2) Any noise generating devices around the unit? 3) Are the speed/position detector cables correctly shielded?	1) The grounding is incomplete.	Correctly ground.		○
		2) The alarm occurs easily when a specific device operates.	Use noise measures on the device described on the left.		
		3) The cable is not correctly shielded.	Correctly shield the cable.		
		No abnormality is found in particular.	Replace the drive unit.		

Alarm No. 50	Overload 1 Overload detection level became over 100%. The motor or the drive unit is overloaded.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the overload parameters. Servo : SV021, SV022 Spindle : SP063, SP064	The standard values (below) are not set. Servo : SV021 = 60, SV022 = 150 Spindle : SV063 = 60, SP064 = 110	Set the standard values.	○	○
		The standard values are set.	Investigate item 2.		
2	Check the overload % (servo) or load meter (spindle).	The load is large.	Servo : Investigate item 3. Spindle : Investigate item 7.	○	○
		The load is not large.	Investigate item 9.		
3	Check whether machine resonance is occurring.	Resonance is occurring.	Adjust the parameters. • Set the notch filter. • Lower VGN1 (SV005).	○	
		Resonance is not occurring.	Investigate item 4.		
4	Check whether the shaft sways when the motor is stopped. (Hunting)	The motor is hunting.	Adjust the parameters. • Increase VGN1 (SV005). • Lower VIA (SV008).	○	
		The motor is not hunting.	Investigate item 5.		
5	Check the brake operation. • Check the brake relay. • Check the connector (CN20) connection.	The motor brakes are not released.	Correct the faulty section.	○	
		The motor brake operation is normal.	Investigate item 6.		
6	Check the load current with the NC Servo Monitor, and investigate the machine load.	The cutting load is large.	Lower the cutting load.	○	
		There is interference with the positioning pin.	When using the positioning pin, turn the servo OFF when stopped.		
		An excessive force is applied from the machine.	Check whether the ball screw is bent, or whether there is a fault in the guide.		
		The machine load is not large.	Investigate item 8.		
7	Check the PLG output waveform.	There is a problem.	Adjust the PLG output waveform.		○
		Normal	Investigate item 8.		
8	Confirm the motor capacity selection again.	The motor performance is insufficient.	Lower the acceleration/deceleration rate or cutting load.	○	○
		The motor performance is sufficient.	Investigate item 9.		
9	Try replacing the drive unit.	Improved.	Replace the drive unit.	○	○
		Not improved.	Replace the motor.		

(Note) NR and PR resetting are not possible when the overload level is 50% or more. Do not forcibly reset (AR) by turning the unit power OFF. If AR resetting is used at 50% or higher, the level is set to 80% when the power is turned ON next. (Servo)

Alarm No. 51	**Overload 2** Current command of more than 95% of the unit's max. current was being continuously given for longer than 1 second in a servo system. In a spindle system, current command of more than 95% of the motor's max. current was being continuously given for longer than 1 second.

	Investigation details	Investigation results	Remedies	SV	SP
1	Did the alarm occur immediately after READY ON?	The alarm occurred after ready ON before operation starts.	Investigate item 2.	○	
		The alarm occurred after normal operation.	Investigate item 5.		
2	Check that the PN voltage is supplied to the drive unit. • Is the CHARGE lamp ON?	The voltage is not supplied.	Correctly supply the PN voltage.	○	
		Approx. 300V is correctly supplied.	Investigate item 3.		
3	Check the motor power cable (U, V, W phases). • The power cable is not connected. • Is the cable connected to the motor for another axis?	The connections are incorrect.	Connect correctly.	○	
		The connections are correct.	Investigate item 4.		
4	Check the detector cable connection. • Is the cable connected to the motor for another axis?	The connections are incorrect.	Connect correctly.	○	
		The connections are correct.	Investigate item 5.		
5	Check whether the machine has collided.	The machine has collided.	Check the machining program and soft limit settings.	○	
		The machine has not collided.	Investigate item 6.		
6	Check whether the current value on the NC Servo Monitor screen is saturated during acceleration/deceleration.	The current is saturated during acceleration/deceleration.	Increase the acceleration/ deceleration time constant.	○	
		The current value during acceleration/deceleration is appropriate.	Investigate item 7.		
7	Check the detector FB.	The FB signal is abnormal.	Replace the detector. (With the absolute position system, the zero point must be established.)	○	
		The FB signal is normal.	Replace the drive unit.		
8	Check the load meter value.	The load is large.	Lower the load.		○
		The load is not large.	Investigate item 9.		
9	Check the PLG output waveform.	There is a problem.	Adjust the PLG output waveform.		○
		Normal	Replace the drive unit.		

Alarm No. 52	**Excessive error 1** A difference between the actual and theoretical motor positions during servo ON exceeded the setting value.

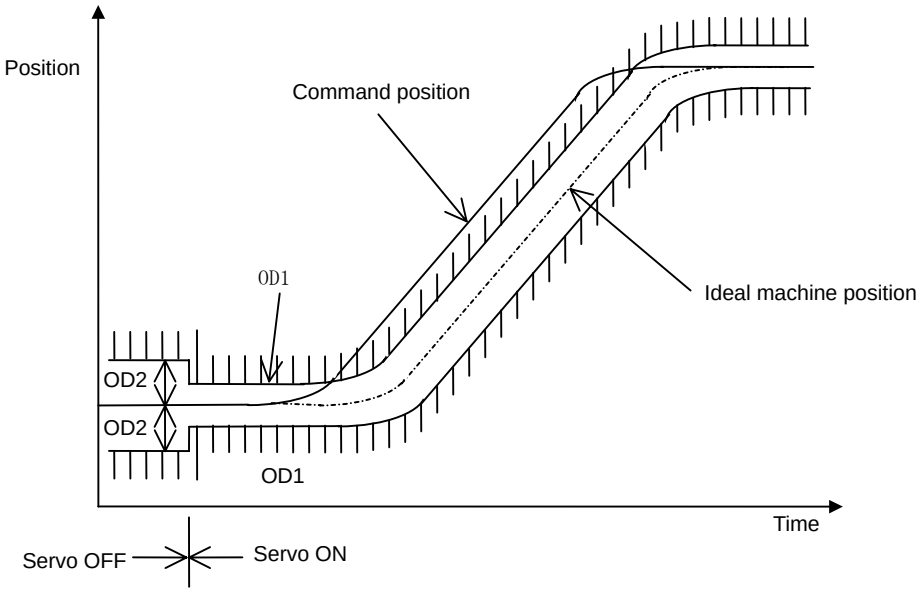
	Investigation details	Investigation results	Remedies	SV	SP
1	Check the excessive error detection width. SV023 (Servo) SP102 (Orientation control) SP154, SP155 (C-axis control) SP177/bitD, SP186 (Spindle synchronous control) SP193/bitD, SP218 (Synchronous tap)	The excessive error detection width is too small. Servo standard value: $SV023 = \frac{RAPID}{60 \times PGN1} \div 2$ For the spindle, a value larger than the droop amount: Droop amount = $\frac{\text{Spindle rotation speed} \times \text{No. of pulses}}{60 \times \text{position loop gain}}$	Set appropriate values.	○	○
		Appropriate values are set.	Investigate item 2.		
2	Check the position detector polarity. SV017/bit4 (Servo) SP097/bit5 (Orientation control) SP129/bit5 (C-axis control) SP177/bit5 (Spindle synchronous control) SP193/bit5 (Synchronous tap control)	The polarity is reversed.	Correctly set the parameters.	○	○
		Normal.	Investigate item 3.		
3	Check the alarm No. "51" items.			○	○

Alarm No. 53	Excessive error 2 A difference between the actual and theoretical motor positions during servo OFF exceeded the setting value.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the follow-up function while the NC is in the servo OFF state.	The axis detachment function (NC parameter) is invalid. (Note) For the axis detachment function, refer to the NC manual.	Check the investigation item No. 2.	○	
		The axis detachment function (NC parameter) is valid. (Note) For the axis detachment function, refer to the NC manual.	Check the investigation item No. 3.		
2	Check whether the axis has moved during servo OFF, and check the motor brake operation.	The axis has moved.	Adjust the brakes, etc. so that the axis does not move.	○	
		The axis has not moved.	Check the investigation item No. 3.		
3	Check the excessive error detection width. SV026 (Servo)	The excessive error detection width is too small. $SV026 = \frac{RAPID}{60 \times PGN1} \div 2$	Set an appropriate value.	○	
		An appropriate value is set.	Check for problems on the NC side, such as the position FB follow-up control.		

Alarm No. 54	Excessive error 3 When an excessive error 1 occurred, detection of the motor current failed.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check that the PN voltage is supplied to the drive unit. • Is the CHARGE lamp ON?	The voltage is not supplied.	Correctly supply the PN voltage.	○	
		Approx. 300V is correctly supplied.	Investigate item 2.		
2	Check the motor power cable (U, V, W phases). • The power cable is not connected. • Is the cable connected to the motor for another axis?	The connections are incorrect.	Connect correctly.	○	
		The connections are correct.	Replace the drive unit.		

Supplement (servo)

Depending on the ideal machine position in respect to the command position, the actual machine position could enter the actual shaded section shown below, which is separated more than the distance set in OD1.



Alarm No. 58	Collision detection 1: G0 When collision detection function was valid, the disturbance torque in rapid traverse (G0) exceeded the collision detection level.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the machine has collided.	The machine has collided.	Check the machining program and soft limit settings.	○	
		The machine has not collided.	Increase the detection level (SV060). (The detection level should be set as 1.5-times the maximum torque or more.)		

Alarm No. 59	Collision detection 1: G1 When collision detection function was valid, the disturbance torque in cutting feed (G1) exceeded the collision detection level.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the machine has collided.	The machine has collided.	Check the machining program and soft limit settings.	○	
		The machine has not collided.	Increase the detection level (SV035. clG1). (Set the detection level larger than the maximum cutting load.)		

Alarm No. 5A	Collision detection 2 When collision detection function was valid, the command torque reached the max. motor torque.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the machine has collided.	The machine has collided.	Check the machining program and soft limit settings.	○	
		The machine has not collided.	Check the investigation item No. 2.		
2	Check whether the current value on the NC Servo Monitor screen is saturated during acceleration/deceleration.	The current is saturated during acceleration/deceleration.	Check the investigation item No. 3.	○	
		The current value during acceleration/deceleration is appropriate.	Investigate the cause of the load fluctuation.		
3	Can the acceleration/deceleration time constant be changed?	The constant can be changed.	Increase the acceleration/ deceleration time constant.	○	
		The constant cannot be changed.	Set to ignore collision detection method 2.		

Alarm No. 5B	Safety observation: Commanded speed error In safety monitoring mode, the commanded speed was detected to exceed the safe speed.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the commanded speed on the NC side.	The commanded speed and safe speed limit value are the same.	Reduce the commanded speed on the NC side or increase the safe speed limit value.	○	○
		The commanded speed is slower than the safe speed.	Replace the drive unit.		

Alarm No. 5D	Safety observation: Door state error In safety monitoring mode, the door state signal from the NC and the same signal from the drive unit don't match. Otherwise, door open state was detected in normal mode.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the DI input timing.	Both NC side and drive unit side input timings match one another within 500ms.	Review the DI input sequence. Check if the cable for the DI input signal is broken.	○	○
		NC side and drive unit side inputs do not match one another within 500ms.	Investigate the wiring and connection environment.		

Alarm No. 5E	Safety observation: Feedback speed error In safety monitoring mode, the motor speed was detected to exceed the safe speed.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the DI input timing.	The feedback speed and safe speed limit value are the same.	Reduce the commanded speed on the NC side or increase the safe speed limit value.	○	○
		The feedback speed is slower than the safe speed.	Replace the drive unit.		
2	Check the wiring and setting environment. 1) Correctly grounded? 2) Any noise generating devices around the unit? 3) Are the speed/position detector cables correctly shielded?	1) The grounding is incomplete.	Correctly ground.	○	○
		2) The alarm occurs easily when a specific device operates.	Use noise measures on the device described on the left.		
		3) The cable is not correctly shielded.	Correctly shield the cable.		
		No abnormality is found in particular.	Replace the drive unit.		

Alarm No. 61	Power supply: Power module overcurrent Overcurrent protection function in the power module has started its operation.

	Investigation details	Investigation results	Remedies	CV
1	Check the state of the operation when the alarm occurs, and check the repeatability.	The alarm occurs each time immediately after 200VAC is supplied or after READY is turned ON.	Replace the unit.	○
		The alarm occurs frequently during READY ON.	Check the investigation item No. 3.	
		The alarm occurs after continuous operation for a long time. The unit is hot.	Check the investigation item No. 2.	
2	Check the load state of all motors, and the starting/stopping frequency.	The total load of all motors exceeds the rated capacity of the power supply unit.	Lower the motor load and operation frequency.	○
		The total does not exceed the capacity.	Check the investigation item No. 3.	
3	Check the power capacity.	The power capacity is insufficient.	Increase the power capacity.	○
		The specified power capacity is secured.	Check the investigation item No. 4.	
4	Measure the voltage across wires. • Is the voltage 170V or more even when the motor is accelerating?	The voltage drops to 170V or less occasionally.	Increase the power capacity.	○
		The difference of the voltage across wires is 10V or more.	Improve the power phase balance.	
		The difference of the voltage across wires is less than 10V.	Check the investigation item No. 5.	
5	Measure the power voltage with a synchroscope, and check whether there is any distortion. • Are there any other devices causing the power distortion?	The power voltage is distorted.	Improve the source of the distortion. Install an AC reactor.	○
		The power voltage waveform is not abnormal.	Check the investigation item No. 6.	
6	Check if there is any abnormality in the unit's ambient environment. (Ex. Noise, grounding, etc.)	Take remedies according to the causes of the abnormality in the ambient environment.		○

Alarm No. 62	Power supply: Frequency error The input power supply frequency increased above the specification range.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the state of the operation when the alarm occurs, and check the repeatability.	The alarm occurs each time immediately after the power is turned ON. Or, the alarm occurs occasionally regardless of the operation state.	Check the investigation item No. 2.	○
		The alarm occurs only while the motor is accelerating/decelerating.	Check the investigation item No. 3.	
2	Measure the power voltage waveform during normal operation.	The frequency is deviated from 50Hz±3% or 60Hz±3%.	Review the power facilities.	○
		The voltage waveform dips at some sections.	Improve the source of the distortion. Install an AC reactor.	
		There is no problem.	Check the investigation item No. 4.	
3	Measure the power voltage when the motor is accelerating/decelerating.	The frequency greatly fluctuates during acceleration/deceleration.	Review the power facilities.	○
		The voltage waveform during deceleration dips in some sections.	Improve the source of the distortion. Install an AC reactor.	
		There is no problem.	Check the investigation item No. 4.	
4	Check if there is any abnormality in the unit's ambient environment. (Ex. Noise, grounding, etc.)	Take remedies according to the causes of the abnormality in the ambient environment.		○

Alarm No. 67	Power supply: Phase interruption An open-phase condition was detected in input power supply circuit.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the voltage for each input phase.	There are phases with no voltage.	Correct the power supply.	○
		There is no problem.	Check the investigation item No. 2.	
2	Check the alarm No. "71" items.			○

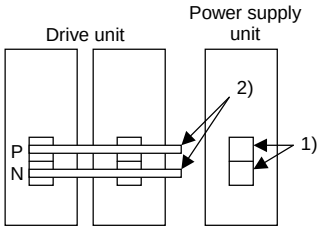
Alarm No. 68	Power supply: Watchdog The system does not operate correctly.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the repeatability.	The alarm occurs each time READY is turned ON.	Replace the unit.	○
		The alarm occurs occasionally.	Check the investigation item No. 2.	
2	Check if there is any abnormality in the unit's ambient environment. (Ex. Noise, grounding, etc.)	Take remedies according to the causes of the abnormality in the ambient environment.		○

Alarm No. 69	Power supply: Grounding The motor power cable is in contact with FG (Frame Ground).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Measure the insulation across the power cables (U,V,W) for all motors and the ground. (Carry out a megger test.)	Less than 100kΩ. (Grounding)	The motor or power cable may be ground faulted.	○	○
		100kΩ or more. (Normal)	Check the investigation item No. 2.		
2	Has oil come in contact with the motor or power cable?	Oil has come in contact.	Take measures so that oil does not come in contact. Check the motor's cannon connector and the inside of the terminal box, and clean as necessary.	○	○
		Oil has not come in contact.	Check the investigation item No. 3.		
3	Measure the insulation again.	Less than 1MΩ. (Grounding)	Replace the motor or cable.	○	○
		1MΩ or more. (Normal)	Check the investigation item No. 2.		
4	Measure the resistance across the U, V, W phase terminals of the servo/spindle drive unit and the ground. (Do not measure the insulation as the unit could be damaged.)	Less than 100kΩ.	Replace the drive unit.	○	○
		100kΩ or more.	Replace the power supply unit.		
5	Check whether there is any axis in which alarm has occurred.	There is an axis in which alarm has occurred.	Check the alarm No. "24" items.	○	○
		There is no axis in which alarm has occurred.	Check the investigation item No. 2.		

Alarm No. 6A	Power supply: External contactor welding A contact of the external contactor is welding.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check whether any alarm has occurred on the drive unit side.	An alarm has occurred.	Remove the cause of the alarm on the drive side, and check the investigation item No. 2.	○
		An alarm has not occurred.	Check the investigation item No. 2.	
2	Check whether the contactor's contact has melted.	The contactor has melted.	Replace the contactor.	○
		The contactor has not melted.	Check the investigation item No. 3.	
3	Check that the contactor excitation wiring is correctly connected from the power supply unit's MC1 terminal.	The connection is correct.	Correctly connect.	○
		The connection is incorrect.	Replace the power supply unit.	

Alarm No. 6B	Power supply: Rush relay welding A resistor relay for rush short circuit fails to be OFF.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check whether any alarm has occurred on the drive unit side.	An alarm has occurred.	Remove the cause of the alarm on the drive side, and then carry out the investigation details 2.	○
		An alarm has not occurred.	Check the investigation item No. 2.	
2	Check the repeatability.	The alarm occurs each time READY is turned ON.	Replace the unit.	○
		The alarm occurs occasionally.	Check the investigation item No. 3.	
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Noise, grounding, etc.)	Take remedies according to the causes of the abnormality in the ambient environment.		○

Alarm No. 6C	Power supply: Main circuit error An error was detected in charging operation of the main circuit capacitor.

	Investigation details	Investigation results	Remedies	CV
1	Check the CHARGE lamp state when the alarm occurs.	The CHARGE lamp remains ON for some time.	Replace the power supply unit.	○
		The lamp turns ON instantly, but when the alarm occurs and the contactor turns OFF, the lamp turns OFF immediately.	Check the investigation item No. 2.	
		The lamp never turns ON.	Check the investigation item No. 2. Then replace the unit.	
2	Disconnect the power supply unit's PN terminal block wiring, and measure the resistance value at 1) and 2) shown below. 	1) The power supply unit side is abnormal.	Replace the power supply unit.	○
		2) The drive unit side is abnormal.	Disconnect the PN wiring, and then check the drive unit side.	
		1) and 2) are both normal.	Replace the power supply unit.	

Tester measurement point	Polarity +	Polarity -	Normal	Abnormal
1)	P	N	Several 100Ω	Short-circuit/∞Ω
	N	P	∞Ω	Several 100Ω
2)	P	N	Several 100Ω	Short-circuit/∞Ω
	N	P	∞Ω	Several 100Ω

Alarm No. 6E	Power supply: Memory error/AD error An error was detected in the internal memory or A/D converter.

	Investigation details	Investigation results	Remedies	CV
1	Check the repeatability.	The alarm occurs each time READY is turned ON.	Replace the unit.	○
		The alarm occurs occasionally.	Check the investigation item No. 2.	
2	Check if there is any abnormality in the unit's ambient environment. (Ex. Noise, grounding, etc.)	Take remedies according to the causes of the abnormality in the ambient environment.		○

Alarm No. 6F	Power supply error No power supply is connected to the drive unit, or a communication error was detected.

	Investigation details	Investigation results	Remedies	CV
1	Check the LED display on the power supply unit.	"F" is flickering.	An A/D converter error has occurred. Check the alarm No. "6E" items.	○
		Another alarm code is flickering.	Check items of each alarm No.	
		"0" is displayed.	Check the investigation item No. 2.	
		"F" is displayed.	Check the investigation item No. 2.	
		"8" is displayed.	Check the alarm No. "68" items.	
		"b", "C", "d" is displayed.	Check the investigation item No. 3.	
		Something else is displayed.	Check the alarm No. "68" items.	
2	Check the rotary switch setting.	0 or 4 is set.	Check the investigation item No. 3.	○
		A value other than the above is set.	Correctly set the rotary switch.	
3	Check the communication cable (CN4) connected with the drive unit.	There is a problem with the wiring or shield.	Replace the cable.	○
		There is no problem.	Replace the unit.	

(Note) Alarm 6F is detected at the same time other power supply alarms occur.

Alarm No. 70	Power supply: External emergency stop error A mismatch of the external emergency stop input and CNC emergency stop input continued for 30 seconds.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the connection between external emergency stop and NC emergency stop.	Not wired.	Correctly wire the external emergency stop and NC emergency stop.	○
2	Check if there is any abnormality in the unit's ambient environment.	No abnormality is found in particular.	Replace the drive unit.	○
		The grounding is incomplete.	Take remedies according to the causes of the abnormality. Additionally ground and review.	

Alarm No. 71	Power supply: Instantaneous power interruption The power was momentarily interrupted.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Investigate the sequence to check whether the contactor has been turned OFF with an emergency stop button, etc.	The contactor has been turned OFF externally.	Review the machine sequence. When turning the contactor OFF with external means, such as an emergency stop button, this alarm can be avoided by inputting NC emergency stop at the same time.	○
		The contactor has not been turned OFF.	Check the investigation item No. 2.	
2	Check the repeatability.	The alarm occurs each time READY is turned ON.	Check the investigation item No. 3.	○
		The alarm occurs at a certain operation.	Check the investigation item No. 1. If there is no problem, check the investigation item No. 3.	
		The alarm occurs occasionally during operation.	Check the investigation item No. 4.	
3	Check whether the power input wire and contactor are correctly wired.	The wiring is incorrect.	Correctly connect.	○
		There is no problem.	Check the investigation item No. 4.	
4	Check the power voltage waveform with a synchroscope.	An instantaneous power failure or voltage drop occurs frequently.	Correct the power facility.	○
		There is no problem.	Replace the unit.	

Alarm No. 72	Power supply: Fan stop A cooling fan built in the power supply unit stopped, and overheat occurred in the power module.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Turn the unit power ON again, and confirm the rotation of the fan. Note) Assure more than 10 seconds for the time from when the power is turned OFF till when it is turned ON. For the fan used for the drive unit, assuring more than 10 seconds for the time from when the power is turned OFF till when it is turned ON is required.	The fan is rotating, and an alarm did not occur again.	Continue to use. The power may be turned ON without assuring more than 10 seconds for the time from when the power is turned OFF till when it is turned ON. Leave for more than 10 seconds, and turn the power ON again.	○
		The fan did not rotate. Or, an alarm occurred again.	Check the investigation item No. 2.	
1	Check if the connector connected to a fan is disconnected.	The connector is disconnected.	Correctly connect the connector.	○
		The connector is not disconnected.	Check the investigation item No. 3.	
2	Check if oil or cutting chips are adhered to the fan.	Oil or cutting chips are adhered.	Improve the use environment and replace the drive unit.	○
		Oil or cutting chips are not adhered. The cable may be broken.	Replace the drive unit.	

