FANUC Series 0*i*-PC

PARAMETER MANUAL

B-64160EN/01

The export of this product is subject to the authorization of the government of the country from where the product is exported.

In this manual we have tried as much as possible to describe all the various matters.
However, we cannot describe all the matters which must not be done, or which cannot be done, because there are so many possibilities.
Therefore, matters which are not especially described as possible in this manual should be regarded as ”impossible”.

PREFACE

The mode covered by this manual, and their abbreviations are :

Product Name	Abbreviations		
FANUC Series 0*i*–PC	0*i*–PC	Series 0*i*–C	0*i*

NOTE
Some functions described in this manual may not be applied to some products.
For details, refer to the DESCRIPTIONS (B–64112EN).

Related manuals of Series 0*i*–PC

The following table lists the manuals related to Series 0*i*–PC.
This manual is indicated by an asterisk(*).

Manual name	Specification number	
FANUC Series 0*i*–MODEL C/0*i* Mate–MODEL C DESCRIPTIONS	B–64112EN	
FANUC Series 0*i*–MODEL C/0*i* Mate–MODEL C CONNECTION MANUAL (HARDWARE)	B–64113EN	
FANUC Series 0*i*–MODEL C/0*i* Mate–MODEL C CONNECTION MANUAL (FUNCTION)	B–64113EN–1	
FANUC Series 0*i*–PC CONNECTION MANUAL (FUNCTION)	B–64153EN	
FANUC Series 0*i*–PC OPERATOR'S MANUAL	B–64154EN	
FANUC Series 0*i*–MODEL C/0*i* Mate–MODEL C MAINTENANCE MANUAL	B–64115EN	
FANUC Series 0*i*–PC PARAMETER MANUAL	B–64160EN	*
PROGRAMMING MANUAL		
Macro Compiler/Macro Executor PROGRAMMING MANUAL	B–61803E–1	
FAPT MACRO COMPILER (For Personal Computer) PROGRAMMING MANUAL	B–66102E	
PMC		
PMC Ladder Language PROGRAMMING MANUAL	B–61863E	
Network		
Profibus–DP Board OPERATOR'S MANUAL	B–62924EN	
FAST Ethernet Board/FAST DATA SERVER OPERATOR'S MANUAL	B–63644EN	
Ethernet Board/DATA SERVER Board OPERATOR'S MANUAL	B–63354EN	
DeviceNet Board OPERATOR'S MANUAL	B–63404EN	
Open CNC		
FANUC OPEN CNC Basic Operation Package 1 (For Windows95/NT) OPERATOR'S MANUAL	B–62994EN	
FANUC OPEN CNC (DNC Operation Management Package) OPERATOR'S MANUAL	B–63214EN	

Related manuals of SERVO MOTOR αis/αi series

The following table lists the manuals related to SERVO MOTOR αis/αi series.

Manual name	Specification number
FANUC AC SERVO MOTOR αis series FANUC AC SERVO MOTOR αi series DESCRIPTIONS	B–65262EN
FANUC AC SERVO MOTOR αis series FANUC AC SERVO MOTOR αi series PARAMETER MANUAL	B–65270EN
FANUC AC SPINDLE MOTOR αi series DESCRIPTIONS	B–65272EN
FANUC AC SPINDLE MOTOR αi series PARAMETER MANUAL	B–65280EN
FANUC SERVO AMPLIFIER αi series DESCRIPTIONS	B–65282EN
FANUC AC SERVO MOTOR αis series FANUC AC SERVO MOTOR αi series FANUC AC SPINDLE MOTOR αi series FANUC SERVO AMPLIFIER αi series MAINTENANCE MANUAL	B–65285EN

Related manuals of Servo Motor β series

The following table lists the manuals related to Servo Motor β series.

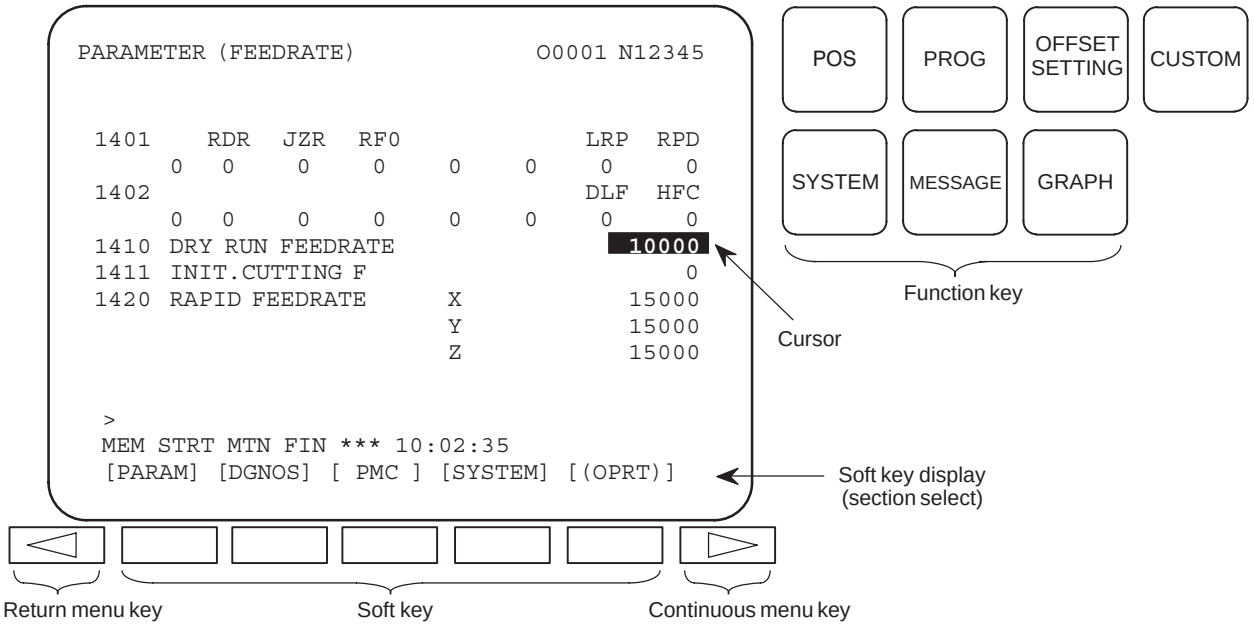
Manual name	Specification number
FANUC SERVO MOTOR β series DESCRIPTIONS	B–65232EN
FANUC SERVO MOTOR β series MAINTENANCE MANUAL	B–65235EN
FANUC SERVO MOTOR β series(I/O Link Option) DESCRIPTIONS	B–65245EN

Table of Contents

1 DISPLAYING PARAMETERS

Follow the procedure below to display parameters.

(1) Press the SYSTEM function key on the MDI as many times as required, or alternatively, press the SYSTEM function key once, then the PARAM section display soft key. The parameter screen is then selected.

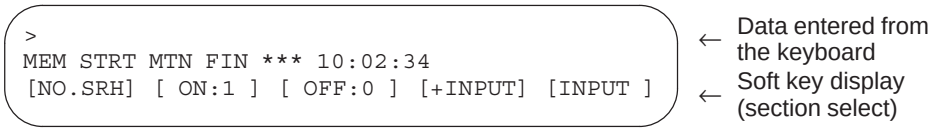


(2) The parameter screen consists of multiple pages. Use step (a) or (b) to display the page that contains the parameter you want to display.

(a) Use the page select key or the cursor move keys to display the desired page.

(b) Enter the data number of the parameter you want to display from the keyboard, then press the [**NO.SRH**] soft key. The parameter page containing the specified data number appears with the cursor positioned at the data number. (The data is displayed in reverse video.)

NOTE
If key entry is started with the section select soft keys displayed, they are replaced automatically by operation select soft keys including [**NO.SRH**]. Pressing the [**(OPRT)**] soft key can also cause the operation select keys to be displayed.



2 SETTING PARAMETERS FROM MDI

Follow the procedure below to set parameters.

(1) Place the NC in the MDI mode or the emergency stop state.

(2) Follow the substeps below to enable writing of parameters.

1. To display the setting screen, press the OFFSET SETTING function key as many times as required, or alternatively press the OFFSET SETTING function key once, then the [**SETTING**] section select soft key. The first page of the setting screen appears.
2. Position the cursor on "PARAMETER WRITE" using the cursor move keys.

```
SETTING (HANDY)                    O0001  N00010

 PARAMETER WRITE = 0   (0:DISABLE 1:ENABLE)
 TV CHECK        =  0  (0:OFF     1:ON)
 PUNCH CODE      =  0  (0:EIA     1:ISO)
 INPUT UNIT      =  0  (0:MM      1:INCH)
 I/O CHANNEL     =  0  (0-3:CHANNEL NO.)
```

3. Press the [**(OPRT)**] soft key to display operation select soft keys.

```
 >
 MDI STOP *** *** *** 10:03:02
 [NO.SRH] [ ON:1 ] [ OFF:0 ] [+INPUT] [INPUT]
```

← Soft key display (section select)

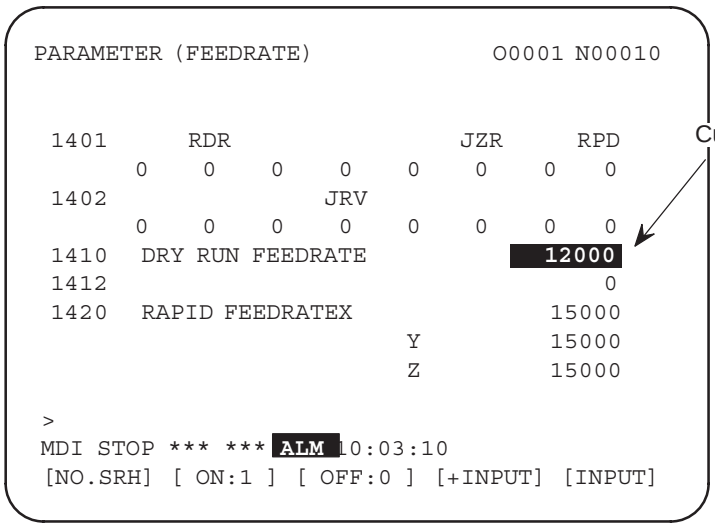
4. To set "PARAMETER WRITE=" to 1, press the ON:1 soft key, or alternatively enter 1 and press the INPUT soft key. From now on, the parameters can be set. At the same time an alarm condition (P/S100 PARAMETER WRITE ENABLE) occurs in the CNC.

(3) To display the parameter screen, press the SYSTEM function key as many times as required, or alternatively press the SYSTEM function key once, then the PARAM section select soft key.
(See "1. Displaying Parameters.")

(4) Display the page containing the parameter you want to set, and position the cursor on the parameter. (See "1. Displaying Parameters.")

(5) Enter data, then press the [**INPUT**] soft key. The parameter indicated by the cursor is set to the entered data.

[Example] 12000 [**INPUT**]



Data can be entered continuously for parameters, starting at the selected parameter, by separating each data item with a semicolon (;).

[Example] Entering 10;20;30;40 and pressing the INPUT key assigns values 10, 20, 30, and 40 to parameters in order starting at the parameter indicatedby the cursor.

(6) Repeat steps (4) and (5) as required.

(7) If parameter setting is complete, set “PARAMETER WRITE=” to 0 on the setting screen to disable further parameter setting.

(8) Reset the NC to release the alarm condition (P/S100).
If an alarm condition (P/S000 PLEASE TURN OFF POWER) occurs in the NC, turn it off before continuing operation.

3 INPUTTING AND OUTPUTTING PARAMETERS THROUGH THE READER/PUNCHER INTERFACE

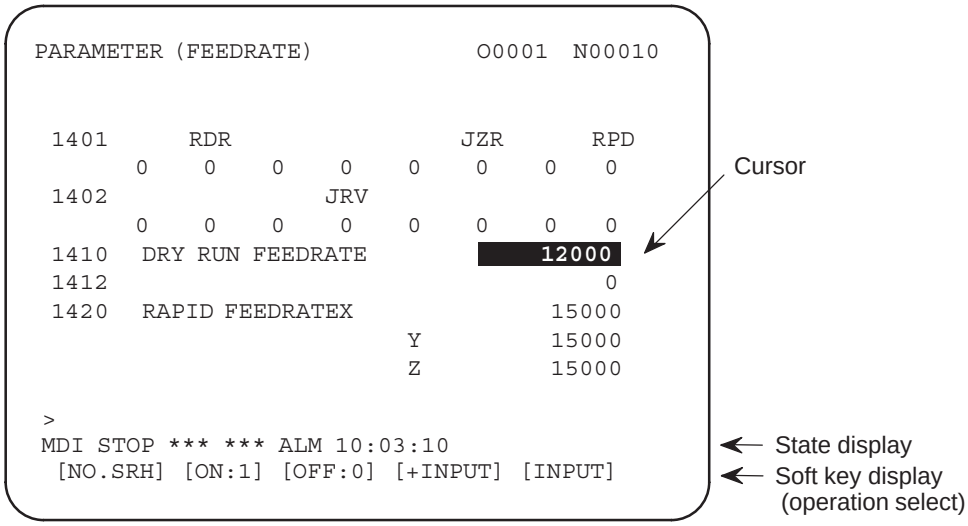
This section explains the parameter input/output procedures for input/output devices connected to the reader/puncher interface.
The following description assumes the input/output devices are ready for input/output. It also assumes parameters peculiar to the input/output devices, such as the baud rate and the number of stop bits, have been set in advance. (See Section 4.2)

3.1 OUTPUTTING PARAMETERS THROUGH THE READER/PUNCHER INTERFACE

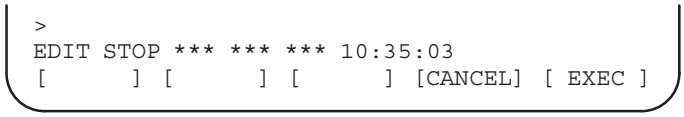
(1) Select the EDIT mode or set to Emergency stop.

(2) To select the parameter screen, press the SYSTEM function key as many times as required, or alternatively press the SYSTEM function key once, then the [**PARAM**] section select soft key.

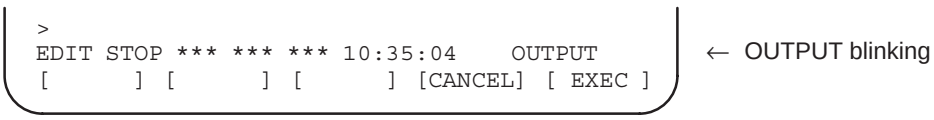
(3) Press the [**(OPRT)**] soft key to display operation select soft keys, then press the forward menu key located at the right–hand side of the soft keys to display another set of operation select keys including [**PUNCH**].



(4) Pressing the [**PUNCH**] soft key changes the soft key display as shown below:



(5) Press the [**EXEC**] soft key to start parameter output. When parameters are being output, “OUTPUT” blinks in the state display field on the lower part of the screen.



(6) When parameter output terminates, “OUTPUT” stops blinking. Press the RESET key to interrupt parameter output.

3.2 INPUTTING PARAMETERS THROUGH THE READER/PUNCHER INTERFACE

(1) Place the NC in the emergency stop state.

(2) Enable parameter writing.

1. To display the setting screen, press the OFFSET SETTING function key as many times as required, or alternatively press the OFFSET SETTING function key once, then the [**SETING**] section select soft key. The first page of the setting screen appears.
2. Position the cursor on "PARAMETER WRITE" using the cursor move keys.
3. Press the [**(OPRT)**] soft key to display operation select soft keys.
4. To set "PARAMETER WRITE=" to 1, press the ON:1 soft key, or alternatively enter 1, then press the [**INPUT**] soft key. From now on, parameters can be set. At the same time an alarm condition (P/S100 PARAMETER WRITE ENABLE) occurs in the NC.

(3) To select the parameter screen, press the SYSTEM function key as many times as required, or alternatively press the SYSTEM key once, then [**PARAM**] soft key.

(4) Press the [**(OPRT)**] soft key to display operation select keys, then press the forward menu key located at the right–hand side of the soft keys to display another set of operation select soft keys including [**READ**].

```
>
EDIT STOP  -EMG- ALM 10:37:30                          ← State display
[      ] [ READ ] [PUNCH] [      ] [      ]            ← Soft key display
```

(5) Pressing the [**READ**] soft key changes the soft key display as shown below:

```
>
EDIT STOP  -EMG- ALM 10:37:30
[      ] [      ] [      ] [CANCEL] [ EXEC ]
```

(6) Press the [**EXEC**] soft key to start inputting parameters from the input/output device. When parameters are being input, "INPUT" blinks in the state display field on the lower part of the screen.

```
>
EDIT STOP  -EMG- ALM 10:37:30    INPUT          ← INPUT blinking
[      ] [      ] [      ] [CANCEL] [ EXEC ]
```

(7) When parameter input terminates, "INPUT" stops blinking. Press the RESET key to interrupt parameter input.

(8) When parameter read terminates, "INPUT" stops blinking, and an alarm condition (P/S000) occurs in the NC. Turn it off before continuing operation.

4 DESCRIPTION OF PARAMETERS

Parameters are classified by data type as follows:

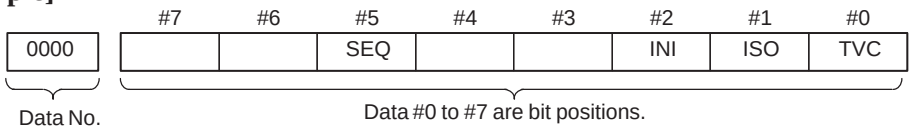
Table 4 Data Types and Valid Data Ranges of Parameters

Data type	Valid data range	Remarks
Bit Bit axis	0 or 1	
Byte Byte axis	–128 to 127 0 to 255	In some parameters, signs are ignored.
Word Word axis	–32768 to 32767 0 to 65535	In some parameters, signs are ignored.
2–word 2–word axis	–99999999 to 99999999	

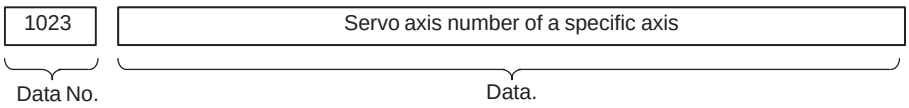
NOTE
1 For the bit type and bit axis type parameters, a single data number is assigned to 8 bits. Each bit has a different meaning.
2 The axis type allows data to be set separately for each control axis.
3 The valid data range for each data type indicates a general range. The range varies according to the parameters. For the valid data range of a specific parameter, see the explanation of the parameter.

(1) Notation of bit type and bit axis type parameters

[Example]



(2) Notation of parameters other than bit type and bit axis type



NOTE
The bits left blank in 4. DESCRIPTION OF PARAMETERS and parameter numbers that appear on the display but are not found in the parameter list are reserved for future expansion. They must always be 0.

4.1 PARAMETERS OF SETTING

	#7	#6	#5	#4	#3	#2	#1	#0
0000			SEQ			INI	ISO	TVC

The following parameter can be set at “Setting screen”.

[Data type] Bit

TVC TV check
0 : Not performed
1 : Performed

ISO Code used for data output
0 : EIA code
1 : ISO code

INI Unit of input
0 : In mm
1 : In inches

SEQ Automatic insertion of sequence numbers
0: Not performed
1: Performed

When a program is prepared by using MDI keys in the part program storage and edit mode, a sequence number can automatically be assigned to each block in set increments. Set the increment to parameter 3216.

	#7	#6	#5	#4	#3	#2	#1	#0
0002	SJZ							RDG

The following parameters can be set at “Setting screen”.

[Data type] Bit

RDG Remote diagnosis is
0: Not performed.
1: Performed.
To use an RS–232C serial port for performing remote diagnosis, connect and setup the modem, cable, and the like, then set 1 in this parameter.

SJZ Manual reference position si performed as follows:
0 : When no reference position has been set, reference position return is performed using deceleration dogs. When a reference position is already set, reference position return is performed using rapid traverse and deceleration dogs are ignored.
1 : Reference position return is performed using deceleration dogs at all times.

Note
SJZ is enabled when bit 3 (HJZ) of parameter No.1005 is set to 1. When a reference position is set without a dog, (i.e. when bit 1 (DLZ) of parameter No.1002 is set to 1 or bit 1 (DLZx) of parameter No.1005 is set to 1) reference position return after reference position setting is performed using rapid traverse at all times, regardless of the setting of SJZ.

	#7	#6	#5	#4	#3	#2	#1	#0
0012								MIRx

The following parameters can be set at “Setting screen”.

[Data type] Bit axis

MIRx Mirror image for each axis
0 : Mirror image is off.
1 : Mirror image is on.

0020	I/O CHANNEL: Selection of an input/output device or selection of input device in the foreground

This parameter can be set at “Setting screen”.

[Data type] Byte

[Valid data range] 0 to 35

I/O CHANNEL: Selection of the input/output device to be used

The CNC provides the following interfaces for data transfer to and from the host computer and external input/output devices:

- Input/output device interface (RS–232C serial port 1, 2)
- DNC2 interface

Data can be transferred to and from a personal computer connected via the FOCAS1/Ethernet or FOCAS1/HSSB.
In addition, data can be transferred to and from the Power Mate via the FANUC I/O Link.
This parameter selects the interface used to transfer data to and from an input/output device.

Setting	Description
0, 1	RS–232C serial port 1
2	RS–232C serial port 2
4	Memory card interface
5	Data server interface
6	The DNC operation is performed or M198 is specified by FOCAS1/ Ethernet.
10	DNC2 interface
15	M198 is specified by FOCAS1/HSSB. (Bit 1 (NWD) of parameter No. 8706) must also be specified.)
20 Group 0 21 Group 1 22 Group 2 | | 34 Group 14 35 Group 15	Data is transferred between the CNC and a Power Mate in group n (n: 0 to 15) via the FANUC I/O Link.

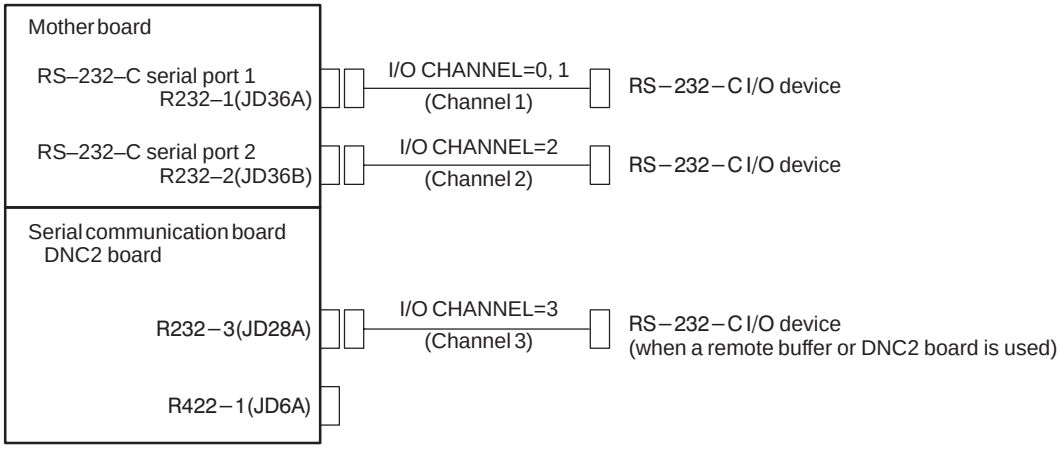
Supplemental remark 1

If the DNC operation is performed with FOCAS1/HSSB, the setting of parameter No. 20 does not matter. The DMMC signal <G042.7> is used.

Supplemental remark 2

If bit 0 (IO4) of parameter No. 110 is set to control the I/O channels separately, the I/O channels can be divided into four types: input and output in the foreground and input and output in the background. If so, parameter No. 20 becomes a parameter for selecting the input device in the foreground.

NOTE
1 An input/output device can also be selected using the setting screen. Usually, the setting screen is used.
2 The specifications (such as the baud rate and the number of stop bits) of the input/output devices to be connected must be set in the corresponding parameters for each interface beforehand. (See Section 4.2.) I/O CHANNEL = 0 and I/O CHANNEL = 1 represent input/output devices connected to RS–232C serial port 1. Separate parameters for the baud rate, stop bits, and other specifications are provided for each channel.



3 The input/output unit interface may be referred to as the reader/punch interface.
RS–232C serial port 1 and RS–232C serial port 2 are also referred to as channel 1 and channel 2, respectively.

0021	Setting of the output device in the foreground
0022	Setting of the input device in the background
0023	Setting of the output device in the background

These parameters can be set at “Setting screen”.

[Data type] Byte

[Valid data range] 0 to 2, 5, 10

These parameters are valid only when bit 0 (IO4) of parameter No. 110 is set to control the I/O channels separately.

The parameters set individual input/output devices if the I/O channels are divided into these four types: input and output in the foreground and input and output in the background. The input device in the foreground is set in parameter No. 20. For the details of the settings, see the table provided with the description of parameter No. 20.

NOTE
If different input/output devices are simultaneously used in the foreground and background, just a value from 0 to 2 can be specified for the background device.
If an attempt is made to use a busy input/output device, an alarm (P/S233 or BP/S233) will be raised. Note that the settings 0 and 1 indicate the same input/output device.

4.2 PARAMETERS OF READER/PUNCHER INTERFACE

This CNC has two channels CRS–232–C serial port1 and RS–232–C serial port2 of input/output device interfaces. The input/output device to be used is specified by setting the channel connected to that device in setting parameter I/O CHANNEL.
The specified data, such as a baud rate and the number of stop bits, of an input/output device connected to a specific channel must be set in parameters for that channel in advance.
For channel 1, two combinations of parameters to specify the input/output device data are provided.
The following shows the interrelation between the input/output device interface parameters for the channels.

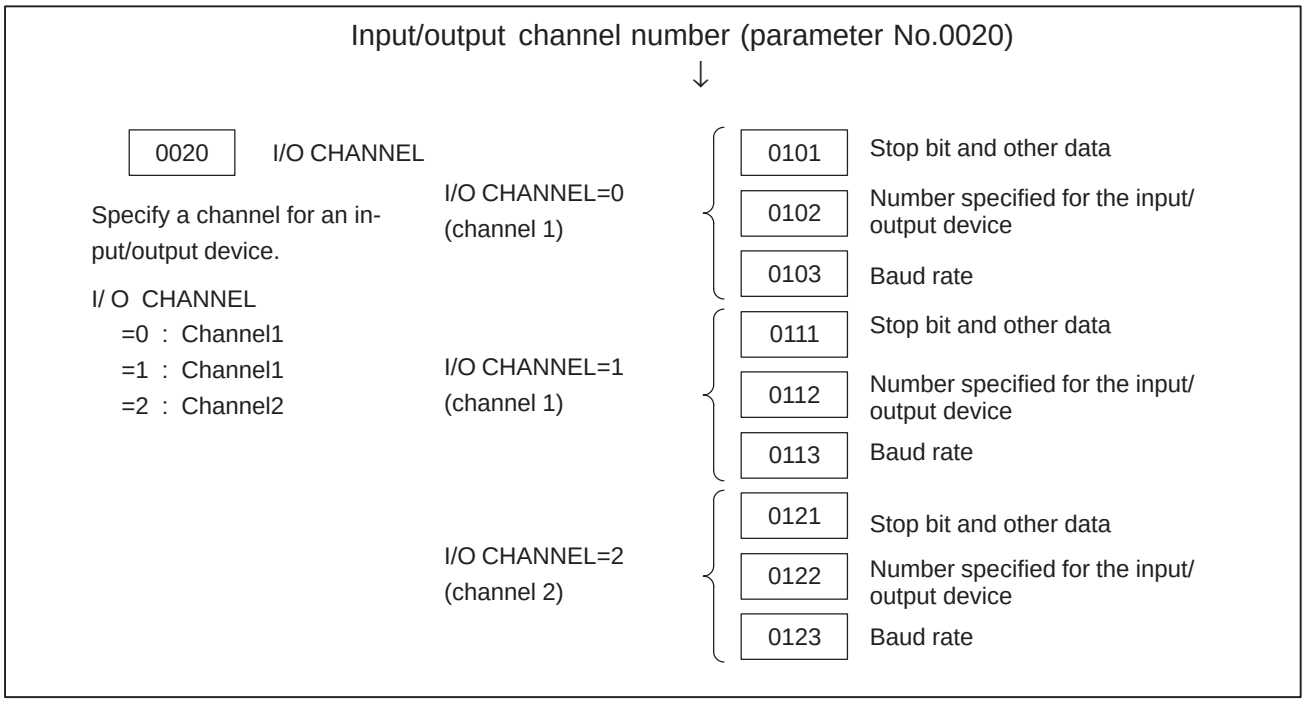


Fig.4.2 I/O Device Interface Settings

4.2.1 Parameters Common to all Channels

0024	Port for communication with the PMC ladder development tool (FAPT LADDER–II/III)

This parameter can be set at “Setting screen”.

[Data type] Byte

This parameter sets the port to be used for communication with the PMC ladder development tool (FAPT LADDER–II/III).

0 : HSSB (COP7)
1 : RS–232C serial port 1 (JD36A)
2 : RS–232C serial port 2 (JD36B)

	#7	#6	#5	#4	#3	#2	#1	#0
0100	ENS	IOP	ND3		NCR	CRF	CTV	

[Data type] Bit

CTV: Character counting for TV check in the comment section of a program.
0 : Performed
1 : Not performed

CRF EOB (end of block) to be output in the ISO code:
0: Depends on the setting of bit 3 (NCR) of parameter No. 100.
1: is “CR”“LF”.

Note) The EOB output patterns are as shown below:

NCR	CRF	EOB output format
0	0	“LF” “CR” “CR”
0	1	“CR” “LF”
1	0	“LF”
1	1	“CR” “LF”

NCR Output of the end of block (EOB) in ISO code
0 : LF, CR, CR are output.
1 : Only LF is output.

ND3 In DNC operation, a program is:
0 : Read block by block. (A DC3 code is output for each block.)
1 : Read continuously until the buffer becomes full. (A DC3 code is output when the buffer becomes full.)

NOTE
In general, reading is performed more efficiently when ND3 set to 1. This specification reduces the number of buffering interruptions caused by reading of a series of blocks specifying short movements. This in turn reduces the effective cycle time.

IOP Specifies how to stop program input/output operations.
0 : An NC reset can stop program input/output operations.
1 : Only the [**STOP**] soft key can stop program input/output operations. (An reset cannot stop program input/output operations.)

ENS Action taken when a NULL code is found during read of EIA code
0 : An alarm is generated.
1 : The NULL code is ignored.

	#7	#6	#5	#4	#3	#2	#1	#0
0110								IO4

[Data type] Bit

IO4 Separate control of I/O channel numbers is:
0: Not performed.
1: Performed.

If the I/O channels are not separately controlled, set the input/output device in parameter No. 20.

If the I/O channels are separately controlled, set the input device and output device in the foreground and the input device and output device in the background in parameters No. 20 to No. 23 respectively.

Separate control of I/O channels makes it possible to perform background editing, program input/output, and the like during the DNC operation.

4.2.2 Parameters of Channel 1 (I/O CHANNEL=0)

	#7	#6	#5	#4	#3	#2	#1	#0
0101	NFD				ASI		HAD	SB2

[Data type] Bit type

SB2 The number of stop bits
0 : 1
1 : 2

HAD An alarm raised for the internal handy file is:
0: Not displayed in detail on the NC screen. (PS alarm 86 is displayed.)
1: Displayed in detail on the NC screen.

ASI Code used at data input
0 : EIA or ISO code (automatically distinguished)
1 : ASCII code

NFD Feed before and after the data at data output
0 : Output
1 : Not output

> **NOTE**
> When input/output devices other than the FANUC PPR are used, set NFD to 1.

0102	Number specified for the input/output device (when the I/O CHANNEL is set to 0)

[Data type] Byte

Set the number specified for the input/output device used when the I/O CHANNEL is set to 0, with one of the set values listed in Table 4.2 (a).

Table 4.2.2 (a) Set value and Input/Output Device

Set value	Input/output device
0	RS–232–C (Used control codes DC1 to DC4)
1	FANUC CASSETTE ADAPTOR 1 (FANUC CASSETTE B1/ B2)
2	FANUC CASSETTE ADAPTOR 3 (FANUC CASSETTE F1)
3	FANUC PROGRAM FILE Mate, FANUC FA Card Adaptor FANUC FLOPPY CASSETTE ADAPTOR, FANUC Handy File FANUC SYSTEM P-MODEL H
4	RS–232–C (Not used control codes DC1 to DC4)
5	Portable tape reader
6	FANUC PPR FANUC SYSTEM P-MODEL G, FANUC SYSTEM P-MODEL H

0103	Baud rate (when the I/O CHANNEL is set to 0)

[Data type] Byte

Set baud rate of the input/output device used when the I/O CHANNEL is set to 0, with a set value in Table 4.2 (b).

Table 4.2.2 (b)

Set value	Baud rate (bps)
1	50
2	100
3	110
4	150
5	200
6	300

Set value	Baud rate (bps)
7	600
8	1200
9	2400
10	4800
11	9600
12	19200

4.2.3 Parameters of Channel 1 (I/O CHANNEL=1)

	#7	#6	#5	#4	#3	#2	#1	#0
0111	NFD				ASI			SB2

[Data type] Bit

These parameters are used when I/O CHANNEL is set to 1. The meanings of the bits are the same as for parameter 0101.

0112	Number specified for the input/output device (when I/O CHANNEL is set to 1)

[Data type] Byte

Set the number specified for the input/output device used when the I/O CHANNEL is set to 1, with one of the set values listed in Table 4.2 (a).

0113	Baud rate (when I/O CHNNEL is set to 1)

[Data type] Byte

Set the baud rate of the input/output device used when I/O CHANNEL is set to 1, with a value in Table 4.2 (b).

4.2.4 Parameters of Channel 2 (I/O CHANNEL=2)

	#7	#6	#5	#4	#3	#2	#1	#0
0121	NFD				ASI			SB2

[Data type] Bit

These parameters are used when I/O CHANNEL is set to 2. The meanings of the bits are the same as for parameter 0101.

0122	Number specified for the input/output device (when I/O CHANNEL is set to 2)

[Data type] Byte

Set the number specified for the input/output device used when I/O CHANNEL is set to 2, with a value in Table 4.2 (a).

0123	Baud rate (when the I/O CHANNEL is set to 2)

[Data type] Byte

Set the baud rate of the input/output device used when I/O CHANNEL is set to 2, with a value in Table 4.2 (b).

	#7	#6	#5	#4	#3	#2	#1	#0
0134				NCD		SYN	PRY	

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

PRY Parity bit
0: Not used
1: Used

SYN Reset/alarm in protocol B
0: Not reported to the host
1: Reported to the host with SYN and NAK codes

NCD CD (signal quality detection) of the RS–232C interface
0: Checked
1: Not checked

	#7	#6	#5	#4	#3	#2	#1	#0
0135	RMS					PRA	ETX	ASC

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

ASC Communication code except NC data
0: ISO code
1: ASCII code

ETX End code for protocol A or extended protocol A
0: CR code in ASCII/ISO
1: ETX code in ASCII/ISO

NOTE
Use of ASCII/ISO is specified by ASC.

PRA Communication protocol
0: Protocol B
1: Protocol A

RMS State of remote/tape operation when protocol A is used
0: Always 0 is returned.
1: Contents of the change request of the remote/tape operation in the SET command from the host is returned.

	#7	#6	#5	#4	#3	#2	#1	#0
0138	MDN							

[Data type] Bit

MDN The DNC operation function by a memory card is:
0: Disabled.
1: Enabled. (A PCMCIA card attachment is required.)

NOTE
Use a PCMCIA card attachment suited to the CNC to secure the memory card in the CNC.

4.3 PARAMETERS OF DNC2 INTERFACE

	#7	#6	#5	#4	#3	#2	#1	#0
0140					ECD	NCE		BCC

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

BCC The BCC value (block check characters) for the DNC2 interface is:
0: Checked.
1: Not checked.

Even if the BCC value is not checked, the BCC value itself must be specified.

NCE The ER (RS–232C) and TR (RS422) signals are:
0: Checked.
1: Not checked.

This parameter is provided only for the DNC2 interface.

ECD Error code of negative acknowledgment
0: A four–digit hexadecimal error code is added to a negative acknowledgment.
1: No error code is added to a negative acknowledgment.

This parameter is provided only for the DNC2 interface.

NOTE
To use FANUC DNC2 communications library for the host computer, set this parameter to 1.

0143	Time limit specified for the timer monitoring a response (DNC2 interface)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Unit of data] S

[Valid data range] 1 to 60 (The standard setting is 3.)

0144	Time limit specified for the timer monitoring the EOT signal (DNC2 interface)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Unit of data] S

[Valid data range] 1 to 60 (The standard setting is 5.)

0145 Time required for switching RECV and SEND (DNC2 interface)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Unit of data] S

[Valid data range] 1 to 60 (The standard setting is 1.)

0146 Number of times the system retries holding communication (DNC2 interface)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Unit of data] S

[Valid data range] 1 to 10 (The standard setting is 3.)

Set the maximum number of times the system retries holding communication with the remote device if the remote device uses an invalid protocol in the data–link layer or the remote device does not respond to the request.

0147 Number of times the system sends the message in response to the NAK signal (DNC2 interface)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Unit of data] Number of times

[Valid data range] 1 to 10 (The standard setting is 2.)

Set the maximum number of times the system retries sending the message in response to the NAK signal.

0148 Number of characters in overrun (DNC2) interface)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Valid data range] 10 to 225 (The standard setting is 10.)

Set the number of characters the system can receive after transmission is stopped (CS off).

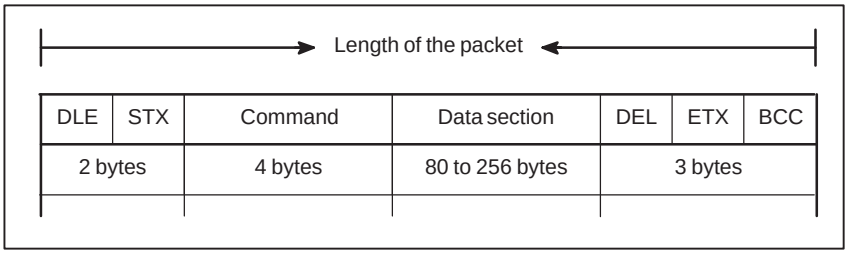
0149	Number of characters in the data section of the communication packet (DNC2 interface)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Word

[Valid range] 80 to 256 (The standard setting is 256.)

The standard setting is 256. If the specified value is out of range, a value of 80 or 256 is used.
This parameter determines the maximum length of the packet used in transmission over the DNC2 interface. Including the two characters at the start of the packet, the four characters used for a command, and the three characters at the end, the maximum number of characters in the packet is nine plus the number specified in parameter No.0149.



4.4 PARAMETERS OF REMOTE DIAGNOSIS

	#7	#6	#5	#4	#3	#2	#1	#0
0002								RDG

[Data type] Bit

RDG Remote diagnosis is:
0: Not performed.
1: Performed.

If an RS–232C serial port is used to carry out remote diagnosis, connect and set up the modem, cable, and the like, then set 1 in this parameter.

	#7	#6	#5	#4	#3	#2	#1	#0
0201						NCR	ASC	SB2

[Data type] Bit

SB2 The number of stop bits is
0: 1.
1: 2.

To carry out remote diagnosis, set 0.

ASC The code to be used for data output is:
0: ISO code.
1: ASCII code.

To carry out remote diagnosis, set 1.

NCR EOB (end of block) is output as:
0: ”LF””CR””CR”.
1: Just as ”LF”.

To carry out remote diagnosis, set 1.

0203	Baud rate (for remote diagnosis)

[Data type] Byte

Set the baud rate of data input/output by remote diagnosis, with reference to the tables given below.

When using an RS–232C serial port

Setting	Baud rate (bps)
1	50
2	100
3	110
4	150
5	200
6	300

Setting	Baud rate (bps)
7	600
8	1200
9	2400
10	4800
11	9600
12	19200

NOTE
The tables above indicate the baud rates of communication between the CNC and modem. The actual communication baud rate may be lowered, depending on the modem and communication line.

0204	Remote diagnosis channel

[Data type] Byte

[Valid data range] 0, 1, 2

The interface to be used for remote diagnosis is:

0, 1: RS–232C serial port 1 (channel 1).
2 : RS–232C serial port 2 (channel 2).

0211	Password 1 for remote diagnosis

0212	Password 2 for remote diagnosis

0213	Password 3 for remote diagnosis

[Data type] 2–word

[Valid data range] 1 to 99999999

Specify a password for using the remote diagnosis function.

The remote diagnosis function has the following password settings. Data can be protected by preventing a third party from accessing any system parameter or machining program without permission.

Password 1:

Set a password for the whole service of the remote diagnosis function. (The whole remote diagnosis service is available only when this password is input on the host side (PC, for instance).)

Password 2:

Set a password of a part program. (The input/output, verification, and the like of a program are possible only when this password is input on the host side (PC, for instance).)

Password 3:

Set a password of a parameter. (The input/output or the like of a parameter is possible only when this password is input on the host side (PC, for instance).)

NOTE
Once any value other than 0 is specified as a password, the password can be changed only when the same value is specified in the corresponding keyword (parameters No. 221 to No. 223). If any value other than 0 is specified as a password, the password setting is not displayed on the parameter screen (blank display is provided). Take great care when setting the password.

0221	Keyword 1 for remote diagnosis
0222	Keyword 2 for remote diagnosis
0223	Keyword 3 for remote diagnosis

[Data type] 2–word

[Valid range] 1 to 99999999

Set a keyword corresponding to a password of the remote diagnosis function.

Keyword 1: Keyword for password 1 (parameter No. 211)

Keyword 2: Keyword for password 2 (parameter No. 212)

Keyword 3: Keyword for password 3 (parameter No. 213)

If any value other than 0 is specified as a password (parameters No. 211 to No. 213), the password can be changed only when the same value is specified as the corresponding keyword.

NOTE
The keyword value is reset to 0 at power–up.
On the parameter screen, the keyword setting is not displayed (blank display is provided).

