GE Fanuc Automation

Computer Numerical Control Products

Series 16 / 18 / 160 / 180 – Model C

Operation and Maintenance Handbook

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Warnings, Cautions, and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software, nor to provide for every possible contingency in connection with installation, operation, or maintenance. Features may be described herein which are not present in all hardware and software systems. GE Fanuc Automation assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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SAFETY PRECAUTIONS

This section describes the safety precautions related to the use of CNC units. It is essential that these precautions be observed by users to ensure the safe operation of machines equipped with a CNC unit (all descriptions in this section assume this configuration). Note that some precautions are related only to specific functions, and thus may not be applicable to certain CNC units.
Users must also observe the safety precautions related to the machine, as described in the relevant manual supplied by the machine tool builder. Before attempting to operate the machine or create a program to control the operation of the machine, the operator must become fully familiar with the contents of this manual and relevant manual supplied by the machine tool builder.

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1. DEFINITION OF WARNING, CAUTION, AND NOTE

This manual includes safety precautions for protecting the user and preventing damage to the machine. Precautions are classified into Warning and Caution according to their bearing on safety. Also, supplementary information is described as a Note. Read the Warning, Caution, and Note thoroughly before attempting to use the machine.

WARNING

Applied when there is a danger of the user being injured or when there is a damage of both the user being injured and the equipment being damaged if the approved procedure is not observed.

CAUTION

Applied when there is a danger of the equipment being damaged, if the approved procedure is not observed.

NOTE

The Note is used to indicate supplementary information other than Warning and Caution.

❍ **Read this manual carefully, and store it in a safe place.**

2. GENERAL WARNINGS AND CAUTIONS

WARNING

1. Never attempt to machine a workpiece without first checking the operation of the machine. Before starting a production run, ensure that the machine is operating correctly by performing a trial run using, for example, the single block, feedrate override, or machine lock function or by operating the machine with neither a tool nor workpiece mounted. Failure to confirm the correct operation of the machine may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

2. Before operating the machine, thoroughly check the entered data.
Operating the machine with incorrectly specified data may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

3. Ensure that the specified feedrate is appropriate for the intended operation. Generally, for each machine, there is a maximum allowable feedrate. The appropriate feedrate varies with the intended operation. Refer to the manual provided with the machine to determine the maximum allowable feedrate. If a machine is run at other than the correct speed, it may behave unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

4. When using a tool compensation function, thoroughly check the direction and amount of compensation.
Operating the machine with incorrectly specified data may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

5. The parameters for the CNC and PMC are factory–set. Usually, there is not need to change them. When, however, there is not alternative other than to change a parameter, ensure that you fully understand the function of the parameter before making any change.
Failure to set a parameter correctly may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

6. Immediately after switching on the power, do not touch any of the keys on the MDI panel until the position display or alarm screen appears on the CNC unit.
Some of the keys on the MDI panel are dedicated to maintenance or other special operations. Pressing any of these keys may place the CNC unit in other than its normal state. Starting the machine in this state may cause it to behave unexpectedly.

WARNING

7. The operator's manual and programming manual supplied with a CNC unit provide an overall description of the machine's functions, including any optional functions. Note that the optional functions will vary from one machine model to another. Therefore, some functions described in the manuals may not actually be available for a particular model. Check the specification of the machine if in doubt.

8. Some functions may have been implemented at the request of the machine–tool builder. When using such functions, refer to the manual supplied by the machine–tool builder for details of their use and any related cautions.

NOTE

Programs, parameters, and macro variables are stored in nonvolatile memory in the CNC unit. Usually, they are retained even if the power is turned off. Such data may be deleted inadvertently, however, or it may prove necessary to delete all data from nonvolatile memory as part of error recovery.
To guard against the occurrence of the above, and assure quick restoration of deleted data, backup all vital data, and keep the backup copy in a safe place.

3. WARNINGS AND CAUTIONS RELATED TO PROGRAMMING

This section covers the major safety precautions related to programming. Before attempting to perform programming, read the supplied operator's manual and programming manual carefully such that you are fully familiar with their contents.

WARNING

1. **Coordinate system setting**

If a coordinate system is established incorrectly, the machine may behave unexpectedly as a result of the program issuing an otherwise valid move command.
Such an unexpected operation may damage the tool, the machine itself, the workpiece, or cause injury to the user.

2. **Positioning by nonlinear interpolation**

When performing positioning by nonlinear interpolation (positioning by nonlinear movement between the start and end points), the tool path must be carefully confirmed before performing programming.
Positioning involves rapid traverse. If the tool collides with the workpiece, it may damage the tool, the machine itself, the workpiece, or cause injury to the user.

3. **Function involving a rotation axis**

When programming polar coordinate interpolation or normal–direction (perpendicular) control, pay careful attention to the speed of the rotation axis. Incorrect programming may result in the rotation axis speed becoming excessively high, such that centrifugal force causes the chuck to lose its grip on the workpiece if the latter is not mounted securely.
Such mishap is likely to damage the tool, the machine itself, the workpiece, or cause injury to the user.

4. **Inch/metric conversion**

Switching between inch and metric inputs does not convert the measurement units of data such as the workpiece origin offset, parameter, and current position. Before starting the machine, therefore, determine which measurement units are being used. Attempting to perform an operation with invalid data specified may damage the tool, the machine itself, the workpiece, or cause injury to the user.

WARNING

5. **Constant surface speed control**

When an axis subject to constant surface speed control approaches the origin of the workpiece coordinate system, the spindle speed may become excessively high. Therefore, it is necessary to specify a maximum allowable speed. Specifying the maximum allowable speed incorrectly may damage the tool, the machine itself, the workpiece, or cause injury to the user.

6. **Stroke check**

After switching on the power, perform a manual reference position return as required. Stroke check is not possible before manual reference position return is performed. Note that when stroke check is disabled, an alarm is not issued even if a stroke limit is exceeded, possibly damaging the tool, the machine itself, the workpiece, or causing injury to the user.

7. **Tool post interference check**

A tool post interference check is performed based on the tool data specified during automatic operation. If the tool specification does not match the tool actually being used, the interference check cannot be made correctly, possibly damaging the tool or the machine itself, or causing injury to the user.
After switching on the power, or after selecting a tool post manually, always start automatic operation and specify the tool number of the tool to be used.

8. **Absolute/incremental mode**

If a program created with absolute values is run in incremental mode, or vice versa, the machine may behave unexpectedly.

9. **Plane selection**

If an incorrect plane is specified for circular interpolation, helical interpolation, or a canned cycle, the machine may behave unexpectedly. Refer to the descriptions of the respective functions for details.

10. **Torque limit skip**

Before attempting a torque limit skip, apply the torque limit. If a torque limit skip is specified without the torque limit actually being applied, a move command will be executed without performing a skip.

11. **Programmable mirror image**

Note that programmed operations vary considerably when a programmable mirror image is enabled.

WARNING

12. **Compensation function**

If a command based on the machine coordinate system or a reference position return command is issued in compensation function mode, compensation is temporarily canceled, resulting in the unexpected behavior of the machine.
Before issuing any of the above commands, therefore, always cancel compensation function mode.

4. WARNINGS AND CAUTIONS RELATED TO HANDLING

This section presents safety precautions related to the handling of machine tools. Before attempting to operate your machine, read the supplied operator's manual and programming manual carefully, such that you are fully familiar with their contents.

WARNING

1. **Manual operation**

When operating the machine manually, determine the current position of the tool and workpiece, and ensure that the movement axis, direction, and feedrate have been specified correctly. Incorrect operation of the machine may damage the tool, the machine itself, the workpiece, or cause injury to the operator.

2. **Manual reference position return**

After switching on the power, perform manual reference position return as required. If the machine is operated without first performing manual reference position return, it may behave unexpectedly. Stroke check is not possible before manual reference position return is performed.
An unexpected operation of the machine may damage the tool, the machine itself, the workpiece, or cause injury to the user.

3. **Manual numeric command**

When issuing a manual numeric command, determine the current position of the tool and workpiece, and ensure that the movement axis, direction, and command have been specified correctly, and that the entered values are valid.
Attempting to operate the machine with an invalid command specified may damage the tool, the machine itself, the workpiece, or cause injury to the operator.

4. **Manual handle feed**

In manual handle feed, rotating the handle with a large scale factor, such as 100, applied causes the tool and table to move rapidly. Careless handling may damage the tool and/or machine, or cause injury to the user.

5. **Disabled override**

If override is disabled (according to the specification in a macro variable) during threading, rigid tapping, or other tapping, the speed cannot be predicted, possibly damaging the tool, the machine itself, the workpiece, or causing injury to the operator.

WARNING

6. **Origin/preset operation**

   Basically, never attempt an origin/preset operation when the machine is operating under the control of a program. Otherwise, the machine may behave unexpectedly, possibly damaging the tool, the machine itself, the tool, or causing injury to the user.

7. **Workpiece coordinate system shift**

   Manual intervention, machine lock, or mirror imaging may shift the workpiece coordinate system. Before attempting to operate the machine under the control of a program, confirm the coordinate system carefully.
   If the machine is operated under the control of a program without making allowances for any shift in the workpiece coordinate system, the machine may behave unexpectedly, possibly damaging the tool, the machine itself, the workpiece, or causing injury to the operator.

8. **Software operator's panel and menu switches**

   Using the software operator's panel and menu switches, in combination with the MDI panel, it is possible to specify operations not supported by the machine operator's panel, such as mode change, override value change, and jog feed commands.
   Note, however, that if the MDI panel keys are operated inadvertently, the machine may behave unexpectedly, possibly damaging the tool, the machine itself, the workpiece, or causing injury to the user.

9. **Manual intervention**

   If manual intervention is performed during programmed operation of the machine, the tool path may vary when the machine is restarted. Before restarting the machine after manual intervention, therefore, confirm the settings of the manual absolute switches, parameters, and absolute/incremental command mode.

10. **Feed hold, override, and single block**

    The feed hold, feedrate override, and single block functions can be disabled using custom macro system variable #3004. Be careful when operating the machine in this case.

11. **Dry run**

    Usually, a dry run is used to confirm the operation of the machine. During a dry run, the machine operates at dry run speed, which differs from the corresponding programmed feedrate. Note that the dry run speed may sometimes be higher than the programmed feed rate.

WARNING

12. **Cutter and tool nose radius compensation in MDI mode**

Pay careful attention to a tool path specified by a command in MDI mode, because cutter or tool nose radius compensation is not applied. When a command is entered from the MDI to interrupt in automatic operation in cutter or tool nose radius compensation mode, pay particular attention to the tool path when automatic operation is subsequently resumed. Refer to the descriptions of the corresponding functions for details.

13. **Program editing**

If the machine is stopped, after which the machining program is edited (modification, insertion, or deletion), the machine may behave unexpectedly if machining is resumed under the control of that program. Basically, do not modify, insert, or delete commands from a machining program while it is in use.

5. WARNINGS RELATED TO DAILY MAINTENANCE

WARNING

1. **Memory backup battery replacement**

When replacing the memory backup batteries, keep the power to the machine (CNC) turned on, and apply an emergency stop to the machine. Because this work is performed with the power on and the cabinet open, only those personnel who have received approved safety and maintenance training may perform this work.
When replacing the batteries, be careful not to touch the high–voltage circuits (marked and fitted with an insulating cover).
Touching the uncovered high–voltage circuits presents an extremely dangerous electric shock hazard.

NOTE

The CNC uses batteries to preserve the contents of its memory, because it must retain data such as programs, offsets, and parameters even while external power is not applied.
If the battery voltage drops, a low battery voltage alarm is displayed on the machine operator's panel or CRT screen.
When a low battery voltage alarm is displayed, replace the batteries within a week. Otherwise, the contents of the CNC's memory will be lost.
Refer to the maintenance section of the operator's manual or programming manual for details of the battery replacement procedure.

WARNING

2. **Absolute pulse coder battery replacement**

When replacing the memory backup batteries, keep the power to the machine (CNC) turned on, and apply an emergency stop to the machine. Because this work is performed with the power on and the cabinet open, only those personnel who have received approved safety and maintenance training may perform this work.
When replacing the batteries, be careful not to touch the high–voltage circuits (marked and fitted with an insulating cover).
Touching the uncovered high–voltage circuits presents an extremely dangerous electric shock hazard.

NOTE

The absolute pulse coder uses batteries to preserve its absolute position.
If the battery voltage drops, a low battery voltage alarm is displayed on the machine operator's panel or CRT screen.
When a low battery voltage alarm is displayed, replace the batteries within a week. Otherwise, the absolute position data held by the pulse coder will be lost.
Refer to the maintenance section of the operator's manual or programming manual for details of the battery replacement procedure.

3. **Fuse replacement**

For some units, the chapter covering daily maintenance in the operator's manual or programming manual describes the fuse replacement procedure.
Before replacing a blown fuse, however, it is necessary to locate and remove the cause of the blown fuse.
For this reason, only those personnel who have received approved safety and maintenance training may perform this work.
When replacing a fuse with the cabinet open, be careful not to touch the high–voltage circuits (marked and fitted with an insulating cover).
Touching an uncovered high–voltage circuit presents an extremely dangerous electric shock hazard.

GENERAL

The Operation and Maintenance Handbook is for persons who are familiar with NC programs and operations. It is used to refer to necessary information quickly in operating or maintaining NC machine tools at a work site.

The Handbook only contains reference information. It does not contain other types of information, such as essential information or notes. Read the following manuals first.

The Handbook assumes that the reader is familiar with the information in the following manuals.

Name of Manual		Specification Number
FANUC Series 16/18/160/180–MODEL C	DESCRIPTIONS	B–62752EN
FANCU Series 16/18/160/180–MODEL C	CONNECTION MANUAL (Hardware)	B–62753EN
FANUC Series 16/18/160/180–MODEL C	CONNECTION MANUAL (Function)	B–62753EN–1
FANUC Series 16/18/160/180–TC	OPERATOR'S MANUAL	B–62754EN
FANUC Series 16/18/160/180–MC	OPERATOR'S MANUAL	B–62764EN
FANUC Series 16/18/160/180–MODEL C	MAINTENANCE MANUAL	B–62755EN
FANUC Series 16/18/160/180–MODEL C	PARAMETER MANUAL	B–62760EN
FANUC AC SERVO MOTOR α series	DESCRIPTIONS	B–65142E
FANUC AC SPINDLE MOTOR α series	DESCRIPTIONS	B–65152E
FANUC CONTROL MOTOR AMPLIFIER α series	DESCRIPTIONS	B–65162E
FANUC CONTROL MOTOR α series	MAINTENANCE MANUAL	B–65165E
FANUC AC SERVO MOTOR α series	PARAMETER MANUAL	B–65150E
FANUC AC SPINDLE MOTOR α series	PARAMETER MANUAL	B–65160E

The Operation and Maintenance Handbook provides information about the following CNC units. The following symbols and system names are used in the Handbook.

Product Name	Abbreviations	System
FANUC Series 16–TC	16–TC	T series or T series (two–path control) *1
FANUC Series 160–TC	160–TC	
FANUC Series 16–MC	16–MC	M series or M series (two–path control) *1
FANUC Series 160–MC	160–MC	
FANUC Series 18–TC	18–TC	T series or T series (two–path control) *1
FANUC Series 180–TC	180–TC	
FANUC Series 18–MC	18–MC	M series
FANUC Series 180–MC	180–MC	

*1) In the case of two–path control is added.

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1. CRT/MDI OR LCD/MDI PANEL

1.1 Keyboard Layout and Names

(1) T series

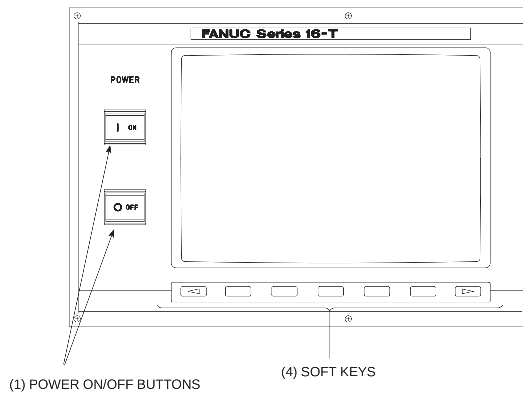


Fig. 1.1 (a) 9″ CRT/MDI Panel (Standard) (T series)

(2) M series

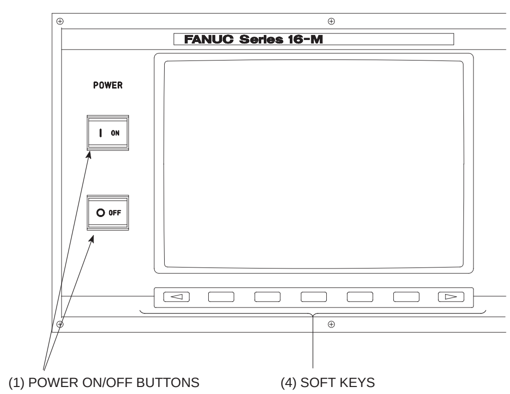
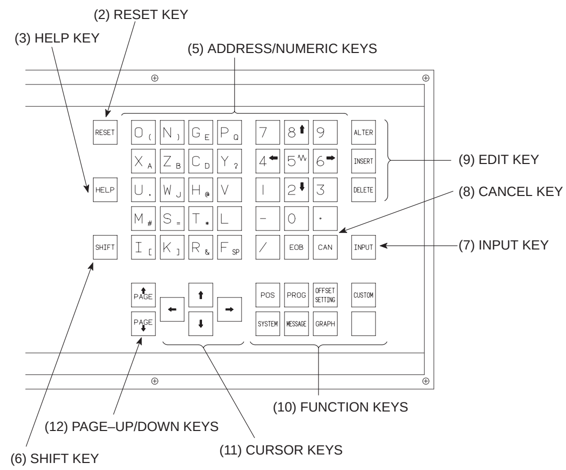
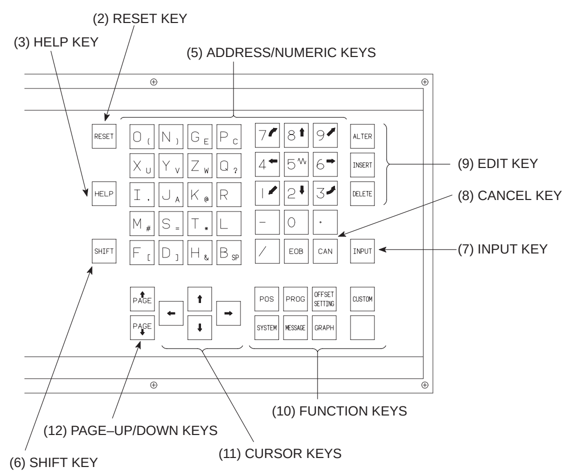


Fig. 1.1 (b) 9″ CRT/MDI Panel (Standard) (M series)


(2) RESET KEY
(3) HELP KEY
(5) ADDRESS/NUMERIC KEYS
(9) EDIT KEY
(8) CANCEL KEY
(7) INPUT KEY
(10) FUNCTION KEYS
(12) PAGE–UP/DOWN KEYS
(11) CURSOR KEYS
(6) SHIFT KEY


(2) RESET KEY
(3) HELP KEY
(5) ADDRESS/NUMERIC KEYS
(9) EDIT KEY
(8) CANCEL KEY
(7) INPUT KEY
(10) FUNCTION KEYS
(12) PAGE–UP/DOWN KEYS
(11) CURSOR KEYS
(6) SHIFT KEY

(3) MDI keyboard of T series CNC

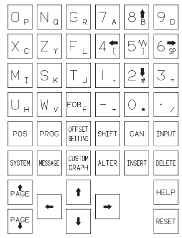


Fig. 1.1 (c) MDI Keyboard of 9″ Small CRT/MDI Panel or 8.4″ Small LCD/MDI Panel

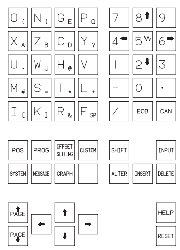


Fig. 1.1 (d) MDI Keyboard of 9.5″ LCD/MDI Panel (Horizontal)

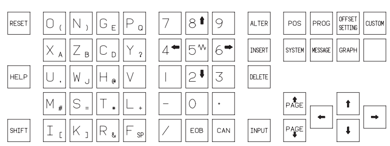


Fig. 1.1 (e) MDI Keyboard of 9.5″ LCD/MDI Panel (Vertical) or 14″ CRT/MDI Panel (Vertical)

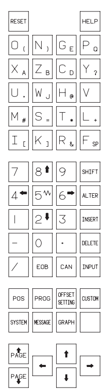


Fig. 1.1 (f) MDI Keyboard of 14″ LCD/MDI Panel (Horizontal)

(4) MDI keyboard of M series CNC

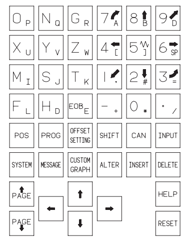


Fig. 1.1 (g) MDI Keyboard of 9″ Small CRT/MDI Panel or 8.4″ Small LCD/MDI Panel

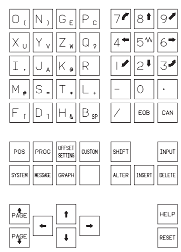


Fig. 1.1 (h) MDI Keyboard of 9.5″ LCD/MDI Panel (Horizontal)

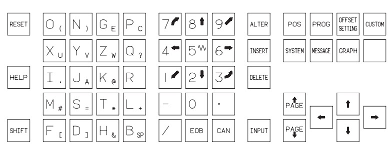


Fig. 1.1 (i) MDI Keyboard of 9.5″ LCD/MDI Panel (Vertical) or 14″ CRT/MDI Panel (Vertical)

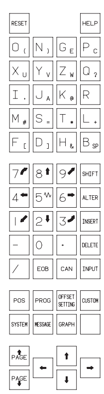


Fig. 1.1 (j) MDI Keyboard of 14″ LCD/MDI Panel (Horizontal)

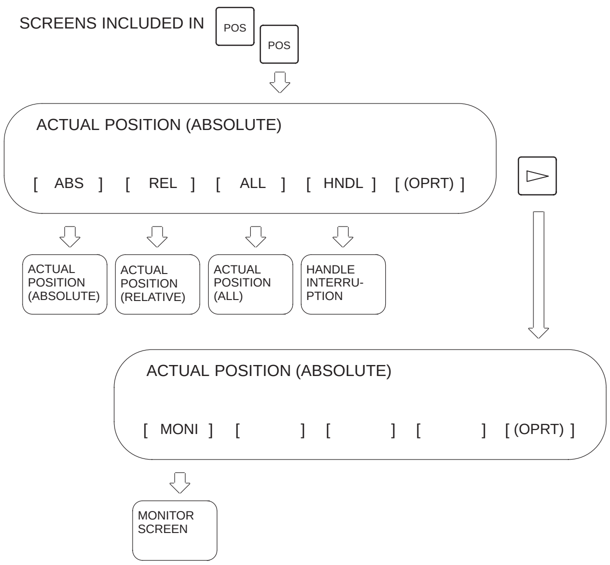
(5) Functions of MDI keyboard

No.	Name	Functions
(1)	<Power> ON/OFF button I ON O OFF	Press this button to turn CNC power ON and OFF.
(2)	<RESET> key RESET	Press this key to reset the CNC, to cancel an alarm, etc.
(3)	<HELP> key HELP	Press this button to use the help function when uncertain about the operation of an MDI key.
(4)	Soft key	The soft key has various functions, according to the Applications. The soft key functions are displayed at the bottom of the CRT screen.
(5)	Address/numerical key X 5	Press these keys to input alphabetic, numeric, and other characters.
(6)	<SHIFT> key SHIFT	Some keys have two characters on their keytop. Pressing the SHIFT key switches the characters. Special character £ is displayed on the screen when a character indicated at the bottom right corner on the keytop can be entered.
(7)	<INPUT> key INPUT	When an address or a numerical key is pressed, the data is input to the buffer, and it is displayed on the CRT screen. To copy the data in the key input buffer to the offset register, etc., press the INPUT key. This key is equivalent to the [INPUT] key of the soft keys, and either can be pressed to produce the same result.
(8)	Cancel <CAN> key CAN	Press this key to delete the last character or symbol input to the key input buffer. The contents of the key input buffer are displayed on the CRT screen. Example: When the key input buffer displays N001X100Z and the cancel CAN key is pressed, Z is canceled and N001X100 is displayed.
(9)	Program edit key ALTER INSERT DELETE	Press this key when editing the program. ALTER : Alter INSERT : Insert DELETE : Delete
(10)	Function key POS PROG	Press this key to switch display screens for each function.

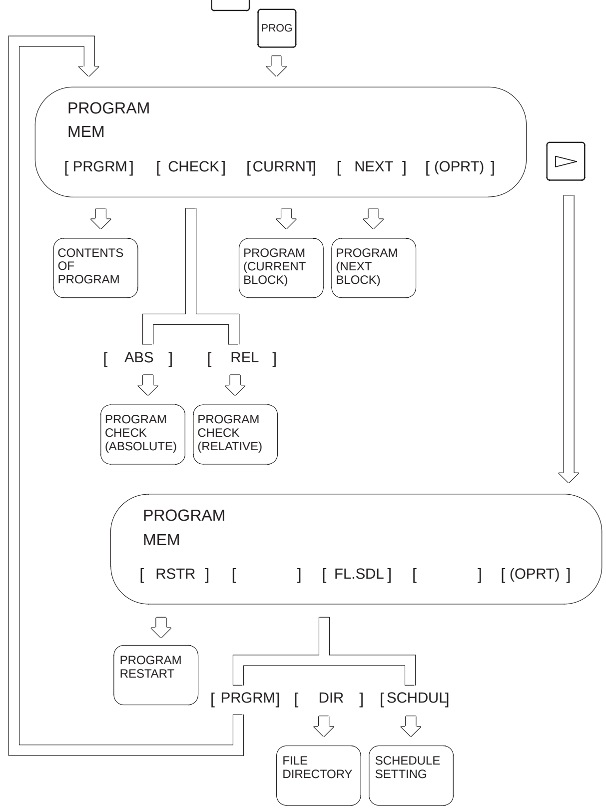
No.	Name	Functions
(11)	Cursor move keys ↑ ← → ↓	There are four different cursor move keys. → : This key is used to move the cursor to the right or in the forward direction. The cursor is moved in short units in the forward direction. ← : This key is used to move the cursor to the left or in the reverse direction. The cursor is moved in short units in the reverse direction. ↓ : This key is used to move the cursor in a downward or forward direction. The cursor is moved in large units in the forward direction. ↑ : This key is used to move the cursor in an upward or reverse direction. The cursor is moved in large units in the reverse direction.
(12)	Page change keys ↑ PAGE PAGE ↓	Two kinds of page change keys are described below. PAGE ↓ : This key is used to changeover the page on the CRT screen in the forward direction. ↑ PAGE : This key is used to changeover the page on the CRT screen in the reverse direction.

1.2 Operation of MDI Panel

1.2.1 Screen transition chart



SCREENS INCLUDED IN PROG (MEM mode)



SCREENS INCLUDED IN PROG (EDIT mode)

PROG

PROGRAM
EDIT

[PRGRM] [LIB] [ ] [C.A.P] [(OPRT)]

- [PRGRM] → PROGRAM EDITING SCREEN
- [LIB] → PROGRAM DIRECTORY SCREEN
- [C.A.P] → C.A.P. SCREEN

▻

PROGRAM
EDIT

[FLOPPY] [ ] [ ] [ ] [ ]

- [FLOPPY] → FILE DIRECTORY OF FLOPPY

SCREENS INCLUDED IN OFFSET SETTING

OFFSET SETTING

OFFSET/GEOMETRY

[OFFSET] [SETING] [WORK] [ ] [(OPRT)]

- [OFFSET] → TOOL OFFSET SCREEN
- [SETING] → SETTING SCREEN
- [WORK] → WORK COORDINATE SCREEN

▻

VARIABLE

[MACRO] [MENU] [OPR] [ ] [(OPRT)]

- [MACRO] → MACRO VARIABLE DISPLAY
- [MENU] → MENU PROGRAM MING
- [OPR] → OPERATOR'S PANEL

SCREENS INCLUDED IN SYSTEM

SYSTEM

PARAMETER

[PARAM] [DGNOS] [PMC] [SYSTEM] [(OPRT)]

PARAMETER SETTING SCREEN | DIAGNOSIS SCREEN | PMC SCREEN | SYSTEM STRUCTUAL SCREEN

PARAMETER

[ ] [PITCH] [SV.PRM] [SP.PRM] [(OPRT)]

PITCH ERROR COM-PENSATION | SERVO PARAMETER SCREEN | SPINDLE PARAMETER SCREEN

PARAMETER

[W.DGNS] [ ] [ ] [ ] [(OPRT)]

WAVEFORM DIAGNOSIS SCREEN

SCREENS INCLUDED IN MESSAGE

MESSAGE

ALARM MESSAGE

MDI

[ALARM] [MSG] [HISTRY] [ ] [ ]

ALARM MESSAGE SCREEN | OPERATOR MESSAGE SCREEN | ALARM HISTORY SCREEN

SCREENS INCLUDED IN HELP

HELP

HELP (INITIAL MENU)

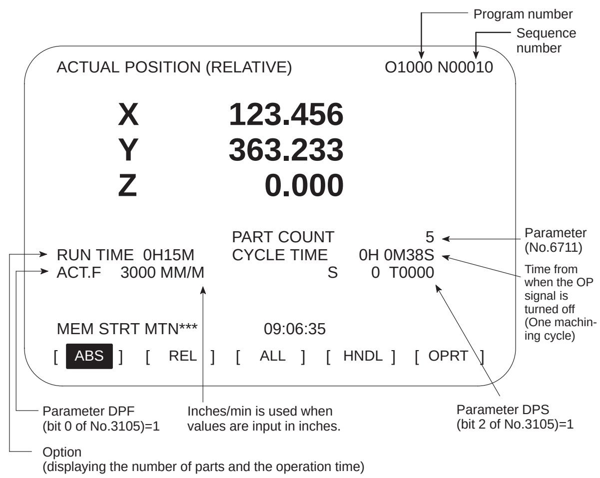
[1 ALAM] [2 OPR] [3 PARA] [ ] [ ]

HELP (ALARM DETAIL) | HELP (OPERATION METHOD) | HELP (PARAME-TER TABLE)

1.2.2 Displaying the current position

(1) Displaying the position using absolute coordinates

(a) Press soft key [ABS].



(b) Operation

Soft key [(OPRT)] ── [PTSPRE] [EXEC]
└ [RUNPRE] [EXEC]

(c) Related parameters

Parameter NDP (bit 0 of No.3115) : 0: The current position is displayed for each axis.
1: The current position is not displayed for each axis.

Parameter PCM (bit 0 of No.6700) : The total number of machined parts and the number of machined parts are incremented when the following M codes are specified.
0: M02, M03, and the M codes specified with parameter No. 6710
1: The M codes specified with parameter No. 6710

Parameter No. 6710: M code that counts the total number of machined parts and the number of machined parts in the current operation

Parameter No. 6711: Number of machined parts

Parameter No. 6751: Operation time (integrated time value during automatic operation) [ms]

Parameter No. 6752: Operation time (integrated time value during automatic operation) [min]
NOTE Hours and minutes are displayed on the screen.

Parameter No. 6757: Operation time (integrated value in one automatic operation) [ms]

Parameter No. 6758: Operation time (integrated value in one automatic operation) [min]
NOTE Hours, minutes, and seconds are displayed on the screen.

(2) Displaying the position using relative coordinates

(a) Press soft key [REL].

```
ACTUAL POSITION (RELATIVE)                O1000 N00010

      X          123.456
      Y          363.233
      Z            0.000

                      PART COUNT              5
RUN TIME  0H15M       CYCLE TIME      0H 0M38S
ACT.F    3000 MM/M                S      0  T0000

MEM STRT MTN***          09:06:35
[  ABS  ]  [  REL  ]  [  ALL  ]  [  HNDL ]  [  OPRT  ]
```

(b) Operation

- Soft key [(OPRT)]
  - Axis Coordinate [PRESET]
  - [ORIGIN]
    - [ALLEXE]
    - Axis [EXEC]
  - [PTSPRE] [EXEC]
  - [RUNPRE] [EXEC]

(3) Overall display

(a) Press soft key [ALL].

Distance from an arbitrary position

```
ACTUAL POSITION                           O1000 N00010
   (RELATIVE)                 (ABSOLUTE)
   X    246.912               X   123.456
   Y    913.780               Y   456.890
   Z  1578.246                Z   789.123

   (MACHINE)                  (DISTANCE TO GO)
   X     0.000                X     0.000
   Y     0.000                Y     0.000
   Z     0.000                Z     0.000
                      PART COUNT              5
RUN TIME  0H15M       CYCLE TIME      0H 0M38S
ACT.F    3000 MM/M                S      0 T0000
MEM  ****  ***  ***          09:06:35
[  ABS  ]  [  REL  ]  [  ALL  ]  [  HNDL ]  [  OPRT  ]
```

Coordinate system used for absolute commands

Remaining distance to move in automatic operation

Distance from the reference position

(b) Operation

- Soft key [(OPRT)]
  - Axis Coordinate [PRESET]
  - [ORIGIN]
    - [ALLEXE]
    - Axis [EXEC]
  - [PTSPRE] [EXEC]
  - [RUNPRE] [EXEC]

1.2.3 Display for handle interrupt

(1) Press soft key [HNDL].

The distance traveled due to a handle interrupt is displayed.

The displayed unit is switched between inch and metric (by setting in G20 and G21)

```
HANDLE INTERRUPTION                       O0000 N02000
   (INPUT UNIT)              (OUTPUT UNIT)
   X    69.594               X    69.594
   Y  137.783                Y  137.783
   Z  –61.439                Z  –61.439
   (RELATIVE)                (DISTANCE TO GO)
   X  0.000                  X  0.000
   Y  0.000                  Y  0.000
   Z  0.000                  Z  0.000

                      PART COUNT              5
RUN TIME  0H15M       CYCLE TIME      0H 0M38S
ACT.F    3000 MM/M          S 0 T0000
MEM   ****   ***   ***             10:29:51
[  ABS  ]  [  REL  ]  [  ALL  ]  [ HNDL ]  [ OPRT ]
```

Displayed in the unit specified by parameter INM (bit 0 of No.100) (mm/inch)

(2) Operation

Soft key [(OPRT)] — [PTSPRE] [EXEC]
                  └ [RUNPRE] [EXEC]

(3) Related signals

DGN

	#7	#6	#5	#4	#3	#2	#1	#0
G041	HS2ID	HS2IC	HS2IB	HS2IA	HS1ID	HS1IC	HS1IB	HS1IA

DGN

	#7	#6	#5	#4	#3	#2	#1	#0
G042					HS3ID	HS3IC	HS3IB	HS3IA

NOTE HS3In is effective only in the M series.

1.2.4 Displaying the program

(1) Program contents screen

(a) Press soft key [PRGRM].

```
PROGRAM                                   O2000 N00130
   O2000 ;
   N100 G92 X0 Y0 Z70. ;
   N110 G91 G00 Y–70. ;
   N120 Z–70. ;
   N130 G42 G39 I–17.5 ;
   N140 G41 G03 X–17.5 Y17.5 R17.5 ;
   N150 G01 X–25. ;
   N160 G02 X27.5 Y27.5 R27.5 ;
   N170 G01 X20. ;
   N180 G02 X45. Y45. R45. ;

>_                                  S       0 T0000
MEM STRT  ***             16:05:59
[PRGRM]  [ CHECK ]  [CURRNT]  [ NEXT ]  [ (OPRT) ]
```

Sequence number

Program number

(b) Operation

Soft key [(OPRT)] — [BG–EDT] → See the EDIT mode screen.

- O Program number [O SRH]
- N Sequence number [NO.SRH]
- [REWIND]
- N Sequence number [P TYPE]
- N Sequence number [O TYPE]

(c) Related parameter

Parameter No.7310: The sequence of the axes along which the machine moves to the restart point after the program is restarted

(d) Related signal

SRN (G006#0): Program restart

(2) Program checking screen

(a) Press soft key [CHECK].

```
PROGRAM CHECK                                    O2000 N00130
  O0010 ;
  G92 G90 X100. Y200. Z50. ;  } Contents of the program.
  G00 X0 Y0 Z0 ;
  G01 Z250. F1000 ;
  (ABSOLUTE)  (DIST TO GO)   G00  G94  G80
  X    0.000  X    0.000     G17  G21  G98
  Y    0.000  Y    0.000     G90  G40  G50   <---- Modal information
  Z    0.000  Z    0.000     G22  G49  G67
                             B
                             H    M
       T                     D
       F           S
>_                                 S      0 T0000
MEM STRT  ***              16:05:59
[ PRGRM ]  [ CHECK ]  [CURRNT]  [  NEXT  ]  [ (OPRT) ]
```

Absolute or relative coordinates can be switched by software

(b) Operation

Soft key [(OPRT)] ── [BG–EDT] → See the EDIT mode screen.

- O Program number [O SRH]
- N Sequence number [NO.SRH]
- [REWIND]
- N Sequence number [P TYPE]
- N Sequence number [O TYPE]

(c) Related parameter

Parameter No.7310: The sequence of the axes along which the machine moves to the restart point after the program is restarted

(d) Related signal

SRN (G006#0): Program restart

(3) Screen displaying the contents of the program currently running

(a) Press soft key [CURRNT].

```
PROGRAM                                          O2000 N00130
         (CURRNT)                     (MODAL)
    G01  X  17.500   G67        G01  F  2000
    G17  F    2000   G54        G17
    G41  H       2   G64        G91
    G80              G69        G22
                     G15        G94
Block data being processed  G40.1   G21  H  2  D     } Modal information
Data with a decimal point   G25     G41
corresponds to the absolute         G49  T
command.                            G80
Data without a decimal point        G98  S
corresponds to the incre-           G50
mental command.
>_                                 S      0 T0000
MEM STRT  ***              16:05:59
[ PRGRM ]  [ CHECK ]  [CURRNT]  [  NEXT  ]  [ (OPRT) ]
```

(b) Operation

Soft key [(OPRT)] [BG-EDT] → See the EDIT mode screen.

(4) Screen displaying the current and next blocks

(a) Press soft key [NEXT].

```
PROGRAM                                        O2000 N00130
        (CURRNT)                      (NEXT)
   G01   X  17.500                  G39   I  –17.500
   G17   F     2000                 G42
   G41   H          2
   G80

>_                                        S          0 T0000
MEM STRT  ***                16:05:59
[ PRGRM ]   [ CHECK ]   [CURRNT]   [ NEXT ]   [ (OPRT) ]
```

Note)
Data with a decimal point corresponds to the absolute command. Data without a decimal point corresponds to the incremental command.

Contents of the program read into the buffer. Nothing is displayed for single block operation.

(b) Operation

Soft key [(OPRT)] [BG-EDT] → See the EDIT mode screen.

1.2.5 Program restart screen

(1) Press soft key [RSTR].

```
PROGRAM RESTART                                O0002 N01000
   DESTINATION                      M *** *** *** *** ***
    X  57.096                         *** *** *** *** ***
    Y  56.877                         *** *** *** *** ***
    Z  56.943                         *** *** *** *** ***
                                      *** *** *** *** ***
                                      *** *** *** *** ***
   DISTANCE TO GO
   1  X     1.459
   2  Y  10.309                     T  **   **
   3  Z     7.320                   S  ****

                                         S          0 T0000
MEM   ****   ***   ***              10:10:40      RSTR
[ RSTR ]   [        ]   [ FL.SDL ]   [        ]   [ (OPRT) ]
```

List of miscellaneous functions specified before restart

Blinks during restart.

Axis sequence set in parameter No. 7310 (Displays * when the preparation for restart is not completed. Displays the axis sequence when searching the restarting block is completed. Blinks when the preparation is completed.)

(2) Operation

The program restart function restarts machining from the block whose sequence number is specified when a tool is damaged or when the power is turned on.

(a) P type (when a tool is damaged)

1 Press the feed hold button. Move the tool away from the workpiece in the manual mode and replace it with a new one.
Change the tool compensation value, if necessary.

2 Set the SRN signal to 1.

3 Display the program contents screen.

4 Press soft key [REWIND] to move the cursor to the top of the program.

5 Enter N followed by the sequence number of the program to be restarted. Press soft key [P TYPE] to search for the sequence number.

6 The program restart screen is displayed. The position at which machining is restarted and the specified M, S, T, and B codes are shown on the screen.

7 Set the SRN signal to 0.

8 Specify M, S, T, or B codes in the MDI mode, if necessary.

9 Return to the automatic operation mode and press the cycle start button.

(b) Q type (When machining is restarted after being stopped for some reason)

Used when machining is restarted after the power is turned off, the emergency stop button is pressed, or the operation is stopped to change the coordinate system.

1 Return the machine to the reference position, if necessary, after the power is turned on.

2 Move the machine to the restart point in the manual mode and set the restarting data and coordinate system.

3 Ensure that the offset value is correct.

4 Set the SRN signal to 1.

5 Display the program contents screen.
Press soft key [REWIND] to move the cursor to the start of the program.

6 Enter N followed by the sequence number of the program to be restarted. Press soft key [Q TYPE] to search for the sequence number.

7 The program restart screen is displayed. The position at which machining is restarted and the specified M, S, T, and B codes are shown in the screen.