Alarm No. 73	Power supply: Over regeneration Over-regeneration detection level became over 100%. The regenerative resistor is overloaded. This alarm cannot be reset for 15 min from the occurrence. Leave the drive system energized for more than 15 min, then turn the power ON to reset the alarm.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the alarm occurrence state and regenerative load displayed on the NC Monitor screen while changing the operation mode.	The regenerative load value increases when the power is turned ON and the motor is not rotated.	Check whether the state is affected by power fluctuation, grounding or noise. If there is no problem, replace the unit.	○
		The regenerative load value increases each time the motor decelerates, and the alarm occurs.	A-CR : Check the investigation item No. 2. C1-CV : Check the investigation item No. 4.	
		The regenerative load value increases each time the motor decelerates, but the alarm does not occur when the operation mode is eased.	A-CR : Check the investigation item No. 2. C1-CV : Ease the operation mode.	
2	Check whether the parameter (regenerative resistor type) of the drive unit controlling the power supply unit is correct.	The setting is incorrect.	Correctly set. (Check the alarm No. "6D" items.)	○
		The setting is correct.	Check the investigation item No. 3.	
3	Check the regenerative resistor's state. • Is oil adhered? • Measure the resistance value.	The regenerative resistor is abnormal.	Replace the regenerative resistor.	○
		There is no problem.	Check the investigation item No. 4.	
4	Check the alarm No. "75" items.			○

Alarm No. 75	Power supply: Overvoltage L+ and L- bus voltage in main circuit exceeded the allowable value. As the voltage between L+ and L- is high immediately after this alarm, another alarm may occur if this alarm is reset in a short time. Wait more than 5 min before resetting so that the voltage drops.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the repeatability.	The alarm occurs each time the motor decelerates.	Check the investigation item No. 3.	○
		The alarm occurs occasionally.	Check the investigation item No. 2.	
2	Check the power supply's alarm history.	Auxiliary regeneration frequency over (E8) occurs just before the over-voltage occurs.	Limit the occurrence of the excessive instantaneous regeneration by not decelerating multiple axes at the same time.	○
		Others.	Check the investigation item No. 3.	
3	Check the power capacity.	The power capacity is insufficient.	Increase the power capacity.	○
		The specified power capacity is secured.	Check the investigation item No. 4.	
4	Measure the voltage across wires. • Is the voltage 170V or more even when the motor is accelerating?	The voltage drops to 170V or less occasionally.	Increase the power capacity.	○
		The difference of the voltage across wires is 10V or more.	Improve the power phase balance.	
		The difference of the voltage across wires is less than 10V.	Check the investigation item No. 5.	
5	Measure the power voltage with a synchroscope, and check whether there is any distortion. • Are there any other devices causing the power distortion?	The power voltage is distorted.	Improve the source of the distortion. Install an AC reactor.	○
		The power voltage waveform is not abnormal.	Check the investigation item No. 6.	
6	Check if there is any abnormality in the unit's ambient environment. (Ex. Noise, grounding, etc.)	Take remedies according to the causes of the abnormality in the ambient environment.		○

Alarm No. 76	Power supply: External emergency stop setting error The rotary switch setting of external emergency stop is not correct, or a wrong external emergency stop signal is input.

	Investigation details	Investigation results	Remedies	CV
1	Check the rotary switch setting.	When using external emergency stop, rotary switch is not set to "4".	Set the rotary switch to "4".	○
2	Check if there is any abnormality in the unit's ambient environment.	No abnormality is found in particular.	Replace the drive unit.	○
		The grounding is incomplete.	Take remedies according to the causes of the abnormality. Additionally ground and review.	

Alarm No. 77	Power supply: Power module overheat Thermal protection function in the power module has started its operation.

	Investigation details	Investigation results	Remedies	CV
1	Confirm that the fan is properly rotating.	Large amounts of cutting oil or cutting chips, etc., are adhered, or the rotation is slow.	Clean or replace the fan.	○
		The fan is properly rotating.	Check the investigation item No. 2.	
2	Check whether the heat dissipating fins are dirty.	Cutting oil or cutting chips, etc., are adhered, and the fins are clogged.	Clean the fins.	○
		The fins are normal.	Check the investigation item No. 3.	
3	Measure the power supply unit's ambient temperature.	55°C or more	Improve the ventilation and cooling for the power distribution panel.	○
		Less than 55°C.	Check the investigation item No. 4.	
4	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○

Alarm No. 88	Watchdog The system does not operate correctly.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check whether the servo or spindle software version was changed recently.	The version was changed.	Change software version back to the original.	○	○
		The version was not changed.	Check the investigation item No. 2.		
2	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 3.		
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

9.1.3.3 Troubleshooting for each warning No.

Warning No. 9E	**Absolute position detector: Revolution counter error** An error was detected in the revolution counter of the absolute position detector. The absolute position data cannot be compensated.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	
2	Check the repeatability.	Occurs frequently.	Replace the detector.	○	○
		Is not repeated.	Check the investigation item No. 1.		

Warning No. 9F	**Battery voltage drop** The battery voltage that is supplied to the absolute position detector dropped. The absolute position data is retained.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Measure the battery (MDS-A-BT) voltage.	Less than 3V.	Replace the battery unit.	○	
		3V or more.	Check the investigation item No. 2.		
2	Check whether the NC bus cable is disconnected.	The cable is disconnected.	Correctly connect.	○	
		The cable is not disconnected.	Check the investigation item No. 3.		
3	Check whether the battery wire in the detector cable is broken.	The cable is broken.	Replace the cable.	○	
		The cable is not broken.	Check the investigation item No. 4.		
4	Replace the drive unit.	Improved.	Replace the drive unit.	○	
		Not improved.	Replace the detector. (With the absolute position system, the zero point must be established.)		

(Note) When warning 9F occurs, do not turn the drive unit power OFF to ensure that the absolute position data is held. Replace the battery with the drive unit power ON.

Warning No. A6	**Fan stop warning** A cooling fan built in the drive unit stopped.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "45" items.			○	○

Warning No. E1	**Overload warning** Overload detection level exceeded 80%.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if the motor is hot.	Motor is hot.	Check the alarm No. "50" items.		○
		Motor is not hot.	Check the investigation item No. 2.		
2	Check if an error occurs when executing acceleration/deceleration operation.	Error is not found in operation. Thus, operation is possible.	Ease the operation patter, if possible. If no alarm occurs, operation can be continued as it is.		○
		Error is found in operation.	Check the investigation item 3 or later of Alarm No. 50.		
3	Check the alarm No. "50" items.			○	○

Warning No. E4	**Set parameter warning** An incorrect parameter was detected among the parameters received from the CNC.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the error parameter No.	SV001 to SV256 SP001 to SP256	Set the value within the designated setting range.	○	○
2	Check the spindle control input 4/bit 0 to 2.	Selected other than 000, 001, 010 and 100 when the alarm occurred.	Correctly select.		○

Warning No. E6	**Control axis detachment warning** Control axis detachment was commanded.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	The status in which removal of the control axis was commanded from the NC is indicated.			○	

Warning No. E7	In NC emergency stop state Emergency stop was input from the CNC.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if the emergency stop is applied on the NC side.	The emergency stop is applied.	Check the investigation item No. 2.	○	○
		The emergency stop is cancelled.	Check the investigation item No. 3.		
2	Cancel the emergency stop.	Normally starts up.	Normal.	○	○
		"E7" remains displayed.	Check the investigation item No. 3.		
3	Check whether an alarm is occurring in another drive unit.	An alarm is occurring in another drive unit.	Reset the alarm in the other drive unit.	○	○
		An alarm is not occurring.	Check the investigation item No. 4.		
4	Turn the power of NC and 200VAC (400V) ON again			○	○

Warning No. E9	Instantaneous power interruption warning The power was momentarily interrupted.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the alarm No. "71" items.			○

Warning No. EA	In external emergency stop state External emergency stop signal was input.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check whether the specifications allow use of the external emergency stop.	Use is not allowed.	Invalidate the external emergency stop.	○
		Use is allowed.	Check the investigation item No. 2.	
2	Measure the input voltage of the CN23 connector. (While emergency stop is cancelled.)	24V is input.	Replace the power supply unit.	○
		24V is not input.	Check whether the external emergency stop cable is broken, or check the external contact operation.	

Warning No. EB	Power supply: Over regeneration warning Over-regeneration detection level exceeded 80%.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the alarm No. "73" items.			○

Warning No. EE	Power supply: Fan stop warning A cooling fan built in the power supply unit stopped.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the alarm No. "72" items.			○

9.1.3.4 Parameter numbers during initial parameter error

If an initial parameter error (alarm 37) occurs, the alarm and the No. of the parameter set exceeding the setting range will appear on the NC Diagnosis screen as shown below.

S02 Initial parameter error ○○○○ □

○○○○: Error parameter No.
□ : Axis name

If an error No. larger than the servo parameter No. is displayed for the servo drive unit (MDS-D/DH-V1/V2), the alarm is occurring for several related parameters. Refer to the following table, and correctly set the parameters.

Error parameter No.	Details	Related parameters
2301	The following settings are overflowing. • Electronic gears • Position loop gain • Speed feedback	SV001, SV002 SV003, SV018 SV019, SV020 SV049
2302	The absolute position parameter is valid when OSE104 and OSE105 are connected.	SV017, SV025

9.1.3.5 Troubleshooting the spindle system when there is no alarm or warning

If an abnormality is observed in the spindle system but no alarm or warning has occurred, refer to the following table and check the state.

[1] The rotation speed command and actual rotation speed do not match.

	Investigation item	Investigation results	Remedies
1	Check the speed command.	The speed command is not input correctly.	Input the correct speed command.
		The speed command is correct.	Check the investigation item No. 2.
2	Check whether there is slipping between the motor and spindle. (When connected with a belt or clutch.)	There is slipping.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 3.
3	Check the spindle parameters (SP026, SP129 and following).	The correct values are not set.	Set the correct values.
		The correct values are set.	Replace the spindle drive unit.

[2] The starting time is long or has increased in length.

	Investigation item	Investigation results	Remedies
1	Check whether the friction torque has increased.	The friction torque has increased.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 2.
2	Manually rotate the motor bearings and check the movement.	The bearings do not rotate smoothly.	Replace the spindle motor.
		The bearings rotate smoothly.	Check the investigation item No. 3.
3	Check whether the torque limit signal has been input.	The signal has been input.	Do not input this signal.
		The signal is not input.	Replace the drive unit.

[3] The motor stops during cutting.

	Investigation item	Investigation results	Remedies
1	Check the load rate during cutting.	The load meter sways over 120% during cutting.	Reduce the load.
		No particular problems found.	Check the investigation item No. 2.
2	Carry out the same investigations and remedies as section (4).		

[4] The vibration and noise (gear noise), etc., are large.

	Investigation item	Investigation results	Remedies
1	Check the machine's dynamic balance. (Coast from the maximum speed.)	The same noise is heard during coasting.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 2.
2	Check whether there is a resonance point in the machine. (Coast from the maximum speed.)	Vibration and noise increase at a set rotation speed during coasting.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 3.
3	Check the machine's backlash.	The backlash is great.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 4.
4	Check the spindle parameter settings. (SP005:VGN1, SP006:VIA1, SP007:VIL1, SP008:VGN2, SP009:VIA2, SP010:VIL2, SP014:PY1)	The vibration and noise levels will increase when the setting value is set to approx. half.	Change the setting value. Note that the impact response will drop.
		The symptoms do not change even if the above value is set.	Return the setting values to the original values. Check the investigation item No. 5.
5	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly connect the connector.
		The connector is not disconnected (or loose).	Check the investigation item No. 6.
6	Turn the power OFF, and check the connection of the speed detector cable with a tester.	The connection is faulty or disconnected.	Replace the detector cable. Correct the connection.
		The connection is normal.	Replace the drive unit.

[5] The spindle coasts during deceleration.

	Investigation item	Investigation results	Remedies
1	Check whether there is slipping between the motor and spindle. (When connected with a belt or clutch.)	There is slipping.	Repair the machine side.
		No particular problems found.	Replace the drive unit.

[6] The rotation does not stabilize.

	Investigation item	Investigation results	Remedies
1	Check the spindle parameter SP005 (SP008) settings.	The rotation stabilizes when the settings values are both set to approx. double.	Change the setting value. Note that the gear noise may increase.
		The symptoms do not change even when the above value is set.	Return the setting values to the original values. Check the investigation item No. 2.
2	Manually shake the speed detector connectors (spindle drive unit side and speed detector side) to check if they are disconnected.	The connector is disconnected (or loose).	Correctly connect the connector.
		The connector is not disconnected (or loose).	Check the investigation item No. 3.
3	Turn the power OFF, and check the connection of the speed detector cable with a tester. (Especially check the shield wiring.)	The connection is faulty or disconnected.	Replace the detector cable. Correct the connection.
		The connection is normal.	Check the investigation item No. 4.
4	Investigate the wiring and installation environment. 1) Is the ground correctly connected? 2) Are there any noise-generating devices near the drive unit?	1) The grounding is incomplete.	Correctly ground.
		2) The alarm occurs easily when a specific device operates.	Use noise measures on the device described on the left.
		No particular problems found.	Replace the spindle drive unit.

[7] The speed does not rise above a set level.

	Investigation item	Investigation results	Remedies
1	Check the speed command. Check whether the override input is input from the machine operation panel.	The speed command is not input correctly.	Input the correct speed command.
		The speed command is input correctly.	Check the investigation item No. 2.
2	Check whether the load has suddenly become heavier.	The load has become heavier.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 3.
3	Manually rotate the motor bearings and check the movement.	The bearings do not rotate smoothly.	Replace the spindle motor.
		The bearings rotate smoothly.	Check the investigation item No. 4.
4	Manually shake the speed detector connectors (spindle drive unit side and speed detector side) to check if they are disconnected.	The connector is disconnected (or loose).	Correctly connect the connector.
		The connector is not disconnected (or loose).	Check the investigation item No. 5.
5	Turn the power OFF, and check the connection of the speed detector cable with a tester. (Especially check the shield wiring.)	The connection is faulty or disconnected.	Replace the detector cable. Correct the connection.
		The waveform is normal.	Replace the spindle drive unit.

9.2 MDS-D-SVJ3/SPJ3 Series

9.2.1 Points of caution and confirmation

If an error occurs in the servo drive unit or spindle drive unit, the warning or alarm will occur. When a warning or alarm occurs, check the state while observing the following points, and inspect or remedy the unit according to the details given in this section.

<Points of confirmation>

[1] What is the alarm code display?
[2] Can the error or trouble be repeated? (Check alarm history)
[3] Is the motor and servo drive unit temperature and ambient temperature normal?
[4] Are the servo drive unit, control unit and motor grounded?
[5] Was the unit accelerating, decelerating or running at a set speed? What was the speed?
[6] Is there any difference during forward and backward run?
[7] Was there a momentary power failure?
[8] Did the trouble occur during a specific operation or command?
[9] At what frequency does the trouble occur?
[10] Is a load applied or removed?
[11] Has the drive unit been replaced, parts replaced or emergency measures taken?
[12] How many years has the unit been operating?
[13] Is the power supply voltage normal? Does the state change greatly according to the time band?

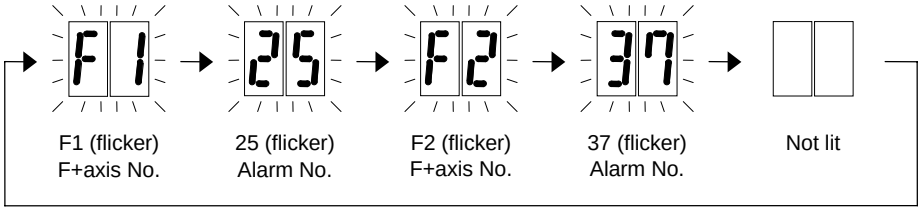
⚠ CAUTION

1. This drive unit uses a large capacity electrolytic capacitor. When the CHARGE lamp on the front of the unit is lit, voltage is still present . Do not touch the terminal block in this state.
2. Before replacing the unit, etc., always confirm that there is no voltage with a tester or wait at least 15 minutes after turning the main power OFF.
3. The conductivity in the unit cannot be checked.
4. Never carry out a megger test on the drive unit as the unit could be damaged.

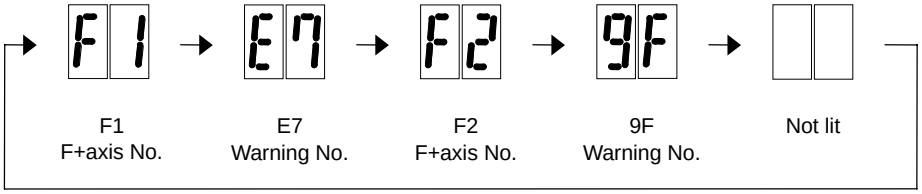
9.2.1.1 LED display when alarm or warning occurs

(1) Servo and spindle drive unit

The axis No. and alarm/warning No. alternate on the display. The display flickers when an alarm occurs.

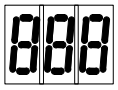


LED display during servo alarm or spindle alarm



LED display during servo warning or spindle warning

When the watchdog alarm of alarm No. "88" occurs, "888" is lit as follows.



Display during watchdog alarm

Numbers displayed on LED

No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
LED display																

9.2.2 Protective functions list of units

9.2.2.1 List of alarms

When an alarm occurs, the servo drive unit will make the motor stop by the deceleration control or dynamic brake. The spindle drive unit will coast to a stop or will decelerate to a stop. At the same time, the alarm No. will appear on the NC monitor screen and with the LEDs on the front of the drive unit. Check the alarm No., and remove the cause of the alarm by following this list.

Drive unit alarm

No.	Alarm name	SV	SP	Alarm details	Reset
10	Insufficient voltage	●	●	Insufficient bus voltage was detected in main circuit.	PR
11	Axis selection error	■	■	Setting of the axis No. selection switch is incorrect.	AR
12	Memory error 1	■	■	A CPU error or an internal memory error was detected during the power ON self-check.	AR
13	Software processing error 1	●	●	Software processing has not finished within the specified time.	PR
16	Magnetic pole position detection error	●	●	An error was detected in the magnetic pole detection for controlling the motor.	PR
17	A/D converter error	●	●	An error was detected in the A/D converter for detecting current FB.	PR
18	Motor side detector: Initial communication error	■	■	Initial communication with the motor side detector failed.	PR
1A	Machine side detector: Initial communication error	■		Initial communication with the linear scale or the ball screw side detector failed.	PR
1B	Machine side detector: Error 1	●		The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).	PR
1C	Machine side detector: Error 2	●			PR
1D	Machine side detector: Error 3	●			PR
1E	Machine side detector: Error 4	●			PR
1F	Machine side detector: Communication error	●		An error was detected in communication data with the linear scale or the ball screw side detector. Or the communication was interrupted.	PR

(Note 1) Motor stopping method applied when self-axis drive unit alarm occurs is indicated in SV for servo and in SP for spindle.
(Note 2) Servo (SV) alarm stopping method …○: Deceleration control (when SV048, SV055 or SV056 is set), ●: Dynamic brake stop, ■: Initial error (while motor is stopped)
(Note 3) Spindle (SP) alarm stopping method…○: Deceleration control (when SP038/bit0=1 is set), ●: Coast to a stop, ■: Initial error (while motor is stopped)

Resetting methods

NR : Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR : Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions.
When the control axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR : Reset by turning the servo drive unit power ON again.

Drive unit alarm

No.	Alarm name	SV	SP	Alarm details	Reset
21	Machine side detector: No signal	●	/	When an excessive error alarm occurred, no signal from the machine side detector was detected.	PR
23	Excessive speed error	/	●	A difference between the speed command and speed feedback was continuously exceeding 50 r/min for longer than the setting time.	NR
24	Grounding	■	■	The motor power cable is in contact with FG (Frame Ground).	PR
25	Absolute position data lost	■	/	The absolute position was lost, as the backup battery voltage dropped in the absolute position detector.	AR
26	Unused axis error	●	●	A power module error occurred in the axis whose axis No. selection switch was set to "F"(free axis).	PR
27	Machine side detector: Error 5	●	/	The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).	PR
28	Machine side detector: Error 6	●	/		PR
29	Machine side detector: Error 7	●	/		PR
2A	Machine side detector: Error 8	●	/		PR
2B	Motor side detector: Error 1	●	●	The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).	PR
2C	Motor side detector: Error 2	●	●		PR
2D	Motor side detector: Error 3	●	●		PR
2E	Motor side detector: Error 4	●	●		PR
2F	Motor side detector: Communication error	●	●	An error was detected in communication data with the motor side detector or with the linear scale of a linear servo system. Or the communication was interrupted.	PR
30	Over-regeneration	●	●	The over-regeneration level exceeded 100%. The regenerative resistor is in the overload state.	PR
31	Overspeed	○	○	The motor was detected to rotate at a speed exceeding the allowable speed. (In the case of linear motor, it was detected to move at a speed exceeding the allowable speed.)	PR
32	Power module overcurrent	●	●	Overcurrent protection function in the power module has started its operation.	PR
33	Overvoltage	●	●	The main circuit bus voltage exceeded the tolerable value.	PR
34	NC-DRV communication: CRC error	○	○	An error was detected in the data received from the CNC.	PR
35	NC command error	○	○	The travel command data that was received from the CNC was excessive.	PR
36	NC-DRV communication: Communication error	○	○	The communication with the CNC was interrupted.	PR
37	Initial parameter error	■	■	An incorrect parameter was detected among the parameters received from the CNC at the power ON.	PR
38	NC-DRV communication: Protocol error 1	○	○	An error was detected in the communication frames received from the CNC.	PR
39	NC-DRV communication: Protocol error 2	○	○	An error was detected in the axis information data received from the CNC.	PR
3A	Overcurrent	●	●	Excessive current was detected in the motor drive current.	PR
3B	Power module overheat	●	●	Thermal protection function in the power module has started its operation.	PR
3C	Regeneration circuit error	●	●	An error was detected in the regenerative transistor or in the regenerative resistor.	PR

(Note 1) Motor stopping method applied when self-axis drive unit alarm occurs is indicated in SV for servo and in SP for spindle.
(Note 2) Servo (SV) alarm stopping method
○: Deceleration control (when SV048, SV055 or SV056 is set)
●: Dynamic brake stop
■: Initial error (while motor is stopped)
(Note 3) Spindle (SP) alarm stopping method
○: Deceleration control (when SP055 or SP056 is set)
●: Coast to a stop
■: Initial error (while motor is stopped)

Resetting methods

NR : Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR : Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions.
When the control axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR : Reset by turning the servo drive unit power ON again.

Drive unit alarm

No.	Alarm name	SV	SP	Alarm details	Reset
42	Feedback error 1	●	●	An error was detected in the feedback signals of the position detector in a servo system, or in PLG's feedback signals in a spindle system.	PR
43	Feedback error 2	●	/	Excessive difference was detected in position data between the motor side detector and the machine side detector in a servo system. In a spindle system, an error was detected in the encoder feedback signals.	PR
45	Fan stop	○	○	A cooling fan built in the drive unit stopped, and overheat occurred in the power module.	PR
46	Motor overheat	○	○	Thermal protection function of the motor or in the detector, has started its operation.	NR
48	Motor side detector: Error 5	●	●	The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).	PR
49	Motor side detector: Error 6	●	●		PR
4A	Motor side detector: Error 7	●	●		PR
4B	Motor side detector: Error 8	●	●		PR
4E	NC command mode error	/	○	The mode outside the specification was input in spindle control mode selection.	NR
4F	Instantaneous power interruption	○	○	The control power was shut OFF for 50ms or more.	NR
50	Overload 1	○	○	Overload detection level became over 100%. The motor or the drive unit is overloaded.	NR
51	Overload 2	○	○	Current command of more than 95% of the unit's max. current was being continuously given for longer than 1 second in a servo system. In a spindle system, current command of more than 95% of the motor's max. current was being continuously given for longer than 1 second.	NR
52	Excessive error 1	○	○	A difference between the actual and theoretical motor positions during servo ON exceeded the setting value.	NR
53	Excessive error 2	●	/	A difference between the actual and theoretical motor positions during servo OFF exceeded the setting value.	NR
58	Collision detection 1: G0	○	/	When collision detection function was valid, the disturbance torque in rapid traverse (G0) exceeded the collision detection level.	NR
59	Collision detection 1: G1	○	/	When collision detection function was valid, the disturbance torque in cutting feed (G1) exceeded the collision detection level.	NR
5A	Collision detection 2	○	/	When collision detection function was valid, the command torque reached the max. motor torque.	NR
5F	External contactor error	○	○	A contact of the external contactor is welding.	NR
88	Watchdog	●	●	The system does not operate correctly.	AR

(Note 1) Motor stopping method applied when self-axis drive unit alarm occurs is indicated in SV for servo and in SP for spindle.
(Note 2) Servo (SV) alarm stopping method
○: Deceleration control (when SV048, SV055 or SV056 is set)
●: Dynamic brake stop
■: Initial error (while motor is stopped)
(Note 3) Spindle (SP) alarm stopping method
○: Deceleration control (when SP055 or SP056 is set)
●: Coast to a stop
■: Initial error (while motor is stopped)

Resetting methods

NR : Reset with the NC RESET button. This alarm can also be reset with the PR and AR resetting conditions.
PR : Reset by turning the NC power ON again. This alarm can also be reset with the AR resetting conditions.
When the control axis is removed, this alarm can be reset with the NC RESET button. (Excluding alarms 32 and 37.)
AR : Reset by turning the servo drive unit power ON again.