4.5 PARAMETER OF MEMORY CARD INTERFACE

	#7	#6	#5	#4	#3	#2	#1	#0
0300								PCM

[Data type] Bit

PCM If the CNC screen display function is enabled, when a memory card interface is provided on the NC side (HSSB connection),
0 : The memory card interface on the NC side is used.
1 : The memory card interface on the PC side is used.

If this parameter is set to 0 while the HSSB board is used for connection, the I/O channel specified in parameter No. 0020 is used.

If this parameter is set to 1, data input/output from and to the PC is performed irrespective of the setting of parameter No. 20. This parameter is valid only while the CNC screen display function is active.

4.6 PARAMETERS OF DATA SERVER

	#7	#6	#5	#4	#3	#2	#1	#0
0900							ONS	DSV

[Data type] Bit

DSV The data server function is
0: Enabled
1: Disabled

ONS When the O number of the data server file name and the O number in an NC program do not match:
0: The O number of the file name takes priority.
1: The O number in the NC program takes priority.

0911	Altemate MDI character

[Data type] Word

[Set value] ASCII code (decimal)

0912	Character not provided in MDI keys

[Data type] Word

[Set value] ASCII code (decimal)

When specifying a character which is not provided as a MDI keys for HOST DIRECTORY of DATA SERVER SETTING–1, use these parameters to assign an alternative key to that character.

[Example]
If ODSERVERONCPROG is specified for HOST DIRECTORY, you cannot enter "\" with the MDI keys. To use "@" as an alternative character, set 64 (ASCII code for @) in parameter No.0911 and 92 (ASCII code for \) in parameter No.0912.
When

"DSERVER@NCPROG"

is specified for HOST DIRECTORY, the data server converts it to

"ODSERVERONCPROG".

NOTE
When both parameters No.0911 and 0912 are set to 0, the data server assumes the following setting:
No.0911 = 32 (blank)
No.0912 = 92 (\)

0921	OS selected for host computer 1 of data server

0922	OS selected for host computer 2 of data server

0923	OS selected for host computer 3 of data server

[Data type] Word

[Valid data range] 0 to 1

1 : UNIX or VMS is selected.

0 : Windows95/98/NT is selected.

0924	Latency setting for FOCAS1/Ethernet

[Data type] Word

[Unit of data] ms

[Valid data range] 0 to 255

Set service latency of FOCAS1/Ethernet while FOCAS1/Ethernet is used together with the data server function.

If a value between 0 and 2 is set, 2 ms is assumed.

4.7 PARAMETERS OF ETHERNET

0931	Special character code corresponding to soft key [CHAR–1]
0932	Special character code corresponding to soft key [CHAR–2]
0933	Special character code corresponding to soft key [CHAR–3]
0934	Special character code corresponding to soft key [CHAR–4]
0935	Special character code corresponding to soft key [CHAR–5]

[Data type] Byte

[Valid data range] 32 to 95

These parameters are provided to allow a special character that is not provided on the MDI panel but needed in a user name, password, or login DIR to be input by pressing a soft key on the Ethernet parameter screen.

If a value other than 0 is input as a parameter, the special character assigned to the corresponding input soft key [CHAR–1] to [CHAR–5] is displayed.

The special character codes correspond to the ASCII codes.

Sample special character codes

Special character	Code	Special character	Code	Special character	Code
Blank	32	)	41	<	60
!	33	*	42	>	62
”	34	+	43	?	63
#	35	,	44	@	64
$	36	–	45	[	91
%	37	.	46	^	92
&	38	/	47	¥	93
’	39	:	58	]	94
(	40	;	59	_	95

4.8 PARAMETERS OF POWER MATE CNC MANAGER

	#7	#6	#5	#4	#3	#2	#1	#0
0960					PMN	MD2	MD1	SLV

[Data type] Bit

SLV When the power mate CNC manager is selected, the screen displays:
0 : One slave.
1 : Up to four slaves with the screen divided into four.

MD1,MD2 These parameters set a slave parameter input/output destination.

MD2	MD1	Input/output destination
0	0	Part program storage
0	1	Memory card

In either case, slave parameters are output in program format.

PMN The power mate CNC manager function is:
0 : Enabled.
1 : Disabled. (Communication with slaves is not performed.)

4.9 PARAMETERS OF AXIS CONTROL/ INCREMENT SYSTEM

	#7	#6	#5	#4	#3	#2	#1	#0
1001								INM

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

INM Least command increment on the linear axis
0 : In mm (metric system machine)
1 : In inches (inch system machine)

	#7	#6	#5	#4	#3	#2	#1	#0
1002	IDG			XIK	AZR	SFD	DLZ	JAX

[Data type] Bit

JAX Number of axes controlled simultaneously in manual continuous feed, manual rapid traverse and manual reference position return
0 : 1 axis
1 : 3 axes

DLZ Function setting the reference position without dog
0 : Disabled
1 : Enabled (enabled for all axes)

NOTE
1 This function can be specified for each axis by DLZx, bit 1 of parameter No.1005.
2 For a system including an axis of Cs contour control or spindle positioning, avoid using this parameter. Use bit 1 (DLZx) of parameter No. 1005 instead to set just a required axis.

SFD The function for shifting the reference position is
0: Not used.
1: Used.

AZR When no reference position is set, the G28 command causes:
0: Reference position return using deceleration dogs (as during manual reference position return) to be exected.
1: P/S alarm No.090 to be issued.

NOTE
When reference position return without dogs is specified, (when bit 1 (DLZ) of parameter No.1002 is set to 1 or bit 1 (DLZx) of parameter No.1005 is set to 1) the G28 command specified before a reference position is set causes P/S alarm No.090 to be issued, regardless of the setting of AZR.

XIK When LRP, bit 1 of parameter No.1401, is set to 0, namely, when positioning is performed using non–linear type positioning, if an interlock is applied to the machine along one of axes in positioning,
0: The machine stops moving along the axis for which the interlock is applied and continues to move along the other axes.
1: The machine stops moving along all the axes.

IDG When the reference position is set without dogs, automatic setting of the IDGx parameter (bit 0 of parameter No.1012) to prevent the reference position from being set again is:
0 : Not performed.
1 : Performed.

	#7	#6	#5	#4	#3	#2	#1	#0
1004	IPR							ISA

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

ISA The least input increment and least command increment are set.

ISA	Least input increment and least command increment	Symbol
0	0.001 mm, 0.001 deg, or 0.0001 inch	IS–B
1	0.01 mm, 0.01 deg, or 0.001 inch	IS–A

IPR Whether the least input increment for each axis is set to a value 10 times as large as the least command increment is specified, in increment systems of IS–B at setting mm.
0: The least input increment is not set to a value 10 times as larg as the least command increment.
1: The least input increment is set to a value 10 times as large as the least command increment.

If IPR is set to 1, the least input increment is set as follows:

Input increment	Least input increment
IS–B	0.01 mm, 0.01 deg, or 0.0001 inch

NOTE
For IS–A, the least input increment cannot be set to a value 10 times as large as the least command increment.
The least input increment is not multiplied by 10 also when the calculator–type decimal point input (bit 0 (DPI) of parameter No. 3401) is used.

	#7	#6	#5	#4	#3	#2	#1	#0
1005			EDMx	EDPx	HJZx		DLZx	ZRNx

[Data type] Bit axis

ZRNx When a command specifying the movement except for G28 is issued in automatic operation (memory, MDI, or DNC operation) and when a return to the reference position has not been performed since the power was turned on

0 : An alarm is generated (P/S alarm 224).
1 : An alarm is not generated.

> **NOTE**
> The state in which the reference position has not been established refers to that state in which reference position return has not been performed after power–on when an absolute position detector is not being used, or that state in which the association of the machine position with the position detected with the absolute position detector has not been completed (see the description of bit 4 (APZx) of parameter No. 1815) when an absolute position detector is being used.

DLZx Function for setting the reference position without dogs

0 : Disabled
1 : Enabled

> **NOTE**
> When DLZ of parameter No.1002 is 0, DLZx is enabled. When DLZ of parameter No.1002 is 1, DLZx is disabled, and the function for setting the reference position without dogs is enabled for all axes.

HJZx When a reference position is already set:

0 : Manual reference position return is performed with deceleration sogs.
1 : Manual reference position return is performed using rapid traverse without deceleration dogs, or manual reference position return is performed with deceleration dogs, depending on the setting of bit 7 (SJZ) of parameter No.0002.

> **NOTE**
> When reference position return without dogs is specified, (see bit 1 (DLZ) of parameter No.1002) reference position return after a reference position is set is performed using rapid traverse, regardless of the setting of HJZ.

EDPx External deceleration signal in the positive direction for each axis

0 : Valid only for rapid traverse
1 : Valid for rapid traverse and cutting feed

EDMx External deceleration signal in the negative direction for each axis

0 : Valid only for rapid traverse
1 : Valid for rapid traverse and cutting feed

	#7	#6	#5	#4	#3	#2	#1	#0
1006			ZMIx				ROSx	ROTx

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit axis

ROTx, ROSx Setting linear or rotation axis.

ROSx	ROTx	Meaning
0	0	Linear axis (1) Inch/metric conversion is done. (2) All coordinate values are linear axis type. (Is not rounded in 0 to 360°) (3) Stored pitch error compensation is linear axis type (Refer to parameter No.3624)
0	1	Rotation axis (A type) (1) Inch/metric conversion is not done. (2) Machine coordinate values are rounded in 0 to 360°. Absolute coordinate values are rounded or not rounded by parameter No.1008#0(ROAx) and #2(RRLx). (3) Stored pitch error compensation is the rotation type. (Refer to parameter No.3624) (4) Automatic reference position return (G28, G30) is done in the reference position return direction and the move amount does not exceed one rotation.
1	0	Setting is invalid (unused)
1	1	Rotation axis (B type) (1) Inch/metric conversion, absolute coordinate values and relative coordinate values are not done. (2) Machine coordinate values, absolute coordinate values and relative coordinate values are linear axis type. (Is not rounded in 0 to 360°). (3) Stored pitch error compensation is linear axis type (Refer to parameter No.3624) (4) Cannot be used with the rotation axis roll over function and the index table indexing function (M series)

ZMIx The direction of reference position return.
0 : Positive direction
1 : Negative direction

NOTE
The direction of the initial backlash, which occurs when power is switched on, is opposite to the direction of a reference position return.

	#7	#6	#5	#4	#3	#2	#1	#0
1008						RRLx	RABx	ROAx

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit axis

ROAx The roll–over function of a rotation axis is
0 : Invalid
1 : Valid

NOTE
ROAx specifies the function only for a rotation axis (for which ROTx, #0 of parameter No.1006, is set to 1)

RABx In the absolute commands, the axis rotates in the direction
0 : In which the distance to the target is shorter.
1 : Specified by the sign of command value.

NOTE
RABx is valid only when ROAx is 1.

RRLx Relative coordinates are
0 : Not rounded by the amount of the shift per one rotation
1 : Rounded by the amount of the shift per one rotation

NOTE
1 RRLx is valid only when ROAx is 1.
2 Assign the amount of the shift per one rotation in parameter No.1260.

1010	Number of CNC–controlled axes

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Valid data range] 1, 2, 3, ..., the number of controlled axes

Set the maximum number of axes that can be controlled by the CNC.

[Example]
Suppose that the first axis is the X axis, and the second and subsequent axes are the Y, Z, and A axes in that order, and that they are controlled as follows:

X, Y, and Z axes: Controlled by the CNC

A axis: Controlled by the PMC

Then set this parameter to 3 (total 3: X, Y, and Z)

With this setting, the fourth axis (A axis) is controlled only by the PMC, and therefore cannot be controlled directly by the CNC.

	#7	#6	#5	#4	#3	#2	#1	#0
1012								IDGx

[Data type] Bit axis

IDGx The function for setting the reference position again, without dogs, is:
0 : Not inhibited.
1 : Inhibited.

NOTE
1 IDGx is enabled when the IDG parameter (bit 7 of parameter No.1002) is 1.
2 When the function for setting the reference position, without dogs, is used, and the reference position is lost for some reason, an alarm requesting reference position return (No.300) is generated when the power is next turned on. If the operator performs reference position return, as a result of mistakenly identifying the alarm as that requesting the operator to perform a normal reference position return, an invalid reference position may be set. To prevent such an operator error, the IDGx parameter is provided to prevent the reference position from being set again without dogs.
(1) If the IDG parameter (bit 7 of parameter No.1002) is set to 1, the IDGx parameter (bit 0 of parameter No.1012) is automatically set to 1 when the reference position is set using the function for setting the reference position without dogs. This prevents the reference position from being set again without dogs.
(2) Once the reference position is prevented from being set for an axis again, without dogs, any attempt to set the reference position for the axis without dogs results in the output of an alarm (No.090).
(3) When the reference position must be set again without dogs, set IDGx to 0 before setting the reference position.

1020 Program axis name for each axis

[Data type] Byte axis

Set the program axis name for each controlled axis, using one of the values listed in the following table:

Axis name	Setting	Axis name	Setting	Axis name	Setting	Axis name	Setting
X	88	U	85	A	65	T	84
Y	89	V	86	B	66		
Z	90	W	87	C	67		

NOTE
1 The same axis name cannot be assigned to more than one axis.
2 When the addresses A, B, U, V, and W are used as the axis name, refer to the parameters ABM and UVW (No. 16200 #6 and #7).
3 When the secondary auxiliary function is provided, the address used by the secondary auxiliary function cannot be used as an axis name.

1022 Setting of each axis in the basic coordinate system

NOTE
When this parameter is set, power must be turned off before operation is continued.

[Data type] Byte axis

To determine the following planes used for circular interpolation, cutter compensation C (for the M series), tool nose radius compensation (for the T series), etc., each control axis is set to one of the basic three axes X, Y, and Z, or an axis parallel to the X, Y, or Z axis.
G17: Plane Xp–Yp
G18: Plane Zp–Xp
G19: Plane Yp–Zp
Only one axis can be set for each of the three basic axes X, Y, and Z, but two or more parallel axes can be set.

Set value	Meaning
0	Neither the basic three axes nor a parallel axis
1	X axis of the basic three axes
2	Y axis of the basic three axes
3	Z axis of the basic three axes
5	Axis parallel to the X axis
6	Axis parallel to the Y axis
7	Axis parallel to the Z axis

1023	Number of the servo axis for each axis

NOTE
When this parameter is set, power must be turned off before operation is continued.

[Data type] Byte axis

[Valid data range] 1, 2, 3, ..., number of control axes /–1, –2

Set the servo axis for each control axis.

Usually set to same number as the control axis number.
The control axis number is the order number that is used for setting the axis–type parameters or axis–type machine signals

Refer to FSSB section of CONNECTION MANUAL (Function) B–64113EN–1.

4.10 PARAMETERS OF COORDINATES

	#7	#6	#5	#4	#3	#2	#1	#0
1201			AWK			ZCL		

[Data type] Bit

ZCL Local coordinate system when the manual reference position return is performed
0 : The local coordinate system is not canceled.
1 : The local coordinate system is canceled.

AWK When the workpiece zero point offset value is changed
0 : The absolute position display changed when the next buffering block is performed.
1 : The absolute position display is changed immediately.

Changed value is valid ofter baffering the next block.

	#7	#6	#5	#4	#3	#2	#1	#0
1202				G52	RLC			

[Data type] Bit

RLC Local coordinate system is
0 : Not cancelled by reset
1 : Cancelled by reset

G52 In local coordinate system setting (G52), a cutter compensation vector is:
0 : Not considered.
1 : Considered.

> **NOTE**
> Select a local coordinate system setting operation when cutter compensation is applied, and when two or more blocks specifying no movement exist prior to the specification of G52, or when G52 is specified after cutter compensation mode is canceled without eliminating the offset vector.

	#7	#6	#5	#4	#3	#2	#1	#0
1203								EMC

[Data type] Bit

EMC The extended external machine zero point shift function is:
0: Disabled.
1: Enabled.

> **NOTE**
> 1 To use the extended external machine zero point shift function, the external machine zero point shift function or the external data input function is required.
> 2 When the extended machine zero point shift function is enabled, the conventional external machine zero point shift function is disabled.

1220	External workpiece zero point offset value

[Data type] 2–word axis

[Unit of data]

Input increment	IS–A	IS–B	Unit
Linear axis (input in mm)	0.01	0.001	mm
Linear axis (input in inches)	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] –99999999 to 99999999

This is one of the parameters that give the position of the origin of workpiece coordinate system (G54 to G59). It gives an offset of the workpiece origin common to all workpiece coordinate systems. In general, the offset varies depending on the workpiece coordinate systems. The value can be set from the PMC using the external data input function.

1221	Workpiece zero point offset value in workpiece coordinate system 1 (G54)
1222	Workpiece zero point offset value in workpiece coordinate system 2(G55)
1223	Workpiece zero point offset value in workpiece coordinate system 3(G56)
1224	Workpiece zero point offset value in workpiece coordinate system 4 (G57)
1225	Workpiece zero point offset value in workpiece coordinate system 5 (G58)
1226	Workpiece zero point offset value in workpiece coordinate system 6 (G59)

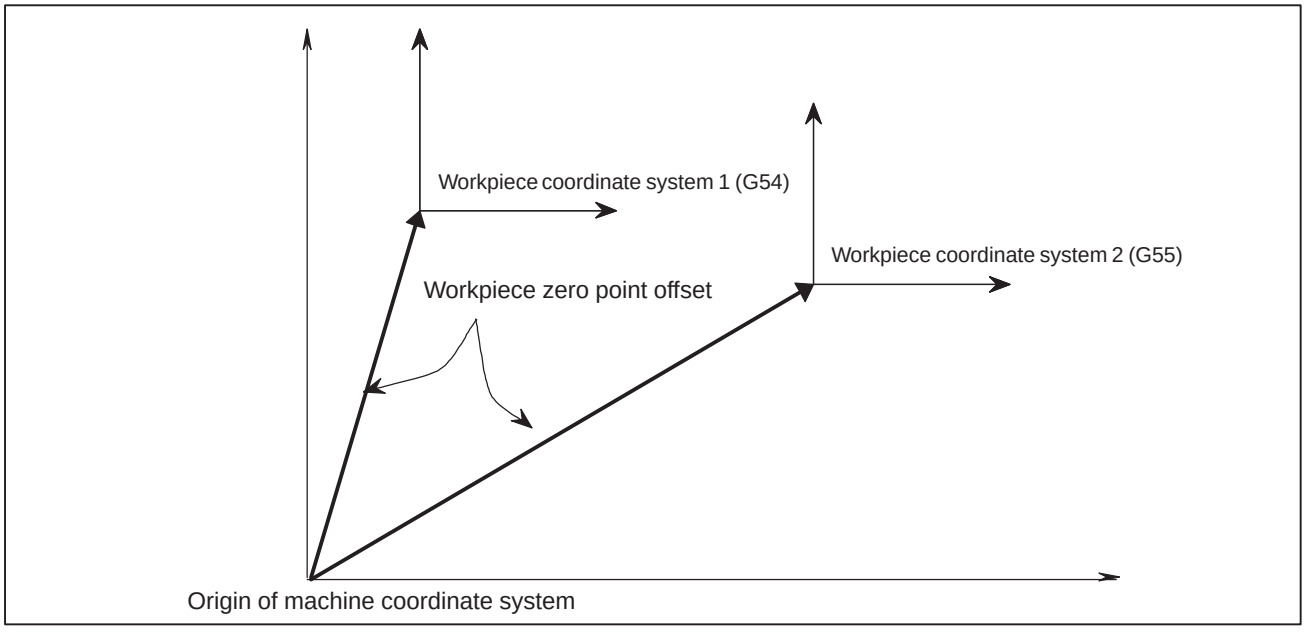
[Data type] 2–word axis

[Unit of data]

Input increment	IS–A	IS–B	Unit
Linear axis (input in mm)	0.01	0.001	mm
Linear axis (input in inches)	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] –99999999 to 99999999

The workpiece zero point offset values in workpiece coordinate systems 1 to 6 (G54 to G59) are set.



NOTE
The workpiece origin offset can also be set using the workpiece coordinate system screen.

1240	Coordinate value of the reference position on each axis in the machine coordinate system

NOTE
When this parameter is set, power must be turned off before operation is continued.

1241	Coordinate value of the second reference position on each axis in the machine coordinate system
1242	Coordinate value of the third reference position on each axis in the machine coordinate system
1243	Coordinate value of the fourth reference position on each axis in the machine coordinate system

[Data type] 2–word axis

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] –99999999 to 99999999

Set the coordinate values of the first to fourth reference positions in the machine coordinate system.

1260	Amount of a shift per one rotation of a rotation axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] 2–word axis

[Unit of data]

Increment system	Unit of data	Standard value
IS–A	0.01 deg	36000
IS–B	0.001 deg	360000

[Valid data range] 1000 to 9999999

Set the amount of a shift per one rotaion of a rotaion axis.

1280	First address of the signal group used by the external machine zero point shift extension

[Data type] Word

[Valid data range] 0 to 65535

Set the first address of the signal group used by the external machine zero point shift extension. If 100 is specified, R0100 to R0115 can be used.

R0100	Shift amount of external machine zero point shift extension for the first axis (LOW)
R0101	Shift amount of external machine zero point shift extension for the first axis (HIGH)
R0102	Shift amount of external machine zero point shift extension for the second axis (LOW)
R0103	Shift amount of external machine zero point shift extension for the second axis (HIGH)
:	:
:	:
:	:
:	:
R0114	Shift amount of external machine zero point shift extension for the eighth axis (LOW)
R0115	Shift amount of external machine zero point shift extension for the eighth axis (HIGH)

NOTE
1 This parameter is valid when bit 0 (EMC) of parameter No. 1203 is set to 1.
2 If the specified number is not present, the external machine zero point shift extension is disabled.
3 A shift amount of the external machine zero point shift extension can be written from the C executer or macro executer.

4.11 PARAMETERS OF STROKE CHECK

	#7	#6	#5	#4	#3	#2	#1	#0
1300	BFA	LZR				LMS		OUT

[Data type] Bit

OUT The area inside or outside of the stored stroke check 2 is set as an inhibition area (setting by the parameters No.1322 and No.1323).
0: Inside
1: Outside

LMS The EXLM signal for switching stored stroke check
0: Disabled
1: Enabled

> **NOTE**
> Stored stroke check 1 supports two pairs of parameters for setting the prohibited area. The stored stroke limit switching signal is used to enable either of the prohibited areas set with these parameter pairs.
> (1) Prohibited area I: Parameters No.1320 and No.1321
> (2) Prohibited area II: Parameters No.1326 and No.1327

LZR Checking of stored stroke check 1 during the time from power–on to the manual position reference return
0: The stroke check 1 is checked.
1: The stroke check 1 is not checked

> **NOTE**
> When an absolute position detector is used and a reference position is already set upon power–up, stored stroke limit check 1 is started immediately after power–up, regardless of the setting.

BFA When a command that exceeds a stored stroke check is issued
0: An alarm is generated after the stroke check is exceeded.
1: An alarm is generated before the stroke check is exceeded.

> **NOTE**
> The tool stops at a point up to F/7500 mm short of or ahead of the boundary.
> (F: Feedrate when the tool reaches the boundary (mm/min))

	#7	#6	#5	#4	#3	#2	#1	#0
1301				OF1				DLM

[Data type] Bit

DLM The stored stroke limit switching signal for each axial direction is:
0: Enabled.
1: Disabled.

OF1 If the tool is moved into the range allowed on the axis after an alarm is raised by stored stroke check 1,
0: The alarm is not canceled before a reset is made.
1: The OT alarm is immediately canceled.

CAUTION
In the cases below, the automatic release function is disabled. To release an alarm, a reset operation is required.
1 When a setting is made to issue an alarm before a stored stroke limit is exceeded (bit 7 (BFA) of parameter No. 1300)
2 When an another overtravel alarm (such as stored stroke check 2 and stored stroke check 3) is already issued

	#7	#6	#5	#4	#3	#2	#1	#0
1310								OT2x

[Data type] Bit axis

OT2x Whether stored stroke check 2 is checked for each axis is set.
0: Stored stroke check 2 is not checked.
1: Stored stroke check 2 is checked.

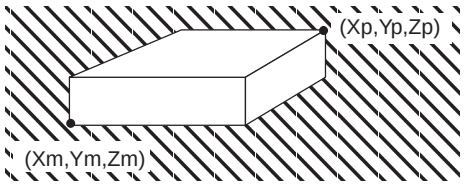
1320	Coordinate value I of stored stroke check 1 in the positive direction on each axis
1321	Coordinate value I of stored stroke check 1 in the negative direction on each axis

[Data type] 2–word axis

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] –99999999 to 99999999
The coordinate values of stored stroke check 1 in the positive and negative directions are setfor each axis in the machine coordinate system. The outside area of the two checks set in the parameters is inhibited.



Set the machine coordinates of the boundaries in the positive direction (Xp, Yp, and Zp) using parameter No. 1320, and those of the boundaries in the negative direction (Xm, Ym, and Zm) using parameter No. 1321. The prohibited area thus becomes the hatched area in the figure on the left.

NOTE
1 For axes with diameter specification, a diameter value must be set.
2 When the parameters are set as follows, the stroke becomes infinite:
parameter 1320 < parameter 1321
For movement along the axis for which infinite stroke is set, only increment commands are available. (The stored stroke limit switching signal also becomes invalid.) If an absolute command is issued for this axis, the absolute register may overflow, and normal movement will not result.
3 The prohibited area specified with these parameters is invalid if bit 2 (LMS) of parameter No. 1300 is set to 1 and stored stroke limit switching signal EXLM is set to 1. In such a case, the settings of parameters No. 1326 and 1327 are used, instead.

1322	Coordinate value of stored stroke check 2 in the positive direction on each axis
1323	Coordinate value of stored stroke check 2 in the negative direction on each axis

[Data type] 2–word axis

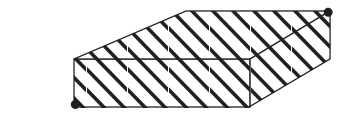
[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

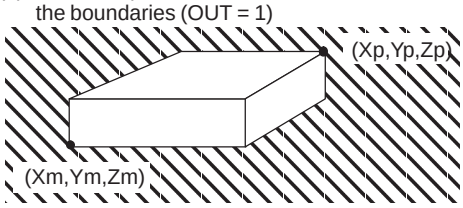
[Valid data range] –99999999 to 99999999

Set the coordinate values of stored stroke check 2 in the positive and negative directions foreach axis in the machine coordinate system. OUT, #0 of parameter 1300, sets either the area outside of the area inside specified by two checks are the inhibition area.

(1) When the prohibited area is inside the boundaries (OUT = 0)



(2) When the prohibited area is outside the boundaries (OUT = 1)



Set the machine coordinates of the boundaries in the positive direction (Xp, Yp, and Zp) using parameter No. 1322, and those of the boundaries in the negative direction (Xm, Ym, and Zm) using parameter No. 1323. The prohibited area thus becomes the hatched area in the figure on the left.

1326	Coordinate value II of stored stroke check 1 in the positive direction on each axis
1327	Coordinate value II of stored stroke check 1 in the negative direction on each axis

[Data type] 2–word axis

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] –99999999 to 99999999

Set the coordinate values of stored stroke check 1 in the positive and negative directions foreach axis in the machine coordinate system.

When stroke check switching signal EXLM is ON, stroke check are checked with parameters 1326 and 1327, not with parameters 1320 and 1321. The area outside that set by parameters 1326 and 1327 is inhibited.

NOTE
1 Specify diameter values for any axes for which diameter programming is specified.
2 These parameters are invalid if bit 2 (LMS) of parameter No. 1300 is set to 0, or if stored stroke limit switching signal EXLM is set to 0. In such a case, the settings of parameters No. 1320 and 1321 are used, instead.

4.12 PARAMETERS OF FEEDRATE

	#7	#6	#5	#4	#3	#2	#1	#0
1401		RDR		RF0			LRP	RPD

[Data type] Bit

RPD Manual rapid traverse during the period from power–on time to the completion of the reference position return.
0: Disabled (Jog feed is performed.)
1: Enabled

LRP Positioning (G00)
0: Positioning is performed with non–linear type positioning so that the tool moves along each axis independently at rapid traverse.
1: Positioning is performed with linear interpolation so that the tool moves in a straight line.

RF0 When cutting feedrate override is 0% during rapid traverse,
0: The machine tool does not stop moving.
1: The machine tool stops moving.

RDR Dry run for rapid traverse command
0: Disabled
1: Enabled

	#7	#6	#5	#4	#3	#2	#1	#0
1402							JOV	

[Data type] Bit

JOV Job override is:
0: Enabled
1: Disabled (tied to 100%)

	#7	#6	#5	#4	#3	#2	#1	#0
1404	FC0		EDR		FRV	F8A	DLF	HFC

[Data type] Bit

HFC The feedrate for helical interpolation is:
0: Clamped so that the feedrates along an arc and linear axis do not exceed the maximum cutting feedrate specified by parameter (No.1422 or 1430).
1: Clamped so that the composite feedrate along an arc and linear axis does not exceed the maximum cutting feedrate specified by parameter (No.1422).

DLF After a reference potition is set, manual reference position return performed at:
0 : Rapid traverse rate (parameter No.1420)
1 : Manual rapid traverse rate (parameter No.1424)

NOTE
This parameter selects a feedrate for reference position return performed without dogs. This parameter also selects a feedrate when manual reference position return is performed according to bit 7 (SJZ) of parameter No.0002 using rapid traverse without deceleration dogs after a reference position is set.

F8A Valid data range for an F command with a decimal point

0:

Increment system	Units	IS–A, IS–B
Millimeter input	mm/min	0.001 to 99999.999.
Inch input	inch/min	0.00001 to 999.99999.
Rotation axis (mm)	deg/min	1 to 240000.
Rotation axis (inch)	deg/min	1 to 9600.

1:

Increment system	Units	IS–A, IS–B
Millimeter input	mm/min	0.001 to 240000.
Inch input	inch/min	0.00001 to 9600.
Rotation axis	deg/min	1 to 240000.

FRV For inch input, the valid range of the feedrate specified for feed per revolution is:

0 : Standard range. (F0.000001 to 9.999999 inches per revolution)

1 : Extended to F50.0 inches per revolution. (F0.000001 to 50.000000 inches per revolution)

EDR The external deceleration speed in liner interpolation type positioning is set in:

0: Parameter No. 1426.

1: Parameter No. 1427, for the first axis.

FC0 Specifies the behavior of the machine tool when a block (G01, G02, G03, etc.) containing a feedrate command (F command) that is 0 is issued during automatic operation, as follows:

0: A P/S alarm (No.011) is displayed, and the block is not executed.

1: No alarm is displayed, and the block is executed.

1410 Dry run rate

[Data type] Word

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000

Set the dry run rate when the manual feedrate is overridden by 100%.

1411 Cutting feedrate in the automatic mode at power–on

This parameter can be set at the “Setting screen”.

[Data type] Word

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 32767
Inch machine	0.1 inch/min	6 to 32767

When the machine requires little change in cutting feedrate during cutting, a cutting feedrate can be specified in the parameter. This eliminates the need to specify a cutting feedrate (F command) in the NC program.

The cutting feedrate set by this parameter is valid after the CNC is placed in the clear state by power–up or a reset until a feedrate is specified by a program command (F command). After a feedrate is specified by the F command, the feedrate becomes valid.

1420	Rapid traverse rate for each axis

[Data type] 2–word axis

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	30 to 240000
Inch machine	0.1 inch/min	30 to 96000
Rotation axis	1 deg/min	30 to 240000

Set the rapid traverse rate when the rapid traverse override is 100% for each axis.

1422	Maximum cutting feedrate for all axes

[Data type] 2–word

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 240000
Inch machine	0.1 inch/min	6 to 96000

Specify the maximum cutting feedrate.

A feedrate in the tangential direction is clamped in cutting feed so that it does not exceed the feedrate specified in this parameter.

NOTE
A maximum cutting feedrate can be specified for each axis only during linear interpolation and circular interpolation by using parameter No. 1430.

1423	Feedrate in manual continuous feed (jog feed) for each axis

[Data type] Word axis

(1) Specify a jog feedrate at feed per minute with an override of 100%.

[Unit of data, valid range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotaiton axis	1 deg/min	6 to 15000

1424 Manual rapid traverse rate for each axis

[Data type] 2–word axis

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	30 to 240000
Inch machine	0.1 inch/min	30 to 96000
Rotation axis	1 deg/min	30 to 240000

Set the rate of manual rapid traverse when the rapid traverse override is 100% for each axis.

NOTE
If 0 is set, the rate set in parameter 1420 is assumed.

1425 FL rate of the reference position return for each axis

[Data type] Word axis

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotaion axis	1 deg/min	6 to 15000

Set feedrate (FL rate) after deceleration when the reference position return is performed for each axis.

1426 External deceleration rate of cutting feed

[Data type] Word axis

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000

Set the external deceleration rate of cutting feed.

1427 External deceleration rate of rapid traverse for each axis

[Data type] Word axis

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotaion axis	1 deg/min	6 to 15000

Set the external deceleration rate of rapid traverse for each axis.

1430	Maximum cutting feedrate for each axis

[Data type] 2–word axis

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 240000
Inch machine	0.1 inch/min	6 to 96000
Rotaion axis	1 deg/min	6 to 240000

Specify the maximum cutting feedrate for each axis.
A feedrate for each axis is clamped in cutting feed so that it does not exceed the maximum feedrate specified for each axis.

NOTE
1 This parameter is valid only during linear interpolation and circular interpolation.
2 When this parameter is set to 0 for all axes, clamping to a maximum cutting feedrate based on parameter No. 1422 is enabled.

This means that if a value other than 0 is set for any of the axes with this parameter, clamping to a maximum cutting feedrate is performed for all axes during linear interpolation or circular interpolation according to this parameter.

4.13 PARAMETERS OF ACCELERATION/ DECELERATION CONTROL

	#7	#6	#5	#4	#3	#2	#1	#0
1601			NCI			OVB		

[Data type] Bit

OVB Block overlap in cutting feed

0: Blocks are not overlapped in cutting feed.

1: Blocks are overlapped in cutting feed.

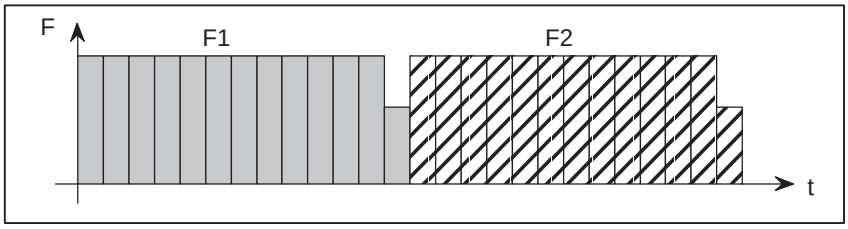
Block overlap outputs the pulses remaining at the end of pulse distribution in a block together with distribution pulses in the next block. This eliminates changes in feedrates between blocks.

Block overlap is enabled when blocks containing G01, G02, or G03 are consecutively specified in G64 mode. If minute blocks, however, are specified consecutively, overlap may not be performed.

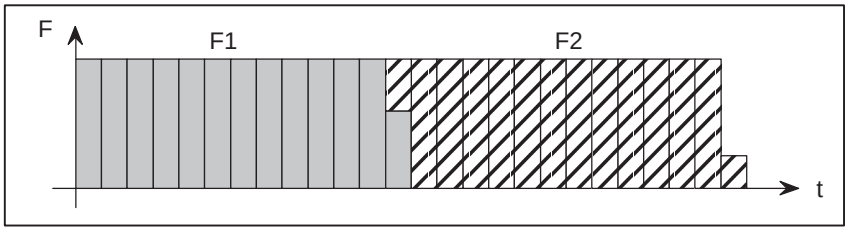
The following pulses in block F2 are added to the pulses remaining at the end of pulse distribution in block F1.

$$\textbf{(Number of pulses to be added)} = \textbf{F2} \times \frac{\textbf{(Number of pulses required at the end of block F1)}}{\textbf{F1}}$$

When F1 = F2



When block overlap is disabled



When block overlap is enabled

NCI Inposition check at deceleration

0 : Performed

1 : Not performed

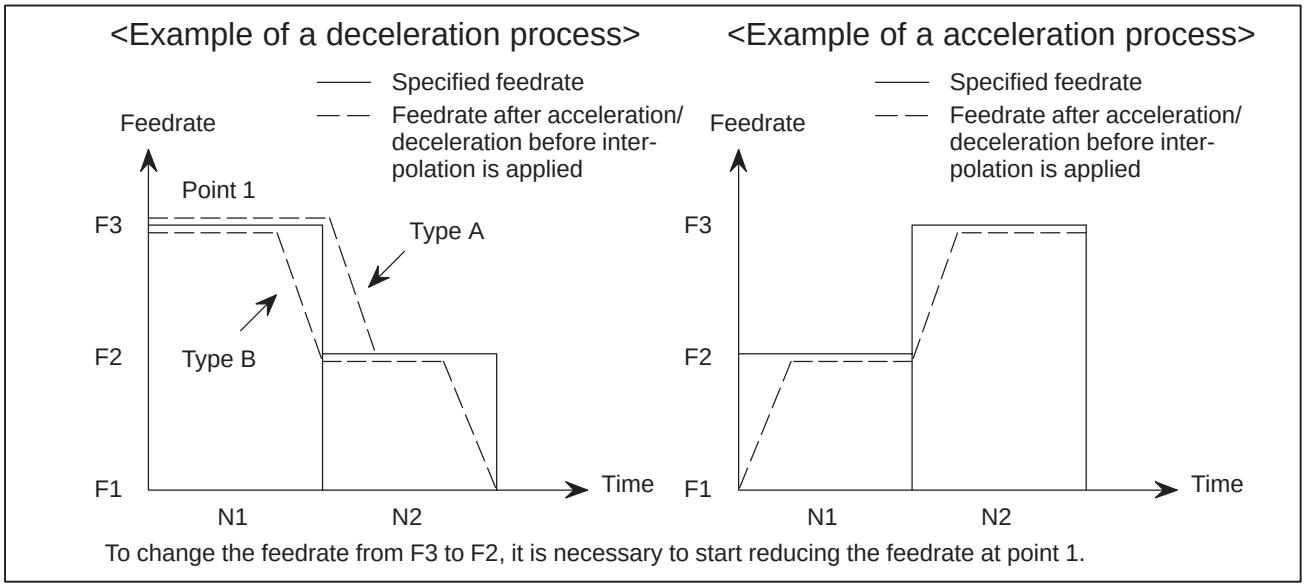
	#7	#6	#5	#4	#3	#2	#1	#0
1602		LS2		CSD		COV		FWB

[Data type] Bit

FWB Cutting feed acceleration/deceleration before interpolation
0 : Type A of acceleration/deceleration before interpolation is used.
1 : Type B of acceleration/deceleration before interpolation is used.

Type A: When a feedrate is to be changed by a command, acceleration/deceleration starts after the program enters the block in which the command is specified.

Type B: When a feedrate is to be changed by a command, deceleration starts and terminates at the block before the blcock in which the command is specified.
When a feedrate is to be changed by a command, acceleration starts after the program enters theblock in which the command is specified.



COV The outer arc cutting feedrate change function of the automatic corner override function is:
0 : Not used.
1 : Used.

CSD In the function for automatically reducing a feedrate at corners,
0 : Angles are used for controlling the feedrate.
1 : Differences in feedrates are used for controlling the feedrate.

LS2 Acceleration/deceleration after interpolation for cutting feed in advanced preview control mode is:
0 : Exponential acceleration/deceleration.
1 : Linear acceleration/deceleration.

	#7	#6	#5	#4	#3	#2	#1	#0
1610				JGLx				CTLx

[Data type] Bit axis

CTLx Acceleration/deceleration in cutting feed including feed in dry run
0 : Exponential acceleration/deceleration is applied.
1 : Linear acceleration/deceleration after interpolation is applied.

JGLx Acceleration/deceleration in jog feed
0 : Exponential acceleration/deceleration is applied.
1 : Linear acceleration/deceleration after interpolation or bell–shaped acceleration/deceleration after interpolation is applied.