8 Set the SRN signal to 0.

9 Specify M, S, T, or B codes in the MDI mode, if necessary.

10 Return to the automatic operation mode and press the cycle start button.

1.2.6 Editing the program

(1) Program editing screen (Press soft key [PRGRM].)

```
PROGRAM                                      O2000 N00130
   O2000 ;
   N100 G92 X0 Y0 Z70. ;
   N110 G91 G00 Y–70. ;
   N120 Z–70. ;
   N130 G42 G39 I–17.5 ;
   N140 G41 G03 X–17.5 Y17.5 R17.5 ;
   N150 G01 X–25. ;
   N160 G02 X27.5 Y27.5 R27.5 ;
   N170 G01 X20. ;
   N180 G02 X45. Y45. R45. ;

>_                                           S 0 T0000
MEM STRT  ***              16:05:59
[PRGRM]  [ CHECK ]  [CURRNT]  [ NEXT ]  [ (OPRT) ]
```

O2000: Program number
N00130: Sequence number

(2) Operation

Soft key [(OPRT)]
- [BG–EDT]
- O Program number [O SRH]
- Address or word [SRH↓]
- Address or word [SRH↑]
- [REWIND]

[▷]

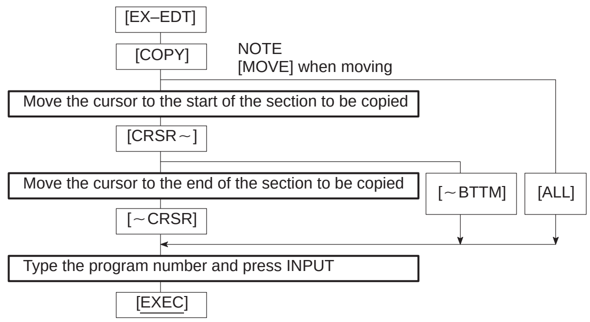
- [F SRH]
  - [CAN]
  - N File number [EXEC]
- [READ]
  - [MERGE]
  - (The cursor moves to the end of the program.) [EXEC]
  - [STOP]
  - [CAN]
  - O Program number [EXEC]

- [PUNCH]
  - [STOP]
  - [CAN]
  - O | Program number | [EXEC]

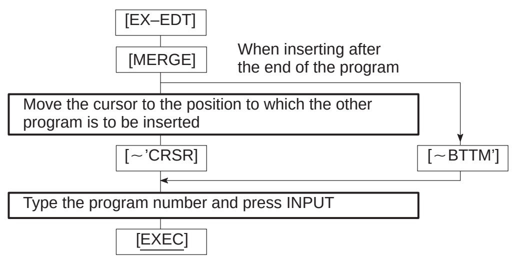
    Note) To specify all the programs, enter 0–9999.
- [DELETE]
  - [CAN]
  - N | File number | [EXEC]
- [EX–EDT]
  - [COPY]
    - [CRSR∼]
    - [∼CRSR]
    - [∼BTTM]
    - [ALL]
    - Program number | INPUT | [EXEC]
  - [MOVE]
    - [CRSR∼]
    - [∼CRSR]
    - [∼BTTM]
    - [ALL]
    - Program number | INPUT | [EXEC]
  - [MERGE]
    - [∼'GCRSR]
    - [∼BTTM']
    - Program number | INPUT | [EXEC]
  - [CHANGE]
    - ADDRESS/WORD | [BEFORE]
    - ADDRESS/WORD | [AFTER]
    - [SKIP]
    - [EX–SGL]
    - [EXEC]

(3) Operation of expanded editing function

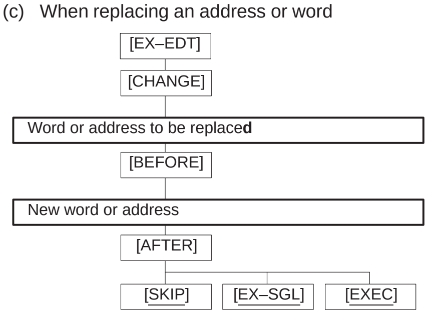
(a) When copying or moving the program



(b) When inserting another program in the program being edited



(c) When replacing an address or word



1.2.7 Displaying the program list

(1) Press soft key [LIB].

(a) When parameter NAM (bit 0 of No. 3107) = 0

```
PROGRAM DIRECTORY                               O0001 N00010

             PROGRAM (NUM.)  MEMORY (CHAR.)
  USED:               60              3321
  FREE:                2               429
 O0240 (SHAFT XSF301   )  :  (                    )
 O0010  O0001  O0003  O0002  O0555  O0999
 O0062  O0004  O0005  O1111  O0969  O6666
 O0021  O1234  O0588  O0020  O0040
          Program numbers

>_                          S 0 T0000
MDI ****   ***  ***                    16:05:59
[ PRGRM ]  [ LIB ]  [          ]  [ C.A.P. ]  [ (OPRT) ]
```

Memory utilization condition. One–meter paper tape contains about 400 characters.

(b) When parameter NAM (bit 0 of No. 3107) = 1

```
PROGRAM DIRECTORY                               O0001 N00010

             PROGRAM (NUM.)  MEMORY (CHAR.)
  USED:               60              3321
  FREE:                2               429
 O0240 (SHAFT XSF301   )  :  (                    )
 O0001  (MACRO–GCODE.MAIN)
 O0002  (MACRO–GCODE.SUB1)
 O0010  (TEST–PROGRAM.ARTHMETIC NO.1)
 O0020  (TEST–PROGRAM.F10–MACRO)
 O0040  (TEST–PROGRAM.OFFSET)
 O0050
 O0100  (INCH/MM CONVERT CHECK NO.1)
 O0200  (MACRO–MCODE.MAIN)
>_
EDIT ****   ***  ***            16:05:59
[ PRGRM ]  [ LIB ]  [          ]  [ C.A.P. ]  [ (OPRT) ]
```

(2) Operation

```
Soft key [(OPRT)] ──┬─ [BG–EDT]   → Same as PRGRM
                    └─ [O]  [Program number]   [O SRH]
                  [▷]
                    ├─ [READ]  ──┬─ [MERGE]
                    │            ├─ [STOP]
                    │            ├─ [CAN]
                    │            └─ [O]  [Program number]   [EXEC]
                    └─ [PUNCH] ──┬─ [STOP]
                                 ├─ [CAN]
                                 └─ [O]  [Program number]   [EXEC]
```

(3) Related parameters

Parameter NAM (No. 3107#0):	Only program numbers are listed/ Program numbers and program names are listed.
Parameter SOR (No. 3107#4):	Programs are listed in the order of registration/in the order of program number.

1.2.8 Operation in the conversational programming menu

(1) Press soft key [C.A.P.].

```
PROGRAM                                         O0010 N00000
STANDARD FORMAT

  G     G     G     G
  X           Y
  Z
  H           F
  R           M
  S           T
  B           I
  J           K
  P           Q
  L
  :

EDIT ****  ***  ***                   14:41:10
[ PRGRM ]  [        ]  [G.MENU ]  [ BLOCK ]  [ (OPRT) ]
```

(2) Operation

[G.MENU]

PAGE ↑ PAGE ↓

```
PROGRAM                                         O1234 N00004
   G00  :  POSITIONING
   G01  :  LINEAR IPL
   G02  :  CIRCULAR IPL. CW
   G03  :  CIRCULAR IPL. CCW
   G04  :  DWELL
   G09  :  EXACT STOP CHECK
   G10  :  OFFSET&TLC VALUE SETTING  (0)
   G17  :  XY PLANE
   G18  :  ZX PLANE
   G19  :  YZ PLANE
   G20  :  INCH
   G21  :  METRIC

>_
EDIT ****  ***  ***                   14:26:15
[ PRGRM ]  [        ]  [G.MENU ]  [ BLOCK ]  [        ]
```

G Number

[BLOCK]

```
PROGRAM                                         O1234 N00000
G00 : POSITIONING

  G00   G      G      G
  X     100.   Y          50.0
  Z                                          (X, Y, Z, )
  H            OFFSET NO.
  M
  S
  T
  B
  :

EDIT ****  ***  ***                   14:32:57
[ PRGRM ]  [        ]  [G.MENU ]  [ BLOCK ]  [ (OPRT) ]
```

Numerical value INPUT … (After all the data is entered) INSERT or ALTER

Return to G code menu

NOTE1 Pressing PAGE ↑ or PAGE ↓ key displays the previous or subsequent block.

NOTE2 Pressing soft key [PRGRM] returns to the program contents screen.

NOTE3 Pressing the DELETE key deletes a block.

1.2.9 Transferring data to and from the floppy disk

(1) Press soft key [FLOPPY].

```
DIRECTORY (FLOPPY)                          O0001 N00000
   NO.FILE NAME                             (METER) VOL

   0001  PARAMETER                            58.5
   0002  O0001                                 1.9
   0003  O0002                                 1.9
   0004  O0010                                 1.3
   0005  O0040                                 1.3
   0006  O0050                                 1.9
   0007  O0100                                 1.9
   0008  O1000                                 1.9
   0009  O9500                                 1.6



EDIT ****  ***  ***            11:53:04
[ F SRH ]  [ READ ]  [ PUNCH ]  [DELETE ]  [        ]
```

(2) Operation

(a) Soft key configuration

Soft key [(OPRT)]
- [F SRH]
  - File number [F SET]
  - [CAN]
  - [EXEC]
- [READ]
  - File number [F SET]
  - Program number [O SET]
  - [STOP]
  - [CAN]
  - [EXEC]
- [PUNCH]
  - File number [F SET]
  - Program number [O SET]
  - [STOP]
  - [CAN]
  - [EXEC]
- [DELETE]
  - File number [F SET]
  - File name [F NAME]
  - [CAN]
  - [EXEC]
- [RENAME]
  - File number [F SET]
  - File name [F NAME]
  - [CAN]
  - [EXEC]

(b) To list the files

[F SRH] — File number [F SET] — [CAN] / [EXEC]

[F SRH] — [PAGE ↑]

(c) To read the program

[READ] File number [F SET] Program number [O SET]
- [CAN]
- [EXEC]

(d) To output the program

[PUNCH] File number [F SET] Program number [O SET] ─ [CAN] / [EXEC]

File number: Can be omitted when the program is added to the same file.

Program number: To specify all the programs, enter "–9999"

(e) To delete the program

[DELETE] ┬ File number [F SET] ─ [CAN] / [EXEC]
└ File name [F NAME] ─ [CAN] / [EXEC]

(f) To rename the program

[RENAME] File number [F SET] New file name [F NAME] ─ [CAN] / [EXEC]

(3) Related parameters

Channel	I/O=0	I/O=1	I/O=2	I/O=3 (remote buffer)	
Common	Parameter (No. 0100)				
Output format	Parameter (No. 0101)	Parameter (No. 0111)	Parameter (No. 0121)	Parameter (No. 0131)	
Specification number	Parameter (No. 0102)	Parameter (No. 0112)	Parameter (No. 0122)	Parameter (No. 0132)	
Transfer rate	Parameter (No. 0103)	Parameter (No. 0113)	Parameter (No. 0123)	Parameter (No. 0133)	
Transfer method	Not defined			Parameter R42 (No. 0135#3)=0	Parameter R42 (No. 0135#2)=1
Connector	JD5A	JD5A	JD5B	JD5C	JD6A

0020	I/O channel selection

0: Channel 1 (J5DA on the main CPU board)

1: Channel 1 (J5DA on the main CPU board)

2: Channel 2 (J5DB on the main CPU board)

3: Channel 3 (J5DC on the option 1 board)

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

#7(NFD) 0: The feed code is output when data is punched out.
1: The feed code is not output when data is punched out.

#3(ASI) 0: EIA or ISO code is used when data is input.
1: ASCII code is used when data is input.

#0(SB2) 0: The number of stop bits is one.
1: The number of stop bits is two.

0102	Specification number of the input/output device

0	RS-232-C (for devices other than those below)
1	FANUC Bubble Cassette B1/B2
2	FANUC Floppy Cassette F1
3	PROGRAM FILE Mate FANUC FA Card adapter FANUC Floppy Cassette adapter, FSP-H
4	Not used
5	Portable tape reader
6	FANUC PPR, FSP-G, FSP-H

0103	Baud rate (set transfer rate)

7: 600 9: 2400 11: 9600

8: 1200 10: 4800 12: 19200 [BPS]

NOTE This screen is displayed when the floppy disk drive is specified as the input/output device for the unit for which the optional function for controlling the reader/punch interface is provided.

1.2.10 Displaying and setting the tool compensation values

(1) Press soft key [OFFSET].

For tool compensation memory C

```
OFFSET                                              O0001 N00000
   NO .   GEOM(H)    WEAR(H)     GEOM(D)   WEAR(D)
   001                 0.000       0.000     0.000
   002      –1.000     0.000       0.000     0.000
   003       0.000     0.000       0.000     0.000
   004      20.000     0.000       0.000     0.000
   005       0.000     0.000       0.000     0.000
   006       0.000     0.000       0.000     0.000
   007       0.000     0.000       0.000     0.000
   008       0.000     0.000       0.000     0.000
ACTUAL POSITION (RELATIVE)
    X        0.000          Y          0.000
    Z        0.000
>_
MDI ****  ***  ***              16:05:59
[OFFSET]  [ SETING ]  [ WORK ]  [        ]  [ (OPRT) ]
```

(2) Operation

(a) For tool length compensation (H code)

[(OPRT)]
- Offset number [NO.SRH]
- Axis [INP.C.]
- Offset value [+INPUT]
- Offset value [INPUT]

(b) For cutter compensation (D code)

```
[(OPRT)] ─┬─ Offset number   [NO.SRH]
          ├─ Offset value    [+INPUT]
          └─ Offset value    [INPUT]
```

(3) Related parameters

Parameter WOE (bit 0 of No. 3290): Entering tool wear compensation values from the MDI panel is allowed/inhibited.

Parameter GOF (bit 1 of No. 3290): Entering tool geometry compensation values from the MDI panel is allowed/inhibited.

(4) Related signal

KEY1 (G046#3): Tool compensation values and offset values from the workpiece reference point can be input.

1.2.11 Displaying and setting the data

(1) Press soft key [SETING].

```
SETTING (HANDY)                              O0000 N00000

  PARAMETER WRITE = 1 (0 : DISABLE  1 : ENABLE)  ← ALM 100
  TV CHECK        = 0 (0 : OFF      1 : ON)      ← ALM 002
  PUNCH CODE      = 1 (0 : EIA      1 : ISO)
  INPUT UNIT      = 0 (0 : MM       1 : INCH)    ← G20/G21
  I/O CHANNEL     = 0 (0–3 : CHANNEL NO.)
  SEQUENCE NC.    = 0 (0 : OFF      1 : ON)      ← Parameter (No.3216)
  TAPE FORMAT     = 0 (0 : NO CNV   1 : F10/11)  ← FS15 format
  SEQUENCE STOP   =    0 (PROGRAM NO.)
  SEQUENCE STOP   =    0 (SEQUENCE NO.)


>_                                          S 0 T0000
MDI ****  ***  ***                 15:06:56
[OFFSET]  [SETING]  [ WORK ]  [        ]  [ (OPRT) ]
```

```
SETTING (MIRROR IMAGE)                       O1234 N00000

  MIRROR IMAGE  X = 1  (0 : OFF  1 : ON)   Signal indi-
  MIRROR IMAGE  Y = 0  (0 : OFF  1 : ON)   cating that
  MIRROR IMAGE  Z = 0  (0 : OFF  1 : OM)   mirror image
                                            processing is
                                            in progress


>_
MDI ****  ***  ***                 14:47:57
[OFFSET]  [SETING]  [        ]  [        ]  [ (OPRT) ]
```

```
SETTING (TIMER)                         O0000 N00000
                                                        Parameter
   PARTS TOTAL      =               0  <--------------- (No.6712)(*1)
   PARTS REQUIRED   =              25  <--------------- (No.6713)
   PARTS COUNT      =              10  <--------------- (No.6711)

   POWER ON         =       0H    0M   <--------------- (No.6750)(*1)
   OPERATING TIME   =       0H    0M    0S  <---------- (No.6751,6752)
   CUTTING TIME     =       0H    0M    0S  <---------- (No.6753,6754)
   FREE PURPOSE     =       0H    0M    0S  <---------- (No.6755,6756)
   CYCLE TIME       =       0H    0M    0S  <---------- (No.6758,6759)
                DATE =      95/10/04
                TIME =      16:18:01

>_
MEM ****   ***  ***               14:47:57
[OFFSET]  [SETING]  [ WORK ]  [        ]  [ (OPRT) ]
```

Not counted when the option for displaying the operation time and the number of parts is not provided.

NOTE *1 Cannot be changed on this screen (but can be changed on the parameter screen).)

```
PARAMETER (SETTING)                     O0000 N00000

0000        SEQ                      INI   ISO   TVC
        0     0     0     0     0     0     0
0001                                       FCV
        0     0     0     0     0     0     0     0
0012                                             MIR
  X     0     0     0     0     0     0     0     0
  Y     0     0     0     0     0     0     0     0
  Z     0     0     0     0     0     0     0     0
0020  I/O  CHANNEL                               0
0022                                             0

>_
MDI ****   ***  ***               15:43:11
[W.DGNS]  [        ]  [        ]  [        ]  [ (OPRT) ]
```

(2) Operation

Soft key [(OPRT)]
- Setting number [NO.SRH]
- [ON:1]
- [OFF:0]
- Numerical value [+INPUT]
- Numerical value [INPUT]

1.2.12 Displaying and setting the offset values for the workpiece coordinate system

(1) Press soft key [WORK].

```
WORK COORDINATES                          O0100 N00001

   NO.    DATA                  NO.    DATA
   00     X  0.000              02     X  152.580
   (EXT)  Z  0.000              (G55)  Z   58.284


   01     X  100.000            03     X  300.000
   (G54)  Z   50.000            (G56)  Z  200.000



>_
MEM   ****   ***   ***                16:24:18
[ OFFSET]   [ SETING ]   [ WORK ]   [        ]   [ (OPRT) ]
```

(2) Operation

Soft key [(OPRT)]
- Coordinate system number → [NO.SRH]
- Axis, Numeral → [MEASUR]
- Compensation value → [+INPUT]
- Compensation value → [INPUT]

(3) Related parameters

Parameter WZO (bit 3 of No. 3290): Entering shift values of the coordinate system (T series) or offsets from the workpiece reference point (M series) from the MDI panel is allowed/inhibited.

Parameter No.1220: External shift value of the workpiece coordinate system (T series).
External offset from the workpiece reference point (M series)

Parameter No.1221: Offset from the workpiece reference point for G54

Parameter No.1222: Offset from the workpiece reference point for G55

Parameter No.1223: Offset from the workpiece reference point for G56

Parameter No.1224: Offset from the workpiece reference point for G57

Parameter No.1225: Offset from the workpiece reference point for G58

Parameter No.1226: Offset from the workpiece reference point for G59

1.2.13 Displaying and setting the custom macro variables

(1) Press soft key [MACRO].

```
VARIABLE                                        O0000 N00000

      NO.       DATA          NO.          DATA
      100     01000.000       108
      101     10000.000       109
      102     23000.000       110        –22000.00
      103                     111
      104     00120.000       112
      105                     113
      106     500000.00       114
      107                     115
      ACTUAL POSITION (RELATIVE)
           U       0.000      W            0.000

>_                                    S  0  T0000
MDI   ****   ***   ***             16:05:59
[ MACRO ]  [        ]  [  OPR  ]  [ TOOLLF ]  [ (OPRT) ]
```

```
VAR. :                                          O1234 N00000   (*1)

      NO.     NAME          DATA        COMMENT
      500                 123.456
      501                   0.000
      502                   3.210
      503
      504
      505
      506
      507
      ACTUAL POSITION (RELATIVE)
           X       0.000           Y       0.000
           Z       0.000
>_
MDI   ****   ***   ***             15:50:13
[ MACRO ]  [ MENU ]  [        ]  [        ]  [ (OPRT) ]
```

NOTE (*) When the Pattern data input function is provided

(2) Operation

Soft key [(OPRT)]
- Variable number [NO.SRH]
- Axis [INP.C.]
- Variable value [INPUT]
- [INPUT] : Delete the input value

(3) Related parameter

Parameter MCV (bit 2 of No. 3290): Entering macro variables from the MDI panel is allowed/inhibited.

(4) Related signal

KEY2 (G046#4): Data and macro variables can be input.

1

1.2.14 Displaying and setting the data for the software operator's panel

(1) Press soft key [OPR].

```
OPERATOR'S PANEL                              O0000 N00000

MODE : ■ MDI     AUTO   EDIT    STEP   JOG     ZRN

 STEP MULTI. :    *1     ■ *10    *100
 RAPID OVRD.:     100%   50%     25%   ■ F0
 JOG FEED    :     1.0%
                          **************
 FEED OVRD. :   140%
                                   ***
ACTUAL POSITION (ABSOLUTE)
  X        0.000                Z        0.000

>_                                          S     0 T0000
MDI ****   ***  ***                    16:05:59
[ MACRO ]   [ MENU ]   [ OPR ]   [TOOLLF ]   [ (OPRT) ]
```

```
OPERATOR'S PANEL                              O0000 N00000

BLOCK SKIP       : ■ OFF              ON
SINGLE BLOCK     :   OFF           ■ ON
MACHINE LOCK     : ■ OFF              ON
PROTECT KEY      : ■ PROTECT          RELEASE
FEED HOLD        : ■ OFF

ACTUAL POSITION (ABSOLUTE)
  X        0.000          Z        0.000


                                            S     0 T0000
MDI ****   ***  ***                    16:05:59
[ MACRO ]   [ MENU ]   [ OPR ]   [TOOLLF ]   [ (OPRT) ]
```

(2) Related signals

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F072	OUT7	OUT6	OUT5	OUT4	OUT3	OUT2	OUT1	OUT0

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F073				ZRNO		MD4O	MD2O	MD1O

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F075	SPO	KEYO	DRNO	MLKO	SBKO	BDTO		

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F076			ROV2O	ROV1O			MP2O	MP1O

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F077		RTO			HS1DO	HS1CO	HS1BO	HS1AO

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F078	*FV7O	*FV6O	*FV5O	*FV4O	*FV3O	*FV2O	*FV1O	*FV0O

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F079	*JV7O	*JV6O	*JV5O	*JV4O	*JV3O	*JV2O	*JV1O	*JV0O

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F080	*JV15O	*JV14O	*JV13O	*JV12O	*JV11O	*JV10O	*JV9O	*JV8O

DGN	#7	#6	#5	#4	#3	#2	#1	#0
F081	–J4O	+J4O	–J3O	+J3O	–J2O	+J2O	–J1O	+J1O

(3) Related parameters

Parameter	#7	#6	#5	#4	#3	#2	#1	#0
7200		OP7	OP6	OP5	OP4	OP3	OP2	OP1

Selects the operations performed on the software operator's panel.

#6(OP7) Feed hold

#5(OP6) Program protection

#4(OP5) Optional block skip, single block operation, machine lock, and dry run

#3(OP4) Manual feedrate override and rapid traverse override

#2(OP3) Selecting the axis and magnification for the manual pulse generator

#1(OP2) Manual feed axis selection and manual rapid traverse

#0(OP1) Mode selection

7220	Names of general–purpose software switches
⋮	⋮
7283	Names of general–purpose software switches

Decimals converted from ASCII codes are set as character codes.

Parameters No. 7220 to No. 7227: Name of general-purpose switch 1
Parameters No. 7228 to No. 7235: Name of general-purpose switch 2
Parameters No. 7236 to No. 7243: Name of general-purpose switch 3
Parameters No. 7244 to No. 7251: Name of general-purpose switch 4
Parameters No. 7252 to No. 7259: Name of general-purpose switch 5
Parameters No. 7260 to No. 7267: Name of general-purpose switch 6
Parameters No. 7268 to No. 7275: Name of general-purpose switch 7
Parameters No. 7276 to No. 7283: Name of general-purpose switch 8

To set “FANUC” as the name of general-purpose switch 1, set the parameters as follows: No. 7220 = 70, No. 7221 = 65, No. 7212 = 78, No. 7213 = 85, and No. 7214 = 67.

1.2.15 Displaying and setting the parameters

(1) Press soft key [PARAM].

```
PARAMETER (SETTING)                          O0010 N00002

0000         SEQ                         INI   ISO   TVC
        0     0     0     0     0     0     0
0001                                           FCV
        0     0     0     0     0     0     0     0
0012                                                 MIR
  X     0     0     0     0     0     0     0     0
  Y     0     0     0     0     0     0     0     0
  Z     0     0     0     0     0     0     0     0
0020  I/O  CHANNEL                                   0
0022                                                 0

>_
MDI ****   ***  ***                 15:43:11
[ PARAM ]   [ DGNOS ]   [  PMC  ]   [SYSTEM]   [ (OPRT) ]
```

(2) Entering values from the MDI panel

1. Enter the MDI mode or emergency stop state.
2. Set PARAMETER WRITE to 1 in the setting screen.
3. Alarm 100 occurs. Press the CAN and RESET keys simultaneously to temporarily stop the alarm.
4. Press soft key [(OPRT)] to display the operation menu including the following:
   - a) Enter a parameter number and press [NO.SRH]: Searches for the specified number.
   - b) Soft key [ON:1]: Sets the value at which the cursor is positioned to 1. (Only for bit parameters)
   - c) Soft key [OFF:0]: Sets the value at which the cursor is positioned to 0. (Only for bit parameters)
   - d) Soft key [+INPUT]: Adds the entered value to the value at which the cursor is positioned. (Only for word parameters)
   - e) Soft key [INPUT]: Sets the value at which the cursor is positioned to theentered value. (Only for word parameters)
   - f) Soft key [READ]: Inputs parameters from the reader/punch interface.
   - g) Soft key [PUNCH]: Outputs parameters to the reader/punch interface.

(3) Convenient methods for entering data

(a) To change data in units of bits

Pressing ⬅ or ➡ changes the cursor to 1-bit size, which enables setting in units of bits (only for bit parameters).

(b) Use [EOB] to continuously set data starting from the cursor position.

(Example1)

When [1] [2] [3] [4] [EOB] [4] [5] [6] [7] [EOB] [9] [9] [9] [9] [INPUT] is entered,

0		1234
0	→	4567
0		9999
0		0

(Example2)

When [1] [2] [3] [4] [EOB] [EOB] [9] [9] [9] [9] [INPUT] is entered,

0		1234
0	→	0
0		9999
0		0

(c) Use [=] to enter the same data.

(Example)

When [1] [2] [3] [4] [EOB] [=] [EOB] [=] [INPUT] is entered,

0		1234
0	→	1234
0		1234
0		0

(d) For bit parameters

(Example)

When [1] [1] [EOB] [=] [EOB] [=] [INPUT] is entered,

0 0 0 0 0 0 0	0 0 0 1 1 0 0 0
0 0 0 0 0 0 0	0 0 0 1 1 0 0 0
0 0 0 0 0 0 0	0 0 0 1 1 0 0 0
0 0 0 0 0 0 0	0 0 0 0 0 0 0 0

1.2.16 Displaying the internal state of the NC (diagnostic screen)

See Chapter 6 for details of self-diagnosis.

(1) Press soft key[DGNOS].

```
DIAGNOSTIC (GENERAL)                              O1234 N00000

 000  WAITING FOR FIN SIGNAL                         :0
 001  MOTION                                         :0
 002  DWELL                                          :0
 003  IN–POSITION  CHECK                             :0
 004  FEEDRATE  OVERRIDE  0%                         :0
 005  INTERLOCK/START–LOCK                           :0
 006  SPINDLE  SPEED  ARRIVAL  CHECK                 :0

>_
MDI ****   ***  ***                  15:50:47
[ PARAM ]  [DGNOS]  [  PMC  ]  [SYSTEM]  [ (OPRT) ]
```

1.2.17 Displaying the system configuration

(1) Press soft key [SYSTEM].

```
SYSTEM CONFIG (SLOT)                     O1234 N00000

 SLOT  MODULE ID    SERIES   VERSION
   00  0090 :  40    B0B1     0006
   01  009A :  45    600M     0003
   81  013F :  4A    B401     0001
   02  309D :  41    4068     0001

>_
MDI ****  ***  ***              15:51:25
[ PARAM ] [ DGNOS ] [  PMC  ] [SYSTEM] [ (OPRT) ]
```

Software series for a module with CPU

Software version for a module with CPU

Software ID

Module ID

Slot number (80 to 8F are on the secondary side.)

(2) Software configuration screen

```
SYSTEM CONFIG (SOFTWARE)                 O1234 N00000

 SYSTEM     B0B1   0002
            BASIC+OPTION–A1+OPTIPN–A2
 SERVO      9080   0001
 PMC        4066   0001
 LADDER     FS16   000B
 MACRO      OZMM   0002
 SPINDLE–1  9A10   0010

>_
MDI ****  ***  ***              15:52:01
[ PARAM ] [ DGNOS ] [  PMC  ] [SYSTEM] [        ]
```

Software version

Software configuration

Series number shown in the title screen of the PMC

Software series

Software type

(3) Module configuration screen
Displays the configuration of a module mounted on a printed circuit board.

Slot number (80 to 8F) are on the secondary side

```
SYSTEM CONFIG (MODULE)                   O1234 N56789
                                               PAGE:03
 SLOT 00 MAIN CPU BOARD

 FLASH ROM MODULE            :            6MB
 DRAM MODULE                 :            6MB
 ADDITIONAL SRAM             :            – – –
 CRTC MODULE                 :            9″CRT
 SERVO 1/2 AXIS MODULE       :          MOUNTED
 SERVO 3/4 AXIS MODULE       :            _ _ _
 SERIAL SPINDLE LSI          :          MOUNTED
 ANALOG SPINDLE LSI          :            _ _ _

>_
MEM ****  ***  ***              16:53:44
[ PARAM ] [ DGNOS ] [  PMC  ] [SYSTEM] [        ]
```

Type of the printed circuit board on which the module is mounted.

Module type.

Indicates that the hardware is not mounted.

Indicates that the hardware is mounted.

Type of module or hardware.

Pressing [PAGE ⬇] or [⬆ PAGE] displays the system configuration for another printed circuit board.

NOTE See the section on the configuration of the printed circuit boards in the control unit for the correspondence between each module and displayed item.

1.2.18 Displaying and setting the pitch error compensation values

(1) Press soft key [PITCH].

```
PIT–ERROR SETTING                         O1234 N00000

   NO.  DATA      NO.  DATA      NO.  DATA
   0000    1      0010    0      0020    0
   0001    0      0011    1      0021    1
   0002    0      0012    0      0022    0
   0003    1      0013   –1      0023    1
   0004   –1      0014    2      0024    3
   0005    0      0015    0      0025    0
   0006    1      0016    0      0026   –1
   0007    0      0017    1      0027    0
   0008    0      0018    0      0028    0
   0009    1      0019    0      0029    0
>_
MDI ****  ***  ***                 15:55:24
[       ]  [ PITCH ]  [       ]  [       ]  [ (OPRT) ]
```

(2) Operation

```
Soft key [(OPRT)] ──┬─ Compensation number   [NO.SRH]
                    ├─ [ON:1]
                    ├─ [OFF:0]
                    ├─ Compensation value   [+INPUT]
                    ├─ Compensation value   [INPUT]
                    ├─ [READ]  N  File number ─┬─ [EXEC]
                    │                          └─ [CAN]    Note) EDIT mode
                    └─ [READ] ─┬─ [EXEC]
                               └─ [CAN]    Note) EDIT mode
```

1.2.19 Displaying the alarm messages

(1) Press soft key [ALARM]

```
ALARM MESSAGE                             O0000 N0000

   100     PARAMETER WRITE ENABLE
   510     OVER TRAVEL  :+1
   521     OVER TRAVEL  :–2




                                          S    0  T0000
MDI ****  ***  ***              ALM  13:28:26
[ ALARM ]  [MSGHIS]  [ HISTRY ]  [       ]  [       ]
```

(2) Related parameter

Parameter NPA (No. 3117#7): Switches/does not switch to the alarm screen when an alarm occurs.

1.2.20 Displaying the operator messages

(1) Press soft key [MSG].

```
MESSAGE HISTORY                              O1234 N12345
93/04/01 17:25:00                                PAGE : 1
No. ****









MEM STRT MTN FIN ALM 17:25:00
[ ALARM ]  [MSGHIS]  [ HISTRY ]  [         ]  [         ]
```

Date, time, and page

Message No.

Display range

(Up to 255 characters)

1.2.21 Displaying the alarm history

(1) Press soft key [HISTRY].

```
ALARM HISTORY                                O1234 N12345


91/04/18 20:56:26
 506 OVERTRAVEL   :  +X
91/04/18 19:58:11
 000 TURN OFF POWER
91/04/18 19:52:45
 000 TURN OFF POWER
91/04/18 19:48:43
 300 APC ALARM    :  X–AXIS ZERO RETURN REQUEST
91/04/18 18:10:10
 507 OVERTRAVEL   :  +B


[ ALARM ]  [ MSG ]  [HISTRY]  [         ]  [ (OPRT) ]
```

(2) Deleting the alarm history

Press soft key [(OPRT)] and then [CLEAR].

(3) About alarms

- When the parameter (No. 3112#3)=0
  1. Alarms generated by a custom macro

     The alarms have numbers in the range of 3000 to 3999 and are referred to as macro alarms in the message.

     (Example) #3000=1(ERROR1)

     →Found as 3001 macro alarm in the history
  2. Alarms generated by a DISP or DISPB instruction in the PMC

     The alarms have numbers in the range of 1000 to 1999 and are referred to as external alarms in the message.

     (Example) DISP instruction A000.0 1000 ERROR1

     →Found as 1000 external alarm in the history

1.3 Help Function

1 Pressing HELP in any screen displays the help screen (except in the PMC screen).

```
HELP (INITIAL MENU)                              O1234 N00001

              *****HELP*****
         1.  ALARM DETAIL
         2.  OPERATION METHOD
         3.  PARAMETER TABLE

                                              S    0  T0000
MEM ****  ***  ***                       00:00:00
[ ALARM ]  [OPERAT]  [ PARAM ]  [        ]  [        ]
```

1.3.1 Alarm detail screen

1 Pressing soft key [ALARM] while an alarm is generated displays the help message for the alarm.

```
HELP (ALARM DETAIL)                              O1234 N00001

      NUMBER:094
      M'SAGE:P TYPE NOT ALLOWED (COORD CHG)
      FUNCTION:RESTART PROGRAM
      ALARM:
      WHEN COORDINATE SYSTEM SETTING IS
      CONDUCTED AFTER HOLDING
   6  AUTOMATIC OPERATION, P–TYPE (WHEN TOOL
      IS DAMAGED) PROGRAM
      RESTART CANNOT BE EXECUTED.

                                              S    0  T0000
MEM ****  ***  ***                       00:00:00
[ ALARM ]  [OPERAT]  [ PARAM ]  [        ]  [ (OPRT) ]
```

2 Press soft key [(OPRT)], enter the alarm number, and then press soft key [SELECT] to display the help message for the alarm corresponding to the entered number.

1.3.2 Operation method screen

1 Pressing soft key [OPERAT] displays the operation help message.

```
HELP (OPERATION METHOD)                    O1234 N00001

 1. PROGRAM EDIT
 2. SEARCH
 3. RESET
 4. DATA INPUT WITH MDI
 5. DATA INPUT WITH TAPE
 6. OUTPUT
 7. INPUT WITH FANUC CASSETTE
 8. OUTPUT WITH FANUC CASSETTE
 9. MEMORY CLEAR

                                          S    0  T0000
MEM ****  ***  ***                  00:00:00
[ ALARM ] [OPERAT] [ PARAM ] [       ] [ (OPRT) ]
```

2 Press soft key [(OPRT)], enter the number of the item to be displayed, and then press soft key [SELECT] to display the operation method.

Use [PAGE ⬇] and [⬆ PAGE] to select another page.

```
HELP (ALARM METHOD)                        O1234 N00001
<< 1. PROGRAM EDIT  >>                              1/4  <- Current page/total number of pages
*DELETE ALL PROGRAMS
   MODE     :  EDIT
   SCREEN   :  PROGRAM
   OPR      :  (O9999) – <DELETE>

*DELETE ONE PROGRAM
   MODE     :  EDIT
   SCREEN   :  PROGRAM
   OPR      :  (O+PROGRAM NUMBER) – <DELETE>

>_                                        S    0  T0000
MEM ****  ***  ***                  00:00:00
[       ] [       ] [       ] [       ] [SELECT ]
```

1.3.3 Parameter contents

Pressing soft key [PARAM] displays the parameter contents.

```
HELP (PARAMETER TABLE)                     O1234 N00001
                                                    1/4  <- Current page/total number of pages

* SETTEING                           (No.0000–)
* READER/PUNCHER INTERFACE           (No.0100–)
* AXIS CONTROL/SETTING UNIT          (No.1000–)
* COORDINATE SYSTEM                  (No.1200–)
* STROKE LIMIT                       (No.1300–)
* FEED RATE                          (No.1400–)
* ACCEL/DECELERATION CTRL            (No.1600–)
* SERVO RELATED                      (No.1800–)
* DI/DO                              (No.3000–)

                                          S    0  T0000
MEM ****  ***  ***                  00:00:00
[ ALARM ] [OPERAT] [ PARAM ] [       ] [ (OPRT) ]
```

Use [PAGE ⬇] and [⬆ PAGE] to select another page.

1.4 BOOT SYSTEM

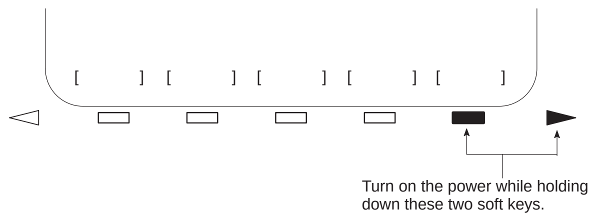
1

- The BOOT system of the Series 16/18–C loads NC control software and P-CODE programs from the FROM (flash ROM) into the DRAM when the power is turned on, subsequently operating according to that data.
- In addition to the above, the BOOT system supports the following functions:
  - Writing files from a memory card to the FROM
  - Displaying a directory of files in the FROM
  - Deleting files from the FROM
  - Writing user files, stored in the FROM, to a memory card
  - Inputting/outputting data to and from the SRAM as a batch
  - Deleting files stored on a memory card
  - Formatting a memory card

Data can be read from and written to a SRAM memory card. A FROM card is a read-only device.

- Displaying the SYSTEM MONITOR MAIN MENU screen

  1 Turn on the power while holding down both the rightmost soft key (continuation key) and the soft key to its left.



→ Use the same soft keys, for the 9.5″ LCD as well as the 14″ CRT.

  2 The SYSTEM MONITOR MAIN MENU screen appears.

```
SYSTEM MONITOR MAIN MENU                60M1–01


1. SYSTEM DATA LOADING
2. SYSTEM DATA CHECK
3. SYSTEM DATA DELETE
4. SYSTEM DATA SAVE
5. SRAM DATA BACKUP
6. MEMORY CARD FILE DELETE
7. MEMORY CARD FORMAT

9. END
***MESSAGE***
SELECT MODE AND HIT SELECT KEY.


[SELECT] [ YES ] [ NO ] [ UP ] [ DOWN ]
```

  3 Using the [UP] or [DOWN] soft key, position the cursor to the desired item.

- The functions of the items are as follows.

1	SYSTEM DATA LOADING	Reads ROM data from a memory card and writes it into the FROM.
2	SYSTEM DATA CHECK	Displays the file directory for the FROM.
3	SYSTEM DATA DELETE	Deletes user files, such as ladder programs, stored in the FROM.
4	SYSTEM DATA SAVE	Writes user files, such as ladder programs, stored in the FROM to a memory card.
5	SRAM DATA BACKUP	Writes parameters, machining programs, and macro variables to a memory card.
6	MEMORY CARD FILE DELETE	Deletes files stored on a memory card.
7	MEMORY CARD FORMAT	Formats a memory card.
8	END	Terminates the system monitor.

4 Press the [SELECT] soft key.

The selected item is executed.

When the basic NC software has not been written into the FROM, the SYSTEM MONITOR MAIN MENU screen automatically appears at power on.

- Selecting the board to be accessed
(BOOT SLOT CONFIGURATION screen)

(1) When the BOOT SLOT CONFIGURATION screen is displayed

1 When the CNC is fitted with the OPT2 or LCB board, it needs to access the flash memory and SRAM mounted on a board other than the main board. The system displays a screen enabling the selection of the board to be accessed. (This function is supported by edition 60M1/02 and later.)

2 Using the [UP] or [DOWN] key, position the cursor to the board to be accessed, then press the [SELECT] key.

The name of the selected board is displayed on the screen.

```
BOOT SLOT CONFIGURATION                60M1–02

NO.BOARD  F–ROM   SRAM
0. MAIN   4MB     1. 0MB
1. OPT2   6MB     1. 0MB
3. LCB            512KB



***MESSAGE***
SELECT SLOT AND HIT SELECT KEY.

[SELECT] [ YES ] [ NO ] [ UP ] [ DOWN ]
```

- Reading files from a memory card
  (SYSTEM DATA LOADING screen)

(1) Display the SYSTEM DATA LOADING screen by following the procedure below.