9.2.2.2 List of warnings

When a warning occurs, a warning No. will appear on the NC monitor screen and with the LEDs on the front of the drive unit. Check the warning No., and remove the cause of the warning by following this list.

Drive unit warnings

No.	Alarm name	Warning details	Reset
9E	Absolute position detector: Revolution counter error	An error was detected in the revolution counter of the absolute position detector. The absolute position data cannot be compensated.	*
9F	Battery voltage drop	The battery voltage that is supplied to the absolute position detector dropped. The absolute position data is retained.	*
A6	Fan stop warning	A cooling fan built in the drive unit stopped.	*
E0	Over regeneration warning	Over-regeneration detection level exceeded 80%.	*
E1	Overload warning	Overload detection level exceeded 80%.	*
E4	Set parameter warning	An incorrect parameter was detected among the parameters received from the CNC.	*
E6	Control axis detachment warning	Control axis detachment was commanded.	*
E7	In NC emergency stop state	Emergency stop was input from the CNC.	*
E9	Instantaneous power interruption warning	The control power was shut OFF for 25ms or more.	*
EA	In external emergency stop state	External emergency stop signal was input.	*

(Note 1) Servo and spindle motor do not stop when the warning occurs.
(Note 2) When an emergency stop is input, servo and spindle motor decelerate to a stop.
(When SV048, SV055 or SV056 is set for servo and when SP055 or SP056 is set for spindle.)

Resetting methods

* : Automatically reset once the cause of the warning is removed.
NR : Reset with the NC RESET button. This warning can also be reset with the PR and AR resetting conditions.
PR : Reset by turning the NC power ON again. This warning can also be reset with the AR resetting conditions.
When the control axis is removed, this warning can be reset with the NC RESET button. (Excluding warning 93.)

Separate table (1)

Alarm number when motor is connected		2B	2C	2D	2E	48	49	4A	4B
Alarm number when machine is connected		1B	1C	1D	1E	27	28	29	2A
Detector type	OSA18	CPU error	—	Data error	—	—	—	—	—
	OSA105	CPU error	LED error	Data error	—	—	—	—	—
	MDS-B-HR	CPU error	—	Data error	—	Connection error	—	—	—
Meaning of data		A CPU initial error was detected.	Deterioration of the LED was detected.	An error was detected in the data.		An error was detected in the connection with the analog output linear scale.			

Alarm number when motor is connected		2B	2C	2D	2E	48	49	4A	4B
Alarm number when spindle is connected		1B	1C	1D	1E	27	28	29	2A
Detector type	TS5690	Initialization error	Waveform error	—	—	—	Overspeed	—	Relative position data error
	TS5691	Initialization error	Waveform error	—	—	—	Overspeed	—	Relative position data error
Meaning of data		An initialization error was detected when the power was turned ON.	An error was detected in the A, B, Z analog signal waveform.				The tolerable rotation speed was exceeded.		An error was detected in the relative position data.

Alarm number when machine is connected		1B	1C	1D	1E	27	28	29	2A
Detector type	**Manufacturer name**								
AT342	**Mitsutoyo**	Initialization error	EEPROM error	Photo-electric type, static capacity data mismatch	ROM/RAM error	CPU error	Photo-electric type overspeed	Static capacity type error	Photo-electric type error
AT343	**Mitsutoyo**	Initialization error	EEPROM error	Photo-electric type, static capacity data mismatch	ROM/RAM error	CPU error	Photo-electric type overspeed	Static capacity type error	Photo-electric type error
AT543	**Mitsutoyo**	Initialization error	EEPROM error	Photo-electric type, static capacity data mismatch	ROM/RAM error	CPU error	Photo-electric type overspeed	Static capacity type error	Photo-electric type error
LC191M	**Heidenhain**	Initialization error	EEPROM error	Relative/ absolute position data mismatch	ROM/RAM error	CPU error	Overspeed	Absolute position data error	Relative position data error
LC491M	**Heidenhain**	Initialization error	EEPROM error	Relative/ absolute position data mismatch	ROM/RAM error	CPU error	Overspeed	Absolute position data error	Relative position data error
RCN723	**Heidenhain**	Initialization error	EEPROM error	Relative/ absolute position data mismatch	ROM/RAM error	CPU error	Overspeed	Absolute position data error	Relative position data error
RCN223	**Heidenhain**	Initialization error	EEPROM error	Relative/ absolute position data mismatch	ROM/RAM error	CPU error	Overspeed	Absolute position data error	Relative position data error
MJ831	**Sony**	–	–	–	–	–	–	–	Encoder error
ADB-20J60	**Mitsubishi Heavy Industries**	Installation accuracy fault	–	Detection position deviance	Scale breaking	–	–	Gain fault	Phase fault
FMD	**Futaba Denshi Kogyo**	–	–	–	–	–	–	Waveform error	Overspeed or phase division signal decision error
ERM280	**Heidenhain**	Initialization error	EEPROM error	–	–	CPU error	Overspeed	–	Relative position data error

9.2.3 Troubleshooting

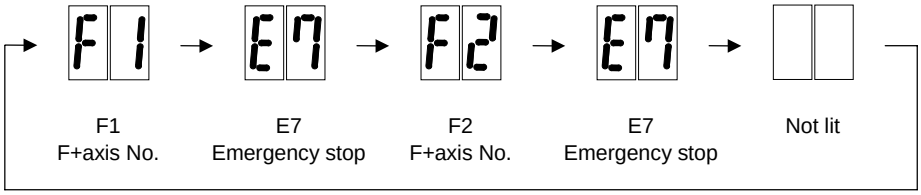
Follow this section to troubleshoot the alarms that occur during start up or while the machine is operating. If the state is not improved with the following investigations, the drive unit may be faulty. Exchange the unit with another unit of the same capacity, and check whether the state is improved.

9.2.3.1 Troubleshooting at power ON

If the NC system does not start up correctly and a system error occurs when the NC power is turned ON, the drive unit may not have been started up properly. Check the LED display on the drive unit, and take measures according to this section.

LED display	Symptom	Cause of occurrence	Investigation method	Remedy
AA	Initial communication with the CNC was not completed correctly.	The drive unit axis No. setting is incorrect.	Is there any other drive unit that has the same axis No. set?	Set correctly.
		The CNC setting is incorrect.	Is the No. of CNC controlled axes correct?	Set correctly.
		Communication with CNC is incorrect.	Is the connector (CN1A, CN1B) connected?	Connect correctly.
			Is the cable broken?	Replace the cable.
Ab	Initial communication with the CNC was not carried out.	The axis is not used, the setting is for use inhibiting.	Is the DIP switch set correctly?	Set correctly.
		Communication with CNC is incorrect.	Is the connector (CN1A, CN1B) connected?	Connect correctly.
			Is the cable broken?	Replace the cable.
12	An error was detected in the unit's memory and IC during the self-diagnosis at power ON.	The CPU peripheral circuit is abnormal.	Check the repeatability.	Replace the unit.
			Check whether there is any abnormality with the unit's surrounding environment, etc.	Improve the surrounding environment.

The drive unit has started up normally if the following type of emergency stop (E7) is displayed on the display unit's LED display.



Normal drive unit LED display at NC power ON (for 1st axis)

9.2.3.2 Troubleshooting for each alarm No.

Alarm No. 10	Insufficient voltage Insufficient bus voltage was detected in main circuit.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the timing when the alarm occurs.	The moment of READY ON	Check the investigation item No. 2.	○	○
		During operation	Review the power supply capacity.		
2	Did the external contactor turn ON at the READY ON?	The external contactor did not turn ON.	Check the investigation item No. 3.	○	○
		The external contactor turned ON, but the alarm occurred immediately.	Check the investigation item No. 4.		
3	Check the wiring of contactor excitation circuit.	The wiring is correct.	Replace the contactor.	○	○
		The wiring is not correct.	Rewire.		
4	Check the input voltage of the drive unit. (Voltage between L1 and L2, L2 and L3, L1 and L3)	The input voltage is normal.	Replace the drive unit.	○	○
		The input voltage is abnormal.	Review the power supply capacity.		

Alarm No. 11	Axis selection error Setting of the axis No. selection switch is incorrect.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the setting of the axis selection switch (rotary switch) on the top of the unit.	The same axis No. is set for the L and M axes.	Correctly set the axis No. 0 = No. 1 axis, 1 = No. 2 axis, ...	○	○
		The value is duplicated with other axis.	Correctly set the axis No. 0 = No. 1 axis, 1 = No. 2 axis, ...		
		No abnormality is found in particular.	Replace the drive unit.		

Alarm No. 12	Memory error 1 A CPU error or an internal memory error was detected during the power ON self-check.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the servo or spindle software version was changed recently.	The version was changed.	There is a possibility that the spindle software was downloaded into servo, or the servo software was downloaded into spindle. Download servo/spindle software again.	○	○
		The version was not changed.	Check the investigation item No. 2.		
2	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 3.		
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 13	Software processing error 1 Software processing has not finished within the specified time.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the servo or spindle software version was changed recently.	The version was changed.	Change software version back to the original.	○	○
		The version was not changed.	Check the investigation item No. 2.		
2	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 3.		
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 16	Magnetic pole position detection error An error was detected in the magnetic pole detection for controlling the motor.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the parameters.	The parameters specified with the adjustment are not set.	Replace the drive unit.		○
		Correct parameters are set.	Check the investigation item No. 2.		
2	Check the repeatability.	The error is always repeated.	Replace the drive unit.		○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 3.		
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.			○

Alarm No. 17	A/D converter error An error was detected in the A/D converter for detecting current FB.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 2.		
2	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 18	Motor side detector: Initial communication error Initial communication with the motor side detector failed.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the servo parameter (SV025.ent) setting value. OSE104: 0, OSA104: 1 Are all others set to 2? (Excluding slave axis for synchronous control)	The value is not set correctly.	Correctly set SV025.		○
		The value is set correctly.	Check the investigation item No. 2.		
2	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 3.		
3	Turn the power OFF, and check the detector cable connection with a tester.	The connection is faulty.	Replace the detector cable.	○	○
		The connection is normal.	Check the investigation item No. 4.		
4	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the detector side.	Check the investigation item No. 5.		
5	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 1A	Machine side detector: Initial communication error Initial communication with the linear scale or the ball screw side detector failed.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the servo parameter (SV025.pen) setting value. Are the serial communication type detector parameters set for the pulse type detector?	The value is not set correctly.	Correctly set SV025.	○	
		The value is set correctly.	Check the investigation item No. 2.		
2	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	
		The connector is not disconnected.	Check the investigation item No. 3.		
3	Turn the power OFF, and check the detector cable connection with a tester.	The connection is faulty.	Replace the detector cable.	○	
		The connection is normal.	Check the investigation item No. 4.		
4	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	
		The alarm is on the detector side.	Check the investigation item No. 5.		
5	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	

Alarm No. 1B	Machine side detector: Error 1 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the servo axis has moved and the spindle has rotated when an alarm occurred.	The axis has operated.	Check the investigation item No. 3.	○	○
		The axis has not operated.	Check the investigation item No. 2.		
2	Check whether the operation at low speed is normal.	The operation is normal.	Check the investigation item No. 3.	○	○
		The operation is not normal.	Check the cautions at power ON. • Wiring check • Parameter check		
3	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 4.		
4	Turn the power OFF, and check the detector cable connection with a tester.	The connection is faulty.	Replace the detector cable.	○	○
		The connection is normal.	Check the investigation item No. 5.		
5	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the detector side.	Check the investigation item No. 6.		
6	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 1C	Machine side detector: Error 2 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 1D	Machine side detector: Error 3 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 1E	Machine side detector: Error 4 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 1F	Machine side detector: Communication error An error was detected in communication data with the linear scale or the ball screw side detector. Or the communication was interrupted.

	Investigation details	Investigation results	Remedies	SV	SP
1	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	
		The connector is not disconnected.	Check the investigation item No. 2.		
2	Is the detector cable wired in the same conduit as the motor's power cable, or are the two cables laid in parallel near each other?	The cables are wired near each other. (Noise is entering from the power cable.)	Improve the cable wiring.	○	
		The wires are sufficiently separated.	Check the investigation item No. 3.		
3	Is the motor FG wire connected only to the drive unit which drives it? (Is the motor grounded to one point?)	The motor FG wire is grounded on the motor side.	Ground the motor to one point, connecting the wires together on the drive unit side.	○	
		The motor is grounded to one point.	Check the investigation item No. 4.		
4	Turn the power OFF, and check the detector cable connection with a tester. (Is the cable shielded?)	The connection is faulty.	Replace the detector cable.	○	
		The connection is normal.	Check the investigation item No. 5.		
5	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	
		The alarm is on the detector side.	Check the investigation item No. 6.		
6	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	

Alarm No. 21	Machine side detector: No signal When an excessive error alarm occurred, no signal from the machine side detector was detected.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the servo parameter (SV025. pen) setting value. Are the pulse type detector parameters set for a serial communication type detector?	The value is not set correctly.	Correctly set SV025.	○	
		The value is set correctly.	Check the investigation item No. 3.		
2	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	
		The connector is not disconnected.	Check the investigation item No. 4.		
3	Turn the power OFF, and check the detector cable connection with a tester.	The connection is faulty.	Replace the detector cable.	○	
		The connection is normal.	Check the investigation item No. 5.		
4	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	
		The alarm is on the detector side.	Check the investigation item No. 6.		
5	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	

Alarm No. 23	Excessive speed error A difference between the speed command and speed feedback was continuously exceeding 50 r/min for longer than the setting time.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the U, V and W wiring between the spindle drive unit and spindle motor.	The wires are not correctly connected.	Correctly connect.		○
		The wires are correctly connected.	Check the investigation item No. 2.		
2	Check the spindle parameter (SP017, SP018, SP019, SP020, SP117 and SP129 or later) setting value.	The correct values are not set.	Correctly set.		○
		The correct values are set.	Check the investigation item No. 3.		
3	Measure the acceleration/ deceleration time up to the point where the spindle speed reaches its maximum. If the alarm occurs when forward run is changed to reverse run, measure the acceleration/ deceleration time from the forward run's maximum speed to reverse run's maximum speed.	12sec or more.	Increase the spindle acceleration/deceleration time constant setting value.		○
		Less than 12sec.	Check the investigation item No. 4.		
4	Check the load amount when the alarm occurred during cutting.	Load amount is 120% or more.	Reduce the load.		○
		Load amount is less than 120%.	Check the investigation item No. 5.		
5	Check the fluctuation of the input voltage into the power supply unit.	Voltage drop during acceleration does not satisfy the motor voltage.	Review the power supply capacity.		○
		Voltage drop during acceleration satisfies the motor voltage.	Check the investigation item No.6.		
6	Check the capacity of the drive unit.	The capacity does not satisfy the motor output.	Increase the capacity.		○
		The capacity satisfies the motor output.	Replace the unit.		

Alarm No. 24	Grounding The motor power cable is in contact with FG (Frame Ground).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Measure the insulation across the power cables (U,V,W) for connected motors and the ground. (Carry out a megger test.)	Less than 100kΩ.	The motor or power cable may be ground faulted.	○	○
		100kΩ or more.	Check the investigation item No. 2.		
2	Has oil come in contact with the motor or power cable?	Oil has come in contact.	Take measures so that oil does not come in contact. Check the motor's cannon connector and the inside of the terminal box, and clean as necessary.	○	○
		Oil has not come in contact.	Check the investigation item No. 3.		
3	Measure the insulation again.	Less than 1MΩ.	Replace the motor or cable.	○	○
		1MΩ or more.	Check the investigation item No. 2.		
4	Measure the resistance across the U, V, W phase terminals of the servo/spindle drive unit and the ground. (Do not measure the insulation as the unit could be damaged.)	Less than 100kΩ.	Replace the drive unit.	○	○
		100kΩ or more.	Replace the power supply unit.		

Alarm No. 25	Absolute position data lost The absolute position was lost, as the backup battery voltage dropped in the absolute position detector.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Is warning 9F occurring at the same time?	The warning is occurring.	Check the investigation item No. 2.	○	
		The warning is not occurring.	Check the investigation item No. 3.		
2	Measure the battery voltage with a tester.	Less than 3V.	Replace the battery, and establish the zero point.	○	
		3V or more.	Check the NC bus cable connection.		
3	Did alarm No.18 occur when the power was turned ON the last time?	Alarm No.18 occurred.	Turn the drive unit control power ON again, and establish the zero point.	○	
		Alarm No.18 did not occur.	Check the investigation item No. 4.		
4	Was the detector cable or battery cable left disconnected from the unit for a long time?	The unit was left disconnected for a long time. Guide at delivery : 20 hours or more After 5 years : 10 hours or more	Turn the drive unit control power ON again, and establish the zero point.	○	
		The cables were not left disconnected.	Check the investigation item No. 5.		
5	Check the detector cable or battery cable connection with a tester.	The connection is faulty.	Replace the cable.	○	
		The connection is normal.	Replace the drive unit.		

Alarm No. 26	Unused axis error A power module error occurred in the axis whose axis No. selection switch was set to "F"(free axis).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 2.		
2	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 27	Machine side detector: Error 5 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 28	Machine side detector: Error 6 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 29	Machine side detector: Error 7 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 2A	Machine side detector: Error 8 The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 2B	Motor side detector: Error 1 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 2C	Motor side detector: Error 2 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 2D	Motor side detector: Error 3 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 2E	Motor side detector: Error 4 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 2F	Motor side detector: Communication error An error was detected in communication data with the motor side detector or with the linear scale of a linear servo system. Or the communication was interrupted.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 2.		
2	Is the detector cable wired in the same conduit as the motor's power cable, or are the two cables laid in parallel near each other?	The cables are wired near each other. (Noise is entering from the power cable.)	Improve the cable wiring.	○	○
		The wires are sufficiently separated.	Check the investigation item No. 3.		
3	Is the motor FG wire connected only to the drive unit which drives it? (Is the motor grounded to one point?)	The motor FG wire is grounded on the motor side.	Ground the motor to one point, connecting the wires together on the drive unit side.	○	○
		The motor is grounded to one point.	Check the investigation item No. 4.		
4	Turn the power OFF, and check the detector cable connection with a tester. (Is the cable shielded?)	The connection is faulty.	Replace the detector cable.	○	○
		The connection is normal.	Check the investigation item No. 5.		
5	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the detector side.	Check the investigation item No. 6.		
6	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 30	Over-regeneration The over-regeneration level exceeded 100%. The regenerative resistor is in the overload state.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check again if the regenerative capacity exceeds the regenerative resistor tolerable capacity.	The regenerative capacity exceeds the regenerative resistor tolerable capacity.	Add the option regenerative resistor or replace it.	○	○
		The regenerative resistor selection is appropriate.	Check the investigation item No. 2.		
2	Check if the parameter is set incorrectly, and check the values of sv036 and sp032.	The parameters are set incorrectly.	Change the parameters.	○	○
		The parameters are correct.	Check the investigation item No. 3.		
3	Is an external regenerative resistor used?	An external regenerative resistor is used.	To the investigation item No. 5.	○	
		A built-in regenerative resistor is used.	To the investigation item No. 4.		
4	Is the short wire connected between P and D terminal? Are there any problems with the connection condition?	The wire is not connected.	Connect the wire.	○	
		The connector is disconnected. The connector has a contact fault.	Reconnect the connector. Replace the connector.		
		The connection is correct.	To the investigation item No. 6.		
5	Is the connection of the regenerative resistor or regeneration resistor cable correct?	The connection is incorrect.	Rewire.	○	○
		The connection is correct.	To the investigation item No. 6.		
6	Is the regeneration resistor or the regeneration resistor cable broken? Disconnect the regenerative resistor terminal and check the resistance value with a tester.	The regeneration resistor is broken. Or the resistance value is large.	Replace the regenerative resistor	○	○
		The regeneration resistor cable is broken.	Replace the cable.		
		The resistance value is normal.	To the investigation item No. 7.		
7	Check if the power supply voltage is too high.	The power supply voltage exceeded 253V.	Review the power supply.	○	○
		The power supply voltage is normal.	Replace the drive unit.		

Alarm No. 31	Overspeed The motor was detected to rotate at a speed exceeding the allowable speed. (In the case of linear motor, it was detected to move at a speed exceeding the allowable speed.)

	Investigation details	Investigation results	Remedies	SV	SP
1	Check if the unit in which the alarm was detected is servo or spindle.	The alarm was detected in servo.	Check the investigation item No. 2.	○	○
		The alarm was detected in spindle.	Check the investigation item No. 3.		
2	Check the servo parameters SV001 (PC1), SV002 (PC2), SV018 (PIT) and SV025 (MTYP) settings.	The settings are incorrect.	Correctly set.	○	
		Correctly set.	Check the investigation item No. 5.		
3	Check the spindle parameter SP017 (TSP) setting.	The setting is incorrect. The alarm is detected at 115% of SP017.	Correctly set.		○
		Correctly set.	Check the investigation item No. 4.		
4	Check the PLG output waveform.	There is a problem.	Adjust the PLG output waveform.	○	○
		Normal.	Check the investigation item No. 5.		
5	Check whether the speed waveform is overshooting.	The waveform is overshooting.	Increase the acceleration/ deceleration time constant.	○	○
		The waveform is not overshooting.	Check if there is any abnormality in the unit's ambient environment. (Ex.: Ambient temperature, noise, grounding)		
			Check the investigation item No. 6.		
6	Check the repeatability.	The alarm occurs when the motor is stopped.	Replace the detector or detector cable.	○	○
		The alarm occurs at all time.	Check the investigation item No. 7.		

Alarm No. 32	Power module overcurrent Overcurrent protection function in the power module has started its operation.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Disconnect the power cable (U, V, W) from the unit's terminal block and motor, and check whether a short-circuit between the power cable or whether conduction at both end of wiring occurs with a tester.	Short-circuited or not conducted.	Replace the power cables (U, V, W).	○	○
		There is no problem.	Check the investigation item No. 2.		
2	Check the motor insulation with a (megger) tester under the condition of the investigation item No. 1. (between motor power and ground earth)	Less than 1MΩ. (Grounding)	Replace the motor.	○	○
		1MΩ or more. (Normal)	Check the investigation item No. 3.		
3	Check the parameter setting values. • Refer to the adjustment procedure.	The value is not set correctly.	Correctly set.	○	○
		The value is set correctly.	Check the investigation item No. 4.		
4	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 5.		
5	Turn the power OFF, and check the detector cable connection with a tester.	Connection is faulty.	Replace the detector cable.	○	○
		Connection is normal.	Check the investigation item No. 6.		
6	Check the repeatability.	The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 8.	○	○
		The error is always repeated.	Check the investigation item No. 7.		
7	Replace with another unit, and check whether the fault is on the drive unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the detector side.	Replace the detector.		
8	Check for any abnormalities in the unit's ambient environment. (Ex.: Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 33	Overvoltage The main circuit bus voltage exceeded the tolerable value.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Is an external regenerative resistor used?	An external regenerative resistor is used.	To the investigation item No. 3.	○	
		A built-in regenerative resistor is used.	To the investigation item No. 2.		
2	Is the short wire connected between P and D terminal? Are there any problems with the connection condition?	The wire is not connected.	Connect the wire.	○	
		The connector is disconnected. The connector has a contact fault.	Reconnect the connector. Replace the connector.		
		The connection is correct.	To the investigation item No. 6.		
3	Is the combination of the used regenerative resistor and drive unit appropriate?	The combination is incorrect.	Replace the correct regenerative resistor.	○	○
		The combination is normal.	To the investigation item No. 4.		
4	Is the connection of the regenerative resistor or regeneration resistor cable correct?	The connection is incorrect.	Rewire.	○	○
		The connection is correct.	To the investigation item No. 5.		
5	Is the regeneration resistor or the regeneration resistor cable broken? Disconnect the regenerative resistor terminal and check the resistance value with a tester.	The regeneration resistor is broken. Or the resistance value is large.	Replace the regenerative resistor.	○	○
		The regeneration resistor cable is broken.	Replace the cable.		
		The resistance value is normal.	To the investigation item No. 6.		
6	The acceleration/deceleration time constant is too short. At acceleration/deceleration, has the speed overshoot reached to the current limit?	Reached to the current limit The speed overshoot is applied.	Increase the acceleration/ deceleration time constant.	○	○
		The connection is normal.	Replace the drive unit.		