1620	Time constant T or T_1 used for linear acceleration/deceleration or bell–shaped acceleration/deceleration in rapid traverse for each axis

[Data type] Word axis

[Unit of data] ms

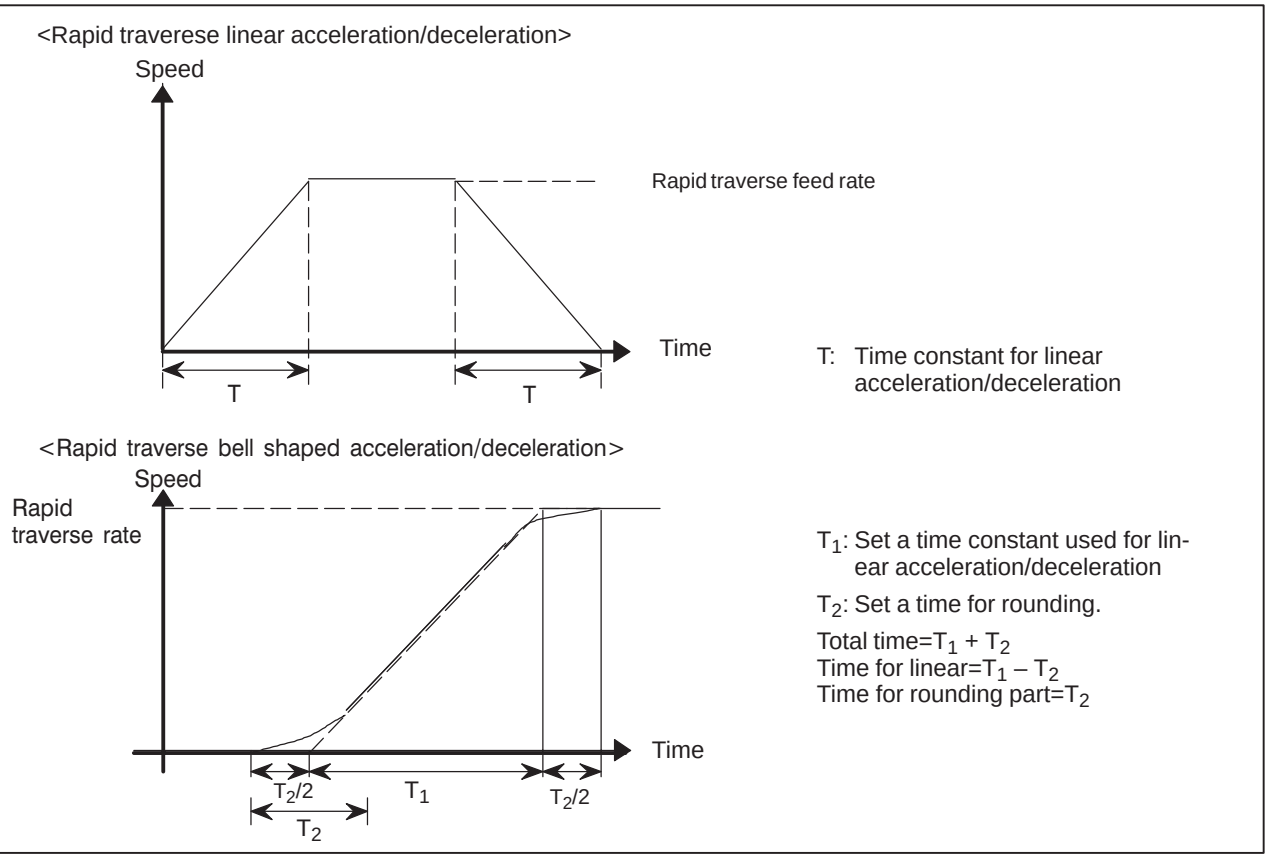
[Valid data range] 0 to 4000

Specify a time constant used for acceleration/deceleration in rapid traverse. When the optional function of bell–shaped acceleration/deceleration in rapid traverse is provided, bell–shaped acceleration/deceleration is applied in rapid traverse. If the function is not provided, linear acceleration/deceleration is applied.

(1) When the function is provided, set this parameter to time constant T_1 used in bell–shaped acceleration/deceleration in rapid traverse, and set parameter No.1621 to time constant T_2.

(2) When the function is not provided, specify a time constant used in linear acceleration/deceleration.

NOTE
1 When parameter No.1621 (time constant T_2 used for bell–shaped acceleration/deceleration in rapid traverse) is set to 0, linear acceleration/deceleration is applied in rapid traverse even if the function is provided. In this case, this parameter stands for a time constant used in linear acceleration/deceleration in rapid traverse.
2 Depending on the setting value of the time constant, the rate slightly lower than the rapid traverse rate may be applied for a given period of time while reaching the rapid traverse rate after acceleration. To work around this problem, set a multiple of 8 as the time constant.



Set the value when the rapid traverse rate is 100%. If it is under 100%, the total time is reduced. (Constant acceleration method)

The value of T_1 is determined from the torque of motor. Usually set the value of T_2 to 24 ms ir 32 ms.

1621	Time constant t T_2 used for bell–shaped acceleration/deceleration in rapid traverse for each axis

[Data type] Word axis

[Unit of data] ms

[Valid data range] 0 to 512

Specify time constant T_2 used for bell–shaped acceleration/deceleration in rapid traverse for each axis.

NOTE
1 This parameter is effective when the function of bell–shaped acceleration/deceleration in rapid traverse is provided. Set parameter No.1620 to time constant T_1 used for bell–shaped acceleration/deceleration in rapid traverse, and set this parameter to time constant T_2.
For details of time constants T_1 and T_2, see the description of parameter No.1620.
2 When this parameter is set to 0, linear acceleration/deceleration is applied in rapid traverse. The setting in parameter No.1620 is used as a time constant in linear acceleration/deceleration.

1622	Time constant of exponential acceleration/deceleration or bell–shaped acceleration/deceleration after interpolation, or linear aceeleration/deceleration after interpolation in cutting feed for each axis

[Data type] Word axis

[Unit of data] ms

[Valid data range] 0 to 4000(exponential acceleration/deceleration in cutting feed)
0 to 512 (linear acceleration/deceleration after interpolation in cutting feed)

Set the time constant used for exponential acceleration/deceleration in cutting feed or linear acceleration/deceleration after interpolation in cutting feed for each axis. The type to select depends on the settings of the parameter CTLx (bit 0 of No. 1610). Except for special applications, the same time constant must be set for all axes in this parameter. If the time constants set for the axes differ from each other, proper straight lines and arcs cannot be obtained.

1623	FL rate of exponential acceleration/deceleration in cutting feed for each axis

[Data type] Word axis

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	0,6 to 15000
Inch machine	0.1 inch/min	0,6 to 6000
Rotaion axis	1 deg/min	0,6 to 15000

Set the lower limit (FL rate) of exponential acceleration/deceleration in cutting feed for each axis.

NOTE
Except for special applications, this parameter must be set to 0 for all axes. If a value other than 0 is specified, proper straight lines and arcs cannot be obtained.

1624	Time constant of exponential acceleration/deceleration in jog feed for each axis.

[Data type] Word axis

[Unit of data] ms

[Valid data range] 0 to 4000(exponential acceleration/deceleration in jog feed)
Set the time constant used for exponential acceleration/deceleration in jog feed fot each axis.

1625	FL rate of exponential acceleration/deceleration in jog feed for each axis.

[Data type] Word axis

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotaion axis	1 deg/min	6 to 15000

Set the lower limit (FL rate) of exponential acceleration/deceleration in cutting feed for each axis.

1710	Minimum deceleration ratio (MDR) of the inner circular cutting rate in automatic corner override

[Data type] Byte

[Unit of data] %

[Valid data range] 1 to 100

This parameter sets the minimum deceleration ratio (MDR) when the inner circular cutting speed is changed by automatic corner override.

In circular cutting with an inward offset, the actual feedrate for a specified feedrate (F) is expressed as follows:

$$F \times \frac{Rc}{Rp}$$

Rc: Radius of the path of the cutter's center.
Rp: Programmed radius

Then, the actual feedrate is controlled so that the feedrate on the programmed path can achieve the specified feedrate F.

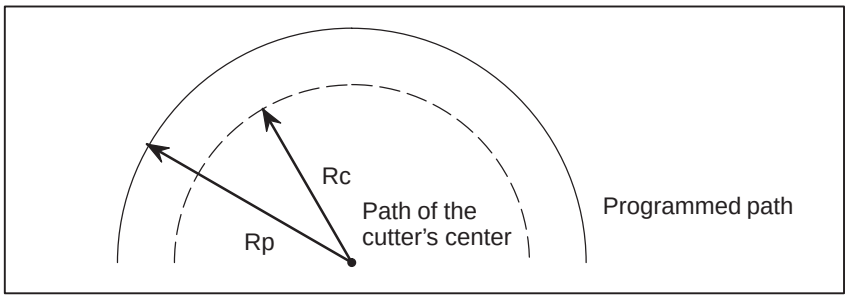


Fig. 4.13 (a) Rp and Rc

If Rc is too small in comparison with Rp, such that Rc/Rp ≒ 0, the cutter will stop. To prevent this, a minimum deceleration ratio (MDR) is set.

1711	Angle (θp) used to recognize an inner corner in inner corner override

[Data type] Byte

[Unit of data] Degree

[Valid data range] 1 to 179 (standard value = 91)

This parameter sets the angle used to recognize an inner corner for inner corner override by automatic corner override.

1712	Amount of override for an inner corner

[Data type] Byte

[Unit of data] %

[Valid data range] 1 to 100 (standard value = 50)

Set the amount of override for an inner corner.

1713	Distance Le from the starting point in inner corner override

[Data type] Word

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter input	1	0.1	mm
Inch input	0.1	0.01	inch

[Valid data range] 0 to 3999

Set distance Le from the starting point in an inner comer for corner override.

1714	Distance Ls up to the ending point in inner corner override

[Data type] Word

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter input	1	0.1	mm
Inch input	0.1	0.01	inch

[Valid data range] 0 to 3999

Set distance Ls up to the end point in an inner corner for corner override.

If $\theta \leqq \theta p$, the inside of a comer is recognized. (θp is set in parameter 1711.)

When an inner corner is recognized, the feedrate is overridden in the range of Le in the block immediately before the intersection of the corner and Ls in the next block following the intersection.

Ls and Le are each a straight line connecting the intersection of the corner and a given point on the path of the cutter's center.

Ls and Le are set in parameters 1713 and 1714.

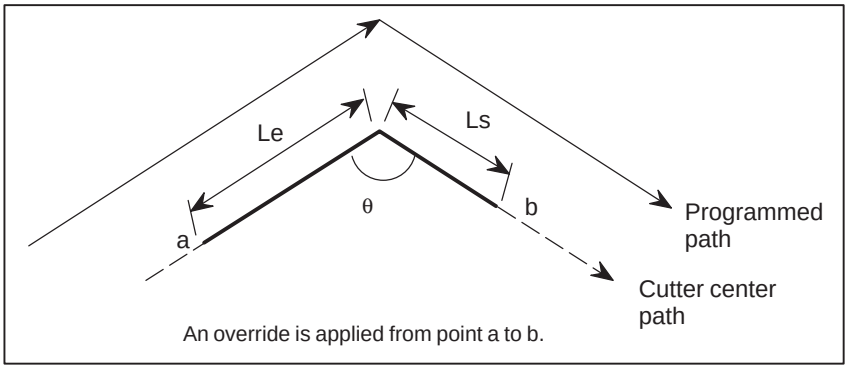


Fig.4.13 (b) Distance Le and Ls in the automatic corner override at an inner corner

1722	Rapid traverse feedrate reduction ratio for overlapping rapid traverse blocks

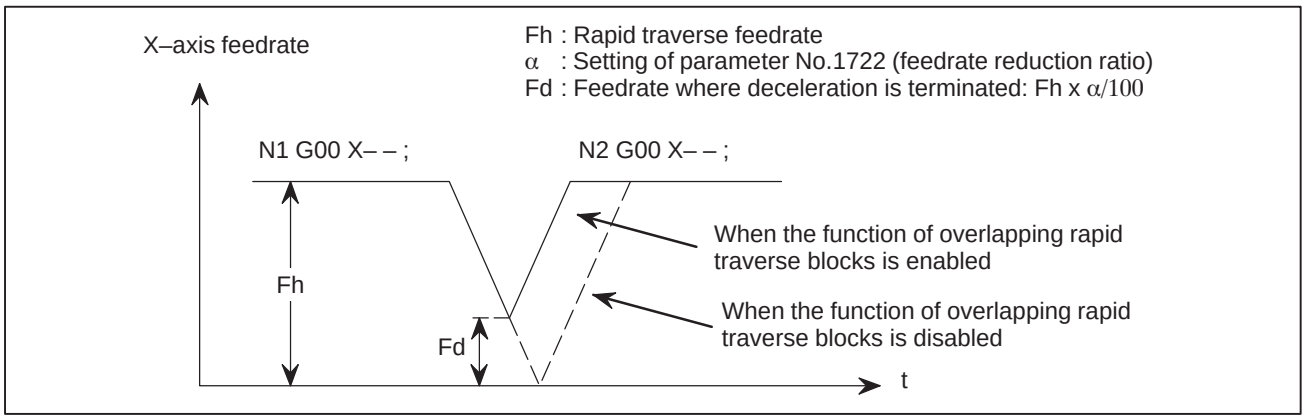
[Data type] Byte axis

[Unit of data] %

[Valid data range] 1 to 100

This parameter is used when rapid traverse blocks are arranged successively, or when a rapid traverse block is followed by a block that does not cause, movement. When the feedrate for each axis of a block is reduced to the ratio set in this parameter, the execution of the next block is started.

Examples



NOTE
The parameter No.1722 is effective when parameter No.1601 #4 (RT0) is set to 1.

1730	Maximum feedrate for arc radius R

[Data type] Word

[Unit of data]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	8 to 15000
Inch machine	0.1 inch/min	8 to 6000

Set a maximum feedrate for the arc radius set in parameter No.1731. Set this parameter when the arc radius–based feedrate clamping function is enabled.

1731	Arc radius value corresponding to a maximum feedrate

[Data type] 2–word

[Unit of data]

Unit	IS–A	IS–B	Unit
Linear axis (millimeter machine)	0.01	0.001	mm
Linear axis (inch machine)	0.001	0.0001	inch

[Valid data range] 1000 to 99999999

Set the arc radius corresponding to the maximum feedrate set in parameter No.1730. Set this parameter when the arc radius–based feedrate clamping function is enabled.

1732	Minimum value (RV min) for arc radius–based feedrate clamp

[Data type] Word

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	0 to 15000
Inch machine	0.1 inch/min	0 to 6000

The arc radius–based feedrate clamping function reduces the maximum feedrate as the arc radius decreases. When the specified maximum feedrate is not greater than RV min (minimum value for arc radius–based feedrate clamping), RV min is used as the maximum feedrate.

1762	Exponential acceleration/deceleration time constant for cutting feed in the advanced preview control mode

[Data type] Word axis

[Unit of data] 1 ms

[Valid data range] 0 to 4000

Set an exponential acceleration/deceleration time constant for cutting feed in the advanced preview control mode.

1763	Minimum speed in exponential acceleration/deceleration for cutting feed in the advanced preview control mode

[Data type] Word axis

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotation axis	1 deg/min	6 to 15000

Set minimum speed (FL) in exponential acceleration/deceleration for cutting feed in the advanced preview control mode.

1768	Time constant for linear acceleration/deceleration after cutting feed interpolation during advanced preview control mode.

[Data type] Word

[Unit of data] ms

[Valid data range] 8 to 512

This parameter sets a time constant for linear acceleration/deceleration after cutting feed interpolation in the advanced preview control mode. Use parameter LS2 (No.1602#6) to select the acceleration/deceleration type.

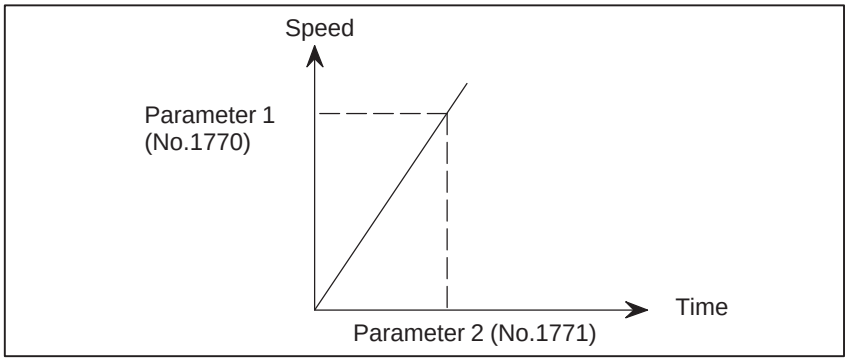
1770	Parameter 1 (for advanced preview control) for setting an acceleration for linear acceleration/deceleration before interpolation (maximum machining speed during linear acceleration/deceleration before interpolation)

[Data type] 2–word

[Unit of data, valid range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 240000
Inch machine	0.1 inch/min	6 to 96000

This parameter is used to set an acceleration for linear acceleration/ deceleration before interpolation in the advanced preview control mode. In this parameter, set the maximum machining speed during linear acceleration/ deceleration before interpolation. Set the time used to reach the maximummachining speed in parameter No.1771.



NOTE
When 0 is set in parameter No.1770 or parameter No.1771, linear acceleration/deceleration before interpolation is disabled.

1771	Parameter 2 (for advanced preview control) for setting an acceleration for linear acceleration/deceleration before interpolation (time used to reach the maximum machining speed during linear acceleration/deceleration before interpolation)

[Data type] Word

[Unit of data] 1 msec

[Valid range] 0 to 4000

This parameter is used to set an acceleration for linear acceleration/ deceleration before interpolation in the advanced preview control mode. In this parameter, set the time (time constant) used toreach the speed set in parameter No.1770.

NOTE
1 When 0 is set in parameter No.1770 or parameter No.1771, linear acceleration/deceleration before interpolation is disabled.
2 In parameter Nos. 1770 and 1771, set values that satisfy the following:
Parameter No.1770/Parameter No.1771 ≧ 5

1777	Minimum speed for the automatic corner deceleration function (advanced pre-view control)

[Data type] Word

[Unit of data, valid range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000

Set a speed at which the number of buffered pulses in deceleration is assumed to be 0 when linear acceleration/deceleration before interpolation is used.

1779	Critical angle subtended by two blocks for automatic corner deceleration (for advanced preview control)

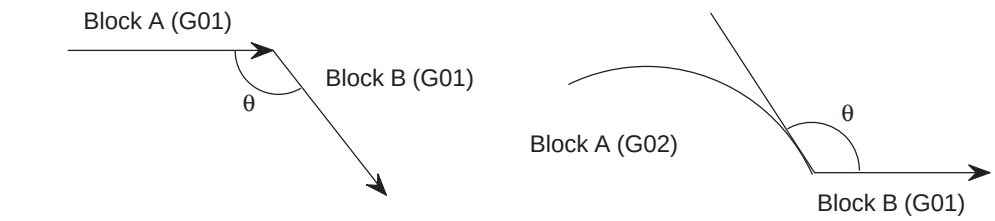
[Data type] 2–word

[Unit of data] 0.001 deg

[Valid data range] 0 to 180000

Set a critical angle to be subtended by two blocks for corner deceleration when the angle–basedautomatic corner deceleration function is used.

The angle subtended by two blocks is defined as θ in the examples shown below.



Angle subtended by two straight lines

Angle subtended by an arc and its tangent

1780	Allowable speed difference for the speed difference–based corner deceleration function (for advanced preview control)

[Data type] Word

[Unit of data, valid range]

Increment system	Unit of data	Valid range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000

Set the speed difference for the speed difference–based automatic corner deceleration function when linear acceleration/deceleration before interpolation is used.

1783	Allowable speed difference for the speed difference based corner deceleration function (for advanced preview control)

[Data type] Word axis

[Unit of data, valid range]

Increment system	Unit of data	Valid range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotation axis	1 deg/min	6 to 15000

A separate allowable feedrate difference can be set for each axis. The allowable feedrate difference is set for each axis with this parameter. Among the axes that exeed the specified allowable feedrate difference, the axis with the greatest ratio of the actual feedrate difference to the allowable feedrate difference is used as the reference to calculate the reduced feedrate at the corner.

1784	Speed when overtravel alarm has generated during acceleration/deceleration before interpolation (for advanced preview control)

[Data type] Word axis

[Unit of data]

[Valid data range]

Increment system	Unit of data	Valid range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotation axis	1 deg/min	6 to 15000

Deceleration is started beforehand to reach the feedrate set in the parameter when an overtravel alarm is issued (when a limit is reached) during linear acceleration/deceleration before interpolation. By using this parameter, the overrun distance that occurs when an overtravel alarm is output can be reduced.

NOTE
1 When 0 is set in this parameter, the control described above is not exercised.
2 Use type–B linear acceleration/deceleration before interpolation (by setting bit 0 (FWB) of parameter No.1602 to 1).
3 The control described above is applicable only to stored stroke check 1.

4.14 PARAMETERS OF SERVO

	#7	#6	#5	#4	#3	#2	#1	#0
1800				RBK	FFR	OZR	CVR	

[Data type] Bit

CVR When velocity control ready signal VRDY is set ON before position control ready signal PRDY comes ON
0: A servo alarm is generated.
1: A servo alarm is not generated.

OZR When manual reference position return is attempted in the halt state during automatic operation (feed hold stop state) under any of the conditions listed below:
0: Manual reference position return is not performed, with P/S alarm No.091.
1: Manual reference position return is performed without an alarm occurring.

< Conditions >

(1) When there is a remaining distance to travel.

(2) When an auxiliary function (miscellaneous function, spindle–speed function, tool function) is being executed.

(3) When a cycle such as a dwell cycle or canned cycle is being executed.

FFR Feed–forward control is enabled for
0 : Cutting feed only
1 : Cutting feed and rapid traverse

RBK Backlash compensation applied separately for cutting feed and rapid traverse
0: Not performed
1: Performed

	#7	#6	#5	#4	#3	#2	#1	#0
1801			CIN	CCI	API			

[Data type] Bit

API To use an absolute position detector for any axis, set API to 1.

CCI The in–position area for cutting feed is:
0 : Set in parameter No.1826 (same as for rapid traverse).
1 : Set in bit 5 (CIN) of parameter No.1801.

CIN When bit 4 (CCI) of parameter No.1801 = 1, the in–position area for cutting feed is:
0 : Use value in parameter No.1827 if the next block is also for cutting feed, or use value in parameter No.1826 if the next block is not for cutting feed.
1 : Use value in parameter No.1827, regardless of the next block. (The setting of parameter No.1826 is used for rapid traverse, and the setting of parameter No.1827 is used for cutting feed.)

	#7	#6	#5	#4	#3	#2	#1	#0
1804		SAK	ANA	IVO				

[Data type] Bit axis

IVO When an attempt is made to release an emergency stop while the VRDY OFF alarm ignore signal is 1:

0 : The emergency stop state is not released until the VRDY OFF alarm ignore signal is set to 0.

1 : The emergency stop state is released.

> **NOTE**
> When a reset is issued while the VRDY OFF alarm ignore signal is set to 1 and the motor activating current is low, the reset state can also be released, provided this parameter is set to 1.

ANA When an abnormal load is detected for an axis:

0 : Movement along all axes is stopped, and a servo alarm is output.

1 : No servo alarm is output, and movement along only the axes of the group containing the axis with the abnormal load is stopped in interlock mode. (The group number of each axis is set in parameter No.1881.)

SAK When the VRDY OFF alarm ignore signal IGNVRY is 1, or when the VRDY OFF alarm ignore signals IGVRY1 to IGVRY4 are 1:

0 : Servo ready signal SA is set to 0.

1 : Servo ready signal SA remains set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
1815			APCx	APZx			OPTx	

> **NOTE**
> When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Bit axis

OPTx Position detector

0 : A separate pulse coder is not used.

1 : A separate pulse coder is used.

For an absolute–position system using Inductosyn, set this parameter to 1.

APZx Machine position and position on absolute position detector when the absolute position detector is used

0 : Not corresponding

1 : Corresponding

> **NOTE**
> When an absolute position detector is used, after primary adjustment is performed or after the absolute position detector is replaced, this parameter must be set to 0, power must be turned off and on, then manual reference position return must be performed. This completes the positional correspondence between the machine position and the position on the absolute position detector, and sets this parameter to 1 automatically.

APCx Position detector
0 : Other than absolute position detector
1 : Absolute position detector (absolute pulse coder)

For an absolute–position system using Inductosyn, set this parameter to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
1817		TANx		SCPx				

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Bit axis

SCPx If bit 2 (DC2) of parameter No. 1802 is set to 1, the scale zero point of the linear scale with absolute addressing reference marks is:
0: On the negative direction side. (Viewed from the scale zero point, the reference position is on the positive direction side.)
1: On the positive direction side. (Viewed from the scale zero point, the reference position is on the negative direction side.)

TANx Tandem control
0 : Not used
1 : Used

NOTE
Set this parameter to both master axis and slave axis.

	#7	#6	#5	#4	#3	#2	#1	#0
1819							CRFx	FUPx

[Data type] Bit axis

FUPx To perform follow–up when the servo is off is set for each axis.
0: The follow–up signal, *FLWU, determines whether follow–up is performed or not.
When *FLWU is 0, follow–up is performed.
When *FLWU is 1, follow–up is not performed.
1: Follow–up is not performed.

NOTE
When the index table indexing function (M series) is used, be sure to set FUPx of the 4th axis to 1.

CRFx When servo alarm No.445 (software disconnection), No.446 (hardware disconnection), No.447 (hardware disconnection (separate type)), or No.421 (excessive dual position feedback error) is issued:
0 : The reference position setting remains as is.
1 : The system enters the reference position undefined state.

1820	Command multiplier for each axis (CMR)

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Byte axis

Set a command multiplier indicating the ratio of the least command increment to the detection unit for each axis.

Least command increment = detection unit × command multiplier

Relationship between the increment system and the least command increment

Increment system	Least input increment and least command increment		
	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

Setting command multiply (CMR), detection multiply (DMR), and the capacity of the reference counter

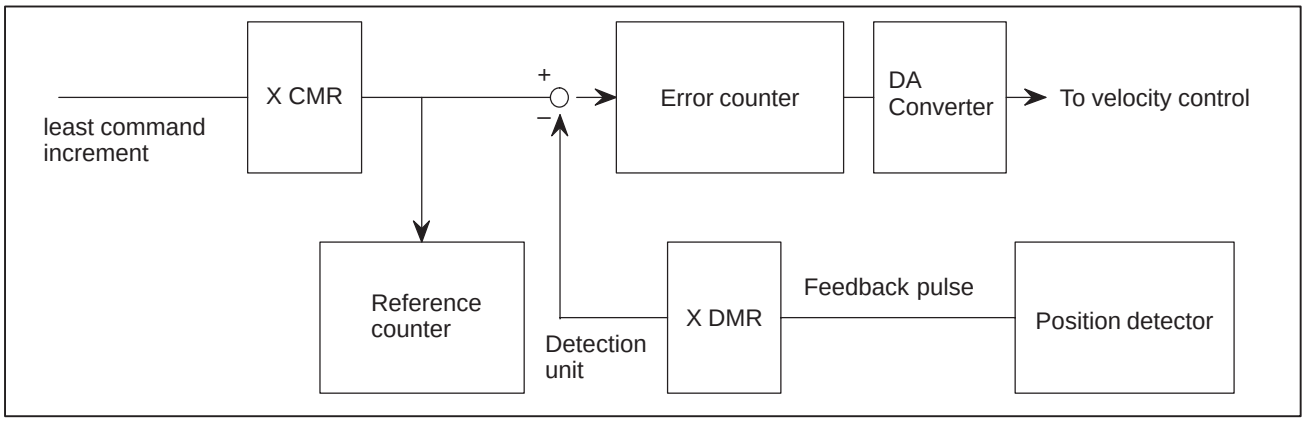


Fig.4.14 CMR, DMR, and the Capacity of the Reference Counter

Set the magnification ratios of CMR and DMR so that the weight of positive inputs to the error counter equals that of negative inputs.

$$\frac{\text{Least command increment}}{\text{CMR}} = \text{detection unit} = \frac{\text{feedback pulse unit}}{\text{DMR}}$$

The feedback pulse unit varies according to the type of detector.

$$\text{Feedback pulse unit} = \frac{\text{the amount of travel per rotation of the pulse coder}}{\text{the number of pulses per rotation of the pulse coder (2000, 2500, or 3000)}}$$

As the size of the reference counter, specify the grid interval for the reference position return in the grid method.

Size of the reference counter = Grid interval/detection unit

Grid interval = the amount of travel per rotation of the pulse coder

The value set in the parameter is obtained as follows:

(1) When command multiplier is 1/2 to 1/27

$$\textbf{Set value} = \frac{\textbf{1}}{\textbf{(Command multiplier)}} + \textbf{100}$$

Valid data range: 102 to 127

(2) When command multiply is 1 to 48

Set value = 2 command multiplier

Valid data range: 2 to 96

NOTE
When command multiplier is 1 to 48, the set value must be determined so that an integer can be set for command multiplier.

1821	Reference counter size for each axis

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] 2–word axis

[Valid data range] 0 to 99999999

Set the size of the reference counter.

1825	Servo loop gain for each axis

[Data type] Word axis

[Unit of data] 0.01 s^{-1}

[Valid data range] 1 to 9999

Set the loop gain for position control for each axis.

When the machine performs linear and circular interpolation (cutting), the same value must be set for all axes. When the machine requires positioning only, the values set for the axes may differ from one another. As the loop gain increases, the response by position control is improved. A too large loop gain, however, makes the servo system unstable.

The relationship between the positioning deviation (the number of pulses counted by the error counter) and the feedrate is expressed as follows:

$$\textbf{Positioning deviation} = \frac{\textbf{feedrate}}{\textbf{60} \times \textbf{(loop gain)}}$$

Unit : Positioning deviation mm, inches, or deg
Feedrate : mm/min, inches/min, or deg/min
loop gain: s^{-1}

1826	In–position width for each axis

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] 0 to 32767

The in–position width is set for each axis.

When the deviation of the machine position from the specified position (the absolute value of the positioning deviation) is smaller than the in–position width, the machine is assumed to have reached the specified position. (The machine is in the in–position state.)

1827	In–position width in cutting feed for each axis

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] 0 to 32767

Set an in–position width for each axis in cutting feed. This parameter is valid when bit 4 (CCI) of parameter No.1801=1.

1828	Positioning deviation limit for each axis in movement

[Data type] 2–word axis

[Unit of data] Detection unit

[Valid data range] 0 to 99999999

Set the positioning deviation limit in movement for each axis.

If the positioning deviation exceeds the positioning deviation limit during movement, a servo alarm is generated, and operation is stopped immediately (as in emergency stop).

Generally, set the positioning deviation for rapid traverse plus some margin in this parameter.

1829	Positioning deviation limit for each axis in the stopped state

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] 0 to 32767

Set the positioning deviation limit in the stopped state for each axis.

If, in the stopped state, the positioning deviation exceeds the positioning deviation limit set for stopped state, a servo alarm is generated, and operation is stopped immediately (as in emergency stop).

1830	Axis–by–axis positional deviation limit at servo–off time

[Data type] 2–word axis

[Unit of data] Detection unit

[Valid data range] 0 to 99999999

This parameter is used to set a positional deviation limit at servo–off time, on an axis–by–axis basis.

If the value specified with this parameter is exceeded at servo–off time, a servo alarm (No.410) is issued to cause an immediate stop (same as an emergency stop). Usually, set the same value as a positional deviation at stop time (parameter No.1829).

NOTE
When this parameter is set to 0, no positional deviation limit check is made at servo–off time.

1836	Servo error amount where reference position return is possible

[Data type] Byte axis

[Unit of data] Detection unit

[Valid data range] 0 to 127

This parameter sets a servo error used to enable reference position return in manual reference position return.

In general, set this parameter to 0. (When 0 is set, 128 is assumed as the default.)

NOTE
When bit 0 (PLC01) of parameter No.2000 is set to 1, a value ten times greater than the value set in this parameter is used to make the check.
Example
When the value 10 is set in this parameter, and bit 0 (PLC01) of parameter No.2000 is set to 1, reference

1850	Grid shift and reference position shift for each axis

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] 2–word axis

[Unit of data] Detection unit

[Valid data range] 0 to 99999999 (for reference position shift)

Reference counter size or less (for grid shift)

To shift the reference position, the grid can be shifted by the amount set in this parameter. Up to the maximum value counted by the reference counter can be specified as the grid shift.

In case of parameter SFD (No.1002#2) is 0: Grid shift

In case of parameter SFD (No.1002#2) is 1: Reference point shift

1851	Backlash compensating value for each axis

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] –9999 to +9999

Set the backlash compensating value for each axis.

When the machine moves in a direction opposite to the reference position return direction after the power is turned on, the first backlash compensation is performed.

1852	Backlash compensating value used for rapid traverse for each axis

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] –9999 to +9999

Set the backlash compensating value used in rapid traverse for each axis.

This parameter is valid when RBK, #4 of parameter 1800, is set to 1.

More precise machining can be performed by changing the backlash compensating value depending on the feedrate, the rapid traverse or the cutting feed.

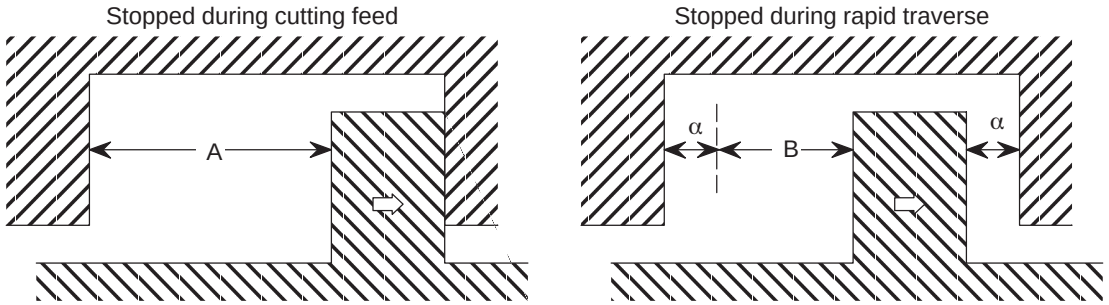
Let the measured backlash at cutting feed be A and the measured backlash at rapid traverse be B. The backlash compensating value is shown below depending on the change of feedrate (cutting feed or rapid traverse) and the change of the direction of movement.

Table 4.14 Backlash Compensating Value

Change of feedrate / Change of direction of movement	Cutting feed to cutting feed	Rapid traverse to rapid traverse	Rapid traverse to cutting feed	Cutting feed to rapid traverse
Same direction	0	0	±α	± (–α)
Opposite direction	±A	±B	±B (B+α)	±B (B+α)

α = (A–B)/2

The positive or negative direction for compensating values is the direction of movement.
(α : Overrun)



Assign the measured backlash at cutting feed (A) in parameter No.1851 and that at rapid traverse (B) in parameter No.1852.

NOTE

1 Jog feed is regarded as cutting feed.
2 The backlash compensation depending on a rapid traverse and a cutting feed is not performed until the first reference position return is completed after the power is turned on. The normal backlash compensation is performed according to the value specified in parameter No.1851 irrespective of a rapid traverse and a cutting feed.
3 The backlash compensation depending on a rapid traverse and a cutting feed is performed only when RBK, #4 of parameter No.1800, is set to 1. When RBK is set to 0, the normal backlash is performed.

1874	Number of the conversion coefficient for inductosyn position detection
1875	Denominator of the conversion coefficient for inductosyn position detection

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Word axis

[Valid data range] 1 to 32767

Set a conversion coefficient for inductosyn position detection for each axis. The value set is determined as follows:

$$\frac{\text{No. 1874}}{\text{No. 1875}} = \frac{\text{Number of position feedback pulses per motor revolution}}{1{,}000{,}000}$$

1876	One–pitch interval of the inductosyn

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] 1 to 32767

Set a one–pitch interval of the inductosyn for each axis.

SUPPLEMENTAL REMARK
To use an absolute–position detector using Inductosyn, set the following digital servo parameters as well:

Bit 4 (INDx) of parameter No. 2015
The absolute–position detect function by Inductosyn is:
0 : Disabled.
1 : Enabled.

Parameter No. 2141 Inductosyn data acquisition time
Set a time requirement for acquiring the Inductosyn data. If the setting is 0, 20 ms is assumed. (For the setting, contact the scale manufacturer.)

1880	Abnormal load detection alarm timer

[Data type] Word axis

[Unit of data] ms

[Valid data range] 0 to 32767 (200 mse is assumed when 0 is set)

This parameter sets the time from the detection of an abnormal load until a servo alarm is issued. The specified value is rounded up to the nearest integral multiple of 8 msec.

[Example] When 30 is specified, the value is rounded up to 32 (msec).

1881	Group number when an abnormal load is detected

[Data type] Byte axis

[Valid data range] 0 to 4

This parameter sets the group number of each axis, used when an abnormal load is detected.

If an abnormal load is detected for an axis, only the movement along the axes of the group containing the axis with the abnormal load is stopped. If 0 is set for an axis, movement along that axis is stopped whenever an abnormal load is detected for any axis.

Example: Assume that the following settings have been made. If an abnormal load is detected for the first axis, movement along the first, third, and fourth axes is stopped. If an abnormal load is detected for the second axis, movement along the second and fourth axes is stopped.

Parameter No.1881	Setting
(First axis)	1
(Second axis)	2
(Third axis)	1
(Fourth axis)	0

NOTE
This parameter is enabled when the ANA parameter (bit 5 of parameter No.1804) is 1.

	#7	#6	#5	#4	#3	#2	#1	#0
1902							ASE	FMD

NOTE
After this parameter has been set, the power must be turned off then back on for the setting to become effective.

[Data type] Bit

FMD The FSSB setting mode is:

0 : Automatic setting mode.
(When information including an axis–amplifier relationship is set on the FSSB setting screen, parameter Nos. 1023, 1905, 1910 through 1919, 1936, and 1937 are set automatically.)

1 : Manual setting 2 mode.
(Set parameter Nos. 1023, 1905, 1910 through 1919, 1936, and 1937 manually.)

ASE When automatic setting mode is selected for FSSB setting (when the FMD parameter (bit 0 of parameter No.1902) is set to 0), automatic setting is:

0 : Not completed.

1 : Completed.
(This bit is automatically set to 1 upon the completion of automatic setting.)

	#7	#6	#5	#4	#3	#2	#1	#0
1904								DSP

NOTE
After this parameter has been set, the power must be turned off then back on for the setting to become effective.

[Data type] Bit axis

DSP

0 : Two axes use one DSP. (Ordinary axes)

1 : One axis uses one DSP.

NOTE
Parameter No.1904 is set on the FSSB setting screen. So, parameter No.1904 should not have to be specified directly. This parameter need not be set in FSSB manual setting 2 mode.

	#7	#6	#5	#4	#3	#2	#1	#0
1905	PM2	PM1	IO2	IO1				FSL

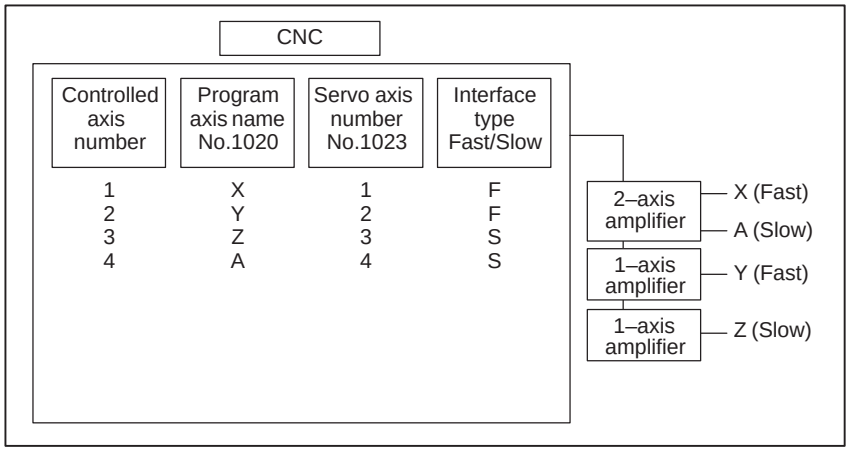
NOTE
After this parameter has been set, the power must be turned off then back on for the setting to become effective.

[Data type] Bit axis

FSL The type of interface used between the servo amplifier and servo software is:
0 : Fast type.
1 : Slow type.

The user can choose between two interface types for servo data transfer: fast type or slow type. Set this parameter so that the following conditions are satisfied:

- When a one–axis amplifier is used, either the fast type or slow type interface can be used.
- When a two–axis amplifier is used, the use of the fast type for both axes is not allowed. The slow type can be used for both axes.
- When a three–axis amplifier is used, the requirement for a two–axes amplifier described above applies to the first and second axes, and the requirement for a one–axis amplifier, again described above, applies to the third axis.
- When an odd number is specified for parameter No.1023, the fast type interface must be used. However, the slow type may be used for high–speed current loop axis and high–speed interface axis.
- When an even number is specified for parameter No.1023, only the slow type interface can be used. (The FSL bit must always be set to 1.)



IO1 A first I/O module supporting FSSB is:
0 : Not used.
1 Used.

IO2 A second I/O module supporting FSSB is:
0 : Not used.
1 Used.

PM1 The first separate detecter interface unit is:
0 : Not used.
1 : Used.

PM2 The second separate detecter interface unit is:
0 : Not used.
1 : Used.

NOTE
When automatic setting mode is selected for FSSB setting (when the FMD parameter (bit 0 of parameter No.1902) is set to 0), parameter No.1905 is automatically set when input is performed with the FSSB setting screen. When manual setting 2 mode is selected for FSSB setting (when the FMD parameter (bit 0 of parameter No.1902) is set to 1), parameter No.1905 must be set directly. When a separate detecter interface unit is used, a connector number must be set in the corresponding parameter (No.1936 or No.1937).

1910	Address conversion table value for slave 1 (ATR)
1911	Address conversion table value for slave 2 (ATR)
1912	Address conversion table value for slave 3 (ATR)
1913	Address conversion table value for slave 4 (ATR)
1914	Address conversion table value for slave 5 (ATR)
1915	Address conversion table value for slave 6 (ATR)
1916	Address conversion table value for slave 7 (ATR)
1917	Address conversion table value for slave 8 (ATR)
1918	Address conversion table value for slave 9 (ATR)
1919	Address conversion table value for slave 10 (ATR)

NOTE
After these parameters have been set, the power must be turned off then back on for the settings to become effective.