1. On the SYSTEM MONITOR MAIN MENU screen, use the [UP] or [DOWN] soft key to position the cursor to 1. SYSTEM DATA LOADING.
2. Press the [SELECT] soft key. (When more than one board is connected to the NC, the BOOT SLOT CONFIGURATION screen appears.)

→ The file directory is displayed.

```
SYSTEM DATA LOADING                         1/1
FILE DIRECTORY
MACRO1. MEM
MACRO2. MEM
LADDER. ROM
END



***MESSAGE***
SELECT FILE AND HIT SELECT KEY.

[SELECT]  [ YES ]  [ NO ]  [ UP ]  [ DOWN ]
```

(2) From the file directory, select the file to be read by following the procedure below.

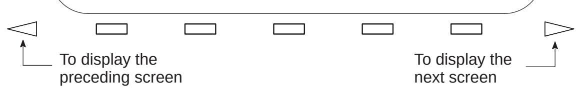
1. Using the [UP] or [DOWN] soft key, position the cursor to the file to be read.

```
SYSTEM DATA LOADING                         1/1
FILE DIRECTORY
MACRO1. MEM
MACRO2. MEM
LADDER. ROM
END



***MESSAGE***
SELECT FILE AND HIT SELECT KEY.

[SELECT]  [ YES ]  [ NO ]  [ UP ]  [ DOWN ]
```



- When the file directory is too large to fit on the screen, the screen can be scrolled by pressing the [◁] or [▷] soft key.
- To return to the SYSTEM MONITOR MAIN MENU screen, position the cursor to END, then press the [SELECT] soft key.

2 Press the [SELECT] soft key.

Any file name can be assigned to the files stored on a memory card. The system automatically determines the type of a file from its contents when reading that file.

(3) A confirmation sign appears at the bottom of the screen. To continue the operation, press the [YES] soft key. To abandon the operation, press the [NO] soft key.

(4) While a file is being read, the following message is displayed on the screen.

```
"READ DATA FROM MEMORY CARD"
        ↓
"F-ROM ERASING"
        ↓
"F-ROM PROGRAM"
        ↓
"LOADING COMPLETE"
```

Displaying the FROM file list (SYSTEM DATA CHECK screen)

→ When reading is terminated, the message, "HIT SELECT KEY," appears at the bottom of the screen.

(5) Press the [SELECT] soft key to return to the SYSTEM DATA LOADING screen.

● Displaying the FROM file list (SYSTEM DATA CHECK screen)

(1) Select the SYSTEM DATA CHECK screen.

1 Using the [UP] or [DOWN] soft key, position the cursor to 2. SYSTEM DATA CHECK on the SYSTEM MONITOR MAIN MENU screen.

2 Press the [SELECT] soft key.
When more than one board is connected to the NC, the SLOT CONFIGURATION screen appears.

→ FROM files are listed on the screen as follows:

```
SYSTEM DATA CHECK
[ BOARD : MAIN ]
FILE DIRECTORY (FLASH ROM : 4MB)
1. NC BASIC(10)
2. DG SERVO(1)
3. PMC0BSC(2)
4. PMC–RB(1)
5. NC1 OPTN(8)
6. END

***MESSAGE***
SELECT FILE AND HIT SELECT KEY.

[ SELECT] [ YES ] [ NO ] [ UP ] [ DOWN ]
```

The file size appears in parentheses (unit : 128KB)

- The names and applications of the FROM files are as follows:

File name	Application	Attribute
NC BASIC	NC system software	System file ● The file can be typed over, but cannot be deleted or output.
DG SERVO	Digital servo software	
GRAPHIC	Graphic software	
NCn OPTN	Optional function	
PMCnxxxx	PMC control software	
PCD xxxx	Macro P-CODE program	User file ● The file can be typed over, deleted, and output.
CEX xxxx	C executor	
PMC-xxxx	Ladder program	
PMC@xxxx	Loader control ladder program	

n: Numeric character x: Alphabetic character

- The object files of the macro P-CODE program and the C executor can be saved to the memory card, but cannot be decompiled into their corresponding source code.

(2) To obtain detailed information about a particular system file, such as its software series and edition, perform the following:

1 Using the [UP] or [DOWN] soft key, position the cursor to the desired file name.

2 Press the [SELECT] soft key.

Note that this function is valid for system files only.

Example screen (when NC BASIC has been selected)

```
ROM FILE CHECK
NC BASIC
0   B0B1 801B 000
1   B0B1 802B 001
2   B0B1 841B 002
3   B0B1 842B 003
4   B0B1 881B 004
5   B0B1 882B 005
6   B0B1 8C1B 006
7   B0B1 8C2B 007



***MESSAGE***
CONTINUE. HIT SELECT KEY.
[SELECT]  [ YES ]  [ NO ]  [ UP ]  [ DOWN ]
```

Example of M series

- Any non-ASCII code, or the symbol @, appearing in the displayed file name indicates that the contents of FROM or the data in the read file has been destroyed. In this case, attempt to read the file again.

3 Press the [SELECT] soft key to return to the SYSTEM DATA CHECK screen.

(3) Return to the SYSTEM MONITOR MAIN MENU screen.

1 Position the cursor to END.

2 Press the [SELECT] soft key.

● Deleting a FROM file (SYSTEM DATA DELETE screen)

NOTE Only user files, such as the ladder and macro P-code programs, can be deleted. System files, such as NC BASIC, cannot be deleted.

(1) Select the SYSTEM DATA DELETE screen.

1 Using the [UP] or [DOWN] soft key, position the cursor to 3. SYSTEM DATA DELETE.

2 Press the [SELECT] soft key.
When more than one board is connected to the NC, the SLOT CONFIGURATION screen appears.

→ FROM files are listed on the screen as follows:

```
SYSTEM DATA CHECK
[ BOARD : MAIN ]
FILE DIRECTORY
1.  NC BASIC(10)
2.  DG SERVO(1)
3.  PMC0BSC(2)
4.  PMC–RB(1)
5.  NC1 OPTN(8)
6.  END



***MESSAGE***
SELECT FILE AND HIT SELECT KEY.


[ SELECT]  [  YES  ]  [  NO  ]  [  UP  ]  [ DOWN ]
```

(2) Select the file to be deleted.

1 Using the [UP] or [DOWN] soft key, position the cursor to the desired file name.

2 Press the [SELECT] soft key.

- To quit and return to the SYSTEM MONITOR MAIN MENU screen, position the cursor to END, then press the [SELECT] soft key.

3 A confirmation message appears at the bottom of the screen. To delete the file, press the [YES] soft key. To abandon the deletion, press the [NO] soft key.
Upon pressing the [YES] soft key, the specified file is deleted.

→ Once the file has been deleted, “HIT SELECT KEY” appears at the bottom of the screen.

(3) Press the [SELECT] soft key to return to the SYSTEM DATA CHECK screen.

1

- Saving a FROM file to a memory card (SYSTEM DATA SAVE screen)

NOTE Only user files, such as the ladder and macro P-code programs, can be saved to a memory card. System files, such as NC BASIC, cannot be saved.

(1) Select the SYSTEM DATA SAVE screen.

1 Using the [UP] or [DOWN] soft key, position the cursor to 4. SYSTEM DATA SAVE.

2 Press the [SELECT] soft key.
When more than one board is connected to the NC, the SLOT CONFIGURATION screen appears.

→ FROM files are listed on the screen as follows:

```
SYSTEM DATA SAVE
[ BOARD : MAIN ]
FILE DIRECTORY
1.  NC BASIC(10)
2.  DG SERVO(1)
3.  PMC0BSC(2)
4.  PMC–RB(1)
5.  NC1 OPTN(8)
6.  END


***MESSAGE***
SELECT FILE AND HIT SELECT KEY.

[ SELECT]   [ YES ]   [ NO ]   [ UP ]   [ DOWN ]
```

(2) Select the file to be saved.

1 Using the [UP] or [DOWN] soft key, position the cursor to the desired file name.

2 Press the [SELECT] soft key.

- To quit and return to the SYSTEM MONITOR MAIN MENU screen, position the cursor to END, then press the [SELECT] soft key.

3 A confirmation message appears at the bottom of the screen. To save the file, press the [YES] soft key. To abandon the saving, press the [NO] soft key.
Upon pressing the [YES] soft key, the specified file is saved to the memory card.

→ Once the file has been saved, “HIT SELECT KEY” appears at the bottom of the screen, together with the name assigned to that saved file.

```
FILE SAVE COMPLETE. HIT SELECT KEY.
SAVE FILE NAME:PCD_05M. 000   ←  Name assigned to the saved file


[ SELECT]   [ YES ]   [ NO ]   [ UP ]   [ DOWN ]
```

- Saved files are named as follows:

File	FROM file name	Memory card file name
Ladder program	PMC-RB	PMC-RB. xxx
Macro P-code program	PCD 0.5M PCD 1.0M PCD 1.5M	PCD_05M. xxx PCD_10M. xxx PCD_15M. xxx

  - A three-digit number (000 to 031) is automatically assigned to a saved file as the file extension. The file extension will be 000 when no other files having the same file name have been saved to the memory card. When a file having the same file name has already been saved to the memory card, the lowest number currently available will be assigned.
  - The most recently saved file need not necessarily have the highest extension number because it may be assigned a number that was previously skipped. Carefully check the file name, displayed at the bottom of the screen, once saving has been completed.

(3) Press the [SELECT] soft key to return to the SYSTEM DATA SAVE screen.

- Dumping SRAM data to a memory card
  (SRAM DATA BACKUP screen)

(1) Select the SRAM DATA BACKUP screen.

1 Using the [UP] or [DOWN] soft key, position the cursor to 5. SRAM DATA BACKUP.

2 Press the [SELECT] soft key.
When more than one board is connected to the NC, the SLOT CONFIGURATION screen appears.
→ The SRAM DATA BACKUP screen is displayed.

```
SYSTEM DATA BACKUP
[BOARD : MAIN]

1. SRAM BACKUP (CNC    → MEMORY CARD)
2. RESTORE SRAM (MEMORY CARD    → CNC)
END

SRAM SIZE : 0.5MB (BASIC)
FILE NAME : SRAM0–5A. FDB



***MESSAGE***
SELECT MENU AND HIT SELECT KEY.


[ SELECT]  [ YES ]  [ NO ]  [ UP ]  [ DOWN ]
```

The size of the SRAM allocated to the NC is displayed here.
The amount of free memory space decreases after formatting, because part of the memory is taken up by directories and other data.
Therefore, the use of a large–capacity memory card is recommended.

(2) Select whether to dump data to the memory card (BACKUP), or to load data from the memory card (RESTORE).

1 Using the [UP] or [DOWN] soft key, position the cursor to the desired function.

2 Press the [SELECT] soft key.
- To quit and return to the SYSTEM MONITOR MAIN MENU screen, position the cursor to END, then press the [SELECT] soft key.

3 A confirmation message appears at the bottom of the screen. To perform the selected operation, press the [YES] soft key. To abandon the operation, press the [NO] soft key.
Upon pressing the [YES] soft key, data transfer between the SRAM and memory card starts.

→ During data transfer, the name of the file being transferred blinks as follows:

When dumping data to the memory card

```
FILE NAME : SRAM0_5A. FDB → MEMORY CARD
```

When loading data from the memory card

```
FILE NAME : SRAM0_5A. FDB → CNC
```

- Backup file data is dumped to the memory card in blocks of 520KB.

  Backup file data can also be dumped to multiple memory cards.
- A backup file is named as follows:

SRAMxxx □. FDB

□: An alphabetic character, representing the file size in units of 512KB, is assigned sequentially, starting from A.

xxx: SRAM size allocated to NC

0.5MB:0_5
1.0MB:1_0
1.5MB:1_5
2.0MB:2_0
2.5MB:2_5

When a board (OPT2 or LCB) other than the main board is connected to the CNC, one of the following extensions will be assigned to an SRAM backup file:

Board type	Main board	OPT2	LCB
Extension	FDB	OP2	LCB

(3) Press the [SELECT] soft key to return to the SRAM DATA BACKUP screen.

● Deleting a file from a memory card
(MEMORY CARD FILE DELETE screen)

(1) Select the MEMORY CARD FILE DELETE screen.

1 Using the [UP] or [DOWN] soft key, position the cursor to 6. MEMORY CARD FILE DELETE on the SYSTEM MONITOR MAIN MENU screen.

2 Press the [SELECT] soft key.

→ Files stored on the memory card are listed on the screen as follows:

```
MEMORY CARD FILE DELETE                    1/1
FILE DIRECTORY
MACRO1. MEM
MACRO2. MEM
LADDER. ROM
END




***MESSAGE***
SELECT FILE AND HIT SELECT KEY.

[SELECT]  [ YES ]  [ NO ]  [ UP ]  [ DOWN ]
```

(2) Select the file to be deleted.

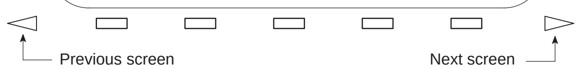
1 Using the [UP] or [DOWN] soft key, position the cursor to the desired file name.

```
MEMORY CARD FILE DELETE                              1/1
FILE DIRECTORY
MACRO1. MEM
MACRO2. MEM
LADDER. ROM
END




***MESSAGE***
SELECT FILE AND HIT SELECT KEY.

[SELECT]  [ YES ]  [ NO ]  [ UP ]  [ DOWN ]
```



- When the file list is too large to be displayed on one screen, the previous and subsequent pages can be viewed by using the ◁ and ▷ soft keys.
- To return to the SYSTEM MONITOR MAIN MENU screen, position the cursor to END, then press the [SELECT] soft key.

2 Press the [SELECT] key.

(3) A confirmation message appears at the bottom of the screen. To delete the file, press the [YES] soft key. To abandon the deletion, press the [NO] soft key.

- Once the file has been deleted, "HIT SELECT KEY" appears at the bottom of the screen.

(4) Press the [SELECT] soft key to return to the MEMORY CARD FILE DELETE screen.

● Formatting a memory card (MEMORY CARD FORMAT screen)

- A newly purchased memory card must be formatted before it can be used. Also, a memory card must be formatted if its contents are destroyed or lost due to battery failure.

(1) Select the MEMORY CARD FORMAT screen.

1 Using the [UP] or [DOWN] soft key, position the cursor to 7. MEMORY CARD FORMAT on the SYSTEM MONITOR MAIN MENU screen.

2 Press the [SELECT] key.

(2) A confirmation message appears at the bottom of the screen. To format the memory card, press the [YES] soft key. To abandon the formatting, press the [NO] soft key.

- While the memory card is being formatted, the message "FORMATTING MEMORY CARD" is displayed at the bottom of the screen.
- Once formatting has been completed, "FORMATTING COMPLETE HIT. SELECT KEY" appears at the bottom of the screen.

(3) Press the [SELECT] soft key to return to the SYSTEM MONITOR MAIN MENU screen.

- Quit system monitoring

(1) Quit system monitoring.

1 Using the [UP] or [DOWN] soft key, position the cursor to 9. END on the SYSTEM MONITOR MAIN MENU.

2 Press the [SELECT] soft key.

```
SYSTEM MONITOR MAIN MENU                         60M1–02

1.  SYSTEM DATA LOADING
2.  SYSTEM DATA CHECH
3.  SYSTEM DATA DELETE
4.  SYSTEM DATA SAVE
5.  SRAM DATA BACKUP
6.  MEMORY CARD FILE DELETE
7.  MEMORY CARD FORMAT

9.  END

***MESSAGE***
SELECT MODE AND HIT SELECT KEY.

[SELECT]  [  YES  ]  [  NO  ]  [  UP  ]  [ DOWN ]
```

(2) To quit system monitoring, press the [YES] soft key.

To continue system monitoring, press the [NO] soft key.

→ The NC system starts in the same way as when the power is first turned on. The following messages are displayed on the screen:

"CHECK CNC BASIC SYSTEM"
↓
"LOADING BASIC CNC TO DRAM"

- Error message list
  - The following table lists and describes the error messages which may be output by the system.

	Message	Cause and Response
D	DELETE ERROR. HIT SELECT KEY.	An attempt to delete a file from flash memory failed. Retry the deletion. If the second attempt also fails, the flash memory may have been destroyed. Replace the flash memory module.
	DEVICE ERROR (CNC x)	An attempt to write data to flash memory failed. Briefly turn the system power off, then on again. If the same message appears, the flash memory may have been destroyed. Replace the flash memory module.
F	FILE SAVE ERROR. HIT SELECT KEY.	An attempt to write a file to a memory card failed. Check that the memory card is normal. (Note) A normal memory card should have a serviceable battery, have no failed circuitry, and be correctly inserted into its slot.
	FLASH MEMORY NO SPACE	There is insufficient flash memory to enable the reading of a selected file. Delete any unnecessary files from flash memory. If this message continues to be displayed and the file still cannot be read, even though calculations indicate that there is sufficient flash memory .
	FLASH ROM MODULE NOT EXIST. HIT SELECT.	No flash memory module is mounted on the board. Mount a module.
I	ILLEGAL FORMAT FILE	The selected file cannot be read into flash memory. The selected file itself or the flash memory header information may have been destroyed.
L	LOADING ERROR. HIT SELECT KEY.	An error occurred while data was being loaded into flash memory. Do not touch the memory card while data is being loaded into flash memory.

	Message	Cause and Response
M	MAX EXTENSION OVER. HIT SELECT KEY.	The extension number added to a file name exceeds 31. Delete any unnecessary backup files from the memory card.
	MEMORY CARD BATTERY ALARM. HIT SELECT.	The memory card battery is exhausted. Replace the memory card's battery.
	MEMORY CARD FULL. HIT SELECT KEY.	The memory card is full. Delete any unnecessary files from the memory card or use a memory card with sufficient capacity.
	MEMORY CARD MOUNT ERROR. HIT SELECT KEY.	The memory card could not be accessed. Check that the memory card is normal.
	MEMORY CARD NOT EXIST. HIT SELECT KEY.	No memory card is mounted in the slot. Or, the memory card may not be correctly seated in its socket.
	MEMORY CARD PROTECTED. HIT SELECT KEY.	Although writing to a memory card was selected, the card's write inhibit switch is enabled. Disable the memory card's write inhibit switch.
	MEMORY CARD RESET ERROR. HIT SELECT KEY.	A memory card could not be accessed. Check that the memory card is normal.
	MEMORY CARD WRITE ERROR. HIT SELECT KEY.	An attempt to write a backup file to a memory card failed. Check that the memory card is normal.
R	ROM PARITY ERROR: NC BASIC. HIT SELECT.	An NC BASIC parity error has occurred. Check that NC BASIC has been loaded into the flash memory module.
S	SRAM DATA BACKUP ERROR. HIT SELECT KEY.	An attempt to write a backup file to a memory card failed. Check that the memory card is normal.

- If an error occurs, the corresponding error message appears on the screen, together with the message "HIT SELECT KEY." (Note that the [SELECT] soft key is disabled for errors whose clearing requires that the power be turned off.)

Reset

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Operating time			–	POS	[(OPRT)] [TIME: 0] → [EXEC]
Number of machined parts			–	POS	[(OPRT)] [PART: 0] → [EXEC]
OT alarm			At power-up	–	P and CAN
Alarm 100			–	–	RESET while pressing CAN

Registration from MDI

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Parameter		○	MDI or emergency stop	SYSTEM	[PARAM] → Parameter No. → [NO.SRH] → Data INPUT → or [INPUT] → PWE = 0 → RESET
Offset	○		–	OFFSET SETTING	[OFFSET] → Offset No. → [NO. SRH] → Offset value → INPUT or [INPUT]
Setting data	○		MDI	OFFSET SETTING	[SETTING] → Setting No. → [NO. SRH]→Data→ INPUT or [INPUT]
PMC parameter (Counter, data table)	○		MDI or emergency stop	SYSTEM (PMC)	[PMC] → [PMCPRM] → [COUNTR] or [DATA] → Data → INPUT
PMC parameter (timer, keep relay)		○	MDI or emergency stop	SYSTEM (PMC)	[PMC] → [PMCPRM] → [TIMER] or [KEEPRL] → Data → INPUT
Tool length measurement			JOG	POS → OFFSET SETTING	POS → [REL] (Relative coordinate system display) → Axis → [ORIGIN] → OFFSET SETTING → [OFFSET] → Offset number → [NO.SRH] → Axis → [C INPUT]

NOTE ○ mark shows the corresponding key is “1”.

2

Registration/input from external I/O device

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Parameter		○	EDIT or emergency stop	SYSTEM	[PARAM] → [(OPRT)] → ▷ → [READ] → [EXEC]
PMC parameter		○	Emergency stop	SYSTEM	[PMC] → ▷ → [I/O]→ (CANNEL NO.) INPUT → [FDCAS] → [READ] → File No. → INPUT → [EXEC]
Offset	○		EDIT	OFFSET SETTING	[OFFSET] → [(OPRT)] → ▷ → [READ] → [EXEC]
Custom macro variable	○		EDIT	PROG	Read by assigning a temporary program number → Execute in MEM mode → Delete program
Program	○		EDIT	PROG	[(OPRT)] → ▷ → (O Program number) → [READ] → [EXEC]

NOTE ○ mark shows the corresponding key is “1”.

Output to external I/O device

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Parameter			EDIT	SYSTEM	[PARAM] → [(OPRT)] → ▷ → [PUNCH] → [EXEC]
PMC parameter			EDIT	SYSTEM	[PMC] → ▷ → [I/O]→ INPUT → [FDCAS] → [WRITE] → (FILE NO) → INPUT → [EXEC]
Offset			EDIT	OFFSET SETTING	[OFFSET] → [(OPRT)] → ▷ → [PUNCH]→ [EXEC]
Custom macro variables			EDIT	OFFSET SETTING	▷ → [MACRO] → [(OPRT)] → ▷ → [PUNCH] → [EXEC]
All programs			EDIT	PROG	[(OPRT)] → ▷ → [PUNCH] → O –9999 → [EXEC]
One program			EDIT	PROG	[(OPRT)] → ▷ → [PUNCH] → O Program number → [EXEC]

Search

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Program number			MEM– or EDIT	PROG	O → Program No. → [O SRH]
Sequence number			MEM	PROG	N → Sequence No. → [N SRH]
Address/ word			EDIT	PROG	Word to be searched for → [SRH↑] or [SRH ↓]
Address only			EDIT	PROG	Address to be searched for → [SRH↑] or [SRH ↓]
Offset number			–	OFFSET SETTING	[OFFSET] → Offset No. → [NO.SRH]
Diagnostic number			–	SYSTEM	[DGNOS] → Diagnosis No. → [NO.SRH]
Parameter number			–	SYSTEM	[PARAM] → Parameter No. → [NO.SRH]

Collation

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Memory collation			EDIT	PROG	[(OPRT)] → ▷ → [READ] → [EXEC]

NOTE ○ mark shows the corresponding key is “1”.

Program editing

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Deletion of all programs	○		EDIT	PROG	O → –9999 → DELETE
Deletion of one program	○		EDIT	PROG	O → Program No. → DELETE
Deletion of multiple blocks	○		EDIT	PROG	N → Sequence No. → DELETE
Deletion of one block	○		EDIT	PROG	EOB → DELETE
Word deletion	○		EDIT	PROG	Search for word to be deleted → DELETE
Word alteration	○		EDIT	PROG	Search for word to be changed→ New data → ALTER
Word insertion	○		EDIT	PROG	Search for word immediately before insertion location → New data → INSERT

NOTE ○ mark shows the corresponding key is “1”.

I/O to and from FANUC Cassette

Function	KEY SW	PWE = 1	Mode	Function key	Operation
File head search			EDIT	PROG	N → FILE No. → ▻ → [F SRH] → [EXEC]
File deletion	○		EDIT	PROG	N → FILE No. → ▻ → [F DELETE] → [EXEC]
Program registra-tion	○		EDIT	PROG	N → FILE No. → ▻ → [READ] → [EXEC]
Output of all programs			EDIT	PROG	O → –9999 → ▻ → [PUNCH] → [EXEC]
Output of one program			EDIT	PROG	O → Program No. → ▻ → [PUNCH] → [EXEC]
Program collation			EDIT	PROG	File head search → O Program No. → ▻ → [READ] → [EXEC]

NOTE ○ mark shows the corresponding key is “1”.

Play-back

Function	KEY SW	PWE = 1	Mode	Function key	Operation
NC data input	○		TJOG THND	PROG	Move machine. → X Y or Z → INSERT → NC data → INSERT → EOB → INSERT

NOTE ○ mark shows the corresponding key is "1".

Clear

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Memory all clear			At power-up	–	RESET and DELETE Only for sub side of two-path control CAN and 2 Only for loader side CAN and 5
Parameters/offset		○	At power-up	–	RESET Only for main side of two-path control RESET and 1 Only for sub side of two-path control RESET and 2 Only for loader side RESET and 5
Program clear		○	At power-up	–	DELETE Only for main side of two-path control DELETE and 1 Only for sub side of two-path control DELETE and 2 Only for loader side DELETE and 5

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Program being edited at power failure (PS101)			–	–	PROG and RESET
PMC RAM module			At pow-er-up	–	X and 0 Only for loader side X and 5
PMC nonvolatile memory			At pow-er-up		Z and O
Additional SRAM area			At pow-er-up		O and DELETE Only for main side of two-path control O and 1 Only for sub side of two-path control O and 2

NOTE ◯ mark shows the corresponding key is "1".

Manual operation

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Manual reference point return			JOG		Turn on Reference point return switch → [+X] [–X] [+Z] or [–Z] → Reference point return LED lit.
Jog feed			JOG		[+X] [–X] [+Z] or [–Z] → Set jog feedrate → (Rapid traverse button, if requred)
Incremental feed			INC		(Move distance selection switch) → [+X] [–X] [+Z] or [–Z] → (Rapid traverse button, if required)
Manual handle feed			HND		(Axis selection switch) → (Turn manual pulse generation) → (Handle magnification selection)

Registeration from NC tape

Function	KEY SW	PWE = 1	Mode	Function key	Operation
One program registera- tion	○		EDIT	PROG	[(OPRT)] → ▻ → O → Program No. → [READ] → [EXEC]
Plural program registera- tion	○		EDIT	PROG	[(OPRT)] → ▻ → (O → Program No.)→[READ] →[EXEC]
Collation of program in memory and NC tape			EDIT	PROG	[(OPRT)] → ▻ → [READ] → [EXEC]

NOTE ○ mark shows the corresponding key is “1”.

DISPLAY

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Program memory used			EDIT	PROG	[LIB]
Command			MEM or MDI	PROG	Current command, Modal command
					[CURRENT]
					Current command, Next command
					[NEXT]
					MDI command, Modal com- mand
					[MDI]
					Current program in memory
					[PRGRM]
					Current block and Current position
					[CHECK]
Current position				POS	Position in workpiece coor- dinate
					[ABS]
					Position in relative coordi- nate
					[REL]
					Overall coordinate
					[ALL]
Alarm			–	MESSAGE	[ALARM]

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Alarm history				MESSAGE	[HISTRY]
Screen clear			–	–	Press CAN and function key simultaneously. Press function key to redisplay.
Switching screen between NC and loader					SHIFT and HELP

NOTE ◯ mark shows the corresponding key is "1".

GRAPHIC FUNCTION (T series)

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Parameter setting				GRAPH	[G.PRM]
Tool path				GRAPH	Selection of graphic screen:
					[GRAPH]
					Graphic start/end:
					Automatic or manual operation
					Erasing graphic screen:
					[OPRT]→ [ERASE]
					Magnification
					[ZOOM]

NOTE1 ◯ mark shows the corresponding key is "1".

NOTE2 Function key GRAPH is CUSTOM GRAPH for small MDI.

GRAPHIC FUNCTION (M series)

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Parameter setting				GRAPH	[PARAM]
Tool path				GRAPH	Selection of graphic screen: [GRAPH] Graphic start/end: Automatic or manual operation
Data setting of dynamic path graphic				GRAPH	Press GRAPH several times → PATH GRAPHIC screen → [PARAM]→ numeric key → INPUT
Dynamic path graphic			MEM	GRAPH	Press GRAPH several times → PATH GRAPHIC screen → [EXEC] → [(OPRT)]→ [AUTO] or [START] Temporary stop of graph [STOP] Execution after temporaly stop: Execution after temporaly stop [START] Execution from program heading after temporary stop: [REWIND] → [START]
Partial enlargement path graphic				GRAPH	Press GRAPH several times → PATH GRAPHIC screen → [SCALE] → [(OPRT)] → [←] [→] [↑] [↓] → P or M → [EXEC]
Displaying tool position mark				GRAPH	Press GRAPH several times → PATH GRAPHIC screen → [POSITION]
Displaying solid graphic data				GRAPH	Press GRAPH several times → PATH GRAPHIC screen → Enter numerics → INPUT

<table>
<tr><th>Function</th><th>KEY SW</th><th>PWE = 1</th><th>Mode</th><th>Function key</th><th colspan="2">Operation</th></tr>
<tr><td>Displaying of blank figure</td><td></td><td></td><td></td><td>GRAPH</td><td colspan="2">Press GRAPH several times → PATH GRAPHIC screen → [BLANK] → [(OPRT)] → [ANEW] → [+ROT][–ROT] [+TILT][–TILT]</td></tr>
<tr><td rowspan="7">Displaying solid graphic</td><td rowspan="7"></td><td rowspan="7"></td><td rowspan="7">MEM</td><td rowspan="7">GRAPH</td><td colspan="2">Press GRAPH several times → PATH GRAPHIC screen → [EXEC] → [(OPRT)] → [A.ST] or [F.ST]</td></tr>
<tr><td colspan="2">Temporary stop of graph</td></tr>
<tr><td colspan="2">[STOP]</td></tr>
<tr><td rowspan="4">Execu-tion af-ter tem-porary stop</td><td>Execution after temporary stop</td></tr>
<tr><td>[A.ST] or [F.ST]</td></tr>
<tr><td>Display of head of part program after temporary stop</td></tr>
<tr><td>[REWIND] → [A.ST] or [F.ST]</td></tr>
<tr><td>In the solid graphic where it drew, the direction of displaying is changed and it draws again.</td><td></td><td></td><td></td><td>GRAPH</td><td colspan="2">Press GRAPH several times → PATH GRAPHIC screen → [REVIEW] → [(OPRT)] → [ANEW] → [+ROT][–ROT] [+TILT][–TILT]</td></tr>
<tr><td>Tri-plane view dis-playing</td><td></td><td></td><td></td><td>GRAPH</td><td colspan="2">Press GRAPH several times → PATH GRAPHIC screen → ▷ → [3-PLN] → [(OPRT)] → [↺] [←] [→] [↑] [↓]</td></tr>
</table>

NOTE1 ○ mark shows the corresponding key is “1”.

NOTE2 Function key GRAPH is CUSTOM GRAPH for small MDI.

HELP FUNCTION

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Displaying INITIAL MENU screen				HELP	HELP
Displaying ALARM DETAIL screen				HELP	[ALARM] → Alarm No. → [SELECT]
Displaying OPERATION METHOD screen				HELP	[OPERAT] → Item No. of operation method → [SELECT]
Displaying PARAMETER TABLE screen				HELP	[PARAM]

SELF DIAGNOSTIC FUNCTION

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Displaying DIAGNOSTIC screen				SYSTEM	[DGNOS] ↓ 1. Page change keys ↑ PAGE PAGE ↓ 2. Number of the diagnostic data → [NO.SRH]

BOOT

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Displaying system monitor screen			At power-up	–	▷ and the soft key to its left
Reading file from memory card					Move cursor to 1. SYSTEM DATA LODING on system monitor screen → [SELECT] → Move cursor to file to be read → [SELECT] → [YES]
Displaying detail screen for flash ROM file list					Move cursor to 2. SYSTEM DATA CHECK on system monitor screen → [SELECT] → Move cursor to item of which to display details → [SELECT]
Deleting file in flash ROM					Move cursor to 3. SYSTEM DATA DELETE on system monitor screen → [SELECT] → Move cursor to file to be deleted → [SELECT] → [YES]

2

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Outputting file in flash ROM to memory card					Move cursor to 4. SYSTEM DATA SAVE on system monitor screen → [SELECT] → Move cursor to file to be output → [SELECT] → [YES]
Batch output of SRAM data to memory card Batch input of SRAM data from memory card					Move cursor to 5. SYSTEM DATA BACKUP on system monitor screen → [SELECT] → Move cursor to 1. SRAM BACKUP or 2. RESTORE SRAM → [SELECT] → [YES]
Deleting file in memory card					Move cursor to 6. MEMORY CARD FILE on system monitor screen → [SELECT] → Move cursor to file to be deleted → [SELECT] → [YES]
Formatting memory card					Move cursor to 7. MEMORY CARD FORMAT on system monitor screen → [SELECT] → [YES]
Exiting system monitor					Move cursor to 9. END on system monitor screen → [SELECT] → [YES]

P-CODE LOADER

Function	KEY SW	PWE = 1	Mode	Function key	Operation
Starting P-CODE LOADER			At power-up	–	CAN and PROG

3.1 T series

G code list (T series) (1/3)

<table>
<tr><th colspan="3">G code</th><th rowspan="2">Group</th><th rowspan="2" colspan="2">Function</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>G00</td><td>G00</td><td>G00</td><td rowspan="4">01</td><td colspan="2">Positioning (Rapid traverse)</td></tr>
<tr><td>G01</td><td>G01</td><td>G01</td><td colspan="2">Linear interpolation (Cutting feed)</td></tr>
<tr><td>G02</td><td>G02</td><td>G02</td><td colspan="2">Circular interpolation CW or Helical interpolation CW</td></tr>
<tr><td>G03</td><td>G03</td><td>G03</td><td colspan="2">Circular interpolation CCW or Helical interpolation CCW</td></tr>
<tr><td>G04</td><td>G04</td><td>G04</td><td rowspan="7">00</td><td colspan="2">Dwell</td></tr>
<tr><td>G05</td><td>G05</td><td>G05</td><td colspan="2">High speed cycle cutting</td></tr>
<tr><td>G07</td><td>G07</td><td>G07</td><td colspan="2">Hypothetical axis interpolation</td></tr>
<tr><td>G07.1
(G107)</td><td>G07.1
(G107)</td><td>G07.1
(G107)</td><td colspan="2">Cylindrical interpolation</td></tr>
<tr><td>G10</td><td>G10</td><td>G10</td><td colspan="2">Programmable data input</td></tr>
<tr><td>G10.6</td><td>G10.6</td><td>G10.6</td><td colspan="2">Tool retract & recover</td></tr>
<tr><td>G11</td><td>G11</td><td>G11</td><td colspan="2">Programmable data input cancel</td></tr>
<tr><td>G12.1
(G112)</td><td>G12.1
(G112)</td><td>G12.1
(G112)</td><td rowspan="2">21</td><td colspan="2">Polar coordinate interpolation mode</td></tr>
<tr><td>G13.1
(G113)</td><td>G13.1
(G113)</td><td>G13.1
(G113)</td><td colspan="2">Polar coordinate interpolation cancel mode</td></tr>
<tr><td>G17</td><td>G17</td><td>G17</td><td rowspan="3">16</td><td>XpYp plane selection</td><td rowspan="3">Xp: X axis or parallel axis
Yp: Y axis or parallel axis
Zp: Z axis or parallel axis</td></tr>
<tr><td>G18</td><td>G18</td><td>G18</td><td>ZpXp plane selection</td></tr>
<tr><td>G19</td><td>G19</td><td>G19</td><td>YpZp plane selection</td></tr>
<tr><td>G20</td><td>G20</td><td>G70</td><td rowspan="2">06</td><td colspan="2">Input in inch</td></tr>
<tr><td>G21</td><td>G21</td><td>G71</td><td colspan="2">Input in mm</td></tr>
<tr><td>G22</td><td>G22</td><td>G22</td><td rowspan="2">09</td><td colspan="2">Stored stroke check function on</td></tr>
<tr><td>G23</td><td>G23</td><td>G23</td><td colspan="2">Stored stroke check function off</td></tr>
<tr><td>G25</td><td>G25</td><td>G25</td><td rowspan="2">08</td><td colspan="2">Spindle speed fluctuation detection off</td></tr>
<tr><td>G26</td><td>G26</td><td>G26</td><td colspan="2">Spindle speed fluctuation detection on</td></tr>
<tr><td>G27</td><td>G27</td><td>G27</td><td rowspan="5">00</td><td colspan="2">Reference position return check</td></tr>
<tr><td>G28</td><td>G28</td><td>G28</td><td colspan="2">Return to reference position</td></tr>
<tr><td>G30</td><td>G30</td><td>G30</td><td colspan="2">2nd, 3rd and 4th reference position return</td></tr>
<tr><td>G30.1</td><td>G30.1</td><td>G30.1</td><td colspan="2">Floating reference position return</td></tr>
<tr><td>G31</td><td>G31</td><td>G31</td><td colspan="2">Skip function, multi–step skip function, torque limit skip</td></tr>
<tr><td>G32</td><td>G33</td><td>G33</td><td rowspan="4">01</td><td colspan="2">Thread cutting</td></tr>
<tr><td>G34</td><td>G34</td><td>G34</td><td colspan="2">Variable–lead thread cutting</td></tr>
<tr><td>G35</td><td>G35</td><td>G35</td><td colspan="2">Circular thread cutting CW</td></tr>
<tr><td>G36</td><td>G36</td><td>G36</td><td colspan="2">Circular thread cutting CCW</td></tr>
<tr><td>G36</td><td>G36</td><td>G36</td><td rowspan="3">00</td><td colspan="2">Automatic tool compensation X</td></tr>
<tr><td>G37</td><td>G37</td><td>G37</td><td colspan="2">Automatic tool compensation Z</td></tr>
<tr><td>G39</td><td>G39</td><td>G39</td><td colspan="2">Corner circular interpolation</td></tr>
<tr><td>G40</td><td>G40</td><td>G40</td><td rowspan="3">07</td><td colspan="2">Tool nose radius compensation cancel</td></tr>
<tr><td>G41</td><td>G41</td><td>G41</td><td colspan="2">Tool nose radius compensation left</td></tr>
<tr><td>G42</td><td>G42</td><td>G42</td><td colspan="2">Tool nose radius compensation right</td></tr>
</table>

G code list (T series) (2/3)

G code A	G code B	G code C	Group	Function
G50	G92	G92	00	Coordinate system setting or max. spindle speed setting
G50.3	G92.1	G92.1		Workpiece coordinate system preset
G50.2 (G250)	G50.2 (G250)	G50.2 (G250)	20	Polygonal turning cancel
G51.2 (G251)	G51.2 (G251)	G51.2 (G251)		Polygonal turning
G52	G52	G52	00	Local coordinate system setting
G53	G53	G53		Machine coordinate system setting
G54	G54	G54	14	Workpiece coordinate system 1 selection
G55	G55	G55		Workpiece coordinate system 2 selection
G56	G56	G56		Workpiece coordinate system 3 selection
G57	G57	G57		Workpiece coordinate system 4 selection
G58	G58	G58		Workpiece coordinate system 5 selection
G59	G59	G59		Workpiece coordinate system 6 selection
G65	G65	G65	00	Macro calling
G66	G66	G66	12	Macro modal call
G67	G67	G67		Macro modal call cancel
G68	G68	G68	04	Mirror image for double turrets ON or balance cut mode
G69	G69	G69		Mirror image for double turrets OFF or balance cut mode cancel
G70	G70	G72	00	Finishing cycle
G71	G71	G73		Stock removal in turning
G72	G72	G74		Stock removal in facing
G73	G73	G75		Pattern repeating
G74	G74	G76		End face peck drilling
G75	G75	G77		Outer diameter/internal diameter drilling
G76	G76	G78		Multiple threading cycle
G71	G71	G72	01	Traverse grinding cycle (for grinding machine)
G72	G72	G73		Traverse direct constant–dimension grinding cycle (for grinding machine)
G73	G73	G74		Oscilation grinding cycle (for grinding machine)
G74	G74	G75		Oscilation direct constant–dimension grinding cycle (for grinding machine)
G80	G80	G80	10	Canned cycle for drilling cancel
G83	G83	G83		Cycle for face drilling
G84	G84	G84		Cycle for face tapping
G86	G86	G86		Cycle for face boring
G87	G87	G87		Cycle for side drilling
G88	G88	G88		Cycle for side tapping
G89	G89	G89		Cycle for side boring

3

G code list (T series) (3/3)

G code A	G code B	G code C	Group	Function
G90	G77	G20	01	Outer diameter/internal diameter cutting cycle
G92	G78	G21		Thread cutting cycle
G94	G79	G24		Endface turning cycle
G92.1	G92.1	G92.1	00	Workpiece coordinate system preset
G96	G96	G96	02	Constant surface speed control
◤G97	◤G97	◤G97		Constant surface speed control cancel
G98	G94	G94	05	Per minute feed
◤G99	◤G95	◤G95		Per revolution feed
–	◤G90	◤G90	03	Absolute programming
–	G91	G90		Incremental programming
–	G98	G98	11	Return to initial level
–	G99	G99		Return to R point level

Explanation

1. If the CNC enters the clear state (see bit 6 (CLR) of parameter 3402) when the power is turned on or the CNC is reset, the modal G codes change as follows.
   (1) G codes marked with ◤ in the above table are enabled.
   (2) When the system is cleared due to power–on or reset, whichever specified, either G20 or G21, remains effective.
   (3) Bit 7 of parameter No. 3402 can be used to specify whether G22 or G23 is selected upon power–on. Resetting the CNC to the clear state does not affect the selection of G22 or G23.
   (4) Setting bit 0 (G01) of parameter 3402 determines which code, either G00 or G01, is effective.
   (5) Setting bit 3 (G91) of parameter 3402 determines which code, either G90 or G91, is effective.
2. G codes of group 00 except G10 and G11 are single–shot G codes.
3. G codes of different groups can be specified in the same block.
   If G codes of the same group are specified in the same block, the G code specified last is valid.