Alarm No. 34	NC-DRV communication: CRC error An error was detected in the data received from the CNC.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Manually shake the connection connectors between NC and drive unit, battery unit and drive unit, or among multiple drive units to check if they are disconnected. Also, check if an excessive force is not applied on them.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 2.		
2	Turn the power OFF, and check the connection of the communication cables indicated in item 1 with a tester. Or, replace with a correct cable.	The connection is faulty.	Replace the communication cable.	○	○
		The connection is normal.	Check the investigation item No. 3.		
3	Check whether the NC or drive unit software version was changed recently.	The version was changed.	Change software version back to the original.	○	○
		The version was not changed.	Check the investigation item No. 4.		
4	Replace with another drive unit, and check whether the fault is on the NC side or drive unit side.	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the unit connections.	Check the investigation item No. 5.		
5	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 35	NC command error The travel command data that was received from the CNC was excessive.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "34" items.			○	○

Alarm No. 36	NC-DRV communication: Communication error The communication with the CNC was interrupted.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "34" items.			○	○

Alarm No. 37	Initial parameter error An incorrect parameter was detected among the parameters received from the CNC at the power ON.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if the unit in which the alarm was detected is servo or spindle.	The alarm was detected in servo.	Check the investigation item No. 2.	○	○
		The alarm was detected in spindle.	Check the investigation item No. 3.		
2	An error parameter No. is displayed on the NC diagnosis screen. Check the servo parameter with the parameter adjustment procedure.	Wrong parameters were set. SV001 to SV005	Correct the parameter. Set the value within the designated setting range.	○	
		-1 The electronic gears are overflowing.	Check SV001, SV002 and SV018.		
		-2 The absolute position detection parameter is valid when OSE104 and OSE105 are connected. (Absolute position control cannot be used.)	In order to use the absolute position control function, an absolute position option is required.		
		Correct parameters were set.	Check the investigation item No. 4.		
3	An error parameter No. is displayed on the NC diagnosis screen. Check the servo parameter with the parameter adjustment procedure.	SP001 to SP384	Set the value within the designated setting range.		○
4	Check the alarm No. "34" items.			○	○

Alarm No. 38	NC-DRV communication: Protocol error 1 An error was detected in the communication frames received from the CNC.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the alarm No. "34" items.			○	○

Alarm No. 39	NC-DRV communication: Protocol error 2 An error was detected in the axis information data received from the CNC.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the alarm No. "34" items.			○	○

Alarm No. 3A	Overcurrent Excessive current was detected in the motor drive current.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check whether vibration is occurring.	Vibration is occurring.	• Set a filter. • Lower the speed loop gain (SV005/SP005).	○	○
		There is no vibration.	Check the investigation item No. 2.		
2	The speed loop gain setting is larger than the standard value. Servo: SV005 / Spindle: SP005	The setting is too large.	Set an appropriate value.	○	○
		The setting is approximately the same as the standard value.	Check the investigation item No. 3.		
3	Check the current loop gain. Servo: SV009,SV010,SV011,SV012 Spindle: SP081,SP082,SP083,SP084	The setting is incorrect.	Set the standard value.	○	○
		The standard value is set.	Check the investigation item No. 4.		
4	Disconnect the power cable (U,V,W) from the terminal block and the cannon plug from the motor. Check the insulation with a tester.	The power cable is short-circuited.	Replace the motor power cable.	○	○
		There is no problem.	Check the investigation item No. 5.		
5	Check the insulation between the motor power cable and FG.	There is a ground fault at the power cable.	Replace the motor power cable.	○	○
		There is no problem.	Check the investigation item No. 6.		
6	Connect the cannon plug, and check the insulation between the power cable and FG.	There is a ground fault in the motor.	Replace the motor. (With the absolute position system, the zero point must be established.)	○	○
		There is no problem.	Check the investigation item No. 7.		
7	Check if there is any abnormality in the motor's ambient environment. (Ex. Ambient temperature, cutting water)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 3B	Power module overheat Thermal protection function in the power module has started its operation.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check that the fan is rotating correctly.	Large amounts of cutting oil or cutting chips, etc., are adhered, or the rotation is slow.	Clean or replace the fan.	○	○
		The fan is rotating properly.	Check the investigation item No. 2.		
2	Check whether the heat dissipating fins are dirty.	Cutting oil or cutting chips, etc., are adhered, and the fins are clogged.	Clean the fins.	○	○
		The fins are normal.	Check the investigation item No. 3.		
3	Measure the drive unit's ambient temperature.	55°C or more.	Improve the ventilation and cooling for the power distribution panel.	○	○
		Less than 55°C.	Check the investigation item No. 4.		
4	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 3C	Regeneration circuit error An error was detected in the regenerative transistor or in the regenerative resistor.

	Investigation details	Investigation results	Remedies	SV	SP
1	Is an external regenerative resistor used?	An external regenerative resistor is used.	To the investigation item No. 3.	○	
		A built-in regenerative resistor is used.	To the investigation item No. 2.		
2	Is the short wire connected between P and D terminal? Are there any problems with the connection condition?	The wire is not connected.	Connect the wire.	○	
		The connector is disconnected. The connector has a contact fault.	Reconnect the connector. Replace the connector.		
		The connection is correct.	Replace the drive unit.		
3	Is the connection of the regenerative resistor or regeneration resistor cable correct?	The connection is incorrect.	Rewire.	○	○
		The connection is correct.	To the investigation item No. 4.		
4	Is the regeneration resistor or the regeneration resistor cable broken? Disconnect the regenerative resistor terminal and check the resistance value with a tester.	The regeneration resistor is broken. Or the resistance value is large.	Replace the regenerative resistor.	○	○
		The regeneration resistor cable is broken.	Replace the cable.		
		The resistance value is normal.	Replace the drive unit.		

Alarm No. 42	Feedback error 1 An error was detected in the feedback signals of the position detector in a servo system, or in PLG's feedback signals in a spindle system.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check SP019 and SP020.	Parameter is set incorrectly.	Correctly set.		○
		Parameter is set correctly.	Check the investigation item No. 2.		
2	Check the alarm No. "2C" items.				○

Alarm No. 43	Feedback error 2 Excessive difference was detected in position data between the motor side detector and the machine side detector in a servo system. In a spindle system, an error was detected in the encoder feedback signals.

	Investigation details	Investigation results	Remedies	SV	SP
1	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	
		The connector is not disconnected.	Check the investigation item No. 2.		
2	Is the detector cable wired in the same conduit as the motor's power cable, or are the two cables laid in parallel near each other?	The cables are wired near each other. (Noise is entering from the power cable.)	Improve the cable wiring.	○	
		The wires are sufficiently separated.	Check the investigation item No. 3.		
3	Is the motor FG wire connected only to the drive unit which drives it? (Is the motor grounded to one point?)	The motor FG wire is grounded on the motor side.	Ground the motor to one point, connecting the wires together on the drive unit side.	○	
		The motor is grounded to one point.	Check the investigation item No. 4.		
4	Turn the power OFF, and check the detector cable connection with a tester. (Is the cable shielded?)	The connection is faulty.	Replace the detector cable.	○	
		The connection is normal.	Check the investigation item No. 5.		
5	Replace with another unit, and check whether the fault is on the unit side or detector side.	The alarm is on the drive unit side.	Replace the drive unit.	○	
		The alarm is on the detector side.	Check the investigation item No. 6.		
6	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	
7	Check SP019 and SP020.	Parameter is set incorrectly.	Correctly set.	○	
		Parameter is set correctly.	Check the investigation item No. 8.		
8	Check the alarm No. "1B" items.			○	

Alarm No. 45	Fan stop A cooling fan built in the drive unit stopped, and overheat occurred in the power module.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Turn the unit power ON again, and confirm the rotation of the fan. Note) Assure more than 10 seconds for the time from when the power is turned OFF till when it is turned ON. For the fan used for the drive unit, assuring more than 10 seconds for the time from when the power is turned OFF till when it is turned ON is required.	The fan is rotating, and an alarm did not occur again.	Continue to use. The power may be turned ON without assuring more than 10 seconds for the time from when the power is turned OFF till when it is turned ON. Leave for more than 10 seconds, and turn the power ON again.	○	○
		The fan did not rotate. Or, an alarm occurred again.	Check the investigation item No. 2.		
2	Check if the connector connected to a fan is disconnected.	The connector is disconnected.	Correctly connect the connector.	○	○
		The connector is not disconnected.	Check the investigation item No. 3.		
3	Check if oil or cutting chips are adhered to the fan.	Oil or cutting chips are adhered.	Improve the use environment and replace the drive unit.	○	○
		Oil or cutting chips are not adhered. The cable may be broken.	Replace the drive unit.		

Alarm No. 46	Motor overheat Thermal protection function of the motor or in the detector, has started its operation.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the repeatability.	The alarm occurs before operation.	Check the investigation item No. 2.	○	○
		The alarm occurs occasionally after operation is started.	Check the investigation item No. 5.		
2	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly install.	○	○
		The connector is not disconnected.	Check the investigation item No. 3.		
3	Turn the power OFF, and check the detector cable connection with a tester. (Is the cable shielded?)	The connection is faulty.	Replace the cable.	○	○
		The connection is normal.	Check the investigation item No. 4.		
4	When using MDS-B-HR, check if the motor is validated even if a motor thermal is not provided?	SV034/bit2 = 0	Set SP034/bit2 to 1.	○	
		SV034/bit2 = 1	Check the investigation item No. 5.		
5	Check the overload % (servo) or load meter (spindle).	The load is large.	Servo : Check the investigation item No. 6. Spindle : Check the investigation item No. 8.	○	○
		The load is not large.	Check the investigation item No. 9.		
6	Is the unbalance torque high?	The constant load torque (friction + unbalance) is 60% or more.	Select the motor so that the constant load torque is 60% or less.	○	
		The constant load torque is less than 60%.	Check the investigation item No. 7.		
7	Was the overload alarm (50) forcibly reset by turning the drive unit power OFF?	The alarm was forcibly reset.	Do not turn the drive unit's power OFF when an overload alarm occurs. (The NC power can be turned OFF.)	○	○
		The alarm was not forcibly reset.	Check the investigation item No. 9.		
8	Check the parameter settings.	The parameter is not set correctly.	Correctly set.		○
		The parameter is set correctly.	Check the investigation item No. 9.		
9	Measure the motor temperature when the alarm occurs.	The motor is hot.	Check the investigation item No. 10.	○	○
		The motor is not hot.	Check the investigation item No. 12.		
10	When using a motor with fan, check whether the fan is stopped, or it is clogged with dust, etc.	The motor fan was stopped.	Check the investigation item No. 11.	○	○
		The motor fan wind flow is poor.	Clean the fan.		
11	Check the fan wiring.	There is no problem.	Check the investigation item No. 12.	○	○
		The cable is broken.	Replace the cable.		
		The cable is not broken.	Replace the fan.		
12	Replace the drive unit or motor with another drive unit or motor, and check whether the fault is on the drive unit side or motor side	The alarm is on the drive unit side.	Replace the drive unit.	○	○
		The alarm is on the motor side.	Replace the motor.		
13	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

Alarm No. 48	Motor side detector: Error 5 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 49	Motor side detector: Error 6 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	

Alarm No. 4A	Motor side detector: Error 7 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 4B	Motor side detector: Error 8 The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "1B" items.			○	○

Alarm No. 4E	NC command mode error The mode outside the specification was input in spindle control mode selection.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the wiring and setting environment. 1) Correctly grounded? 2) Any noise generating devices around the unit? 3) Are the speed/position detector cables correctly shielded?	1) The grounding is incomplete.	Correctly ground.		○
		2) The alarm occurs easily when a specific device operates.	Use noise measures on the device described on the left.		
		3) The cable is not correctly shielded.	Correctly shield the cable.		
		No abnormality is found in particular.	Replace the drive unit.		

Alarm No. 50	Overload 1 Overload detection level became over 100%. The motor or the drive unit is overloaded.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the overload parameters. Servo : SV021, SV022 Spindle : SP063, SP064	The standard values (below) are not set. Servo : SV021 = 60, SV022 = 150 Spindle : SV063 = 60, SP064 = 110	Set the standard values.	○	○
		The standard values are set.	Investigate item 2.		
2	Check the overload % (servo) or load meter (spindle).	The load is large.	Servo : Investigate item 3. Spindle : Investigate item 7.	○	○
		The load is not large.	Investigate item 9.		
3	Check whether machine resonance is occurring.	Resonance is occurring.	Adjust the parameters. • Set the notch filter. • Lower VGN1 (SV005).	○	
		Resonance is not occurring.	Investigate item 4.		
4	Check whether the shaft sways when the motor is stopped. (Hunting)	The motor is hunting.	Adjust the parameters. • Increase VGN1 (SV005). • Lower VIA (SV008).	○	
		The motor is not hunting.	Investigate item 5.		
5	Check the brake operation. • Check the brake relay. • Check the connector (CN20) connection.	The motor brakes are not released.	Correct the faulty section.	○	
		The motor brake operation is normal.	Investigate item 6.		
6	Check the load current with the NC Servo Monitor, and investigate the machine load.	The cutting load is large.	Lower the cutting load.	○	
		There is interference with the positioning pin.	When using the positioning pin, turn the servo OFF when stopped.		
		An excessive force is applied from the machine.	Check whether the ball screw is bent, or whether there is a fault in the guide.		
		The machine load is not large.	Investigate item 8.		
7	Check the PLG output waveform.	There is a problem.	Adjust the PLG output waveform.		○
		Normal	Investigate item 8.		
8	Confirm the motor capacity selection again.	The motor performance is insufficient.	Lower the acceleration/deceleration rate or cutting load.	○	○
		The motor performance is sufficient.	Investigate item 9.		
9	Try replacing the drive unit.	Improved.	Replace the drive unit.	○	○
		Not improved.	Replace the motor.		

(Note) NR and PR resetting are not possible when the overload level is 50% or more. Do not forcibly reset (AR) by turning the unit power OFF. If AR resetting is used at 50% or higher, the level is set to 80% when the power is turned ON next. (Servo)

Alarm No. 51	**Overload 2** Current command of more than 95% of the unit's max. current was being continuously given for longer than 1 second in a servo system. In a spindle system, current command of more than 95% of the motor's max. current was being continuously given for longer than 1 second.

	Investigation details	Investigation results	Remedies	SV	SP
1	Did the alarm occur immediately after READY ON?	The alarm occurred after ready ON before operation starts.	Investigate item 2.	○	
		The alarm occurred after normal operation.	Investigate item 5.		
2	Check that the PN voltage is supplied to the drive unit. • Is the CHARGE lamp ON?	The voltage is not supplied.	Correctly supply the PN voltage.	○	
		Approx. 300V is correctly supplied.	Investigate item 3.		
3	Check the motor power cable (U, V, W phases). • The power cable is not connected. • Is the cable connected to the motor for another axis?	The connections are incorrect.	Connect correctly.	○	
		The connections are correct.	Investigate item 4.		
4	Check the detector cable connection. • Is the cable connected to the motor for another axis?	The connections are incorrect.	Connect correctly.	○	
		The connections are correct.	Investigate item 5.		
5	Check whether the machine has collided.	The machine has collided.	Check the machining program and soft limit settings.	○	
		The machine has not collided.	Investigate item 6.		
6	Check whether the current value on the NC Servo Monitor screen is saturated during acceleration/deceleration.	The current is saturated during acceleration/deceleration.	Increase the acceleration/deceleration time constant.	○	
		The current value during acceleration/deceleration is appropriate.	Investigate item 7.		
7	Check the detector FB.	The FB signal is abnormal.	Replace the detector. (With the absolute position system, the zero point must be established.)	○	
		The FB signal is normal.	Replace the drive unit.		
8	Check the load meter value.	The load is large.	Lower the load.		○
		The load is not large.	Investigate item 9.		
9	Check the PLG output waveform.	There is a problem.	Adjust the PLG output waveform.		○
		Normal	Replace the drive unit.		

Alarm No. 52	**Excessive error 1** A difference between the actual and theoretical motor positions during servo ON exceeded the setting value.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check the excessive error detection width. SV023 (Servo) SP102 (Orientation control) SP154, SP155 (C-axis control) SP177/bitD, SP186 (Spindle synchronous control) SP193/bitD, SP218 (Synchronous tap)	The excessive error detection width is too small. Servo standard value: $SV023 = \frac{RAPID}{60 \times PGN1} \div 2$ For the spindle, a value larger than the droop amount: Droop amount = $\frac{\text{Spindle rotation speed} \times \text{No. of pulses}}{60 \times \text{position loop gain}}$	Set appropriate values.	○	○
		Appropriate values are set.	Investigate item 2.		
2	Check the position detector polarity. SV017/bit4 (Servo) SP097/bit5 (Orientation control) SP129/bit5 (C-axis control) SP177/bit5 (Spindle synchronous control) SP193/bit5 (Synchronous tap control)	The polarity is reversed.	Correctly set the parameters.	○	○
		Normal.	Investigate item 3.		
3	Check the alarm No. "51" items.			○	○

Alarm No. 53	Excessive error 2 A difference between the actual and theoretical motor positions during servo OFF exceeded the setting value.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the follow-up function while the NC is in the servo OFF state.	The axis detachment function (NC parameter) is invalid. (Note) For the axis detachment function, refer to the NC manual.	Check the investigation item No. 2.	○	
		The axis detachment function (NC parameter) is valid. (Note) For the axis detachment function, refer to the NC manual.	Check the investigation item No. 3.		
2	Check whether the axis has moved during servo OFF, and check the motor brake operation.	The axis has moved.	Adjust the brakes, etc. so that the axis does not move.	○	
		The axis has not moved.	Check the investigation item No. 3.		
3	Check the excessive error detection width. SV026 (Servo)	The excessive error detection width is too small. $SV026 = \frac{RAPID}{60 \times PGN1} \div 2$	Set an appropriate value.	○	
		An appropriate value is set.	Check for problems on the NC side, such as the position FB follow-up control.		

Alarm No. 58	Collision detection 1: G0 When collision detection function was valid, the disturbance torque in rapid traverse (G0) exceeded the collision detection level.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the machine has collided.	The machine has collided.	Check the machining program and soft limit settings.	○	
		The machine has not collided.	Increase the detection level (SV060). (The detection level should be set as 1.5-times the maximum torque or more.)		

Alarm No. 59	Collision detection 1: G1 When collision detection function was valid, the disturbance torque in cutting feed (G1) exceeded the collision detection level.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the machine has collided.	The machine has collided.	Check the machining program and soft limit settings.	○	
		The machine has not collided.	Increase the detection level (SV035. clG1). (Set the detection level larger than the maximum cutting load.)		

Alarm No. 5A	Collision detection 2 When collision detection function was valid, the command torque reached the max. motor torque.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check whether the machine has collided.	The machine has collided.	Check the machining program and soft limit settings.	○	
		The machine has not collided.	Check the investigation item No. 2.		
2	Check whether the current value on the NC Servo Monitor screen is saturated during acceleration/deceleration.	The current is saturated during acceleration/deceleration.	Check the investigation item No. 3.	○	
		The current value during acceleration/deceleration is appropriate.	Investigate the cause of the load fluctuation.		
3	Can the acceleration/deceleration time constant be changed?	The constant can be changed.	Increase the acceleration/ deceleration time constant.	○	
		The constant cannot be changed.	Set to ignore collision detection method 2.		

Alarm No. 5F	External contactor error A contact of the external contactor is welding.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check whether the contactor's contact has melted.	The contactor has melted.	Replace the contactor.	○	○
		The contactor has not melted.	Check the investigation item No. 2.		
2	Check whether the axis where an alarm occurred was a contactor control axis.	The alarm occurred at the axis where the contactor control is not executed.	Set the parameter correctly.	○	○
		The alarm occurred at the axis where the contactor control is executed.	Replace the drive unit.		

Alarm No. 88	Watchdog The system does not operate correctly.

	Investigation details	Investigation results	Remedies	SV	SP
1	Check whether the servo or spindle software version was changed recently.	The version was changed.	Change software version back to the original.	○	○
		The version was not changed.	Check the investigation item No. 2.		
2	Check the repeatability.	The error is always repeated.	Replace the drive unit.	○	○
		The state returns to normal once, but occurs sometimes thereafter.	Check the investigation item No. 3.		
3	Check if there is any abnormality in the unit's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	○

9.2.3.3 Troubleshooting for each warning No.

Warning No. 9E	**Absolute position detector: Revolution counter error** An error was detected in the revolution counter of the absolute position detector. The absolute position data cannot be compensated.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if there is any abnormality in the detector's ambient environment. (Ex. Ambient temperature, noise, grounding)	Take remedies according to the causes of the abnormality in the ambient environment.		○	
2	Check the repeatability.	Occurs frequently.	Replace the detector.	○	○
		Is not repeated.	Check the investigation item No. 1.		

Warning No. 9F	**Battery voltage drop** The battery voltage that is supplied to the absolute position detector dropped. The absolute position data is retained.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Measure the battery (MDS-A-BT) voltage.	Less than 3V.	Replace the battery unit.	○	
		3V or more.	Check the investigation item No. 2.		
2	Check whether the NC bus cable is disconnected.	The cable is disconnected.	Correctly connect.	○	
		The cable is not disconnected.	Check the investigation item No. 3.		
3	Check whether the battery wire in the detector cable is broken.	The cable is broken.	Replace the cable.	○	
		The cable is not broken.	Check the investigation item No. 4.		
4	Replace the drive unit.	Improved.	Replace the drive unit.	○	
		Not improved.	Replace the detector. (With the absolute position system, the zero point must be established.)		

(Note) When warning 9F occurs, do not turn the drive unit power OFF to ensure that the absolute position data is held. Replace the battery with the drive unit power ON.

Warning No. A6	**Fan stop warning** A cooling fan built in the drive unit stopped.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the alarm No. "45" items.			○	○

Warning No. E1	**Overload warning** Overload detection level exceeded 80%.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if the motor is hot.	Motor is hot.	Check the alarm No. "50" items.		○
		Motor is not hot.	Check the investigation item No. 2.		
2	Check if an error occurs when executing acceleration/deceleration operation.	Error is not found in operation. Thus, operation is possible.	Ease the operation patter, if possible. If no alarm occurs, operation can be continued as it is.		○
		Error is found in operation.	Check the investigation item 3 or later of Alarm No. 50.		
3	Check the alarm No. "50" items.			○	○

Warning No. E4	**Set parameter warning** An incorrect parameter was detected among the parameters received from the CNC.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check the error parameter No.	SV001 to SV256 SP001 to SP256	Set the value within the designated setting range.	○	○
2	Check the spindle control input 4/bit 0 to 2.	Selected other than 000, 001, 010 and 100 when the alarm occurred.	Correctly select.		○

Warning No. E6	**Control axis detachment warning** Control axis detachment was commanded.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	The status in which removal of the control axis was commanded from the NC is indicated.			○	

Warning No. E7	In NC emergency stop state Emergency stop was input from the CNC.				
	Investigation details	**Investigation results**	**Remedies**	**SV**	**SP**
1	Check if the emergency stop is applied on the NC side.	The emergency stop is applied.	Check the investigation item No. 2.	○	○
		The emergency stop is cancelled.	Check the investigation item No. 3.		
2	Cancel the emergency stop.	Normally starts up.	Normal.	○	○
		"E7" remains displayed.	Check the investigation item No. 3.		
3	Check whether an alarm is occurring in another drive unit.	An alarm is occurring in another drive unit.	Reset the alarm in the other drive unit.	○	○
		An alarm is not occurring.	Check the investigation item No. 4.		
4	Turn the power of NC and 200VAC (400V) ON again			○	○

Warning No. E9	Instantaneous power interruption warning The power was momentarily interrupted.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check the alarm No. "71" items.			○

Warning No. EA	In external emergency stop state External emergency stop signal was input.			
	Investigation details	**Investigation results**	**Remedies**	**CV**
1	Check whether the specifications allow use of the external emergency stop.	Use is not allowed.	Invalidate the external emergency stop.	○
		Use is allowed.	Check the investigation item No. 2.	
2	Measure the input voltage of the CN23 connector. (While emergency stop is cancelled.)	24V is input.	Replace the power supply unit.	○
		24V is not input.	Check whether the external emergency stop cable is broken, or check the external contact operation.	