[Data type] Byte

[Valid data range] 0 to 3, 16, 40, 48

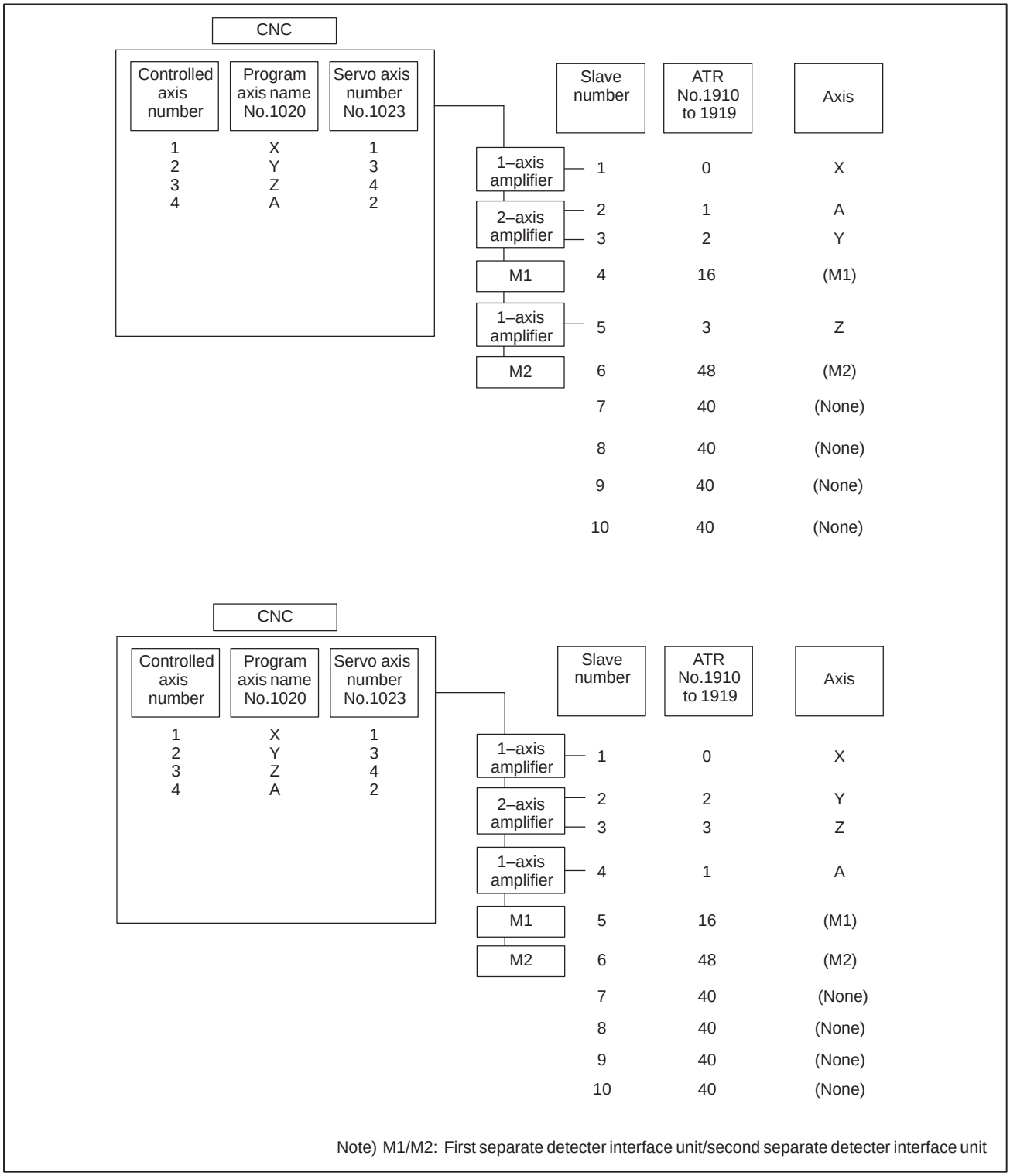
These parameters set address conversion table values for slaves 1 to 10.

A slave is the generic name given to a device such as a servo amplifier or separate detecter interface unit, connected to the CNC via an FSSB optical cable. Smaller numbers, starting from 1 are assigned to slaves closer to the CNC; the maximum number that can be assigned is 10. A two–axis amplifier has two slaves, while a three–axis amplifier has three slaves. Set each parameter as described below, depending on whether the slave is an amplifier or separate detecter interface unit, or when no slave exists.

- When the slave is an amplifier:
  Set the value obtained by subtracting 1 from the setting of parameter No.1023 for the axis to which the amplifier is assigned.
- When the slave is a separate detecter interface unit:
  Set 16 for the first separate detecter interface unit (closest to the CNC).
  Set 48 for the second separate detecter interface unit (furthest from the CNC).
- When no slave exists
  Set 40.

NOTE
When automatic setting mode is selected for FSSB setting (when the FMD parameter (bit 0 of parameter No.1902) is set to 0), parameters No.1910 through No.1919 are automatically set when input is performed with the FSSB setting screen. When manual setting mode is selected for FSSB setting (when the FMD parameter (bit 0 of parameter No.1902) is set to 1), parameter No.1910 through No.1919 must be directly set.

• Examples of axis configurations and parameter settings



Note) M1/M2: First separate detecter interface unit/second separate detecter interface unit

1920	Controlled axis number for slave 1 (dedicated to the FSSB setting screen)
1921	Controlled axis number for slave 2 (dedicated to the FSSB setting screen)
1922	Controlled axis number for slave 3 (dedicated to the FSSB setting screen)
1923	Controlled axis number for slave 4 (dedicated to the FSSB setting screen)
1924	Controlled axis number for slave 5 (dedicated to the FSSB setting screen)
1925	Controlled axis number for slave 6 (dedicated to the FSSB setting screen)
1926	Controlled axis number for slave 7 (dedicated to the FSSB setting screen)
1927	Controlled axis number for slave 8 (dedicated to the FSSB setting screen)
1928	Controlled axis number for slave 9 (dedicated to the FSSB setting screen)
1929	Controlled axis number for slave 10 (dedicated to the FSSB setting screen)

NOTE
After these parameters have been set, the power must be turned off then back on for the settings to become effective.

[Data type] Byte

[Valid data range] 0 to 3

These parameters are used to set the controlled axis numbers for slaves 1 to 10.

NOTE
These parameters are set using the FSSB setting screen. So, these parameters should not normally have to be specified directly. These parameters need not be set in FSSB manual setting mode.

1931	Connector number for the first separate detecter interface unit (dedicated to the FSSB setting screen)
1932	Connector number for the second separate detecter interface unit (dedicated to the FSSB setting screen)

NOTE
After these parameters have been set, the power must be turned off then back on for the settings to become effective.

[Data type] Byte axis

[Valid data range] 0 to number of connectors provided on each separate detecter interface unit

When a separate detecter interface unit is used, these parameters set a separate detecter interface unit connector number for each axis.

NOTE
These parameters are set using the FSSB setting screen. So, these parameters should not normally have to be specified directly. These parameters need not be set in FSSB manual setting 2 mode.

1934	Master and slave axis numbers subject to tandem control (dedicated to the FSSB setting screen)

NOTE
After this parameter has been set, the power must be turned off then back on for the setting to become effective.

[Data type] Byte axis

[Valid data range] 0 to 8

This parameter is used to set an odd number, and the subsequent even number, for a master axis and slave axis subject to tandem control, respectively.

NOTE
This parameter is set using the FSSB setting screen. So, this parameter should not normally have to be specified directly. This parameter need not be set in FSSB manual setting 2 mode.

1936	Connector number of the first separate detecter interface unit
1937	Connector number of the second separate detecter interface unit

NOTE
After these parameters have been set, the power must be turned off then back on for the settings to become effective.

[Data type] Byte axis

[Valid data range] 0 to 7

When a separate detecter interface unit is used, each of these parameters sets the value obtained by subtracting 1 from a separate detecter interface unit connector number for each axis. That is, values of 0 through 7 are set for connector numbers 1 through 8. In addition, bits 6 and 7 of parameter No.1905 must be set. For an axis that does not use a separate detecter interface unit, 0 must be set.

Any connector can be used for any axis, however the connectors in a single separate detecter interface unit should be used in ascending order of connector number. For instance, connector 4 of a separate detecter interface unit cannot be used without using connector 3 of the same separate detecter interface unit.

Example:

Controlled axis	Connector number for the first separate detecter interface unit	Connector number for the second separate detecter interface unit	No.1936	No.1937	No.1905 (#7, #6)
X	1	Not used	0	0	0,1
Y	Not used	2	0	1	1,0
Z	Not used	1	0	0	1,0
A	Not used	Not used	0	0	0,0

NOTE

When automatic setting mode is selected for FSSB setting (when bit 0 of parameter No.1902 is set to 0), these parameters are automatically set when input is performed with the FSSB setting screen. When manual setting 2 mode is selected for FSSB setting (when bit 0 of parameter No.1902 is set to 1), these parameters must be set directly.

Parameters No.2000 to 2999 are for digital servo, The following parameters are not explained in this manual. Refer to FANUC AC SERVO MOTOR αi series PARAMETER MANUAL (B–65270EN)

No.	Data type	Contents							
2000	Bit axis				PGEX	PRMC		DGPR	PLC0
2001	Bit axis	AMR7	AMR6	AMR5	AMR4	AMR3	AMR2	AMR1	AMR0
2002	Bit axis	VFSE				PFSE			
2003	Bit axis	V0FS	OVSC	BLEN	NPSP	PIEN	OBEN	TGAL	
2004	Bit axis		DLY0			TRW1	TRW0	TIB0	TIA0
2005	Bit axis	SFCM	BRKC					FEED	
2006	Bit axis		DCBE		ACCF	SPVE	PKVE	SBSM	FCBL
2007	Bit axis	FRCA	FAD						
2008	Bit axis	LAXD	PFBS	VCTM	SPPC	SPPR	VFBA	TNDM	
2009	Bit axis	BLST	BLCU				ADBL	IQOB	SERD
2010	Bit axis	POLE		HBBL	HBPE	BLTE	LINE		
2011	Bit axis			RCCL				FFALWY	SYNMOD
2012	Bit axis	STNG		VCM2	VCM1			MSFE	
2013	Bit axis	APTG							
2014	Bit axis	(Reserve)							
2015	Bit axis	BZNG	BLAT	TDOU				SSG1	PGTW
2016	Bit axis					K2VC			ABNT
2017	Bit axis	PK25	OVCR	RISC	HTNG				DBST
2018	Bit axis	PFBC						MOVO	REVS
2019	Bit axis	DPFB			SPSY				
2020	Word axis	Motor number							
2021	Word axis	Load inertia ratio							
2022	Word axis	Direction of motor rotation							
2023	Word axis	Number of velocity pulses							
2024	Word axis	Number of position pulses							
2028	Word axis	Position gain switching speed							
2029	Word axis	Effective speed for integral acceleration at low speed							
2030	Word axis	Effective speed for integral deceleration at low speed							
2033	Word axis	Position feedback pulse							
2034	Word axis	Damping control gain							
2039	Word axis	Second–stage acceleration for two–stage backlash acceleration							
2040	Word axis	Current loop integral gain (PK1)							
2041	Word axis	Current loop proportional gain (PK2)							
2042	Word axis	Current loop gain (PK3)							
2043	Word axis	Velocity loop integral gain (PK1V)							
2044	Word axis	Velocity loop proportional gain (PK2V)							
2045	Word axis	Velocity loop incomplete integral gain (PK3V)							
2046	Word axis	Velocity loop gain (PK4V)							
2047	Word axis	Observer parameter (POA1)							
2048	Word axis	Backlash acceleration							
2049	Word axis	Maximum amplitude for dual position feedback							
2050	Word axis	Observer parameter (POK1)							
2051	Word axis	Observer parameter (POK2)							
2053	Word axis	Current dead zone compensation (PPMAX)							
2054	Word axis	Current dead zone compensation (PDDP)							
2055	Word axis	Current dead zone compensation (PHYST)							
2056	Word axis	Counterectromotive force compensation (EMFCMP)							
2057	Word axis	Current phase lead compensation (PVPA)							
2058	Word axis	Current phase lead compensation (PALPH)							
2059	Word axis	Counterelectromotive force compensation (EMFBAS)							
2060	Word axis	Torque limit							

No.	Data type	Contents
2061	Word axis	Counterelectromotive force compensation (EMFLMT)
2062	Word axis	Overload protection coefficient (OVC1)
2063	Word axis	Overload protection coefficient (OVC2)
2064	Word axis	Soft disconnection alarm level
2065	Word axis	Overload protection coefficient (OCVLMT)
2066	Word axis	250–μs acceleration feedback
2067	Word axis	Torque command filter
2068	Word axis	Feed forward coefficient
2069	Word axis	Velocity feed forward coefficient
2070	Word axis	Backlash acceleration timing
2071	Word axis	Backlash acceleration effective duration
2072	Word axis	Static friction compensation
2073	Word axis	Stop judgment parameter
2074	Word axis	Velocity–dependent current loop gain
2077	Word axis	Overshoot prevention counter
2078	Word axis	Conversion coefficient for dual position feedback (numerator)
2079	Word axis	Conversion coefficient for dual position feedback (denominator)
2080	Word axis	First–order lag time constant for dual position feedback
2081	Word axis	Zero width for dual position feedback
2082	Word axis	Backlash acceleration stop amount
2083	Word axis	Brake control timer (ms)
2084	Word axis	Flexible feed gear (numerator)
2085	Word axis	Flexible feed gear (denominator)
2086	Word axis	Rated current parameter
2087	Word axis	Torque offset
2088	Word axis	Machine velocity feedback coefficient gain
2089	Word axis	Backlash acceleration base pulse
2091	Word axis	Non–linear control parameter
2092	Word axis	Look–ahead feed forward coefficient
2097	Word axis	Static friction compensation stop parameter
2098	Word axis	Current phase lead compensation coefficient
2099	Word axis	N–pulse suppression level
2101	Word axis	Overshoot compensation effective level
2102	Word axis	Final clamp value for actual current limit
2103	Word axis	Amount of track back upon detection of unexpected disturbance torque
2104	Word axis	Threshold for detecting abnormal load during cutting
2105	Word axis	Torque constant
2107	Word axis	Velocity loop gain override
2109	Word axis	Fine acceleration/deceleration time constant (BELLTC)
2110	Word axis	Magnetic saturation compensation (base/coefficient)
2111	Word axis	Deceleration torque limit (base/coefficient)
2112	Word axis	AMR conversion coefficient 1
2113	Word axis	Notch filter center frequency (Hz)
2114	Word axis	Stage 2 acceleration amount override for two–stage backlash acceleration
2116	Word axis	Abnormal load detection, dynamic friction compensation value
2118	Word axis	Excessive error level between semi–closed and closed loops for dual position feedback.
2119	Word axis	Stop level with variable proportional gain
2121	Word axis	Conversion coefficient for number of feedback pulses
2122	Word axis	Conversion coefficient for detected resistance
2126	Word axis	Tandem control , time constant for switching position feedback
2127	Word axis	Non–interacting control coefficient
2128	Word axis	Weak magnetic flux compensation (coefficient)
2129	Word axis	Weak magnetic flux compensation (base/limit)

No.	Data type	Contents							
2130	Word axis	Two thrust ripple compensations per magnetic pole pair							
2131	Word axis	Four thrust ripple compensations per magnetic pole pair							
2132	Word axis	Six thrust ripple compensations per magnetic pole pair							
2133	Word axis	Deceleration phase delay compensation coefficient (PHDLY1)							
2134	Word axis	Deceleration phase delay compensation coefficient (PHDLY2)							
2137	Word axis	Stage 1 acceleration amount override for two–stage backlash acceleration							
2138	Word axis	Linear motor AMR conversion coefficient 2							
2139	Word axis	Linear motor AMR offset							
2142	Word axis	Threshold for detecting abnormal load during rapid traverse							
2143	Word axis	Fine acceleration/deceleration time constant 2 (ms)							
2144	Word axis	Position feed forward coefficient for cutting							
2145	Word axis	Velocity feed forward coefficient for cutting							
2146	Word axis	Two–stage backlash acceleration end timer							
2148	Word axis	Deceleration decision level (HRV control)							
2154	Word axis	Static friction compensation function. Decision level for movement restart after stop.							
2156	Word axis	Torque command filter (at cutting)							
2162	Word axis	Second overload protection coefficient (POVC21)							
2163	Word axis	Second overload protection coefficient (POVC22)							
2164	Word axis	Second overload protection coefficient (POVCLMT2)							
2165	Word axis	Maximum amplifier current							
2167	Word axis	Stage 2 acceleration amount offset for two–stage backlash acceleration							
2177	Word axis	Damping filter limit bandwidth (Hz)							
2180	Word axis	Linear motor thrust ripple correction.							
2185	Word axis	Position pulse conversion coefficient							
2200	Bit axis		P2EX			ABGO	IQOB		OVSP
2201	Bit axis		CPEE		SPVC			RNVL	CROF
2202	Bit axis				DUAL	OVS1	PIAL	VGCG	FAGO
2203	Bit axis				FRC2		1/2PI		
2204	Bit axis	ERC0		PGW2					
2205	Bit axis						FLDY		
2206	Bit axis	HSSR							
2207	Bit axis					PD50			
2209	Bit axis					FADL			
2210	Bit axis						PKGA		
2211	Bit axis							PHCP	
2212	Bit axis	OVQK							

4.15 PARAMETERS OF DI/DO

	#7	#6	#5	#4	#3	#2	#1	#0
3001	MHI					RWM		

[Data type] Bit

RWM RWD signal indicating that rewinding is in progress
- 0 : Output only when the tape reader is being rewound by the reset and rewind signal RRW
- 1 : Output when the tape reader is being rewound or a program in memory is being rewound by the reset and rewind signal RRW

MHI Exchange of strobe and completion signals for the M, S, T, and B codes
- 0 : Normal
- 1 : High–speed

	#7	#6	#5	#4	#3	#2	#1	#0
3002				IOV				

[Data type] Bit

IOV For the feedrate override signal and rapid traverse override signal:
- 0 : Negative logic is used.
- 1 : Positive logic is used.

	#7	#6	#5	#4	#3	#2	#1	#0
3003		MVX	DEC		DIT	ITX		ITL

[Data type] Bit

ITL Interlock signal
- 0 : Enabled
- 1 : Disabled

ITX Interlock signals for each axis
- 0 : Enabled
- 1 : Disabled

DIT Interlock for each axis direction
- 0 : Enabled
- 1 : Disabled

DEC Deceleration signal (*DEC1 to *DEC4) for reference position return
- 0 : Deceleration is applied when the signal is 0.
- 1 : Deceleration is applied when the signal is 1.

MVX The axis–in–movement signal is set to 0 when:
- 0 : Distribution for the axis is completed. (The signal is set to 0 in deceleration.)
- 1 : Deceleration of the axis is terminated, and the current position is in the in–position.

If, however, a parameter specifies not to make in–position during deceleration, the signal turns to “0” at the end of deceleration.

	#7	#6	#5	#4	#3	#2	#1	#0
3004			OTH					

[Data type] Bit

OTH The overtravel limit signal is:
0 : Checked
1 : Not checked

WARNING
For safety, usually set 0 to check the overtravel limit signal.

	#7	#6	#5	#4	#3	#2	#1	#0
3006						EPS	EPN	GDC

[Data type] Bit

GDC As the deceleration signal for reference position return:
0 : X009 is used.
1 : G196 is used. (X009 is disabled.)

EPN Workpiece number search signals are assigned to:
0 : PN1, PN2, PN4, PN8, and PN16. <G009>
1 : EPN0 to EPN13. <G024, G025>

EPS When a program is searched using the workpiece number search function, it is started by:
0 : Automatic operation start signal ST (when automatic operation (memory operation) is started).
1 : Workpiece number search start signal EPNS <G025.7>. (Search is not started by ST.)

3010	Time lag in strobe signals MF, SF, TF, and BF

[Data type] Word

[Unit of data] 1 ms

[Valid data range] 16 to 32767

The time required to send strobe signals MF, SF, TF, and BF after the M, S, T, and B codes are sent, respectively.

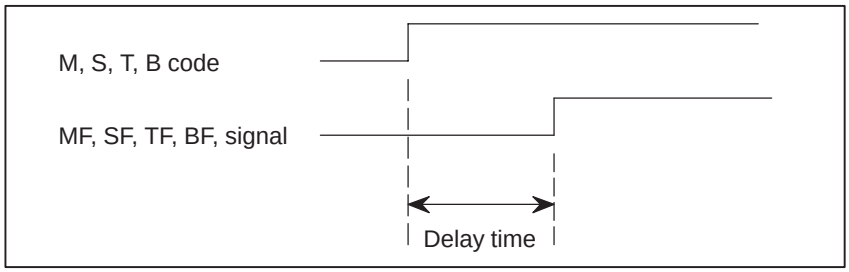


Fig.4.15 (a) Delay Time of the strobe signal

NOTE
The time is counted in units of 8 ms. If the set value is not a multiple of eight, it is raised to the next multiple of eight.
Example
When 30 is set, 32 ms is assumed.
When 32 is set, 32 ms is assumed.
When 100 ie set, 104 ms is assumed.

3011	Acceptable width of M, S, T, and B function completion signal (FIN)

[Data type] Word

[Unit of data] 1 ms

[Valid data range] 16 to 32767

Set the minimum signal width of the valid M, S, T, and B function completion signal (FIN).

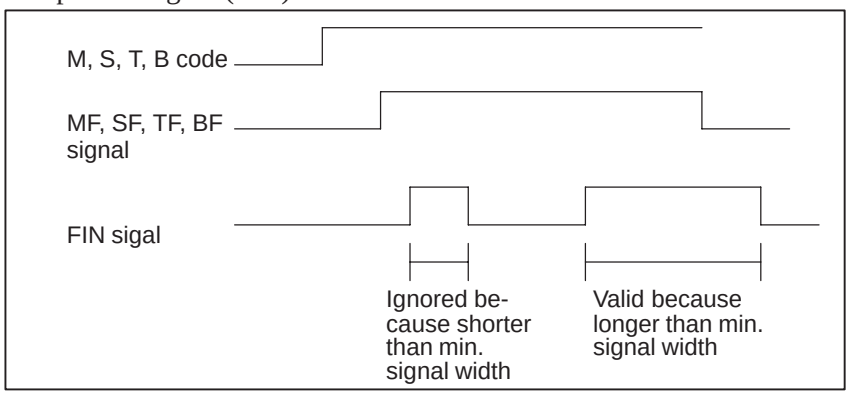


Fig.4.15 (b) Valid Width of the FIN (M,S, T, and B Function Completion) Signal

NOTE
The time is counted in units of 8 ms. If the set value is not a multiple of eight, it is raised to the next multiple of eight.
Example
When 30 is set, 32 ms is assumed.

3017	Output time of reset signal RST

[Data type] Byte

[Unit of data] 16 ms

[Valid data range] 0 to 255

To extend the output time of reset signal RST, the time to be added is specified in this parameter.

RST signal output time = time veguired for reset + parameter $\times$ 16 ms

3030	Allowable number of digits for the M code
3031	Allowable number of digits for the S code
3032	Allowable number of digits for the T code
3033	Allowable number of digits for the B code (Second auxiliary function)

[Data type] Byte

[Valid data range] 1 to 8

Set the allowable numbers of digits for the M, S, and T codes.

NOTE
Up to 5 digits can be specified in the S code

4.16 PARAMETERS OF DISPLAY AND EDIT

	#7	#6	#5	#4	#3	#2	#1	#0
3100	COR				FKY	SKY	CEM	

[Data type] Bit

CEM On screens such as the operation history screen and help screen, keys on the MDI panel are indicated:
0 : In English.
1 : With graphics qualifying for CE marking. (A character generator supporting graphics qualifying for CE marking is required.)

SKY MDI key board use:
0 : Standard keys.
1 : Small keys.

> **NOTE**
> Set this parameter when using the 10.4” LCD (with ten soft keys). After this parameter has been set, the power must be turned off then back on for the setting to become effective.

FKY MDI keyboard
0 : Small type keys are used.
1 : Standard keys are used.

> **NOTE**
> Set this parameter when using the 7.2”/8.4” LCD (with seven soft keys). After this parameter has been set, the power must be turned off then back on for the setting to become effective.

COR Display
0 : Monochrome display
1 : Color display

> **NOTE**
> When using the 8.4” LCD, set this bit to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
3101				BGD			KBF	

[Data type] Bit

KBF When the screen or mode is changed, the contents of the key–in buffer are:
0 : Cleared.
1 : Not cleared.

NOTE
When KBF = 1, the contents of the key–in buffer can all be cleared at one time by pressing the SHIFT key followed by the CAN key.

BGD In background editing, a program currently selected in the foreground:
0 : Cannot be selected. (BP/S alarm No.140 is issued disabling selection.)
1 : Can be selected. (However, the program cannot be edited, only displayed.)

	#7	#6	#5	#4	#3	#2	#1	#0
3102		SPN		ITA		FRN	GRM	JPN
3119							POR	
3190		CHI2						

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Bit

Select the language to be used for the display.

POR	SPN	ITA	CHI2	FRN	GRM	JPN	Language
0	0	0	0	0	0	0	English
0	0	0	0	0	0	1	Japanese
0	0	0	0	0	1	0	German
0	0	0	0	1	0	0	French
0	0	0	1	0	0	0	Chinese
0	0	1	0	0	0	0	Italian
0	1	0	0	0	0	0	Spanish
1	0	0	0	0	0	0	Portuguese

	#7	#6	#5	#4	#3	#2	#1	#0
3103						NMH		

[Data type] Bit

NMH The system alarm history screen is:
0 : Not displayed.
1 : Displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3104					PPD			MCN

[Data type] Bit

MCN Machine position
0 : Not displayed according to the unit of input.
(Regardless of whether input is made in mm or inches, the machine position is displayed in mm for millimeter machines, or in inches for inch machines.)
1 : Displayed according to the unit of input.
(When input is made in mm, the machine position is displayed in mm, and when input is made in inches, the machine position is displayed in inches accordingly.)

PPD Relative position display when a coordinate system is set
0 : Not preset
1 : Preset

> **NOTE**
> When PPD is set to 1 and the absolute position display is preset by one of the following, the relative position display is also preset to the same value as the absolute position display:
> 1) The manual reference position return
> 2) Setting of a coordinate system by G92

	#7	#6	#5	#4	#3	#2	#1	#0
3105						DPS	PCF	DPF

[Data type] Bit

DPF Display of the actual speed on the current position display screen, program check screen and program screen (MD1 mode)
0 : Not displayed
1 : Displayed

PCF Addition of the movement of the PMC–controlled axes to the actual speed display
0 : Added
1 : Not added

> **NOTE**
> For each setting, movement along any axis other than those controlled by the CNC (see the description of parameter No. 1010) is not reflected in the actual speed display.

DPS Actual spindle speed and T code
0 : Not always displayed
1 : Always displayed

	#7	#6	#5	#4	#3	#2	#1	#0
3106	OHS			OPH			GPL	

[Data type] Bit

GPL On the program list screen, the list–by–group function is:
0 : Disabled
1 : Enabled

OPH The operation history screen is:
0 : Not displayed.
1 : Displayed.

OHS Operation history sampling is:
0 : Performed.
1 : Not performed.

	#7	#6	#5	#4	#3	#2	#1	#0
3107	MDL			SOR		DNC		

[Data type] Bit

DNC Upon reset, the program display for DNC operation is:
0 : Not cleared
1 : Cleared

SOR Display of the program directory
0 : Programs are listed in the order of registration.
1 : Programs are listed in the order of program number.

MDL Display of the modal state on the program display screen
0 : Not displayed
1 : Displayed (only in the MDI mode)

	#7	#6	#5	#4	#3	#2	#1	#0
3108	JSP			WCI	PCT			

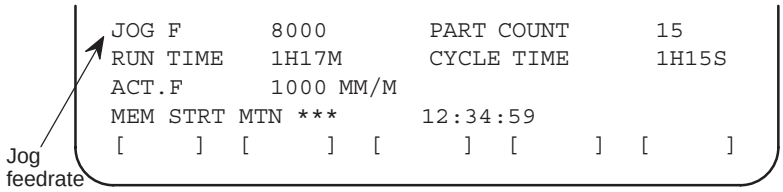
[Data type] Bit

PCT On the 7–pieces type soft key display program check screen and 12–pieces type soft key display position screen, T code displayed
0 : is a T code specified in a program (T).
1 : is a T code specified by the PMC (HD. T/NX. T)

WCI On the workpiece coordinate system screen, a counter input is:
0 : Disabled.
1 : Enabled.

JSP On the current position display screen and program check screen, jog feed is:
0 : Not displayed.
1 : Displayed.

NOTE
In manual operation mode, the jog feedrate is displayed. In automatic operation mode, the dry run feedrate is displayed. In each case, the feedrate to which a manual feedrate override has been applied is displayed.



	#7	#6	#5	#4	#3	#2	#1	#0
3109			RHD			IKY		

[Data type] Bit

IKY On the tool offset screen, soft key **[INPUT]** is:
0 : Displayed.
1 : Not displayed.

RHD When a manual handle interrupt is generated, the relative position display is:
0 : Not updated.
1 : Updated.

NOTE
This parameter is enabled when the INH parameter (bit 2 of parameter No.7100) is 1.

	#7	#6	#5	#4	#3	#2	#1	#0
3110				OPC		AHC		

[Data type] Bit

AHC With a soft key, the alarm history:
0: Can be cleared.
1: Cannot be cleared.

OPC The [ERASE] soft key on the operation history screen is:
0 : Disabled.
1 : Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3111	NPA		OPM					SVS

[Data type] Bit

SVS Servo tuning screen
0 : Not displayed
1 : Displayed

OPM Operating monitor
0 : Not displayed
1 : Displayed

NPA Action taken when an alarm is generated or when an operator message is entered
0 : The display shifts to the alarm or message screen.
1 : The display does not shift to the alarm or message screen.

	#7	#6	#5	#4	#3	#2	#1	#0
3112			OPH		EAH	OMH		SGD

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

SGD Servo waveform
0 : Not displayed
1 : Displayed

NOTE
If SGD is set to 1, no graphic display other than servo waveform display is done.

OMH The external operator message history screen is:
0 : Not displayed.
1 : Displayed.

EAH Messages of the exfernal alam/macro alarm in alarm history:
0 : Not recorded
1 : Recorded

OPH The operation history log function is:
0 : Enabled.
1 : Disabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3113	MS1	MS0	DCL					MHC

[Data type] Bit

MHC External operator message history data:
0 : Cannot be cleared.
1 : Can be cleared.
(Such data can be cleared using the [**CLEAR**] soft key.)

DCL The compensation function for the touch panel on the display is:
0 : Disabled.
1 : Enabled.

MS0, MS1 A combination of the number of characters preserved as external operator message history data and the number of history data items is set according to the table below.

MS1	MS0	Number of history data characters	Number of history data items
0	0	255	8
0	1	200	10
1	0	100	18
1	1	50	32

NOTE
When the values of MS0 and MS1 are changed, all preserved external operator message history data is cleared.

	#7	#6	#5	#4	#3	#2	#1	#0
3114		ICS	IUS	IMS	ISY	IOF	IPR	IPO

[Data type] Bit

IPO When the POS function key is pressed while the position display screen is being displayed:
0 : The screen is changed.
1 : The screen is not changed.

IPR When the PROG function key is pressed while the program screen is being displayed:
0 : The screen is changed.
1 : The screen is not changed.

IOF When the OFFSET SETTING function key is pressed while the offset/setting screen is being displayed:
0 : The screen is changed.
1 : The screen is not changed.

ISY When the SYSTEM function key is pressed while the system screen is being displayed:
0 : The screen is changed.
1 : The screen is not changed.

IMS When the MESSAGE function key is pressed while the message screen is being displayed:
0 : The screen is changed.
1 : The screen is not changed.

IUS When the CUSTOM GRAPH (using the small MDI) or GRAPH (using the standard MDI) function key is pressed while the custom or graphic screen is being displayed:
0 : The screen is changed.
1 : The screen is not changed.

ICS When the CUSTOM (using the standard MDI) function key is pressed while the custom screen is being displayed:
0 : The screen is changed.
1 : The screen is not changed.

	#7	#6	#5	#4	#3	#2	#1	#0
3115		D10x			NDFx		NDAx	NDPx

[Data type] Bit axis

NDPx Display of the current position for each axis
0 : The current position is displayed.
1 : The current position is not displayed.

NDAx Position display using absolute coordinates and relative coordinates is:
0 : Performed.
1 : Not performed. (Machine coordinates are displayed.)

NDFx To the actual speed display, axis movement data is:
0 : Added.
1 : Not added.

NOTE
Even if the PCF parameter (bit 1 of parameter No.3105) is set to 0, so as to add PMC controlled axis movement data to the actual speed display, the movement data for a PMC controlled axis for which NDFx is set to 1 is not added to the actual speed display.

	#7	#6	#5	#4	#3	#2	#1	#0
3116	MDC	T8D	COA	FOV		PWR		

[Data type] Bit

PWR Alarm No.100 (parameter enable) :

0 : Clear by CAN + RESET key

1 : Clear by RESET key

FOV In the field of specified feedrate F on the program check screen,
0 : The specified feedrate is displayed.
1 : (Specified feedrate) x (override) is displayed.

COA While an external alarm state is present or while an external message is being displayed, automatic screen erasure is:
0 : Performed.
1 : Not performed.

T8D T codes that are always displayed are displayed with:
0 : Four digits.
1 : Eight digits.

This parameter expands the T code display to eight digits for the continuous S or T display (bit 2 (DPS) of parameter No. 3105 is set to 1).

MDC Maintenance information by operating soft key :
0 : All clear disable.
1 : All clear enable.

	#7	#6	#5	#4	#3	#2	#1	#0
3117	P9D							

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

P9D The format of the screen displayed on the PC side by the CNC screen display function is:
0 : 14–inch type.
1 : 9–inch type.

This parameter is valid when the NC is not equipped with a display unit.

	#7	#6	#5	#4	#3	#2	#1	#0
3119	NVG				TPD	DDS	POR	

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

POR Display in Portuguese is:
0 : Disabled.
1 : Enabled.

DDS When the touch panel option is available, the touch panel is:
0: Enabled.
1: Disabled.

TPD When the external touch panel option is available, the external touch panel is:
0: Enabled.
1: Disabled.

NVG When a color display device is used, VGA mode is:
0 : Used.
1 : Not used.

3120	Time from the output of an alarm to the termination of sampling (waveform diagnosis function)

[Data type] Word

[Unit of data] ms

[Valid data range] 1 to 32760

When the waveform diagnosis function is used, this parameter sets the time form the output of a servo alarm until data collection. Storage operation is stopped because of the alarm. (This means that the termination of data collection can be delayed by a specified time.)

3122	Time interval used to record time data in operation history

[Data type] Word

[Unit of data] min

[Valid data range] 0 to 1439

Time data is recorded in operation history at set intervals. When 0 is specified in this parameter, 10 minutes is assumed as the default. However, note that time data is not recorded if there is no data to be recorded at the specified time.

3123	Time until screen clear function is applied

[Data type] Byte

[Unit of data] min

[Valid data range] 1 to 255

This parameter specifies the period that must elapse before the screen clear function is applied. If 0 is set, the screen is not cleared.

Moreover, this parameter is valid only when it is set on the path 1 side.

	#7	#6	#5	#4	#3	#2	#1	#0
3124	D08	D07	D06	D05	D04	D03	D02	D01
3125	D16	D15	D14	D13	D12	D11	D10	D09
3126	D24	D23	D22	D21	D20	D19	D18	D17
3127								D25

[Data type] Bit

Dxx (xx: 01 to 25) When modal G code is displayed on the program check screen, the xx group G code is:
0 : Displayed.
1 : Not displayed.

NOTE
Set these parameters when using the display with seven soft keys.

3134	Axis display order on workpiece coordinate system screen and workpiece shift screen

[Data type] Byte axis

[Valid data range] 0, 1 to the number of controlled axes

This parameter specifies the order in which axes are displayed on the workpiece coordinate system screen.
When the parameters of all axes are set to 0, all axes are displayed.
When the parameters of some axes are set, the axes for which a value of 0 is specified do not appear. The displayed axes are consecutive without spaces being left for non–displayed axes.

3151	Number of the axis for which the first load meter for the servo motor is used
3152	Number of the axis for which the second load meter for the servo motor is used
3153	Number of the axis for which the third load meter for the servo motor is used
3154	Number of the axis for which the fourth load meter for servo motor is used

[Data type] Byte

[Valid data range] 0, 1, . . . , the number of control axes

Set the numbers of the axes for which measurement values on the load meters for the fourth servo motors are displayed. Set the parameters to 0 for those axes for which a load meter need not be displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3191					STS	WKI		

[Data type] Bit

WKI On the workpiece coordinate system setting screen, the soft key [INPUT] is:
0 : Displayed.
1 : Not displayed.

STS When data is input on the setting screen, a confirmation message is:
0 : Not displayed.
1 : Displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3192						TRA	T2P	

[Data type] Bit

T2P If two points are pressed on the touch panel, it is assumed that:
0 : A mid point is pressed.
1 : The first point is pressed.

NOTE
1 If two or more points are pressed during a sampling period, it is assumed that a mid point is pressed.
2 In open CNC, the parameter is valid just for CNC screen display function.

TRA If a point on the touch panel is kept pressed for a time specified in parameter No. 3197 or longer,
0 : P/S alarm 5303 is not raised.
1 : P/S alarm 5303 is raised.

NOTE
In open CNC, the parameter is valid just for the CNC screen display function.

3197	Detection time of continuous pressing on touch panel

[Data type] Byte

[Unit of data] s

[Valid data range] 0 to 255

This parameter is valid if bit 2 (TRA) of parameter No. 3192 is set to 1.

Set a period of continuous pressing on the touch panel which causes P/S5305 alarm to be raised. If 0 is set, a period of 20 s is assumed.

	#7	#6	#5	#4	#3	#2	#1	#0
3201	MIP	NPE	N99		PUO	REP	RAL	RDL

[Data type] Bit

RDL When a program is registered by input/output device external control
0 : The new program is registered following the programs already registered.
1 : All registered programs are deleted, then the new program is registered.
Note that programs which are protected from being edited are not deleted.

RAL When programs are registered through the reader/puncher interface
0 : All programs are registered.
1 : Only one program is registered.

REP Action in response to an attempt to register a program whose number is the same as that of an existing program
0 : An alarm is generated.
1 : The existing program is deleted, then the new program is registered.
Note that if the existing program is protected from being edited, it is not deleted, and an alarm is generated.

PUO When address O of a program number is output in ISO code:
0 : ":" is output.
1 : "O" is output.

N99 With an M99 block, when bit 6 (NPE) of parameter No.3201 = 0, program registration is assumed to be:
0 : Completed
1 : Not completed

NPE With an M02, M30, or M99 block, program registration is assumed to be:
0 : Completed
1 : Not completed

MIP Program registration by external start signal (MINP) :
0 : Not performed.
1 : Performed.

	#7	#6	#5	#4	#3	#2	#1	#0
3202		PSR	CPD	NE9	OSR	CND	OLV	NE8

[Data type] Bit

NE8 Editing of subprograms with program numbers 8000 to 8999
0 : Not inhibited
1 : Inhibited

The following edit operations are disabled:

(1) Program deletion (Even when deletion of all programs is specified, programs with program numbers 8000 to 8999 are not deleted.)

(2) Program output (Even when outputting all programs is specified, programs with program numbers 8000 to 8999 are not output.)

(3) Program number search

(4) Program editing of registered programs

(5) Program registration

(6) Program collation

(7) Displaying programs

OLV When a program other than the selected program is deleted or output:
0 : The display of the selected program is not held.
1 : The display of the selected program is held.

CND By using the [**CONDENSE**] soft key on the program directory screen, the program condensing operation is:
0 : Not performed. (The [**CONDENSE**] soft key is not displayed.)
1 : Performed.

OSR In programming number search, when pressing soft key [**O–SEARCH**] without inputting program number by key :
0 : Search the following program number
1 : Operation is invalid

NE9 Editing of subprograms with program numbers 9000 to 9999
0 : Not inhibited
1 : Inhibited

The following program editing during operation is invalid.

(1) Program deletion (Even when deletion of all programs is specified, programs with program numbers 9000 to 9999 are not deleted.)

(2) Program punching (Even when punching of all programs is specified, programs with program numbers 9000 to 9999 are not punched.)

(3) Program number search

(4) Program editing after registration

(5) Program registration

(6) Program collation

(7) Displaying programs

CPD When an NC program is deleted, a confirmation message and confirmation soft key are:
0 : Not output.
1 : Output.

PSR Search for the program number of a protected program
0 : Disabled
1 : Enabled

NOTE
If this parameter is set, a protected program is also displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3203	MCL	MER	MIE					

[Data type] Bit

MIE After MDI operation is started, program editing during operation is:
0 : Enabled
1 : Disabled

MER When the last block of a program has been executed at single block operation in the MDI mode, the executed block is:
0 : Not deleted
1 : Deleted

> **NOTE**
> When MER is set to 0, the program is deleted if the end–of–record mark (%) is read and executed. (The mark % is automatically inserted at the end of a program.)

MCL Whether a program prepared in the MDI mode is cleared by reset
0 : Not deleted
1 : deleted

	#7	#6	#5	#4	#3	#2	#1	#0
3204		MKP				EXK		PAR

[Data type] Bit

PAR When a small keyboard is used, characters “[” and “]” are:
0 : Used as “[” and “]”.
1 : Used as “(” and “)”.

EXK The input character extension function is:
0 : Not used. ([C–EXT] soft key is displayed.)
1 : Used.

> **NOTE**
> The [C–EXT] soft key is used to select an operation on the program screen. This soft key enables the entry of “(”, “)”, and “@” using soft keys. This soft key is useful when using the small MDI keyboard, which does not have the “(”, “)”, and “@” keys.

MKP When M02, M30, or EOR(%) is executed during MDI operation, the created MDI program is:
0 : Erased automatically.
1 : Not erased automatically.

> **NOTE**
> If the MER parameter (bit 6 of parameter No.3203) is 1, executing the last block provides a choice of whether to automatically erase a created program.

	#7	#6	#5	#4	#3	#2	#1	#0
3205	MCK			OSC	PNS			COL

[Data type] Bit

COL When a program is displayed or output, any colons (:) in the comments of the program are:
0 : Converted to letter O
1 : Displayed or output as is colon (:)

PNS On the program screen, a search by a cursor key is:
0 : Performed.
1 : Not performed.

OSC On the offset screen, offset value erasure by a soft key is:
0 : Enabled.
1 : Disabled.

MCK The system tape memory check function is:
0 : Not used.
1 : Used. (This setting is inhibited.)

	#7	#6	#5	#4	#3	#2	#1	#0
3206				PHS			MIF	

[Data type] Bit

MIF Editing of the maintenance information screen is:
0 : Not prohibited.
1 : Prohibited.

PHS The selection of an operation history signal and parameters (No. 12801 to No. 12900) are:
0 : Not linked.
1 : Linked.