3.2 M series

G code list (M series) (1/3)

G code	Group	Function	
G00	01	Positioning	
G01		Linear interpolation	
G02		Circular interpolation/Helical interpolation CW	
G03		Circular interpolation/Helical interpolation CCW	
G02.2, G03.2		Involute interpolation	
G02.3, G03.3		Exponential interpolation	
G04	00	Dwell, Exact stop	
G05		High speed cycle machining	
G05.1		Smooth interpolation	
G07		Hypothetical axis interpolation	
G07.1 (G107)		Cylindrical interpolation	
G08		Look–ahead control	
G09		Exact stop	
G10		Programmable data input	
G10.6		Tool retract & recover	
G11		Programmable data input mode cancel	
G12.1	25	Polar coordinate interpolation mode	
G13.1		Polar coordinate interpolation cancel mode	
G15	17	Polar coordinates command cancel	
G06		Polar coordinates command	
G17	02	XpYp plane selection	Xp: X axis or its parallel axis
G18		ZpXp plane selection	Yp: Y axis or its parallel axis
G19		YpZp plane selection	Zp: Z axis or its parallel axis
G20	06	Input in inch	
G21		Input in mm	
G22	04	Stored stroke check function on	
G23		Stored stroke check function off	
G25	24	Spindle speed fluctuation detection off	
G26		Spindle speed fluctuation detection on	
G27	00	Reference position return check	
G28		Return to reference position	
G29		Return from reference position	
G30		2nd, 3rd and 4th reference position return	
G30.1		Floating reference position return	
G31		Skip function, Multi–step skip function	
G33	01	Thread cutting	
G37	00	Automatic tool length measurment	
G39		Corner offset circular interpolation	
G40	07	Cutter compensation cancel/Three dimentional tool offset cancel	
G41		Cutter compensation left/Three dimentional tool offset	
G42		Cutter compensation right	
G40.1 (G150)	19	Normal direction control cancel mode	
G41.1 (G151)		Normal direction control left side on	
G42.1 (G152)		Normal direction control right side on	

G code list (M series) (2/3)

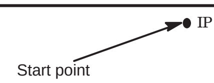
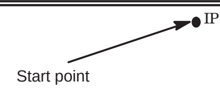
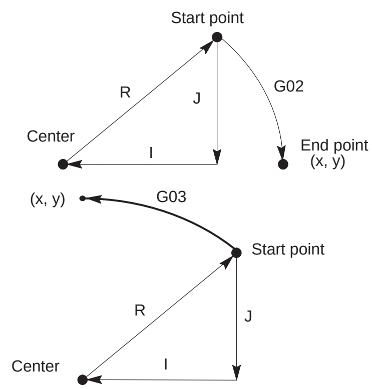
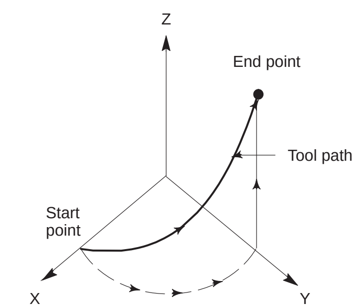
G code	Group	Function
G43	08	Tool length compensation + direction
G44		Tool length compensation – direction
G45	00	Tool offset increase
G46		Tool offset decrease
G47		Tool offset double increase
G48		Tool offset double decrease
G49	08	Tool length compensation cancel
G50	11	Scaling cancel
G51		Scaling
G50.1	22	Programmable mirror image cancel
G51.1		Programmable mirror image
G52	00	Local coordinate system setting
G53		Machine coordinate system selection
G54	14	Workpiece coordinate system 1 selection
G54.1		Additional workpiece coordinate system selection
G55		Workpiece coordinate system 2 selection
G56		Workpiece coordinate system 3 selection
G57		Workpiece coordinate system 4 selection
G58		Workpiece coordinate system 5 selection
G59		Workpiece coordinate system 6 selection
G60	00	Single direction positioning
G61	15	Exact stop mode
G62		Automatic corner override
G63		Tapping mode
G64		Cutting mode
G65	00	Macro call
G66	12	Macro modal call
G67		Macro modal call cancel
G68	16	Coordinate rotation/Three dimensional coordinate conversion
G69		Coordinate rotation cancel/Three dimensional coordinate conversion cancel
G72.1	00	Rotation copy
G72.2		Parallel copy
G73	09	Peck drilling cycle
G74		Counter tapping cycle
G75	01	Plunge grinding cycle (for grinding machine)
G76	09	Fine boring cycle
G77	01	Direct constant–dimension plunge grinding cycle (for grinding machine)
G78		Continuous–feed surface grinding cycle (for grinding machine)
G79		Intermittent–feed surface grinding cycle (for grinding machine)

G code list (M series) (3/3)

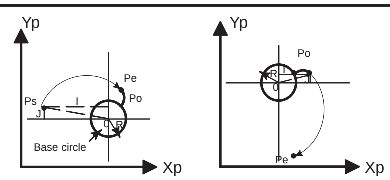
G code	Group	Function
G80	09	Canned cycle cancel/external operation function cancel
G81		Drilling cycle, spot boring cycle, external operation function, simple electric gear box
G81.1		Chopping function
G82		Drilling cycle or counter boring cycle
G83		Peck drilling cycle
G84		Tapping cycle
G85		Boring cycle
G86		Boring cycle
G87		Back boring cycle
G88		Boring cycle
G89		Boring cycle
G90	03	Absolute command
G91		Increment command
G92	00	Setting for work coordinate system or clamp at maximum spindle speed
G92.1		Work coordinate system preset
G94	05	Feed per minute
G95		Feed per rotation
G96	13	Constant surface speed control
G97		Constant surface speed control cancel
G98	10	Return to initial point in canned cycle
G99		Return to R point in canned cycle
G160	20	In–feed control function cancel (for grinding machine)
G161		In–feed control function (for grinding machine)

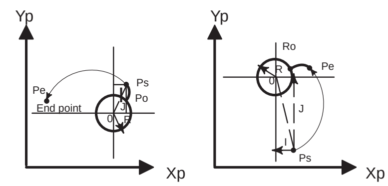
Explanation

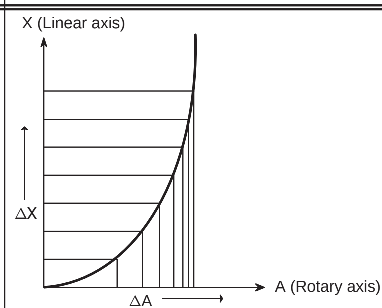
1. When the clear state (bit 6 (CLR) of parameter No. 3402) is set at power–up or reset, the modal G codes are placed in the states described below.
   (1) The modal G codes are placed in the states marked with as indicated in the above table.
   (2) G20 and G21 remain unchanged when the clear state is set at power–up or reset.
   (3) Which status G22 or G23 at power on is set by parameter G23 (No.3402#7). However, G22 and G23 remain unchanged when the clear state is set at reset.
   (4) The user can select G00 or G01 by setting bit 0 (G01) of parameter No. 3402.
   (5) The user can select G90 or G91 by setting bit 3 (G91) of parameter No. 3402.
   (6) The user can select G17, G18, or G19 by setting bit 1 (parameter G18) and bit 2 (parameter G19) of parameter No. 3402.
2. G codes other than G10 and G11 are one–shot G codes.
3. Multiple G codes can be specified in the same block if each G code belongs to a different group. If multiple G codes that belong to the same group are specified in the same block, only the last G code specified is valid.

Function	Explanation
Positioning (G00)	
Linear interpolation (G01)	
Circular interpolation (G02, G03)	
Helical interpolation (G02, G03)	

Tape format	T series	M series
G00 IP _ ;	○	○
G01IP _ ;	○	○
$G17 \begin{Bmatrix} G02 \\ G03 \end{Bmatrix} \; Xp\_Yp\_ \; \begin{Bmatrix} R\_ \\ I\_J\_ \end{Bmatrix} \; F\_ \;;$ $G18 \begin{Bmatrix} G02 \\ G03 \end{Bmatrix} \; Xp\_Zp\_ \; \begin{Bmatrix} R\_ \\ I\_K\_ \end{Bmatrix} \; F\_ \;;$ $G19 \begin{Bmatrix} G02 \\ G03 \end{Bmatrix} \; Yp\_Zp\_ \; \begin{Bmatrix} R\_ \\ J\_K\_ \end{Bmatrix} \; F\_ \;;$	○	○
Synchronously with arc of XpYp plane $G17 \begin{Bmatrix} G02 \\ G03 \end{Bmatrix} \; Xp\_Yp\_ \; \begin{Bmatrix} I\_J\_ \\ R\_ \end{Bmatrix} \; \alpha\_(\beta\_)F\_ \;;$ Synchronously with arc of ZpXp plane $G18 \begin{Bmatrix} G02 \\ G03 \end{Bmatrix} \; Xp\_Zp\_ \; \begin{Bmatrix} I\_K\_ \\ R\_ \end{Bmatrix} \; \alpha\_(\beta\_)F\_ \;;$ Synchronously with arc of YpZp plane $G19 \begin{Bmatrix} G02 \\ G03 \end{Bmatrix} \; Yp\_Zp\_ \; \begin{Bmatrix} J\_K\_ \\ R\_ \end{Bmatrix} \; \alpha\_(\beta\_)F\_ \;;$ α, β : Any one axis where circular interpolation is not applied. Up to two other axes can be specified.	○	○

<table>
<tr><th>Function</th><th>Explanation</th></tr>
<tr><td>Involute interpolation
(G02.2, G03.2)</td><td>


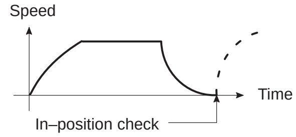
Clockwise (G02.2)


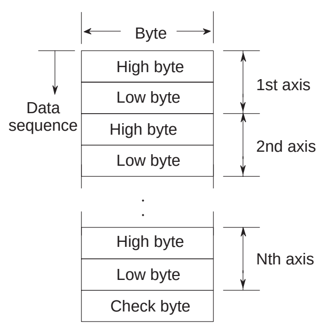
Counterclockwise (G03.2)
</td></tr>
<tr><td>Exponential
interpolation
(G02.3, G03.3)</td><td>


</td></tr>
<tr><td>Dwell (G04)</td><td>(Example)
G94 G04 P10; Dwell by 10 seconds
G95 G04 X30; Dwell by 30 revolutions</td></tr>
</table>

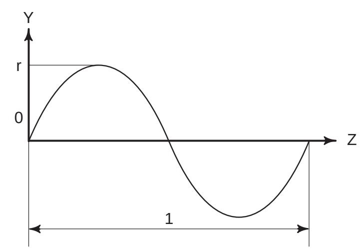
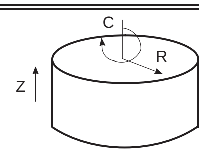
Tape format	T series	M series
Involute interpolation on the X-Y plane G17G02.2 X_Y_I_J_R_F_; G17 G3.2 X_Y_I_J_R_F_; Involute interpolation on the Z-X plane G18G02.2 Z_X_K_I_R_F_; G18 G3.2 Z_X_K_I_R_F_; Involute interpolation on the Y-Z plane G19G02.2 Y_Z_J_K_R_F_; G19 G3.2 Y_Z_J_K_R_F_; X, Y, Z : Involute curve end coordinate I, J, K : Center of the base circle for an involute curve viewed from the start point R : Base circle radius F : Cutting feedrate		○
Positive rotation G02.3 X_Y_Z_I_J_K_R_F_Q_; Negative rotation G03.3X_Y_Z_I_J_K_R_F_Q_; X_; Specifies an end point with an absolute or incremental value. Y_; Specifies an end point with an absolute or incremental value. Z_; Specifies an end point with an absolute or incremental value. I_; Specifies angle I (from ±1 to ± 89 deg in units of 0.001 deg). J_; Specifies angle J (from ±1 to ± 89 deg in units of 0.001 deg). K_; Specifies the amount to divide the linear axis for exponential interpolation (span value). Specify a positive value. When no value is specified, the value specified in parameter No. 5643 is used. R_; Specifies constant R for exponential interpolation. F_; Specifies the initial feedrate. Specified in the same way as an ordinary F code. Specify a composite feedrate including a feedrate on the rotary axis. Q_; Specifies the feedrate at the end point. The same unit used for F is used. The CNC internally performs interpolation between the initial feedrate (F) and final feedrate(Q), depending on the travel distance on the linear axis.		○
G94 G04 $\left\{\begin{array}{l}X\_\\P\_\end{array}\right\}$; Dwell by second G95 G04 $\left\{\begin{array}{l}X\_\\P\_\end{array}\right\}$; Dwell by revolution	○	○

4

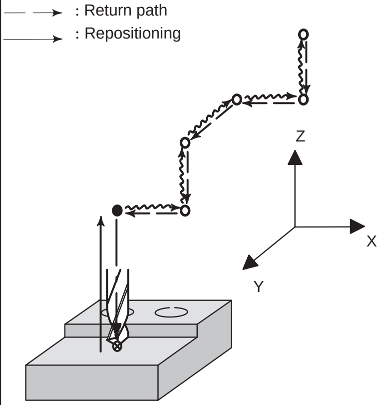
Function	Explanation
Exact stop (G09, G61)	
High-speed cycle machining (G05)	(Example) Cycle 1: connection 2, repetition 1 Cycle 2: connection 3, repetition 3 Cycle 3: connection 0, repetition 1 G05P10001L2; Cycle is executed as 1, 2, 2, 2, 3, 1, 2, 2, 2, 3
High-speed remote buffer A (G05)	Specify G05 only in a block using normal NC command format. Then specify move data in the special format shown below. When zero is specified as the travel distance along all axes, normal NC command format can be used again for subsequent command specification.
High-speed remote buffer B (G05)	High-speed remote buffer A uses binary data. On the other hand, high-speed remote buffer B can directly use NC language coded with equipment such as an automatic programming unit to perform high-speed machining.
High-precision contour control (G05)	Some machining errors are due to the CNC. Such errors include machining errors caused by acceleration/deceleration after interpolation. To eliminate these errors, the following functions are performed at high speed by an RISC processor. These functions are called high-precision contour control functions. (1) Function for multiple-block look-ahead acceleration/deceleration before interpolation. This function eliminates machining errors due to acceleration/deceleration. (2) Automatic speed control function which enables smooth acceleration/deceleration by considering changes in the figure and speed and allowable acceleration for the machine. This is performed by reading multiple blocks in advance.

Tape format	T series	M series
G09IP ; G61 ;		○
G05 P10 xxx L△△△ ; XXX : Start program number of called programs △△△ : Repetition time of machining cycle	○	○
● Binary input operation enabled : G05 ; ● Binary input operation disabled : The travel distance along all axes are set to zero ● Data format for binary input operation  All data must be specified in binary.	○	○
G05P01; Start high-speed machining X_Y_Z_; G05P00; End high-speed machining		○
G05P10000; Start HPCC mode G05P0; End HPCC mode		○

4

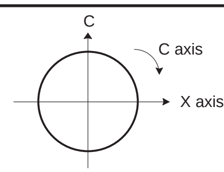
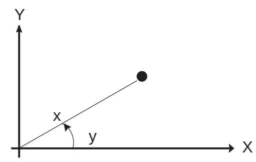
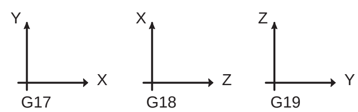
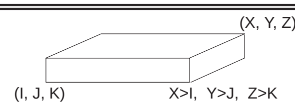
Function	Explanation
Smooth interpolation (G05.1)	Either of two types of machining can be selected, depending on the program command. ● For those portions where the accuracy of the figure is critical, such as at corners, machining is performed exactly as specified by the program command. ● For those portions having a large radius of curvature where a smooth figure must becreated, points along the machining path are interpolated with a smooth curve, calculated from the polygonal lines specified with the program command (smooth interpolation). Smooth interpolation can be specified in high–speed contour control mode.
Hypothetical axis interpolation (G07)	
Cylindrical interpolation (G07.1)	
Look-ahead control (G08)	With this function, the delay due to acceleration/deceleration and the delay in the servo system which increase as the feedrate becomes higher can be suppressed. The tool can then follow specified values accurately and errors in the machining profile can be reduced.

Tape format	T series	M series
G05.1 Q2X0Y0Z0; Starting of smooth interpolation mode G05.1 Q0; Cancelation of smooth interpolation mode		○
G07 α 0; Hypothetical axis setting G07 α 1; Hypothetical axis cancel Where, α is any one of the addresses of the controlled axes.		
G07.1 Cr ; Cylindrical interpolation mode C: Rotary axis name r: Radius of cylinder G07.1 C0 ; Cylindrical interpolation mode cancel	○	○
G08P_ ; P1: Turn on look-ahead control mode. P0: Turn off look-ahead control mode.		○

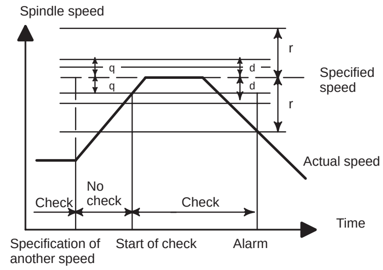
Function	Explanation
Change of offset values by program (G10)	The tool compensation amount can be set or changed with the G10 command. When G10 is used in absolute input (G90), the compensation amount specified in the command becomes the new tool compensation amount. When G10 is used in incremental input (G91), the compensation amount specified in the command is added to the amount currently set.
Tool withdrawal and return (G10.6)	⊗: Position where the TOOL WITHDRAW switch is turned on ●: Programmed position ○: Position to which the tool is retracted by manual operation : Retraction path : Manual operation (withdraw path) : Return path : Repositioning 

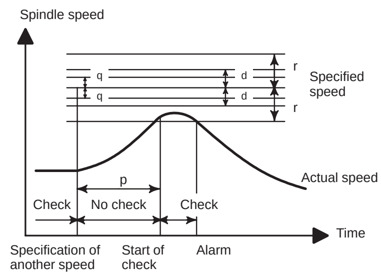
Tape format	T series	M series
G10P_X (U)_Y (V)_Z (W)_R (C)_Q_; For geometry offset amount P=10000+geometry offset number For offset amount P= wear offset number R : Tool nose radius offset value Q : Imaginary tool nose number	○	
G10L_PpRr ; p : Offset No. r : Tool compensation amount Format (1) For tool compensation memory A G10L11P_R_; (2) For tool compensation memory B Setting/changing the geometric compensation amount G10L10P_R_; Setting/changing the wear compensation amount G10L11P_R_; (3) For tool compensation memory C Setting/changing the geometric compensation amount for H code G10L10P_R_; Setting/changing the wear compensation amount for D code G10L12P_R_; Setting/changing the wear compensation amount for H code		○
G10.6 IP_; IP_: In incremental mode, retraction distance from the position where the retract signal is turned on In the absolute mode, retraction distance to an absolute position		○

4

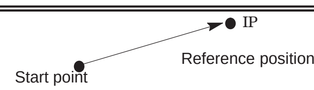
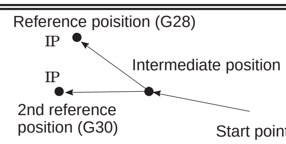
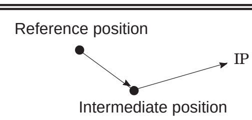
Function	Explanation
Polar coordinate interpolation mode (G12.1, G13.1)	
Polar coordinate command mode (G15, G16)	
XpYp plane selection (G17) ZpXp plane selection (G18) YpZp plane selection (G19)	
Inch/metric conversion (G20, G21)	
Stored stroke limit check on (G22) Stored stroke limit check off (G23)	

Tape format	T series	M series
G12.1 ; Polar coordinate interpolation mode G13.1 ; Polar coordinate interpolation mode cancel	○	○
G16 ; Polar coordinate command X$\underline{x}$ Y$\underline{y}$; X: radius, Y: angle (°) G15 ; Polar coordinate command cancel		○
G17 ; G18 ; G19 ;	○	○
G20 ; Inch input G21 ; Metric input	○	○
G22X_Y_Z_I_J_K_ ; on G23 ; off	○	○

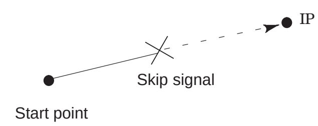
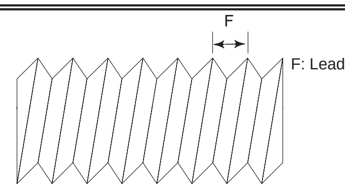
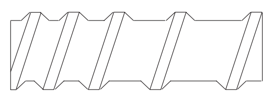
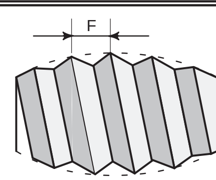
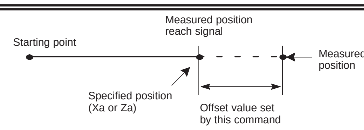
<table>
<tr><th>Function</th><th>Explanation</th></tr>
<tr><td>Spindle speed fluctuation detection on (G26)
Spindle speed fluctuation detection off (G25)</td><td>(Example)
(1) When an alarm is raised after a specified spindle speed is reached


(2) When an alarm is raised before a specified spindle speed is reached


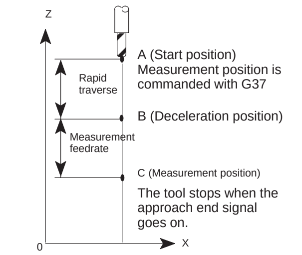
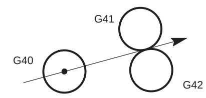
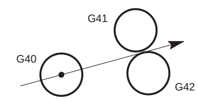
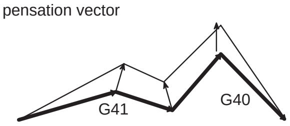
pecified speed : (Speed specified by address S and five–digit value)×(spindle override)
Actual speed :Speed detected with a position coder
p : Time elapses since the specified speed changes until a check starts.
q : (Percentage tolerance for a check to start)×(specified speed)
r : (Percentage fluctuation detected as an alarm condition)×(specified speed)
d : Fluctuation detected as an alarm (specified in parameter (No.4913))

An alarm is issued when the difference between the specified speed and the actual speed exceeds both r and d.</td></tr>
<tr><td>Reference position return check
(G27)</td><td>
</td></tr>
<tr><td>Reference position return (G28)
2nd, 3rd, 4th reference position return (G30)
Floating reference position return (G30.1)</td><td>
</td></tr>
<tr><td>Return to reference position return start position (G29)</td><td>
</td></tr>
</table>

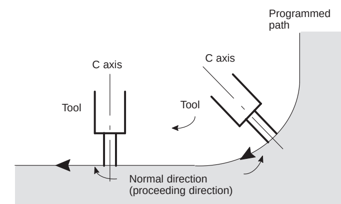
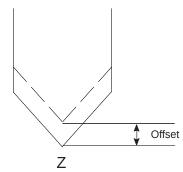
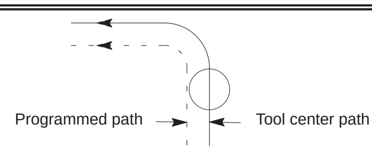
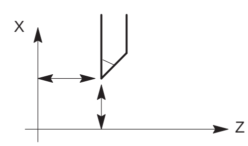
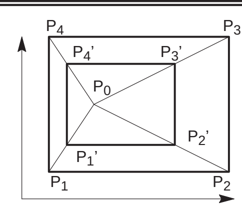
Tape format	T series	M series
G26PpQqRr ; spindle fluctuation detection on G25 ; Spindle fluctuation detection off p: Time (in ms) from the issue of a new spindle rotation command (S command) to the start of checking whether the actual spindle speed is so fast that an overheat can occur. (When a specified speed is reached within the time period of P, a check is started at that time.) q : Tolerance (%) of a specified spindle speed (if a specified spindle speed lies within this range, it is regarded as having reached the specified value. Then, the checking of an actual spindle speed is started.) q= (1– actual spindle speed/specified spindle speed)×100 r : Spindle speed fluctuation (%) at which the actual spindle speed is so fast that an overheat can occur r= (1–speed that can cause overheat/specified spindle speed)×100	○	○
G27IP_ ;	○	○
G28 IP_ ; $G30 \left\{ \begin{array}{c} P2 \\ P3 \\ P4 \end{array} \right\} IP\_ ;$ G30.1 IP_ ; P2: 2nd reference position return P3: 3rd reference position return P4: 4th reference position return	○	○
G29 IP_ ;	○	○

Function	Explanation
Skip function (G31)	
Multi–step skip function (G31)	
Torque limit skip function (G31)	
Equal lead thread cutting (G32)	
Thread cutting (G33)	
Variable lead thread cutting (G34)	
Circular thread cutting (G35, G36)	
Automatic tool compensation (G36, G37)	

Tape format	T series	M series
G31IP_F_ ;	○	○
Move command G31 IP_F_P_; F_: Feedrate P_: P1-P4 Dwell G04X (U, P)_(Q_); X(U, P)_: Dwell time Q_: Q1-Q4	○	○
G31 P99 IP_F_; G31 P98 IP_F_; G31: One-shot G code (G code effective only in the block in which it is issued)	○	
G32 IP_F_ ;	○	
G33 IP_F_ ;		○
G34 IP_FfKk ; f: longer axis lead at the start position k: increase/decrease value per spindle revolution	○	
$\left\{\begin{matrix} G35 \\ G36 \end{matrix}\right\}$ IP_ $\left\{\begin{matrix} I\_\ K\_ \\ R\_\ \ \_ \end{matrix}\right\}$ F_ Q_	○	
G36X xa ; G37Z za ; Specified position	○	

Function	Explanation
Automatic tool length measurement (G37)	 Compensation value=(Current compensation value)+[(Coordinates of the point at which the tool is stopped)–(Coordinates of the programmed measurement position)]
Tool nose radius compensation (G40, G41, G42)	 G40 ; Programmed path G41 ; Left of programmed path G42 ; Right of programmed path
Cutter compensation B (G39 to G42) Cutter compensation C (G40 to G42)	 G40 ; Programmed path G41 ; Left of programmed path G42 ; Right of programmed path
Three dimensional tool compensation (G40, G41)	Programmed path Path after three–dimensional tool compensation Three–dimensional tool compensation vector  The three–dimensional tool compensation vector is obtained from the following expressions: $Vx = \frac{i \cdot r}{p}$ (Vector component along the Xp–axis) $Vy = \frac{j \cdot r}{p}$ (Vector component along the Yp–axis) $Vz = \frac{k \cdot r}{p}$ (Vector component along the Zp–axis) In the above expressions, i, j, and k are the values specified in addresses I, J, and K in the block. r is the offset value corresponding to the specified offset number. p is the value obtained from the following expression: $p = \sqrt{i^2 + j^2 + k^2}$

Tape format	T series	M series
G92 IP_; Sets the workpiece coordinate system. (It can be set with G54 to G59.) H○○; Specifies an offset number for tool length offset. G90 G37 IP_; Absolute command·G37 is valid only in the block in which it is specified. IP_ indicates the X-, Y-, Z-, or fourth axis.		○
{G40 / G41 / G42} IP_ ;	○	
G39X(I)_Y(J)_ ; Corner offset circular interpolation {G17 / G18 / G19} {G40 / G41 / G42} D(H)_ ; D(H): Tool offset number		○
G41 Xp_Yp_Zp_I_J_K_D_; (Start up) Xp: X-axis or a parallel axis Yp: Y-axis or a parallel axis Zp: Z-axis or a parallel axis G40 Xp_Yp_Zp_; (When canceling the or three-dimensional tool Xp_Yp_Zp_D00; compensation mode and tool movement at the same time) G40; (When only canceling the vector) or D00;		○

Function	Explanation
Normal direction control (G40.1, G41.1 G42.1)	
Tool length compensation A, B, C (G43, G44, G49)	 G43: + offset G44: – offset
Tool offset (G45 to G48)	
Coordinate system setting Spindle speed setting (G50)	
Scaling (G50, G51)	 P_1 to P_4: Programmed shape P_1' to P_4': Scaled chape P0: Scaling center

Tape format	T series	M series
G41.1 ; Normal direction control left G42.1 ; Normal direction control right G40.1 ; Normal direction control cancel		○
$\left\{\begin{matrix}\mathrm{G43}\\\mathrm{G44}\end{matrix}\right\}$ (Z_)H_ ; Tool length compensation A $\left\{\begin{matrix}\mathrm{G17}\\\mathrm{G18}\\\mathrm{G19}\end{matrix}\right\}\left\{\begin{matrix}\mathrm{G43}\\\mathrm{G44}\end{matrix}\right\}\left\{\begin{matrix}X\_\\Y\_\\Z\_\end{matrix}\right\}$; Tool length compensation B $\left\{\begin{matrix}\mathrm{G43}\\\mathrm{G44}\end{matrix}\right\}$ α_H_ ; Tool length compensation C H: Offset number (H00 to H999) α : Arbitrary one axis G49 ; Tool length compensation cancel		○
$\left\{\begin{matrix}\text{G45 (increase)}\\\text{G46 (decrease)}\\\text{G47 (double increase)}\\\text{G48 (double decrease)}\end{matrix}\right\}\left\{\begin{matrix}X\_\\Y\_\\Z\_\end{matrix}\right\}$ D_{xx};		○
G50X_Z_ ; Coordinate system setting G50S_ ; Spindle speed setting	○	
G51X_Y_Z_P_ (or I_J_K_) ; G50 ; Cancel X, Y, Z: Scaling center P: Magnification (I, J, and K are the scaling magnifications for the X-, Y-, and Z-axes respectively.)		○

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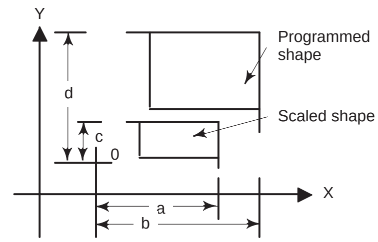
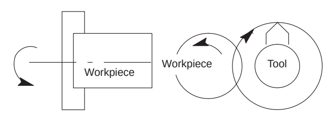
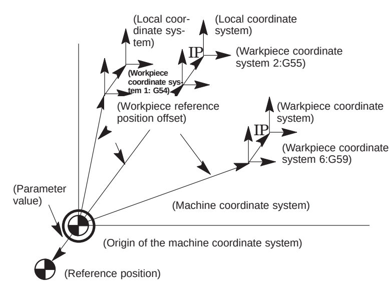
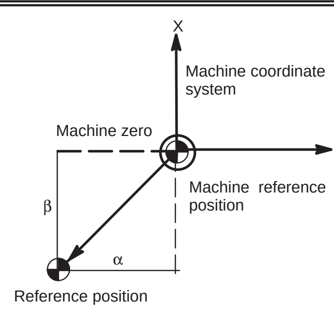
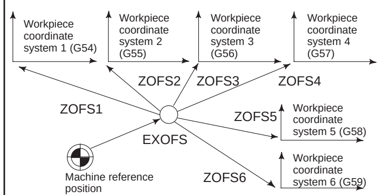
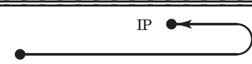
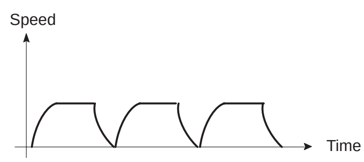
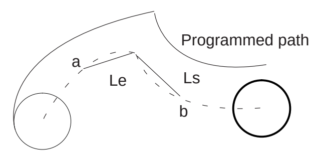
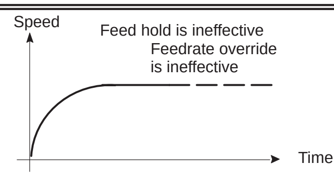
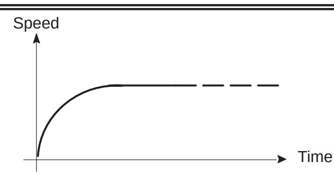
<table>
<tr><th>Function</th><th>Explanation</th></tr>
<tr><td>Programmable
mirror image
(G50.1, G51.1)</td><td>a/b : X–axis scaling magnification
c/d : Y–axis scaling magnification
0 : Scaling center

</td></tr>
<tr><td>Polygon turning
(G51.2, G50.2)</td><td>
</td></tr>
<tr><td>Local coordinate system
setting
(G52)</td><td>
</td></tr>
<tr><td>Machine coordinate
system setting
(G53)</td><td>
</td></tr>
</table>

Tape format	T series	M series
G51.1 IP_ ; G50.1 ; Cancel		○
G51.2P_Q_ ; Polygon turning G50.2 ; Polygon turning cancel P, Q: Rotation ratio of spindle and workpiece	○	
G52 IP _; Local coordinate system setting G52P0 ; Local coordinate system cancel	○	○
G53 IP_ ;	○	○

Function	Explanation
Work coordinate system 1 to 6 selection (G54 to G59)	 EXOFS: External workpiece zero point offset ZOFS1 to ZOFS6: Reference position offset for workpiece coordinate system 1 to 6
Additional work coordinate system selection (G54.1)	(Example) G54.1P12 ; Selecting additional work coordinate system 12
Single direction positioning (G60)	
Exact stop mode (G61)	
Automatic corner override (G62	 Override is applied from a to b
Tapping mode (G63)	
Cutting mode (G64)	

Tape format	T series	M series
G54 IP_ ; Work coordinate system 1 selection G55 IP_ ; Work coordinate system 2 selection G56 IP_ ; Work coordinate system 3 selection G57 IP_ ; Work coordinate system 4 selection G58 IP_ ; Work coordinate system 5 selection G59 IP_ ; Work coordinate system 6 selection	○	○
G54.1 Pn; (n=1 to 300)		○
G60 IP_ ;		○
G61 ;		○
G62 ;		○
G63 ;		○
G64 ;		○

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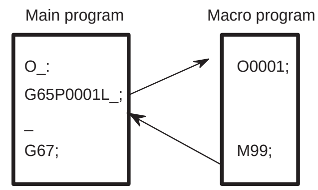
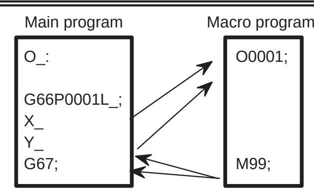
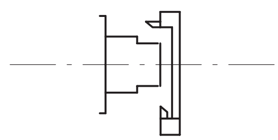
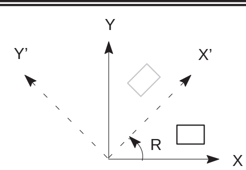
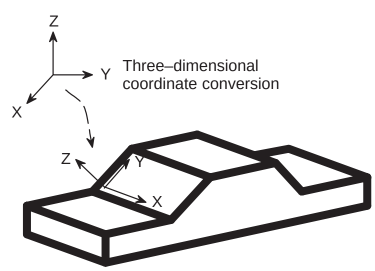
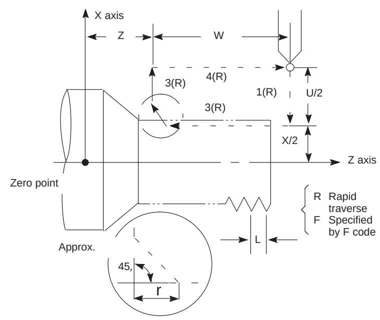
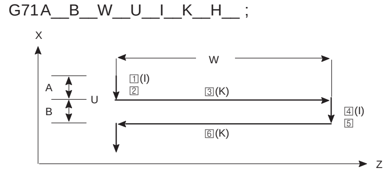
Function	Explanation
Macro call (G65)	
Macro modal call (G66, G67)	
Mirror image for double turrets (G68, G69) (Only when two-path control)	
Coordinate rotation (G68, G69) (G68.1, G69.1 in the case of T series)	
Three-dimentional coordinate conversion (G68, G69)	Coordinate conversion about an axis can be carried out if the center of rotation, direction of the axis of rotation, and angular displacement are specified. 

Tape format	T series	M series
G65 P_L_ ; P: Program number L: Repetition count (1 to 9999)	○	○
G66 P_L_ ; G67; Cancel P: Program number L: Repetition count (1 to 9999)	○	○
G68 ; Mirror image for double turrets G69 ; Mirror image cancel	○	
$\left\{\begin{matrix} G17 \\ G18 \\ G19 \end{matrix}\right\}$ G68 (G68.1) α_β_R_ ; G69 ; (G69.1) α, β: 2 axes corresponding to G17, G18, G19 R: Rotation angle	○	○
G68 Xp$\underline{x_1}$ Yp$\underline{y_1}$ Zp$\underline{z_1}$ I$\underline{i_1}$ J$\underline{j_1}$ K$\underline{k_1}$ R$\underline{\alpha}$; Starting tree–dimensional coordinate conversion • • Three–dimensional coordinate conversion mode • • G69 ; Canceling three–dimensional coordinate conversion Xp, Yp, Zp: Center of rotation (absolute coordinates) on the X, Y, and Z axis or parallel axes I, J, K : Direction of the axis of rotation R : Angular displacement		○

Function	Explanation
Figure copy (G72.1, G72.2)	Machining can be repeated after moving or rotating the figure using a subprogram.

Tape format	T series	M series
Rotational copy		○
Xp-Yp plane (specified by G17):		
G72.1 P_L_Xp_Yp_R_;		
Zp-Xp plane (specified by G18):		
G72.1 P_L_Zp_Xp_R_;		
Yp-Zp plane (specified by G19):		
G72.1 P_L_Yp_Zp_R_;		
P : Subprogram number		
L : Number of times the operation is repeated		
Xp : Center of rotation on the Xp axis (Xp: X-axis or an axis parallel to the X-axis)		
Yp : Center of rotation on the Yp axis (Yp; Y-axis or an axis parallel to the Y-axis)		
Zp : Center of rotation on the Zp axis (Zp: Z-axis or an axis parallel to the Z-axis)		
R : Angular displacement (A positive value indicates a counterclockwise angular displacement. Specify an incremental value.)		
Linear copy		
Xp-Yp plane (specified by G17):		
G72.2 P_L_I_J_;		
Zp-Xp plane (specified by G18):		
G72.2 P_L_K_I_;		
Yp-Zp plane (specified by G19):		
G72.2 P_L_J_K_;		
P : Subprogram number		
L : Number of times the operation is repeated		
I : Shift along the Xp axis		
J : Shift along the Yp axis		
K : Shift along the Zp axis		

Function	Explanation
Canned cycle for lathes (G70 to G76) (G90, G92, G94)	Canned cycle G90: Outer diameter/internal diameter cutting cycle G92: Thread cutting cycle G94: End face turning cycle Multiple repetitive cycle G70: Finishing G71: Stock removal in turning G72: Stock removal in facing G73: Pattern repeating G74: End face peck drilling cycle G75: Outer diameter/internal diameter drilling cycle G76: Multiple thread cutting cycle (Example) G92  Detailed chamfered thread (The chamfered angle in the left figure is 45 degrees or less because of the delay in the servo system.)
Canned cycle for grinding (G71 – G74)	G71: Traverse grinding cycle G72: Traverse direct fixed-dimension grinding cycle G73: Oscillation grinding cycle G74: Oscillation direct fixed-dimention grinding cycle (Example) G71 G71A__B__W__U__I__K__H__ ;  A: First depth of cut B: Second depth of cut W: Grinding range U: Dwell time Maximum specification time: 99999.999 seconds I: Feedrate of A and B K: Feedrate of W H: Number of repetitions Setting value: 1 to 9999

Tape format	T series	M series
G70 P_Q_ ; G71 U_R_ ; G71 P_Q_U_W_F_S_T_ ; G72 W_ R_ ; G72 P_Q_U_W_F_S_T_ ; G73 W_ R_ ; G73 P_Q_U_W_F_S_T_ ; G74 R_ ; G74 X(u)_Z(w)_P_Q_R_F_ ; G75 R_ ; G75 X(u)_Z(w)_P_Q_R_F_ ; G76 R_ ; G76 X(u)_Z(w)_P_Q_R_F_ ; $\left\{\begin{matrix}\text{G90}\\ \text{G92}\end{matrix}\right\}$ X_Z_I_F_ ; G94 X_Z_I_F_;	○	
G71 A__B__W__U__I__K__H__ ; G72 P__A__B__W__U__I__K__H__ ; G73 A__(B__)W__U__I__K__H__ ; G74 P__A__(B__)W__U__I__K__H__ ;	○	

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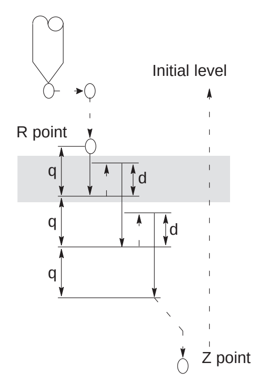
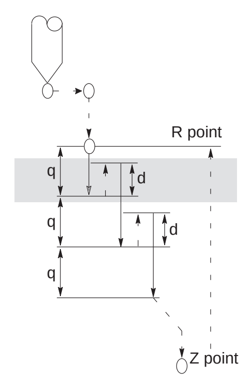
Function	Explanation
Canned cycle (G73, G74, G80 to G89)	G73: High-speed peck drilling cycle G74: Left-hand tapping cycle G76: Fine boring cycle G80: Cancel G81: Drilling cycle, spot drilling cycle G82: Drilling cycle, counter boring cycle G83: Peck drilling cycle G84: Tapping cycle G85: Boring cycle G86: Boring cycle G87: Back boring cycle G88: Boring cycle G89: Boring cycle

Example

G73 (G98)



G73 (G99)

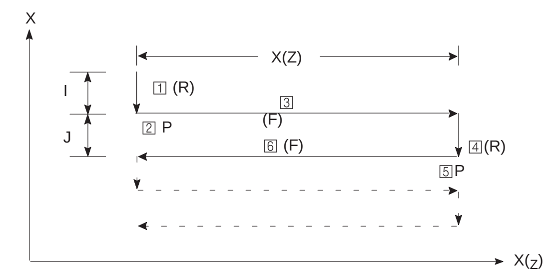


Tape format	T series	M series
G73 X__Y__Z__P__Q__R__F__K__ ; G74 X__Y__Z__P__Q__R__F__K__ ; G76 X__Y__Z__P__Q__R__F__K__ ; G81 X__Y__Z__P__Q__R__F__K__ ; G82 X__Y__Z__P__Q__R__F__K__ ; G83 X__Y__Z__P__Q__R__F__K__ ; G84 X__Y__Z__P__Q__R__F__K__ ; G85 X__Y__Z__P__Q__R__F__K__ ; G86 X__Y__Z__P__Q__R__F__K__ ; G87 X__Y__Z__P__Q__R__F__K__ ; G88 X__Y__Z__P__Q__R__F__K__ ; G89 X__Y__Z__P__Q__R__F__K__ ; G80 ; Cancel G□□ X__Y__Z__R__Q__P__F__K__ ; Number of repeat Hole position data Drilling data Drilling mode		○

Item	Address	Explanation
Drilling mode	G□□	G73, G74, G76, G80 to G89
Hole position data	X, Y	Specifies the hole position by an incremental or absolute value.
Drilling data	Z	Specifies the distance from point R to the bottom of the hole.
Drilling data	R	Specifies the distance from the initial level to point R.
Drilling data	Q	Specifies each cut-in value with G73 and G83 or the shift value with G76 and G87. (Always specified with an incremental value.)
Drilling data	P	Specifies the dwell time at the bottom of the hole.
Drilling data	F	Specifies the feed rate.
Number of repeats	K	Specifies the number of repeats for a series of operation 1 to 6.