9.2.3.4 Parameter numbers during initial parameter error

If an initial parameter error (alarm 37) occurs, the alarm and the No. of the parameter set exceeding the setting range will appear on the NC Diagnosis screen as shown below.

S02 Initial parameter error ○○○○ □

○○○○: Error parameter No.
□ : Axis name

If an error No. larger than the servo parameter No. is displayed for the servo drive unit (MDS-D-SVJ3), the alarm is occurring for several related parameters. Refer to the following table, and correctly set the parameters.

Error parameter No.	Details	Related parameters
2301	The following settings are overflowing. • Electronic gears • Position loop gain • Speed feedback	SV001, SV002 SV003, SV018 SV019, SV020 SV049
2302	The absolute position parameter is valid when an incremental detector is connected.	SV017, SV025

9.2.3.5 Troubleshooting the spindle system when there is no alarm or warning

If an abnormality is observed in the spindle system but no alarm or warning has occurred, refer to the following table and check the state.

[1] The rotation speed command and actual rotation speed do not match.

	Investigation item	Investigation results	Remedies
1	Check the speed command.	The speed command is not input correctly.	Input the correct speed command.
		The speed command is correct.	Check the investigation item No. 2.
2	Check whether there is slipping between the motor and spindle. (When connected with a belt or clutch.)	There is slipping.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 3.
3	Check the spindle parameters (SP026, SP129 and following).	The correct values are not set.	Set the correct values.
		The correct values are set.	Replace the spindle drive unit.

[2] The starting time is long or has increased in length.

	Investigation item	Investigation results	Remedies
1	Check whether the friction torque has increased.	The friction torque has increased.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 2.
2	Manually rotate the motor bearings and check the movement.	The bearings do not rotate smoothly.	Replace the spindle motor.
		The bearings rotate smoothly.	Check the investigation item No. 3.
3	Check whether the torque limit signal has been input.	The signal has been input.	Do not input this signal.
		The signal is not input.	Replace the drive unit.

[3] The motor stops during cutting.

	Investigation item	Investigation results	Remedies
1	Check the load rate during cutting.	The load meter sways over 120% during cutting.	Reduce the load.
		No particular problems found.	Check the investigation item No. 2.
2	Carry out the same investigations and remedies as section (4).		

[4] The vibration and noise (gear noise), etc., are large.

	Investigation item	Investigation results	Remedies
1	Check the machine's dynamic balance. (Coast from the maximum speed.)	The same noise is heard during coasting.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 2.
2	Check whether there is a resonance point in the machine. (Coast from the maximum speed.)	Vibration and noise increase at a set rotation speed during coasting.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 3.
3	Check the machine's backlash.	The backlash is great.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 4.
4	Check the spindle parameter settings. (SP005:VGN1, SP006:VIA1, SP007:VIL1, SP008:VGN2, SP009:VIA2, SP010:VIL2, SP014:PY1)	The vibration and noise levels will increase when the setting value is set to approx. half.	Change the setting value. Note that the impact response will drop.
		The symptoms do not change even if the above value is set.	Return the setting values to the original values. Check the investigation item No. 5.
5	Jiggle the detector connectors (drive unit side and detector side) and check if they are disconnected.	The connector is disconnected (or loose).	Correctly connect the connector.
		The connector is not disconnected (or loose).	Check the investigation item No. 6.
6	Turn the power OFF, and check the connection of the speed detector cable with a tester.	The connection is faulty or disconnected.	Replace the detector cable. Correct the connection.
		The connection is normal.	Replace the drive unit.

[5] The spindle coasts during deceleration.

	Investigation item	Investigation results	Remedies
1	Check whether there is slipping between the motor and spindle. (When connected with a belt or clutch.)	There is slipping.	Repair the machine side.
		No particular problems found.	Replace the drive unit.

[6] The rotation does not stabilize.

	Investigation item	Investigation results	Remedies
1	Check the spindle parameter SP005 (SP008) settings.	The rotation stabilizes when the settings values are both set to approx. double.	Change the setting value. Note that the gear noise may increase.
		The symptoms do not change even when the above value is set.	Return the setting values to the original values. Check the investigation item No. 2.
2	Manually shake the speed detector connectors (spindle drive unit side and speed detector side) to check if they are disconnected.	The connector is disconnected (or loose).	Correctly connect the connector.
		The connector is not disconnected (or loose).	Check the investigation item No. 3.
3	Turn the power OFF, and check the connection of the speed detector cable with a tester. (Especially check the shield wiring.)	The connection is faulty or disconnected.	Replace the detector cable. Correct the connection.
		The connection is normal.	Check the investigation item No. 4.
4	Investigate the wiring and installation environment. 1) Is the ground correctly connected? 2) Are there any noise-generating devices near the drive unit?	1) The grounding is incomplete.	Correctly ground.
		2) The alarm occurs easily when a specific device operates.	Use noise measures on the device described on the left.
		No particular problems found.	Replace the spindle drive unit.

[7] The speed does not rise above a set level.

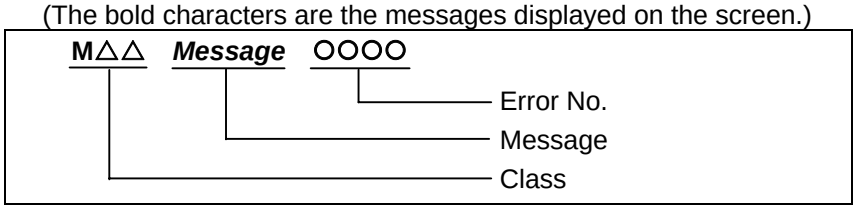
	Investigation item	Investigation results	Remedies
1	Check the speed command. Check whether the override input is input from the machine operation panel.	The speed command is not input correctly.	Input the correct speed command.
		The speed command is input correctly.	Check the investigation item No. 2.
2	Check whether the load has suddenly become heavier.	The load has become heavier.	Repair the machine side.
		No particular problems found.	Check the investigation item No. 3.
3	Manually rotate the motor bearings and check the movement.	The bearings do not rotate smoothly.	Replace the spindle motor.
		The bearings rotate smoothly.	Check the investigation item No. 4.
4	Manually shake the speed detector connectors (spindle drive unit side and speed detector side) to check if they are disconnected.	The connector is disconnected (or loose).	Correctly connect the connector.
		The connector is not disconnected (or loose).	Check the investigation item No. 5.
5	Turn the power OFF, and check the connection of the speed detector cable with a tester. (Especially check the shield wiring.)	The connection is faulty or disconnected.	Replace the detector cable. Correct the connection.
		The waveform is normal.	Replace the spindle drive unit.

10. Appendix

10.1 List of Alarms

10.1.1 Operation Alarms

(The bold characters are the messages displayed on the screen.)



(1) Class: M01 Operation error

Alarms occurring due to incorrect operation by the operator during NC operation and those by machine trouble are displayed.

Error No.	Details	Remedy
0001	**Dog overrun** When returning to the reference position, the near-point detection limit switch did not stop over the dog, but overran the dog.	• Increase the length of the near-point dog. • Reduce the reference position return speed.
0002	**Some ax does not pass Z phase** One of the axes did not pass the Z-phase during the initial reference position return after the power was turned ON.	• Move the detector one rotation or more in the opposite direction of the reference position, and repeat reference position return.
0003	**R-pnt direction illegal** When manually returning to the reference position, the return direction differs from the axis movement direction selected with the AXIS SELECTION key.	• The selection of the AXIS SELECTION key's +/- direction is incorrect. The error is canceled by feeding the axis in the correct direction.
0004	**External interlock axis exists** The external interlock function has activated (the input signal is "OFF") and one of the axes has entered the interlock state.	• As the interlock function has activated, release it before resuming operation. • Check the sequence on the machine side. • Check for broken wires in the interlock signal line.
0005	**Internal interlock axis exists** The internal interlock state has been entered. The absolute position detector axis has been removed. A command for the manual/automatic simultaneous valid axis was issued from the automatic mode.	• The servo OFF function is valid, so release it first. • An axis that can be removed has been issued, so perform the correct operations. • The command is issued in the same direction as the direction where manual skip turned ON, so perform the correct operations. • During the manual/automatic simultaneous mode, the axis commanded in the automatic mode became the manual operation axis. Turn OFF the manual/automatic valid signal for the commanded axis. • Turn ON the power again, and perform absolute position initialization.
0006	**H/W stroke end axis exists** The stroke end function has activated (the input signal is "OFF") and one of the axes is in the stroke end status.	• Move the machine manually. • Check for broken wires in the stroke end signal wire. • Check for trouble in the limit switch.

Error No.	Details	Remedy
0007	**S/W stroke end axis exists** The stored stroke limit I, II, IIB or IB function has activated.	• Move it manually. • If the stored stroke limit in the parameter is incorrectly set, correct it.
0008	**Chuck/tailstock stroke end ax** The chuck/tail-stock barrier function turned ON, and an axis entered the stroke end state.	• Reset the alarm with reset, and move the machine in the reverse direction.
0009	**Ref point return No. invalid** Return to the No. 2 reference position was performed before return to the No. 1 reference position was completed.	• Execute No. 1 reference position return.
0019	**Sensor signal illegal ON** The sensor signal was already ON when the tool measurement mode (TLM) signal was validated. The sensor signal turned ON when there was no axis movement after the tool measurement mode (TLM) signal was validated. The sensor signal turned ON at a position within 100μm from the final entry start position.	• Turn the tool measurement mode signal input OFF, and move the axis in a safe direction. • The operation alarm will turn OFF even when the sensor signal is turned OFF. **(Note)** When the tool measurement mode signal input is turned OFF, the axis can be moved in either direction. Pay attention to the movement direction.
0020	**Ref point retract invalid** Return to the reference position was performed before the coordinates had not been established.	• Execute reference position return
0021	**Tool ofs invld after R-pnt** Reference position return was performed during tool retract return, and therefore the tool compensation amount became invalid after reference position return was completed.	• The error is cleared if the operation mode is changed to other than reference position return before the axis performs reference position return. • The error is cleared when reference position return is completed. • The error is cleared if reset 1 is input or the emergency stop button is pushed.
0024	**R-pnt ret invld at abs pos alm** A zero point return signal was input during an absolute position detection alarm.	• Reset the absolute position detection alarm, and then perform zero point return.
0025	**R-pnt ret invld at zero pt ini** A zero point return signal was input during zero point initialization of the absolute position detection system.	• Complete zero point initialization, and then perform zero point return.
0030	**Now skip on** The skip signal remains input when the skip return operation changed to the measurement operation.	• Increase the skip return amount.
0031	**No skip** Even though 1st skip was to the correct position, the 2nd skip could not be found.	• Check whether the measurement target has moved.
0050	**Chopping axis R-pnt incomplete** The chopping axis has not completed zero point return before entering the chopping mode. All axes interlock will be applied.	• Reset or turn the chopping signal OFF, and then carry out zero point return.

Error No.	Details	Remedy
0051	**Synchronous error excessive** The synchronization error of the master and slave axes exceeded the allowable value under synchronous control. A deviation exceeding the synchronization error limit value was found with the synchronization deviation detection.	• Select the correction mode and move one of the axes in the direction in which the errors are reduced. • Increase the allowable value or reset it to 0 (check disabled). • When using simple C-axis synchronous control, set the contents of the R435 register to 0. • Check the parameter (#2024 synerr).
0053	**No spindle select signal** Synchronous tapping command was issued when the spindle select signals (SWS) for all spindles were OFF in the multiple-spindle control II.	• Turn ON the spindle select signal (SWS) responding to the tapping spindle before performing the synchronous tapping command.
0054	**No spindle serial connection** Synchronous tapping command was issued when the spindle that the spindle select signal (SWS) was ON was not serially connected in the multiple-spindle control II.	• Make sure the spindle select signal (SWS) for the responding spindle is ON. • When issuing a command, consider the machine construction.
0055	**Spindle fwd/rvs run para err** Asynchronous tapping command was issued when M code of the spindle frd/rvs run command set by the parameter "#3028 sprcmm" was one of the followings in the multiple-spindle control II. • One of M0, M1, M2, M30, M98, M99, M198 • M code No. that commands macro interrupt signal valid/invalid	• Change the value of the parameter #3028 sprcmm.
0056	**Tap pitch/thread number error** The command of the pitch/thread number is not correct in the synchronous tapping command of the multiple-spindle control II. The pitch is too small for the spindle rotation speed. Thread number is too large for the spindle rotation speed.	• Check the pitch/thread number and rotation speed of the tapping spindle.
0060	**Handle ratio too large** Handle ratio is too large for the rapid traverse rate (or external deceleration speed when external deceleration is valid).	• Set a smaller ratio.
0065	**R-pos offset value illegal** At the start of reference position initial setting, setting of reference position offset value (#2034 rfpofs) is other than 0.	• Set the reference position offset value (#2034 rfpofs) to 0, then turn the power ON again to perform reference position initial setting.
0066	**R-pos scan distance exceeded** Reference position could not be established within the maximum scan distance.	• Check the scale to see if it has dirt or damage. • Check if the servo drive unit supports this function.

Error No.	Details	Remedy
0101	**No operation mode**	• Check for a broken wire in the input mode signal wire. • Check for trouble in the mode selector switch. • Check the sequence program.
0102	**Cutting override zero** The "cutting feed override" switch on the machine operation panel is set to zero. The override was set to "0" during a single block stop.	• Set the "cutting feed override" switch to a value other than zero to clear the error. • When the "cutting feed override" switch is set to a value other than zero, check for a short circuit in the signal wire. • Check the sequence program.
0103	**External feed rate zero** "The manual feed speed" switch on the machine operation panel is set to zero when the machine is in the jog mode or automatic dry run mode. The "Manual feedrate B speed" is set to zero during the jog mode when manual feedrate B is valid. The "each axis manual feedrate B speed" is set to zero during the jog mode when each axis manual feedrate B is valid.	• Set "the manual feed speed" switch to a value other than zero to release the error. • If "the manual feed speed" switch is set to a value other than zero, check for a short circuit in the signal wire. • Check the sequence program.
0104	**F 1-digit feed rate zero** The F1-digit feedrate is set to zero when the F1-digit feed command is being executed.	• Set the F1-digit feedrate on the setup parameter screen.
0105	**Spindle stop** The spindle stopped during the synchronous feed command.	• Rotate the spindle. • If the workpiece is not being cut, start dry run. • Check for a broken wire in the spindle encoder cable. • Check the connections for the spindle encoder connectors. • Check the spindle encoder pulse. • Reconsider the program. (Command, address)
0106	**Handle feed ax No. illegal** An axis not found in the specifications was designated for handle feed or the handle feed axis was not selected.	• Check for broken wires in the handle feed axis selection signal wire. • Check the sequence program. • Check the No. of axes listed in the specifications.
0107	**Spindle rotation speed over** The spindle rotation speed exceeded the axis clamp speed during the thread cutting command.	• Lower the commanded spindle rotation speed.
0108	**Fixed pnt mode feed ax illegal** An axis not found in the specifications was designated for the fixed point mode feed or the fixed point mode feedrate is illegal.	• Check for broken wires in the fixed mode feed axis selection signal wire and fixed point mode feedrate wire. • Check the fixed point mode feed specifications.
0109	**Block start interlock** An interlock signal that locks the start of the block has been input.	• Check the sequence program.
0110	**Cutting block start interlock** An interlock signal that locks the start of the cutting block has been input.	• Check the sequence program.

Error No.	Details	Remedy
0111	**Restart switch ON** The restart switch was turned ON before the restart search was completed, and the manual mode was selected.	• Search the block to be restarted. • Turn OFF the restart switch.
0112	**Program check mode** The automatic start button was pressed during program check or in program check mode.	• Press the reset button to cancel the program check mode.
0113	**Auto start in buffer correct** The automatic start button was pressed during buffer correction.	• Press the automatic start button after buffer correction is completed.
0115	**In reset process** The automatic start button was pressed during resetting or tape rewinding.	• When rewinding the tape, wait for the winding to end, or press the reset button to stop the winding, and then press the automatic start button. • During resetting, wait for resetting to end, and then press the automatic start button.
0117	**Playback not possible** The playback switch was turned ON during editing.	• During editing, cancel the function by pressing the input or previous screen key, and then turn ON the playback switch.
0118	**Turn stop in normal line cntrl** The turning angle at the block joint exceeded the limit during normal line control. Normal line control type I The normal line control axis turning speed (#1523 C_feed) has not been set. Normal line control type II When turning in the inside of the arc, the parameter "#8041 C-rot. R" setting value is larger than the arc radius.	• Check the program. • Set the normal line control axis turning speed. (Parameter "#1523 C_feed") • Set the C axis turning diameter smaller than the arc radius, or check the setting value of the C axis turning diameter. (Parameter "#8041 C rot. R")
0120	**In synchronous correction mode** The synchronous correction mode switch was pressed in a non-handle mode.	• Select the handle or manual feed mode. • Turn OFF the correction mode switch.
0121	**No synchronous control option** The synchronous control system (register R2589) was set with no synchronous control option.	• Set 0 in register R2589.
0123	**Computer link B not possible** The cycle start was attempted before resetting was completed. An attempt was made to perform computer link B operation at the second part system and following in a multi-part system.	• Perform the cycle start after resetting is completed. • Set 0 in "#8109 HOST LINK", and then set 1 again before performing the cycle start. • The computer link B operation cannot be performed at the second part system and following in a multi-part system.
0124	**X/Z axes simultaneous prohibit** The basic axis corresponding to the inclined axis was started simultaneously in the manual mode while the inclined axis control was valid.	• Turn the inclined axis and basic axis start OFF for both axes. (This also applied for manual/automatic simultaneous start.) • Invalidate the basic axis compensation, or command one axis at a time.

Error No.	Details	Remedy
0125	**Rapid override zero** The "rapid traverse override" switch on the machine operation panel is set to zero.	• Set the "rapid traverse override" switch to a value other than zero to clear the error. • When the "rapid traverse override" switch is set to a value other than zero, check for a short circuit in the signal wire. • Check the sequence program.
0126	**Program restart machine lock** Machine lock was applied on the return axis while manually returning to the restart position.	• Release the machine lock before resuming operations.
0127	**Rot axis parameter error** The orthogonal coordinate axis name does not exist. The rotary axis name does not exist. The orthogonal coordinate axis name is duplicated. The number of axes that were selected to change tool length compensation along the tool axis amount exceeds the maximum number of axes. The orthogonal coordinate axis name is that of the rotary axis name.	• Review the rotational axis configuration parameters.
0150	**Chopping override zero** The override became "0" while performing the chopping operation.	• Check the chopping override (R2530). • Check the rapid traverse override (R2502).
0151	**Command axis chopping axis** A chopping axis movement command was issued from the program during the chopping mode. (This alarm will not occur when the movement amount is commanded as 0.) (All axes interlock state will be applied.)	• Reset, or turn OFF the chopping signal. When the chopping signal is turned OFF, the axis will return to the reference position, and then the program movement command will be executed.
0153	**Bottom dead center pos. zero** The bottom dead center position is set to the same position as the upper dead center position.	• Correctly set the bottom dead center position.
0154	**Chopping disable for handle ax** Chopping was started when the chopping axis was selected as the handle axis.	• Select an axis other than the chopping axis as the handle axis, or start chopping after changing the mode to another mode.
0160	**No speed set out of soft limit** Returned from the outside of the soft limit range for the axis with no maximum speed set for the outside of the soft limit range.	• Set the maximum speed for the outside of the soft limit range. (Parameter "#2021 out_f") • Change the soft limit range. (Parameter "#2013 OT-" "#2014 OT+")
0170	**Ill. op during T tip control** An attempt was made to perform an incorrect operation during tool tip center control.	• Change to the previous operation mode and reboot.
1005	**G114.n command illegal** An attempt was made to execute G114.n during execution of G114.n. G51.2 was commanded when the G51.2 spindle-spindle polygon machining mode was already entered with a separate part system.	• Cancel with G113. • Issue the spindle synchronous cancel signal (Y18B8: SPSYC). • Cancel with G50.2. • Cancel with the spindle-spindle polygon cancel signal (YCD1).
1007	**Spindle in-use by synchro tap** The spindle is being used in synchronized tapping.	• Cancel synchronized tapping.

Error No.	Details	Remedy
1026	**SP-C ax ctrl runs independntly** C axis mode command was issued for polygon machining spindle. C axis mode command was issued for synchronized tapping spindle. Polygon command was issued for synchronized tapping spindle. Spindle is being used as spindle/C axis.	• Cancel the C axis command. • Cancel the polygon machining command. • Cancel the C axis with servo OFF.
1030	**Synchronization mismatch** Different M codes were commanded in the two part systems as the synchronization M codes. Synchronization with the "!" code was commanded in another part system during M code synchronization. Synchronization with the M code was commanded in another part system during synchronization with the "!" code.	• Correct the program so that the M codes match. • Correct the program so that the same synchronization codes are commanded.
1031	**Multiple C axes select invalid** The C axis selection signal was changed when multiple C axes could not be selected. An axis that cannot be controlled as the multiple C axes selection was selected.	• Check and correct the parameters and program.
1032	**Tap retract Sp select illegal** Tap return was executed when a different spindle was selected. Cutting feed will wait until synchronization is completed.	• Select the spindle for which tap cycle was halted before the tap return signal was turned ON.
1033	**Sp-Sp polygon cut interlock** Cutting feed will wait until synchronization is completed.	• Wait for synchronization to end.
1034	**Mixed sync ctrl prmtr illegal** Mixed synchronization control exceeding the number of control axes was attempted. Mixed synchronization control with duplicated axis addresses was attempted.	• Check the parameter settings for mixed synchronization control.
1035	**Mixed sync ctrl disable modal** Mixed synchronization was commanded for a part system in which mixed synchronization control is disabled as shown below. • During nose R compensation mode • During pole coordinate interpolation mode • During cylindrical interpolation mode • During balance cut mode • During fixed cycle machining mode • During facing turret mirror image	• Check the program.

Error No.	Details	Remedy
1036	**Synchro ctrl setting disable** The synchronous control operation method selection (R2589 register) was set when the mode was not the C axis mode. The synchronous control operation method selection (R2589 register) was set in the zero point not set state. Mirror image disable state The external mirror image or parameter mirror image was commanded during facing turret mirror image.	• Set the R2589 register to 0. • Check the program and parameters.
1037	**Synchro start/cancel disable** Synchronous control was started or canceled when synchronous control could not be started or canceled.	• Check the program and parameters.
1038	**Move cmnd invld to synchro ax** A movement command was issued to a synchronous axis in synchronous control.	• Check the program.
1106	**Sp synchro phase calc illegal** The spindle synchronization phase alignment command was issued while the spindle synchronization phase calculation request signal was ON.	• Check the program. • Check the sequence program.

(2) Class: M90 Message: Parameter set mode

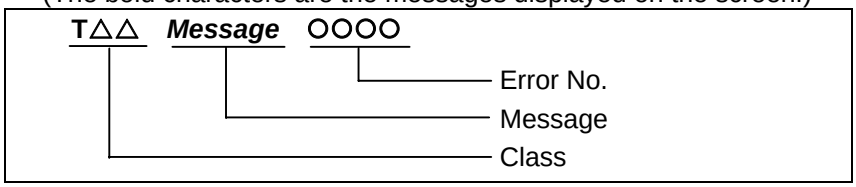
M90 Messages output when the setup parameter lock function is enabled are displayed.

Error No.	Details	Remedy
-	Setup parameter lock released The setup parameter lock is released. Automatic start is disabled when setup parameters can be set.	Refer to the manual issued by the machine tool builder.

10.1.2 Stop Codes

These codes indicate a status that caused the controller to stop for some reason.

(The bold characters are the messages displayed on the screen.)