	#7	#6	#5	#4	#3	#2	#1	#0
3207								OM4

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Bit

OM4 A message displayed on the external operator message screen can have:
0 : Up to 256 characters, and just a single message can be displayed.
1 : Up to 64 characters, and up to four messages can be displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3208							COK	SKY

[Data type] Bit

SKY The function key [SYSTEM] on the MDI panel is:
0 : Enabled.
1 : Disabled.

COK The automatic screen erase function is:
0 : Enabled.
1 : Disabled.

> **NOTE**
> If this parameter is set to 1, screen erasure by the CAN + FUNCTION key is enabled, irrespective of the setting of parameter No. 3123.

	#7	#6	#5	#4	#3	#2	#1	#0
3209								MPD

[Data type] Bit

MPD When a subprogram is executed, the main program number is:
0 : Not displayed.
1 : Displayed.

3210	Password

[Data type] 2–word axis

This parameter sets a password for protecting program Nos. 9000 to 9999. When a value other than zero is set in this parameter and this value differs from the keyword set in parameter No.3211, bit 4 (NE9) of parameter No.3202 for protecting program Nos. 9000 to 9999 is automatically set to 1. This disables the editing of program Nos. 9000 to 9999. Until the value set as the password is set as a keyword, NE9 cannot be set to 0 and the password cannot be modified.

> **NOTE**
> 1 The state where password ≠ 0 and password ≠ keyword is referred to as the locked state. When an attempt is made to modify the password by MDI input operation in this state, the warning message “WRITE PROTECTED” is displayed to indicate that the password cannot be modified. When an attempt is made to modify the password with G10 (programmable parameter input), P/S alarm No.231 is issued.
> 2 When the value of the password is not 0, the parameter screen does not display the password. Care must be taken in setting a password.

3211	Keyword

[Data type] 2–word

When the value set as the password (set in parameter No.3210) is set in this parameter, the locked state is released and the user can now modify the password and the value set in bit 4 (NE9) of parameter No.3202.

NOTE
The value set in this parameter is not displayed. When the power is turned off, this parameter is set to 0.

3216	Increment in sequence numbers inserted automatically

This parameter can be set at the “Setting screen”.

[Data type] Word

[Valid data range] 0 to 9999

Set the increment for sequence numbers for automatic sequence number insertion (when SEQ, #5 of parameter 0000, is set to 1.)

	#7	#6	#5	#4	#3	#2	#1	#0
3290	KEY	MCM		IWZ	WZO	MCV	GOF	WOF

[Data type] Bit

WOF Setting the tool offset value by MDI key input is:
0 : Not disabled
1 : Disabled (With parameter No.3294 and No.3295, set the offset number range in which updating the setting is to be disabled.)

GOF Setting the tool offset value by MDI key input is:
0 : Not disabled
1 : Disabled (With parameter No.3294 and No.3295, set the offset number range in which updating the setting is to be disabled.)

MCV Macro variable setting by MDI key input is:
0 : Not disabled
1 : Disabled

WZO Setting a workpiece zero point offset value by MDI key input is:
0 : Not disabled
1 : Disabled

IWZ Setting a workpiece zero point offset value or workpiece shift value (T–series) by MDI key input in the automatic operation activation or halt state is:
0 : Not disabled
1 : Disabled

MCM The setting of custom macros by MDI key operation is:
0 : Enabled regardless of the mode.
1 : Enabled only in the MDI mode.

KEY For memory protection keys:
0 : The KEY1, KEY2, KEY3, and KEY4 signals are used.
1 : Only the KEY1 signal is used.

NOTE
The functions of the signals depend on whether KEY=0 or KEY=1.
When KEY = 0:
– KEY1: Enables a tool offset value and a workpiece zero point offset value to be input.
– KEY2: Enables setting data and macro variables to be input.
– KEY3: Enables program registration and editing.
– KEY4: Enables PMC data (counter and data table) to be input.

When KEY = 1:
– KEY1: Enables program registration and editing, and enables PMC parameter input.
– KEY2 to KEY4: Not used

	#7	#6	#5	#4	#3	#2	#1	#0
3291								WPT

[Data type] Bit

WPT The input of the tool wear compensation amount is:
0 : Enabled according to memory protection key signal KEY1.
1 : Always enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3292	PK5							

[Data type] Bit

PK5 The KEYPRM signal (memory protection signal, parameter write setting) is:
0 : Disabled.
1 : Enabled.

3294	Start number of tool offset values whose input by MDI is disabled
3295	Number of tool offset values (from the start number) whose input by MDI is disabled

[Data type] Word

When the modification of tool offset values by MDI key input is to be disabled using bit 0 (WOF) of parameter No.3290 and bit 1 (GOF) of parameter No.3290, parameter Nos. 3294 and 3295 are used to set the range where such modification is disabled. In parameter No.3294, set the offset number of the start of tool offset values whose modification is disabled. In parameter No.3295, set the number of such values.

When 0 or a negative value is set in parameter No.3294 or parameter No.3295, no modification of the tool offset values is allowed.

When the value set with parameter No.3294 is greater than the maximum tool offset count, no modification is allowed.

[Example]

The following setting disables the modification of both the tool geometry compensation values and tool wear compensation values corresponding to offset numbers 51 to 60:

Bit 1 (GOF) of parameter No.3290=1 (Disables tool offset value modification.)

Bit 0 (WOF) of parameter No.3290=1 (Disables tool wear compensation value modification.)

Parameter No.3294 = 51

Parameter No.3295 = 60

If bit 0 (WOF) of parameter No.3290 is set to 0, the modification of the tool offset values alone is disabled. The tool wear compensation values may be modified.

4.17 PARAMETERS OF PROGRAMS

	#7	#6	#5	#4	#3	#2	#1	#0
3401		GSB	ABS	MAB				DPI

[Data type] Bit

DPI When a decimal point is omitted in an address that can include a decimal point
0 : The least input increment is assumed.
1 : The unit of mm, inches, or second is assumed. (Pocket calculator type decimal point input)

MAB Switching between the absolute and incremental commands in MDI operation
0 : Performed by G90 or G91
1 : Depending on the setting of ABS, #5 of parameter No.3401

ABS Program command in MDI operation
0 : Assumed as an incremental command
1 : Assumed as an absolute command

> **NOTE**
> ABS is valid when MAB, #4 of parameter No.3401, is set to 1.

GSB The G code system is set.

GSB	G code
0	G code system A
1	G code system B

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

	#7	#6	#5	#4	#3	#2	#1	#0
3402	G23	CLR			G91	G19	G18	G01

[Data type] Bit

G01 Mode entered when the power is turned on or when the control is cleared
0 : G00 mode (positioning)
1 : G01 mode (linear interpolation)

G18 and G19 Plane selected when power is turned on or when the control is cleared

G19	G18	G17, G18 or G19 mode
0	0	G17 mode (plane XY)
0	1	G18 mode (plane ZX)
1	0	G19 mode (plane YZ)

G91 When the power is turned on or when the control is cleared
0 : G90 mode (absolute command)
1 : G91 mode (incremental command)

CLR Reset button on the MDI panel, external reset signal, reset and rewind signal, and emergency stop signal
0 : Cause reset state.
1 : Cause clear state.

For the reset and clear states, refer to Appendix in the Operator's Manual.

G23 When the power is turned on
0 : G22 mode (stored stroke check on)
1 : G23 mode (stored stroke check off)

	#7	#6	#5	#4	#3	#2	#1	#0
3403		AD2	CIR					

[Data type] Bit

CIR When neither the distance (I, J, K) from a start point to the center nor an arc radius (R) is specified in circular interpolation (G02, G03):
0 : The tool moves to an end point by linear interpolation.
1 : P/S alarm No.022 is issued.

AD2 Specification of the same address two or more times in a block is:
0 : Enabled (Next specification is enabled.)
1 : Disabled (P/S alarm No.5074)

NOTE
1 When 1 is set, specifying two or more G codes of the same group in a block will also result in an alarm being issued.
2 Up to three M codes can be specified in a single block, when bit 7 (M3B) of parameter No.3404 is set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
3404	M3B	EOR	M02	M30		SBP	POL	NOP

[Data type] Bit

NOP When a program is executed, a block consisting of an O number, EOB, or N number is:
0 : Not ignored, but regarded as being one block.
1 : Ignored.

POL For a command address allowing a decimal point, omission of the decimal point is:
0 : Enabled
1 : Disabled (P/S alarm No.5073)

SBP Address P of the block including M198 in the subprogram call function
0 : Indicating a file number
1 : Indicating a program number

M30 When M30 is specified in a memory operation:
0 : M30 is sent to the machine, and the head of the program is automatically searched for. So, when the ready signal FIN is returned and a reset or reset and rewind operation is not performed, the program is executed, starting from the beginning.
1 : M30 is sent to the machine, but the head of the program is not searched for. (The head of the program is searched for by the reset and rewind signal.)

M02 When M02 is specified in memory operation
0 : M02 is sent to the machine, and the head of the program is automatically searched for. So, when the end signal FIN is returned and a reset or reset and rewind operation is not performed, the program is executed, starting from the beginning.
1 : M02 is sent to the machine, but the head of the program is not searched for. (The head of the program is searched for by the reset and rewind signal.)

EOR When the end–of–record mark (%) is read during program execution:
0 : P/S alarm No.5010 occurs. (Automatic operation is stopped, and the system enters the alarm state.)
1 : No alarm occurs. (Automatic operation is stopped, and the system is reset.)

M3B The number of M codes that can be specified in one block
0 : One
1 : Up to three

	#7	#6	#5	#4	#3	#2	#1	#0
3406	C07		C05	C04	C03	C02	C01	
3407	C15	C14	C13		C11	C10	C09	C08
3408					C19	C18	C17	C16
3409	CFH							

[Data type] Bit

Cxx (xx: 01 to 19) When bit 6 (CLR) of parameter No.3402 is 1, the reset button on the MDI panel, the external reset signal, the reset and rewind signal, or emergency stop will,
0 : Clear the G code with group number xx.
1 : Not clear the G code with group number xx.

CFH When bit 6 (CLR) of parameter No.3402 is 1, the reset button on the MDI panel, the external reset signal, the reset and rewind signal, or emergency stop will,
0 : Clear F codes, H codes (for the M series), D codes (for the M series), and T codes (for the T series).
1 : Not clear F codes and D codes.

3410	Tolerance of arc radius

[Data type] 2–word

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter input	0.01	0.001	mm
Inch input	0.001	0.0001	inch

[Valid data range] 1 to 99999999

When a circular interpolation command (G02, G03) is executed, the tolerance for the radius between the start point and the end point is set. If the difference of radii between the start point and the end point exceeds the tolerance set here, a P/S alarm No.20 is informed.

NOTE
When the set value is 0, the difference of radii is not checked.

3411	M code preventing buffering 1
3412	M code preventing buffering 2
3413	M code preventing buffering 3
⋮	⋮
3420	M code preventing buffering 10

[Data type] Byte

[Valid data range] 0 to 255

Set M codes that prevent buffering the following blocks. If processing directed by an M code must be performed by the machine without buffering the following block, specify the M code.

M00, M01, M02, and M30 always prevent buffering even when they are not specified in these parameters.

3421	Minimum value 1 of M code preventing buffering
3422	Maximum value 1 of M code preventing buffering
3423	Minimum value 2 of M code preventing buffering
3424	Maximum value 2 of M code preventing buffering
3425	Minimum value 3 of M code preventing buffering
3426	Maximum value 3 of M code preventing buffering
3427	Minimum value 4 of M code preventing buffering
3428	Maximum value 4 of M code preventing buffering
3429	Minimum value 5 of M code preventing buffering
3430	Maximum value 5 of M code preventing buffering
3431	Minimum value 6 of M code preventing buffering
3432	Maximum value 6 of M code preventing buffering

[Data type] Word

[Valid data range] 0 to 65535

When a specified M code is within the range specified with parameter Nos. 3421 and 3422, 3423 and 3424, 3425 and 3426, 3427 and 3428, 3429 and 3430, or 3431 and 3432, buffering for the next block is not performed until the execution of the block is completed.

NOTE
1 The specification of a minimum value that exceeds the specified maximum value is invalid.
2 When there is only one data item, set the following: minimum value = maximum value.

	#7	#6	#5	#4	#3	#2	#1	#0
3450					CQD			

[Data type] Bit

CQD The method used for determining the amount of travel in circular interpolation is:
0 : Series 16 type.
1 : Series 15 type.

	#7	#6	#5	#4	#3	#2	#1	#0
3451				NBN				

[Data type] Bit

NBN If bit 0 (NOP) of parameter No. 3404 is set to 1, a block including just N (sequence number) is:
0 : Ignored.
1 : Not ignored but handled as a single block.

	#7	#6	#5	#4	#3	#2	#1	#0
3455								AXD

[Data type] Bit axis

AXD If a decimal point is omitted for an address with which a decimal point can be used, the value is determined:
0 : In accordance with the least input increment.
1 : In millimeters, inches, or seconds. (calculator–type decimal point input)

NOTE
1 This parameter is valid if bit 0 (DPI) of parameter No. 3401 is set to 0.
2 Because some addresses (such as R and K) are not related to an axis, setting this parameter for all axes is not equivalent to setting bit 0 (DPI) of parameter No. 3401 to 1.

3460	Address for second miscellaneous function

[Data type] Byte

This parameter specifies the address used for the second miscellaneous function, as follows:

Address	A	B	C	U	V	W
Set value	65	66	67	85	86	87

Address B is assumed when a value other than the above is set.
Axes names cannot be used to specify the address.

4.18 PARAMETERS OF PITCH ERROR COMPENSATION

	#7	#6	#5	#4	#3	#2	#1	#0
3605								BDP

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Bit

BDP Both–direction pitch error compensation is:
0 : Not used.
1 : Used.

3620	Number of the pitch error compensation position for the reference position for each axis

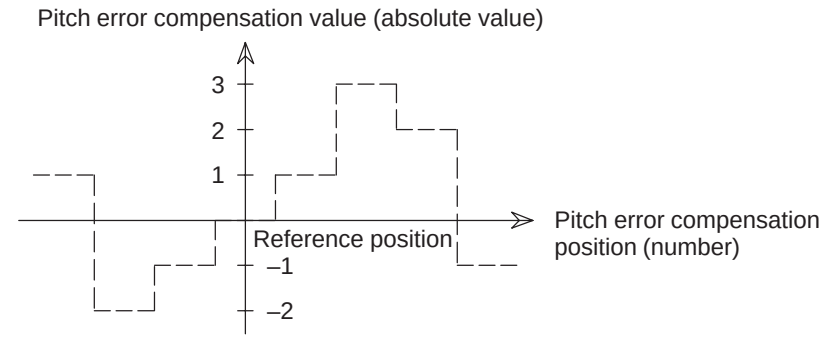
NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Word axis

[Unit of data] Number

[Valid data range] 0 to 1023

Set the number of the pitch error compensation position for the reference position for each axis.



Compensation position number	31	32	33	34	35	36	37
Set compensating value	+3	–1	–1	+1	+2	–1	–3

Fig.4.18 Pitch Error Compensation Position Number and Value (Example)

In the above example, set 33 as the number of the pitch error compensation position for the reference position.

3621	Number of the pitch error compensation position at extremely negative position for each axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Word axis

[Unit of data] Number

[Valid data range] 0 to 1023

Set the number of the pitch error compensation position at the extremely negative position for each axis.

3622	Number of the pitch error compensation position at extremely positive position for each axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Word axis

[Unit of data] Number

[Valid data range] 0 to 1023

Set the number of the pitch error compensation position at the extremely positive position for each axis.

This value must be larger than set value of parameter (No.3620).

3623	Magnification for pitch error compensation for each axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte axis

[Unit of data] 1

[Valid data range] 0 to 100

Set the magnification for pitch error compensation for each axis.

If the magnification is set to 1, the same unit as the detection unit is used for the compensation data. If 0 is set, the same magnification selected by setting 1 is selected.

3624	Interval between pitch error compensation positions for each axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] 2–word axis

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] 0 to 99999999

The pitch error compensation positions are arranged with equal spacing. The space between two adjacent positions is set for each axis. The minimum interval between pitch error compensation positions is limited and obtained from the following equation:

Minimum interval between pitch error compensation positions = maximum feedrate (rapid traverse rate)/7500

Units: Minimum interval between pitch error compensation positions: mm, inch, deg
Maximum feedrate: mm/min, inch/min, deg/min

Example: When the maximum feedrate is 15000 mm/min, the minimum interval between pitch error compensation positions is 2 mm.

If setting a magnification causes the absolute value of the compensation amount at a compensation position to exceed 100, enlarge the interval between the compensation positions by using a multiple calculated as follows:

Multiple = maximum compensation amount (absolute value)/128
(Round the remainder up to the nearest integer.)

Minimum interval between pitch error compensation positions
= Value obtained from the above maximum feedrate x multiple

Example 1) For linear axis

- Machine stroke: –400 mm to + 800 mm
- Interval between the pitch error compensation positions: 50 mm
- No.of the compensation position of the reference position: 40

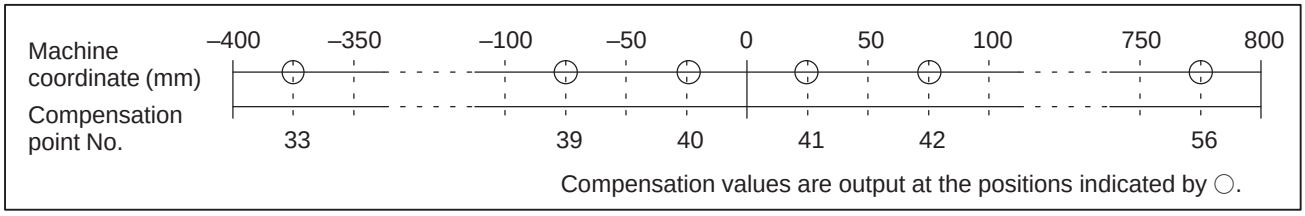
If the above is specified, the No.of the farthest compensation point in the negative direction is as follows:

No.of the compensation position of the reference position – (Machine stroke length in the negative direction/Interval between the compensation points) + 1
= 40 – 400/50 + 1
=33

No.of the farthest compensation position in the positive direction is as follows:

No.of the compensation position of the reference position + (Machine stroke length in the positive direction/Interval between the compensation positions)
= 40 + 800/50
= 56

The correspondence between the machine coordinate and the compensation position No.is as follows:



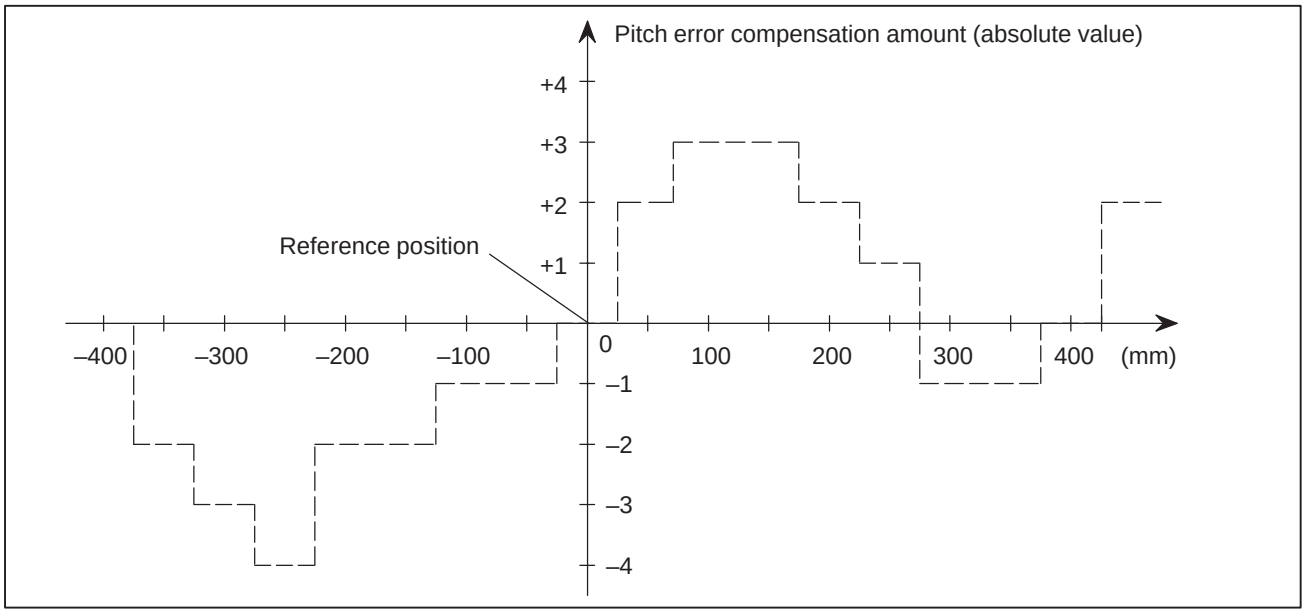
Therefore, set the parameters as follows:

Parameter	Setting
No. 3620: Compensation point number for reference position	40
No. 3621: Compensation point number for farthest point in the negative direction	33
No. 3622: Compensation point number for farthest point in the positive direction	56
No. 3623: Compensation magnification	1
No. 3624: Compensation point interval	50000

The compensation value is output at the compensationn position No.corresponding to each section between the coordinates.

The following is an example of the compensation values.

No.	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Compensation values	+2	+1	+1	–2	0	–1	0	–1	+2	+1	0	–1	–1	–2	0	+1	+2



Example 2) For the rotation axis

- Amount of movement per rotation: 360°
- Interval between pitch error compensation position: 45°
- No.of the compensation position of the reference position: 60

If the above is specified, the No.of the farthest compensation position in the negative direction for the rotation axis is always equal to the compensation position No.of the reference position.

The No.of the farthest compensation position in the positive direction is as follows:

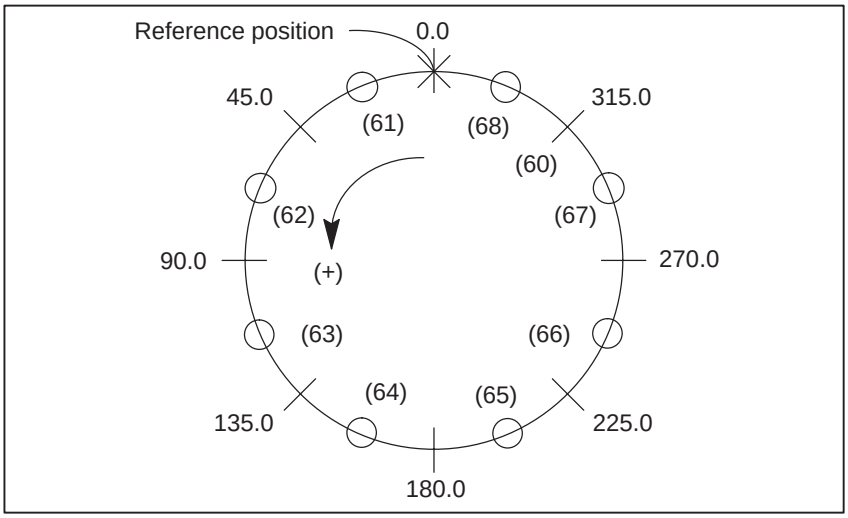
No.of the compensation position of the reference position + (Move amount per rotation/Interval between the compensation position)
= 60 + 360/45
= 68

The correspondence between the machine coordinate and the compensation position No.is as follows:

The compensation value is output at the circled position.

If the sum of the compensation value from 61 to 68 is not zero, the pitch error per rotation accumulates, resulting in a positional shift.

For compensation position 60, set the same compensation value as for 68.

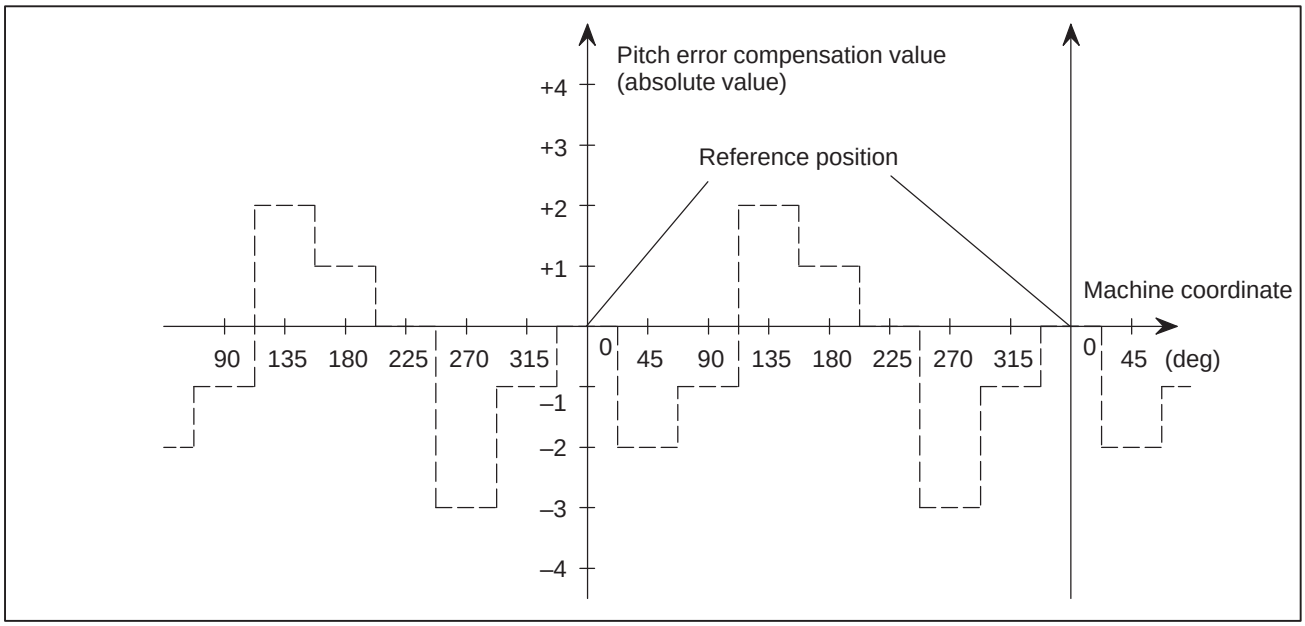


Set the parameters as follows:

Parameter	Setting
No. 3620: Compensation point number for reference position	60
No. 3621: Compensation point number for farthest point in the negative direction	60
No. 3622: Compensation point number for farthest point in the positive direction	68
No. 3623: Compensation magnification	1
No. 3624: Compensation point interval	45000

The following is an example of compensation values.

No.of the compensation position	60	61	62	63	64	65	66	67	68
Compensation value	+1	–2	+1	+3	–1	–1	–3	+2	+1



3625	Travel distance per revolution in pitch error compensation of rotation axis type

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] 2–word axis

[Valid data range] 0 to 99999999

If the pitch error compensation of rotation axis type is performed (bit 1 (ROSx) of parameter No. 1006 is set to 0 and bit 0 (ROTx) of parameter No. 1006 is set to 1), set the travel distance per revolution. The travel distance per revolution does not have to be 360 degrees, and a cycle of pitch error compensation of rotation axis type can be set.

However, the travel distance per revolution, compensation interval, and number of compensation points must satisfy the following condition:

(Travel distance per revolution) = (Compensation interval) x (Number of compensation points)

The compensation at each compensation point must be set so that the total compensation per revolution equals 0.

NOTE
If 0 is set, the travel distance per revolution becomes 360 degrees.

3626	Number of pitch error compensation point at the farthest end in the negative direction (for movement in the negative direction)

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Word axis

[Unit of data] Number

[Valid data range] 0 to 1023, 3000 to 4023

When using both–direction pitch error compensation, set the number of pitch error compensation point at the farthest end in the negative direction for a movement in the negative direction.

NOTE
1 For a movement in the positive direction, set the compensation point number at the farthest end in the negative direction in parameter No. 3621.
2 A set of compensation data items for a single axis should not be set to lie astride 1023 and 3000.

3627	Pitch error compensation (absolute value) at reference position when a movement to the reference position is made from the direction opposite to the direction of reference position return

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] –32768 to 32767

Set the absolute value of pitch error compensation at reference position when a movement to the reference position is made from the negative direction if the direction of reference position return (bit 5 (ZMI) of parameter No. 1006) is positive or from the positive direction if the direction of reference position return is negative.

4.19 PARAMETERS OF TOOL COMPENSATION

	#7	#6	#5	#4	#3	#2	#1	#0
5003							SUV	SUP

[Data type] Bit

SUP Start up or cancel in cutter compensation C
0 : Type A
1 : Type B

SUV When G40, G41, and G42 are specified independently,
0 : The start up and cancel operation conforms to the standard specification.
1 : Moves by a distance corresponding to the offset vector which is vertical to the next block movement. Specifying G40 alone results in the offset cancel operation.

	#7	#6	#5	#4	#3	#2	#1	#0
5004						ODI		

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

ODI A cutter compensation amount is set using:
0 : A radius.
1 : A diameter.

	#7	#6	#5	#4	#3	#2	#1	#0
5008			QCR	MCR	CNV		CNC	CNI

[Data type] Bit

CNI Interference check for cutter compensation C:
0 : Performed
1 : Not performed

CNC During interference check for cutter compensation, when the direction of movement after application of the offset differs from the programmed direction by between 90° and 270°:
0 : An alarm is issued.
1 : No alarm is issued.

CNV The interference check and vector erasure of cutter compensation C are:
0 : Performed.
1 : Not performed.

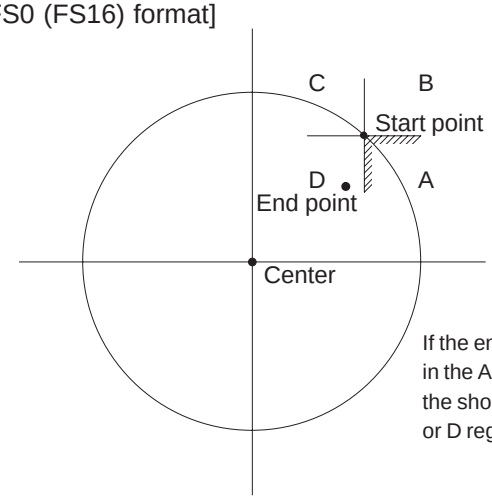
MCR If G41/G42 (cutter compensation C) is specified in the MDI mode, an alarm is:
0 : Not raised.
1 : Raised. (P/S5257)

NOTE
In the MDI mode, cutter compensation C is not performed, irrespective of the setting of this parameter.

QCR The travel distance of circular interpolation in cutter compensation C is judged:
0 : In the FS0 (FS16) format.
1 : In the FS15 format.

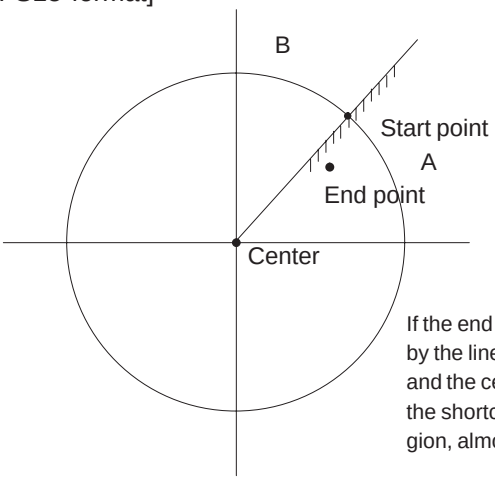
FS0 (FS16) and FS15 determine the travel distance in different ways if the radius of arc at the start point of circular interpolation is different from that at the end point (if the end point is not on the arc). By this parameter, the method of determining the travel distance of circular interpolation can be selected.

[FS0 (FS16) format]



If the end point viewed from the start point is in the A region, the movement is made along the shortcut. If the end point is in the B, C, or D region, almost a single turn is made.

[FS15 format]



If the end point is in the A region separated by the line L drawn between the start point and the center, the movement is made along the shortcut. If the end point is in the B region, almost a single turn is made.

NOTE
The setting of this parameter determines the travel distance determination method for circular interpolation not during cutter compensation C as well. Accordingly, if this parameter is set, the setting of bit 3 (CQD) of parameter No. 3450 is invalid.

5010	Limit value that ignores the vector when a tool moves on the outside of a corner during cutter compensation C

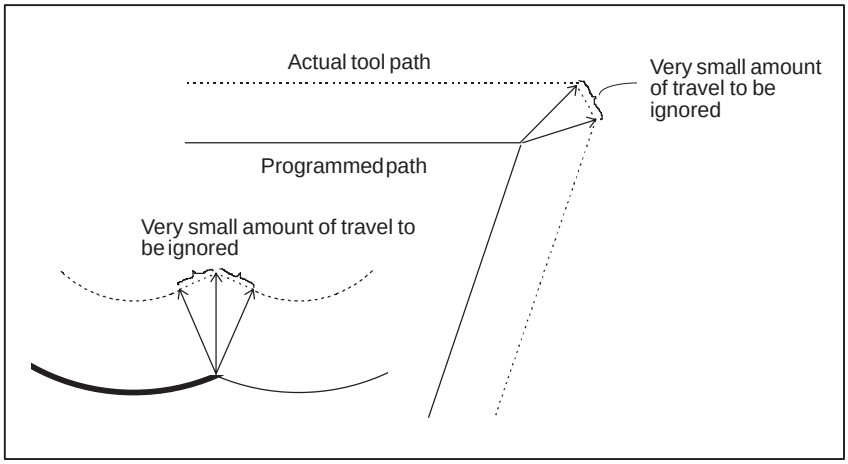
[Data type] Word

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter input	0.01	0.001	mm
Inch input	0.001	0.0001	inch

[Valid data range] 0 to 16383

This parameter sets the limit value that ignores a slight movement occurring when a tool moves on the outside of the corner during cutter compensation C.



4.20 PARAMETERS OF SCALING/ COORDINATE ROTATION

	#7	#6	#5	#4	#3	#2	#1	#0
5400	SCR	XSC		RCW				RIN

[Data type] Bit

RIN Coordinate rotation angle command (R)
0 : Specified by an absolute method
1 : Specified by G90 or G91

RCW When a workpiece or local coordinate system command is issued in coordinate system rotation mode:
0 : No alarm is issued.
1 : An alarm (P/S alarm No. 5302) is issued.

XSC Axis scaling and programmable mirror image
0 : Invalidated (The scaling magnification is specified by P.)
1 : Validated

SCR Scaling magnification unit
0 : 0.00001 times (1/100,000)
1 : 0.001 times

	#7	#6	#5	#4	#3	#2	#1	#0
5401								SCLx

[Data type] Bit axis

SCLx Scaling
0 : Invalidated
1 : Validated

5410	Angular displacement used when no angular displacement is specified for coordinate system rotation

[Data type] 2–word

[Unit of data] 0.001 degrees

[Valid data range] –360000 to 360000

This parameter sets the angular displacement for coordinate system rotation. When the angular displacement for coordinate system rotation is not specified with address R in the block where G68 is specified, the setting of this parameter is used as the angular displacement for coordinate system rotation.

5411	Magnification used when scaling magnification is not specified

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] 0.001 or 0.00001 times (Selected using SCR, #7 of parameter No.5400)

[Valid data range] 1 to 999999

This parameter sets the scaling magnification. This setting value is used when a scaling magnification (P) is not specified in the program.

NOTE
Parameter No.5421 becomes valid when scaling for every axis is valid. (XSC, #6 of parameter No.5400 is “1”.)

5421	Scaling magnification for every axis

This parameter can be set at the “Setting screen”.

[Data type] 2–word axis

[Unit of data] 0.001 or 0.00001 times (Selected using SCR, #7 of parameter No.5400)

[Valid data range] –999999 to –1, 1 to 999999

This parameter sets the scaling magnification for every axis.

4.21 PARAMETERS OF NORMAL DIRECTION CONTROL

5480	Number of the axis for controlling the normal direction

[Data type] Byte

[Valid data range] 1 to the maximum control axis number

This parameter sets the control axis number of the axis for controlling the normal direction.

5481	Rotation feedrate of normal direction control axis

[Data type] Word

[Unit of data] deg/min

[Valid data range] 1 to 15000

This parameter sets the feedrate of a normal direction control axis that is inserted at the start point of a block during normal direction control.

5482	Limit value that ignores the rotation insertion of normal direction control axis

[Data type] 2–word

[Unit of data]

Increment system	IS–A	IS–B	Unit
Rotation axis	0.01	0.001	deg

[Valid data range] 1 to 99999999

The rotation block of a normal direction control axis is not inserted when the rotation insertion angle calculated during normal direction control does not exceed this setting value. The ignored rotation angle is added to the next rotation insertion angle. The block insertion is then judged.

NOTE
1 No rotation block is inserted when 360 or more degrees are set.
2 If 180 or more degrees are set, a rotation block is inserted only when the circular interpolation is 180 or more degrees.

5483	Limit value of movement that is executed at the normal direction angle of a preceding block

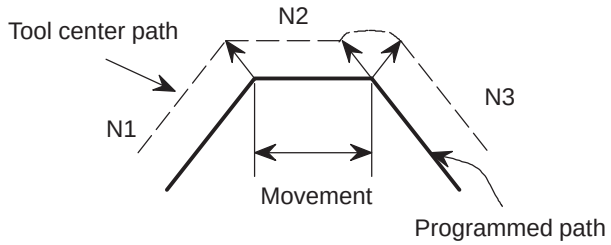
[Data type] 2–word

[Unit of data]

Increment system	IS–A	IS–B	Unit
Millimeter input	0.01	0.001	mm
Inch input	0.001	0.0001	inch

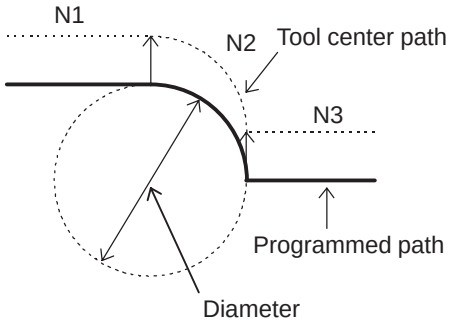
[Valid data range] 1 to 99999999

This parameter sets the limit value of movement at the normal direction angle of a preceding block.



For straight line
Block N2 is machined with the tool being normal to block N1 when the movement of N2 in the figure on the left does not exceed the set value.

Fig.4.21 (a) When the Block Moves Along a Straight Line



For arc
Arc N2 is machined with the tool being normal to block N1 when the arc diameter of N2 in the figure on the left does not exceed the setting value. A normal direction axis is not controlled to move in the normal direction according to the arc movement.

Fig.4.21 (b) When the Block Moves Along on Arc

	#7	#6	#5	#4	#3	#2	#1	#0
5484							CTI	SDC

[Data type] Bit

SDC In normal direction control:

0 : A C–axis movement is automatically inserted between blocks so that the C–axis is directed at right angles to the direction of motion at the start point of each block. (After movement on the C–axis, movement (along the X–axis and Y–axis) specified by the block is performed.)

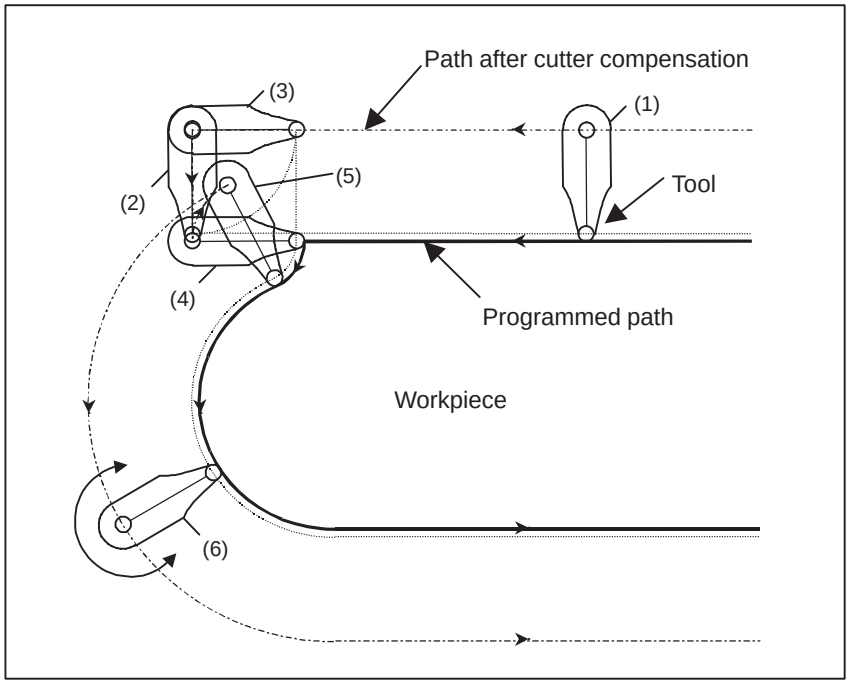
1 : If the amount of C–axis movement is smaller than the value set in parameter No.5485, a C–axis movement is not inserted before a block. Instead, it is performed together with movement along the X–axis and Y–axis.

CTI If such an arc that the vector from the center of the arc to a start point rotates in the reverse direction after cutter compensation is specified during normal direction control in the cutter compensation C mode:

0 : P/S 041 alarm is issued.

1 : The command is executed.

If this parameter is set to 1, and such an arc that the vector from the center of the arc to a start point rotates in the reverse direction after cutter compensation is specified during normal direction control in the cutter compensation C mode (see the tool path from (4) to (5) in the figure below), the tool is controlled so that the tool faces in the direction at right angles to the move direction (programmed path) before cutter compensation (see the tool path from (2) to (3) in the figure below).
Thus, as shown by the programmed path from (4) to (5) in the figure below, the inside of an arc where the radius of the workpiece is smaller than the compensation value of the tool can be cut.



NOTE
When this parameter is set to **1**, no interference check is made in cutter compensation C.