Function	Explanation
Canned grinding cycle (G75, G77, G78, G79)	G75: Plunge grinding cycle G77: Direct constant-dimension plunge grinding cycle G78: Continuous-feed surface grinding cycle G79: Intermittent-feed surface grinding cycle

(Example)



G75 I_J_K_X (Z)_R_F_P_L_ ;

I: Depth-of-cut 1 (A sign in the command specifies the direction of cutting.)

J: Depth-of-cut 2 (A sign in the command specifies the direction of cutting.)

K: Total depth of cut

X (Z): Range of grinding
(A sign in the command specifies the direction of grinding.)

R: Feedrate for I and J

F: Feedrate for X (Z)

P: Dwell time

L: Grinding-wheel wear compensation (Note 1)

Tape format	T series	M series
G75 I_J_K_X (Z)_R_F_P_L_ ; G77 I_J_K_X (Z)_R_F_P_L_ ; G78 I_J_K_X (Z)_R_F_P_L_ ; G79 I_J_K_X (Z)_R_F_P_L_ ;		○

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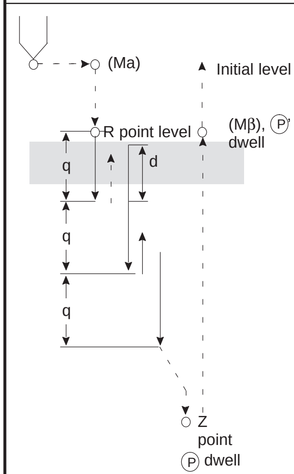
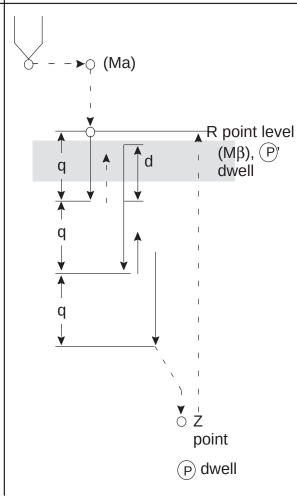
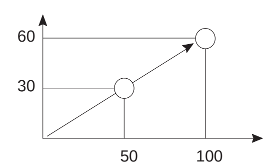
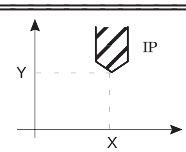
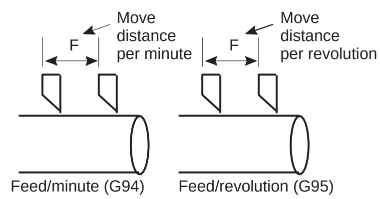
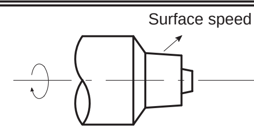
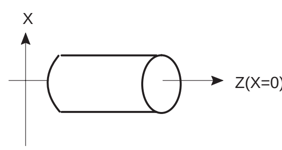
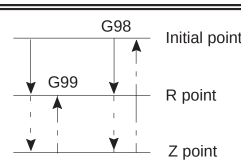
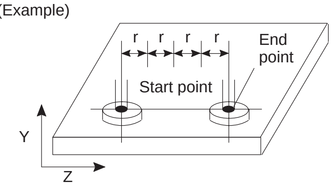
<table>
<tr><th>Function</th><th colspan="2">Explanation</th></tr>
<tr><td>Canned cycle for drilling
(G80 to G89)</td><td colspan="2">G83: Front drilling cycle
G84: Front tapping cycle
G85: Front boring cycle
G87: Side drilling cycle
G88: Side tapping cycle
G89: Side boring cycle
G80: Drilling cycle cancel</td></tr>
<tr><td colspan="3">Example</td></tr>
<tr><td colspan="2">G83 (G87) (G99 mode)</td><td>G83 (G87) (G98 mode)</td></tr>
<tr><td colspan="2">
</td><td>
</td></tr>
<tr><td>Absolute/Incremental command
(G90/G91)</td><td colspan="2">(Example)


Absolute command G90X100Y60;
Incremental command G91X50Y30;</td></tr>
<tr><td>Change of workpiece coordinate system
(G92)</td><td colspan="2">
</td></tr>
</table>

Tape format	T series	M series
G83 X(Z)_C_Z(X)_R_Q_P_F_K_(M_) ; G84 X(Z)_C_Z(X)_R_Q_P_F_K_(M_) ; G86 X(Z)_C_Z(X)_R_Q_P_F_K_(M_) ; G87 X(Z)_C_Z(X)_R_Q_P_F_K_(M_) ; G88 X(Z)_C_Z(X)_R_Q_P_F_K_(M_) ; G89 X(Z)_C_Z(X)_R_Q_P_F_K_(M_) ; G80 ; Cancel G□□ X(Z)_C_Z(X)_R_Q_P_F_K_(M□□) ; Number of repeat Hole position data Drilling data Drilling mode	○	

Designation	Address	Description
Drilling mode	G□□	G80, G83, G84, G86, G87, G88, G89
Hole position	X/U(Z/W)C/H	Specifies the hole position by an incremental or absolute value.
Drilling data	Z(X)	Specifies the distance from point R to the bottom of the hole.
	R	Specifies the distance from the initial level to point R level.
	Q	Specifies each cut-in value with G83 (G87). This value is always specified with an incremental value to specify radius.
	P	Specifies the dwell time at the bottom of the hole.
	F	Specifies the feedrate.
Number of repeats	K	Specifies the number of repeats for a series of operations.
M code of C-axis clamp	M□□	M-code (specified by a parameter) of C-axis clamp.

Tape format	T series	M series
G90_; Absolute command G91_; Incremental command G90_G91_; Change of workpiece coordinate system	○	○
G92IP_ ;		○

Function	Explanation
Workpiece coordinate system preset (G92.1)	The workpiece coordinate system preset function presets a workpiece coordinate system shifted by manual intervention to the pre-shift workpiece coordinate system. The latter system is displaced from the machine zero point by a workpiece zero point offset value.
Feed/minute, Feed/revolution (G94, G95)	
Constant surface speed control (G96, G97)	
Constant surface speed control (G96, G97)	
Initial point return/ R point return (G98, G99)	
Infeed control (G160, G161)	(Example) 

Tape format	T series	M series
G92.1 IP 0; P0 ; Specifies axis addresses subject to the workpiece coordinate system preset operation. Axes that are not specified are not subject to the preset operation.	○	○
G94 · · · · · F_ ; G95 · · · · · F_ ;	○	○
G96 Ss ; G97 ; Cancel s: Surface speed (m/min or feet/min)	○	
G96 Ss Pα ; G97 ; Cancel α: 1 to 8 (X axis, Y axis, Z axis, 4th axis to 8th axis) s: Surface speed (m/min or feet/min)		○
G98_ ; G99_ ;	○	○
G161 Rr ; G160 ; Cancel r: Cut in depth		○

5.1 Types of Variables

Type of variable	Variable number
Local variable	#1 – #33
Common variable	#100 – #149 #500 – #531
Additional common variable (Note 1)	#100 – #199 #500 – #999
System variable (Note 2)	#1000 – #19099

NOTE1 Common variables #150 to #199 and #532 to #999 can be added. Part program length reduces by 8.5 m.

NOTE2 Details are shown in 5.2.

5.2 System Variable

Variable number	Contents	Purpose	Series
#1000–#1015	Corresponds to UI000 to UI015	Interface input signal	T/M
#1032	Unified input of UI000 to UO015		
#1100–#1115	Corresponds to UO000 to UO015	Interface output signal	T/M
#1132	Unified output of UO000 to UO015		
#1133	Unified output of UO100 to UO131		
#2001–#2064	Wear offset value (Offset No. 1–64)	X axis offset	T
#2701–#2749	Geometry offset value (Offset No. 1–49)		
#10001–#10099	Wear offset value (Offset No. 1–99)		
#15001–#15099	Geometry offset value (Offset No. 1–99)		
#2101–#2164	Wear offset value (Offset No. 1–64)	Z axis offset	T
#2801–#2849	Geometry offset value (Offset No. 1–49)		
#11001–#11099	Wear offset value (Offset No. 1–99)		
#16001–#16099	Geometry offset value (Offset No. 1–99)		
#2201–#2264	Wear offset value (Offset No. 1–64)	Tool nose radius compensation	T
#2901–#2969	Geometry offset value (Offset No. 1–64)		
#12001–#12099	Wear offset value (Offset No. 1–99)		
#17001–#17099	Geometry offset value (Offset No. 1–99)		

Variable number	Contents	Purpose	Series
#2301–#2364	Wear offset value (Offset No. 1–64)	Imaginary tool tip position	T
#2301–#2364	Geometry offset value (Offset No. 1–64)		
#13001–#13099	Wear offset value (Offset No. 1–99)		
#13001–#13099	Geometry offset value (Offset No. 1–99)		
#2401–#2449	Wear offset value (Offset No. 1–49)	Y axis offset	T
#2451–#2499	Geometry offset value (Offset No. 1–49)		
#14001–#14099	Wear offset value (Offset No. 1–99)		
#19001–#19099	Geometry offset value (Offset No. 1–99)		
#2001–#2200	Tool compensation (offset no. 1–200)	Tool compensation (offset memory A)	M
#10001–#10999	Tool compensation (offset no. 1–999)		
#2001–#2200	Wear offset value (offset no. 1–200)	Tool compensation (offset memory B)	M
#2201–#2400	Geometry offset value (offset no. 1–200)		
#10001–#10999	Wear offset value (offset no. 1–999)		
#11001–#11999	Geometry offset value (offset no. 1–999)		
#2001–#2200	Wear offset of H code (offset no. 1–200)	Tool compensation (offset memory C)	M
#2201–#2400	Geometry offset of H code (offset no. 1–200)		
#10001–#10400	Wear offset of H code (offset no. 1–999)		
#11001–#11999	Geometry offset of H code (offset no. 1–999)		
#12001–#12999	Wear offset of D code (offset no. 1–999)		
#13001–#13999	Geometry offset of D code (offset no. 1–999)		
#3000		Alarm	T/M
#3001	Clock 1 (unit: 1ms)	Clock	T/M
#3002	Clock 2 (unit: 1 hour)		
#3003		Control of single block stop, wait signal for FIN	T/M
#3004		Control of feed-hold, feedrate override, exact stop check	T/M
#3005		Setting	T/M
#3007	Mirror image check signal	Status of mikrror image	T/M

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Variable number	Contents	Purpose	Series
#3011	Year, month, day	Clock	T/M
#3012	Hour, minute, second		
#3901	No. of parts machined	No. of parts	T/M
#3902	No. of parts required		
#4001–#4022	G code (group 01–22)	Modal information	T/M
#4102	B code		
#4107	D code		
#4109	F code		
#4111	H code		
#4113	M code		
#4114	Sequence number		
#4115	Program number		
#4119	S code		
#4120	T code		
#4130	P code		
#5001–#5008	1st axis block end position to 8th axis block end position	Block end position (Work-piece coordinate)	T/M
#5021–#5028	1st axis current position to 8th axis current position	Machine coordinate	T/M
#5041–#5048	1st axis current position to 8th axis current position	Workpiece coordinate	T/M
#5061–#5068	1st axis skip signal position to 8th axis skip signal position	Skip signal position (Workpiece coordinate)	T/M
#5081–#5088	1st axis tool offset value to 8th axis tool offset value	Tool offset value	T/M
#5101–#5108	1st axis servo position deviation to 8th axis servo position deviation	Servo position deviation	T/M
#2500 #2600 #2700 #2800	External workpiece zero point offset value	1st axis 2nd axis 3rd axis 4th axis	M
#2501 #2601 #2701 #2801	G54 workpiece zero point offset value	1st axis 2nd axis 3rd axis 4th axis	M
#2502 #2602 #2702 #2802	G55 workpiece zero point offset value	1st axis 2nd axis 3rd axis 4th axis	M
#2503 #2603 #2703 #2803	G56 workpiece zero point offset value	1st axis 2nd axis 3rd axis 4th axis	M

Variable number	Contents	Purpose	Series
#2504 #2604 #2704 #2804	G57 workpiece zero point offset value	1st axis 2nd axis 3rd axis 4th axis	M
#2505 #2605 #2705 #2805	G58 workpiece zero point offset value	1st axis 2nd axis 3rd axis 4th axis	M
#2506 #2606 #2706 #2806	G59 workpiece zero point offset value	1st axis 2nd axis 3rd axis 4th axis	M
#5201–#5208	External workpiece zero point offset value	1st axis to 8th axis	T/M
#5221–#5228	G54 workpiece zero point offset value	1st axis to 8th axis	T/M
#5241–#5248	G55 workpiece zero point offset value	1st axis to 8th axis	T/M
#5261–#5268	G56 workpiece zero point offset value	1st axis to 8th axis	T/M
#5281–#5288	G57 workpiece zero point offset value	1st axis to 8th axis	T/M
#5301–#5308	G58 workpiece zero point offset value	1st axis to 8th axis	T/M
#5321–#5328	G59 workpiece zero point offset value	1st axis to 8th axis	T/M
#7001–#7008	G54.1 P1 workpiece zero point offset value	1st axis to 8th axis	M
#7021–#7028	G54.1 P2 workpiece zero point offset value	1st axis to 8th axis	M
:	:		
#7941–#7948	G54.1 P48 workpiece zero point offset value	1st axis to 8th axis	M
#14001–#14008	G54.1 P1 workpiece zero point offset value	1st axis to 8th axis	M
#14021–#14028	G54.1 P2 workpiece zero point offset value	1st axis to 8th axis	M
:	:		
#19980–#19988	G54.1 P48 workpiece zero point offset value	1st axis to 8th axis	M

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5.3 Argument Assignment I/II

Correspondence Table between Argument Assignment I Addresses and Macro Variables

Argument Assignment I Addresses	Macro Variables
A	#1
B	#2
C	#3
D	#7
E	#8
F	#9
H	#11
I	#4
J	#5
K	#6
M	#13
Q	#17
R	#18
S	#19
T	#20
U	#21
V	#22
W	#23
X	#24
Y	#25
Z	#26

Correspondence Table between Argument Assignment II Addresses and Macro Variables

Argument Assignment II Addresses	Macro Variables
A	#1
B	#2
C	#3
I_1	#4
J_1	#5
K_1	#6
I_2	#7
J_2	#8
K_2	#9
I_3	#10
J_3	#11
K_3	#12
I_4	#13
J_4	#14
K_4	#15
I_5	#16
J_5	#17
K_5	#18
I_6	#19
J_6	#20
K_6	#21
I_7	#22
J_7	#23
K_7	#24
I_8	#25
J_8	#26
K_8	#27
I_9	#28
J_9	#29
K_9	#30
I_{10}	#31
J_{10}	#32
K_{10}	#33

5.4 Arithmetic Commands

Purpose	Expression	Contents
Definition and substitution of variables	#i=#j	Definition, substitution
Addition arithmetic	#i=#j+#k	Sum
	#i=#j – #k	Subtraction
	#i=#jOR#k	Logical sum (at every bit of 32 bits)
	#i=#jXOR#k	Exclusive OR (at every bit of 32 bits)
Multiplication arithmetic	#i=#j*#k	Product
	#i=#j/#k	Quotient
	#i=#jAND#k	Logical product (at every bit of 32 bits)
Functions	#i=SIN [#j]	Sine (degree unit)
	#i=ASIN [#j]	Arcsine (degree unit)
	#i=COS [#j]	Cosine (degree unit)
	#i=ACOS [#j]	Arccosine (degree unit)
	#i=TAN [#j]	Tangent (degree unit)
	#i=ATAN [#j]/[#k]	Arctangent (degree unit)
	#i=SQRT [#j]	Square root
	#i=ABS [#j]	Absolute value
	#i=BIN [#j]	Conversion from BCD to BIN
	#i=BCD [#j]	Conversion from BIN to BCD
	#i=ROUND [#j]	Rounding off
	#i=FIX [#j]	Discard fractions less than 1
	#i=FUP [#j]	Add 1 for fractions less than 1
	#i=LN [#j]	Logarithm
	#i=EXP [#j]	Index
Combination of arithmetic operations	–	The above arithmetic operations and functions can be combined. The order of priority in an arithmetic operation is function, multiplication arithmetic then addition arithmetic.

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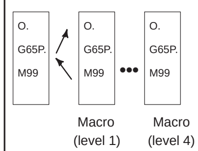
5.5 Control Command

Purpose	Expression	Kind of operation
Conditional branch	IF [<conditional expression>] GOTO n Branch to sequence number n.	#j EQ #k (=)
		#j NE #k (≠)
Conditional execution	IF [<conditional expression>] THEN st Execute macro statement st.	#j GT #k (>)
		#j LT #k (<)
		#j GE #k (≧)
		#j LE #k (≦)
Iteration	WHILE [<conditional expres-sion>] DO m (m = 1, 2, 3) If omitted conditional expression, blocks from DO m to END m are executed eternally.	#j EQ #k (=)
		#j NE #k (≠)
		#j GT #k (>)
		#j LT #k (<)
		#j GE #k (≧)
		#j LE #k (≦)

5.6 Macro Call

Name	Format	Program No.	Parame-ter No.	Remarks
Simple call	G65P (program number) L (repetition count) <argument assignment>			Refer to 5.3 for argument assignment.
Modal call	G66P (program number) L (repetition count) <argument assignment>			
Macro call by G code	Gxx <argument assignment> Max. 10 G codes from G01–G64 and G68–G9999	9010 to 9019	6050 to 6059	Refer to 5.3 for argument assignment. Set G or M code that calls a pro-gram specified in the parameter.
Macro call by M code	Mxx <argument assignment> Max. 10 M codes from M006 to M99999999	9020 to 9029	6080 to 6089	
Sub-pro-gram call by M code	Mxx ; Mxx ; Max. 9 M codes from M006–M99999999	9001 to 9009	6071 to 6079	Displayed on pro-gram check screen but no MF nor M code is sent. Set an M code that calls a sub-pro-gram specified by the parameter.

Name	Format	Program No.	Parameter No.	Remarks
Sub-program call by T code	Tt ;	P9000 (Sub-program)	6001#5 TCS	Calls sub-program P9000. T code t is stored in common variable #149 as an argument.
Multiplex call	Main program 			Can be called up to 4 loops including simple call and modal call.

5.7 Command Range

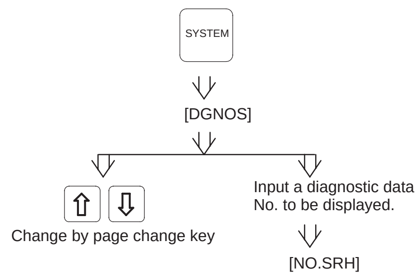
Item	Contents	
Variables	Local variable:	#1–#33
	Common variable:	#100–#149, #500–#531
	Additional common variable:	#100–#199, #500–#999
	System variable:	#1000–#19099
Value of variables	Maximum value	$\pm 10^{47}$
	Minimum value	$\pm 10^{-29}$
Constant in expression	Maximum value	±99999999
	Minimum value	±0.0000001
	Decimal point possible	
Arithmetic precision	Decimal 8 digits	
Macro call duplex	Max. 4 loops	
Iteration classification no.	1 to 3	
Nesting	Max. 5 loops	
Nesting of subprograms	Max. 4 loops (8 loops including macro calls)	

6. STATUS DISPLAY BY SELF–DIAGNOSTIC DISPLAY

6.1 Displaying CNC Internal State

6.1.1 Procedure for displaying diagnostic screen

Display the CNC internal state as below:



6.1.2 Display of status in which command is not apparently executed (No. 000 – 015)

No.	Display	Internal status when 1 is displayed
000	WATING FOR FIN SIGNAL	M, S, T function is being executed
001	MOTION	Move command in automatic operation is being executed
002	DWELL	Dwell is being executed
003	IN–POSITION CHECK	In-position check is being performed
004	FEEDRATE OVER-RIDE 0%	Override 0%
005	INTERLOCK/ START–LOCK	Interlock is on.
006	SPINDLE SPEED ARRIVAL CHECK	Waiting for spindle speed arrival signal to turn on
010	PUNCHING	Data is being output via reader puncher inter-face
011	READING	Data is being input via reader puncher interface
012	WAITING FOR (UN)CLAMP	Waiting for index table clamp/unclamp before B axis index table indexing start/after B axis index table indexing end to complete
013	JOG FEEDRATE OVERRIDE 0%	Jog override 0%
014	WAITING FOR RE-SET, ESP, RRW OFF	One of the emergency stop, external reset, re-set & rewind or MDI panel reset key is on.
015	EXTERNAL PRO-GRAM NUMBER SEARCH	External program number search is active.
016	BACKGROUND ACTIVE	Background is being used.

6.1.3 Information indicating automatic operation stop, automatic idle statuses (No. 020 – 025)

No.	Display	Internal status when 1 is displayed
020	CUT SPEED UP/ DOWN	Set when emergency stop turns on or when servo alarm occurs
021	RESET BUTTON ON	Set when reset key turns on
022	RESET AND REWIND ON	Reset and rewind turned on
023	EMERGENCY STOP ON	Set when emergency stop turns on
024	RESET ON	Set when external reset, emergency stop, reset or reset & rewind key is on.
025	STOP MOTION OR DWELL	A flag which stops pulse distribution. It is set to 1 in the following cases. (1) External reset is set to on. (2) Reset & rewind is set to on. (3) Emergency stop is set to on. (4) Feed hold is set to on. (5) The MDI panel reset key turned on. (6) Switched to the manual mode (JOG/HANDLE/INC). (7) Other alarm occurred. (There is also an alarm which is not set.)

Causes for cycle start LED turned off

020	CUT SPEED UP/DOWN	1	0	0	0	1	0	0
021	RESET BUTTON ON	0	0	1	0	0	0	0
022	RESET AND REWIND ON	0	0	0	1	0	0	0
023	EMERGENCY STOP ON	1	0	0	0	0	0	0
024	RESET ON	1	1	1	1	0	0	0
025	STOP MOTION OR DWELL	1	1	1	1	1	1	0

Emergency stop signal input
External reset signal input
MDI reset button turned on
Reset & rewind input
Servo alarm generation
Changed to another mode or feed hold
Single block stop

6.1.4 TH alarm statuses (No. 030, 031)

No.	Display	Internal status when 1 is displayed
030	CHARACTER NUMBER TH DATA	The position of the character which turned TH alarm on is displayed in the number of characters from the beginning of the block at TH alarm.
031	TH DATA	Read code of character which turned TH alarm on

6.1.5 Digital servo system alarm (No. 200, 201)

Diagnostic display of the detailed content of digital servo system alarm No. 414

No.	#7	#6	#5	#4	#3	#2	#1	#0
200	OVL	LV	OVC	HCA	HVA	DCA	FBA	OFA

OFA : Overflow alarm has occurred.

FBA : Wire breakage alarm has occurred. (See No. 201.)

DCA : Regenerative discharge circuit alarm has occurred.

HVA : Overvoltage alarm has occurred.

HCA : Abnormal current alarm has occurred.

OVC : Overcurrent alarm has occurred.

LV : Undervoltage alarm has occurred.

OVL : Overload alarm has occurred. (See No. 201.)

The detailed content of wire breakage alarm, overload alarm is displayed.

No.	#7	#6	#5	#4	#3	#2	#1	#0
201	ALD			EXP				

When No. 200 OVL = 1:

ALD 1: Motor overheat

0: Amplifier overheat

When No. 200 FBA = 1:

ALD	EXP	Detail of alarm
1	0	Built-in pulse coder wire breakage (hard)
1	1	Separately installed pulse coder wire breakage (hard)
0	0	Pulse coder wire breakage (soft)

6.1.6 Serial pulse coder alarm (No. 202, 203)

Diagnostic display of the detailed content of serial pulse coder alarm No. 350 (pulse coder alarm).

No.	#7	#6	#5	#4	#3	#2	#1	#0
202		CSA	BLA	PHA	RCA	BZA	CKA	SPHA

SPHA : Soft phase data trouble alarm has occurred.

CKA : Clock alarm has occurred.

BZA : Battery zero alarm has occurred.

RCA : Speed count trouble alarm has occurred.

PHA : Phase data trouble alarm has occurred.

BLA : Battery low alarm has occurred.

CSA : Check sum alarm has occurred.

Diagnostic display of the detailed content of serial pulse coder alarm No. 351 (communication alarm).

No.	#7	#6	#5	#4	#3	#2	#1	#0
203	DTE	CRCE	STBE	PRMA				

DTE : Data error has occurred.

CRC : CRC error has occurred.

STBE : Stop bit error has occurred.

PRMA : The parameter illegal alarm has been given.

Servo parameter illegal alarm No. 417 is also displayed.

No.	#7	#6	#5	#4	#3	#2	#1	#0
204		OFS	MCC	LDA	PMS			

OFS : A/D conversion of a digital servo current value is abnormal.

MCC : The contact of the servo amplifier's magnetic contactor has melted.

LDA : The LED of the serial pulse coder is abnormal.

PMS : A feedback error occurred.

No.	#7	#6	#5	#4	#3	#2	#1	#0
280		AXS		DIR	PLS	PLC		MOT

When servo alarm No. 417 is detected by the NC, the cause of the alarm is indicated. When the same alarm is detected by the servo system, bit 4 (PRM) of DGN No. 0203 is set to 1.

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AXS : In parameter No. 1023 (servo axis number), a value that exceeds the range of 1 to the number of controlled axes (such as 4 instead of 3), or non–sequential value is set.

DIR : In parameter No. 2022, used for specifying the direction of rotation of the motor, a valid value (111 or –111) has not been set.

PLS : In parameter No. 2024, used for specifying the number of position feedback pulses per motor rotation, an invalid value, such as 0 or a negative value, has been set.

PLC : In parameter No. 2023, used for specifying the number of velocity feedback pulses per motor rotation, an invalid value, such as 0 or a negative value, has been set.

MOT : In parameter No. 2020, used for specifying the motor model, an invalid value has been set.

6.1.7 Positional error display (No. 300)

No.	
300	SERVO ERROR

The positional error is displayed in Least command units.

6.1.8 Machine position display (No. 301)

No.	
301	MACHINE POSITION

The machine position from the reference point is displayed in least command units.

6.1.9 Reference position shift function display (No. 302)

No.	
302	DISTANCE FROM DECELERATION DOG TO THE FIRST GRID POINT

The distance from the deceleration dog to the first grid point is displayed on the output unit.

6.1.10 Inductosyn display (No. 380 and No. 381)

No.	
380	DEVIATION BETWEEN MOTOR ABSOLUTE POSITION AND OFFSET DATA

The deviation between the absolute position of the motor and the offset data is displayed. That is, the remainder of (M (absolute motor position) – S (offset data)) / λ (1–pitch interval) is displayed in detection units.

No.	
381	OFFSET DATA OF INDUCTOSYN

Offset data, received by the CNC at the time of macine position calculation, is displayed in detection units.

6.1.11 Spindle data (No. 400–420)

No.	#7	#6	#5	#4	#3	#2	#1	#0
400				SAI	SS2	SSR	POS	SIC

SIC 0: The module required for spindle serial control is not installed.
1: The module required for spindle serial control is installed.

POS 0: The module required for spindle analog control is not installed.
1: The module required for spindle analog control is installed.

SSR 0: Spindle serial control is not used.
1: Spindle serial control is used.

SS2 0: The 2nd spindle is not used in spindle serial control.
1: The 2nd spindle is used in spindle serial control.

SAI 1: Spindle analog control is not used.
0: Spindle analog control is used.

No.	
401	Alarm status of the serial spindle unit for the 1st spindle

No.	
402	Alarm status of the serial spindle unit for the 2nd spindle

Information related to communication errors in the spindle serial output interface

No.	#7	#6	#5	#4	#3	#2	#1	#0
408	SSA		SCA	CME	CER	SNE	FRE	CRE

CRE 1: A CRC error occurred (warning).
FRE 1: A framing error occurred (warning).
SNE 1: The sender/receiver is incorrect.
CER 1: A receiver error occurred.
CME 1: In automatic scanning, no response is returned.
SCA 1: A communication alarm is issued on the spindle amplifier side.
SSA 1: A system alarm is issued on the spindle amplifier side.

(These states represent the causes of spindle alarm No. 749. These states are caused mainly by noise, disconnection, and momentary power failure.)

No.	#7	#6	#5	#4	#3	#2	#1	#0
409					SPE	S2E	S1E	SHE

Refer to this diagnosis when alarm 750 has generated.

SPE In spindle serial control, serial spindle parameters
0: Satisfy start condition of spindle unit
1: Do not satisfy start condition of spindle unit
S2E 0: 2nd spindle started normally in spindle serial control.
1: 2nd spindle did not start normally in spindle serial control.
S1E 0: 1st spindle started normally in spindle serial control.
1: 1st spindle did not start normally in spindle serial control.
SHE 0: Serial communication module is correct on CNC side.
1: An error occurred in serial communication module on CNC side.

No.	
410	Display of the load meter for the 1st spindle (%)

Load meter (load data) of the 1st spindle when the serial spindle is used

No.	
411	Display of the speed meter for the 1st spindle (rpm)

Speed meter (motor speed) of the 1st spindle when the serial spindle is used

No.	
412	Display of the load meter for the 2nd spindle (%)

Load meter (load data) of the 2nd spindle when the serial spindle is used

No.	
413	Display of the speed meter for the 2nd spindle (rpm)

Speed meter (motor speed) of the 2nd spindle when the serial spindle is used

No.	
414	SRLERRS1

Motion error on the 1st spindle during synchronous control

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No.	
415	SRLERRS2

Motion error on the 2nd spindle during synchronous control

No.	
416	SRLSYCERR

Absolute value of the synchronous error between the 1st and the 2nd spindle synchronous control

No.	
417	Data returned by the 1st spindle position coder

Data returned by the 1st spindle position coder

No.	
418	Positional shift of the 1st spindle

Positional shift of the 1st spindle in each mode, including a positional loop

No.	
419	Data returned by the 2nd spindle position coder

Data returned by the 2nd spindle position coder

No.	
420	Positional shift of the 2nd spindle

Positional shift of the 2nd spindle in each mode, including a positional loop

The above four DGN items (No. 417 to 420) directly display the data received from the serial spindle control unit.

6.1.12 Rigid tapping display (No. 450–457)

No.	
450	SPINDLE MOTION ERROR

The position deviation of the spindle during rigid tapping is displayed in detection units.

No.	
451	SPINDLE MOTION PULSE

The number of pulses issued to the spindle during rigid tapping, is displayed in detection units.

No.	
454	TOTAL PULSE OF SPINDLE MOTION

The cumulative number of pulses, issued to the spindle during rigid tapping, is displayed in detection units.

No.	
455	SYNC. PULSE (SUM)

The momentary value (signed, cumulative) of a spindle–converted move command difference during rigid tapping is displayed in detection units.

No.	
456	SYNC. ERROR

The momentary value (signed) of a spindle–converted position deviation difference during rigid tapping is displayed in detection units.

No.	
457	SYNC. WIDTH

The width (maximum value) of a synchronization error during rigid tapping is displayed in detection units.

6.1.13 Polygon synchronization mode status (No. 470–478)

No.	#7	#6	#5	#4	#3	#2	#1	#0
470	SC0	LGE		SCF			PST	SPL

#0(SPL) : Spindle polygon synchronization is in progress.

#1(PST) : Spindle polygon synchronization mode is starting.

#2 : Spindle polygon synchronization mode is being released.

#3 : The spindle speed is being changed in spindle polygon synchronization mode.

#4(SCF) : The spindle speed has been changed in spindle polygon synchronization mode.

#5 : Not used

#6(LGE) : In spindle polygon synchronization mode, the two spindles have different loop gains.

#7(SC0) : In spindle polygon synchronization mode, the specified speed is zero.

This data indicates the cause of P/S alarm 5018 or 218.

No.	#7	#6	#5	#4	#3	#2	#1	#0
471	NPQ	PQE		NSP	SUO	QCL	PCL	

#0 to #3 →Cause of P/S alarm No. 5018
P/S alarm No. 5018 can be cleared by issuing a reset. The cause indication is retained until the cause is removed or until polygon synchronization mode is released.

#4 to #7 →Cause of P/S alarm No. 218
If P/S alarm No. 218 occurs, polygon synchronization mode is released. The cause indication, however, is retained until P/S alarm No. 218 is cleared by issuing a reset.

#0 : The speed specified for spindle polygon synchronization is too low. (The unit speed becomes 0 for internal operations.)

#1(PCL) : The first spindle (master axis in polygon synchronization) is clamped.

#2(QCL) : The second spindle (slave axis in polygon synchronization) is clamped.

#3(SUO) : The speed specified in spindle polygon synchronization is too high. (The speed is restricted to the upper limit for internal operations.)

#4(NSP) : A spindle required for control is not connected. (The serial spindle, second spindle, etc. is not connected.)

#5 : A negative Q value is specified while the QDRC bit (bit 1 of parameter No. 7603) is set to 1.

#6(PQE) : The P value or Q value, specified with G51.2, falls outside the predetermined range. Alternatively, the P and Q values are not specified as a pair.

#7(NPQ) : Although the P and Q values are not specified with G51.2, an R value is specified. Alternatively, none of the P, Q, or R value is specified.

DGN	
474	Rotation ratio of the master axis in spindle polygon synchronization (specified P value)

In spindle polygon synchronization mode, the rotation ratio (specified P value) of the current master axis (first spindle) is displayed.

DGN	
475	Rotation ratio of the slave axis in spindle polygon synchronization (specified Q value)

In spindle polygon synchronization mode, the rotation ratio (specified Q value) of the current slave axis (second axis) is displayed.

DGN	
476	Phase difference between two spindles in spindle polygon synchronization (specified R value)

In spindle polygon synchronization mode, the current phase difference (specified R value) is displayed. (The units are the minimum input increment for the rotation axis of the machine.)

If the RDGN bit (bit 5 of parameter 7603) is set to 1, the shift amount specified for the serial spindle (number of specified pulses, calculated at a rate of 4096 pulses per 360 degrees) is displayed.

This diagnostic data indicates the actual speed of each spindle in synchronization mode.

DGN	
477	Actual speed of the master axis for spindle polygon synchronization (rpm)

In spindle polygon synchronization mode, the actual speed of the master axis (first spindle) is displayed.

DGN	
478	Actual speed of the slave axis in spindle polygon synchronization (rpm)

In spindle polygon synchronization mode, the actual speed of the slave axis (second spindle) is displayed.

6.1.14 Remote buffer protocol A status (No. 500–502)

No.	
500	Displays the transmit command

1 : SYN   5 : SAT
2 : RDY   6 : GTD
3 : RST   7 : RTY
4 : ALM   8 : SDI

No.	
501	Displays the receive command

1 : SYN   5 : CLB   9 : WAT
2 : RDY   6 : SET   10 : RTY
3 : ARS   7 : DAT   11 : RDI
4 : AAL   8 : EOD   12 : SDO

No.	
502	Displays the remote buffer status

0 : Not ready for operation
1 : Reset
2 : Run
3 : Alarm
4 : Line breakage

6

6.1.15 Display lated to MMC–IV (No. 510–513)

DGN	#7	#6	#5	#4	#3	#2	#1	#0
510								

This data indicates the internal MMC–IV information (not available to general users).

DGN	#7	#6	#5	#4	#3	#2	#1	#0
511								

This data indicates the internal MMC–IV information (not available to general users).

DGN	#7	#6	#5	#4	#3	#2	#1	#0
512	PA1	PA0	BNK		THH	THL		PRA

This data indicates the cause of a system alarm that has occurred in MMC–IV.

#0(PRA) 1 : A RAM parity error occurred in shared RAM.
#2(THL) 0 : The temperature of the MMC board is too low.
1 : Normal
#3(THH) 0 : The temperature of the MMC board is too high.
1 : Normal
#4 0 : Normal
1 : An NMI has occurred on the MMC board.
#5(BNK) If bit 0 (PRA) is set to 1,
0 : An alarm occurred in the lower half of shared RAM.
1 : An alarm occurred in the upper half of shared RAM.

#6 (PA0) If bit 0 (PRA) is set to 1,

1 : An alarm occurred at an even–numbered address.

#7 (PA1) If bit 0 (PRA) is set to 1,

1 : An alarm occurred at an odd–numbered address.

DGN	#7	#6	#5	#4	#3	#2	#1	#0
513								

This data indicates the internal MMC–IV information.

#4 For the VIDEO signal,

1 : The CNC/PMC screen is selected.

0 : The MMC screen is selected.

6.1.16 Small–diameter peck drilling cycle display (No. 520–523)

No.	
520	PECKING COUNTER

The total count of the retract movements, performed during cutting after G83 is specified, is displayed. This count is cleared to zero when G83 is next specified.

No.	
521	PECKING BY SKIP SIGNAL

The total count of the retract movements, performed by overload signal reception during cutting after G83 is specified, is displayed. This count is cleared to zero when G83 is next specified.

No.	
522	PECKING POINTER

The coordinates of the drilling axis where a retract movement was started are displayed in units of the least input increment.

No.	
523	(PECK OLD POS – NEW POS)

The difference between the coordinates of the drilling axis where the previous retract movement was started, and the coordinates of the drilling axis where the current retract movement was started, is displayed in units of the least input increment.

6.1.17 Display of ATC for FD alpha (No. 530–531)

No.	#7	#6	#5	#4	#3	#2	#1	#0
530			A99	A98	A97	A96	A95	A43

A43 : An unusable T code is specified with M06T□□.

A95 : M06 is specified when the machine coordinate along the Z–axis is positive.

A96 : Parameter No. 7810 for the current tool number is set to 0.

A97 : In canned cycle mode, M06 is specified.
In a block containing a reference position return command, M06 is specified.
In tool compensation mode, M06 is specified.

A98 : M06 is specified when a reference position return operation has not been performed after the power was turned on or the emergency stop state was released.
During a tool exchange operation, the machine lock signal or Z–axis ignore signal was turned on for the Z–axis.

A99 : During a tool exchange operation, a wrench alarm was detected.

No.	#7	#6	#5	#4	#3	#2	#1	#0
531		585	584	583	582	581	580	502

502 : Excessive pulse distribution to the spindle (system error)

580 : Spindle servo alarm (excessive error in the stop state)

581 : Spindle servo alarm (excessive error during movement)

582 : Spindle servo alarm (excessive drift)

583 : Spindle servo alarm (LSI overflow)

584 : ATC and spindle positioning sequence error (system error)

585 : Spindle servo alarm (excessive error during ATC magazine indexing)

6.1.18 Simplified synchronous control display (No. 540)

No.	
540	SYNC. ERROR

The position deviation difference between the master axis and a synchronized slave axis, is displayed in detection units.