(1) Class: T01 Cycle start prohibit

This indicates the state where automatic operation cannot be started when attempting to start it from the stop state.

Error No.	Details	Remedy
0101	**Axis in motion** Automatic start is not possible as one of the axes is moving.	• Try automatic start again after all axes have stopped.
0102	**NC not ready** Automatic start is not possible as the NC is not ready.	• Another alarm has occurred. Check the details and remedy.
0103	**Reset signal ON** Automatic start is not possible as the reset signal has been input.	• Turn OFF the reset input signal. • Check that the reset switch is not ON constantly due to trouble. • Check the sequence program.
0104	**Auto operation pause signal ON** The FEED HOLD switch on the machine operation panel is ON (valid).	• Check the FEED HOLD switch. • The feed hold switch is the B contact. • Check for broken wires in the feed hold signal wire. • Check the sequence program.
0105	**H/W stroke end axis exists** Automatic start is not possible as one of the axes is at the stroke end.	• If one of the axis' ends is at the stroke end, move the axis manually. • Check for broken wire in the stroke end signal wire. • Check for trouble in the stroke end limit switch.
0106	**S/W stroke end axis exists** Automatic start is not possible as one of the axes is at the stored stroke limit.	• Move the axis manually. • If an axis is not at the end, check the parameter details.
0107	**No operation mode** The operation mode has not been selected.	• Select the automatic operation mode. • Check for broken wires in the automatic operation mode (memory, tape, MDI) signal wire.
0108	**Operation mode duplicated** Two or more automatic operation modes are selected.	• Check for a short circuit in the mode selection signal wire (memory, tape, MDI). • Check for trouble in the switch. • Check the sequence program.
0109	**Operation mode changed** The automatic operation mode changed to another automatic operation mode.	• Return to the original automatic operation mode, and start automatic start.

Error No.	Details	Remedy
0110	**Tape search execution** Automatic start is not possible as tape search is being executed.	• Begin automatic start after the tape search is completed.
0112	**Restart pos. return incomplete** Automatic start is not possible as the axis has not been returned to the restart position.	• Manually return to the restart position. • Turn the automatic restart valid parameter ON, and then execute automatic start.
0113	**CNC overheat** Automatic start is not possible because a thermal alarm (Z53 CNC overheat) has occurred.	• The NC controller temperature has exceeded the specified temperature. • Take appropriate measures to cool the unit.
0115	**Cycle st. prohibit(Host comm.)** Automatic start cannot be executed as the NC is communicating with the host computer.	• Execute automatic start after the communication with the host computer is completed.
0116	**Cycle st prohibit(Battery alm)** Automatic start cannot be executed because the voltage of the battery inserted in the NC control unit has dropped.	• Replace the battery of the NC control unit. • Contact the service center.
0117	**R-pnt offset value not set** As the reference position offset value has not been set, automatic operation cannot be used.	• Perform the initial reference position setting, then set the reference position offset value (#2034 rfpofs).
0138	**In absolute position alarm** A start signal was input during an absolute position detection alarm.	• Reset the absolute position detection alarm, and then input the start signal.
0139	**In abs posn initial setting** A start signal was input while initializing the absolute position detector's zero point.	• Complete zero point initialization before inputting the start signal.
0180	**Cycle start prohibit** Automatic start is disabled in servo auto turning valid.	• Set "0" to "#1164 ATS" when the servo auto turning is not executed.
0190	**Cycle start prohibit** Automatic start is disabled because setup parameters can be set.	• Refer to the manual issued by the machine tool builder.
0191	**Cycle start prohibit** Automatic start was caused during file deletion or writing.	• Cause automatic start after file deletion or writing is completed.
0193	**Cycle st. prohibit (Term exp'd)** Automatic start is disabled because the valid term has been expired.	• Enter the decryption code and turn the power ON again.

(2) Class: T02 Feed hold

The feed hold state been entered due to a condition in the automatic operation.

Error No.	Details	Remedy
0201	**H/W stroke end axis exists** An axis is at the stroke end.	• Manually move the axis away from the stroke end limit switch. • The machining program must be corrected.
0202	**S/W stroke end axis exists** An axis is at the stored stroke limit.	• Manually move the axis. • The machining program must be corrected.
0203	**Reset signal ON** The reset signal has been input.	• The program execution position has returned to the start of the program. Execute automatic operation from the start of the machining program.
0204	**Auto operation pause signal ON** The FEED HOLD switch is ON.	• Resume automatic operation by pressing the "CYCLE START" switch.
0205	**Operation mode changed** The operation mode changed to another mode during automatic operation.	• Return to the original automatic operation mode, and resume automatic operation by pressing the "CYCLE START" switch.
0206	**Acc/dec time cnst too large** The acceleration and deceleration time constants are too large. (This problem occurs at the same time as system alarm Z59.)	• Increase the set value of the parameter "#1206 G1bF". • Decrease the set value of the parameter "#1207 G1btL". • Lower the cutting speed.
0215	**Abs posn detect alarm occurred** An absolute position detection alarm occurred.	• Reset the absolute position detection alarm.

(3) Class: T03 Block stop

This indicates that automatic operation stopped after executing one block of the program.

Error No.	Details	Remedy
0301	**Single block stop signal ON** The SINGLE BLOCK switch on the machine operation panel is ON. The single block or machine lock switch changed.	• Automatic operation can be resumed by turning the CYCLE START switch ON.
0302	**Block stop cmnd in user macro** The block stop command was issued in the user macro program.	• Automatic operation can be resumed by turning the CYCLE START switch ON.
0303	**Operation mode changed** The automatic mode changed to another automatic mode.	• Return to the original automatic operation mode, and resume automatic operation by turning the CYCLE START switch ON.
0304	**MDI completed** The last block of MDI was completed.	• Set MDI again, and turn the CYCLE START switch ON to resume MDI operation.
0305	**Block start interlock** The interlock signal that locks the block start is entered.	• Check the sequence program.
0306	**Cutting blck start interlock** The interlock signal that locks the block cutting start is entered.	• Check the sequence program.
0310	**Inclined Z offset change** Whether to validate the offset of the inclined Z-axis switched during program operation.	• Automatic operation can be restarted by turning ON the CYCLE START switch.

(4) Class: T04 Collation stop

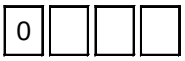
This indicates that collation stop was applied during automatic operation.

Error No.	Details	Remedy
0401	**Collation stop** Collation stop occurred.	• Automatic operation can be restarted with automatic start.

(5) Class: T10 Fin wait

This indicates the operation state when an alarm did not occur during automatic operation, and nothing seems to have happened.

Error No.	Details
0□□□	The error number is displayed while each of the completion wait modes listed in the table below is ON. It disappears when the mode is canceled.



Alarm No.	Unclamp signal wait (Note 2)	In dwell execu-tion
0		
1		×
8	×	
9	×	×

Alarm No.	Door open (Note 1)	Waiting for spindle position to be looped
0		
1		×
8	×	
9	×	×

Alarm No.	Waiting for spindle orienta-tion to complete	Waiting for cutting speed decelera-tion	Waiting for rapid traverse decelera-tion	Waiting for MSTB comp-letion
0				
1				×
2			×	
3			×	×
4		×		
5		×		×
6		×	×	
7		×	×	×
8	×			
9	×			×
A	×		×	
B	×		×	×
C	×	×		
D	×	×		×
E	×	×	×	
F	×	×	×	×

(Note 1) This mode is enabled by the door interlock function.
(Note 2) The system is waiting for the index table indexing unclamp signal to turn ON or OFF

10.1.3 Servo/Spindle Alarms

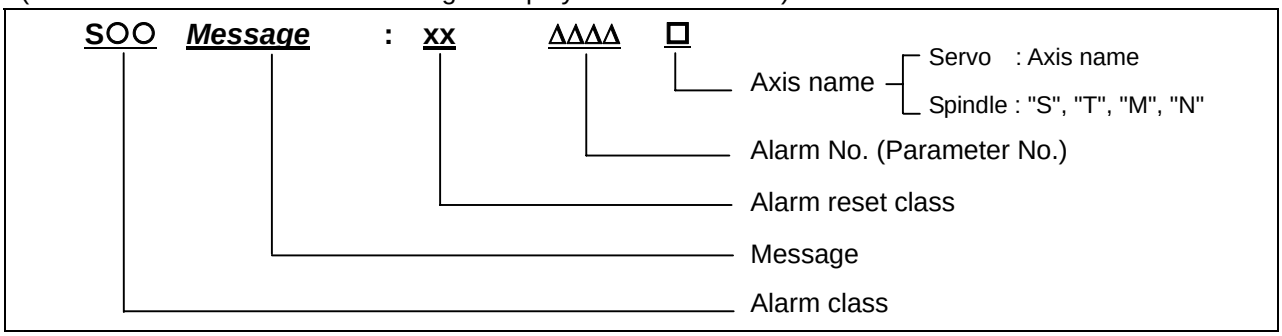
This section describes alarms occurred by the errors in the servo system such as the drive unit, motor and encoder, etc. The alarm message, alarm No. and axis name will display on the alarm message screen. The axis where the alarm occurred and the alarm No. will also display on the servo monitor screen and the spindle monitor screen respectively. If several alarms have occurred, up to two errors per axis will display on the servo monitor screen and the spindle monitor screen respectively.

(Note 1) The alarm class and alarm reset class combinations are preset.

Alarm class	Alarm reset class	Resetting methods
S01	PR	After removing the cause of the alarm, reset the alarm by turning the NC power ON again.
S02	PR	After correcting the parameter, reset the alarm by turning ON the NC power again.
S03	NR	After removing the cause of the alarm, reset the alarm by inputting the NC RESET key.
S04	AR	After removing the cause of the alarm, reset the alarm by turning the drive unit power ON again.
S51	-	This is cleared if a correct value is set.
S52	-	-

(Note 2) The resetting method may change according to the alarm class.
For example, even if "S03 SERVO ALARM: NR" is displayed, it may be necessary to turn the NC power ON again.

(The bold characters are the messages displayed on the screen.)



(1) Class: S01/S03/S04 Servo alarm

Alarm No.	Message	Meaning
0010	**Insufficient voltage**	Insufficient PN bus voltage was detected in main circuit.
0011	**Axis selection error**	Setting of the axis No. selection switch is incorrect.
0012	**Memory error 1**	A CPU error or an internal memory error was detected during the power ON self-check.
0013	**Software processing error 1**	Software processing has not finished within the specified time.
0014	**Software processing error 2**	Software processing has not finished within the specified time.
0015	**Memory error 2**	A CPU error or an internal memory error was detected during the power ON self-check.
0016	**Magnet pole pos detect error**	An error was detected in the magnetic pole detection for controlling the motor.
0017	**A/D converter error**	An error was detected in the A/D converter for detecting current FB.
0018	**Motor side dtc: Init commu err**	Initial communication with the motor end detector failed.

Alarm No.	Message	Meaning
0019	**Detector commu err in syn cont**	Initial communication with the motor end detector on master axis failed when setting closed-loop current synchronous control. Or the communication was interrupted.
001A	**Machine side dtc: Init comu er**	Initial communication with the linear scale or the ball screw end detector failed.
001B	**Machine side dtc: Error 1**	The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).
001C	**Machine side dtc: Error 2**	
001D	**Machine side dtc: Error 3**	
001E	**Machine side dtc: Error 4**	
001F	**Machine side dtc: Commu error**	An error was detected in communication data with the linear scale or the ball screw end detector. Or the communication was interrupted.
0020	**Motor side dtc: No signal**	When an excessive error alarm occurred, no signal from the motor side detector was detected.
0021	**Machine side dtc: No signal**	When an excessive error alarm occurred, no signal from the machine side detector was detected.
0023	**Excessive speed error**	A difference between the speed command and speed feedback was continuously exceeding 50 r/min for longer than the setting time.
0024	**Grounding**	The motor power cable is in contact with FG (Frame Ground).
0025	**Absolute position data lost**	The absolute position was lost, as the backup battery voltage dropped in the absolute position detector.
0026	**Unused axis error**	A power module error occurred in the axis whose axis No. selection switch was set to "F"(free axis).
0027	**Machine side dtc: Error 5**	The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).
0028	**Machine side dtc: Error 6**	
0029	**Machine side dtc: Error 7**	
002A	**Machine side dtc: Error 8**	
002B	**Motor side dtc: Error 1**	The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).
002C	**Motor side dtc: Error 2**	
002D	**Motor side dtc: Error 3**	
002E	**Motor side dtc: Error 4**	
002F	**Motor side dtc: Commu error**	An error was detected in communication data with the motor end detector or with the linear scale of a linear servo system. Or the communication was interrupted.
0030	**Over regeneration**	Over-regeneration detection level became over 100%. The regenerative resistor is overloaded.
0031	**Overspeed**	The motor was detected to rotate at a speed exceeding the allowable speed. (In the case of linear motor, it was detected to move at a speed exceeding the allowable speed.)

Alarm No.	Message	Meaning
0032	**Power module overcurrent**	Overcurrent protection function in the power module has started its operation.
0033	**Overvoltage**	PN bus voltage in main circuit exceeded the allowable value.
0034	**NC-DRV commu: CRC error**	An error was detected in the data received from the CNC.
0035	**NC command error**	The travel command data that was received from the CNC was excessive.
0036	**NC-DRV commu: Commu error**	The communication with the CNC was interrupted.
0037	**Initial parameter error**	An incorrect parameter was detected among the parameters received from the CNC at the power ON.
0038	**NC-DRV commu: Protocol error 1**	An error was detected in the communication frames received from the CNC.
0039	**NC-DRV commu: Protocol error 2**	An error was detected in the axis information data received from the CNC.
003A	**Overcurrent**	Excessive current was detected in the motor drive current.
003B	**Power module overheat**	Thermal protection function in the power module has started its operation.
003C	**Regeneration circuit error**	An error was detected in the regenerative transistor or in the regenerative resistor.
003D	**Spindle speed blocked**	The spindle motor failed to rotate faster than 45 r/min, even when the max. torque command was given.
003E	**Spindle speed overrun**	1. The spindle motor speed feedback was detected to be accelerated exceeding the commanded speed. 2. The spindle motor was detected to be rotated at a speed exceeding the parameter value, while the speed command was "0" (including the case of operation stoppage during the position control).
0040	**Detector select unit swtch err**	An error was detected in the motor switching signals that were received from the detector selection unit, while controlling one drive unit and two motors.
0041	**Detector select unit commu err**	An error was detected in the communication with the detector selection unit, while controlling one drive unit and two motors.
0042	**Feedback error 1**	An error was detected in the feedback signals of the position detector in a servo system, or in PLG's feedback signals in a spindle system.
0043	**Feedback error 2**	Excessive difference was detected in position data between the motor end detector and the machine end detector in a servo system. In a spindle system, an error was detected in the encoder feedback signals.
0044	**Inappropriate coil for C axis**	When using a coil changeover motor, C-axis was controlled while the high-speed coil was selected.
0045	**Fan stop**	A cooling fan built in the drive unit stopped, and the loads on the unit exceeded the specified value.
0046	**Motor overheat**	Thermal protection function of the motor or in the detector, has started its operation.
0047	**Regenerative resistor overheat**	Thermal protection function of the regenerative resistor, has started its operation.

Alarm No.	Message	Meaning
0048	**Motor side dtc: Error 5**	The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).
0049	**Motor side dtc: Error 6**	
004A	**Motor side dtc: Error 7**	
004B	**Motor side dtc: Error 8**	
004C	**Current err at mag pole detect**	A current error was detected in the IPM spindle motor when the initial magnetic pole was being formed.
004E	**NC command mode error**	The mode outside the specification was input in spindle control mode selection.
004F	**Instantaneous power interrupt**	The power was momentarily interrupted.
0050	**Overload 1**	Overload detection level became over 100%. The motor or the drive unit is overloaded.
0051	**Overload 2**	Current command of more than 95% of the unit's max. current was being continuously given for longer than 1 second in a servo system. In a spindle system, current command of more than 95% of the motor's max. current was being continuously given for longer than 1 second.
0052	**Excessive error 1**	A difference between the actual and theoretical motor positions during servo ON exceeded the setting value.
0053	**Excessive error 2**	A difference between the actual and theoretical motor positions during servo OFF exceeded the setting value.
0054	**Excessive error 3**	When an excessive error 1 occurred, detection of the motor current failed.
0055	**External emergency stop error**	There is no contactor shutoff command, even after 30 seconds has passed since the external emergency stop was input.
0058	**Collision detection 1: G0**	When collision detection function was valid, the disturbance torque in rapid traverse (G0) exceeded the collision detection level.
0059	**Collision detection 1: G1**	When collision detection function was valid, the disturbance torque in cutting feed (G1) exceeded the collision detection level.
005A	**Collision detection 2**	When collision detection function was valid, the command torque reached the max. Motor torque.
005B	**Sfty obsrvation: Cmd spd err**	In safety monitoring mode, the command speed was detected to exceed the safe speed.
005C	**Orientation feedback error**	After orientation was achieved, a difference between the command and feedback exceeded the parameter setting.
005D	**Sfty obsrvation: Door stat err**	In safety monitoring mode, the door state signal from the NC and the same signal from the drive unit don't match. Otherwise, door open state was detected in normal mode.
005E	**Sfty obsrvation: FB speed err**	In safety monitoring mode, the motor speed was detected to exceed the safe speed.
005F	**External contactor error**	A contact of the external contactor is welding. Or the contactor fails to be ON during ready ON.
0060	**Pw sply:Inst pw interpt(DC24V)**	It was detected that the 24VDC power supply lowered.
0061	**Pw sply: Pwr module overcurnt**	Overcurrent protection function in the power module has started its operation.

Alarm No.	Message	Meaning
0062	**Pw sply: Frequency error**	The input power supply frequency increased above the specification range.
0063	**Pw sply: Supplement regen err**	The supplementary regenerative transistor is being ON.
0065	**Pw sply: Rush relay error**	A resistor relay for rush short circuit fails to be ON.
0067	**Pw sply: Phase interruption**	An open-phase condition was detected in input power supply circuit.
0068	**Pw sply: Watchdog**	The system does not operate correctly.
0069	**Pw sply: Grounding**	The motor power cable is in contact with FG (Frame Ground).
006A	**Pw sply: Ext contactor weld**	A contact of the external contactor is welding.
006B	**Pw sply: Rush relay welding**	A resistor relay for rush short circuit fails to be OFF.
006C	**Pw sply: Main circuit error**	An error was detected in charging operation of the main circuit capacitor.
006D	**Pw sply: Parameter error**	The capacity of the power supply unit and the regenerative resistor type that was set in the parameter are mismatched.
006E	**Pw sply: Memory error/AD error**	An error was detected in the internal memory or A/D converter.
006F	**Power supply error**	No power supply is connected to the drive unit, or a communication error was detected.
0070	**Pw sply: Ext emergency stp err**	A mismatch of the external emergency stop input and CNC emergency stop input continued for 30 seconds.
0071	**Pw sply: Instant pwr interrupt**	The power was momentarily interrupted.
0072	**Pw sply: Fan stop**	A cooling fan built in the power supply unit stopped, and overheat occurred in the power module.
0073	**Pw sply: Over regeneration**	Over-regeneration detection level became over 100%. The regenerative resistor is overloaded. This alarm cannot be reset for 15 min from the occurrence. Leave the drive system emergized for more than 15 min, then turn the power ON to reset the alarm.
0074	**Pw sply: Regen resist ovheat**	Thermal protection function of the regenerative resistor, has started its operation.
0075	**Pw sply: Overvoltage**	L+ and L- bus voltage in main circuit exceeded the allowable value. As the voltage between L+ and L- is high immedialtey after this alarm, another alarm may occur if this alarm is reset in a short time. Wait more than 5 min before resetting so that the voltage drops.
0076	**Pw sply: Ext EMG stop set err**	As for the external emergency stop settings, the setting on the rotary switch and the parameter setting are mismatched.
0077	**Pw sply: Power module overheat**	Thermal protection function in the power module has started its operation.
007F	**Drv unit pw supply restart req**	A mismatch of program mode selection was detected. Turn the drive unit power ON again.
0087	**Drive unit communication error**	Answers from a drive unit connected to the power supply stopped.
0088	**Watchdog**	The system does not operate correctly.

Separate table (1)

Alarm number when motor end is connected		002B	002C	002D	002E
Alarm number when machine end is connected		001B	001C	001D	001E
Detector type	**OSA105**	CPU error	LED error	Data error	-
	OSA166				-
	MDS-B-HR		-		-
Meaning of alarm		A CPU initial error was detected.	Deterioration of the LED was detected.	An error was detected in the data.	-

Alarm number when motor end is connected		0048	0049	004A	004B
Alarm number when machine end is connected		0027	0028	0029	002A
Detector type	**OSA105**	-	-	-	-
	OSA166	-	-	-	-
	MDS-B-HR	Connection error	Communication error	Judgment error	Magnetic error
Meaning of alarm		An error was detected in the connection with the analog output linear scale.	An error was detected in the communication with the serial output linear scale.	The linear scale analog frequency cycle could not be judged.	An error was detected in the magnetic data for the linear servo system.

Alarm number when motor end is connected		002B	002C	002D	002E
Alarm number when machine end is connected		001B	001C	001D	001E
Detector type	**TS5690**	Initialization error	Waveform error	-	-
	TS5691			-	-
Meaning of alarm		An initialization error was detected when the power was turned ON.	An error was detected in the A, B, Z analog signal waveform.	-	-

Alarm number when motor end is connected		0048	0049	004A	004B
Alarm number when machine end is connected		0027	0028	0029	002A
Detector type	**TS5690**	-	Overspeed	-	Relative position data error
	TS5691	-		-	
Meaning of alarm		-	The tolerable rotation speed was exceeded.	-	An error was detected in the relative position data.

Alarm number when motor end is connected		002B	002C	002D	002E
Alarm number when machine end is connected		001B	001C	001D	001E
Detector type	Manufacturer name				
AT342	Mitsutoyo	Initialization error	EEPROM error	Photo-electric type, static capacity data mismatch	ROM/RAM error
AT343					
AT543					
LC191M	Heidenhain			Relative/absolute position data mismatch	
LC491M					
RCN723					
RCN223					
ERM280				-	-
MJ831	Sony	-	-	-	-
ADB-20J60	MHI	Faulty mounting accuracy	-	Detection position deviated	Scale disconnected
FMD	Futaba Denshi Kogyo	-	-	-	-

Alarm number when motor end is connected		0048	0049	004A	004B
Alarm number when machine end is connected		0027	0028	0029	002A
Detector type	Manufacturer name				
AT342	Mitsutoyo	CPU error	Photo-electric type overspeed	Static capacity type error	Photo-electric type error
AT343					
AT543					
LC191M	Heidenhain		Overspeed	Absolute position data error	Absolute position data error
LC491M					
RCN723					
RCN223					
ERM280				-	
MJ831	Sony	-	-	-	Encoder error
ADB-20J60	MHI	-	-	Gain fault	Phase fault
FMD	Futaba Denshi Kogyo	-	-	Waveform error	Excessive speed

(2) Class: S02 Message: Initial parameter error

An error was found in the parameters transmitted from the controller to the drive unit when the power was turned ON.
Remove the cause of the alarm, and then reset the alarm by turning the controller power OFF once.

Alarm No.	Details	Remedy
2201 to 2264	The servo parameter setting data is illegal. The alarm No. is the No. of the servo parameter where the error occurred.	Check the descriptions for the appropriate servo parameters and correct them.
2301	The number of constants to be used in the following functions is too large: • Electronic gears • Position loop gain • Speed feedback conversion	Check that all the related parameters are specified correctly. sv001:PC1, sv002:PC2, sv003:PGN1 sv018:PIT, sv019:RNG1, sv020:RNG2
2302	When high-speed serial incremental detector (OSE104, OSE105) is connected, parameters for absolute position are set to ON. Set the parameters for absolute position detection to OFF. To detect an absolute position, replace the incremental specification detector with an absolute position detector.	Check that all the related parameters are specified correctly. sv017:SPEC, sv025:MTYP
2303	No servo option is found. The closed loop (including the ball screw-end detector) or dual feedback control is an optional function.	Check that all the related parameters are specified correctly. sv025:MTYP/pen sv017:SPEC/dfbx
2304	No servo option is found. The SHG control is an optional function.	Check that all the related parameters are specified correctly. sv057:SHGC sv058:SHGCsp
2305	No servo option is found. The adaptive filtering is an optional function.	Check that all the related parameters are specified correctly. sv027:SSF1/aflt
13001 to 13256	Parameter error The spindle parameter setting data is illegal. The alarm No. is the No. of the spindle parameter where the error occurred.	Check the descriptions for the appropriate spindle parameters and correct them. Refer to Alarm No.37 in Spindle Drive Maintenance Manual.