5485 Limit imposed on the insertion of a single block for rotation about the normal direction control axis

[Data type] 2–word

[Unit of data]

Increment system	IS–A	IS–B	Units
Rotation axis	0.01	0.001	deg

[Valid data range] 1 to 99999999

When normal direction control is applied, the amount of movement (rotation angle) on the normal direction control axis (C–axis), calculated so that the C–axis is directed at right angles to the direction of motion at the start point of a block, may be smaller than the value specified in this parameter. In such a case, the C–axis movement is not inserted before the movement (along the X–axis and Y–axis) specified by the block. Instead, the C–axis movement is performed together with the movement specified by the block. If the amount of movement (rotation angle) on the C–axis is greater than or equal to the value specified with this parameter, the C–axis movement is inserted, and the movement specified by the block is made after the completion of the C–axis movement.

NOTE
This parameter is enabled when the SDC parameter (bit 0 of parameter No.5484) is set to 1. If a value equal to or greater than 180 degrees is specified, a C–axis movement is inserted only when circular interpolation involving a C–axis rotation of 180 degrees or more is performed.

4.22 PARAMETERS OF CUSTOM MACROS

	#7	#6	#5	#4	#3	#2	#1	#0
6000	SBV		SBM	HGO			MGO	G67

[Data type] Bit

G67 If the macro continuous–state call cancel command (G67) is specified when the macro continuous–state call mode (G66) is not set:
0 : P/S alarm No.122 is issued.
1 : The specification of G67 is ignored.

MGO When a GOTO statement for specifying custom macro control is executed, a high–speed branch to 20 sequence numbers executed from the start of the program is:
0 : A high–speed branch is not caused to n sequence numbers from the start of the executed program.
1 : A high–speed branch is caused to n sequence numbers from the start of the program.

HGO When a GOTO statement for specifying custom macro control is executed:
0 : A high–speed branch is not caused to 30 sequence numbers, immediately following the point of execution.
1 : A high–speed branch is caused to 30 sequence numbers, immediately before the point of execution.

SBM Custom macro statement
0: Not stop the single block
1: Stops the single block

If you want to disable the single blocks in custom macro statements using system variable #3003, set this parameter to 0. If this parameter is set to 1, the single blocks in custom macro statements cannot be disabled using system variable #3003. To control single blocks in custom macro statements using system variable #3003, use bit 7 (SBV) of parameter No. 6000.

NOTE
This bit is invalid when bit 0 (NOP) of parameter No. 6000 is set to 1. (M series)

SBV Custom macro statement
0 : Not stop the single block
1 : Stops the single block

To control single blocks in custom macro statements using system variable #3003, use this parameter to enable or disable single blocks in custom macro statements.

This bit is valid when bit 5 (SBM) of parameter No. 6000 is set to 0.

	#7	#6	#5	#4	#3	#2	#1	#0
6001	CLV	CCV	TCS	CRO	PV5		PRT	

[Data type] Bit

PRT Reading zero when data is output using a DPRINT command
0 : Outputs a space
1 : Outputs no data

PV5 Custom macro common variables:
0 : Nos. 500 to 599 are output.
1 : Nos. 100 to 199 and Nos. 500 to 599 are output.

CRO ISO code in BPRWT or DPRNT commond
0 : Outputs only LF after data is output
1 : Outputs LF and CR after data is output

TCS Subprogram
0 : Not called using a T code
1 : Called using a T code

CCV Custom macro's common variables Nos. 100 through 199
0: Cleared to "vacant" by reset
1: Not cleared by reset

CLV Custom macro's local variables Nos. 1 through 33
0: Cleared to "vacant" by reset
1: Not cleared by reset

	#7	#6	#5	#4	#3	#2	#1	#0
6004							MFZ	NAT

[Data type] Bit

NAT Specification of the results of custom macro functions ATAN
0 : The result of ATAN is 0 to 360.0.
1 : The result of ATAN is –180 to 0 to 180.0.

MFZ If the angle of a custom macro operation command SIN, COS, or TAN is 1.0×10^{-8} or below or if the result of operation is not accurately 0, the operation result is:
0: Handled as underflow.
1: Normalized to 0.

	#7	#6	#5	#4	#3	#2	#1	#0
6005							ADR	SQC

NOTE
When this parameter has been set, the power must be turned off before operation is continued.

[Data type] Bit

SQC Calling a subprogram with its sequence number by the subprogram call function is:
0 : Disabled.
1 : Enabled.

ADR Calling a subprogram with address E by the subprogram call function using a custom macro and macro executor special code is:
0 : Disabled.
1 : Enabled.

Address E can be set for parameters Nos. 6090 and 6091.

	#7	#6	#5	#4	#3	#2	#1	#0
6006								MLG

[Data type] Bit

MLG In conditional decision statements in custom macros, logical operations:
0 : Cannot be used.
1 : Can be used.

	#7	#6	#5	#4	#3	#2	#1	#0
6010	*7	*6	*5	*4	*3	*2	*1	*0
6011	=7	=6	=5	=4	=3	=2	=1	=0
6012	#7	#6	#5	#4	#3	#2	#1	#0
6013	[7	[6	[5	[4	[3	[2	[1	[0
6014	]7	]6	]5	]4	]3	]2	]1	]0

[Data type] Bit

These parameters are used to input/output macro statements.
The numeral of a suffix indicates the bit position in a code.
*0 to *7 : Set the hole pattern of an EIA code indicating *.
=0 to =7 : Set the hole pattern of an EIA code indicating =.
#0 to #7 : Set the hole pattern of an EIA code indicating #.
[0 to [7 : Set the hole pattern of an EIA code indicating [.
] 0 to] 7 : Set the hole pattern of an EIA code indicating].
0 : Corresponding bit is 0
1 : Corresponding bit is 1.

6030	M code that calls the program entered in file

[Data type] Byte

[Valid data range] 0, and 1 to 255

This parameter sets an M code that calls the program entered in a file.

NOTE
The M code is judged to be M198 when zero is specified as the setting value.

6050	G code that calls the custom macro of program number 9010
6051	G code that calls the custom macro of program number 9011
6052	G code that calls the custom macro of program number 9012
6053	G code that calls the custom macro of program number 9013
6054	G code that calls the custom macro of program number 9014
6055	G code that calls the custom macro of program number 9015
6056	G code that calls the custom macro of program number 9016
6057	G code that calls the custom macro of program number 9017
6058	G code that calls the custom macro of program number 9018
6059	G code that calls the custom macro of program number 9019

[Data type] Word

[Valid data range] 1 to 999

These parameters set the G codes that call the custom macros of program numbers 9010 through 9019.

NOTE
Setting value 0 is invalid. No custom macro can be called by G00.

6071	M code that calls the subprogram of program number 9001
6072	M code that calls the subprogram of program number 9002
6073	M code that calls the subprogram of program number 9003
6074	M code that calls the subprogram of program number 9004
6075	M code that calls the subprogram of program number 9005
6076	M code that calls the subprogram of program number 9006
6077	M code that calls the subprogram of program number 9007
6078	M code that calls the subprogram of program number 9008
6079	M code that calls the subprogram of program number 9009

[Data type] 2–word

[Valid data range] 1 to 99999999

These parameters set the M codes that call the subprograms of program numbers 9001 through 9009.

NOTE
Setting value 0 is invalid. No subprogram can be called by M00.

6080	M code that calls the custom macro of program number 9020
6081	M code that calls the custom macro of program number 9021
6082	M code that calls the custom macro of program number 9022
6083	M code that calls the custom macro of program number 9023
6084	M code that calls the custom macro of program number 9024
6085	M code that calls the custom macro of program number 9025
6086	M code that calls the custom macro of program number 9026
6087	M code that calls the custom macro of program number 9027
6088	M code that calls the custom macro of program number 9028
6089	M code that calls the custom macro of program number 9029

[Data type] 2–word

[Valid data range] 1 to 99999999

These parameters set the M codes that call the custom macros of program numbers 9020 through 9029.

NOTE
Setting value 0 is invalid. No custom macro can be called by M00.

6090	ASCII code that calls the subprogram of program number 9004
6091	ASCII code that calls the subprogram of program number 9005

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Valid data range] 65 (A:41H) to 90 (Z:5AH)

These parameters set the ASCII codes that call subprograms in decimal. Addresses that can be used are as follows:
A, B, D, F, H, I, J, K, L, M, P, Q, R, S, T, X, Y, Z

NOTE
Set 0 when no subprogram is called

4.23 PARAMETERS OF SKIP FUNCTION

	#7	#6	#5	#4	#3	#2	#1	#0
6200	SKF	SRE		HSS			SK0	

[Data type] Bit

SK0 This parameter specifies whether the skip signal is made valid under the state of the skip signal SKIP <X004#7>.
0 : Skip signal is valid when these signals are 1.
1 : Skip signal is valid when these signals are 0.

HSS 0 : The skip function does not use high-speed skip signals.
1 : The skip function uses high-speed skip signals.

SRE When a high-speed skip signal is used:
0 : The signal is considered to be input at the rising edge (0 → 1).
1 : The signal is considered to be input at the falling edge (1 → 0).

SKF Dry run, override, and automatic acceleration/deceleration for G33 skip command
0 : Disabled
1 : Enabled

	#7	#6	#5	#4	#3	#2	#1	#0
6201	SPE						SEB	SEA

[Data type] Bit

SEA When a high speed skip signal goes on while the skip function is used, acceleration/deceleration and servo delay are:
0 : Ignored.
1 : Considered and compensated (type A).

SEB When a high speed skip signal goes on while the skip function is used, acceleration/deceleration and servo delay are:
0 : Ignored.
1 : Considered and compensated (type B).

NOTE
There are two types of compensation: Types A and B. With the skip function, the current position is stored in the CNC according to the skip signal. However, the current position stored in the CNC contains servo delay. The machine position is therefore deviated by the servo delay. The deviation can be obtained from the position deviation of the servo and the error generated due to feedrate acceleration/deceleration performed by the CNC. If the deviation can be compensated, it is not necessary to include the servo delay in measurement errors. The deviation can be compensated with the following two types by the parameter as follows:
(1) Type A: The deviation is the value calculated from the cutting time constant and servo time constant (loop gain).
(2) Type B: The deviation is the error due to acceleration/deceleration and the position deviation when the skip signal goes on.

SPE For the skip function (G33), the skip signal (bit 7 of X004) is:
0 : Disabled.
1 : Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
6202								1S1

[Data type] Bit

1S1 Specify high-speed skip signal (HDI0) is enabled when the G33 skip command is issued.
1S1 —— HDI0

NOTE
HDI0 is high-speed skip signals.

	#7	#6	#5	#4	#3	#2	#1	#0
6210							ROS	

[Data type] Bit

ROS When the skip position goes beyond the roll–over range, the values of system variables #5061 through #5068 indicating the skip signal position:
0 : Are not rolled over.
1 : Are rolled over similar to the absolute coordinates.

4.24 PARAMETERS OF EXTERNAL DATA INPUT/OUTPUT

	#7	#6	#5	#4	#3	#2	#1	#0
6300	EEX			ESR	ESC			

[Data type] Bit

ESC When a reset is input between input of the external data input read signal ESTB and execution of a search, the external program number search function:
0 : Performs a search.
1 : Does not perform a search.

ESR External program number search
0 : Disabled
1 : Enabled

EEX PMC EXIN function
0 : Conventional specifications
1 : Extended specifications

If you want to handle data unavailable with the PMC/EXIN command according to the conventional specifications, set this bit to 1.

For details of EXIN and how to change ladder software, refer to the PMC specifications and other manuals.

4.25 PARAMETERS OF GRAPHIC DISPLAY

6561	Standard color data for graphic color number 1
6562	Standard color data for graphic color number 2
6563	Standard color data for graphic color number 3
6564	Standard color data for graphic color number 4
6565	Standard color data for graphic color number 5
6566	Standard color data for graphic color number 6
6567	Standard color data for graphic color number 7
6568	Standard color data for graphic color number 8
6569	Standard color data for graphic color number 9
6570	Standard color data for graphic color number 10
6571	Standard color data for graphic color number 11
6572	Standard color data for graphic color number 12
6573	Standard color data for graphic color number 13
6574	Standard color data for graphic color number 14
6575	Standard color data for graphic color number 15
6581	Standard color data for character color number 1
6582	Standard color data for character color number 2
6583	Standard color data for character color number 3
6584	Standard color data for character color number 4
6585	Standard color data for character color number 5
6586	Standard color data for character color number 6
6587	Standard color data for character color number 7
6588	Standard color data for character color number 8
6589	Standard color data for character color number 9
6590	Standard color data for character color number 10
6591	Standard color data for character color number 11
6592	Standard color data for character color number 12
6593	Standard color data for character color number 13
6594	Standard color data for character color number 14
6595	Standard color data for character color number 15

[Data type] 2–word

[Unit of data] rr gg bb: 6–digit number (rr: Red gg: Green bb: Blue)
When a number of less than six digits is set, the system assumes that 0 has been specified for the unspecified higher digit(s).

[Valid data range] Data of each color: 00 to 15 (same value as the tone level data on the color setting screen)
When a value of more than 15 is set, the system assumes that 15 has been specified.

Example: Set 10203 in this parameter when the color tone levels are as follows:
Red: 1 Green: 2 Blue: 3

NOTE
To set the color of the VGA display, use the color setting screen. Note that the color changes when the settings of parameters No.6561 through No.6595 are modified.

4.26 PARAMETERS OF DISPLAYING OPERATION TIME AND NUMBER OF PARTS

	#7	#6	#5	#4	#3	#2	#1	#0
6700								PCM

[Data type] Bit

PCM M code that counts the total number of machined parts and the number of machined parts
0 : M02, or M30, or an M code specified by parameter No.6710
1 : Only M code specified by parameter No.6710

6710	M code that counts the total number of machined parts and the number of machined parts

[Data type] Byte

[Valid data range] 0 to 255 except 98 and 99

The total number of machined parts and the number of machined parts are counted (+1) when the M code set is executed.

NOTE
Set value 0 is invalid (the number of parts is not counted for M00). Data 98 and 99 cannot be set.

6711	Number of machined parts

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One piece

[Valid data range] 0 to 99999999

The number of machined parts is counted (+1) together with the total number of machined parts when the M02, M30, or a M code specified by parameter No.6710 is executed.

NOTE
The number of parts is not counted for M02, M03, when bit 0 (PCM) of parameter No. 6700 is set to 1.

6712	Total number of machined parts

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One piece

[Valid data range] 0 to 99999999

This parameter sets the total number of machined parts.

The total number of machined parts is counted (+1) when M02, M30, or an M code specified by parameter No.6710 is executed.

NOTE
The number of parts is not counted for M02, M03, when bit 0 (PCM) of parameter No. 6700 is set to 1.

6713	Number of required parts

This parameter can be set at the “Setting screen”.

[Data type] Word

[Unit of data] One piece

[Valid data range] 0 to 9999

This parameter sets the number of required machined parts.

Required parts finish signal PRTSF is output to PMC when the number of machined parts reaches the number of required parts. The number of parts is regarded as infinity when the number of required parts is zero. The PRTSF signal is then not output.

6750	Integrated value of power–on period

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One min

[Valid data range] 0 to 99999999

This parameter displays the integrated value of power–on period.

6751	Operation time (integrated value of time during automatic operation) I

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One ms

[Valid data range] 0 to 60000

6752	Operation time (integrated value of time during automatic operation) II

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One min

[Valid data range] 0 to 99999999

This parameter displays the integrated value of time during automatic operation (neither stop nor hold time included).
The actual time accumulated during operation is the sum of this parameter No. 6751 and parameter No. 6752.

6753	Integrated value of cutting time I

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One ms

[Valid data range] 1 to 60000

6754	Integrated value of cutting time II

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One min

[Valid data range] 0 to 99999999

This parameter displays the integrated value of a cutting time that is performed in cutting feed such as linear interpolation (G01) and circular interpolation (G02 or G03).
The actual time accumulated during cutting is the sum of this parameter No. 6753 and parameter No. 6754.

6755	Integrated value of general–purpose integrating meter drive signal (TMRON) ON time I

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One ms

[Valid data range] 0 to 60000

6756	Integrated value of general–purpose integrating meter drive signal (TMRON) ON time II

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One min

[Valid data range] 0 to 99999999

This parameter displays the integrated value of a time while input signal TMRON from PMC is on.
The actual integrated time is the sum of this parameter No. 6755 and parameter No. 6756.

6757	Operation time (integrated value of one automatic operation time) I

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One ms

[Valid data range] 0 to 60000

6758	Operation time (integrated value of one automatic operation time) II

This parameter can be set at the “Setting screen”.

[Data type] 2–word

[Unit of data] One min

[Valid data range] 0 to 99999999

This parameter displays the one automatic operation drive time (neither stop nor hold state included). The actual time accumulated during operating is the sum of this parameter No. 6757 and parameter No. 6758. The operation time is automatically preset to 0 during the power–on sequence and the cycle start from the reset state.

4.27 PARAMETERS OF POSITION SWITCH FUNCTIONS

	#7	#6	#5	#4	#3	#2	#1	#0
6901						PCM	EPS	IGP

[Data type] Bit

IGP During follow–up for the absolute position detector, position switch signals are:
0 : Output
1 : Not output

EPS The number of position switches is:
0 : Up to 10.
1 : Up to 16.

PCM Position switch signals are output:
0 : Without considering acceleration/deceleration and servo delay.
1 : With considering acceleration/deceleration and servo delay.

NOTE
The position switch signals are output considering acceleration/deceleration after interpolation and servo delay. When this parameter is set to 1, however, signals are output from the position switches at different times from the specified ones.

6910	Axis corresponding to the first position switch
6911	Axis corresponding to the second position switch
6912	Axis corresponding to the third position switch
6913	Axis corresponding to the fourth position switch
6914	Axis corresponding to the fifth position switch
6915	Axis corresponding to the sixth position switch
6916	Axis corresponding to the seventh position switch
6917	Axis corresponding to the eighth position switch
6918	Axis corresponding to the ninth position switch
6919	Axis corresponding to the tenth position switch
6920	Axis corresponding to the eleventh position switch
6921	Axis corresponding to the twelveth position switch
6922	Axis corresponding to the thirteenth position switch
6923	Axis corresponding to the fourteenth position switch
6924	Axis corresponding to the fifteenth position switch
6925	Axis corresponding to the sixteenth position switch

[Data type] Byte

[Valid data range] 0 to Number of controlled axes

These parameters sequentially specify the numbers of the controlled axes corresponding to the 1st through 16th position switch functions. The corresponding position switch signal is output to the PMC when the machine coordinate of the corresponding axis is within the range set in parameters.

NOTE
Set 0 for the number corresponding to a position switch which is not to be used.

6930	Maximum operation range of the first position switch
6931	Maximum operation range of the second position switch
6932	Maximum operation range of the third position switch
6933	Maximum operation range of the fourth position switch
6934	Maximum operation range of the fifth position switch
6935	Maximum operation range of the sixth position switch
6936	Maximum operation range of the seventh position switch
6937	Maximum operation range of the eighth position switch
6938	Maximum operation range of the ninth position switch
6939	Maximum operation range of the tenth position switch
6940	Maximum operation range of the eleventh position switch
6941	Maximum operation range of the twelveth position switch
6942	Maximum operation range of the thirteenth position switch
6943	Maximum operation range of the fourteenth position switch
6944	Maximum operation range of the fifteenth position switch
6945	Maximum operation range of the sixteenth position switch

[Data type] 2–word

[Unit of data]

Increment system	IS–A	IS–B	Unit
Metric machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] –99999999 to 99999999

These parameters sequentially set the maximum operation ranges of the 1st through 16th position switches.

6950	Minimum operation range of the first position switch
6951	Minimum operation range of the second position switch
6952	Minimum operation range of the third position switch
6953	Minimum operation range of the fourth position switch
6954	Minimum operation range of the fifth position switch
6955	Minimum operation range of the sixth position switch
6956	Minimum operation range of the seventh position switch
6957	Minimum operation range of the eighth position switch
6958	Minimum operation range of the ninth position switch
6959	Minimum operation range of the tenth position switch
6960	Minimum operation range of the eleventh position switch
6961	Minimum operation range of the twelveth position switch
6962	Minimum operation range of the thirteenth position switch
6963	Minimum operation range of the fourteenth position switch
6964	Minimum operation range of the fifteenth position switch
6965	Minimum operation range of the sixteenth position switch

[Data type] 2–word

[Unit of data]

Increment system	IS–A	IS–B	Unit
Metric machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] –99999999 to 99999999

These parameters sequentially set the minimum operation ranges of the 1st through 16th position switches.

4.28 PARAMETERS OF MANUAL HANDLE FEED AND HANDLE INTERRUPTION

	#7	#6	#5	#4	#3	#2	#1	#0
7100				HPF	HCL		THD	JHD

[Data type] Bit

JHD Manual handle feed in JOG feed mode or incremental feed in the manual handle feed
0 : Invalid
1 : Valid

	When JHD:=0		When JHD:=1	
	JOG feed mode	Manual handle feed mode	JOG feed mode	Manual handle feed mode
JOG feed	○	×	○	×
Manual handle feed	×	○	○	○
Incremental feed	×	×	×	○

THD Manual pulse generator in TEACH IN JOG mode
0 : Invalid
1 : Valid

HCL The clearing of handle interruption amount display by soft key [CAN] operation is:
0 : Disabled.
1 : Enabled.

HPF When a manual handle feed exceeding the rapid traverse rate is issued,
0 : The rate is clamped at the rapid traverse rate, and the handle pulses corresponding to the excess are ignored. (The graduations of the manual pulse generator may not agree with the distance the machine has traveled.)
1 : The rate is clamped at the rapid traverse rate, and the handle pulses corresponding to the excess are not ignored, but stored in the CNC. (If the rotation of the manual pulse generator is stopped, the machine moves by the distance corresponding to the pulses preserved in the CNC, then stops.)

	#7	#6	#5	#4	#3	#2	#1	#0
7102								HNGx

[Data type] Bit axis

HNGx Axis movement direction for rotation direction of manual pulse generator
0 : Same in direction
1 : Reverse in direction

	#7	#6	#5	#4	#3	#2	#1	#0
7103				IBH	HIT	HNT		

[Data type] Bit

HNT The manual handle feed/incremental feed magnification is:
0 : Multiplied by 1.
1 : Multiplied by 10.

HIT The manual handle interruption magnification is:
0 : Multiplied by 1.
1 : Multiplied by 10.

IBH Manual handle feed for the β servo unit using an I/O link is:
0 : Disabled.
1 : Enabled.

7110	Number of manual pulse generators used

[Data type] Byte

[Valid data range] 1, 2, or 3

This parameter sets the number of manual pulse generators.

7113	Manual handle feed magnification m

[Data type] Word

[Unit of data] One time

[Valid data range] 1 to 127

This parameter sets the magnification when manual handle feed movement selection signals MP1 and MP2 are set to 0 and 1.

7114	Manual handle feed magnification n

[Data type] Word

[Unit of data] One time

[Valid data range] 1 to 1000

This parameter sets the magnification when manual handle feed movement selection signals MP1 and MP2 are set to 1.

Movement selection signal		Movement (Manual handle feed)
MP2	MP1	
0	0	Least input increment × 1
0	1	Least input increment × 10
1	0	Least input increment × m
1	1	Least input increment × n

7117	Allowable number of pulses that can be accumulated during manual handle feed

[Data type] 2–Word

[Unit of data] Pulses

[Valid data range] 0 to 99999999

If manual handle feed is specified such that the rapid traverse rate will be exceeded momentarily, those pulses received from the manual pulse generator that exceed the rapid traverse rate are accumulated rather than canceled. This parameter sets the maximum number of pulses which can be accumulated in such a case.

NOTE

If the specification of manual handle feed is such that the rapid traverse rate will be exceeded, for example, when the manual pulse generator is rotated at high speed with a large magnification such as $\times 100$, the axial feedrate is clamped at the rapid traverse rate and those pulses received from the manual pulse generator that exceed the rapid traverse rate are ignored. In such a case, therefore, the scale on the manual pulse generator may differ from the actual amount of travel. If such a difference is not acceptable, this parameter can be set to temporarily accumulate the excess pulses in the CNC, rather than ignoring them, up to the specified maximum (pulses in excess of the set maximum are ignored). The accumulated pulses are output and converted to a move command once the feedrate falls below the rapid traverse rate by reducing the rotational speed of the manual pulse generator or stopping its rotation altogether. Note, however, that if the maximum number of pulses to be accumulated is too large, stopping the rotation of the manual pulse generator does not stop feeding until the tool moves by an amount corresponding to the pulses accumulated in the CNC.

4.29 PARAMETERS OF SOFTWARE OPERATOR'S PANEL

	#7	#6	#5	#4	#3	#2	#1	#0
7200		OP7	OP6	OP5	OP4	OP3	OP2	OP1

[Data type] Bit

OP1 Mode selection on software operator's panel
0 : Not performed
1 : Performed

OP2 JOG feed axis select and JOG rapid traverse buttons on software operator's panel
0 : Not performed
1 : Performed

OP3 Manual pulse generator's axis select and manual pulse generator's magnification switches on software operator's panel
0 : Not performed
1 : Performed

OP4 JOG speed override and rapid traverse override switches on software operator's panel
0 : Not performed
1 : Performed

OP5 Optional block skip, single block, machine lock, and dry run switches on software operator's panel
0 : Not performed
1 : Performed

OP6 Protect key on software operator's panel
0 : Not performed
1 : Performed

OP7 Feed hold on software operator's panel
0 : Not performed
1 : Performed

	#7	#6	#5	#4	#3	#2	#1	#0
7201								JPC

[Data type] Bit

JPC For the name of a general–purpose switch function on the software operator's panel, the use of full–size characters is:
0 : Not allowed.
1 : Allowed.

7210	Job–movement axis and its direction on software operator's panel [↑]
7211	Job–movement axis and its direction on software operator's panel [↓]
7212	Job–movement axis and its direction on software operator's panel [→]
7213	Job–movement axis and its direction on software operator's panel [←]
7214	Job–movement axis and its direction on software operator's panel [↙]
7215	Job–movement axis and its direction on software operator's panel [↗]
7216	Job–movement axis and its direction on software operator's panel [↷]
7217	Job–movement axis and its direction on software operator's panel [↶]

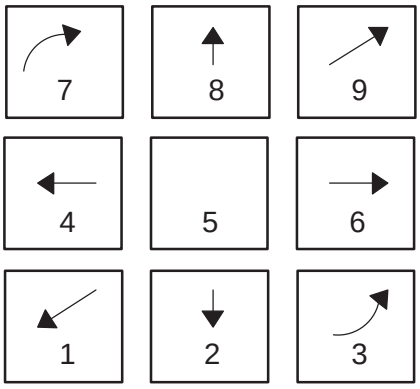
[Data type] Byte

[Valid data range] 0 to 8

On software operator's panel, set a feed axis corresponding to an arrow key on the MDI panel when jog feed is performed.

Set value	Feed axis and direction
0	Not moved
1	First axis, positive direction
2	First axis, negative direction
3	Second axis, positive direction
4	Second axis, negative direction
5	Third axis, positive direction
6	Third axis, negative direction
7	Fourth axis, positive direction
8	Fourth axis, negative direction

Arrow keys on the MDI panel



Example

Under X, Y, and Z axis configuration, to set arrow keys to feed the axes in the direction specified as follows, set the parameters to the values given below. [8 ↑] to the positive direction of the Z axis, [2 ↓] to the negative direction of the Z axis, [6 →] to the positive direction of the X axis [4←] to the negative direction of the X axis, [1↙] to the positive direction of the Y axis, [9↗] to the negative direction of the Y axis

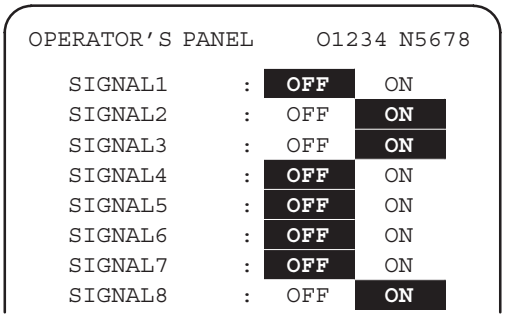
Parameter No.7210 = 5 (Z axis, positive direction)
Parameter No.7211 = 6 (Z axis, negative direction)
Parameter No.7212 = 1 (X axis, positive direction)
Parameter No.7213 = 2 (X axis, negative direction)
Parameter No.7214 = 3 (Y axis, positive direction)
Parameter No.7215 = 4 (Y axis, negative direction)
Parameter No.7216 = 0 (Not used)
Parameter No.7217 = 0 (Not used)

7220	Name of general–purpose switch on software operator's panel
7283	Name of general–purpose switch on software operator's panel

[Data type] Byte

Example

These parameters set the names of the general–purpose switches (SIGNAL 1 through SIGNAL 8) on the software operator's panel as described below.



These names are set using character codes that are displayed in parameter Nos. 7220 to 7283.

Parameter No.7220:
Sets the character code (083) corresponding to S of SIGNAL 1.
Parameter No.7221:
Sets the character code (073) corresponding to I of SIGNAL 1.
Parameter No.7222:
Sets the character code (071) corresponding to G of SIGNAL 1.
Parameter No.7223:
Sets the character code (078) corresponding to N of SIGNAL 1.
Parameter No.7224:
Sets the character code (065) corresponding to A of SIGNAL 1.
Parameter No.7225:
Sets the character code (076) corresponding to L of SIGNAL 1.
Parameter No.7226:
Sets the character code (032) corresponding to (space) of SIGNAL 1.
Parameter No.7227:
Sets the character code (049) corresponding to 1 of SIGNAL 1.
Parameter Nos. 7228 to 7235:
Set the character codes of SIGNAL 2 shown in the figure above.
Parameter Nos. 7236 to 7243:
Set the character codes of SIGNAL 3 shown in the figure above.
Parameter Nos. 7244 to 7251:
Set the character codes of SIGNAL 4 shown in the figure above.
Parameter Nos. 7252 to 7259:
Set the character codes of SIGNAL 5 shown in the figure above.
Parameter Nos. 7260 to 7267:
Set the character codes of SIGNAL 6 shown in the figure above.
Parameter Nos. 7268 to 7275:
Set the character codes of SIGNAL 7 shown in the figure above.
Parameter Nos. 7276 to 7283:
Set the character codes of SIGNAL 8 shown in the figure above.

The character codes are shown in Appendix A CHARACTER CODE LIST.

4.30 PARAMETERS OF AXIS CONTROL BY PMC

	#7	#6	#5	#4	#3	#2	#1	#0
8001	SKE	AUX	NCC		RDE	OVE		MLE

[Data type] Bit

MLE Whether all axis machine lock signal MLK is valid for PMC–controlled axes
0 : Valid
1 : Invalid

> **NOTE**
> Each–axis machine lock signals MLK1 to MLK4 are always valid, regardless of the setting of this parameter.

OVE Signals related to dry run and override used in PMC axis control
0: Same signals as those used for the CNC
(1) Feedrate override signals *FV0 to *FV7
(2) Override cancellation signal OVC
(3) Rapid traverse override signals ROV1 and ROV2
(4) Dry run signal DRN
(5) Rapid traverse selection signal RT
1: Signals specific to the PMC
(1) Feedrate override signals *FV0E to *FV7E
(2) Override cancellation signal OVCE
(3) Rapid traverse override signals ROV1E and ROV2E
(4) Dry run signal DRNE
(5) Rapid traverse selection signal RTE

RDE Whether dry run is valid for rapid traverse in PMC axis control
0 : Invalid
1 : Valid

NCC When a travel command is issued for a PMC–controlled axis (selected by a controlled–axis selection signal) according to the program:
0 : P/S alarm 139 is issued while the PMC controls the axis with an axis control command. While the PMC does not control the axis, a CNC command is enabled.
1 : P/S alarm 139 is issued unconditionally.

AUX The number of bytes for the code of an auxiliary function (12H) command to be output is
0 : 1 (0 to 255)
1 : 2 (0 to 65535)

SKE Skip signal during axis control by the PMC
0 : Uses the same signal SKIP (X004#7) as CNC.
1 : Uses dedicated axis control signal ESKIP (X004#6) used by the PMC.

	#7	#6	#5	#4	#3	#2	#1	#0
8002			PF2	PF1	F10	SUE		RPD

[Data type] Bit

RPD Rapid traverse rate for PMC–controlled axes
0 : Feedrate specified with parameter No.1420
1 : Feedrate specified with the feedrate data in an axis control command

SUE Whether acceleration/deceleration is performed for an axis that is synchronized with external pulses, for external pulse synchronization commands in PMC axis control
0 : Performed (exponential acceleration/deceleration)
1 : Not performed

F10 Least increment for the feedrate for cutting feed (per minute) in PMC axis control

F10	Millimeter input	Inch input
0	1 mm/min	0.01 inch/min
1	10 mm/min	0.1 inch/min

PF1, PF2 Set the the feedrate unit of feed per minute in PMC axis control

PF2	PF1	Feedrate unit
0	0	1/1
0	1	1/10
1	0	1/100
1	1	1/1000

	#7	#6	#5	#4	#3	#2	#1	#0
8003							PAX	PIM

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

PIM Specifies whether to cause an inch/metric input to affect the linear axis that is subjected only to PMC axis control (see the parameter No.1010), as follows:
0: To affect.
1: Not to affect.

PAX When the number of CNC–controlled axes (parameter No. 1010) is set to 0:
0 : All axes are assumed to be CNC axes.
1 : All axes are assumed to be PMC axes.

	#7	#6	#5	#4	#3	#2	#1	#0
8004		NCI	DSL				NMT	CMV

CMV When a move command and auxiliary function are specified from the CNC, and the system is awaiting the auxiliary function completion signal after completion of the specified axis movement:
0 : An alarm (No.130) is issued when an axis control command is issued from the PMC for the same axis.
1 : An axis control command, when issued from the PMC for the same axis, is executed.

NMT When a command is specified from the CNC for the axis on which the tool is moving according to axis control specification from the PMC:
0 : P/S alarm No.130 is issued.
1 : The command is executed without issuing an alarm, provided the command does not involve a movement on the axis.

DSL If the selection of an axis is changed when PMC axis selection is disabled:
0 : P/S alarm No.139 is issued.
1 : The change is valid, and no alarm is issued for an unspecified system.

NCI In axis control by the PMC, a position check at the time of deceleration is:
0 : Performed.
1 : Not performed.

	#7	#6	#5	#4	#3	#2	#1	#0
8005	MFD		IFV			R10		EDC

[Data type] Bit

EDC In PMC–based axis control, an external deceleration signal is:
0 : Disabled.
1 : Enabled.

R10 When the RPD parameter (bit 0 of parameter No.8002) is set to 1, the unit for specifying a rapid traverse rate for the PMC axis is:
0 : 1 mm/min.
1 : 10 mm/min.

IFV Override for each group in PMC axis control is:
0 : Disabled.
1 : Enabled.

MFD Output by each auxiliary function of the PMC axis control function is:
0 : Disabled.
1 : Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
8006						IPA	EML	

[Data type] Bit

EML When bit 0 (MLE) of parameter No. 8001 is set to 1, for PMC axes:
0 : The all axis machine lock signal and axis–by–axis machine lock signals are disabled.
1 : The all axis machine lock signal is disabled and the axis–by–axis machine lock signals are enabled.

IPA For controlled axis at PMC axis control only (see the parameter No.1010) :
0 : The in–position check is performed when no move command is issued for the PMC axis.
1 : No in–position check is always performed.

	#7	#6	#5	#4	#3	#2	#1	#0
8008								MIRx

[Data type] Bit axis

MIRx When a PMC axis control command is issued in mirror image mode, the mirror image is:
0 : Not considered.
1 : Considered.

This parameter is valid when PMC signals MI1 to MI4 <bits 0 to 3 of G106> are set to “1” or bit 0 (MIRx) of parameter No. 0012 is set to “1”.

8010	Selection of the DI/DO group for each axis controlled by the PMC

[Data type] Byte axis

[Valid data range] 1 to 4

Specify the DI/DO group to be used to specify a command for each PMC–controlled axis.

Value	Description
1	DI/DO group A (G142 to G153) is used.
2	DI/DO group B (G154 to G165) is used.
3	DI/DO group C (G166 to G177) is used.
4	DI/DO group D (G178 to G189) is used.

8020	Low–speed feedrate at reference position return in axis control by PMC (FL)

[Data type] Word axis

[Unit of data, Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotation axis	1 deg/min	6 to 15000

This parameter specifies the low–speed feedrate at a reference position return on a PMC–controlled axis (FL).

NOTE
If 0 is specified, the value of parameter No. 1425 is used.

8021 Minimum speed of rapid traverse override in axis control by PMC (Fo)

[Data type] Word axis

[Unit of data, Valid data range]

Increment system	Unit of data	Valid data range
		IS–A, IS–B
Millimeter machine	1 mm/min	6 to 15000
Inch machine	0.1 inch/min	6 to 6000
Rotation axis	1 deg/min	6 to 15000

This parameter specifies the minimum speed of rapid traverse override on a PMC–controlled axis (Fo).

8028 Linear acceleration/deceleration time constant for speed commands for PMC axis control

[Data type] Word axis

[Unit of data] ms/1000 min^{-1}

[Valid data range] 0 to 32767

This parameter sets the time required for the servo motor rotation speed to increase or decrease by 1000 min^{-1}, for each axis, as a linear acceleration/deceleration time constant for speed commands for PMC axis control.

NOTE
If this parameter is set to 0, acceleration/deceleration control is not applied.

4.31 PARAMETERS OF SIMPLE SYNCHRONOUS CONTROL

	#7	#6	#5	#4	#3	#2	#1	#0
8301	SOF		SYE	SYA				

[Data type] Bit

SYA In the servo–off state in simple synchronous control, the limit of the difference between the positioning deviation of the master axis and that of the slave axis is:
0 : Not checked.
1 : Checked.

SYE During execution of synchronization, the limit of the difference between positioning deviations (parameter No. 8313 or 8323) is:
0 : Checked.
1 : Not checked.

SOF The synchronization funciton in simple synchronous control (one pair) is:
0 : Not used.
1 : Used.

	#7	#6	#5	#4	#3	#2	#1	#0
8302	SMA				SSE		ATS	ATE

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

ATE Automatic setting of grid positioning for simplified synchronous control one pair is:
0 : Disabled
1 : Enabled

ATS Automatic setting of grid positioning for simplified synchronous control one pair is:
0 : Not started
1 : Started

NOTE
1 When the bits are set to 1, parameter No.8316 and bit 4 (APZx) of parameter No.1815 for the master and slave axes are set to 0.
2 These bits are automatically set to 0 once grid positioning has been completed.

SSE In simple synchronization control, the external machine coordinate system shift function for the slave axis is:
0 : Not used.
1 : Used.

For axes under simple synchronization control, when the external machine coordinate system shift is performed for the master axis, it can also performed for the slave axis simultaneously.

NOTE
The simple synchronous signal must be manipulated. Carefully turn the simple synchronous signal on and off because the machine may move at that time.

SMA When bit 4x (APZx) of parameter No. 1015 is turned off for one axis under simple synchronous control, APZx for the other axis under simple synchronous control is:
0 : Not turned off.
1 : Turned off.

When an axis for which the simple synchronous axis parameter is set is under simple synchronous control, the simple synchronous signal is turned on for the axis.

	#7	#6	#5	#4	#3	#2	#1	#0
8303	SOFx						ATSx	ATEx

NOTE
After this parameter has been set, the power must be turned off then on again for the setting to become effective.

[Data type] Bit axis

ATEx In simple synchronous control, automatic setting for grid positioning is:
0 : Disabled.
1 : Enabled.

ATSx In simple synchronous control, automatic setting for grid positioning is:
0 : Not started.
1 : Started.

NOTE
When starting automatic setting for grid positioning, set ATSx to 1. Upon the completion of setting, ATSx is automatically set to 0.

SOFx In simple synchronous control, the synchronization function is:
0 : Not used.
1 : Used.

NOTE
Set this parameter on the master axis side.

	#7	#6	#5	#4	#3	#2	#1	#0
8304								USD

[Data type] Bit axis

USD In simple synchronous control, the uni–directional synchronization function uses:
0 : Axis of which machine coordinate is larger as the reference.
1 : Axis of which machine coordinate is smaller as the reference.

NOTE
Set this parameter (USD) to the same value for both the master and slave axes.

	#7	#6	#5	#4	#3	#2	#1	#0
8305							USE	USC

[Data type] Bit

USC In simple synchronous control, the uni–directional synchronization function is:
0 : Not used.
1 : Used.

NOTE
This parameter is valid only when bit 7 (SOF) of parameter No. 8301 or bit 7 (SOFx) of parameter No. 8303 is set to 1.

USE In simple synchronous control, after emergency stop, the uni–directional synchronization function is:
0 : Used.
1 : Not used.

NOTE
This parameter is valid only when bit 7 (SOF) of parameter No. 8301 or bit 7 (SOFx) of parameter No. 8303 is set to 1.

8311	Axis number of master axis in synchronous control

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte axis

[Valid data range] 0, 1 to Number of controlled axes

Select a master axis and slave axis in simple synchronous control. Set a master axis number with the slave axis side. The axis number settings are: 1 –> First axis, 2 –> Second axis, 3 –> Third axis, 4 –> Fourth axis. Up to two pairs can be specified.

Example1: Simple synchronous control is exercised with one pair.
When using the first axis (X–axis) as the master axis, and the third axis (Z–axis) as the slave axis, set parameter No.8311 as follows:

Parameter No. 8311	X (first axis)	= 0
	Y (second axis)	= 0
	Z (third axis)	= 1
	A (fourth axis)	= 0

Example2: Simple synchronous control is exercised with two pairs.
Assume that the following three pairs are to be used:
The master axis is the first axis, while a slave axis is the fouth axis.
The master axis is the second axis, while a slave axis is the third axis.
For this specification, set this parameter as follows:

Parameter No.8311
X (First axis) = 0
Y (Second axis) = 0
Z (Third axis) = 2
(Fourth axis) = 1

NOTE
1 In Example 2 above, the Z axis, which is the master axis, is used as the slave axis of another axis. This usage may prevent other functions from operating normally. When exercising simple synchronous control with two pairs, take care.
2 The axis number of a master axis must always be smaller than the corresponding slave axis number. Multiple slave axes cannot be assigned to a master axis.