6

6.1.19 Display related to the dual position feedback function (No. 550–553)

No.	
550	Closed loop error

Data is displayed in detection units.

No.	
551	Semi–closed loop error

Data is displayed in detection units.

No.	
552	Error between semi–closed and closed loops

Data is displayed in detection units.

No.	
553	Amount of dual position compensation

Data is displayed in detection units.

6.2 Waveform Diagnosis Display

The purpose of this function is to tune the servo motor easily by graphically displaying the changes in servo motor error, torque and pulse distribution in waveform.

(1) Setting a parameter

1 Set the parameter for wave analysis

	#7	#6	#5	#4	#3	#2	#1	#0
3112								SGD

#0(SGD) 0: Graphic function is effective

*1: Wave analysis is effective
(The usual graphic function cannot be used)

2 Turn off the power once, then on again.

(2) Displaying parameter screen for wave diagnosis.

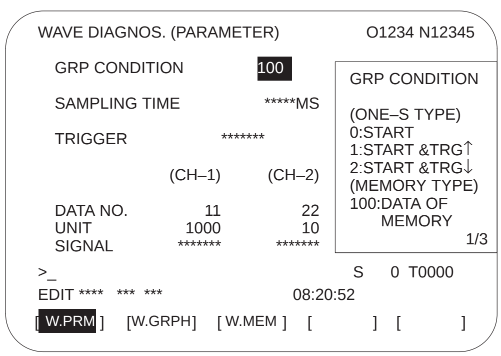
1 Display SYSTEM contents screen by pressing SYSTEM key.

2 Press ▷ key twice to display [W.DGNS] soft key.

3 Display the parameter screen of Waveform diagnoses by pressing [W.DGNS] soft key.

4 Position the cursor and enter the required data. Data can be entered from the keyboard. Press the INPUT key after entering the required data.

5 Those items indicated by ***** cannot be set.
When the cursor is positioned to an item to be set, guidance information for that item is displayed in the box displayed in the right-hand half of the screen. Use the displayed information for reference. When one screen cannot display all the guidance information, press the page change keys (↑ PAGE and PAGE ↓) to display the remaining part of the information.



(a) One-shot type waveform diagnosis (parameter)

Display start condition

0: Starts data collection when the [START] soft key is pressed. Data is collected for a specified sampling period, after which the data is plotted.

1: Starts data collection on a rising edge of a trigger signal after the [START] soft key is pressed. Data is collected for a specified sampling period, after which the data is plotted.

2: Starts data collection on a falling edge of a trigger signal after the [START] soft key is pressed. Data is collected for a specified sampling period, after which the data is plotted.

Sampling period: Sets the period during which data is to be collected.
Setting range: 10 to 32760
Units: 1 ms

Trigger: Sets a PMC address and bit. Set this item when 1 or 2 is specified for the display start condition. This item specifies a trigger for starting data collection.

Example: G0007.2: ST signal

Data number: The table below lists the numbers of data subject to waveform display. A number from 1 to 8 can be entered in the squares (□) of the data numbers below.

Data No.	Description	Units
00	No waveform is displayed.	–
0□	Servo error along the n-th axis (8 ms) (position deviation)	Pulses (detection units)
1□	Number of pulses distributed to the n-th axis (move command)	Pulses (increment system)
2□	Torque value for the n-th axis (actual current)	% (ratio to the maximum current)
3□	Servo error along the n-th axis (2 ms) (position deviation)	Pulses (detection units)
5□	Actual speed along the n-th axis	RPM
6□	Current command for the n-th axis	% (ratio to the maximum current)
7□	Thermal simulation data for the n-th axis	% (OVC alarm ratio)
90	Combined speed along the first, second, and third axes	Pulses (increment system)
99	On/off state of the machine signal specified with a signal address	None
10□	Actual speed of the spindle along the n-th axis	% (ratio to the maximum speed)
11□	Load meter for the spindle on the n-th axis	% (ratio to the maximum power)

Data units : Weighting used when the data subject to analysis is 1. This item is set automatically. Set this item only when different units are to be used.
Setting range: 1 to 1000
Units: 0.001 increments

Signal address: PMC address and bit number. Set this item when the data number 99 is specified. The example given in the trigger item, above, applies.

(b) Memory-type waveform diagnosis (parameter)

Display start condition

100: Plots data sampled in memory type mode.

Sampling time: Not applicable

Trigger: Not applicable

Data number: The table below lists the numbers of data subject to waveform display. A number from 1 to 8 can be entered in the squares (□) of the data numbers below. No number can be set for data that has not been saved.

Data No.	Description	Units
00	No waveform is displayed.	–
0□	Servo error along the n-th axis (8 ms) (position deviation)	Pulses (detection units)
1□	Number of pulses distributed to the n-th axis (move command)	Pulses (increment system)
2□	Torque value for the n-th axis (actual current)	% (ratio to the maximum current)
5□	Actual speed along the n-th axis	RPM
6□	Current command for the n-th axis	% (ratio to the maximum current)
7□	Thermal simulation data for the n-th axis	% (OVC alarm ratio)

Data unit : Weighting used when data subject to analysis is 1. This item is set automatically. Set this item only when different units are to be used.

Setting range: 1 to 1000
Units: 0.001

Signal address: Not applicable

(3) Graphic display

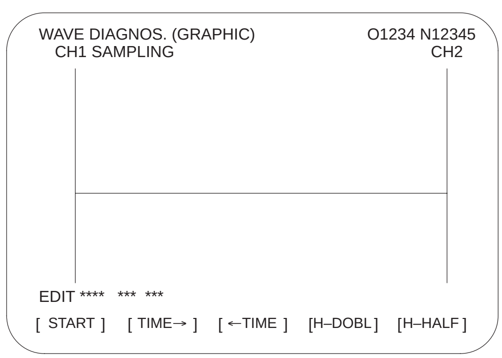
(a) Plotting of one-shot waveform diagnosis data

One-shot waveform diagnosis data is sampled and simultaneously displayed graphically. Unlike memory type data, one-shot waveform diagnosis data is not saved for later output.
The sampling of one-shot waveform diagnosis data is started when the [START] soft key is pressed on the waveform diagnosis (graph) screen and the start condition is satisfied.
After waveform diagnosis data has been collected for the specified sampling period, sampling stops.

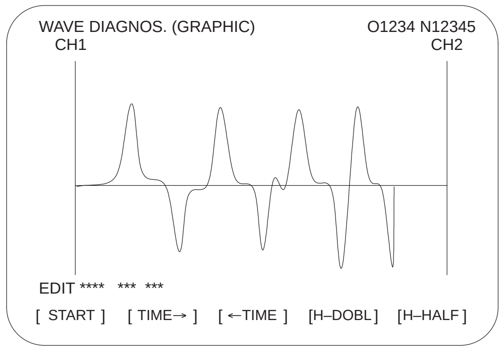
1 Press the SYSTEM function key. When the continuation menu key ▷ is pressed, the [W.DGNS] soft key appears. Then, press the [W.DGNS] soft key to display the waveform diagnosis (parameter) screen. Waveform diagnosis (parameter) setting is explained in an earlier description.

2 Press the [W.GRPH] soft key.

3 The waveform diagnosis (graph) screen appears. The soft keys for operation selection are displayed.



4 Press the [START] soft key.
In the upper part of the screen, the word SAMPLING blinks, indicating that data sampling has started. Upon the completion of data collection, a waveform is displayed automatically.



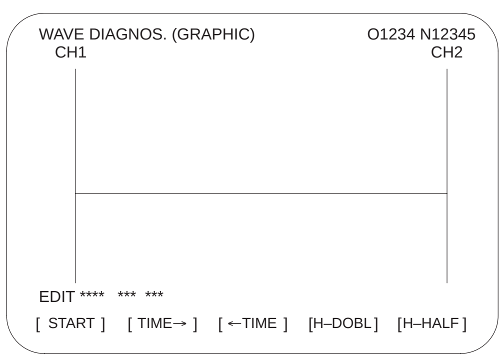
(b) Plotting of memory-type waveform diagnosis data

To plot memory-type waveform diagnosis data, set 100 for the display start condition. When the [START] soft key is pressed while data is being memorized, data saving stops, and the waveform for the saved data is displayed. Whether data is being memorized can be checked by using the waveform diagnosis (memory data) screen.
The memory-type waveform diagnosis data width is a maximum of 32,760 ms.

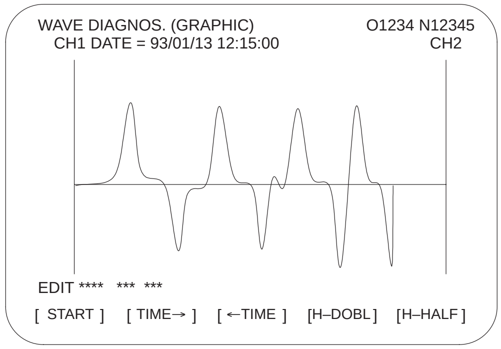
1 Press the SYSTEM function key. When the continuation menu key ▷ is pressed, the [W.DGNS] soft key appears. Then, press the [W.DGNS] soft key to display the waveform diagnosis (parameter) screen. Waveform diagnosis (parameter) setting is explained in an earlier description.

2 Press the [W.GRPH] soft key.

3 The waveform diagnosis (graphic) screen appears. The soft keys for operation selection are also displayed.



4 Press the [START] soft key.
In the upper-left part of the screen, the words NOT READY blink, indicating that saved data is still being read. Once the saved data has been read, waveform display is started. The display in the upper-left part of the screen changes from NOT READY to the date on which the data was saved.



(c) Operation selection keys

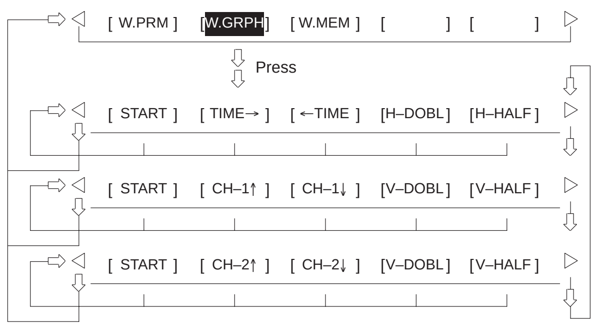


Fig. 1 Soft Key Display

[START] : Plots the waveform of the object being analyzed.

[TIME→] : Shifts the CH-1/CH-2 waveform to the right.

[←TIME] : Shifts the CH-1/CH-2 waveform to the left.

[H-DOBL] : Increases the horizontal width of the CH-1/CH-2 waveform by a factor of 2.

[H-HALF] : Reduces the horizontal width of the CH-1/CH-2 waveform by a factor of 2.

[CH-1↑] : Shifts the CH-1 zero point level up.

[CH-1↓] : Shifts the CH-1 zero point level down.

[V-DOBL] : Increases the height of the CH-1/CH-2 waveform by a factor of 2.

[V-HALF] : Reduces the height of the CH-1/CH-2 waveform by a factor of 2.

[CH-2↑] : Shifts the CH-2 zero point level up.

[CH-2↓] : Shifts the CH-2 zero point level down.

(4) Selection of memory data

(a) Displaying the memory data screen

1 Press the SYSTEM function key. When the continuation menu key ▷ is pressed, the [W.DGNS] soft key appears. Then, press the [W.DGNS] soft key to display the waveform diagnosis (parameter) screen.

2 Press the [W.MEM] soft key.

3 The waveform diagnosis (memory data) screen appears. The soft keys for operation selection are also displayed.

```
WAVE DIAGNOS. (MEMORY)                      O1234 N12345

CONDITION  :  100          TRIGGER    :    G0123.4

DATA KINDS                 SAMPLING  AXIS
POS ERROR                  X  Y  Z  A  B  C  U  V
MOTION CMD                 X  Y  Z  A  B  C  U  V
CURRNT(%)                  X  Y  Z  A  B  C  U  V
SPEED(RPM)                 NONE
TORQUE CMD                 NONE
HEAT SIMLT                 X  Y  Z  A  B  C  U  V
                       SMPL TIME : 2.0 SEC
                       DATE : MEMORY

EDIT ****   ***  ***            08:20:52
[ SELECT]   [        ]  [        ]  [        ]  [ START ]
```

4 The operation selection soft keys are as follows:

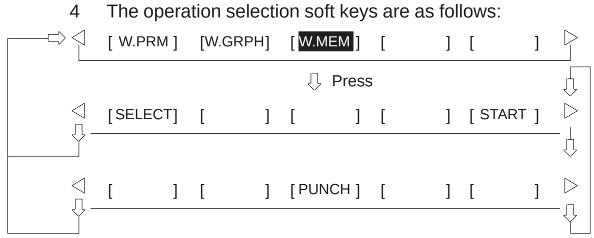


Fig. 2 Soft Key Display

(b) Selecting memory data

1 Display the waveform diagnosis (memory data) screen.

2 Position the cursor and enter the required data. For sampling axis selection, move the cursor to the desired data type, type in desired axis names, then press the [SELECT] soft key or the INPUT key. The entered axis names appear in the sampling axis field to the right of the selected data type field.

Example: XYZ + [SELECT] or INPUT

3 When axis selection is completed, a sampling period for one axis is displayed. Then, press the [START] soft key to start data sampling.

NOTE1 Those items indicated by ***** cannot be set.

NOTE2 To change the selected axes, type in the desired axes again, then press the [SELECT] soft key. If the [SELECT] soft key is pressed without having typed in any axes, no axes are selected.

NOTE3 If selected axes are changed during waveform data sampling, the sampling operation stops. In such a case, press the [START] soft key to restart data sampling.

NOTE4 The initial sampling axis setting is such that no sampling axis is selected.

(c) Memory data parameter

1 Data saving termination condition

100: Terminates data saving when a servo alarm is issued.

101: Terminates data saving when a servo alarm is issued or the rising edge of a trigger signal is detected.

102: Terminates data saving when a servo alarm is issued or the falling edge of a trigger signal is detected.

The data saving width is 32,760 ms, maximum. If a specified saving termination condition is not satisfied upon the elapse of 32760 ms, older data is replaced by newer data.
In the case of data saving termination by the issue of a servo alarm, the termination of data saving can be delayed by the period (in ms) set in parameter No. 3120.

2 Trigger: Sets a PMC address and bit. Set this item when 101 or 102 is specified for the termination condition. This item specifies a trigger for terminating data collection.

Example: G0007.2: ST signal

3 Data type: The table below lists the data types subject to waveform display.

Data type	Description	Unit
Position deviation	Servo error along the n-th axis (8 ms)	Pulses (detection units)
Move command	Number of pulses distributed to the n-th axis	Pulses (increment system)
Actual current	Torque value on the n-th axis	% (ratio to the maximum current)
Actual speed	Actual speed along the n-th axis	RPM
Current command	Current command for the n-th axis	% (ratio to the maximum current)
Thermal simulation	Thermal simulation data for the n-th axis	% (OVC alarm ratio)

4 Sampling axis: Displays the names of the axes subject to sampling.

5 Sampling time: Displays a sampling period for one axis.

6 Date and time of saving: Displays MEMORY during data sampling. When data sampling is terminated, the date of the termination is displayed.

(5) Output of waveform diagnosis data

Servo alarm type waveform diagnosis data can be output to an input/output unit connected to the reader/punch interface.
Set the input/output unit to be used for output in parameter No. 0020 and Nos. 0100 to 0135.
In addition, set a code in bit 1 (ISO) of parameter No. 0020.

(a) Output of waveform diagnosis data

Servo alarm type waveform diagnosis data can be output to an input/output unit, according to the procedure below.

1 Set the EDIT mode.

2 Press the SYSTEM function key, then select the waveform diagnosis (memory data) screen.

3 Press the soft keys [W.MEM], ▷ , [PUNCH], and [EXEC], in this order.

For an explanation of input/output to and from the FANUC Floppy Cassette or FA Card, see item (b).

```
WAVE DIAGNOS. (MEMORY)                        O1234 N12345

CONDITION  :  100              TRIGGER   :   G0123.4

DATA KINDS                     SAMPLING  AXIS
POS ERROR                      X  Y  Z  A  B  C  U  V
MOTION CMD                     X  Y  Z  A  B  C  U  V
CURRNT(%)                      X  Y  Z  A  B  C  U  V
SPEED(RPM)                     NONE
TORQUE CMD                     NONE
HEAT SIMLT                     X  Y  Z  A  B  C  U  V
                        SMPL TIME : 2.0 SEC
                        DATE : 93/01/13 12:15:00

EDIT ****   ***  ***                08:20:52
[ SELECT]  [        ]  [        ]  [        ]  [ START ]

[        ]  [        ]  [ PUNCH ]  [        ]  [        ]
                        Press
[        ]  [        ]  [        ]  [CANCEL]  [  EXEC  ]
```

(b) Output to the FANUC Floppy Cassette or FA Card

In the item below, a FANUC Floppy Cassette is referred to as a Cassette, and a FANUC FA Card as a Card.

(i) Directory

When the directory of a Cassette or Card is displayed, the name of a file containing servo alarm type waveform diagnosis data is registered as WAVE DIAGNOS.
The procedure for displaying the directories is described later.

(ii) Output to the Cassette/Card

Servo alarm type waveform diagnosis data can be output to a Cassette or Card by following the procedure below.

1 Set EDIT mode.

2 Press the SYSTEM function key, then select the waveform diagnosis (memory data) screen.

3 Open the write protect switch of the Cassette or Card.

4 Press the [W.MEM], ▷ , [PUNCH], and [EXEC] soft keys, in this order.

Specify a file number at the end.
The file name WAVE DIAGNOS is assigned.

If the Cassette or Card used as the output destination already contains a file having the same name as that specified, P/S alarm No. 86 is issued. To a Cassette or Card, only one file of waveform diagnosis data of servo alarm type can be output. When output to a Cassette or Card containing unnecessary servo alarm type waveform diagnosis data is needed, delete the file having the same name from the Cassette or Card beforehand.
Deleting a file is described later.

(iii) Displaying the directory of a Cassette or Card

The directory of a Cassette or Card can be displayed by following the procedure below.

1 Set EDIT mode.

2 Press the [PROG] function key, then select the program screen.

3 Press [▷]. Then press [FLOPPY].

4 Press the page change key [PAGE ⬇].

In this way, the directory is displayed.

(iv) Deleting a file from a Cassette or Card

A file can be deleted from a Cassette or Card by following the procedure below.

1 Set EDIT mode.

2 Press the [PROG] function key, then select the program screen.

3 Open the write protect switch of the Cassette or Card.

4 Press [FLOPPY].

5 Press [DELETE].

6 Type in a file number, then press [F SET].

7 Press [EXEC].
The file having the specified file number is deleted. After the file is deleted, all subsequent file numbers are decremented by 1.

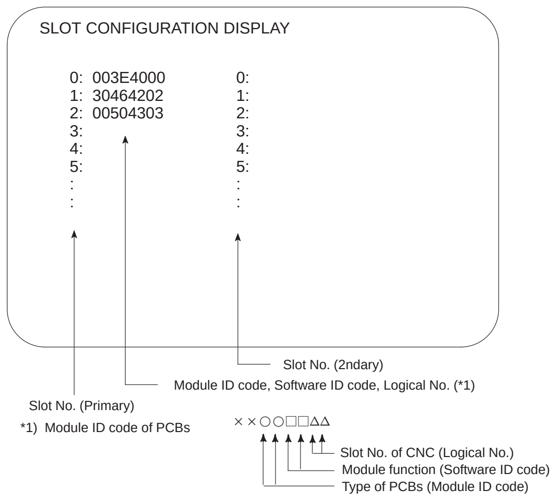
NOTE The floppy directory display function is optional.

6.3 Screen Display at Power On

(1) Slot configuration display

PCB modules mounted on the slots are displayed. The CRT displays this screen when a hardware trouble or invalid leading of PCB has occurred.

(a) Screen display



(b) Module ID code

B9 : Series 16 main CPU
BA : Series16/18 option 2
BD : Series 18 main CPU (For 4–axis)
3F : Remote buffer DNC1
9D : PMC–RC
B4 : PMC–RB5/RB6
46 : I/O card (Sink type)
5F : I/O card (Source type)
A8 : I/O card with power supply (Sink type)
B1 : I/O card with power supply (Source type)
6D : CAP–II
A9 : Graphic

(c) Software ID code

40 : Main CPU
41 : PMC–RC
42 : Built–in I/O card
43 : Sub CPU
45 : Graphic
49 : CAP II
4A : Remote buffer
4F : PMC–RE
50 : Additional 4–axis control (FS16 option 2)
53 : Loader control
59 : RISC board for high–precision contour control
5A : Sub CPU for background drawing
5C : Built–in I/O card
5E : MMC–IV or HSSB interface
67 : PMC–RB5/RB6

(2) Screen of waiting for setting module configuration information

```
            B0B1 – 01

                 SLOT 01 (3046) :     END     ← END : End
                 SLOT 02 (0050) :             ← Blank :
                                                   Waiting
                                                Module ID
                                                code
                                                Slot No.
```

(3) Display of the software series and version

```
            B0B1 – 01                    ← CNC control software

              SERVO  :  9070–01   ← Servo CPU software
              SUB    :  xxxx–xx   ← Sub CPU (Remote buffer)
              OMM    :  yyyy–yy   ← OMM/Macro Executer
              PMC    :  zzzz–zz   ← PMC Ladder soft
```

OMM : Order–Made Macro

(4) Initial screen (different on some machines)

```
ACTUAL POSITION (ABSOLUTE)                O1000 N00010

        X          235.891
        Y          509.818
        Z          –50.000

                            PART COUNT          11
  RUN TIME   0H18M      CYCLE TIME   0H      0M23S
  ACT.F   1200 MM/M              S    0      T0000
MEM STRT MTN ***                 12:15:24
[ ABS ]  [ REL ]  [ ALL ]  [ HNDL ]  [ (OPRT) ]
```

6.4 System Configuration Screen

Software and hardware configuration are displayed on the system configuration screen when the CNC becomes ready for operation.

(1) Display method

Function key SYSTEM .

↓

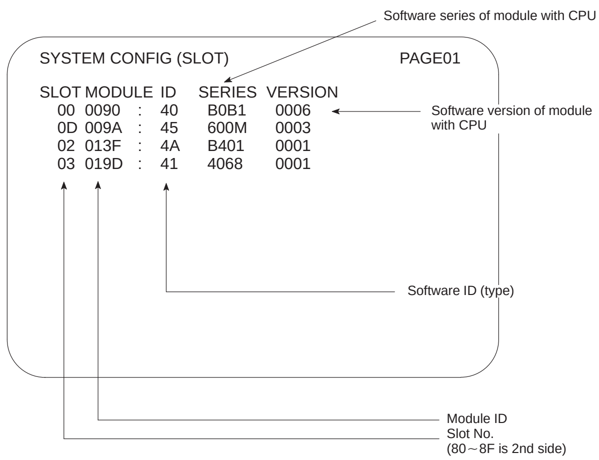
Soft key [SYSTEM].

↓

Page key ⬆PAGE or PAGE⬇ , selecting screens (2) to (4).

(2) PCB configuration screen

(a) Screen display



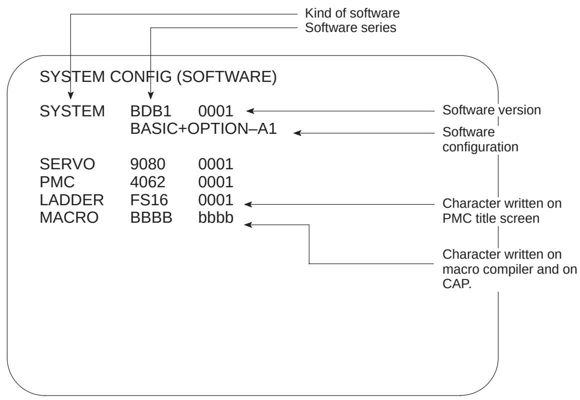
(b) Module ID code

B9 : Series 16 main CPU
BA : Series16/18 option 2
BD : Series 18 main CPU (For 4–axis)
3F : Remote buffer DNC1
9D : PMC–RC
B4 : PMC–RB5/RB6
46 : I/O card (Sink type)
5F : I/O card (Source type)
A8 : I/O card with power supply (Sink type)
B1 : I/O card with power supply (Source type)
6D : CAP–II
45 : Graphic (CAP–II)
9A : Graphic

(c) Software ID code

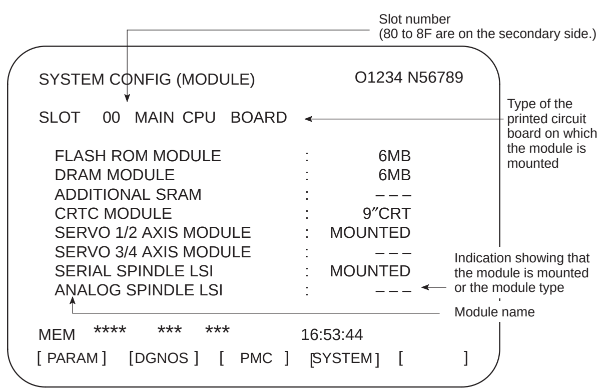
40 : Main CPU
41 : PMC–RC
42 : Built–in I/O card
43 : Sub CPU
45 : Graphic
49 : CAP II
4A : Remote buffer
4F : PMC–RE
50 : Additional 4–axis control (FS16 option 2)
53 : Loader control
59 : RISC board for high–precision contour control
5A : Sub CPU for background drawing
5C : Built–in I/O card
5E : MMC–IV or HSSB interface
67 : PMC–RB5/RB6

(3) Software configuration screen



(4) Module configuration screen

The configuration of the modules mounted on each board is displayed.



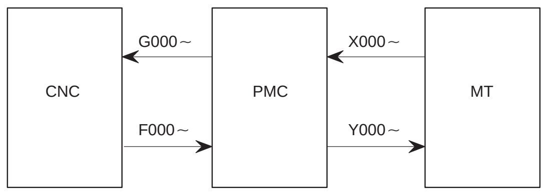
System configuration of another PCB is displayed by page key (PAGE ⬇ or ⬆ PAGE).

NOTE See Maintenance Manual for display of each module.

6.5 Interface between CNC and PMC/MT and Displaying I/O Signals

(1) One–path control

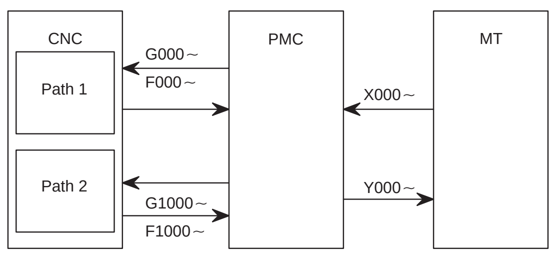
Addresses of interface signals between CNC and PMC/MT.



(2) Two-path control

The figure below shows the addresses of the interface signals between the CNC and the PMC.

Note, however, that some of signals common to paths 1 and 2 are allocated to path 1.



6

6.5.1 I/O signal list

○ : Available
● : Available only with 2–path control
– : Unavailable

Symbol	Signal name	Address	T series	M series
*+ED1 to *+ED8	External deceleration signal	G118	○	○
*+L1 to *+L8	Overtravel signal	G114	○	○
*-ED1 to *-ED8	External deceleration signal	G120	○	○
*-L1 to *-L8	Overtravel signal	G116	○	○
*ABSM	Manual absolute signal	G006#2	○	○
*AFV0 to *AFV7	2nd feedrate override signal	G013	○	○
*BECLP	B–axis clamp completion signal	G038#7	–	○
*BEUCP	B–axis unclamp completion signal	G038#6	–	○
*CHLD	Chopping hold signal	G051#7	–	○
*CHP8 to *CHP0	Chopping feedrate override signals	G051#0 to #3	–	○
*CRTOF	Automatic erase CRT screen display cancel signal	G062#1	○	○
*DEC1 to *DEC8	Deceleration signal for reference position return	X009	○	○
*EAXSL	Control axis selection status signal (PMC axis control)	F129#7	○	○
*ESP	Emergency stop signal	X008#4	○	○
*ESP		G008#4	○	○
*ESPA	Emergency stop signal (serial spindle)	G071#1	○	○
*ESPB		G075#1	○	○
*ESPC		G205#1	○	○
*FLWU	Follow–up signal	G007#5	○	○
*FV0 to *FV7	Feedrate override signal	G012	○	○
*FV0E to *FV7E	Feedrate override signal (PMC axis control)	G151	○	○
*FV0O to *FV7O	Software operator's panel signal (*FV0 to *FV7)	F078	○	○
*HROV0 to *HROV6	1% step rapid traverse override signal	G096#0 to #6	○	○
*IT	Interlock signal	G008#0	○	○
*IT1 to *IT8	Interlock signal for each axis	G130	○	○
*JV0 to *JV15	Manual feedrate override signal	G010, G011	○	○
*JV0O to *JV15O	Software operator's panel signal(*JV0 to *JV15)	F079, F080	○	○

Symbol	Signal name	Address	T series	M series
*PLSST	Polygon spindle stop signal	G038#0	○	-
*SCPF	Spindle clamp completion signal	G028#5	○	-
*SP	Feed hold signal	G008#5	○	○
*SSTP	Spindle stop signal	G029#6	○	○
*SSTP1	Stop signal in each spindle	G027#3	○	–
*SSTP2		G027#4	○	–
*SSTP3		G027#5	○	–
*SUCPF	Spindle unclamp completion signal	G028#4	○	–
*TLV0 to *TLV9	Tool life count override signal	G049#0 to G050#1	–	○
*TSB	Tailstock barrier select signal	G060#7	○	–
+J1 to +J8	Feed axis and direction selection signal	G100	○	○
+J1O to +J4O	Software operator's panel signal (+J1 to +J4)	F081#0,#2, #4,#6	○	○
+Jg, –Jg, +Ja, –Ja	Feed axis and direction selection signals	G086#0 to #3	○	○
+LM1 to +LM8	Stroke limit external setting signal	G110	–	○
+MIT1,+MIT2	Manual feed interlock signal for each axis	X004#2,#4	○	–
+MIT1,+MIT2	Tool offset write signal	X004#2,#4	○	–
+MIT1 to +MIT4	Interlock signal for each axis and direction	G132#0 to #3	–	○
–J1 to –J8	Feed axis and direction selection signal	G102	○	○
–J1O to –J4O	Software operator's panel signal (–J1 to –J4)	F081#1,#3, #5,#7	○	○
–LM1 to –LM8	Stroke limit external setting signal	G112	–	○
–MIT1,–MIT2	Manual feed interlock signal for each axis	X004#3,#5	○	–
–MIT1,–MIT2	Tool offset write signal		○	–
–MIT1 to –MIT4	Interlock signal for each axis and direction	G134#0 to #3	–	○
ABTQSV	Servo axis abnormal load detected signal	F090#0	○	○
ABTSP1	First–spindle abnormal load detected signal	F090#1	○	○
ABTSP2	Second–spindle abnormal load detected signal	F090#2	○	○
AFL	Miscellaneous function lock signal	G005#6	○	○
AL	Alarm signal	F001#0	○	○

Symbol	Signal name	Address	T series	M series
ALMA	Alarm signal (serial spindle)	F045#0	○	○
ALMB	Alarm signal (serial spindle)	F049#0	○	○
ALMC	Alarm signal (serial spindle)	F168#0	○	○
ALNGH	Tool axis direction handle feed mode signal	G023#7	–	○
AR0 to AR15	Actual spindle speed signal	F040, F041	○	–
ARSTA	Alarm reset signal (serial spindle)	G071#0	○	○
ARSTB	Alarm reset signal (serial spindle)	G075#0	○	○
ARSTC	Alarm reset signal (serial spindle)	G205#0	○	○
B00 to B31	2nd auxiliary function code signal	F030 to F033	○	○
BAL	Battery alarm signal	F001#2	○	○
BCLP	B–axis clamp signal	F061#1	–	○
BDT1,BDT2 to BDT9	Optional block skip signal	G044#0, G045	○	○
BDTO	Software operator’s panel signal(BDT)	F075#2	○	○
BF	2nd auxiliary function strobe signal	F007#4	○	–
BF	2nd auxiliary function strobe signal	F007#7	–	○
BFIN	2nd auxiliary function completion signal	G005#4	○	–
BFIN	2nd auxiliary function completion signal	G005#7	–	○
BGEACT	Background busy signal	F053#4	○	○
BGEN	Power Mate background busy signal	G092#4	○	○
BGIALM	Power Mate read/write alarm signal	G092#3	○	○
BGION	Power Mate read/write inprogress signal	G092#2	○	○
BUCLP	B–axis unclamp signal	F061#0	–	○
CDZ	Chamferring signal	G053#7	○	–
CFINA	Spindle switch completion signal (serial spindle)	F046#1	○	○
CFINB	Spindle switch completion signal (serial spindle)	F050#1	○	○
CFINC	Spindle switch completion signal (serial spindle)	F169#1	○	○
CHPA	Power line switch signal (serial spindle)	F046#0	○	○
CHPB	Power line switch signal (serial spindle)	F050#0	○	○
CHPC	Power line switch signal (serial spindle)	F269#0	○	○
CHPCYL	Chopping cycle signal	F039#3	–	○
CHPMD	Chopping–in–progress signal	F039#2	–	○
CHPST	Chopping start signal	G051#6	–	○
CLRCH1 to CLRCH8	Torque limit reach signals for butt–type reference position setting	F180	○	○
CON	Cs contour control change signal	G027#7	○	○

Symbol	Signal name	Address	T series	M series
COSP	Spindle command signal	F064#5	●	–
CSS	Constant surface speed signal	F002#2	○	○
CTH1A,CTH2A	Clutch/gear signal (serial spindle)	G070#3,#2	○	○
CTH1B,CTH2B		G074#3,#2	○	○
CTH1C,CTH2C		G204#3,#2	○	○
CUT	Cutting feed signal	F002#6	○	○
DEFMDA	Differential mode command signal (serial spindle)	G072#3	○	○
DEFMDB		G076#3	○	○
DEFMDC		G206#3	○	○
DEN	Distribution end signal	F001#3	○	○
DM00	Decode M signal	F009#7	○	○
DM01		F009#6	○	○
DM02		F009#5	○	○
DM30		F009#4	○	○
DMMC	Direct operation select signal	G042#7	○	○
DNCI	DNC operation select signal	G043#5	○	○
DRN	Dry run signal	G046#7	○	○
DRNE	Dry run signal (PMC axis control)	G150#7	○	○
DRNO	Software operator's panel signal(DRN)	F075#5	○	○
DSP1, DSP2, DSP3	Spindle motor speed detection signals	Y(n+1) #0 to #2	○	○
DSV1 to DSV8	Servo motor speed detection signals	Y(n+0)	○	○
DTCH1 to DTCH8	Controlled axis detach signal	G124	○	○
EA0 to EA6	Address signal for external data input	G002#0 to #6	○	○
EABUFA	Buffer full signal (PMC axis control)	F131#1	○	○
EABUFB		F134#1	○	○
EABUFC		F137#1	○	○
EABUFD		F140#1	○	○
EACNT1 to EACNT8	Controlling signal (PMC axis control)	F182	○	○
EADEN1 to EADEN8	Distribution completion signal (PMC axis control)	F112	○	○
EAX1 to EAX8	Control axis select signal (PMC axis control)	G136	○	○
EBSYA	Axis control command read completion signal (PMC axis control)	F130#7	○	○
EBSYB		F133#7	○	○
EBSYC		F136#7	○	○
EBSYD		F139#7	○	○

Symbol	Signal name	Address	T series	M series
EBUFA	Axis control command read signal (PMC axis control)	G142#7	○	○
EBUFB		G154#7	○	○
EBUFC		G166#7	○	○
EBUFD		G178#7	○	○
EC0A to EC6A	Axis control command signal (PMC axis control)	G143#0 to #6	○	○
EC0B to EC6B		G155#0 to #6	○	○
EC0C to EC6C		G167#0 to #6	○	○
EC0D to EC6D		G179#0 to #6	○	○
ECKZA	Following zero checking signal (PMC axis control)	F130#1	○	○
ECKZB		F133#1	○	○
ECKZC		F136#1	○	○
ECKZD		F139#1	○	○
ECLRA	Reset signal (PMC axis control)	G142#6	○	○
ECLRB		G154#6	○	○
ECLRC		G166#6	○	○
ECLRD		G178#6	○	○
ED0 to ED15	Data signal for external data input	G000, G001	○	○
EDENA	Auxiliary function executing signal (PMC axis control)	F130#3	○	○
EDENB		F133#3	○	○
EDENC		F136#3	○	○
EDEND		F139#3	○	○
EDGN	Slave diagnosis selection signal	F177#7	○	○
EF	External operation signal	F008#0	–	○
EFD	External operation signal for high–speed interface	F007#1	–	○
EFIN	External operation function completion signal	G005#1	–	○
EFINA	Auxiliary function completion signal (PMC axis control)	G142#0	○	○
EFINB		G154#0	○	○
EFINC		G166#0	○	○
EFIND		G178#0	○	○
EGENA	Axis moving signal (PMC axis control)	F130#4	○	○
EGENB		F133#4	○	○
EGENC		F136#4	○	○
EGEND		F139#4	○	○
EIALA	Alarm signal (PMC axis control)	F130#2	○	○
EIALB		F133#2	○	○
EIALC		F136#2	○	○
EIALD		F139#2	○	○

Symbol	Signal name	Address	T series	M series
EID0A to EID31A	Axis control data signal (PMC axis control)	G146 to G149	○	○
EID0B to EID31B		G158 to G161	○	○
EID0C to EID31C		G170 to G173	○	○
EID0D to EID31D		G182 to G185	○	○
EIF0A to EIF15A	Axis control feedrate signal (PMC axis control)	G144, G145	○	○
EIF0B to EIF15B		G156, G157	○	○
EIF0C to EIF15C		G168, G169	○	○
EIF0D to EIF15D		G180, G181	○	○
EINPA	In–position signal (PMC axis control)	F130#0	○	○
EINPB		F133#0	○	○
EINPC		F136#0	○	○
EINPD		F139#0	○	○
EKC0 to EKC7	Key code signal	G098	○	○
EKENB	Key code read completion signal	F053#7	○	○
EKSET	Key code read signal	G066#7	○	○
EM11A to EM48A	Auxiliary function code signal (PMC axis control)	F132, F142	○	○
EM11B to EM48B		F135, F145	○	○
EM11C to EM48C		F138, F148	○	○
EM11D to EM48D		F141, F151	○	○
EMBUFA	Buffering disable signal (PMC axis control)	G142#2	○	○
EMBUFB		G154#2	○	○
EMBUFC		G166#2	○	○
EMBUFD		G178#2	○	○
EMFA	Auxiliary function strobe signal (PMC axis control)	F131#0	○	○
EMFB		F134#0	○	○
EMFC		F137#0	○	○
EMFD		F140#0	○	○
EMSBKA	Block stop disable signal (PMC axis control)	G143#7	○	○
EMSBKB		G155#7	○	○
EMSBKC		G167#7	○	○
EMSBKD		G179#7	○	○
ENB	Spindle enable signal	F001#4	○	○
ENB2		F038#2	○	–
ENB3		F038#3	○	–

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Symbol	Signal name	Address	T series	M series
ENBKY	External key input mode selection signal	G066#1	○	○
EOTNA	Negative–direction overtravel signal (PMC axis control)	F130#6	○	○
EOTNB		F133#6	○	○
EOTNC		F136#6	○	○
EOTND		F139#6	○	○
EOTPA	Positive–direction overtravel signal (PMC axis control)	F130#5	○	○
EOTPB		F133#5	○	○
EOTPC		F136#5	○	○
EOTPD		F139#5	○	○
EOV0	Override 0% signal (PMC axis control)	F129#5	○	○
EPARM	Slave parameter selection signal	F177#6	○	○
EPRG	Slave program selection signal	F177#4	○	○
ERDIO	Slave external read start signal	F177#1	○	○
EREND	Read completion signal for external data input	F060#0	○	○
ERS	External reset signal	G008#7	○	○
ESBKA	Block stop signal (PMC axis control)	G142#3	○	○
ESBKB		G154#3	○	○
ESBKC		G166#3	○	○
ESBKD		G178#3	○	○
ESEND	Search completion signal for external data input	F060#1	○	○
ESKIP	Skip signal (PMC axis control)	X004#6	○	○
ESOFA	Servo off signal (PMC axis control)	G142#4	○	○
ESOFB		G154#4	○	○
ESOFC		G166#4	○	○
ESOFD		G178#4	○	○
ESRSYC	Simple spindle synchronous control signal	G064#6	○	○
ESTB	Read signal for external data input	G002#7	○	○
ESTPA	Axis control temporary stop signal (PMC axis control)	G142#5	○	○
ESTPB		G154#5	○	○
ESTPC		G166#5	○	○
ESTPD		G178#5	○	○
ESTPIO	Slave read/write stop signal	F177#2	○	○
EVAR	Slave macro variable selection signal	F177#5	○	○
EXHPCC	HPCC operation signal	F066#7	–	○
EXLM	Stored stroke limit select signal	G007#6	○	○