(3) Class: S51 Message: Parameter error

This warning is displayed if a parameter outside the tolerance range is set.
Illegal settings will be ignored.
This alarm will be reset when a correct value is set.

Alarm No.	Details	Remedy
2201 to 2264	Servo parameter setting data is illegal. The alarm No. is the No. of the servo parameter where the warning occurred.	Check the descriptions for the appropriate servo parameters and correct them.
13001 to 13256	Spindle parameter setting data is illegal. The alarm No. is the No. of the spindle parameter where the warning occurred.	Check the descriptions for the appropriate spindle parameters and correct them. Refer to Spindle Drive Maintenance Manual.

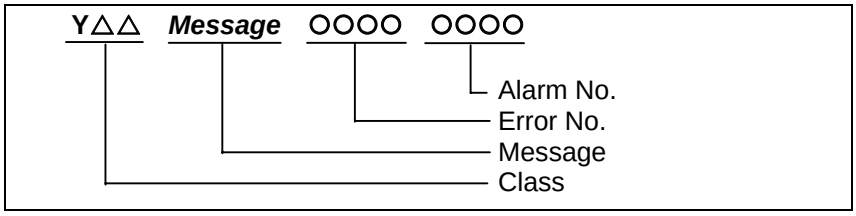
(4) Class: S52 Servo warning

Displays servo and spindle tool warnings.

Alarm No.	Message	Meaning
0093	**Init abs pos fluctuation**	The position data have fluctuated during the absolute position initializing.
0096	**Scale feedback error**	An excessive deviation was detected between the motor end detector and MP scale feedback data in a MP scale absolute position detection system.
0097	**Scale offset error**	An error was detected in the offset data received from the MP scale in a MP scale absolute position detection system.
009B	**Detector converting unit: Magnetic pole shift warning**	An error was detected in the shift distance of the magnetic pole in a linear servo system.
009E	**Absolute position detector: Revolution counter error**	An error was detected in the revolution counter of the absolute position detector. The absolute position data cannot be compensated.
009F	**Battery voltage drop**	The battery voltage that is supplied to the absolute position detector dropped. The absolute position data is retained.
00A6	**Fan stop warning**	A cooling fan built in the drive unit stopped.
00A8	**Turret indexing warning**	The designated position shift amount of turret indexing is outside the setting range.
00A9	**Orientation feedback warning**	As an orientation feedback error occurred, the retrial has been conducted.
00E0	**Overregeneration warning**	Over-regeneration detection level exceeded 80%.
00E1	**Overload warning**	Overload detection level exceeded 80%.
00E2	**Continuous high-speed revolution warning**	The motor was continuously rotated at a speed exceeding the rated speed.
00E3	**Absolute position counter warning**	Deviation between the absolute and relative position data was detected.
00E4	**Set parameter warning**	An incorrect parameter was detected among the parameters received from the CNC.
00E6	**Control axis detachment warning**	Control axis detachment was commanded.
00E7	**In NC emergency stop state**	Emergency stop was input from the CNC.
00E8	**Power supply: Over supplementary regeneration frequency**	Regeneration that are beyond the power supply limitation has frequently occurred.
00E9	**Instantaneous power interruption warning**	The power was momentarily interrupted.
00EA	**In external emergency stop state**	External emergency stop signal was input.
00EB	**Power supply: Over regeneration warning**	Over-regeneration detection level exceeded 80%.
00EE	**Pw sply: Fan stop warning**	A cooling fan built in the power supply unit stopped.

10.1.4 MCP Alarm

An error has occurred in the drive unit and other interfaces. (The bold characters are the messages displayed on the screen.)



(1) Class: Y02 System alarm

An error occurred in the data transmitted between the MCP and drive unit after the power was turned ON.

Error No.	Details		Remedy
0050	**System alm: Process time over**		The software or hardware may be damaged. Contact the service center.
0051	**Alarm No.**		A communication error has occurred between the controller and drive unit. • Take measures against noise. • Check that the communication cable connector between the controller and drive unit and one between the drive units are tight. • Check whether the communication cable between the controller and drive unit and one between the drive units are disconnected. • A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and report to the Service Center. • Update the drive unit software version.
	0000	**SV commu er: CRC error 1** (10 times/910.2 ms)	
	0001	**SV commu er: CRC error 2** (2 continuous times)	
	0002	**SV commu er: Recv timing err** (2 continuous times)	
	xy03	**SV commu er: Data ID error** (2 continuous times) x: Channel No. (0 to) y: Drive unit rotary switch No. (0 to)	
	xy04	**SV commu er: Recv frame No.** (2 continuous times) x: Channel No. (0 to) y: Number of reception frame -1 (0 to)	
	x005	**SV commu er: Commu error** (No error classification) x: Channel No. (0 to)	
	x006	**SV commu er: Connect error** x: Channel No. (0 to)	
	xy20	**SV commu er: Init commu error** The drive unit could not shift to the initial communication run time and stopped. x: Channel No. (0 to) y: Drive unit rotary switch No. (0 to)	
	xy30	**SV commu er: Node detect error** No response from drive unit to the request from NC when setting network configuration. x: Channel No. (0 to) y: Station No. (0 to)	
	xy31	**SV commu er: Commu not support** SV commu er: Communication mode not supported Drive unit's software version doesn't support the communication mode that the controller requires. x: Channel No. (0 to) y: Station No. (0 to)	

(Note) When two or more "Y02 System alarms" occur at the same time, only the alarm which occurs first is displayed.

(2) Class: Y03 Message: Drive unit unequipped

The drive unit is not correctly connected.

Error No.	Details	Remedy
Alphabet (axis name)	Servo axis drive unit not mounted	Check the drive unit mounting state. • Check the end of the cable wiring. • Check the cable for broken wires. • Check the connector insertion. • The drive unit input power is not being input. • The drive unit axis No. switch is illegal.
1 to 4	PLC axis drive unit not mounted	
S	No.1 spindle axis drive unit not mounted	
T	No.2 spindle axis drive unit not mounted	
M	No.3 spindle axis drive unit not mounted	
N	No.4 spindle axis drive unit not mounted	

(3) Class : Y05 Message: Initial parameter error

Details	Remedy
There is a problem in the value set for the number of axes or the number of part systems.	Check the value set for the corresponding parameters. #1001 SYS_ON #1002 axisno #1039 spinno, etc.

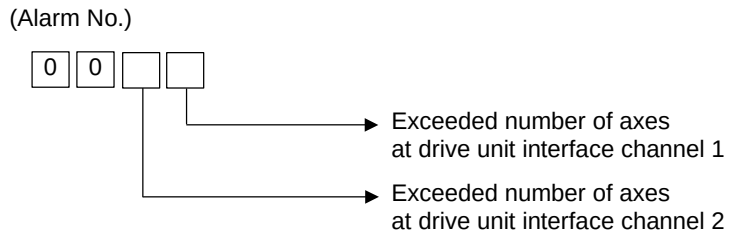
(4) Class: Y06 Message: mcp_no setting error

There are differences in the MCP and axis parameters when the NC power is turned ON.

Error No.	Details	Remedy
0001	There is a skipped number in the channels.	Check the values set for the following parameters. #1021 mcp_no #3031 smcp_no
0002	The random layout setting is duplicated.	
0003	The drive unit fixed setting "0000" and random layout setting "****" are both set.	
0004	The spindle/C axis "#1021 mcp_no" and "#3031 smcp_no" are not set to the same values.	
0005	A random layout is set for the "#1154 pdoor" =1 two-part system.	
0006	The channel No. parameter is not within the setting range.	

(5) Class: Y07 Message: Too many axes connected

The number of connected axes exceeds the number allowed in the system.



Alarm No.	Details	Remedy
0000 to 00FF	The number of axes connected to each channel exceeds the maximum number of connectable axes. The exceeded number of axes per channel is displayed as alarm No. This alarm occurs when the drive unit is connected only with the 2nd channel without connecting with the 1st channel.	Remove connected axes from the channel whose alarm No. is other than 0 for the number displayed as the alarm No. Keep the number of connected axes to or less than the maximum that can be connected.

(Note 1) The number of axes is limited per each drive unit interface channel.

(Note 2) Maximum number of axes that can be connected differs depending on whether or not an expansion unit is available or the setting of "#11012 16 axes for 1ch". The maximum number of connectable axes is as shown below.

Extension unit	#11012 16 axes for 1ch	Maximum number of axes to be connected (Per 1 channel)
Yes	0/1	8 axes
No	0	
	1	16 axes

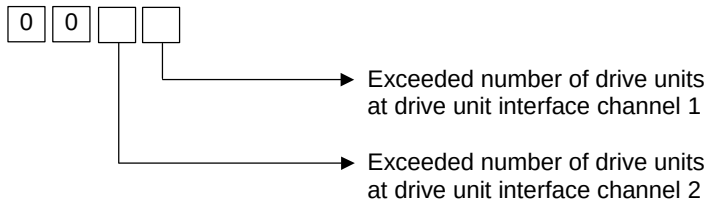
(Note 3) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.

(Note 4) This alarm is displayed taking precedence over the alarm "Y08 Too many drive units connected" and "Y09 Too many axisno connected".

(6) Class: Y08 Message: Too many drive units connected

The number of connected drive units exceeds the number allowed in the system.

(Alarm No.)



Alarm No.	Details	Remedy
0000 to 00FF	The number of drive units connected to each channel exceeds 8. The exceeded number of drive units per channel is displayed as alarm No.	Remove drive units from the channel whose alarm No. is other than 0 for the number displayed as the alarm No. Keep the number of connected drive units to 8 or less.

(Note 1) The drive unit is not counted when all the axes connected to it are invalid.

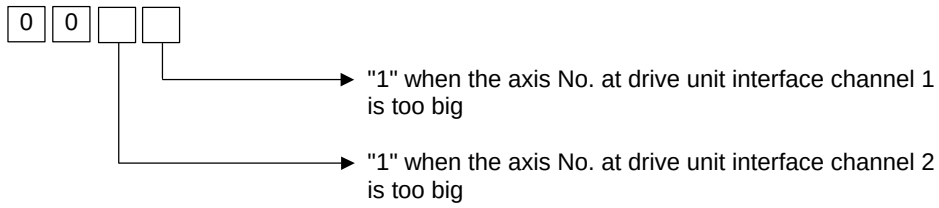
(Note 2) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.

(Note 3) The alarm "Y07 Too many axes connected" and "Y09 Too many axisno connected" are displayed taking precedence over this alarm.

(7) Class: Y09 Message: Too many axisno connected

The connected axes No. (drive unit's rotary switch No.) is bigger than the No. allowed in the system.

(Alarm No.)



Alarm No.	Details	Remedy
0000 to 0011	The No. of the axis (drive unit's rotary switch No.) connected to each channel is bigger than the No. allowed.	For the channel whose alarm No. is 1, keep the axis No. (drive unit's rotary switch No.) not bigger than the No. allowed.

(Note 1) The axis No. is limited per each drive unit interface channel.

(Note 2) The biggest allowed connected axis No. differs depending on whether or not an expansion unit is available or the setting of "#11012 16 axes for 1ch". The biggest connectable axis No. is as shown below.

Extension unit	#11012 16 axes for 1ch	Highest allowed connected axis No. (Per 1 channel)
Yes	0/1	0 to 7
No	0	
	1	0 to F

(Note 3) If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.

(Note 4) This alarm is displayed taking precedence over the alarm "Y08 Too many drive units connected".

(Note 5) The alarm "Y07 Too many axes connected" is displayed taking precedence over this alarm.

(8) Class: Y20 Safety observation alarm

When this alarm is output, emergency stop mode is applied.
Refer to "remedy" of each alarm as to how to cancel the alarm.

Error No.	Alarm No.	Details	Remedy
0001	Axis name	**Parameter compare error** The speed monitoring parameter in the NC and the parameter transmitted to the drive unit are not matched. The name of the axis with an error is displayed.	The NC or the servo drive unit may be damaged. Contact the service center.
0002	Axis name	**Sfty obsrvation: Cmd spd err** The speed exceeding the speed set with the parameter was commanded during the speed monitoring mode. The name of the axis with an error is displayed.	Check the speed monitoring parameter and the user PLC. Restart the NC.
0003	Axis name	**Sfty obsrvation: FB pos err** The commanded position transmitted to the servo drive unit from NC and the feedback position to be received from the servo drive unit are totally different during the speed monitoring mode. The name of the axis with an error is displayed.	The NC or the servo drive unit may be damaged. Contact the service center.
0004	Axis name	**Sfty obsrvation: FB speed err** Actual rotation speed of the motor is exceeding the speed set with speed monitoring parameter during the speed monitoring mode. The name of the axis with an error is displayed.	Check the speed observation parameter and the user PLC. Restart the NC.
0005	Door No.	**Door signal: Input mismatch** Door state signals on the NC side and the drive side do not match. It may be caused by the followings: • Cable disconnection • Damaged door switch • Damaged NC or servo drive unit	Check the cable. Check the door switch. Restart the NC.
0006	Door No.	**No spd obsv mode in door open** The door open state was detected when the speed monitoring mode was invalid. The causes may be same as the ones for 0005 (Door signal: Input mismatch). Also the user PLC may not be correct.	Check the user PLC. Restart the NC.

Error No.	Alarm No.	Details	Remedy
0007	Axis name	**Speed obsv: Para incompatible** Two speed monitoring parameters are not matched at the rising edge of the speed monitoring mode signal. The name of the axis with an error is displayed.	Change the relevant parameters so that the two speed monitoring parameters match. Restart the NC.
0008	Contactor No.	**Contactor welding detected** Contactor welding was detected.	Make sure that contactor's auxiliary b contact signal is output correctly to the device set on "#1380 MC_dp1" and "#1381 MC_dp2". If welding, replace the contactor. Restart the NC.
0009	-	**No spec: Safety observation** The servo parameter and the spindle parameter of the speed monitor are set for a system with no safety observation option.	Turn OFF the servo parameter SV113/bitF, the spindle parameter SP229/bitF and the spindle type servo parameter SV113/bitF. Then, restart the NC.
0010	-	**SDIO connector input volt err** 24VDC power is not supplied to SDIO connector correctly. (SDIO 4A pin supply voltage was dropped to 16V or less, or 1ms or more instant power interrupt was detected.) In this case, "Pw sply:Inst pw interpt(DC24V)" alarm occurs because the contactor control output signal cannot be controlled. This state remains until restarting the NC even if the cause of the alarm has been removed.	Check the wiring. Supply 24VDC power to the SDIO connector. Restart the NC.

(9) Class: y21 Safety observation warning

The warning will be cancelled when the cause of the warning is removed.

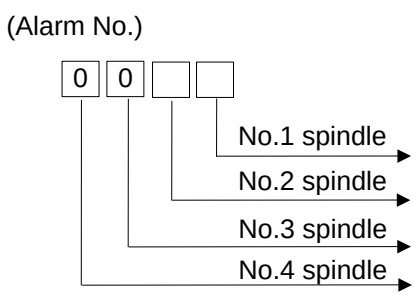
Error No.	Alarm No.	Details	Remedy
0001	Axis name	**Speed obsv signal: Speed over** The speed exceeds the safety speed limit when the speed monitoring mode signal is ON. The name of the axis with an error is displayed.	When decelerated, the warning will be removed, and the speed monitor will be started.

(10) Class: Y51 Parameter error

An error occurred in a parameter that causes an alarm while the control axis was operating.

Error No.	Details	Remedy
0001	**Parameter G0tL illegal** The time constant has not been set or the setting exceeded the setting range.	• Check "#2004 G0tL".
0002	**Parameter G1tL illegal** The time constant has not been set or the setting exceeded the setting range.	• Check "#2007 G1tL".
0003	**Parameter G0t1 illegal** The time constant has not been set or the setting exceeded the setting range.	• Check "#2005 G0t1".
0004	**Parameter G1t1 illegal** The time constant has not been set or the setting exceeded the setting range.	• Check "#2008 G1t1".
0009	**Parameter grid space illegal**	• Check "#2029 grspc".
0012	**Parameter stapt1-4 illegal** The time constant has not been set or the setting exceeded the setting range.	• Check spindle parameters" #3017 stapt1" to "#3020 stapt4".
0015	**Parameter skip_tL illegal** The time constant has not been set or the setting exceeded the setting range.	• Check "#2102 skip_tL".
0016	**Parameter skip_t1 illegal** The time constant has not been set or the setting exceeded the setting range.	• Check "#2103 skip_t1".
0017	**Parameter G0bdcc illegal** "#1205 G0bdcc" for the 2nd part system is set to acceleration/deceleration before G0 interpolation.	• Check "#1205 G0bdcc".
0018	**OMR-II parameter error** The OMR-II related parameter settings are incorrect. In this case, the OMR-II is disabled.	• Check the related parameter settings.
0101	**Values of PC1/PC2 too large** The PC1 and PC2 settings used for the rotary axis are too large.	• Check "#2201 PC1" and "#2202 PC2".

(11) Class: Y90 Message: No spindle signal

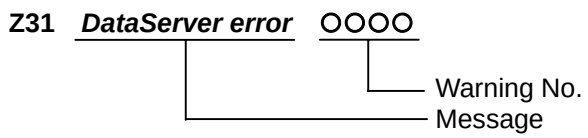


Alarm No.	Z open phase	B open phase	A open phase
1			×
2		×	
3		×	×
4	×		
5	×		×
6	×	×	
7	×	×	×

Alarm No.	Details	Remedy
0001 to 0007	There is an error in the spindle encoder signal. The data transmission to the drive unit is stopped when this error occurs.	• Check the spindle encoder's feedback cable and the encoder.

10.1.5 System Alarms

(The bold characters are the messages displayed on the screen.)



Warning No.	Explanation
0001	**Socket open error(socket)**
0002	**Socket bind error(bind)**
0003	**Connection wait queue error(listen)**
0004	**Connection request error(accept)**
0005	**Data recv error(socket error)**
0006	**Data recv error(data error)**
0007	**Data send error(socket error)**
0008	**Data send error(data error)**
000A	**Socket close error(close)**

(Note) If warning No. 0001, 0002, 0003, or 000A is displayed, set the parameters, then turn power OFF and turn it ON again.

(The bold characters are the messages displayed on the screen.)

Message	Details	Remedy
Z40 Format mismatch	This appears when the parameter MemVal is formatted at 0, and MemVal is set to 1.	• Either return the MemVal setting, or format and restart.
Z51 E2PROM error 00xx	<Type> Z51 E2PROM error 0011: Read error Z51 E2PROM error 0012: Write error	• If the same alarm is output by the same operation, the cause is an H/W fault. Contact the Service Center.
Z52 Battery fault 000x	The voltage of the battery inserted in the NC control unit has dropped. (The battery used to save the internal data.) 0001: Battery warning 0002: Battery detecting circuit error 0003: Battery alarm **(Note 1)**	• Replace the battery of the NC control unit. • Check for disconnection of the battery cable. • After treating the battery, check the machining program.
Z53 CNC overheat	The controller or operation board temperature has risen above the designated value. **(Note 2)**	• Cooling measures are required. • Turn OFF the controller power, or lower the temperature with a cooler, etc.
Z55 RIO communication stop	This occurs when an error occurs in the communication between the controller and remote I/O unit. • Cable breakage • Remote I/O unit fault • Power supply to remote I/O unit fault **(Note 3)**	• Check and replace the cables. • Replace the remote I/O unit. • Check the power supply. (existence of supply, voltage)
Z57 System warning	The program memory capacity setting value cannot be formatted. The expansion cassette (HR437) is not mounted after formatting. An expansion cassette different from the expansion cassette (HR437) mounted during formatting is mounted.	Check the state of the following items. • Program memory capacity • Status of expansion cassette (HR437) mounting • APLC open option
Z58 ROM write not completed	The machine tool builder macro program was not written to the FROM after being registered, edited, copied, condensed, merged, the number changed, or deleted.	• Write the machine tool builder macro program to the FROM. • If the operations, such as editing, done while the NC power was OFF can be invalidated, the program does not need to be written to the FROM.
Z59 Acc/dec time cnst too large	Acceleration and deceleration time constants are too large. (This alarm is output at the same time as "T02 Acc/dec time cnst too large 0206.")	• Increase the value specified as the "#1206 G1bF" parameter. • Decrease the value specified as the "#1207 G1btL" parameter. • Lower the feedrate.
Z60 Fieldbus communi-cation error	Communication error has occurred on the Fieldbus communication using HN571/HN573/HN575.	• Refer to (Note 4) for details.
Z64 Valid term soon to be expired xx	The valid term will be expired in less than a week. Remaining valid term is xx more days.	• Obtain a decryption code by making a payment. Enter the decryption code.
Z65 Valid term has been expired	No decryption code was input before the valid term was expired.	• Obtain a decryption code by making a payment. Enter the decryption code.

Message	Details	Remedy
Z67 CC-Link communication error	A communication error occurred during CC-Link communication using HN566/HN576.	• Refer to "List of Messages" in CC-Link (Master/Slave) Specification manual (BNP-C3039-214).
Z68 CC-Link unconnected	The cable connected between HN566/HN576 and each device is disconnected or broken.	• Connect the cable. • Check whether or not the cable is broken.

⚠ CAUTION

- If the battery low warning is issued, save the machining programs, tool data and parameters in an input/output device, and then replace the battery. When the battery alarm is issued, the machining programs, tool data and parameters may be destroyed. Reload the data after replacing the battery.
- ⚠ Do not replace the battery while the power is ON.
- ⚠ Do not short circuit, charge, heat, incinerate or disassemble the battery.
- ⚠ Dispose of the spent battery following local laws.

(Note 1) The display of Z52 battery fault 0001 can be removed by resetting. However, the warning state will not be cancelled until the battery is replaced.

(Note 2) Temperature warning
If the alarm is displayed when an overheat alarm is detected, the overheat signal will be output simultaneously. If the machine is in automatic operation, the operation will be continued, but restarting will not be possible after resetting or stopping with M02/M30. (Starting will be possible after block stop or feed hold.) The alarm will be reset and the overheat signal will turn OFF when the temperature drops below the specified temperature.

Z53	CNC overheat	000x ↑	
		0001	: The temperature in the controller is high.
		0002	: The temperature around the communication terminal (setting and display unit) is high.
		0003	: The temperature in the controller and around the communication terminal (setting and display unit) is high.

The ambient temperature must be lowered immediately when a "Z53 CNC overheat" alarm occurs, but if machining must be continued, the alarm can be invalidated by turning the following parameter OFF.

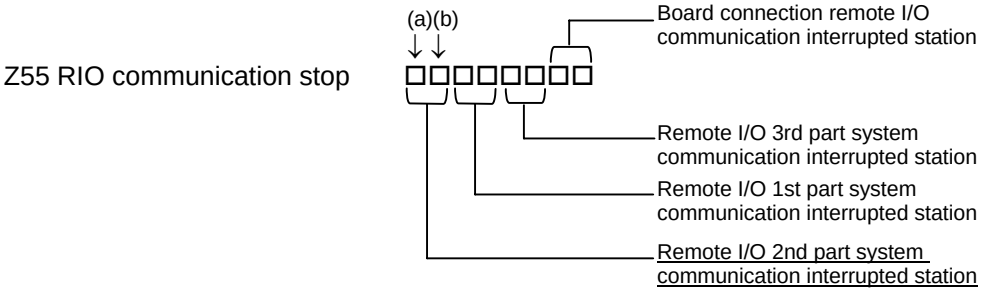
PLC parameter bit selection #6449

7	6	5	4	3	2	1	0
□	□	□	□	□	□	□	□

- Communication terminal (setting and display unit) { 0: Detection invalid / 1: Detection valid
- Controller { 0: Detection invalid / 1: Detection valid

(Note 3) RIO communication interrupt

If communication between the control unit and remote I/O unit fails, the alarm and remote I/O unit number are displayed.