8313	Limit of the difference between the amount of positioning deviation of the master and slave axes (Synchronous control one pair)

[Data type] Word

[Unit of data] Detection unit

[Valid data range] 0 to 32767

Set the limit of the difference between the amount of positioning deviation of the master and slave (fourth) axes. If the difference between them exceeds the limit assigned to the parameter, the P/S alarm (No.213) is activated.

8314	Maximum error in synchronization error check

[Data type] Word axis

[Unit of data]

Increment system	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch
Rotation axis	0.01	0.001	deg

[Valid data range] 0 to 32767

The machine coordinates on a master axis and slave axis are monitored. If a difference (synchronization error) which is greater than the value specified in this parameter is detected, a servo alarm (No.407) is generated, and the machine is stopped.

Set this parameter with a master axis. When 0 is set in this parameter, no synchronization error check is made.

8315 Maximum compensation value for synchronization (Synchronous control one pair)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Word

[Unit of data] Detection unit

[Valid data range] 0 to 32767

This parameter sets the maximum compensation value for synchronization. When a compensation value greater than the value set in this parameter is used, servo alarm No.410 of slave axis is issued.

8316 Difference between reference counters for master and slave axes (Synchronous control one pair)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] 2–word

[Data unit] Detection unit

[Valid data range] –99999999 to 99999999

This parameter indicates the difference between the values in the reference counter for the master axis and that for the slave axis.

NOTE
Once grid positioning has been completed, the difference between the reference counters is automatically set in this parameter. At this time, bit 1 (ATS) of parameter No.8302 is set to 0.

8317 Torque difference alarm detection time (Synchronous control one pair)

[Data type] Word

[Data unit] ms

[Valid data range] 0 to 4000 (When 0 is set, 512 ms is assumed.)

This parameter specifies the period between the servo preparation completion signal (SA <F000 bit 6>) being set to 1 and the check of the torque difference alarm being started, for the torque difference alarm detection function.

The set value is rounded up to the nearest a multiple of 16 ms.

[Example]
When 100 is specified, 112 ms is assumed.

8318	Detection timer for the limit of the difference between the positioning deviation of the master axis and that of the slave axis

[Data type] Word

[Unit of data] 8m

[Valid data range] 0 to 1000

This parameter sets the time from the output of a compensation pulse to the slave axis to the start of the check of the limit of the difference between the positioning deviation of the master axis and that of the slave axis by the synchronization function. The setting is also used for the check of an excessive error at stop.

NOTE
If a value greater than 1000 is set, a value of 1000 is assumed.

8323	Maximum allowable difference between master axis and slave axis positional deviations

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] 0 to 32767

This parameter sets the maximum allowable difference between the master axis and slave axis position deviations. If a positional deviation difference exceeds the value specified in this parameter, an alarm (No.213) is issued.

Set this parameter with a master axis. If 0 is specified in this parameter, no position deviation difference check is made.

8325	Maximum compensation value for synchronization

[Data type] Word axis

[Unit of data] Detection unit

[Valid data range] 0 to 32767

This parameter sets the maximum compensation value for synchronization. If a compensation value exceeds the value specified with this parameter, a servo alarm (No.407) is issued.

Specify a master axis for this parameter. To enable this parameter, set the SOFx parameter (bit 7 of parameter No.8303) to 1.

8326	Difference between master axis and slave axis reference counters

[Data type] 2–word axis

[Unit of data] Detection unit

[Valid data range] –99999999 to 99999999

The difference between the master axis reference counter and slave axis reference counter (master axis and slave axis grid shift) is automatically set when automatic setting for grid positioning is performed. Then, the difference is transferred together with an ordinary grid shift value to the servo system when the power is turned on.

This parameter is set with a master axis.

8327	Torque difference alarm detection timer

[Data type] Word axis

[Unit of data] ms

[Valid data range] 0 to 4000

This parameter sets a time from the servo preparation completion signal, SA (F000#6), being set to 1 until torque difference alarm detection is started in simple synchronous control. A fraction of less than 16 msec is rounded up.

Example: Setting = 100: The specification of 112 msec is assumed.

Set this parameter with a master axis. If 0 is set in this parameter, the specification of 512 msec is assumed.

4.32 PARAMETERS OF SEQUENCE NUMBER COMPARISON AND STOP

8341	Program number subject to check termination

[Data type] Word

[Valid data range] 0 to 9999

This parameter sets the program number, including a sequence number, subject to sequence number check termination. Parameter No.8342 is used to set a sequence number subject to check termination.

NOTE
A program number can also be set on the setting screen. If a program number is set on the setting screen, the value of the parameter is changed accordingly.

8342	Sequence number subject to check termination

[Data type] 2–word

[Valid data range] 0 to 9999

This parameter sets the sequence number subject to sequence number check termination.
If the block containing the sequence number set with this parameter is executed while the program set with parameter No.8341 is being executed, a single block stop occurs after the block is executed. At this time, the setting is automatically set to –1.

NOTE
A sequence number can also be set by using the setting screen. If a sequence number is set on the setting screen, the value of the parameter is changed accordingly.

4.33 PARAMETERS OF FS0*i* BASIC FUNCTIONS

8130	Number of total controlled axes

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Byte

[Valid data range] 2 to 4
Set the total number of CNC controlled axes.

	#7	#6	#5	#4	#3	#2	#1	#0
8131					AOV	EDC		HPG

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

HPG Manual handle feed is
0 : Not used.
1 : Used.

EDC External deceleration is
0 : Not used.
1 : Used.

AOV Automatic corner override is
0 : Not used.
1 : Used.

	#7	#6	#5	#4	#3	#2	#1	#0
8132			SCL			BCD		

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

BCD Second auxiliary function is
0 : Not used.
1 : Used.

SCL Scaling is
0 : Not used.
1 : Used.

	#7	#6	#5	#4	#3	#2	#1	#0
8134								IAP

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Data type] Bit

IAP Conversational programming with graphic function is
0 : Not used.
1 : Used.

4.34 OTHER PARAMETERS

	#7	#6	#5	#4	#3	#2	#1	#0
8700					DMM			

[Data type] Bit

DMM In DNC operation from the PMC or OPEN CNC, pre–reading is:
0 : Not performed.
1 : Performed.

	#7	#6	#5	#4	#3	#2	#1	#0
8701						WPR		

[Data type] Bit

WPR The function that allows parameters that are rewritten using the PMC window to be enabled during automatic operation is:
0 : Disabled.
1 : Enabled.

> **NOTE**
> If this parameter is set, a move command based on manual operation is disabled (interlock state) while parameter rewriting using the PMC window is being executed.

	#7	#6	#5	#4	#3	#2	#1	#0
8702	LFM							

[Data type] Bit

LFM At the beginning of program uploading in response to a request using the data window library:
0 : “LF+%” is not output.
1 : “LF+%” is output.

	#7	#6	#5	#4	#3	#2	#1	#0
8706							NWD	HSD

NOTE
When this parameter has been set, the power must be turned off before operation is contimued.

[Data type] Bit

HSD Main machining during DNC operation with FOCAS1/HSSB is:
0 : Normal operation.
1 : High–speed operation.

Set this parameter according to machining during DNC operation. Usually, when binary operation and programs containing contiguous small blocks are performed during DNC operation with FOCAS1/HSSB, high–speed operation is selected.

NOTE
For details of this parameter, also refer to “FANUC Open CNC DNC Operation Management Package” and other manuals.

NWD During DNC operation with FOCAS1/HSSB, new DNC functions are:
0 : Not executed.
1 : Executed.

When this parameter is set, the M198 command (subprogram call) can also be executed with FOCAS1/HSSB.

NOTE
To execute the M198 command with FOCAS1/HSSB, parameter No. 20 must be set to “15”.

For details of this parameter, also refer to “FANUC Open CNC DNC Operation Management Package” and other manuals.

8760	Program number for data registration (data input/output function using the I/O link)

[Data type] Word

[Valid data range] 0 to 9999

When the data input/output function using the I/O link is used, this parameter sets the program numbers of the programs to be used for registering data (parameters, macro variables, and diagnostic data) from Power Mates.

For a Power Mate in group n, the following program numbers are used:
For parameters: Setting + n × 10 + 0
For macro variables: Setting + n × 10 + 1
For diagnostic data: Setting + n × 10 + 2

Example: When 8000 is set

8000: Parameters of group 0 (I/O channel = 20)
8001: Macro variables of group 0 (I/O channel = 20)
8002: Diagnostic data of group 0 (I/O channel = 20)
8010: Parameters of group 1 (I/O channel = 21)
8011: Macro variables of group 1 (I/O channel = 21)
8012: Diagnostic data of group 1 (I/O channel = 21)
8020: Parameters of group 2 (I/O channel = 22)
8021: Macro variables of group 2 (I/O channel = 22)
8022: Diagnostic data of group 2 (I/O channel = 22)

8150: Parameters of group 15 (I/O channel = 35)
8151: Macro variables of group 15 (I/O channel = 35)
8152: Diagnostic data of group 15 (I/O channel = 35)

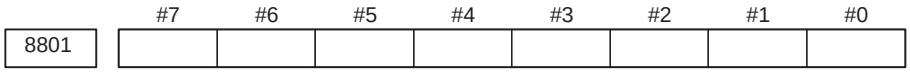
NOTE
When 0 is set, the input/output of parameters, macro variables, and diagnostic data cannot be performed, but program input/output processing is performed.

8790	Timing for executing an auxiliary macro

[Data type] Word

This parameter sets the timing for executing a macro executor auxiliary macro while NC programs, offset data, and so forth are being read or punched out.

When as many characters as the number specified with this parameter are read or punched out, an auxiliary macro is executed once. When 0 is set in this parameter, no auxiliary macro is executed during read or punch processing.



[Data type] Bit

Bit parameter 1 for machine tool builder

[Data type] Bit

Bit parameter 2 for machine tool builder

NOTE
These parameters are used only by the machine tool builder. Refer to the relevant manual supplied by the machine tool builder for details.

8811	2–word parameter 1 for machine tool builder
8812	2–word parameter 2 for machine tool builder
8813	2–word parameter 3 for machine tool builder

[Data type] 2–word

[Valid data range] –99999999 to 99999999

NOTE
These parameters are used only by the machine tool builder. Refer to the relevant manual supplied by the machine tool builder for details.

4.35 PARAMETERS OF MAINTENANCE

	#7	#6	#5	#4	#3	#2	#1	#0
8901								FAN

[Data type] Bit

FAN A fan motor error is:
0 : Detected. (When the fan motor error is detected, an overheating alarm occurs.)
1 : Not detected. (Use inhibited)

	#7	#6	#5	#4	#3	#2	#1	#0
8903								PRM

[Data type] Bit

PRM A periodic maintenance expiration message is:
0 : Not displayed.
1 : Displayed.

8911	Ratio of the items on the periodic maintenance screen to the respective lives

[Data type] Byte

[Unit of data] 1%

[Valid data range] 0 to 100

On the periodic maintenance screen, if the remaining time of an item falls to a value less than the percentage of the life specified in this parameter, the remaining time is displayed in red as a warming.

8940	Title character code 1
8941	Title character code 2
:	
8949	Title character code 10

[Data type] Byte

[Valid data range] See below.

When the CNC is turned on, up to ten characters specified in these parameters are displayed on the screen showing the series and edition of the CNC.

- The following characters can be used.
  0 to 9, A to Z, – (minus sign), . (period), and space
- The character codes to be specified are listed in the character code list in Appendix A.
- If any code other than those character codes that can be specified is specified, a space is displayed.

4.36 PARAMETERS OF OPERATION HISTORY

12801	Number of a signal symbol table for selecting an operation history signal (01)
12802	Number of a signal symbol table for selecting an operation history signal (02)
12803	Number of a signal symbol table for selecting an operation history signal (03)
12804	Number of a signal symbol table for selecting an operation history signal (04)
12805	Number of a signal symbol table for selecting an operation history signal (05)
12806	Number of a signal symbol table for selecting an operation history signal (06)
12807	Number of a signal symbol table for selecting an operation history signal (07)
12808	Number of a signal symbol table for selecting an operation history signal (08)
12809	Number of a signal symbol table for selecting an operation history signal (09)
12810	Number of a signal symbol table for selecting an operation history signal (10)
12811	Number of a signal symbol table for selecting an operation history signal (11)
12812	Number of a signal symbol table for selecting an operation history signal (12)
12813	Number of a signal symbol table for selecting an operation history signal (13)
12814	Number of a signal symbol table for selecting an operation history signal (14)
12815	Number of a signal symbol table for selecting an operation history signal (15)
12816	Number of a signal symbol table for selecting an operation history signal (16)
12817	Number of a signal symbol table for selecting an operation history signal (17)
12818	Number of a signal symbol table for selecting an operation history signal (18)
12819	Number of a signal symbol table for selecting an operation history signal (19)
12820	Number of a signal symbol table for selecting an operation history signal (20)

[Data type] Byte

[Valid data range] 1 to 10

Set the number of a symbol table including a signal of which operation history is to be recorded for operation history channel (01) to (20) as follows:

1 : G0 to G255
3 : F0 to F255
5 : Y0 to Y127
6 : X0 to X127

12841	Number of a signal selected as an operation history signal (01)
12842	Number of a signal selected as an operation history signal (02)
12843	Number of a signal selected as an operation history signal (03)
12844	Number of a signal selected as an operation history signal (04)
12845	Number of a signal selected as an operation history signal (05)
12846	Number of a signal selected as an operation history signal (06)
12847	Number of a signal selected as an operation history signal (07)
12848	Number of a signal selected as an operation history signal (08)
12849	Number of a signal selected as an operation history signal (09)
12850	Number of a signal selected as an operation history signal (10)
12851	Number of a signal selected as an operation history signal (11)
12852	Number of a signal selected as an operation history signal (12)
12853	Number of a signal selected as an operation history signal (13)
12854	Number of a signal selected as an operation history signal (14)
12855	Number of a signal selected as an operation history signal (15)
12856	Number of a signal selected as an operation history signal (16)
12857	Number of a signal selected as an operation history signal (17)
12858	Number of a signal selected as an operation history signal (18)
12859	Number of a signal selected as an operation history signal (19)
12860	Number of a signal selected as an operation history signal (20)

[Data type] Word

[Valid data range] 0 to 255

Set the number of a signal of which operation history is to be recorded for operation history channel (01) to (20) with a value between 0 and 255.

	#7	#6	#5	#4	#3	#2	#1	#0
12881	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (01)

	#7	#6	#5	#4	#3	#2	#1	#0
12882	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (02)

	#7	#6	#5	#4	#3	#2	#1	#0
12883	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (03)

	#7	#6	#5	#4	#3	#2	#1	#0
12884	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (04)

	#7	#6	#5	#4	#3	#2	#1	#0
12885	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (05)

	#7	#6	#5	#4	#3	#2	#1	#0
12886	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (06)

	#7	#6	#5	#4	#3	#2	#1	#0
12887	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (07)

	#7	#6	#5	#4	#3	#2	#1	#0
12888	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (08)

	#7	#6	#5	#4	#3	#2	#1	#0
12889	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (09)

	#7	#6	#5	#4	#3	#2	#1	#0
12890	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (10)

	#7	#6	#5	#4	#3	#2	#1	#0
12891	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (11)

	#7	#6	#5	#4	#3	#2	#1	#0
12892	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (12)

	#7	#6	#5	#4	#3	#2	#1	#0
12893	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (13)

	#7	#6	#5	#4	#3	#2	#1	#0
12894	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (14)

	#7	#6	#5	#4	#3	#2	#1	#0
12895	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (15)

	#7	#6	#5	#4	#3	#2	#1	#0
12896	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (16)

	#7	#6	#5	#4	#3	#2	#1	#0
12897	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (17)

	#7	#6	#5	#4	#3	#2	#1	#0
12898	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (18)

	#7	#6	#5	#4	#3	#2	#1	#0
12899	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (19)

	#7	#6	#5	#4	#3	#2	#1	#0
12900	RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0

History record bit settings for an operation history signal (20)

[Data type] Bit

RB7 to RB0 For the signal set in channel (01) to (20), of which operation history is to be recorded, the history of each bit is:

0 : Not recorded. (The history of this bit is not recorded.)

1 : Recorded. (The history of this bit is recorded.)

4.37 PARAMETERS OF THE PRESS FUNCTION

	#7	#6	#5	#4	#3	#2	#1	#0
16000	PEI	NFI	PFI			RPF		

[Data type] Bit

RPF When the RESET key is pressed or when external reset, reset and rewind, or emergency stop is activated, the PF signal to start pressing is:
0: Set to 0.
1: Not set to 0.

PF is set to 0 only when the *PE signal to stop pressing is set to 0.

PFI The logic of the *PFIN signal to complete punching for single–cycle pressing is:
0: The same as the logic described in the ”Connection Manual.”
1: The reverse of the logic described in the ”Connection Manual.”

NFI The logic of the *NFIN signal to complete punching for continuous pressing is:
0: The same as the logic described in the “Connection Manual.”
1: The reverse of the logic described in the “Connection Manual.”

PEI The logic of the *PE signal to stop pressing is:
0: The same as the logic described in the “Connection Manual.”
1: The revese of the logic described in the “Connection Manual.”

	#7	#6	#5	#4	#3	#2	#1	#0
16001	CPF	MPF	PMA		PE2	PRC	PFE	MNP

[Data type] Bit

MNP If there remains a distance to be traveled when automatic operation is halted, manual pressing or continuous manual pressing is:
0: Validated.
1: Invalidated.

PFE When the PF signal to start pressing is set to 1, the absolute value of positional deviation for the X– and Y– axes:
0: Must be less than or equal to the value set in paramter 16010.
1: Need not be less than or equal to the value set in parameter 16010.

PRC When the machine lock signal, MLK, is set to 1, a program check is:
0: Not executed.
1: Executed.

The machine position data is updated although the actual position is not changed. This setting is invalid for the machine lock signal of each axis.

PE2 To output the PF signal to start pressing, position check is executed at intervals of:
0: 8 msec.
1: 2 msec.

PMA When the AFL signal to lock miscellaneous functions is set to 1, M code signals for forming, repositioning, and nibbling are:
0: Not output to the machine.
1: Output to the machine.

MPF In a block containing an M code, the PF signal to start pressing is:
0: Not set to 1.
1: Set to 1.

PF is set to 1 when movement along an axis terminates or when completion of the miscellaneous function is returned.

CPF At the end of the 01 group containing the G01, G02, or G03 code, the PF signal to start pressing is:
0: Not set to 1.
1: Set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
16002	EUP	PF9	PWB	SPR	PFB	PEM	NIP	AET

[Data type] Bit

AET The timer for issuing the EF signal to start external operation in advance (parameter 16041) is:
0: Disabled.
1: Enabled.

NIP Upon the completion of punching, ITP shift is:
0: Performed (The delay between the completion of punching and the start of axial movement is fixed to 19 ms.)
1: Not performed (The delay between the completion of punching and the start of axial movement varies within a range of 11 to 19 ms.)

PEM MDI operation:
0: Does not start pressing.
1: Starts pressing.

PFB The PFB signal to start pressing is:
0: Enabled.
1: Disabled.

SPR The *SPR signal to halt automatic oparation B is:
0: Invalidated.
1: Validated.

PWB The PFWB signal to wait for the start of pressing B is:
0: Invalidated.
1: Validated.

PF9 The time interval between setting of the PFB signal to start pressing B to 0 and setting of the PF signal to start pressing to 0 is set to the value in:
0: Parameter 16037.
1: Parameter 16038.

EUP By executing the external operation function, the number of punching cycles is:
0: Not aggregated.
1: Aggregated.

One is added when the PF signal to start pressing and the EF signal to external operation are set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
16003	NED	DPE	TCF			NPF		

[Data type] Bit

NPF The G01, G02, or G03 code specified in normal direction control:
0: Sets PF to 1.
1: Does not set PF to 1.

Parameter NPF (No.16003, #2) is validated when parameter CPF (No.16001, #7) is set to 1.

TCF After the OP signal indicating that automatic operation is in progress is set from 0 to 1, the PF signal to start pressing is set to 1:
0: Only when a T command is found.
This status is the same as the status in which the PFW signal to wait for the start of pressingis set to 1.
1: Even if no T commands are found.

DPE The relationship between the *PE signal to stop pressing and the EPE signal for ignoring the signal to stop pressing is as follows:
0: *PE is always validated irrespective of the status of EPE.
1: *PE is validated when EPE is set to 1, and invalidated when EPE is set to 0.

NED After the last positioning ends in a nibbling block, the PF signal to start pressing is set to 0:
0: When the contact of the *PE signal to stop pressing is set to 0.
1: When the two contacts of the *NFIN signal to complete punching for continuous pressing and the *PE signal stop pressing are set to 0.

16008	M code for setting the forming mode
16009	M code for canceling the forming mode

[Data type] Byte

[Valid data range] 1 to 97

Parameter 16008 sets the M code for setting the forming mode.

Parameter 16009 sets the M code for canceling the forming mode.

16010	Upper limit of the position deviation at which PF is set to 1

[Data type] Word axis

[Unit of data] Units of detection

[Valid data range] 0 to 32767

For each axis, parameter 16010 sets the upper limit of the positional deviation at which the PF signal to start pressing is set to 1. When the absolute value of the positional deviation does not exceed this highest limit, PF is set to 1.

Parameter 16010 is validated when parameter PFE (No. 16001, #1) is set to 1.

NOTE
The parameter can only be set for the X, Y, and C axes.

16011 Duration for which the start of positioning is delayed

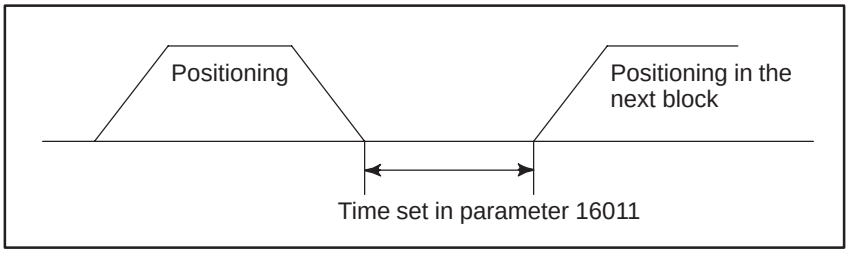
[Data type] Byte axis

[Unit of data] msec

[Valid data range] 0 to 248

For each axis, parameter 16011 sets the duration for which the start of positioning is delayed.

NOTE
1 Only a multiple of 8 can be set for parameter 16011.
2 The parameter can only be set for the X, Y, and C axes.



16012 Time interval by which setting of PF to 1 precedes completion of positioning

[Data type] Byte axis

[Unit of data] msec

[Valid data range] 0 to 248

For each axis, parameter 16012 sets the time interval by which setting of the PF signal to start pressing to 1 precedes completion of positioning. (Function to advance setting of the PF signal)

NOTE
1 When parameter KLV (No. 16050, #7) is set to 1, the data is invalidated. If it is invalidated, see the descriptions of parameters 16013 to 16026.
2 The parameter can only be set for the X, Y, and C axes.

16013	Time interval by which setting of PF to 1 precedes completion of X–axis positioning for the distance of level 1
16014	Time interval by which setting of PF to 1 precedes completion of X–axis positioning for the distance of level 2
16015	Time interval by which setting of PF to 1 precedes completion of X–axis positioning for the distance of level 3
16016	Time interval by which setting of PF to 1 precedes completion of X–axis positioning for the distance of level 4
16017	Time interval by which setting of PF to 1 precedes completion of X–axis positioning for the distance of level 5
16018	Time interval by which setting of PF to 1 precedes completion of X–axis positioning for the distance of level 6
16019	Time interval by which setting of PF to 1 precedes completion of X–axis positioning for the distance of level 7

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to ±120

Each of these parameters set the time interval by which setting of the PF signal to start pressing to 1 precedes completion of X–axis positioning for the corresponding distance level. (Function to advance setting of PF signal)

The parameters are validated when parameter KLV (No. 16050, #7) is set to 1.

For the positioning distance, see the descriptions of parameters 16055 to 16066.

NOTE
If a negative value is specified, the PF signal is set to 1 when the corresponding time period elapses after the completion of the positioning.

16020	Time interval by which setting of PF to 1 precedes completion of Y–axis positioning for the distance of level 1.
16021	Time interval by which setting of PF to 1 precedes completion of Y–axis positioning for the distance of level 2.
16022	Time interval by which setting of PF to 1 precedes completion of Y–axis positioning for the distance of level 3.
16023	Time interval by which setting of PF to 1 precedes completion of Y–axis positioning for the distance of level 4.
16024	Time interval by which setting of PF to 1 precedes completion of Y–axis positioning for the distance of level 5.
16025	Time interval by which setting of PF to 1 precedes completion of Y–axis positioning for the distance of level 6.
16026	Time interval by which setting of PF to 1 precedes completion of Y–axis positioning for the distance of level 7.

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to ±120

Each of these parameters set the time interval by which setting of the PF signal to start pressing to 1 precedes completion of Y–axis positioning for the corresponding distance level. (Function to advance setting of PF signal)

The parameters are validated when parameter KLV (No. 16050, #7) is set to 1.

For the positioning distance, set the descriptions of data 16055 to 16066.

NOTE
If a negative value is specified, the PF signal is set to 1 when the corresponding time period elapses after the completion of the positioning.

16027	Time interval by which setting of PF to 1 precedes completion of C–axis positioning for the distance of level 1.
16028	Time interval by which setting of PF to 2 precedes completion of C–axis positioning for the distance of level 2.
16029	Time interval by which setting of PF to 3 precedes completion of C–axis positioning for the distance of level 3.

[Data type] Byte

[Unit of data] msec

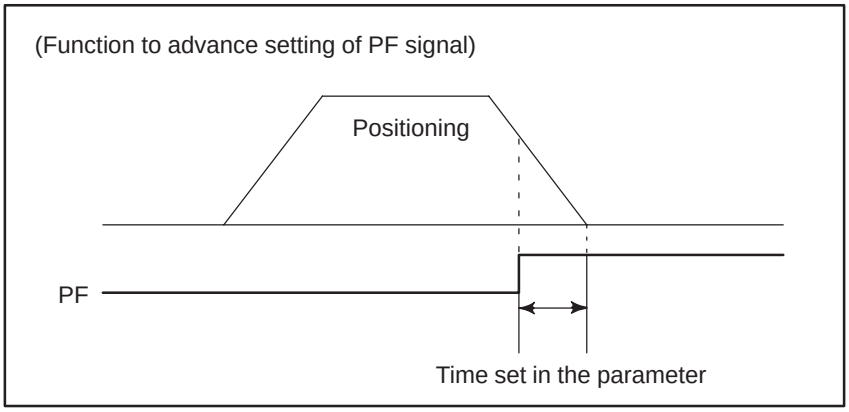
[Valid data range] 0 to ±120

Each of these parameters set the time intarval by which setting of the PF signal to start pressing to 1 precedes completion of C–axis positioning for the corresponding distance level. (Function to advance setting of PF signal)

The parameters are validated when parameter KLC (No. 16050, #4) is set to 1.

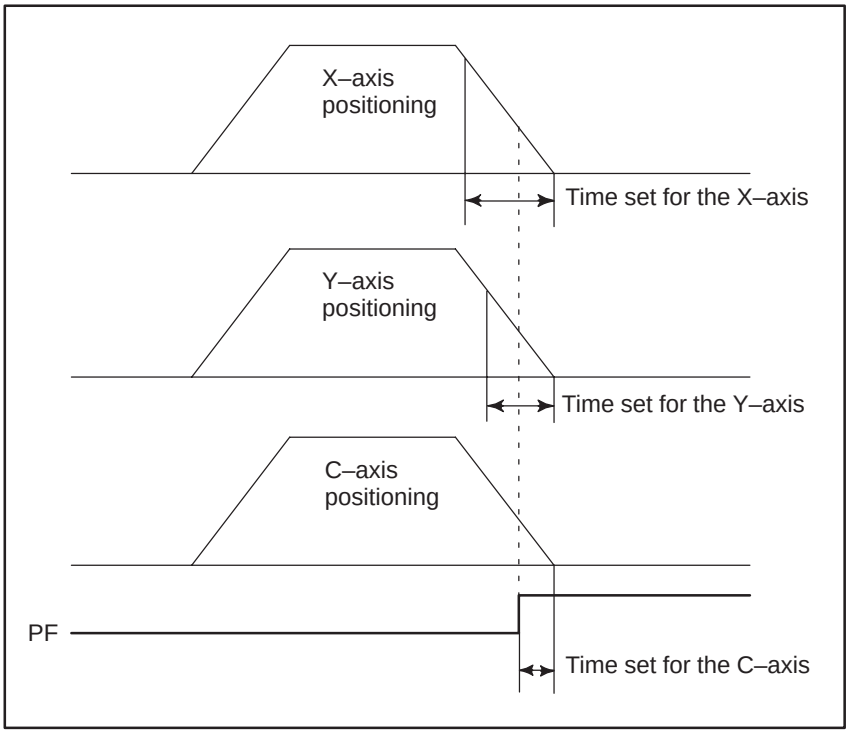
For the positioning distance, see the description of data 16140 and 16141.

NOTE
If a negative value is specified, the PF signal is set to 1 when the corresponding time period elapses after the completion of the positioning.



If the time set here is longer than the time required for deceleration, the PF signal is set to1 when decelaration starts.

In simultaneous positioning for the X, Y, and C axes, the PF signal is set to 1 when the individual conditions for the X, Y, and C axes are all satisfied.



16030	Time interval by which setting PF to 0 follows setting *PE to 0 in single–cycle pressing

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16030 sets the time interval by which setting the PF signal to start pressing to 0 follows setting the contact of the *PE signal to stop pressing to 0 in single–cycle pressing.

16031	Time interval between completion of positioning and the start of the next block when PFL is set to 1

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16031 sets the time interval between completion of positioning and the start of the next block when are PFL signal to lock the start of pressing is set to 1.

16032	Time interval by which setting of PF to 1 follows positioning in the forming mode

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16032 sets the time interval by which setting the PF signal to start pressing to 1 follows positioning in the forming mode (except for nibbling).

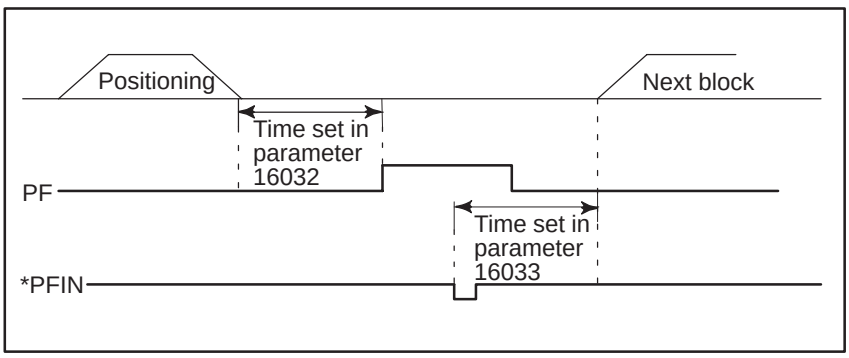
16033	Time interval by which the start of the next bolck follows setting of *PFIN to 0 in the forming mode

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16033 sets the time interval by which the start of the next block follows setting the contact of the *PFIN signal to complete punching for single–cycle pressing to 0 in the forming mode.



16034	Time interval by which setting PF to 1 follows first positioning in nibbling

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16034 sets the time interval by which setting the PF signal to start pressing to 1 follows positioning at the first punch point in nibbling (nibbling by G68, G69, and M code).

16035	Time interval by which the start of the next block follows setting *NFIN to 0 at the last positioning in nibbling

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16035 sets the time interval by which the start of the next block follows setting the contact of the *NFIN signal to complete punching for continuous pressing to 0 at positioning at the last punch point in nibbling (nibbling by G68, G69, and M code).

16036	Minimum time interval by which setting of PF to 1 follows setting of *PFIN to 0 in single–cycle pressing

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16036 sets the minimum time interval by which setting the PF signal to start pressingto 1 follows setting the contact of the *PFIN signal to complete punching for single–cycle pressing to 0 in single–cycle pressing. After the contact of *PFIN is set to 0, PF is set to 1 when the time set here elapses. PF is not set to 1 even if positioning for the next block completes and other conditions are satisfied before the time elapses.

16037	Time interval by which setting PFB to 1 follows setting PF to 1 and settiug PF to 0 follows setting PFB to 0

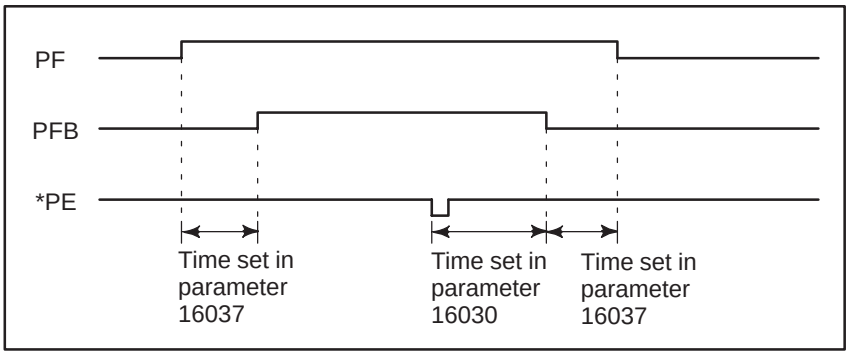
[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 20

Parameter 16037 sets the time interval by which setting the PFB signal to start pressing B to 1follows setting the PF signal to start pressing to 1 and setting PF to 0 follows setting PFB to 0.

NOTE
1 Only a multiple of 2 can be set for parameter 16037.
2 The parameter must be set to 0 when the PFB signal is not used.



16038	Time interval by which setting PF to 0 follows setting PFB to 0

[Data type] Byte

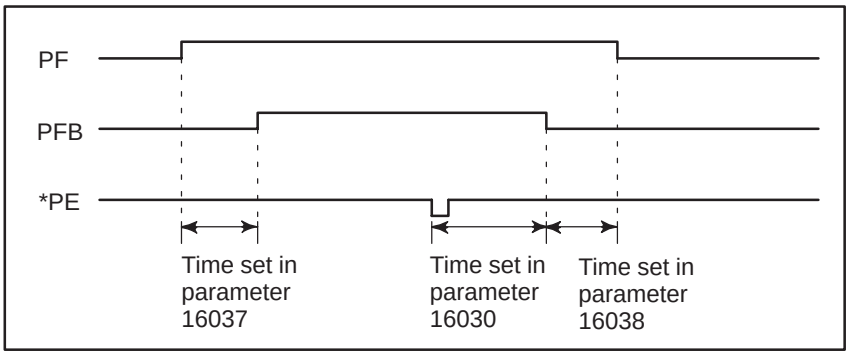
[Unit of data] msec

[Valid data range] 0 to 20

Parameter 16038 sets the time interval by which setting the PF signal to start pressing to 0 follows setting the PFB signal to start pressing B to 0.

The data is validated when parameter PF9 (No. 16002, #6) is set to 1.

NOTE
Only a multiple of 2 can be set in parameter 16038.



16039	Time interval by which setting PF to 0 follows setting *PE to 0 in nibbling

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16039 sets the time interval by which setting the PF signal to start pressing to 0 follows setting the contact of the *PE signal to stop pressing to 0 in nibbing.

16040	Time interval by which the start of the next block follows setting *PFIN to 0

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to 248

Parameter 16040 sets the time interval by which the start of the next block follows setting the contact of the *PFIN signal to complete single–cycle pressing to 0 in a block where the PF signal to start pressing is set to 1 (except for the nibbling or forming mode).

16041	Time interval by which setting of EF to 1 precedes the completion of positioning

[Data type] Byte

[Unit of data] msec

[Valid data range] 0 to ± 120

This parameter sets the time interval by which setting of the EF signal to 1 by the external operation function precedes the completion of positioning.
If a negative value is specified, the EF signal is set to 1 when the corresponding time period elapses after the completion of positioning.

4.38 PARAMETERS FOR THE SPEED AND LOOP GAIN SWITCH

	#7	#6	#5	#4	#3	#2	#1	#0
16050	KLV	PCT	CT2	KLC	NCT		PCF	G0F

[Data type] Bit

G0F For a rapid traverse command (G00), the X–axis or Y–axis rapid traverse feedrate is set to the value:
0: Specified in the parameter.
1: Specified by the F code.

The maximum feedrate of the F command is limited to the rapid traverse feedrate in the parameter. KLV (No. 16050, #7) and LPG (No. 16051, #4) are valid.

PCF The X–axis or Y–axis movement mode is selected for the following blocks:
(1) Movement to each punch point with the pattern function (G26, G76, G77, G78, etc.)
(2) Operation in automatic repositioning (G75)
(3) Movement to the first punch point with the nibbling function (G68, G69, and M code)
0: Rapid traverse is executed.
1: For G00, rapid traverse is executed. For G01, G02, or G03, linear interpolation cutting feed is executed.

NCT Constant control of positioning time is:
0: Always enabled.
1: Enabled only when the nibbling command is executed.

This parameter is valid when the PCT bit (bit 6 of parameter 16050) is set to 1.

KLC When rapid traverse is executed in automatic operation, the function to change the time constant and C–axis rapid traverse feedrate among three levels according to the positioning angleis:
0: Invalidated.
1: Validated. See the descriptions of parameters 16140 to 16147.

CT2 In constant control of the positioning time, the times specified in parameters 16095 to 16102 are:
0: Not changed.
1: Doubled.

PCT Constant control of positioning time is:
0: Invalidated.
1: Validated.

The parameter is validated when parameter KLV (No. 16050, #7) is set to 1.
See the descriptions of parameters 16095 to 16102.

KLV When rapid traverse is executed in automatic operation, the function to change the time constant and X–axis and Y–axis rapid traverse feedrates among seven levels according to the positioning distance is:
0: Invalidated.
1: Validated. See the descriptions of data 16055 to 16094.

	#7	#6	#5	#4	#3	#2	#1	#0
16051	PGC			LPG	KLT			

[Data type] Bit

KLT When rapid traverse is executed in automatic operation, the function to change the servo loop gain of position control and time constant of T–axis rapid traverse among three levels according to the indexed angle is:
0: Invalidated.
1: Validated.

See the descriptions of parameters 16117 to 16124.

LPG When rapid traverse is executed in automatic operation, the function to change the servo loop gain of X–axis and Y–axis position control among seven levels according to the positioning distance is:
0: Invalidated.
1: Validated.

The parameter is validated when parameter KLV (No. 16050, #7) is set to 1.
See the descriptions of parameters 16103 to 16116.

PGC Servo loop gains of X–axis and Y–axis position control to be used in rapid traverse and cutting feed:
0: Are the same.
1: Can be set separately. See the description of parameter 16160.

	#7	#6	#5	#4	#3	#2	#1	#0
16052			TJG				TCO	NJC

[Data type] Bit

NJC The jog feedrate is:
0: Limited to the manual rapid traverse rate.
1: Not limited to the manual rapid traverse rate.

TCO For the T or C axis, a rapid traverse override is:
0: Validated.

ROV1	ROV2	T–axis or C–axis override
0	0	100%
1	0	100%
0	1	50%
1	1	50%

1: Invalidated. (The rapid traverse override is always 100%.)

TJG The jog override signals for the T–axis and C–axis (G233, #0 and #1) are:
0: Not used.
1: Used.

*JVT1	*JVT2	T–axis or C–axis override
1	1	25%
1	0	50%
0	1	75%
0	0	100%

	#7	#6	#5	#4	#3	#2	#1	#0
16053						ROM		TMO

[Data type] Bit

TMO Override for a linear acceleration/deceleration time constant for rapid traverse is:
0: Disabled
1: Enabled

ROM Rapid traverse override is carried out:
0: According to the conventional specification.
1: According to the specification for the 16*i*/18*i*–M.

The PF signal is issued in advance only when the override is 100%.
The constant positioning–time control function cannot be used.

	#7	#6	#5	#4	#3	#2	#1	#0
16054		NAZj						

[Data type] Bit axis

NAZj Specifies whether to make a return to the reference position of the CNC controlled axis using G28 as follows:
0: Make a return.
1: Do not make a return.

16055	Distance D1 to level 1 (in mm)
16056	Distance D2 to level 2 (in mm)
16057	Distance D3 to level 3 (in mm)
16058	Distance D4 to level 4 (in mm)
16059	Distance D5 to level 5 (in mm)
16060	Distance D6 to level 6 (in mm)

16061	Distance D1 to level 1 (in inches)
16062	Distance D2 to level 2 (in inches)
16063	Distance D3 to level 3 (in inches)
16064	Distance D4 to level 4 (in inches)
16065	Distance D5 to level 5 (in inches)
16066	Distance D6 to level 6 (in inches)

[Data type] Two–word

[Unit of data]

Increment system	IS–A	IS–B	Units
Input in milimeters	0.01	0.001	mm
Input in inches	0.001	0.0001	inch

[Valid data range] 0 to 99999999

Each of the parameters set the positioning distance to use the function to change the time constant and X–axis and Y–axis rapid traverse feedrate among seven levels according to the positioning distance. (Identical values are set for the X and Y axes.)

The data is validated when parameter KLV (No. 16050, #7) is set to 1.

NOTE
1 The values set here must satisfy the following relationship: D1 < D2 < D3 < D4 < D5 < D6.
2 The values can be changed among seven levels or less. When the values are to be changed among four levels, set D4 to 99999999.

16067	X–axis rapid traverse feedrate of level 1
16068	X–axis rapid traverse feedrate of level 2
16069	X–axis rapid traverse feedrate of level 3
16070	X–axis rapid traverse feedrate of level 4
16071	X–axis rapid traverse feedrate of level 5
16072	X–axis rapid traverse feedrate of level 6
16073	X–axis rapid traverse feedrate of level 7

[Data type] Two–word

[Unit of data]

[Valid data range]

Increment system	Units of data	Valid data range
Millimeter machine	1 mm/min	30 to 240000
Inch machine	0.1 inch/min	30 to 96000

Each of the parameters set the X–axis rapid traverse feedrate for the corresponding distance.

See the descriptions of parameters 16055 to 16066.