Symbol	Signal name	Address	T series	M series
EXRD	External read start signal	G058#1	○	○
EXSTP	External read/punch stop signal	G058#2	○	○
EXWT	External punch start signal	G058#3	○	○
EWTIO	Slave external write start signal	F177#3	○	○
F1D	F1–digit feed select signal	G016#7	–	○
FIN	Completion signal	G004#3	○	○
FRP1 to FRP8	Floating reference position return end signal	F116	○	○
FSCSL	Cs contour control change completion signal	F044#1	○	○
FSPPH	Spindle phase synchronous control completion signal	F044#3	○	○
FSPSY	Spindle synchronous speed control completion signal	F044#2	○	○
G08MD	Lock–ahead control mode signal	F066#0	–	○
GOQSM	Tool offset value write mode select signal	G039#7	○	–
GR1,GR2	Gear selection signal (input)	G028#1,#2	○	○
GR1O,GR2O,GR3O	Gear selection signal (output)	F034#0 to #2	–	○
GR21	Gear selection signal (input)	G029#0	○	–
GR31		G029#2	○	–
HDO0 to HDO7	High–speed skip status signal	F122	○	○
HEAD	Path selection signal (Tool post selection signal)	G063#0	●	●
HROV	1% step rapid traverse override select signal	G096#7	○	○
HS1A to HS1D	Manual handle feed axis selection signal	G018#0 to #3	○	○
HS1AO	Software operator’s panel signal (HS1A)	F077#0	○	○
HS1BO	Software operator’s panel signal (HS1B)	F077#1	○	○
HS1CO	Software operator’s panel signal (HS1C)	F077#2	○	○
HS1DO	Software operator’s panel signal (HS1D)	F077#3	○	○
HS1IA to HS1ID	Manual handle interruption axis select signal	G041#0 to #3	○	○
HS2A to HS2D	Manual handle feed axis selection signal	G018#4 to #7	○	○
HS2IA to HS2ID	Manual handle interruption axis select signal	G041#4 to #7	○	○
HS3A to HS3D	Manual handle feed axis selection signal	G019#0 to #3	–	○

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Symbol	Signal name	Address	T series	M series
HS3IA to HS3ID	Manual handle interruption axis select signal	G042#0 to #3	–	○
IGNVRY	All–axis VRDY OFF alarm ignore signal	G066#0	○	○
IGVRY1 to IGVRY8	Each–axis VRDY OFF alarm ignore signal	G192	○	○
INCH	Inch input signal	F002#0	○	○
INCMDA	Incremental command external setting type orientation signal (serial spindle)	G072#5	○	○
INCMDB		G076#5	○	○
INCMDC		G206#5	○	○
INCSTA	Incremental method orientation signal (serial spindle)	F047#1	○	○
INCSTB		F051#1	○	○
INCSTC		F170#1	○	○
INDXA	Orientation stop position change signal (serial spindle)	G072#0	○	○
INDXB		G076#0	○	○
INDXC		G206#0	○	○
INHKY	Key input disable signal	F053#0	○	○
INP1 to INP8	In–position signal	F104	○	○
INTGA	Signal for controlling velocity integration (serial spindle)	G071#5	○	○
INTGB		G075#5	○	○
INTGC		G205#5	○	○
IOLACK	I/O Link confirmation signal	G092#0	○	○
IOLNK	Slave I/O Link selection signal	F177#0	○	○
IOLS	I/O Link specification signal	G092#1	○	○
KEY1 to KEY4	Memory protect signal	G046#3 to #6	○	○
KEYO	Software operator's panel signal (KEY1 to KEY4)	F075#6	○	○
LDT1A	Load detection signal 1 (serial spindle)	F045#4	○	○
LDT1B		F049#4	○	○
LDT1C		F168#4	○	○
LDT2A	Load detection signal 2 (serial spindle)	F045#5	○	○
LDT2B		F049#5	○	○
LDT2C		F168#5	○	○
M00 to M31	Miscellaneous function code signal	F010 to F013	○	○
M200 to M215	2nd M function code signal	F014 to F015	○	○
M300 to M315	3rd M function code signal	F016 to F017	○	○
MA	CNC ready signal	F001#7	○	○
MABSM	Manual absolute check signal	F004#2	○	○
MAFL	Miscellaneous function lock check signal	F004#4	○	○

Symbol	Signal name	Address	T series	M series
MBDT1, MBDT2 to MBDT9	Optional block skip check signal	F004#0, F005	○	○
MCFNA	Power line switch completion signal (serial spindle)	G071#3	○	○
MCFNB		G075#3	○	○
MCFNC		G205#3	○	○
MD1,MD2,MD4	Mode selection signal	G043#0 to #2	○	○
MD1O	Software operator’s panel signal (MD1)	F073#0	○	○
MD2O	Software operator’s panel signal (MD2)	F073#1	○	○
MD4O	Software operator’s panel signal (MD4)	F073#2	○	○
MDRN	Dry run check signal	F002#7	○	○
MDTCH1 to MDTCH8	Controlled axis detach status signal	F110	○	○
MEDT	Memory edit select check signal	F003#6	○	○
MF	Auxiliary function strobe signal	F007#0	○	○
MF2	2nd M function strobe signal	F008#4	○	○
MF3	3rd M function strobe signal	F008#5	○	○
MFIN	Auxiliary function completion signal	G005#0	○	○
MFIN2	2nd M function completion signal	G004#4	○	○
MFIN3	3rd M function completion signal	G004#5	○	○
MFNHGA	Main spindle MCC status signal while changing spindles signal (serial spindle)	G072#6	○	○
MFNHGB		G076#6	○	○
MFNHGC		G206#6	○	○
MH	Manual handle feed select check signal	F003#1	○	○
MHPCC	HPCC mode signal	F066#6	–	○
MI1 to MI8	Mirror image signal	G106	○	○
MINC	Incremental feed select check signal	F003#0	○	○
MINP	External program input start signal	G058#0	○	○
MIX1 to MIX7	Composite control axis selection signals	G128#0 to #6	●	–
MJ	JOG feed select check signal	F003#2	○	○
MLK	All–axis machine lock signal	G044#1	○	○
MLK1 to MLK8	Each–axis machine lock signal	G108	○	○

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Symbol	Signal name	Address	T series	M series
MLKO	Software operator's panel signal(MLK)	F075#4	○	○
MMDI	Manual data input select check signal	F003#3	○	○
MMEM	Automatic operation select check signal	F003#5	○	○
MMI1 to MMI8	Mirror image check signal	F108	○	○
MMLK	All–axis machine lock check signal	F004#1	○	○
MORA1A	Signal for completion of spindle orientation with a magnetic sensor (serial spindle)	F046#6	○	○
MORA1B		F050#6	○	○
MORA1C		F169#6	○	○
MORA2A	Signal for approximate spindle orientation with a magnetic sensor (serial spindle)	F046#7	○	○
MORA2B		F050#7	○	○
MORA2C		F169#7	○	○
MORCMA	Command for spindle orientaion with a magnetic sensor (serial spindle)	G073#0	○	○
MORCMB		G077#0	○	○
MORCMC		G207#0	○	○
MP1, MP2	Manual handle feed amount selection signal (incremental feed signal)	G019#4, #5	○	○
MP1O	Software operator's panel signal (MP1)	F076#0	○	○
MP2O	Software operator's panel signal (MP2)	F076#1	○	○
MPOFA	Motor power stop signal (serial spindle)	G073#2	○	○
MPOFB		G077#2	○	○
MPOFC		G207#2	○	○
MRDYA	Machine ready signal (serial spindle)	G070#7	○	○
MRDYB		G074#7	○	○
MRDYC		G204#7	○	○
MREF	Manual reference position return selection check signal	F004#5	○	○
MRMT	DNC operation select check signal	F003#4	○	○
MSBK	Single block check signal	F004#3	○	○
MSDFON	Motor speed detection function enable signal	G016#0	○	○
MTCHIN	TEACH IN select check signal	F003#7	○	○
MV1 to MV8	Axis moving signal	F102	○	○
MVD1 to MVD8	Axis moving direction signal	F106	○	○
NOWT	No–wait signal	G063#1	●	●
NOZAGC	Perpendicular/angular axis control disable signal	G063#5	○	○

Symbol	Signal name	Address	T series	M series
NPOS1 to NPOS8	Position display neglect signal	G198	○	○
NRROA	Short–distant movement command while changing the orientation stop position signal (serial spindle)	G072#2	○	○
NRROB		G076#2	○	○
NRROC		G206#2	○	○
OFN0 to OFN5,OFN6	Tool offset number select signal	G039#0 to #5, G040#0	○	–
OP	Automatic operation signal	F000#7	○	○
ORARA	Orientation completion signal (serial spindle)	F045#7	○	○
ORARB		F049#7	○	○
ORARC		F168#7	○	○
ORCMA	Orientation command signal (serial spindle)	G070#6	○	○
ORCMB		G074#6	○	○
ORCMC		G204#6	○	○
OUT0 to OUT7	Software operator's panel general–purpose switch signal	F072	○	○
OVC	Override cancel signal	G006#4	○	○
OVCE	Override cancellation signal (PMC axis control)	G150#5	○	○
OVLS1 to OVLS7	Superimposed control axis selection signals	G190#0 to #6	●	–
OVRIDA	Analog override command signal (serial spindle)	G072#4	○	○
OVRIDB		G076#4	○	○
OVRIDC		G206#4	○	○
PC1DEA	Signal indicating the status of the detected one–rotation position coder signal (serial spindle)	F047#0	○	○
PC1DEB		F051#0	○	○
PC1DEC		F170#0	○	○
PC2SLC	2nd position coder selection signal	G028#7	○	–
PECK2	Small–diameter peck drilling in progress signal	F066#5	–	○
PK1 to PK8	Parking signals	G122	○	–
PK1 to PK7	Parking signals	G122#0 to #6	●	–
PKESS1	First spindle synchronous control signal	G122#6 (G031#6)	○	○
PKESS2	Second spindle synchronous control signal	G122#7 (G031#7)	○	○
PN1, PN2, PN4, PN8, PN16	Workpiece number search signal	G009#0 to 4	○	○
PORA2A	Signal for approximate spindle orientation with a position coder (serial spindle)	F046#5	○	○
PORA2B		F050#5	○	○
PORA2C		F169#5	○	○
PRC	Position record signal	G040#6	○	–

Symbol	Signal name	Address	T series	M series
PRGDPL	program screen display mode signal	F053#1	○	○
PRTSF	Target parts count reached signal	F062#7	○	○
PSAR	Spindle polygon speed arrival signal	F063#2	○	–
PSE1	Master axis not arrival signal	F063#0	○	–
PSE2	Polygon synchronous axis not arrival signal	F063#1	○	–
PSW01 to PSW10	Position switch signal	F070#0 to F071#1	○	○
PSYN	Polygon synchronization under way signal	F063#7	○	–
R01I to R12I	Spindle motor speed command signal	G032#0 to G033#3	○	○
R01I2 to R12I2		G034#0 to G035#3	○	○
R01I3 to R12I3		G036#0 to G037#3	○	○
R01O to R12O	S12–bit code signal	F036#0 to F037#3	○	○
RCFNA	Output switch completion signal (serial spindle)	F046#3	○	○
RCFNB		F050#3	○	○
RCFNC		F169#3	○	○
RCHA	Power line status check signal (serial spindle)	G071#7	○	○
RCHB		G075#7	○	○
RCHC		G205#7	○	○
RCHHGA	High–output MCC status signal while a magnetic sensor (serial spindle)	G072#7	○	○
RCHHGB		G076#7	○	○
RCHHGC		G206#7	○	○
RCHPA	Output switch signal (serial spindle)	F046#2	○	○
RCHPB		F050#2	○	○
RCHPC		F169#2	○	○
RCYO	Retry complete signal	F063#5	–	○
RGHTH	Tool axis perpendicular direction handle feed mode signal	G023#6	–	○
RGSPM	Spindle rotation direction signal	F065#1	–	○
RGSPP		F065#0	–	○
RGTAP	Rigid tapping signal	G061#0	○	○
RGTSP1, RGTSP2	Rigid tapping spindle selection signal	G061#4, #5	○	–
RLSOT3	Stroke check 3 release signal	G007#4	○	○
RMTDI0 to RMTDI7	Input signal for remote buffer	G052	○	○

Symbol	Signal name	Address	T series	M series
RMTDO0 to RMTDO7	Output signal for remote buffer	F069	○	○
ROTAA	Rotation direction command while changing the orientation stop position signal (serial spindle)	G072#1	○	○
ROTAB		G076#1	○	○
ROTAC		G206#1	○	○
ROV1,ROV2	Rapid traverse override signal	G014#0, #1	○	○
ROV1E, ROV2E	Rapid traverse override signal (PMC axis control)	G150#0, #1	○	○
ROV1O	Software operator's panel signal (ROV1)	F076#4	○	○
ROV2O	Software operator's panel signal (ROV2)	F076#5	○	○
RPALM	Read/punch alarm signal	F053#3	○	○
RPBSY	Read/punch in–progress signal	F053#2	○	○
RPDO	Rapid traversing signal	F002#1	○	○
RRW	Reset&rewind signal	G008#6	○	○
RSLA	Output switch request signal (serial spindle)	G071#6	○	○
RSLB		G075#6	○	○
RSLC		G205#6	○	○
RST	Reset signal	F001#1	○	○
RT	Manual rapid traverse selection signal	G019#7	○	○
RTAP	Rigid tapping in–progress signal	F076#3	○	○
RTE	Manual rapid traverse selection signal (PMC axis control)	G150#6	○	○
RTO	Software operator's panel signal (RT)	F077#6	○	○
RTNCY	Retry start signal	G064#0	–	○
RTNMVS	Retry point signal	F066#3	–	○
RTRCT	Retract signal	G066#4	–	○
RTRCTF	Retract completion signal	F065#4	–	○
RVS	Retrace signal	G007#0	–	○
RVSL	Retrace–in–progress signal	F082#2	–	○
RWD	Rewinding signal	F000#0	○	○
S00 to S31	Spindle speed code signal	F022 to F025	○	○
SA	Servo ready signal	F000#6	○	○
SAR	Spindle speed arrival signal	G029#4	○	○
SARA	Speed arrival signal (serial spindle)	F045#3	○	○
SARB		F049#3	○	○
SARC		F168#3	○	○
SBK	Single block signal	G046#1	○	○

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Symbol	Signal name	Address	T series	M series
SBKO	Software operator's panel signal (SBK)	F075#3	○	○
SCLP	Spindle clamp signal	F038#0	○	–
SDTA	Speed detection signal (serial spindle)	F045#2	○	○
SDTB		F049#2	○	○
SDTC		F168#2	○	○
SF	Spindle speed strobe signal	F007#2	○	○
SFIN	Spindle function completion signal	G005#2	○	○
SFRA	CW command signal (serial spindle)	G070#5	○	○
SFRB		G074#5	○	○
SFRC		G204#5	○	○
SGN	Spindle motor command polarity select signal	G033#5	○	○
SGN2		G035#5	○	○
SGN3		G037#5	○	○
SHA00 to SHA11	Spindle orientation external stop position command signal	G078#0 to G079#3	○	○
SHB00 to SHB11		G080#0 to G081#3	○	○
SHC00 to SHC11	Spindle orientation stop position external command signal	G208#0 to G209#3	○	○
SIND	Spindle motor speed command select signal	G033#7	○	○
SIND2		G035#7	○	○
SIND3		G037#7	○	○
SKIP	Skip signal	X004#7	○	○
	Overload torque signal	X004#7	–	○
SKIP2 to SKIP6, SKIP7, SKIP8	Skip signal	X004#2 to #6, #0, #1	○	○
SKIPP	Skip signal	G006#6	○	–
SLCSEQ	Retry point selection signal	G064#1		○
SLPCA, SLPCB	Spindle return select signal	G064#2, #3	●	–
SLSPA, SLSPB	Spindle command select signal	G063#2, #3	●	–
SLVA	Slave operation command signal (serial spindle)	G073#1	○	○
SLVB		G077#1	○	○
SLVC		G207#1	○	○
SLVSA	Slave operation status signal (serial spindle)	F046#4	○	○
SLVSB		F050#4	○	○
SLVSC		F169#4	○	○
SMZ	Error detect signal	G053#6	○	–
SOCNA	Soft start/stop cancel signal (serial spindle)	G071#4	○	○
SOCNB		G075#4	○	○
SOCNC		G205#4	○	○

Symbol	Signal name	Address	T series	M series
SOR	Spindle orientation signal	G029#5	○	○
SOV0 to SOV7	Spindle speed override signal	G030	○	○
SPAL	Spindle fluctuation detection alarm signal	F035#0	○	○
SPL	Feed hold lamp signal	F000#4	○	○
SPO	Software operator’s panel signal (*SP)	F075#7	○	○
SPPHS	Spindle phase synchronous control signal	G038#3	○	○
SPSLA	Spindle select signal (serial spindle)	G071#2	○	○
SPSLB		G075#2	○	○
SPSLC		G205#2	○	○
SPSTP	Spindle stop complete signal	G028#6	○	–
SPSYC	Spindle synchronous control signal	G038#2	○	○
SRLNI0 to SRLNI3	Group number specification signals	G091#0 to #3	○	○
SRLNO0 to SRLNO3	Group number output signals	F178#0 to #3	○	○
SRN	Program restart signal	G006#0	○	○
SRNMV	Program restart under way signal	F002#4	○	○
SRVA	CCW command signal (serial spindle)	G070#4	○	○
SRVB		G074#4	○	○
SRVC		G204#4	○	○
SSIN	Spindle motor command polarity select signal	G033#6	○	○
SSIN2		G035#6	○	○
SSIN3		G037#6	○	○
SSTA	Speed zero signal (serial spindle)	F045#1	○	○
SSTB		F049#1	○	○
SSTC		F168#1	○	○
ST	Cycle start lamp signal	G007#2	○	○
STL	Cycle start signal	F000#5	○	○
STLK	Start lock signal	G007#1	○	–
STRD	Input and run simultaneous mode select signal	G058#5	–	○
STWD	Output and run simultaneous mode select signal	G058#6	–	○
SUCLP	Spindle unclamp signal	F038#1	○	–
SVF1 to SVF8	Servo off signal	G126	○	○
SWS1	Spindle selection signal	G027#0	○	–
SWS2		G027#1	○	–
SWS3		G027#2	○	–

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Symbol	Signal name	Address	T series	M series
SYCAL	Spindle synchronous control alarm signal/ phase error monitor signal	F044#4	○	○
SYN1O to SYN8O	Synchronous control under way signals	F118	○	–
SYN1O to SYN7O	Synchronous/composite/ superimposed control under way signals	F118#0 to #6	●	–
SYNC1 to SYNC8	Simple synchronous axis select signal	G138	○	○
SYNC to SYNC8	Synchronous control axis selection signals	G138	○	–
SYNC to SYNC7	Synchronous control axis selection signals	G138#0 to #6	●	–
SYNCJ1 to SYNCJ8	Simple synchronous manual feed axis select signal	G140	–	○
SYNMOD	EGB mode signal	F065#6		○
T00 to T31	Tool function code signal	F026 to F029	○	○
TAP	Tapping signal	F001#5	○	○
TF	Tool function strobe signal	F007#3	○	○
TFIN	Tool function completion signal	G005#3	○	○
THRD	Thread cutting signal	F002#3	○	○
TIALM	Tool post interference alarm signal	F064#7	●	–
TICHK	Tool post interference check signal	F064#6	●	–
TL01 to TL64	Tool group number select signal	G047#0 to #6	○	–
TL01 to TL256		G047#0 to G048#0	–	○
TLCH	Tool change signal	F064#0	○	○
TLCHI	Individual tool change signal	F064#2	–	○
TLMA	Torque limit signal (serial spindle)	F045#6	○	○
TLMB		F049#6	○	○
TLMC		F168#6	○	○
TLMHA	Torque limit command HIGH signal (serial spindle)	G070#1	○	○
TLMHB		G074#1	○	○
TLMHC		G204#1	○	○
TLMLA	Torque limit command LOW signal (serial spindle)	G070#0	○	○
TLMLB		G074#0	○	○
TLMLC		G204#0	○	○
TLNW	New tool select signal	F064#1	○	○
TLRST	Tool change reset signal	G048#7	○	○

Symbol	Signal name	Address	T series	M series
TLRSTI	Individual tool change reset signal	G048#6	–	○
TLSKP	Tool skip signal	G048#5	○	○
TMRON	General–purpose integrating meter start signal	G053#0	○	○
TRACT	Tool retraction mode signal	F092#3	○	○
TRESC	Tool retraction signal	G059#0	○	○
TRQL1 to TRQL8	Torque limit reached signal	F114	○	–
TRRTN	Tool return signal	G059#1	○	○
TRSPS	Tool return completion signal	F092#5	○	○
UI000 to UI015	Input signal for custom macro	G054, G055	○	○
UINT	Interrupt signal for custom macro	G053#3	○	○
UO000 to UO015	Output signal for custom macro	F054, F055	○	○
UO100 to UO131		F056 to F059	○	○
WATO	Waiting signal	F063#6	●	●
WOQSM	Workpiece coordinate system shift value write mode select signal	G039#6	○	–
WOSET	Workpiece coordinate system shift value write signal	G040#7	○	–
XAE	Measuring position reached signal	X004#0	○	○
YAE		X004#1	–	○
ZAE		X004#1	○	–
ZAE		X004#2	–	○
ZP1 to ZP8	Reference position return end signal	F094	○	○
ZP21 to ZP28	2nd reference position return end signal	F096	○	○
ZP31 to ZP38	3rd reference position return end signal	F098	○	○
ZP41 to ZP48	4th reference position return end signal	F100	○	○
ZPX	Spindle orientation completion signal	F094	○	–
ZRF1 to ZRF8	Reference position establishment signal	F120	○	○
ZRN	Manual reference position return selection signal	G043#7	○	○
ZRNO	Software operator’s panel signal (ZRN)	F073#4	○	○

6.5.2 Address list

(1) List of Addresses (One–Path Control)

Following shows table of addresses:

In an item where both T series and M series are described, some signals are covered with shade ( ) in the signal address figure as shown below. This means either T series or M series does not have this signal. Upper part is for T series and lower part is for M series.

[Example 1]

Signals EXLM and ST are common signals, STLK is for T series only and RLSOT and RVS are for M series only.

	#7	#6			#2	#1	#0	
G007	RLSOT	SA			ST	STLK	RVS	T series M series

MT→PMC

Address	#7	#6	#5	#4	#3	#2	#1	#0	Bit number
X004	SKIP	ESKIP SKIP6	–MIT2 SKIP5	+MIT2 SKIP4	–MIT1 SKIP3	+MIT1 SKIP2	ZAE SKIP8	XAE SKIP7	(T series)
	SKIP	ESKIP SKIP6	SKIP5	SKIP4	SKIP3	ZAE SKIP2	YAE SKIP8	XAE SKIP7	(M series)
X008				*ESP					
X009	*DEC8	*DEC7	*DEC6	*DEC5	*DEC4	*DEC3	*DEC2	*DEC1	

PMC→CNC

Address	#7	#6	#5	#4	#3	#2	#1	#0
G000	ED7	ED6	ED5	ED4	ED3	ED2	ED1	ED0
G001	ED15	ED14	ED13	ED12	ED11	ED10	ED9	ED8
G002	ESTB	EA6	EA5	EA4	EA3	EA2	EA1	EA0
G004			MFIN3	MFIN2	FIN			
G005	BFIN	AFL		BFIN	TFIN	SFIN	EFIN	MFIN
G006		SKIPP		OVC		*ABSM		SRN
G007	RLSOT	EXLM	*FLWU	RLSOT3		ST	STLK	RVS
G008	ERS	RRW	*SP	*ESP				*IT
G009				PN16	PN8	PN4	PN2	PN1
G010	*JV7	*JV6	*JV5	*JV4	*JV3	*JV2	*JV1	*JV0

	#7	#6	#5	#4	#3	#2	#1	#0
G011	*JV15	*JV14	*JV13	*JV12	*JV11	*JV10	*JV9	*JV8
G012	*FV7	*FV6	*FV5	*FV4	*FV3	*FV2	*FV1	*FV0
G013	*AFV7	*AFV6	*AFV5	*AFV4	*AFV3	*AFV2	*AFV1	*AFV0
G014							ROV2	ROV1
G016	F1D							MSDFON
G018	HS2D	HS2C	HS2B	HS2A	HS1D	HS1C	HS1B	HS1A
G019	RT		MP2	MP1	HS3D	HS3C	HS3B	HS3A
G023	ALNGH	RGHTH						
G027	CON		*SSTP3	*SSTP2	*SSTP1	SWS3	SWS2	SWS1
G028	PC2SLC	SPSTP	*SCPF	*SUCPF		GR2	GR1	
G029		*SSTP	SOR	SAR		GR31		GR21
G030	SOV7	SOV6	SOV5	SOV4	SOV3	SOV2	SOV1	SOV0
G031	PKESS2	PKESS1						
G032	R08I	R07I	R06I	R05I	R04I	R03I	R02I	R01I
G033	SIND	SSIN	SGN		R12I	R11I	R10I	R09I
G034	R08I2	R07I2	R06I2	R05I2	R04I2	R03I2	R02I2	R01I2
G035	SIND2	SSIN2	SGN2		R12I2	R11I2	R10I2	R09I2
G036	R08I3	R07I3	R06I3	R05I3	R04I3	R03I3	R02I3	R01I3
G037	SIND3	SSIN3	SGN3		R12I3	R11I3	R10I3	R09I3
G038	*BECLP	*BEUCP			SPPHS	SPSYC		*PLSST
G039	GOQSM	WOQSM	OFN5	OFN4	OFN3	OFN2	OFN1	OFN0
G040	WOSET	PRC						OFN6
G041	HS2ID	HS2IC	HS2IB	HS2IA	HS1ID	HS1IC	HS1IB	HS1IA
G042	DMMC				HS3ID	HS3IC	HS3IB	HS3IA

	#7	#6	#5	#4	#3	#2	#1	#0
G043	ZRN		DNCI			MD4	MD2	MD1
G044							MLK	BDT1
G045	BDT9	BDT8	BDT7	BDT6	BDT5	BDT4	BDT3	BDT2
G046	DRN	KEY4	KEY3	KEY2	KEY1		SBK	
G047	TL128	TL64	TL32	TL16	TL08	TL04	TL02	TL01
G048	TLRST	TLRSTI	TLSKP					TL256
G049	*TLV7	*TLV6	*TLV5	*TLV4	*TLV3	*TLV2	*TOV1	*TLV0
G050							*TLV9	*TLV8
G051	*CHLD	CHPST			*CHP8	*CHP4	*CHP2	*CHP0
G052	RMTDI7	RMTDI6	RMTDI5	RMTDI4	RMTDI3	RMTDI2	RMTDI1	RMTDI0
G053	CDZ	SMZ			UINT			TMRON
G054	UI007	UI006	UI005	UI004	UI003	UI002	UI001	UI000
G055	UI015	UI014	UI013	UI012	UI011	UI010	UI009	UI008
G058		STWD	STRD		EXWT	EXSTP	EXRD	MINP
G059							TRRTN	TRESC
G060	*TSB							
G061			RGTSP2	RGTSP1				RGTAP
G062							*CRTOF	
G063			NOZAGC					
G064		ESRSYC					SLCSEQ	RTNCY
G066	EKSET			RTRCT			ENBKY	IGNVRY
G070	MRDYA	ORCMA	SFRA	SRVA	CTH1A	CTH2A	TLMHA	TLMLA
G071	RCHA	RSLA	INTGA	SOCNA	MCFNA	SPSLA	*ESPA	ARSTA
G072	RCHHGA	MFNHGA	INCMDA	OVRIDA	DEFMDA	NRROA	ROTAA	INDXA

	#7	#6	#5	#4	#3	#2	#1	#0
G073						MPOFA	SLVA	MORCMA
G074	MRDYB	ORCMB	SFRB	SRVB	CTH1B	CHT2B	TLMHB	TLMLB
G075	RCHB	RSLB	INTGB	SOCNB	MCFNB	SPSLB	*ESPB	ARSTB
G076	RCHHGB	MFNHGB	INCMDB	OVRIDB	DEFMDB	NRROB	ROTAB	INDXB
G077						MPOFB	SLVB	MORCMB
G078	SHA07	SHA06	SHA05	SHA04	SHA03	SHA02	SHA01	SHA00
G079					SHA11	SHA10	SHA09	SHA08
G080	SHB07	SHB06	SHB05	SHB04	SHB03	SHB02	SHB01	SHB00
G081					SHB11	SHB10	SHB09	SHB08
G082	Reserve for order made macro							
G083	Reserve for order made macro							
G086					–Ja	+Ja	–Jg	+Jg
G091					SRLNI3	SRLNI2	SRLNI1	SRLNI0
G092				BGEN	BGIALM	BGION	IOLS	IOLACK
G096	HROV	*HROV6	*HROV5	*HROV4	*HROV3	*HROV2	*HROV1	*HROV0
G098	EKC7	EKC6	EKC5	EKC4	EKC3	EKC2	EKC1	EKC0
G100	+J8	+J7	+J6	+J5	+J4	+J3	+J2	+J1
G102	–J8	–J7	–J6	–J5	–J4	–J3	–J2	–J1
G106	MI8	MI7	MI6	MI5	MI4	MI3	MI2	MI1
G108	MLK8	MLK7	MLK6	MLK5	MLK4	MLK3	MLK2	MLK1
G110	+LM8	+LM7	+LM6	+LM5	+LM4	+LM3	+LM2	+LM1
G112	–LM8	–LM7	–LM6	–LM5	–LM4	–LM3	–LM2	–LM1
G114	*+L8	*+L7	*+L6	*+L5	*+L4	*+L3	*+L2	*+L1
G116	*–L8	*–L7	*–L6	*–L5	*–L4	*–L3	*–L2	*–L1

	#7	#6	#5	#4	#3	#2	#1	#0
G118	*+ED8	*+ED7	*+ED6	*+ED5	*+ED4	*+ED3	*+ED2	*+ED1
G120	*–ED8	*–ED7	*–ED6	*–ED5	*–ED4	*–ED3	*–ED2	*–ED1
G122 (T series)	PK8 PKESS2	PK7 PKESS1	PK6	PK5	PK4	PK3	PK2	PK1
G122 (M series)	PKESS2	PKESS1						
G124	DTCH8	DTCH7	DTCH6	DTCH5	DTCH4	DTCH3	DTCH2	DTCH1
G126	SVF8	SVF7	SVF6	SVF5	SVF4	SVF3	SVF2	SVF1
G130	*IT8	*IT7	*IT6	*IT5	*IT4	*IT3	*IT2	*IT1
G132					+MIT4	+MIT3	+MIT2	+MIT1
G134					–MIT4	–MIT3	–MIT2	–MIT1
G136	EAX8	EAX7	EAX6	EAX5	EAX4	EAX3	EAX2	EAX1
G138	SYNC8	SYNC7	SYNC6	SYNC5	SYNC4	SYNC3	SYNC2	SYNC1
G140	SYNCJ8	SYNCJ7	SYNCJ6	SYNCJ5	SYNCJ4	SYNCJ3	SYNCJ2	SYNCJ1
G142	EBUFA	ECLRA	ESTPA	ESOFA	ESBKA	EMBUFA		EFINA
G143	EMSBKA	EC6A	EC5A	EC4A	EC3A	EC2A	EC1A	EC0A
G144	EIF7A	EIF6A	EIF5A	EIF4A	EIF3A	EIF2A	EIF1A	EIF0A
G145	EIF15A	EIF14A	EIF13A	EIF12A	EIF11A	EIF10A	EIF9A	EIF8A
G146	EID7A	EID6A	EID5A	EID4A	EID3A	EID2A	EID1A	EID0A
G147	EID15A	EID14A	EID13A	EID12A	EID11A	EID10A	EID9A	EID8A
G148	EID23A	EID22A	EID21A	EID20A	EID19A	EID18A	EID17A	EID16A
G149	EID31A	EID30A	EID29A	EID28A	EID27A	EID26A	EID25A	EID24A
G150	DRNE	RTE	OVCE				ROV2E	ROV1E
G151	*FV7E	*FV6E	*FV5E	*FV4E	*FV3E	*FV2E	*FV1E	*FV0E
G154	EBUFB	ECLRB	ESTPB	ESOFB	ESBKB	EMBUFB		EFINB
G155	EMSBKB	EC6B	EC5B	EC4B	EC3B	EC2B	EC1B	EC0B

	#7	#6	#5	#4	#3	#2	#1	#0
G156	EIF7B	EIF6B	EIF5B	EIF4B	EIF3B	EIF2B	EIF1B	EIF0B
G157	EIF15B	EIF14B	EIF13B	EIF12B	EIF11B	EIF10B	EIF9B	EIF8B
G158	EID7B	EID6B	EID5B	EID4B	EID3B	EID2B	EID1B	EID0B
G159	EID15B	EID14B	EID13B	EID12B	EID11B	EID10B	EID9B	EID8B
G160	EID23B	EID22B	EID21B	EID20B	EID19B	EID18B	EID17B	EID16B
G161	EID31B	EID30B	EID29B	EID28B	EID27B	EID26B	EID25B	EID24B
G166	EBUFC	ECLRC	ESTPC	ESOFC	ESBKC	EMBUFC		EFINC
G167	EMSBKC	EC6C	EC5C	EC4C	EC3C	EC2C	EC1C	EC0C
G168	EIF7C	EIF6C	EIF5C	EIF4C	EIF3C	EIF2C	EIF1C	EIF0C
G169	EIF15C	EIF14C	EIF13C	EIF12C	EIF11C	EIF10C	EIF9C	EIF8C
G170	EID7C	EID6C	EID5C	EID4C	EID3C	EID2C	EID1C	EID0C
G171	EID15C	EID14C	EID13C	EID12C	EID11C	EID10C	EID9C	EID8C
G172	EID23C	EID22C	EID21C	EID20C	EID19C	EID18C	EID17C	EID16C
G173	EID31C	EID30C	EID29C	EID28C	EID27C	EID26C	EID25C	EID24C
G178	EBUFD	ECLRD	ESTPD	ESOFD	ESBKD	EMBUFD		EFIND
G179	EMSBKD	EC6D	EC5D	EC4D	EC3D	EC2D	EC1D	EC0D
G180	EIF7D	EIF6D	EIF5D	EIF4D	EIF3D	EIF2D	EIF1D	EIF0D
G181	EIF15D	EIF14D	EIF13D	EIF12D	EIF11D	EIF10D	EIF9D	EIF8D
G182	EID7D	EID6D	EID5D	EID4D	EID3D	EID2D	EID1D	EID0D
G183	EID15D	EID14D	EID13D	EID12D	EID11D	EID10D	EID9D	EID8D
G184	EID23D	EID22D	EID21D	EID20D	EID19D	EID18D	EID17D	EID16D
G185	EID31D	EID30D	EID29D	EID28D	EID27D	EID26D	EID25D	EID24D
G192	IGVRY8	IGVRY7	IGVRY6	IGVRY5	IGVRY4	IGVRY3	IGVRY2	IGVRY1
G198	NPOS8	NPOS7	NPOS6	NPOS5	NPOS4	NPOS3	NPOS2	NPOS1

	#7	#6	#5	#4	#3	#2	#1	#0
G204	MRDYC	ORCML	SFRC	SRVC	CTH1C	CTH2C	TLMHC	TLMLC
G205	RCHC	RSLC	INTGC	SOCNC	MCFNC	SPSLC	*ESPC	ARSTC
G206	RCHHGC	MFNHGC	INCMDC	OVRIDC	DEFMDC	NRROC	ROTAC	INDXC
G207						MPOFC	SLVC	MORCMC
G208	SHC07	SHC06	SHC05	SHC04	SHC03	SHC02	SHC01	SHC00
G209					SHC11	SHC10	SHC09	SHC08

CNC→PMC

Address	Bit number #7	#6	#5	#4	#3	#2	#1	#0
F000	OP	SA	STL	SPL				RWD
F001	MA		TAP	ENB	DEN	BAL	RST	AL
F002	MDRN	CUT		SRNMV	THRD	CSS	RPDO	INCH
F003	MTCHIN	MEDT	MMEM	MRMT	MMDI	MJ	MH	MINC
F004			MREF	MAFL	MSBK	MABSM	MMLK	MBDT1
F005	MBDT9	MBDT8	MBDT7	MBDT6	MBDT5	MBDT4	MBDT3	MBDT2
F007	BF			BF	TF	SF	EFD	MF
F008			MF3	MF2				EF
F009	DM00	DM01	DM02	DM30				
F010	M07	M06	M05	M04	M03	M02	M01	M00
F011	M15	M14	M13	M12	M11	M10	M09	M08
F012	M23	M22	M21	M20	M19	M18	M17	M16
F013	M31	M30	M29	M28	M27	M26	M25	M24
F014	M207	M206	M205	M204	M203	M202	M201	M200
F015	M215	M214	M213	M212	M211	M210	M209	M208
F016	M307	M306	M305	M304	M303	M302	M301	M300

	#7	#6	#5	#4	#3	#2	#1	#0
F017	M315	M314	M313	M312	M311	M310	M309	M308
F022	S07	S06	S05	S04	S03	S02	S01	S00
F023	S15	S14	S13	S12	S11	S10	S09	S08
F024	S23	S22	S21	S20	S19	S18	S17	S16
F025	S31	S30	S29	S28	S27	S26	S25	S24
F026	T07	T06	T05	T04	T03	T02	T01	T00
F027	T15	T14	T13	T12	T11	T10	T09	T08
F028	T23	T22	T21	T20	T19	T18	T17	T16
F029	T31	T30	T29	T28	T27	T26	T25	T24
F030	B07	B06	B05	B04	B03	B02	B01	B00
F031	B15	B14	B13	B12	B11	B10	B09	B08
F032	B23	B22	B21	B20	B19	B18	B17	B16
F033	B31	B30	B29	B28	B27	B26	B25	B24
F034						GR3O	GR2O	GR1O
F035								SPAL
F036	R08O	R07O	R06O	R05O	R04O	R03O	R02O	R01O
F037					R12O	R11O	R10O	R09O
F038					ENB3	ENB2	SUCLP	SCLP
F039					CHPCYL	CHPMD		
F040	AR7	AR6	AR5	AR4	AR3	AR2	AR1	AR0
F041	AR15	AR14	AR13	AR12	AR11	AR10	AR09	AR08
F044				SYCAL	FSPPH	FSPSY	FSCSL	
F045	ORARA	TLMA	LDT2A	LDT1A	SARA	SDTA	SSTA	ALMA
F046	MORA2A	MORA1A	PORA2A	SLVSA	RCFNA	RCHPA	CFINA	CHPA

	#7	#6	#5	#4	#3	#2	#1	#0
F047							INCSTA	PC1DEA
F049	ORARB	TLMB	LDT2B	LDT1B	SARB	SDTB	SSTB	ALMB
F050	MORA2B	MORA1B	PORA2B	SLVSB	RCFNB	RCHPB	CFINB	CHPB
F051							INCSTB	PC1DEB
F053	EKENB			BGEACT	RPALM	RPBSY	PRGDPL	INHKY
F054	UO007	UO006	UO005	UO004	UO003	UO002	UO001	UO000
F055	UO015	UO014	UO013	UO012	UO011	UO010	UO009	UO008
F056	UO107	UO106	UO105	UO104	UO103	UO102	UO101	UO100
F057	UO115	UO114	UO113	UO112	UO111	UO110	UO109	UO108
F058	UO123	UO122	UO121	UO120	UO119	UO118	UO117	UO116
F059	UO131	UO130	UO129	UO128	UO127	UO126	UO125	UO124
F060							ESEND	EREND
F061							BCLP	BUCLP
F062	PRTSF							
F063	PSYN		RCYO			PSAR	PSE2	PSE1
F064						TLCHI	TLNW	TLCH
F065		SYNMOD		RTRCTF			RGSPM	RGSPP
F066	EXHPCC	MMPCC	PECK2		RTNMVS			G08MD
F069	RMTDO7	RMTDO6	RMTDO5	RMTDO4	RMTDO3	RMTDO2	RMTDO1	RMTDO0
F070	PSW08	PSW07	PSW06	PSW05	PSW04	PSW03	PSW02	PSW01
F071							PSW10	PSW09
F072	OUT7	OUT6	OUT5	OUT4	OUT3	OUT2	OUT1	OUT0
F073				ZRNO		MD4O	MD2O	MD1O
F075	SPO	KEYO	DRNO	MLKO	SBKO	BDTO		

	#7	#6	#5	#4	#3	#2	#1	#0
F076			ROV2O	ROV1O	RTAP		MP2O	MP1O
F077		RTO			HS1DO	HS1CO	HS1BO	HS1AO
F078	*FV7O	*FV6O	*FV5O	*FV4O	*FV3O	*FV2O	*FV1O	*FV0O
F079	*JV7O	*JV6O	*JV5O	*JV4O	*JV3O	*JV2O	*JV1O	*JV0O
F080	*JV15O	*JV14O	*JV13O	*JV12O	*JV11O	*JV10O	*JV9O	*JV8O
F081	–J4O	+J4O	–J3O	+J3O	–J2O	+J2O	–J1O	+J1O
F082						RVSL		
F090					ABTSP3	ABTSP2	ABTSP1	ABTQSV
F092			TRSPS		TRACT			
F094	ZP8	ZP7	ZP6	ZP5	ZP4	ZP3	ZP2	ZP1
F096	ZP28	ZP27	ZP26	ZP25	ZP24	ZP23	ZP22	ZP21
F098	ZP38	ZP37	ZP36	ZP35	ZP34	ZP33	ZP32	ZP31
F100	ZP48	ZP47	ZP46	ZP45	ZP44	ZP43	ZP42	ZP41
F102	MV8	MV7	MV6	MV5	MV4	MV3	MV2	MV1
F104	INP8	INP7	INP6	INP5	INP4	INP3	INP2	INP1
F106	MVD8	MVD7	MVD6	MVD5	MVD4	MVD3	MVD2	MVD1
F108	MMI8	MMI7	MMI6	MMI5	MMI4	MMI3	MMI2	MMI1
F110	MDTCH8	MDTCH7	MDTCH6	MDTCH5	MDTCH4	MDTCH3	MDTCH2	MDTCH1
F112	EADEN8	EADEN7	EADEN6	EADEN5	EADEN4	EADEN3	EADEN2	EADEN1
F114	TRQL8	TRQL7	TRQL6	TRQL5	TRQL4	TRQL3	TRQL2	TRQL1
F116	FRP8	FRP7	FRP6	FRP5	FRP4	FRP3	FRP2	FRP1
F118	SYN8O	SYN7O	SYN6O	SYN5O	SYN4O	SYN3O	SYN2O	SYN1O
F120	ZRF8	ZRF7	ZRF6	ZRF5	ZRF4	ZRF3	ZRF2	ZRF1
F122	HDO7	HDO6	HDO5	HDO4	HDO3	HDO2	HDO1	HDO0

	#7	#6	#5	#4	#3	#2	#1	#0
F129	*EAXSL		EOV0					
F130	EBSYA	EOTNA	EOTPA	EGENA	EDENA	EIALA	ECKZA	EINPA
F131							EABUFA	EMFA
F132	EM28A	EM24A	EM22A	EM21A	EM18A	EM14A	EM12A	EM11A
F133	EBSYB	EOTNB	EOTPB	EGENB	EDENB	EIALB	ECKZB	EINPB
F134							EABUFB	EMFB
F135	EM28B	EM24B	EM22B	EM21B	EM18B	EM14B	EM12B	EM11B
F136	EBSYC	EOTNC	EOTPC	EGENC	EDENC	EIALC	ECKZC	EINPC
F137							EABUFC	EMFC
F138	EM28C	EM24C	EM22C	EM21C	EM18C	EM14C	EM12C	EM11C
F139	EBSYD	EOTND	EOTPD	EGEND	EDEND	EIALD	ECKZD	EINPD
F140							EABUFD	EMFD
F141	EM28D	EM24D	EM22D	EM21D	EM18D	EM14D	EM12D	EM11D
F142	EM48A	EM44A	EM42A	EM41A	EM38A	EM34A	EM32A	EM31A
F145	EM48B	EM44B	EM42B	EM41B	EM38B	EM34B	EM32B	EM31B
F148	EM48C	EM44C	EM42C	EM41C	EM38C	EM34C	EM32C	EM31C
F151	EM48D	EM44D	EM42D	EM41D	EM38D	EM34D	EM32D	EM31D
F168	ORARC	TLMC	LDT2C	LDT1C	SARC	SDTC	SSTC	ALMC
F169	MORA2C	MORA1C	PORA2C	SLVSC	RCFNC	RCHPC	CFINC	CHPC
F170							INCSTC	PC1DEC
F177	EDGN	EPARM	EVAR	EPRG	EWTIO	ESTPIO	ERDIO	IOLNK
F178					SRLNO3	SRLNO2	SRLNO1	SRLNO0
F180	CLRCH8	CLRCH7	CLRCH6	CLRCH5	CLRCH4	CLRCH3	CLRCH2	CLRCH1
F182	EACNT8	EACNT7	EACNT6	EACNT5	EACNT4	EACNT3	EACNT2	EACNT1

(2) List of Addresses (Two–Path Control)

Signals addresses for each path are usually assigned as follows:

However, for the signals common to both paths, those signals are assigned to path 1. Interface signals between the CNC and PMC are as shown below: The signals with suffix #1 are those for path 1 and the signals with suffix #2 are those for path 2.