(a) and (b) above indicate the following matters.

Alarm number	RIO (seventh station)	RIO (sixth station)	RIO (fifth station)	RIO (fourth station)
0				
1				×
2			×	
3			×	×
4		×		
5		×		×
6		×	×	
7		×	×	×
8	×			
9	×			×
A	×		×	
B	×		×	×
C	×	×		
D	×	×		×
E	×	×	×	
F	×	×	×	×

Alarm number	RIO (third station)	RIO (second station)	RIO (first station)	RIO (0th station)
0				
1				×
2			×	
3			×	×
4		×		
5		×		×
6		×	×	
7		×	×	×
8	×			
9	×			×
A	×		×	
B	×		×	×
C	×	×		
D	×	×		×
E	×	×	×	
F	×	×	×	×

This also applies for the remote I/O 1st part system communication interrupted station, remote I/O 3rd part system communication interrupted station and board connection remote I/O communication interrupted station.

(Note 4)

Z60 Fieldbus communication error **n1 n2 n3 n4**

Classification No.

Message

Class. No.	Details	
n1	Shows state of the master channel (shown in hexadecimal number)	
	00: Offline	In initializing
	40: Stop	Cutting I/O communication
	80: Clear	Resetting output data of each slave by sending 0 data.
	C0: In operation	In I/O communication
n2	Shows error state (shown in hexadecimal number) Bit 7 6 5 4 3 2 1 0	
n3	Shows error No. (shown in hexadecimal number) Refer to "(a) Error in master channel" and "(b) Error in slave channel" for details.	
n4	Shows slave No. where communication error has occurred. (shown in hexadecimal number) "FF" means an error in master channel.	

BIT	Details
0	Control error: Parameter error
1	Auto clear error: Communication with all the slave channels was cut because a communication with one slave channel had an error.
2	Non exchange error: Slave channel with communication error is found
3	Fatal error: The communication cannot be continued because sever network failure exists.
4	Event error: Short-circuit was found on the network.
5	Not ready: CNC communication is not ready.
6	Time out error: Time out was detected in communication with each channel.
7	Not used

(a) Error in master channel (when remote address with an error is FF (hexadecimal number))

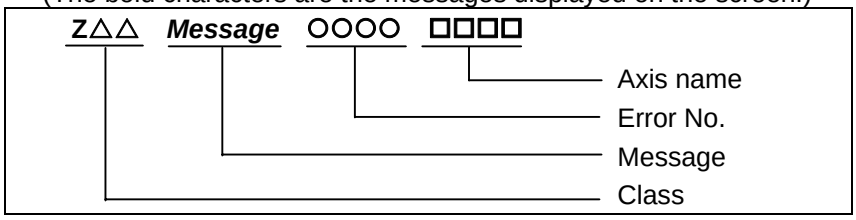
Value in n3	Details	Remedy
0	No error	Operating normally
32	No USR_INTF-task	Damage in **HN571**. Replace **HN571**.
33	No global data field	
34	No FDL-task	
35	No PLC-task	
37	Master parameter incorrect	
39	Slave parameter incorrect	
3C	Data offset exceeding allowable set value received	Check the configuration setting.
3D	Slave data send range overlap	
3E	Slave data receive range overlap	
3F	Not set data hand shake	Damage in **HN571**. Replace **HN571**.
40	RAM range exceeded	
41	Slave parameter data set illegal	
CA	No segment	
D4	Data base read illegal	Download the configuration data again.
D5	Operating system illegal	Damage in **HN571**. Replace **HN571**.
DC	Watch dog error	
DD	Hand shake mode No data communication by 0	
DE	Master auto clear mode	When setting auto clear mode, the auto clear mode was performed because one slave was not able to connect in run time.

(b) Error in slave channel (when remote address with an error is other than FF (hexadecimal number))

Value in n4	Details	Remedy
2	Station overflow reported	Check the configuration of slave channel in which error has occurred. Check if there is any short-circuit in wire to bus.
3	Station stopped responding to master command	
9	No slave required responding data	
11	No station respond	
12	No master to logical token ring	
15	Illegal parameter requested	

10.1.6 Absolute Position Detection System Alarms

(The bold characters are the messages displayed on the screen.)



(1) Class: Z70 Abs data error

This error is displayed if the absolute position data is lost in the absolute position detection system.

Error No.	Details	Remedy	Zero point initialization	Alarm reset when power is turned OFF	Servo alarm No.
0001	**Abs posn base set incomplete** Zero point initialization is incomplete. Otherwise, the spindle was removed.	Complete zero point initialization.	Required	-	-
0002	**Absolute position lost** The absolute position reference point data saved in the NC has been destroyed.	Input the parameters. If the reference point data cannot be restored, perform zero point initialization.	(Required)	-	-
0003	**Abs posn param changed** The parameters used to detect the absolute position have been changed. #1003 iunit #2201 PC1 #1016 iout #2202 PC2 #1017 rot #2218 PIT #1018 ccw #2219 RNG1 #1040 M_inch #2220 RNG2 #2049 type #2225 MTYP	Correctly set the parameters. Turn the power on again, and perform zero point initialization.	Required	-	-
0004	**Abs posn initial set illegal** The zero point initialization point is not at the grid position.	Reperform zero point initialization.	Required	-	-
0005	**Abs posn param restored** Restoration was possible with parameter input in the above No.0002 state.	Turn the power on again, and operation will be possible.	Not required	-	-
0080	**Abs posn data lost** The absolute value data was lost, because the multi-rotation counter data in the detector was incorrect, etc.	Replace the detector and complete zero point initialization.	Required	-	(9E) etc.

Error No.	Details	Remedy	Zero point initialization	Alarm reset when power is turned OFF	Servo alarm No.
0101	**Abs posn error(servo alm 25)** The power was turned ON again after the servo alarm No. 25 displayed.	Reperform zero point initialization.	Required	-	(25)
0106	**Abs posn error(servo alm E3)** The power was turned ON again after the servo alarm No. E3 displayed.	Reperform zero point initialization.	Required	-	(E3)

(Note) To release alarm "Z70 Abs data error", enter the parameter data output when establishing the absolute position and turn ON the power again. For the rotary axis, however, the alarm cannot be released by entering the parameter data.

(2) Class: Z71 Abs encoder failure

This alarm is displayed if an error is found in the detector for the absolute position detection system.

Error No.	Details	Remedy	Zero point initialization	Alarm reset when power is turned OFF	Servo alarm No.
0001	**AbsEncoder:Backup voltage drop** The backup voltage in the absolute position detector dropped.	Replace the battery, check the cable connections, and check the detector. Turn the power ON again, and perform zero point initialization.	Required	- (Z70-0101 displays after power is turned ON again.)	25
0003	**AbsEncoder: Commu error** Communication with the absolute position detector was not possible.	Check and replace the cables, card or detector. Turn the power ON again, and perform zero point initialization.	(Required) Only when detector is replaced.	Reset	91
0004	**AbsEncoder: Abs data changed** The absolute position data fluctuated when establishing the absolute position.	Check and replace the cables, card or detector. Turn the power ON again, and perform zero point initialization.	(Required) Only when detector is replaced.	Reset	93
0005	**AbsEncoder: Serial data error** An error was found in the serial data from the absolute position detector.	Check and replace the cables, card or detector. Turn the power ON again, and perform zero point initialization.	(Required) Only when detector is replaced.	Reset	92
0006	**AbsEncoder: Abs/inc posn diffr** Servo alarm E3 Absolute position counter warning	Operation is possible until the power is turned off.	(Required) When power is turned ON again.	Reset (Z70-0106 displays after power is turned ON again.)	E3
0007	**AbsEncoder: Initial commu err** Initial communication with the absolute position detector was not possible.	Check and replace the cables, card or detector. Turn the power ON again, and perform zero point initialization.	(Required) Only when detector is replaced.	Reset	18

(3) Class: Z72 Message: Position check error

This alarm is displayed if an error is detected when comparing the detector's absolute position and controller coordinate values in the absolute position system.

(4) Class: Z73 Message: Absolute position data warning

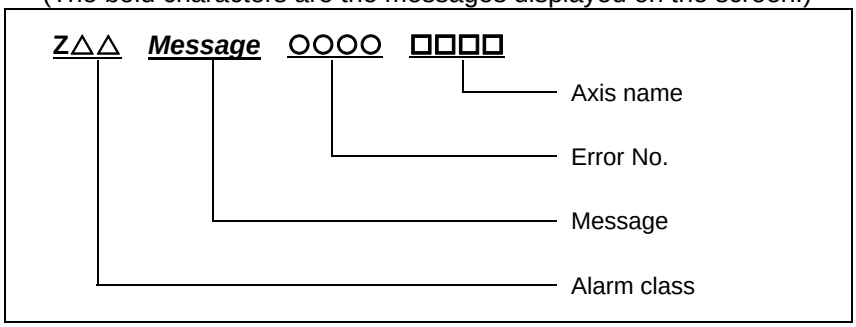
This warning is displayed for the absolute position detection system.

Alarm No.	Details	Remedy
0001	Battery for abs data fault Servo alarm 9F Low battery voltage	If the battery voltage is low or the cable is damaged, there is no need to initialize the absolute position.

(Note) When this alarm occurs, do not turn OFF the drive unit power to protect the absolute position data. Replace the battery while the drive unit power is ON.

10.1.7 Distance-coded Reference Scale Errors

(The bold characters are the messages displayed on the screen.)



(1) Class: Z80 Distance-coded ref scale err

Error No.	Details	Remedy
0001	**Basic position lost** The basic point data memorized by the NC is broken.	• Input the parameter. If the basic point data cannot be recovered, perform the initial reference position setting.
0002	**Basic position restore** The basic point data is recovered by parameter input.	• Operation can be started after turning the power ON.
0003	**No spec: Distance-coded scale** Even if the distance-coded reference scale is not included in the specification, it is set to be available.	• Check the specification. • If you do not use this function, set the detector type in servo parameters correctly.

10.1.8 Messages during Emergency Stop

(The bold characters are the messages displayed on the screen.)

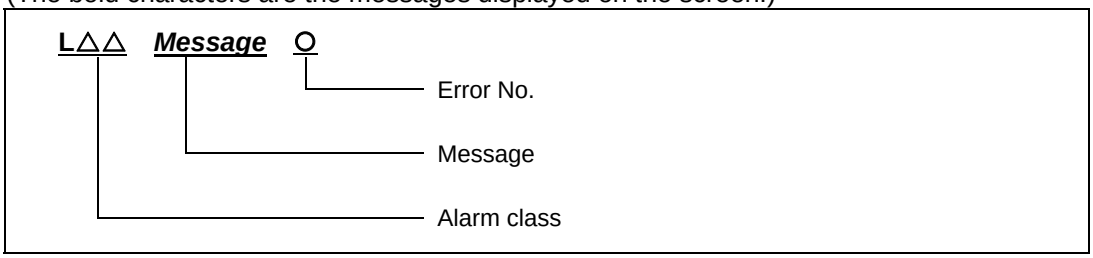
EMG Emergency stop □□□□
Error items

Error Item	Details	Remedy
PLC	The user PLC has entered the emergency stop state during the sequence process.	• Investigate and remove the cause of the user PLC emergency stop.
EXIN	The emergency stop input signal for machine operation board or handy terminal is significant (open).	• Cancel the emergency stop input signal. • Check the wiring to see if any wiring is broken.
SRV	An alarm occurred in the servo system causing an emergency stop.	• Investigate and remove the cause of the servo alarm.
STOP	The user PLC (ladder sequence) is not running.	• Check if the rotary switch CS2 on the top of the controller front panel is set to 1. • Check if the PLC edit file save screen (onboard function) [4RUN/SP] (run/stop) switch is turned ON.
SPIN	Spindle drive unit not mounted The spindle drive unit is not mounted.	• Cancel the causes of the other emergency stop. • Check emergency stop signal input in the spindle drive unit.
PC_H	High-speed PC processing abnormal	• Check the sequence program. (To stop monitoring the high-speed PC processing temporarily, set 1 in "#1219 aux03/bit1". Disable the monitoring function only as a temporary measure.)
PARA	Setting of the door open II fixed device is illegal. The dog signal random assignment parameter setting is illegal.	• Specify the "#1155 DOOR_m" and "#1156 DOOR_s" parameters correctly. (When the door open II fixed device is not used, set "#1155 DOOR_m" and "#1156 DOOR_s" to "100".) • Correctly set the "#2073 zrn_dog", "#2074 H/W_OT+", "#2075 H/W_OT-" and "#1226 aux10/bit5" parameters.

Error No.	Details	Remedy
LINK	If the FROM/TO instruction is not executed within 500 ms, an emergency stop occurs.	• Try to execute the FROM or TO instruction one or more times every 500 ms. * Measure the time in which no interrupt request is issued from MELSEC and store the result in the R register. R10190: Current time-out counter R10191: Counter for maximum time-out after power-on R10192: Counter for maximum time-out after system start-up (backed up)
	MELSEC is held in error and reset states.	• Check the MELSEC states.
	The contents of MELSEC-specific code area in buffer memory have been destroyed.	• Check the MELSEC states.
	PLC serial link communication has stopped. **(Note)** When "WAIT" is entered for the PLC serial link, only the preparation sequence has been established before the communication stops. Therefore, it is supposed that the basic specification parameters related to serial link parameters #1902 and #1903 are incorrect or the #1909 set-time is too short.	• Check that HR571 card wiring and external sequencer transmission are normal. • Check the diagnostic screen for link communication errors. • Check whether the basic specification parameters related to serial link parameters are specified correctly.
WAIT	The preparation sequence is not sent from the master station. Otherwise, the contents of the received preparation sequence are inconsistent with those of the parameters, so that the usual sequence cannot be started. **(Note)** When "LINK" is also entered for the PLC serial link, refer to "Note" in the section, "LINK".	• Check that the HR571 card rotary switch and wiring and the external sequencer transmission are normal. • Check the diagnostic screen for link communication errors.
XTEN	The HR571 card operates abnormally or the rotary switch is set incorrectly.	• Check the HR571 card rotary switch and replace the HR571 card if required.
LAD	The user PLC (ladder sequence) has an illegal code.	• Check the user PLC (ladder sequence) to see if it uses illegal device numbers or constants.
CVIN	The external emergency stop function for power supply is valid. So, the emergency stop input signal for power supply is significant (open).	• Cancel the emergency stop input signal. • Check the wiring to see if any wiring is broken.
MCT	An emergency stop occurs because the contactor shutoff test is executing.	• Automatically cancel the emergency stop after the contactor shutoff is confirmed. • When the contactor shutoff cannot be confirmed within 5 seconds after contactor shutoff test signal (Y742) is input, "Y20 Contactor welding detected" alarm will occur, and the emergency stop status remains. • Turn the power ON again after confirming "contactor's auxiliary b contact" signal is correctly output to the device that is set with "#1330 MC_dp1" and "#1331 MC_dp2".

10.1.9 Computer Link Errors

(The bold characters are the messages displayed on the screen.)

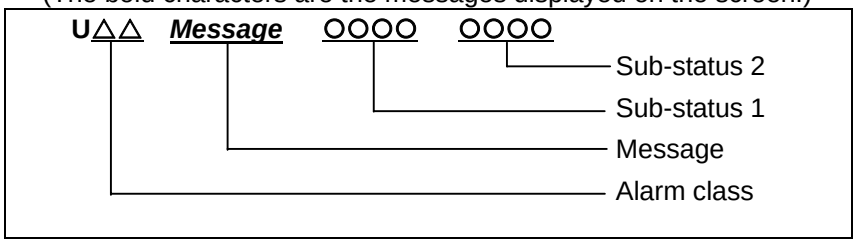


(1) Class: L01 Computer link error

Error No.	Details	Remedy
-2	**Serial port being used** Serial port has already being opened or cannot be used.	• Check whether the same port being used by Anshin-net, etc. • Recheck the parameters for tape operation port.
-4	**Timeout error** Communication ends with timeout (CNC has a 248-byte receive buffer. The time during which CNC receives 248 bytes exceeds the "TIME-OUT" value set in the I/O device parameter.)	• Set a greater timeout value in the input/output device parameter. • Recheck the HOST software as to whether or not the HOST transmits data in response to DC1 from CNC (data request). • Check whether or not start code of computer link parameter is set to 0.
-10	**Host ER signal OFF** HOST ER (CNC DR) signal is not turned ON.	• Check whether or not the cable is disconnected from the connector. • Check whether or not the cable is broken. • Check whether or not the HOST power is turned ON.
-15	**Parity H error** Communication ends with parity H.	• Recheck the HOST software as to whether or not the data to be transmitted to CNC is ISO code.
-16	**Parity V error** Communication ends with parity V.	• Recheck the data to be transmitted to CNC.
-17	**Overrun error** Although CNC transmits DC3 (request to stop data transfer) to the HOST, it receives data of 10 bytes or more from the HOST, thus terminates communication. When CNC is transmitting data to the HOST, it receives data of 10 bytes or more from the HOST.	• Recheck the software as to whether or not the HOST stops transmitting data within 10 bytes after receiving DC3. • Recheck the HOST software as to whether or not the HOST transmits data such as a command or header to CNC during receiving a work program.

10.1.10 User PLC Alarms

(The bold characters are the messages displayed on the screen.)



Message	Sub-status		Details	Remedy
	1	2		
U01 No user PLC	-	-	PLC program is not input. (Note) Emergency stop (EMG) will be applied.	Download the PLC program of the format selected with the PLC environment selection parameters (bit selection #51/bit 4).
U10 Illegal PLC	**0x0010**	-	**PLC scan time error** The scan time is 1 second or longer.	Edit the PLC program size to a smaller size.
	0x0040	-	**PLC program operation mode illegal** PLC program different from the designated mode was downloaded. (Note) Emergency stop (EMG) will be applied.	Download the PLC program having the same format as when the power was reset or turned ON.
	0x0080	-	**GPPW ladder code error** (Note) Emergency stop (EMG) will be applied.	Download the correct GPPW format PLC program.
	0x008x	-	**PLC4B ladder code error** An illegal circuit was found in the PLC4B ladder. bit1: PC medium-speed circuit illegal bit2: PC high-speed circuit illegal (Note) Emergency stop (EMG) will be applied.	Download the correct PLC4B format PLC program.
	0x0400	**Number of ladder steps**	**Software illegal interrupt** The PLC program process stopped abnormally due to an illegal software command code. (Note) Emergency stop (EMG) will be applied.	Turn the power ON again. If the error is not reset, download the correct PLC program.

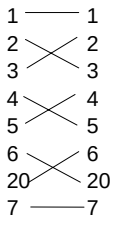
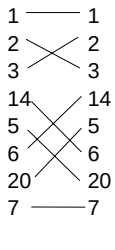
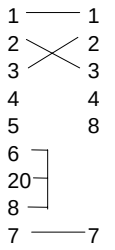
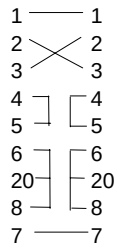
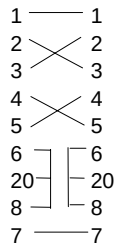
Message	Sub-status		Details	Remedy
	1	2		
U10 Illegal PLC	**0x800x**	**Number of PLC program steps**	**Software exception** The PLC program process stopped abnormally due to a bus error, etc.	
			bit 0: BIN command operation error bit 1: BCD command operation error	Refer to the methods for using the BCD and BIN function commands.
			bit6: CALL/CALLS/RET command error bit7: IRET command execution error (Note) Emergency stop (EMG) is applied for bit 6/7.	Turn the power ON again. If the error is not reset, download the correct PLC program.
U50 PLC stopped			The PLC program is stopped.	Start the PLC program.
U55 PLC stopped / is not saved			The PLC program is stopped and not written into ROM.	Write the PLC program into ROM.
U60 Ladder is not saved			The PLC program is not written into ROM.	Write the PLC program into ROM.

(Note) The number of PLC program steps displayed on the screen may not match the actual number of error occurrence steps because of the PLC program timing. Use this as a guideline of the occurrence place.

10.1.11 Network Service Errors

Message	Details	Remedy
N001 Modem initial error	• There is an error in the modem connection when the power is turned ON.	• Check the connection between the NC and modem, connection port and modem power.
N002 Redial over	• The dial transmission failed more than the designated No. of redial times.	• Wait a while, and then transmit again.
N003 TEL unconnect	• The phone line is not connected.	• Check the modem's phone line connection.
N004 Net communication error	• An error other than the above errors occurred during communication.	• Note down the circumstances under which this error occurred, and contact the Service Center.
N005 Invalid net communication	• The modem connection port is being used for another function such as input/output. • The modem connection port settings are incorrect.	• Quit using the modem connection port with the other function, and then turn the power ON again. • Check the modem connection port settings.
N006 Received result of diagnosis	• The diagnosis data file has been received	• Erase the message.
N007 Send data size over	• A file larger than Anshin-net server capacity (64Kbyte) has been transmitted during machining data sharing.	• Reduce the size of machining program file so that it won't exceed the capacity of Anshin-net server.
N008 No file on server	• When machining data sharing function is being executed, file reception fails, as the file does not exist on Anshin-net server.	• Before receiving file, confirm that a machining program file exists on Anshin-net server.
N009 Password error	• File reception fails due to wrong password when machining data sharing is being executed.	• Input the password again.
N010 Customer number error	• Data reception fails due to wrong customer number when machining data sharing is being executed.	• Input the customer number again.
N011 Storage capacity over	• As the size of file to be received is bigger than free space on the NC side, file reception fails during machining data sharing.	• Ensure sufficient free space on the NC side.
N012 File deletion error	• A file on Anshin-net server cannot be deleted when machining data sharing is being executed.	• Check if the file exists on Anshin-net server. • Note down the circumstances under which this error occurred, and contact the Service Center.

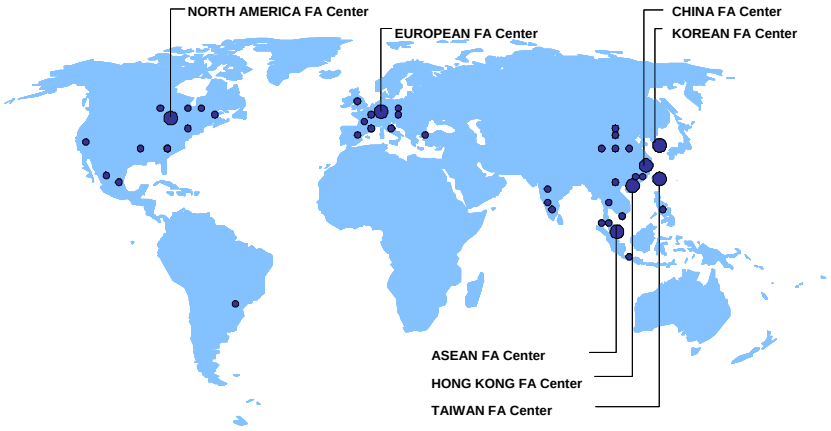
10.2 RS-232C I/O Device Parameter Setting Examples

Cable connection / **Parameter setting examples**	NC I/O 	NC I/O 	NC I/O 	NC I/O 	NC I/O 	Follows communication protocol. (NC side) 2 : SD 3 : RD 4 : RS 5 : CS 6 : DR 20 : ER 7 : GND
DEVICE NAME						Follows communication software.
BAUD RATE	2	2	2	2	2	
STOP BIT	3	3	3	3	3	
PARITY EFFECTIVE	0	0	0	0	0	
EVEN PARITY	0	0	0	0	0	
CHR. LENGTH	3	3	3	3	3	
HAND SHAKE	3	2	3	3	3	
DC CODE PARITY	1	0	1	1	1	
DC2/DC4 OUTPUT	0	0	1	0	1	
CR OUTPUT	0	0/1	0	0	0	
FEED CHR.	0	0	0	0	0	
PARITY V	0	0	0	0/1	0/1	
TIME-OUT SET	100	100	100	100	100	

Revision History

Date of revision	Manual No.	Revision details
Jun. 2007	IB(NA)1500364-A	First edition created.

Global service network



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Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.

Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

Duplication Prohibited

MITSUBISHI CNC

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MODEL	70 Series
Manual No.	IB-1500364 (ENG)

Specifications subject to change without notice.
IB(NA)1500364(ENG)-A(0706)
Printed in Japan on recycled paper.