16074	X–axis rapid traverse time constant of level 1
16075	X–axis rapid traverse time constant of level 2
16076	X–axis rapid traverse time constant of level 3
16077	X–axis rapid traverse time constant of level 4
16078	X–axis rapid traverse time constant of level 5
16079	X–axis rapid traverse time constant of level 6
16080	X–axis rapid traverse time constant of level 7

[Data type] Word

[Unit of data] msec

[Valid data range] 8 to 4000

Each of the parameters set the X–axis rapid traverse time constant for the corresponding positioning distance.

See the descriptions of parameters 16055 to 16066.

16081	Y–axis rapid traverse feedrate of level 1
16082	Y–axis rapid traverse feedrate of level 2
16083	Y–axis rapid traverse feedrate of level 3
16084	Y–axis rapid traverse feedrate of level 4
16085	Y–axis rapid traverse feedrate of level 5
16086	Y–axis rapid traverse feedrate of level 6
16087	Y–axis rapid traverse feedrate of level 7

[Data type] Two–word

[Unit of data]

[Valid data range]

Increment system	Units of data	Valid data range
Millimeter machine	1 mm/min	30 to 240000
Inch machine	0.1 inch/min	30 to 96000

Each of the parameters set the Y–axis rapid traverse feedrate for the corresponding distance.

See the descriptions of parameters 16055 to 16066.

16088	Y–axis rapid traverse time constant of level 1
16089	Y–axis rapid traverse time constant of level 2
16090	Y–axis rapid traverse time constant of level 3
16091	Y–axis rapid traverse time constant of level 4
16092	Y–axis rapid traverse time constant of level 5
16093	Y–axis rapid traverse time constant of level 6
16094	Y–axis rapid traverse time constant of level 7

[Data type] Word

[Unit of data] msec

[Valid data range] 8 to 4000

Each of the parameters set the Y–axis rapid traverse time constant for the corresponding positioning distance.

See the descriptions of parameters 16055 to 16066.

Relationship between positioning distances and data numbers

Level	Positioning distance d	X–axis		Y–axis	
		Rapid traverse feedrate	Rapid traverse time constant	Rapid traverse feedrate	Rapid traverse time constant
1	0<d≦D1	16067	16074	16081	16088
2	D1<d≦D2	16068	16075	16082	16089
3	D2<d≦D3	16069	16076	16083	16090
4	D3<d≦D4	16070	16077	16084	16091
5	D4<d≦D5	16071	16078	16085	16092
6	D5<d≦D6	16072	16079	16086	16093
7	D6<d	16073	16080	16087	16094

16095	X–axis positioning time of level 1 (Rapid traverse override of 100% or 75%)
16096	X–axis positioning time of level 1 (Rapid traverse override of 50% or 25%)
16097	X–axis positioning time of level 2 (Rapid traverse override of 100% or 75%)
16098	X–axis positioning time of level 2 (Rapid traverse override of 50% or 25%)

16099	Y–axis positioning time of level 1 (Rapid traverse override of 100% or 75%)
16100	Y–axis positioning time of level 1 (Rapid traverse override of 50% or 25%)
16101	Y–axis positioning time of level 2 (Rapid traverse override of 100% or 75%)
16102	Y–axis positioning time of level 2 (Rapid traverse override of 50% or 25%)

[Data type] Byte

[Unit of data] msec

[Valid data range] 32 to 248

When constant control of the positioning time is applied, each of the parameters set the X–axisor Y–axis positioning time for the positioning distance of level one or two.

The parameters are validated when parameter KLV (No. 16050, #7) and PCT (No. 16050, #6) are set to 1.

NOTE
When this function is used, parameters 16067, 16068, 16074, 16075, 16081, 16082, 16088, and 16089 are invalidated. Constant control of the positioning time is applied, irrespective of the positioning distance.

16103	X–axis servo loop gain of level 1
16104	X–axis servo loop gain of level 2
16105	X–axis servo loop gain of level 3
16106	X–axis servo loop gain of level 4
16107	X–axis servo loop gain of level 5
16108	X–axis servo loop gain of level 6
16109	X–axis servo loop gain of level 7

[Data type] Word

[Unit of data] 0.01 sec^{-1}

[Valid data range] 1 to 9999

Each of the parameters set the servo loop gain of X–axis position control for the corresponding positioning distance.

See the descriptions of parameters 16055 to 16066.

16110	Y–axis servo loop gain of level 1
16111	Y–axis servo loop gain of level 2
16112	Y–axis servo loop gain of level 3
16113	Y–axis servo loop gain of level 4
16114	Y–axis servo loop gain of level 5
16115	Y–axis servo loop gain of level 6
16116	Y–axis servo loop gain of level 7

[Data type] Word

[Unit of data] 0.01 sec^{-1}

[Valid data range] 1 to 9999

Each of the parameters set the servo loop gain of Y–axis position control for the corresponding positioning distance.

See the descriptions of parameters 16055 to 16066.

16117	T–axis angle to level 1
16118	T–axis angle to level 2

[Data type] Word

[Unit of data] 0.1 deg

[Valid data range] 0 to 3600

Each of the parameters set the indexed angle to use the function for changing the T–axis rapid traverse time constant and servo loop gain of position control among three levels according to the indexed angle.

The parameters are validated when parameter KLT (No. 16051, #3) is set to 1.

NOTE
The value of level 1 must be smaller than the value of level 2.

16119	T–axis rapid traverse time constant of level 1
16120	T–axis rapid traverse time constant of level 2
16121	T–axis rapid traverse time constant of level 3

[Data type] Word

[Unit of data] msec

[Valid data range] 8 to 4000

Each of the parameters set the T–axis rapid traverse time constant to use the function for changing the T–axis rapid traverse time constant and servo loop gain of position control among three levels according to the indexed angle.

See the descriptions of parameters 16117 and 16118.

16122	T–axis servo loop gain of level 1
16123	T–axis servo loop gain of level 2
16124	T–axis servo loop gain of level 3

[Data type] Word

[Unit of data] 0.01 sec^{-1}

[Valid data range] 1 to 9999

Each of the parameters set the servo loop gain of T–axis position control to use the function for changing the T–axis rapid traverse time constand and servo loop gain of position control among three levels according to the indexed angle.

See the descriptions of parameters 16117 and 16118.

16140	C–axis angle to level 1
16141	C–axis angle to level 2

[Data type] Two–word

[Unit of data] 0.01 deg (IS–A)/0.001 deg (IS–B)

[Valid data range] 0 to 99999999

Each of the paramters set the positioning angle to use the function for changing the C–axis rapid traverse feedrate and time constant among three levels according to the positioning angle.

The data is validated when parameter KLC (No. 16050, #4) is set to 1.

NOTE
The value of level 1 must be smaller than the value of level 2.

16142	C–axis rapid traverse feedrate of level 1
16143	C–axis rapid traverse feedrate of level 2
16144	C–axis rapid traverse feedrate of level 3

[Data type] Two–word

[Unit of data] 1 deg/min

[Valid data range] 30 to 240000

Each of the parameters set the C–axis rapid traverse feedrate to use the function for changing the C–axis rapid traverse feedrate and rapid traverse time constant among tree levels according to the positioning angle.

See the descriptions of parameters 16140 and 16141.

16145	C–axis rapid traverse time constant of level 1
16146	C–axis rapid traverse time constant of level 2
16147	C–axis rapid traverse time constant of level 3

[Data type] Word

[Unit of data] msec

[Valid data range] 8 to 4000

Each of the parameters set the C–axis rapid traverse to use the function for changing the C–axis rapid traverse feedrate and rapid traverse time constant among three levels according to the positioning angle.

See the descriptions of parameters 16140 and 16141.

16160	Servo loop gain in cutting feed

[Data type] Word axis

[Unit of data] 0.01 sec^{-1}

[Valid data range] 1 to 9999

For each axis, the parameter sets the servo loop gain of position control in cutting feed.

The parameter is validated when parameter PGC (No. 16051, #7) is set to 1.

NOTE
The parameter can only be set for the X and Y axes.

4.39 PARAMETERS FOR THE NIBBLING FUNCTION

	#7	#6	#5	#4	#3	#2	#1	#0
16181					NPF	NSP	NPC	NMG

[Data type] Bit

NMG When the M code for canceling the nibbling mode (No. 16184) is specified, the G code in the 01 group is:
0: Not changed.
1: Changed to G00 (rapid traverse).

NPC The function to change maximum pitch in the nibbling mode between two levels is:
0: Not used.
1: Used.

The function can be executed by the SNP signal for changing nibbling between two levels or by the M code (No. 16185).

NSP When the *SP signal to halt automatic operation is set to 0 in nibbling, automatic operation is:
0: Decelerated and halted immediately.
1: Halted after positioning for a nibbling pitch completes.

NPF In nibbling mode, a press sequence is:
0: Executed according to conventional signals, NBL and *NFIN.
1: Executed according to signals PF, *PFIN, and *PE.

When this parameter is set to 1, a press sequence is executed in the same way as a sequence for single–cycle press.

16183	M code for setting the nibbling mode
16184	M code for canceling the nibbling mode

[Data type] Byte

[Valid data range] 1 to 255

Parameter 16183 sets the M code for setting the nibbling mode.

16185	M code for setting the nibbling mode in which nibbling is changed between two levels

[Data type] Byte

[Valid data range] 1 to 255

Parameter 16185 sets the M code for setting the nibbling mode in which nibbling is changed between two levels.

The data is validated when parameter NPC (No. 16181, #1) is set to 1.

NOTE
The M code in parameter 16184 is used to cancel the nibbling mode if set.

16186	Maximum pitch for G68 or G69 (in mm)
16187	Maximum pitch for G68 or G69 (in inches)

[Data type] Two–word

[Unit of data]

Increment system	IS–A	IS–B	Units
Input in millmeters	0.01	0.001	mm
Input in inches	0.001	0.0001	inch

[Valid data range] 1 to 99999999

Each of the parameters specifies the maximum pitch that can be specified with G01, G02, or G03 for nibbling by G68 or G69 or by an M code.

16188	Maximum pitch for nibbling by the M code (in mm)
16189	Maximum pitch for nibbling by the M code (in inches)

[Data type] Two–word

[Unit of data]

Increment system	IS–A	IS–B	Units
Input in millmeters	0.01	0.001	mm
Input in inches	0.001	0.0001	inch

[Valid data range] 1 to 99999999

Each of the parameters set the maximum pitch for nibbling by the M code (No. 16183).

16190	Maximum pitch of the G01, G02 or G03 command for changing nibbling between two levels (in mm)
16191	Maximum pitch of the G01, G02 or G03 command for changing nibbling between two levels (in inches)

[Data type] Two–word

[Unit of data]

Increment system	IS–A	IS–B	Units
Input in millmeters	0.01	0.001	mm
Input in inches	0.001	0.0001	inch

[Valid data range] 1 to 99999999

When nibbling by the M code (No. 16185) is executed or the SNP signal for changing nibbling between two levels is set to 1 while the function for changing nibbling between two levels is used,each of the parameters set the maximum nibbling pitch for the G01, G02, or G03 command.

The parameters are validated when parameter NPC (No.16181, #1) is set to 1.

16192	Maximum pitch of G00 command for changing nibbling between two levels (in mm)
16193	Maximum pitch of G00 command for changing nibbling between two levels (in inches)

[Data type] Two–word

[Unit of data]

Increment system	IS–A	IS–B	Units
Input in millmeters	0.01	0.001	mm
Input in inches	0.001	0.0001	inch

[Valid data range] 1 to 99999999

When nibbling by the M code (No. 16185) is executed or the SNP signal for changing nibbling between two levels is set to 1 while the function for changing nibbling between two levels is used,each of the parameters sets the maximum nibbling pitch for the G00 command.

The data is validated when parameter NPC (No.16181, #1) is set to 1.

16194	Maximum distance traveled along C–axis in nibbling

[Data type] Two–word

[Unit of data] 0.01 deg (IS–A)/0.001 deg (IS–B)

[Valid data range] 1 to 99999999

The parameter sets the maximum distance traveled along the C–axis for G68 and the nibbling mode.

4.40 PARAMETERS FOR THE PATTERN FUNCTION

	#7	#6	#5	#4	#3	#2	#1	#0
16200	UVW	ABM	MUR					

[Data type] Bit

MUR U or V macro numbers are handled:
0: According to the standard specifications.
1: According to the following specifications.
(1) Changing a macro number

Storage and execution: U01 to U69 and U90 to U99

Storage: U70 to U79

Representation of several macros: U80 to U89

(2) Macro numbers are handled in the same way as when parameter 16206 of the G73 or G74 command for taking multiple workpieces is set to 2.

NOTE
Parameter 16206 is invalidated.

ABM To store and call a pattern, addresses A and B:
0: Are used.
1: Are not used. (The A and B axes can be used.)

UVW To execute a macro function, addresses U, V, and W:
0: Are used.
1: Are not used. (The U, V, and W axes can be used.)

	#7	#6	#5	#4	#3	#2	#1	#0
16201	MSA	AWP	IPA	APR	MLP	MPC		LIP

[Data type] Bit

LIP In the block immediately following setting a local coordinate system (G52), an incremental command specifies an incremental value from:
0: The origin of the local coordinate system.
1: The current tool position.

MPC When the number of machined workpieces is counted in multiple–workpiece machining:
0: The number of actually machined workpieces is counted.
1: The number is incremented by one when complete machining or remainder machining is executed (but not when trial machining is executed).

MLP Setting for taking multiple workpieces depends on:
0: The set parameter (No.16206).
1: A signal (MLP1 or MLP2) input from the PMC machine.

APR Upon reset, the repositioning compensation value is:
0: Not cleared.
1: Added to the workpiece coordinate system and cleared.

IPA Although positioning is to be executed in the block immediately following execution of the pattern function (including G68 or G69), only a command for either the X– or Y–axis is specified. Movement to the pattern reference point:

0: Is not executed for the axis which is not specified.
1: Is executed for the axis which is not specified.

AWP When a workpiece coordinate system is specified, automatic coordinate system setting is executed as designed for:

0: The FANUC Series 16.
When manual return to the reference position is completed, the origin of the coordinate system is shifted by the amount set for the selected workpiece coordinate system (G54 to G59).
1: The FANUC Series 0–P.
When manual return to the reference position is completed, the coordinates of the automatic coordinate system setting are shifted by the amount set for the selected workpiece coordinate system (G54 to G59).

MSA When the MUR bit (bit 5 of parameter 16200) is set to 1, the machining pattern set for multiple–workpiece machining is:

0: Disabled. When this is selected, the value of parameter 16206 is always assumed to be 2.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
16202								AIP

[Data type] Bit

AIP Specifies the condition for the share–proof command (G86).

0: Alarm 4506 is issued when I ≧ 1.5P (l ≧ 1.5wl).
(Conventional specification)
1: Alarm 4506 is issued when I ≧ P (l ≧ wl).

	#7	#6	#5	#4	#3	#2	#1	#0
16203							ACD	PCU

[Data type] Bit

PCU The number of machined workpieces is:

0: Counted by an MDI command.
1: Not counted by an MDI command.

ACD A program block causing a PS alarm is:

0: Not displayed.
1: Displayed.

See the description of parameter 16229.

	#7	#6	#5	#4	#3	#2	#1	#0
16204				PDG		BKR		

[Data type] Bit

BKR The first automatic repositioning command (G75) that sets automatic operation signal OP from 0 to 1 uses:

0: The values set in parameters 16209 and 16210 as the clearance and amount of return for the Y–axis.
(The clearance and amount of return are identical values.)

1: The values set in parameters 16209 and 16210 as the clearance for the Y–axis, and the values set in parameters 16211 and 16212 as the amount of return.
(The clearance and amount of return are different values.)

PDG On the graphic screen, a program being drawn is:

0: Not displayed.

1: Displayed.

This parameter is invalid when the 9–inch CRT is being used.

16206	Machining pattern when multiple workpieces are taken

[Data type] Byte

[Valid data range] 0 to 3

Parameter 16206 sets a machining pattern when multiple workpieces are taken.

0: A program without the G73 or G74 command for machining when multiple workpieces are taken is used.

> **NOTE**
> Alarm 4539 is issued if the G73 or G74 command is found with this setting.

1: A program containing the G73 or G74 command is used and test machining is executed.

2: A program containing the G73 or G74 command is used and the remaining processing is executed after test machining.

3: A program containing the G73 or G74 command is used and the entire machining is executed.

16207	M code for clamping a workpiece
16208	M code for releasing the workpiece

[Data type] Byte

[Valid data range] 1 to 255

Parameter 16207 sets the M code for clamping a workpiece. Parameter 16208 sets the M code for releasing the workpiece.

In blocks between the M code for clampling a workpiece and the M code for releasing the workpiece, the distances traveled along the X–axis and Y–axis are not take into account in the workpiece coordinate system. The PF signal to start pressing is not set to 1.

16209	Clearance and amount of return for the Y axis in automatic repositioning (in mm)
16210	Clearance and amount of return for the Y axis in automatic repositioning (in inches)

[Data type] Two–word

[Unit of data]

Increment system	IS–A	IS–B	Units
Input in millmeters	0.01	0.001	mm
Input in inches	0.001	0.0001	inch

[Valid data range] 1 to ±99999999

Each of the parameters sets the clearance and amount of return for the Y–axis in automatic repositioning (G75).

16211	Amount of return for the Y–axis in automatic repositioning (G75, in millimeters)
16212	Amount of return for the Y–axis in automatic repositioning (G75, in inches)

[Data type] Two–word

[Unit of data]

Increment system	IS–A	IS–B	Units
Input in millmeters	0.01	0.001	mm
Input in inches	0.001	0.0001	inch

[Valid data range] 1 to ±99999999

These parameters specify the amount of return for the Y–axis in automatic repositioning (G75).
The clearance is specified in conventional parameters 16209 and 16210.
These parameters are valid when the BKR bit (bit 2 of parameter 16204) is set to 1.

16228	Number of characters that can be stored for a U or V macro function

[Data type] Byte

[Valid data range]

Setting value	Number of macro storage characters
0	3200
1	11008
2	22272
3	27072

16229	Color code setting for alarm block display

[Data type] Byte

[Valid data range]

Setting value	Alarm color
1	Red
2	Green
3	Yellow
4	Blue
5	Pink
6	Light blue
7	White
Others	Pink

This parameter specifies the color code in which a program block causing a PS alarm is displayed. A block causing an overtravel or servo alarm is not displayed.

4.41 PARAMETERS FOR THE TURRET AXIS

	#7	#6	#5	#4	#3	#2	#1	#0
16260		TLP	TNM	TCL				

[Data type] Bit

TCL The T axis is:
0: Not controlled by the CNC machine.
1: Controlled the CNC machine.

TNM When machine lock signal MLK and the TNG signal for ignoring a T command are on, whether the number following address T is cataloged as a tool number is:
0: Not checked.
1: Checked.

> **NOTE**
> Generally, the tool number is not checked when the TNG signal is set to 1.

TLP In positioning by the T–axis command, a shift from the current position to a specified position is executed:
0: In the direction in which required rotation angle is smaller.
1: Linearly.

> **NOTE**
> The parameters are validated when parameter TCL (No. 16260 #4) is set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
16262	MBT	DTF	TNA	TND	TDP	PWT	JGT	NTD

[Data type] Bit

NTD The tool data input screen is:
0: Displayed.
1: Not displayed.

JGT On the position display screen in jog mode, a T code (tool number) is:
0: Not displayed by a signal input from the PMC.
1: Displayed by a signal (addresses G234 to G237) input from the PMC.

PWT When the power is turned on, the T code (tool number) on the position display screen is:
0: Set to 0.
1: Represented by signal input from the PMC machine (addresses G234 to G237).

TDP On the position screen, a T code is:
0: Not displayed.
1: Displayed.

This parameter is valid when the TCL bit (bit 4 of parameter 16260) is set to 1 and when the NDPx bit (bit 0 of parameter 3115) is set to 0.

TND When the T–axis position is displayed,
0: The current position is indicated in units of minimum travel increments.
1: The number of the tool at the current position is indicated. This is validated when TDP (No. 16262, #3) is set to 1.

TNA When a tool number which is not cataloged is specified,
0: Alarm 4692 is issued.
1: No alarm are issued but a T code is output.

This must be specified when a T code with five or more digits is specified and TCL (No. 16260, #4) is set to 1.

DTF When T codes are specified in automatic operation, a TF signal for reading the code of the tool function and the tool function code signal are output:
0: For each T code.
1: For the first T code command when the machine enters the status in which automatic operation is started from the status in which automatic operation is halted or stopped. For the second and subsequent T code commands specified until the machine returns to the status in which automatic operation is halted or stopped, the TF signal and tool function code signal are output only when the T code signal is different from the previous one.

MBT In a block in which a T code is specified, buffering is:
0: Executed.
1: Not executed.

	#7	#6	#5	#4	#3	#2	#1	#0
16263	NDA	IDX			ROF	TOF	ATO	OFM

[Data type] Bit

OFM In a block containing a T command, the tool position is compensated:
0: Even if there is no movement along an axis.
1: Only when there is movement along an axis. If a block does not contain any movements along an axis, the compensation is executed in the next block containing movement along an axis.

ATO The tool position is compensated:
0: Only when a tool command is specified.
1: According to the T code currently specified, even if no tool commands are specified.

TOF The function for compensating the tool position is:
0: Invalidated.
1: Validated.

Specify a tool position compensation value on the tool input screen.

ROF At reset, compensation of tool position is:
0: Not canceled.
1: Canceled.

IDX The tool position is not compensated in a block in which no movement along an axis occurs. In the next block containing movement along an axis the tool position is compensated:
0: For each T code.
1: Only for T codes with which turret indexing is not executed.

This is validated when parameter OFM (No. 16263, #0) is set to 1.

NDA If a T command is specified in normal direction mode:
0: An alarm is issued (alarm No. 4606).
1: An alarm is not issued.

If a multi–tool command is specified, however, an alarm is issued.

16265	Total number of tools to be used

[Data type] Word

[Valid data range] 0 to 136

This parameter specifies the total number of tools to be used by the tool function. If T–axis control is selected (TCL bit (bit 4 of parameter 16260) is set to 1), the total number should include the number of tools for which T–axis control (turret index) is not executed. This parameter can be specified on the tool input screen. The tool numbers to be used should be specified on the tool input screen.

16266	Number of tools for which T–axis control is executed

[Data type] Word

[Valid data range] 0 to 136

This parameter specifies the number of tools for which T–axis control (turret index) is executed. This parameter is valid when the TCL bit (bit 4 of parameter 16260) is set to 1. The parameter can be specified on the tool input screen.

16267	Reference–positiontool number under T–axis control

[Data type] Word

[Valid data range] 0 to 9999

This parameter specifies the tool number to be selected upon reference position return for the T–axis. This parameter is valid when the TCL bit (bit 4 of parameter 16260) is set to 1. The parameter can be specified on the tool input screen.

16268	T–axis travel for each rotation of the turret

[Data type] Two-Word

[Unit of data] Least command increment for the T–axis

[Valid data range] 0 to 99999999

This parameter specifies the total T–axis travel for each rotation of the turret. This parameter is valid when the TCL bit (bit 4 of parameter 16260) is set to 1. The parameter can be specified using the tool input screen. The T–axis machine position (index position) for each tool to be used should be specified using the tool input screen.

16269	Punching count for all tools (low–order)
16270	Punching count for all tools (high–order)

[Data type] Two-Word

[Valid data range] 0 to 99999999

These parameters preset the punching count for all tools to be used. Parameter 16269 can be preset on the tool input screen.

4.42 PARAMETERS FOR C–AXIS CONTROL

	#7	#6	#5	#4	#3	#2	#1	#0
16360	CBR		CIP		MAB	MAI		

[Data type] Bit

MAI The function for compensating the C–axis position is:
0: Invalidated.
1: Validated.

MAB The function B for compensating the C-axis position is:
0: Invalidated.
1: Validated.

CIP In G01, G02, and G03 modes, a C–axis command is:
0: Disabled
1: Enabled

CBR For a tool for which C–axis control can be executed, a C–axis backlash compensation value is:
0: Not separately specified.
1: Separately specified.

The tool numbers of those tools for which C–axis control can be executed are specified in parameters 16370 to 16389.

	#7	#6	#5	#4	#3	#2	#1	#0
16362	NRC		CRM	CMO	G92	CNT	CR0	RCO

[Data type] Bit

RCO At reset, compensation of C–axis position is:
0: Not canceled.
1: Canceled.

CR0 When reference position return is performed for the C–axis:
0: Moves to the zero point of the machine coordinate system.
1: Moves to the zero point of the workpiece coordinate system.

CNT If a T code with which turret indexing is not executed is specified when the C axis is not at the reference point, the machine is:
0: Moved along the C–axis to the reference point.
1: Not moved along the C–axis to the reference point.

This is validated when parameter CRM (No. 16362, #5) is set to 0. The T code with which turret indexing is not executed must be cataloged.

G92 G92 command for C–axis control is:
0: Invalidated.
1: Validated.

CMO In positioning for a C–axis command, a shift from the current position to a specified position is executed:
0: In the direction in which the required rotation angle is smaller.
1: Linearly.

CRM According to a T command,the machine is:
0: Moved along the C–axis to the reference point.
1: Not moved along the C–axis to the reference point.

NRC According to the command of automatic return to the reference point (G28), the machine is:

0: Moved along the C–axis to the reference point.

1: Not moved along the C–axis to the reference point.

This is validated when parameter CRM (No. 16362, #5) is set to 0.

	#7	#6	#5	#4	#3	#2	#1	#0
16363					NDC		NDB	G91

[Data type] Bit

G91 For C–axis control, a G91 command is:

0: Disabled

1: Enabled

NDB Positioning under normal direction control is carried out:

0: According to the conventional specification.

1: By handling the C–axis angle immediately before the beginning of the normal direction control mode, as an offset value.

NDC Positioning under normal direction control is carried out:

0: According to the conventional specification.

1: By handling the C–axis angle immediately before the beginning of the normal direction control mode, as the direction normal to the next traveling direction.

16370	Number of tool 1 for which C–axis control can be executed
16371	Number of tool 2 for which C–axis control can be executed
16372	Number of tool 3 for which C–axis control can be executed
16373	Number of tool 4 for which C–axis control can be executed
16374	Number of tool 5 for which C–axis control can be executed
16375	Number of tool 6 for which C–axis control can be executed
16376	Number of tool 7 for which C–axis control can be executed
16377	Number of tool 8 for which C–axis control can be executed
16378	Number of tool 9 for which C–axis control can be executed
16379	Number of tool 10 for which C–axis control can be executed
16380	Number of tool 11 for which C–axis control can be executed
16381	Number of tool 12 for which C–axis control can be executed
16382	Number of tool 13 for which C–axis control can be executed
16383	Number of tool 14 for which C–axis control can be executed
16384	Number of tool 15 for which C–axis control can be executed
16385	Number of tool 16 for which C–axis control can be executed
16386	Number of tool 17 for which C–axis control can be executed
16387	Number of tool 18 for which C–axis control can be executed
16388	Number of tool 19 for which C–axis control can be executed
16389	Number of tool 20 for which C–axis control can be executed

[Data type] Word

[Valid data range] 0 to 9999

Each of the parameters set the number of a tool for which C–axis control can be executed.

16390	C-axis backlash 1
16391	C-axis backlash 2
16392	C-axis backlash 3
16393	C-axis backlash 4
16394	C-axis backlash 5
16395	C-axis backlash 6
16396	C-axis backlash 7
16397	C-axis backlash 8
16398	C-axis backlash 9
16399	C-axis backlash 10
16400	C-axis backlash 11
16401	C-axis backlash 12
16402	C-axis backlash 13
16403	C-axis backlash 14
16404	C-axis backlash 15
16405	C-axis backlash 16
16406	C-axis backlash 17
16407	C-axis backlash 18
16408	C-axis backlash 19
16409	C-axis backlash 20

[Data type] Word

[Unit of data] Detection Unit

[Valid data range] –9999 to +9999

Each of these parameters specifies a C–axis backlash for each index (C_1–axis backlash under C–axis synchronous control). The parameter values correspond to the tool numbers specified in parameters 16370 to 16389, respectively. The parameters are valid when the CBR bit (bit 7 of parameter 16360) is set to 1. When these parameters are valid, the C–axis backlash specified in parameter 1852 is invalid.

16430	C–axis position compensation 1 to use function for compensating the C–axis position
16431	C–axis position compensation 2 to use function for compensating the C–axis position
16432	C–axis position compensation 3 to use function for compensating the C–axis position
16433	C–axis position compensation 4 to use function for compensating the C–axis position
16434	C–axis position compensation 5 to use function for compensating the C–axis position
16435	C–axis position compensation 6 to use function for compensating the C–axis position
16436	C–axis position compensation 7 to use function for compensating the C–axis position
16437	C–axis position compensation 8 to use function for compensating the C–axis position
16438	C–axis position compensation 9 to use function for compensating the C–axis position
16439	C–axis position compensation 10 to use function for compensating the C–axis position
16440	C–axis position compensation 11 to use function for compensating the C–axis position
16441	C–axis position compensation 12 to use function for compensating the C–axis position
16442	C–axis position compensation 13 to use function for compensating the C–axis position
16443	C–axis position compensation 14 to use function for compensating the C–axis position
16444	C–axis position compensation 15 to use function for compensating the C–axis position
16445	C–axis position compensation 16 to use function for compensating the C–axis position
16446	C–axis position compensation 17 to use function for compensating the C–axis position
16447	C–axis position compensation 18 to use function for compensating the C–axis position
16448	C–axis position compensation 19 to use function for compensating the C–axis position
16449	C–axis position compensation 20 to use function for compensating the C–axis position

[Data type] Two-Word

[Unit of data] 0.01 deg (IS-A) /0.001 deg (IS-B)

[Valid data range] 0 to ±99999999

Each of the parameters set the C–axis position compensation to use the function for compensating the C–axis position.

These compensated values correspond to the tool numbers set in parameters 16370 to 16389.

The values validated when parameter MAI (No. 16360, #2) is set to 1.

4.43 PARAMETERS FOR THE SAFETY ZONE

	#7	#6	#5	#4	#3	#2	#1	#0
16500	YSF		SAT					SF0

[Data type] Bit

SF0 The safety zone of type:
0: A is used.
1: B is used.

> **NOTE**
> When type B is used, punching is inhibited in punching mode and entry is inhibited in laser mode.

SAT When punching is inhibited in the safety zone, the block in which a T command is specified is checked:
0: In advance.
1: After the FIN signal to complete the T command has been received.

YSF When a safety zone check is executed, the inhibited area along the Y axis extends from the values set in parameters 16507, 16510, 16513, and 16516:
0: In the negative direction.
1: In the positive direction.

	#7	#6	#5	#4	#3	#2	#1	#0
16501					SZ4	SZ3	SZ2	SZ1

[Data type] Bit

SZj When a safety zone check is executed, in the #j (j=1 to 4) area,
0: An entry is inhibited.
1: Punching is inhibited.

	#7	#6	#5	#4	#3	#2	#1	#0
16502	SOF	ACZ	ZNO	SZ1	GSZ	ZIO	SZC	MDP

[Data type] Bit

MDP On the safety zone setting display,
0: The workpiece coordinate system is indicated.
1: The machine coordinate system is indicated.

SZC On the safety zone setting display, the data for:
0: Any zone can be changed.
1: Those zones to be set automatically (parameter 16534) can be changed.

ZIO When the safety zone is automatically set by an external signal, the position of a workpiece holder is detected according to:
0: The on and off states of the SAFZ signal used to detect the position of a workpiece holder.
1: The on state of the SAFZ signal used to detect the position of a workpiece holder.

GSZ On the graphic screen, the safety zone is checked according to the position of a workpiece holder:
0: Specified on the safety zone screen.
1: Specified by graphic parameters.
(On the graphic screen, this check is executed in an area that is not related to the actual machining check.)

SZI Data set on the safety zone setting display is:
0: Invalidated.
1: Validated.

ZNO In the safety zone area setting screen of the safety zone B specification, :
0: Number of zone and other number than number of zone can be inputted.
1: Number of zone can be inputted.

ACZ The function used to prevent interference between workpiece holders of:
0: Type A is used.
1: Type B is used.

SOF In the safety zone check, tool position compensation is:
0: Not considered.
1: Considered.

16505	Positive X coordinate for safety zone 1
16506	Negative X coordinate for safety zone 1
16507	Y coordinate for safety zone 1
16508	Positive X coordinate for safety zone 2
16509	Negative X coordinate for safety zone 2
16510	Y coordinate for safety zone 2
16511	Positive X coordinate for safety zone 3
16512	Negative X coordinate for safety zone 3
16513	Y coordinate for safety zone 3
16514	Positive X coordinate for safety zone 4
16515	Negative X coordinate for safety zone 4
16516	Y coordinate for safety zone 4

[Data type] Two-Word

[Unit of data]

Increment system	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch

[Valid data range] 0 to ±99999999

Each set of the parameters specify safety zone 1, 2, 3, or 4.

NOTE
1 The values set for zone #n must be smaller than those set for zone #n + 1. (n: 1 to 3)
2 Zeros must be specified for zones which need not be specified.
3 If any of the +X, –X, and Y coordinates are set to 0 for an area, that area is invalid.

16517	Size of tool area 1 in the X direction for the safety zone function
16518	Size of tool area 1 in the Y direction for the safety zone function
16519	Size of tool area 2 in the X direction for the safety zone function
16520	Size of tool area 2 in the Y direction for the safety zone function
16521	Size of tool area 3 in the X direction for the safety zone function
16227	Size of tool area 3 in the Y direction for the safety zone function
16523	Size of tool area 4 in the X direction for the safety zone function
16524	Size of tool area 4 in the Y direction for the safety zone function
16525	Size of tool area 5 in the X direction for the safety zone function
16526	Size of tool area 5 in the Y direction for the safety zone function
16527	Size of tool area 6 in the X direction for the safety zone function
16528	Size of tool area 6 in the Y direction for the safety zone function
16529	Size of tool area 7 in the X direction for the safety zone function
16530	Size of tool area 7 in the Y direction for the safety zone function
16531	Size of tool area 8 in the X direction for the safety zone function
16532	Size of tool area 8 in the Y direction for the safety zone function

[Data type] Two-Word

[Unit of data]

Increment system	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch

[Valid data range] 0 to 99999999

The parameters set 12 tool areas for the safety zone function.

Refer to parameters No. 16551 to No. 16558

NOTE
A tool area is selected by signals SZTS0 to SZTS3 input from a PMC machine.

16533 Distance between the position detector of the workpiece holder and the punch

[Data type] Two-Word

[Unit of data]

Increment system	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch

[Valid data range] 0 to ±99999999

The parameter sets the distance between the position detector of the workpiece holder and punch.

The sign of the value set in the parameter corresponds to the direction the machine travels along the X–axis, assuming the punch position as zero.

16534 Number of zones to be detected for automatic setting

[Data type] Byte

[Unit of data] Piece

[Valid data range] 0 to 4

This parameter specifies the number of zones to be detected for automatic setting of a safety zone by an external signal.

NOTE
This parameter must be specified when automatic setting is executed.

16535 Retraction position from the X–axis reference position for automatic setting

[Data type] Two-Word

[Unit of data]

Increment system	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch

[Valid data range] 0 to ±99999999

This parameter specifies a clearance from the X–axis reference position for automatic setting of a safety zone by means of an external signal.

NOTE
Specify a position that is sufficiently distant to allow the speed at which the position of a workpiece holder is detected to become stable.

16536 X–axis rapid traverse rate for automatic setting

[Data type] Two-Word

[Unit of data]

Increment system	Units of data	Valid data range
Millimeter machine	1 mm/min	30 to 240000
Inch machine	0.1 inch/min	30 to 9600

This parameter specifies an X–axis rapid traverse rate for automatic setting of a safety zone by an external signal.

NOTE
When this parameter is set to 0, the feedrate along the X–axis for automatic detection equals the manual rapid traverse rate.

16537 X–axis rapid traverse time constant for automatic setting

[Data type] Word

[Unit of data] msec

[Valid data range] 8 to 4000

This parameter specifies an X–axis rapid traverse time constant for the automatic setting of a safety zone by an external signal.

NOTE
When this parameter is set to 0, the X–axis time constant for automatic detection equals the time constant for manual rapid traverse.

16538 Lower limit of position error for movement along the X–axis for automatic setting

16539 Upper limit of position error for movement along the X–axis for automatic setting

[Data type] Two-Word

[Unit of data] Units of detection

[Valid data range] 0 to 99999999

These parameters specify the lower and upper limits, for the position error for movement along the X–axis, for the automatic setting of a safety zone by an external signal. These parameters must be specified for automatic setting.

NOTE
The values of these parameters must satisfy the following condition: Parameter 16538 < Parameter 16539

16540	Width of workpiece holder 1 along the X–axis for automatic setting
16541	Width of workpiece holder 2 along the X–axis for automatic setting
16542	Width of workpiece holder 3 along the X–axis for automatic setting
16543	Width of workpiece holder 4 along the X–axis for automatic setting

[Data type] Two-Word

[Unit of data]

Increment system	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch

[Valid data range] 0 to 99999999

Each of the parameters specifies the width of a workpiece holder along the X–axis for the automatic setting of a safety zone by an external signal. The parameter values correspond to safety zones 1 to 4, specified in parameters 16505 to 16516, respectively.
When automatic setting is executed, these parameters must be set.

16551	X dimension of tool area 9 for the safety zone function
16552	Y dimension of tool area 9 for the safety zone function
16553	X dimension of tool area 10 for the safety zone function
16554	Y dimension of tool area 10 for the safety zone function
16555	X dimension of tool area 11 for the safety zone function
16556	Y dimension of tool area 11 for the safety zone function
16557	X dimension of tool area 12 for the safety zone function
16558	Y dimension of tool area 12 for the safety zone function

[Data type] Two-Word

[Unit of data]

Increment system	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch

[Valid data range] 0 to 99999999

The parameters set 12 tool areas for the safety zone function.

Refer to parameters No. 16517 to No. 16532

NOTE
A tool area is selected by signals SZTS0 to SZTS3 input from a PMC machine.

4.44 ADDITIONAL PARAMETERS FOR DI/DO SIGNALS

16600	Width for the second reference position on each axis
16601	Width for the third reference position on each axis
16602	Width for the fourth reference position on each axis

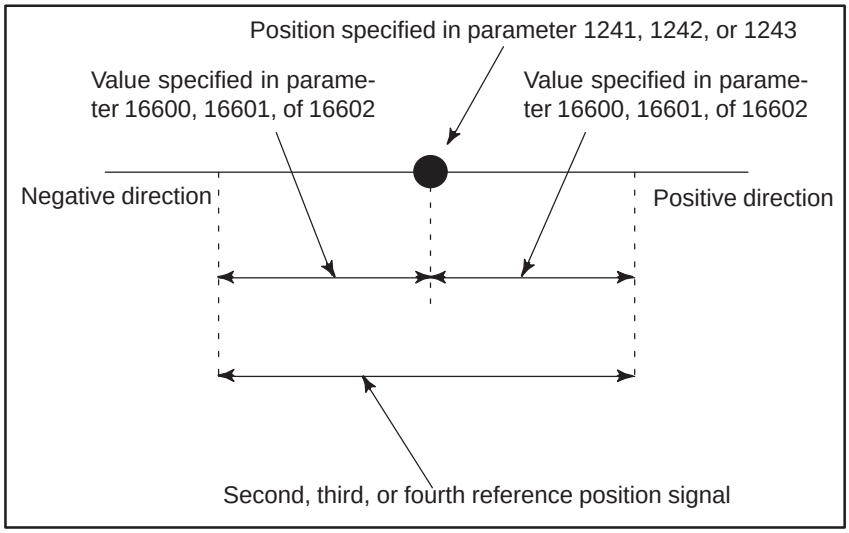
[Data type] Word

[Unit of data]

Increment system	IS–A	IS–B	Units
Millimeter machine	0.01	0.001	mm
Inch machine	0.001	0.0001	inch

[Valid data range] 0 to 65535

The parameters specify the width for the second, third, or fourth reference position of the machine coordinate system. The second, third, or fourth reference position signal is output within the range shown below:



NOTE
For a rotation axis, the specified reference position output range must not include 0 of the machine coordinate system.

	#7	#6	#5	#4	#3	#2	#1	#0
16747								SUV

[Data type] Bit

This parameter can be changed using the setting screen.

SUV In the reset state, the macros stored under U or V macro numbers are:
0: Deleted.
1: Not deleted.

This parameter is valid when the UVC bit (bit 0 of parameter 16200) is set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
16748								NUV

[Data type] Bit

NUV Specifies the macro UV storage format.

0: Complies with the conventional specification.

1: Executes only character storage processing.

APPENDIX

A CHARACTER CODE LIST

Character	Code	Comment	Character	Code	Comment
A	065		6	054	
B	066		7	055	
C	067		8	056	
D	068		9	057	
E	069			032	Space
F	070		!	033	Exclamation mark
G	071		”	034	Quotation marks
H	072		#	035	Shape
I	073		$	036	Dollar mark
J	074		%	037	Percent
K	075		&	038	Ampersand
L	076		’	039	Apostrophe
M	077		(	040	Left parenthesis
N	078		)	041	Right parenthesis
O	079		*	042	Asterisk
P	080		+	043	Positive sign
Q	081		,	044	Comma
R	082		–	045	Negative sign
S	083		.	046	Period
T	084		/	047	Slash
U	085		:	058	Colon
V	086		;	059	Semicolon
W	087		<	060	Left angle bracket
X	088		=	061	Equal sign
Y	089		>	062	Right angle bracket
Z	090		?	063	Question mark
0	048		@	064	Commercial at mark
1	049		[	091	Left square bracket
2	050		¥	092	Yen mark
3	051		]	093	Right square bracket
4	052		^	094	
5	053			095	Underline

Index

Revision Record

FANUC Series 0*i* – PC PARAMETER MANUAL (B–64160EN)

Edition	Date	Contents	Edition	Date	Contents
01	Jun., 2004	———			