Signal address	Contents
G000–G255	Signals on path 1 (PMC→CNC)
F000–F255	Signals on path 1 (CNC→PMC)
G1000–G1255	Signals on path 2 (PMC→CNC)
F1000–F1255	Signals on path 2 (CNC→PMC)

MT→PMC

Address	#7	#6	#5	#4	#3	#2	#1	#0	Bit number
X004	SKIP#1	ESKIP / SKIP6#1	–MIT2#1 / SKIP5#1	+MIT2#1 / SKIP4#1	–MIT1#1 / SKIP3#1	+MIT1#1 / SKIP2#1	ZAE#1 / SKIP8#1	XAE#1 / SKIP7#1	(T series)
	SKIP#1	ESKIP / SKIP6#1	SKIP5#1	SKIP4#1	SKIP3#1	ZAE#1 / SKIP2#1	YAE#1 / SKIP8#1	XAE#1 / SKIP7#1	(M series)
X007		*DEC7#2	*DEC6#2	*DEC5#2	*DEC4#2	*DEC3#2	*DEC2#2	*DEC1#2	
X008				*ESP					
X009		*DEC7#1	*DEC6#1	*DEC5#1	*DEC4#1	*DEC3#1	*DEC2#1	*DEC1#1	
X013	SKIP#2	SKIP6#2	–MIT2#2 / SKIP5#2	+MIT2#2 / SKIP4#2	–MIT1#2 / SKIP3#2	+MIT1#2 / SKIP2#2	ZAE#2 / SKIP8#2	XAE#2 / SKIP7#2	(T series)
	SKIP#2	SKIP6#2	SKIP5#2	SKIP4#2	SKIP3#2	ZAE#2 / SKIP2#2	YAE#2 / SKIP8#2	XAE#2 / SKIP7#2	(M series)

PMC→CNC

Address	#7	#6	#5	#4	#3	#2	#1	#0
G000	ED7#1	ED6#1	ED5#1	ED4#1	ED3#1	ED2#1	ED1#1	ED0#1
G001	ED15#1	ED14#1	ED13#1	ED12#1	ED11#1	ED10#1	ED9#1	ED8#1
G002	ESTB#1	EA6#1	EA5#1	EA4#1	EA3#1	EA2#1	EA1#1	EA0#1
G004			MFIN3#1	MFIN2#1	FIN#1			
G005	BFIN#1	AFL#1		BFIN#1	TFIN#1	SFIN#1	EFIN#1	MFIN#1
G006		SKIPP#1		OVC#1		*ABSM#1		SRN#1
G007	RLSOT#1	EXLM#1	*FLWP#1	RLSOT3#1		ST#1	STLK#1	RVS#1

	#7	#6	#5	#4	#3	#2	#1	#0
G008	ERS[#1]	RRW[#1]	*SP[#1]	*ESP[#1]				*IT[#1]
G009				PN16[#1]	PN8[#1]	PN4[#1]	PN2[#1]	PN1[#1]
G010	*JV7[#1]	*JV6[#1]	*JV5[#1]	*JV4[#1]	*JV3[#1]	*JV2[#1]	*JV1[#1]	*JV0[#1]
G011	*JV15[#1]	*JV14[#1]	*JV13[#1]	*JV12[#1]	*JV11[#1]	*JV10[#1]	*JV9[#1]	*JV8[#1]
G012	*FV7[#1]	*FV6[#1]	*FV5[#1]	*FV4[#1]	*FV3[#1]	*FV2[#1]	*FV1[#1]	*FV0[#1]
G013	*AFV7[#1]	*AFV6[#1]	*AFV5[#1]	*AFV4[#1]	*AFV3[#1]	*AFV2[#1]	*AFV1[#1]	*AFV0[#1]
G014							ROV2[#1]	ROV1[#1]
G016	F1D[#1]							MSDFON[#1]
G018	HS2D[#1]	HS2C[#1]	HS2B[#1]	HS2A[#1]	HS1D[#1]	HS1C[#1]	HS1B[#1]	HS1[#1]
G019	RT[#1]		MP2[#1]	MP1[#1]	HS3D[#1]	HS3C[#1]	HS3B[#1]	HS3A[#1]
G023	ALNGH[#1]	RGHTH[#1]						
G027	CON[#1]		*SSTP3[#1]	*SSTP2[#1]	*SSTP1[#1]	SWS3[#1]	SWS2[#1]	SWS1[#1]
G028	PC2SLC[#1]	SPSTP[#1]	*SCPF[#1]	*SUCPF[#1]		GR2[#1]	GR1[#1]	
G029		*SSTP[#1]	SOR[#1]	SAR[#1]		GR31[#1]		GR21[#1]
G030	SOV7[#1]	SOV6[#1]	SOV5[#1]	SOV4[#1]	SOV3[#1]	SOV2[#1]	SOV1[#1]	SOV0[#1]
G031	PKESS2[#1]	PKESS1[#1]						
G032	R08I[#1]	R07I[#1]	R06I[#1]	R05I[#1]	R04I[#1]	R03I[#1]	R02I[#1]	R01I[#1]
G033	SIND[#1]	SSIN[#1]	SGN[#1]		R12I[#1]	R11I[#1]	R10I[#1]	R09I[#1]
G034	R08I2[#1]	R07I2[#1]	R06I2[#1]	R05I2[#1]	R04I2[#1]	R03I2[#1]	R02I2[#1]	R01I2[#1]
G035	SIND2[#1]	SSIN2[#1]	SGN2[#1]		R12I2[#1]	R11I2[#1]	R10I2[#1]	R09I2[#1]
G036	R08I3[#1]	R07I3[#1]	R06I3[#1]	R05I3[#1]	R04I3[#1]	R03I3[#1]	R02I3[#1]	R01I3[#1]
G037	SIND3[#1]	SSIN3[#1]	SGN3[#1]		R12I3[#1]	R11I3[#1]	R10I3[#1]	R09I3[#1]
G038	*BECLP[#1]	*BEUCP[#1]			SPPHS SPPHS[#1]	SPSYC SPSYC[#1]		*PLSST[#1]
G039	GOQSM[#1]	WOQSM[#1]	OFN5[#1]	OFN4[#1]	OFN3[#1]	OFN2[#1]	OFN1[#1]	OFN0[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
G040	WOSET#1	PRC#1						OFN6#1
G041	HS2ID#1	HS2IC#1	HS2IB#1	HS2IA#1	HS1ID#1	HS1IC#1	HS1IB#1	HS1IA#1
G042					HS3ID#1	HS3IC#1	HS3IB#1	HS3IA #1
G043	ZRN#1		DNCI#1			MD4#1	MD2#1	MD1#1
G044							MLK#1	BDT1#1
G045	BDT9#1	BDT8#1	BDT7#1	BDT6#1	BDT5#1	BDT4#1	BDT3#1	BDT2#1
G046	DRN#1	KEY4#1	KEY3#1	KEY2#1	KEY1#1		SBK#1	
G047	TL128#1	TL64#1	TL32#1	TL16#1	TL08#1	TL04#1	TL02#1	TL01#1
G048	TLRST#1	TLRSTI#1	TLSKP#1					TL256#1
G049	*TLV7#1	*TLV6#1	*TLV5#1	*TLV4#1	*TLV3#1	*TLV2#1	*TOV1#1	*TLV0#1
G050							*TLV9#1	*TLV8#1
G051	*CHLD#1	CHPST#1			*CHP8#1	*CHP4#1	*CHP2#1	*CHP0#1
G053	CDZ#1	SMZ#1			UINT#1			TMRON#1
G054	UI007#1	UI006#1	UI005#1	UI004#1	UI003#1	UI002#1	UI001#1	UI000#1
G055	UI015#1	UI014#1	UI013#1	UI012#1	UI011#1	UI010#1	UI009#1	UI008#1
G058					EXWT#1	EXSTP#1	EXRD#1	MINP#1
G059							TRRTN#1	TRESC#1
G060	*TSB#1							
G061			RGTSP2#1	RGTSP1#1				RGTAP#1
G062							*CRTOF#1	
G063			NOZAGC#1		SLSPB	SLSPA	NOWT	HEAD
G064		ESRSYC#1			SLPCB	SLPCA	SLCSEQ#1	RTNCY#1
G066	EKSET			RTRCT			ENBKY	IGNVRY#1
G070	MRDYA#1	ORCMA#1	SFRA#1	SRVA#1	CTH1A#1	CTH2A#1	TLMHA#1	TLMLA#1

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	#7	#6	#5	#4	#3	#2	#1	#0
G071	RCHA[#1]	RSLA[#1]	INTGA[#1]	SOCNA[#1]	MCFNA[#1]	SPSLA[#1]	*ESPA[#1]	ARSTA[#1]
G072	RCHHGA[#1]	MFNHGA[#1]	INCMDA[#1]	OVRIDA[#1]	DEFMDA[#1]	NRROA[#1]	ROTAA[#1]	INDXA[#1]
G073						MPOFA[#1]	SLVA[#1]	MORCMA[#1]
G074	MRDYB[#1]	ORCMB[#1]	SFRB[#1]	SRVB[#1]	CTH1B[#1]	CTH2B[#1]	TLMHB[#1]	TLMLB[#1]
G075	RCHB[#1]	RSLB[#1]	INTGB[#1]	SOCNB[#1]	MCFNB[#1]	SPSLB[#1]	*ESPB[#1]	ARSTB[#1]
G076	RCHHGB[#1]	MFNHGB[#1]	INCMDB[#1]	OVRIDB[#1]	DEFMDB[#1]	NRROB[#1]	ROTAB[#1]	INDXB[#1]
G077						MPOFB[#1]	SLVB[#1]	MORCMB[#1]
G078	SHA07[#1]	SHA06[#1]	SHA05[#1]	SHA04[#1]	SHA03[#1]	SHA02[#1]	SHA01[#1]	SHA00[#1]
G079					SHA11[#1]	SHA10[#1]	SHA09[#1]	SHA08[#1]
G080	SHB07[#1]	SHB06[#1]	SHB05[#1]	SHB04[#1]	SHB03[#1]	SHB02[#1]	SHB01[#1]	SHB00[#1]
G081					SHB11[#1]	SHB10[#1]	SHB09[#1]	SHB08[#1]
G082	Reserved for order made macro							
G083	Reserved for order made macro							
G091					SRLNI3[#1]	SRLNI2[#1]	SRLNI1[#1]	SRLNI0[#1]
G092				BGEN[#1]	BGIALM[#1]	BGION[#1]	IOLS[#1]	IOLACK[#1]
G096	HROV[#1]	*HROV6[#1]	*HROV5[#1]	*HROV4[#1]	*HROV3[#1]	*HROV2[#1]	*HROV1[#1]	*HROV0[#1]
G098	EKC7	EKC6	EKC5	EKC4	EKC3	EKC2	EKC1	EKC0
G100		+J7[#1]	+J6[#1]	+J5[#1]	+J4[#1]	+J3[#1]	+J2[#1]	+J1[#1]
G102		–J7[#1]	–J6[#1]	–J5[#1]	–J4[#1]	–J3[#1]	–J2[#1]	–J1[#1]
G106		MI7[#1]	MI6[#1]	MI5[#1]	MI4[#1]	MI3[#1]	MI2[#1]	MI1[#1]
G108		MLK7[#1]	MLK6[#1]	MLK5[#1]	MLK4[#1]	MLK3[#1]	MLK2[#1]	MLK1[#1]
G110		+LM7[#1]	+LM6[#1]	+LM5[#1]	+LM4[#1]	+LM3[#1]	+LM2[#1]	+LM1[#1]
G112		–LM7[#1]	–LM6[#1]	–LM5[#1]	–LM4[#1]	–LM3[#1]	–LM2[#1]	–LM1[#1]
G114		*+L7[#1]	*+L6[#1]	*+L5[#1]	*+L4[#1]	*+L3[#1]	*+L2[#1]	*+L1[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
G116		*–L7[#1]	*–L6[#1]	*–L5[#1]	*–L4[#1]	*–L3[#1]	*–L2[#1]	*–L1[#1]
G118		*+ED7[#1]	*+ED6[#1]	*+ED5[#1]	*+ED4[#1]	*+ED3[#1]	*+ED2[#1]	*+ED1[#1]
G120		*–ED7[#1]	*–ED6[#1]	*–ED5[#1]	*–ED4[#1]	*–ED3[#1]	*–ED2[#1]	*–ED1[#1]
								(T series)
G122	PKESS2[#1]	PK7[#1] / PKESS1[#1]	PK6[#1]	PK5[#1]	PK4[#1]	PK3[#1]	PK2[#1]	PK1[#1]
	PKESS2[#1]	PKESS1[#1]						
								(M series)
G124		DTCH7[#1]	DTCH6[#1]	DTCH5[#1]	DTCH4[#1]	DTCH3[#1]	DTCH2[#1]	DTCH1[#1]
G126		SVF7[#1]	SVF6[#1]	SVF5[#1]	SVF4[#1]	SVF3[#1]	SVF2[#1]	SVF1[#1]
G128		MIX7	MIX6	MIX5	MIX4	MIX3	MIX2	MIX1
G130		*IT7[#1]	*IT6[#1]	*IT5[#1]	*IT4[#1]	*IT3[#1]	*IT2[#1]	*IT1[#1]
G132					+MIT4[#1]	+MIT3[#1]	+MIT2[#1]	+MIT1[#1]
G134					–MIT4[#1]	–MIT3[#1]	–MIT2[#1]	–MIT1[#1]
G136		EAX7[#1]	EAX6[#1]	EAX5[#1]	EAX4[#1]	EAX3[#1]	EAX2[#1]	EAX1[#1]
G138		SYNC7[#1]	SYNC6[#1]	SYNC5[#1]	SYNC4[#1]	SYNC3[#1]	SYNC2[#1]	SYNC1[#1]
G140		SYNCJ7[#1]	SYNCJ6[#1]	SYNCJ5[#1]	SYNCJ4[#1]	SYNCJ3[#1]	SYNCJ2[#1]	SYNCJ1[#1]
G142	EBUFA[#1]	ECLRA[#1]	ESTPA[#1]	ESOFA[#1]	ESBKA[#1]	EMBUFA[#1]		EFINA[#1]
G143	EMSBKA[#1]	EC6A[#1]	EC5A[#1]	EC4A[#1]	EC3A[#1]	EC2A[#1]	EC1A[#1]	EC0A[#1]
G144	EIF7A[#1]	EIF6A[#1]	EIF5A[#1]	EIF4A[#1]	EIF3A[#1]	EIF2A[#1]	EIF1A[#1]	EIF0A[#1]
G145	EIF15A[#1]	EIF14A[#1]	EIF13A[#1]	EIF12A[#1]	EIF11A[#1]	EIF10A[#1]	EIF9A[#1]	EIF8A[#1]
G146	EID7A[#1]	EID6A[#1]	EID5A[#1]	EID4A[#1]	EID3A[#1]	EID2A[#1]	EID1A[#1]	EID0A[#1]
G147	EID15A[#1]	EID14A[#1]	EID13A[#1]	EID12A[#1]	EID11A[#1]	EID10A[#1]	EID9A[#1]	EID8A[#1]
G148	EID23A[#1]	EID22A[#1]	EID21A[#1]	EID20A[#1]	EID19A[#1]	EID18A[#1]	EID17A[#1]	EID16A[#1]
G149	EID31A[#1]	EID30A[#1]	EID29A[#1]	EID28A[#1]	EID27A[#1]	EID26A[#1]	EID25A[#1]	EID24A[#1]
G150	DRNE[#1]	RTE[#1]	OVCE[#1]				ROV2E[#1]	ROV1E[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
G151	*FV7E[#1]	*FV6E[#1]	*FV5E[#1]	*FV4E[#1]	*FV3E[#1]	*FV2E[#1]	*FV1E[#1]	*FV0E[#1]
G154	EBUFB[#1]	ECLRB[#1]	ESTPB[#1]	ESOFB[#1]	ESBKB[#1]	EMBUFB[#1]		EFINB[#1]
G155	EMSBKB[#1]	EC6B[#1]	EC5B[#1]	EC4B[#1]	EC3B[#1]	EC2B[#1]	EC1B[#1]	EC0B[#1]
G156	EIF7B[#1]	EIF6B[#1]	EIF5B[#1]	EIF4B[#1]	EIF3B[#1]	EIF2B[#1]	EIF1B[#1]	EIF0B[#1]
G157	EIF15B[#1]	EIF14B[#1]	EIF13B[#1]	EIF12B[#1]	EIF11B[#1]	EIF10B[#1]	EIF9B[#1]	EIF8B[#1]
G158	EID7B[#1]	EID6B[#1]	EID5B[#1]	EID4B[#1]	EID3B[#1]	EID2B[#1]	EID1B[#1]	EID0B[#1]
G159	EID15B[#1]	EID14B[#1]	EID13B[#1]	EID12B[#1]	EID11B[#1]	EID10B[#1]	EID9B[#1]	EID8B[#1]
G160	EID23B[#1]	EID22B[#1]	EID21B[#1]	EID20B[#1]	EID19B[#1]	EID18B[#1]	EID17B[#1]	EID16B[#1]
G161	EID31B[#1]	EID30B[#1]	EID29B[#1]	EID28B[#1]	EID27B[#1]	EID26B[#1]	EID25B[#1]	EID24B[#1]
G166	EBUFC[#1]	ECLRC[#1]	ESTPC[#1]	ESOFC[#1]	ESBKC[#1]	EMBUFC[#1]		EFINC[#1]
G167	EMSBKC[#1]	EC6C[#1]	EC5C[#1]	EC4C[#1]	EC3C[#1]	EC2C[#1]	EC1C[#1]	EC0C[#1]
G168	EIF7C[#1]	EIF6C[#1]	EIF5C[#1]	EIF4C[#1]	EIF3C[#1]	EIF2C[#1]	EIF1C[#1]	EIF0C[#1]
G169	EIF15C[#1]	EIF14C[#1]	EIF13C[#1]	EIF12C[#1]	EIF11C[#1]	EIF10C[#1]	EIF9C[#1]	EIF8C[#1]
G170	EID7C[#1]	EID6C[#1]	EID5C[#1]	EID4C[#1]	EID3C[#1]	EID2C[#1]	EID1C[#1]	EID0C[#1]
G171	EID15C[#1]	EID14C[#1]	EID13C[#1]	EID12C[#1]	EID11C[#1]	EID10C[#1]	EID9C[#1]	EID8C[#1]
G172	EID23C[#1]	EID22C[#1]	EID21C[#1]	EID20C[#1]	EID19C[#1]	EID18C[#1]	EID17C[#1]	EID16C[#1]
G173	EID31C[#1]	EID30C[#1]	EID29C[#1]	EID28C[#1]	EID27C[#1]	EID26C[#1]	EID25C[#1]	EID24C[#1]
G178	EBUFD[#1]	ECLRD[#1]	ESTPD[#1]	ESOFD[#1]	ESBKD[#1]	EMBUFD[#1]		EFIND[#1]
G179	EMSBKD[#1]	EC6D[#1]	EC5D[#1]	EC4D[#1]	EC3D[#1]	EC2D[#1]	EC1D[#1]	EC0D[#1]
G180	EIF7D[#1]	EIF6D[#1]	EIF5D[#1]	EIF4D[#1]	EIF3D[#1]	EIF2D[#1]	EIF1D[#1]	EIF0D[#1]
G181	EIF15D[#1]	EIF14D[#1]	EIF13D[#1]	EIF12D[#1]	EIF11D[#1]	EIF10D[#1]	EIF9D[#1]	EIF8D[#1]
G182	EID7D[#1]	EID6D[#1]	EID5D[#1]	EID4D[#1]	EID3D[#1]	EID2D[#1]	EID1D[#1]	EID0D[#1]
G183	EID15D[#1]	EID14D[#1]	EID13D[#1]	EID12D[#1]	EID11D[#1]	EID10D[#1]	EID9D[#1]	EID8D[#1]
G184	EID23D[#1]	EID22D[#1]	EID21D[#1]	EID20D[#1]	EID19D[#1]	EID18D[#1]	EID17D[#1]	EID16D[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
G185	EID31D#1	EID30D#1	EID29D#1	EID28D#1	EID27D#1	EID26D#1	EID25D#1	EID24D#1
G190		OVLS7#1	OVLS6#1	OVLS5#1	OVLS4#1	OVLS3#1	OVLS2#1	OVLS1#1
G192		IGVRY7#1	IGVRY6#1	IGVRY5#1	IGVRY4#1	IGVRY3#1	IGVRY2#1	IGVRY1#1
G198		NPOS7#1	NPOS6#1	NPOS5#1	NPOS4#1	NPOS3#1	NPOS2#1	NPOS1#1

PMC→CNC

Address	Bit number							
	#7	#6	#5	#4	#3	#2	#1	#0
G1000	ED7#2	ED6#2	ED5#2	ED4#2	ED3#2	ED2#2	ED1#2	ED0#2
G1001	ED15#2	ED14#2	ED13#2	ED12#2	ED11#2	ED10#2	ED9#2	ED8#2
G1002	ESTB#2	EA6#2	EA5#2	EA4#2	EA3#2	EA2#2	EA1#2	EA0#2
G1004			MFIN3#2	MFIN2#2	FIN#2			
G1005	BFIN#2	AFL#2		BFIN#2	TFIN#2	SFIN#2	EFIN#2	MFIN#2
G1006		SKIPP#2		OVC#2		*ABSM#2		SRN#2
G1007	RLSOT#2	EXLM#2	*FLWP#2	RLSOT3#2		ST#2	STLK#2	RVS#2
G1008	ERS#2	RRW#2	*SP#2	*ESP#2				*IT#2
G1009				PN16#2	PN8#2	PN4#2	PN2#2	PN1#2
G1010	*JV7#2	*JV6#2	*JV5#2	*JV4#2	*JV3#2	*JV2#2	*JV1#2	*JV0#2
G1011	*JV15#2	*JV14#2	*JV13#2	*JV12#2	*JV11#2	*JV10#2	*JV9#2	*JV8#2
G1012	*FV7#2	*FV6#2	*FV5#2	*FV4#2	*FV3#2	*FV2#2	*FV1#2	*FV0#2
G1013	*AFV7#2	*AFV6#2	*AFV5#2	*AFV4#2	*AFV3#2	*AFV2#2	*AFV1#2	*AFV0#2
G1014							ROV2#2	ROV1#2
G1016	F1D#2							MSDFON#2
G1018	HS2D#2	HS2C#2	HS2B#2	HS2A#2	HS1D#2	HS1C#2	HS1B#2	HS1A#2
G1019	RT#2		MP2#2	MP1#2	HS3D#2	HS3C#2	HS3B#2	HS3A#2
G1023	ALNGH#2	RGHTH#2						

	#7	#6	#5	#4	#3	#2	#1	#0
G1027	CON#2		*SSTP3#2	*SSTP2#2	*SSTP1#2	SWS3#2	SWS2#2	SWS1#2
G1028	PC2SLC#2	SPSTP#2	*SCPF#2	*SUCPF#2		GR2#2	GR1#2	
G1029		*SSTP#2	SOR#2	SAR#2		GR31#2		GR21#2
G1030	SOV7#2	SOV6#2	SOV5#2	SOV4#2	SOV3#2	SOV2#2	SOV1#2	SOV0#2
G1031	PKESS2#2	PKESS1#2						
G1032	R08I#2	R07I#2	R06I#2	R05I#2	R04I#2	R03I#2	R02I#2	R01I#2
G1033	SIND#2	SSIN#2	SGN#2		R12I#2	R11I#2	R10I#2	R09I#2
G1034	R08I2#2	R07I2#2	R06I2#2	R05I2#2	R04I2#2	R03I2#2	R02I2#2	R01I2#2
G1035	SIND2#2	SSIN2#2	SGN2#2		R12I2#2	R11I2#2	R10I2#2	R09I2#2
G1036	R08I3#2	R07I3#2	R06I3#2	R05I3#2	R04I3#2	R03I3#2	R02I3#2	R01I3#2
G1037	SIND3#2	SSIN3#2	SGN3#2		R12I3#2	R11I3#2	R10I3#2	R09I3#2
G1038	*BECLP#2	*BEUCP#2			SPPHS#2	SPSYC#2		*PLSST#2
G1039	GOQSM#2	WOQSM#2	OFN5#2	OFN4#2	OFN3#2	OFN2#2	OFN1#2	OFN0#2
G1040	WOSET#2	PRC#2						OFN6#2
G1041	HS2ID#2	HS2IC#2	HS2IB#2	HS2IA#2	HS1ID#2	HS1IC#2	HS1IB#2	HS1IA#2
G1042					HS3ID#2	HS3IC#2	HS3IB#2	HS3IA#2
G1043	ZRN#2		DNCI#2			MD4#2	MD2#2	MD1#2
G1044							MLK#2	BDT1#2
G1045	BDT9#2	BDT8#2	BDT7#2	BDT6#2	BDT5#2	BDT4#2	BDT3#2	BDT2#2
G1046	DRN#2	KEY4#2	KEY3#2	KEY2#2	KEY1#2		SBK#2	
G1047	TL128#2	TL64#2	TL32#2	TL16#2	TL08#2	TL04#2	TL02#2	TL01#2
G1048	TLRST#2	TLRSTI#2	TLSKP#2					TL256#2
G1049	*TLV7#2	*TLV6#2	*TLV5#2	*TLV4#2	*TLV3#2	*TLV2#2	*TOV1#2	*TLV0#2
G1050							*TLV9#2	*TLV8#2

	#7	#6	#5	#4	#3	#2	#1	#0
G1051	*CHLD[#2]	CHPST[#2]			*CHP8[#2]	*CHP4[#2]	*CHP2[#2]	*CHP0[#2]
G1053	CDZ[#2]	SMZ[#2]			UINT[#2]			TMRON[#2]
G1054	UI007[#2]	UI006[#2]	UI005[#2]	UI004[#2]	UI003[#2]	UI002[#2]	UI001[#2]	UI000[#2]
G1055	UI015[#2]	UI014[#2]	UI013[#2]	UI012[#2]	UI011[#2]	UI010[#2]	UI009[#2]	UI008[#2]
G1058					EXWT[#2]	EXSTP[#2]	EXRD[#2]	MINP[#2]
G1059							TRRTN[#2]	TRESC[#2]
G1060	*TSB[#2]							
G1061			RGTSP2[#2]	RGTSP1[#2]				RGTAP[#2]
G1062							*CRTOF[#2]	
G1063			NOZAGC[#2]					
G1064		ESRSYC[#2]					SLCSEQ[#2]	RTNCY[#2]
G1066				RTRCT[#2]				IGNVRY[#2]
G1070	MRDYA[#2]	ORCMA[#2]	SFRA[#2]	SRVA[#2]	CTH1A[#2]	CTH2A[#2]	TLMHA[#2]	TLMLA[#2]
G1071	RCHA[#2]	RSLA[#2]	INTGA[#2]	SOCNA[#2]	MCFNA[#2]	SPSLA[#2]	*ESPA[#2]	ARSTA[#2]
G1072	RCHHGA[#2]	MFNHGA[#2]	INCMDA[#2]	OVRIDA[#2]	DEFMDA[#2]	NRROA[#2]	ROTAA[#2]	INDXA[#2]
G1073						MPOFA[#2]	SLVA[#2]	MORCMA[#2]
G1074	MRDYB[#2]	ORCMB[#2]	SFRB[#2]	SRVB[#2]	CTH1B[#2]	CTH2B[#2]	TLMHB[#2]	TLMLB[#2]
G1075	RCHB[#2]	RSLB[#2]	INTGB[#2]	SOCNB[#2]	MCFNB[#2]	SPSLB[#2]	*ESPB[#2]	ARSTB[#2]
G1076	RCHHGB[#2]	MFNHGB[#2]	INCMDB[#2]	OVRIDB[#2]	DEFMDB[#2]	NRROB[#2]	ROTAB[#2]	INDXB[#2]
G1077						MPOFB[#2]	SLVB[#2]	MORCMB[#2]
G1078	SHA07[#2]	SHA06[#2]	SHA05[#2]	SHA04[#2]	SHA03[#2]	SHA02[#2]	SHA01[#2]	SHA00[#2]
G1079					SHA11[#2]	SHA10[#2]	SHA09[#2]	SHA08[#2]
G1080	SHB07[#2]	SHB06[#2]	SHB05[#2]	SHB04[#2]	SHB03[#2]	SHB02[#2]	SHB01[#2]	SHB00[#2]
G1081					SHB11[#2]	SHB10[#2]	SHB09[#2]	SHB08[#2]

	#7	#6	#5	#4	#3	#2	#1	#0
G1082	Reserved for order made macro							
G1083	Reserved for order made macro							
G1091					SRLNI3[#2]	SRLNI2[#2]	SRLNI1[#2]	SRLNI0[#2]
G1092				BGEN[#2]	BGIALM[#2]	BGION[#2]	IOLS[#2]	IOLACK[#2]
G1096	HROV[#2]	*HROV6[#2]	*HROV5[#2]	*HROV4[#2]	*HROV3[#2]	*HROV2[#2]	*HROV1[#2]	*HROV0[#2]
G1100		+J7[#2]	+J6[#2]	+J5[#2]	+J4[#2]	+J3[#2]	+J2[#2]	+J1[#2]
G1102		–J7[#2]	–J6[#2]	–J5[#2]	–J4[#2]	–J3[#2]	–J2[#2]	–J1[#2]
G1106		MI7[#2]	MI6[#2]	MI5[#2]	MI4[#2]	MI3[#2]	MI2[#2]	MI1[#2]
G1108		MLK7[#2]	MLK6[#2]	MLK5[#2]	MLK4[#2]	MLK3[#2]	MLK2[#2]	MLK1[#2]
G1110		+LM7[#2]	+LM6[#2]	+LM5[#2]	+LM4[#2]	+LM3[#2]	+LM2[#2]	+LM1[#2]
G1112		–LM7[#2]	–LM6[#2]	–LM5[#2]	–LM4[#2]	–LM3[#2]	–LM2[#2]	–LM1[#2]
G1114		*+L7[#2]	*+L6[#2]	*+L5[#2]	*+L4[#2]	*+L3[#2]	*+L2[#2]	*+L1[#2]
G1116		*–L7[#2]	*–L6[#2]	*–L5[#2]	*–L4[#2]	*–L3[#2]	*–L2[#2]	*–L1[#2]
G1118		*+ED7[#2]	*+ED6[#2]	*+ED5[#2]	*+ED4[#2]	*+ED3[#2]	*+ED2[#2]	*+ED1[#2]
G1120		*–ED7[#2]	*–ED6[#2]	*–ED5[#2]	*–ED4[#2]	*–ED3[#2]	*–ED2[#2]	*–ED1[#2]
G1122 (T series)	PKESS2[#2]	PK7[#2] / PKESS1[#2]	PK6[#2]	PK5[#2]	PK4[#2]	PK3[#2]	PK2[#2]	PK1[#2]
G1122 (M series)	PKESS2[#2]	PKESS1[#2]						
G1124		DTCH7[#2]	DTCH6[#2]	DTCH5[#2]	DTCH4[#2]	DTCH3[#2]	DTCH2[#2]	DTCH1[#2]
G1126		SVF7[#2]	SVF6[#2]	SVF5[#2]	SVF4[#2]	SVF3[#2]	SVF2[#2]	SVF1[#2]
G1130		*IT7[#2]	*IT6[#2]	*IT5[#2]	*IT4[#2]	*IT3[#2]	*IT2[#2]	*IT1[#2]
G1132					+MIT4[#2]	+MIT3[#2]	+MIT2[#2]	+MIT1[#2]
G1134					–MIT4[#2]	–MIT3[#2]	–MIT2[#2]	–MIT1[#2]
G1136		EAX7[#2]	EAX6[#2]	EAX5[#2]	EAX4[#2]	EAX3[#2]	EAX2[#2]	EAX1[#2]

	#7	#6	#5	#4	#3	#2	#1	#0
G1138		SYNC7[#2]	SYNC6[#2]	SYNC5[#2]	SYNC4[#2]	SYNC3[#2]	SYNC2[#2]	SYNC1[#2]
G1140		SYNCJ7[#2]	SYNCJ6[#2]	SYNCJ5[#2]	SYNCJ4[#2]	SYNCJ3[#2]	SYNCJ2[#2]	SYNCJ1[#2]
G1142	EBUFA[#2]	ECLRA[#2]	ESTPA[#2]	ESOFA[#2]	ESBKA[#2]	EMBUFA[#2]		EFINA[#2]
G1143	EMSBKA[#2]	EC6A[#2]	EC5A[#2]	EC4A[#2]	EC3A[#2]	EC2A[#2]	EC1A[#2]	EC0A[#2]
G1144	EIF7A[#2]	EIF6A[#2]	EIF5A[#2]	EIF4A[#2]	EIF3A[#2]	EIF2A[#2]	EIF1A[#2]	EIF0A[#2]
G1145	EIF15A[#2]	EIF14A[#2]	EIF13A[#2]	EIF12A[#2]	EIF11A[#2]	EIF10A[#2]	EIF9A[#2]	EIF8A[#2]
G1146	EID7A[#2]	EID6A[#2]	EID5A[#2]	EID4A[#2]	EID3A[#2]	EID2A[#2]	EID1A[#2]	EID0A[#2]
G1147	EID15A[#2]	EID14A[#2]	EID13A[#2]	EID12A[#2]	EID11A[#2]	EID10A[#2]	EID9A[#2]	EID8A[#2]
G1148	EID23A[#2]	EID22A[#2]	EID21A[#2]	EID20A[#2]	EID19A[#2]	EID18A[#2]	EID17A[#2]	EID16A[#2]
G1149	EID31A[#2]	EID30A[#2]	EID29A[#2]	EID28A[#2]	EID27A[#2]	EID26A[#2]	EID25A[#2]	EID24A[#2]
G1150	DRNE[#2]	RTE[#2]	OVCE[#2]				ROV2E[#2]	ROV1E[#2]
G1151	*FV7E[#2]	*FV6E[#2]	*FV5E[#2]	*FV4E[#2]	*FV3E[#2]	*FV2E[#2]	*FV1E[#2]	*FV0E[#2]
G1154	EBUFB[#2]	ECLRB[#2]	ESTPB[#2]	ESOFB[#2]	ESBKB[#2]	EMBUFB[#2]		EFINB[#2]
G1155	EMSBKB[#2]	EC6B[#2]	EC5B[#2]	EC4B[#2]	EC3B[#2]	EC2B[#2]	EC1B[#2]	EC0B[#2]
G1156	EIF7B[#2]	EIF6B[#2]	EIF5B[#2]	EIF4B[#2]	EIF3B[#2]	EIF2B[#2]	EIF1B[#2]	EIF0B[#2]
G1157	EIF15B[#2]	EIF14B[#2]	EIF13B[#2]	EIF12B[#2]	EIF11B[#2]	EIF10B[#2]	EIF9B[#2]	EIF8B[#2]
G1158	EID7B[#2]	EID6B[#2]	EID5B[#2]	EID4B[#2]	EID3B[#2]	EID2B[#2]	EID1B[#2]	EID0B[#2]
G1159	EID15B[#2]	EID14B[#2]	EID13B[#2]	EID12B[#2]	EID11B[#2]	EID10B[#2]	EID9B[#2]	EID8B[#2]
G1160	EID23B[#2]	EID22B[#2]	EID21B[#2]	EID20B[#2]	EID19B[#2]	EID18B[#2]	EID17B[#2]	EID16B[#2]
G1161	EID31B[#2]	EID30B[#2]	EID29B[#2]	EID28B[#2]	EID27B[#2]	EID26B[#2]	EID25B[#2]	EID24B[#2]
G1166	EBUFC[#2]	ECLRC[#2]	ESTPC[#2]	ESOFC[#2]	ESBKC[#2]	EMBUFC[#2]		EFINC[#2]
G1167	EMSBKC[#2]	EC6C[#2]	EC5C[#2]	EC4C[#2]	EC3C[#2]	EC2C[#2]	EC1C[#2]	EC0C[#2]
G1168	EIF7C[#2]	EIF6C[#2]	EIF5C[#2]	EIF4C[#2]	EIF3C[#2]	EIF2C[#2]	EIF1C[#2]	EIF0C[#2]
G1169	EIF15C[#2]	EIF14C[#2]	EIF13C[#2]	EIF12C[#2]	EIF11C[#2]	EIF10C[#2]	EIF9C[#2]	EIF8C[#2]

	#7	#6	#5	#4	#3	#2	#1	#0
G1170	EID7C[#2]	EID6C[#2]	EID5C[#2]	EID4C[#2]	EID3C[#2]	EID2C[#2]	EID1C[#2]	EID0C[#2]
G1171	EID15C[#2]	EID14C[#2]	EID13C[#2]	EID12C[#2]	EID11C[#2]	EID10C[#2]	EID9C[#2]	EID8C[#2]
G1172	EID23C[#2]	EID22C[#2]	EID21C[#2]	EID20C[#2]	EID19C[#2]	EID18C[#2]	EID17C[#2]	EID16C[#2]
G1173	EID31C[#2]	EID30C[#2]	EID29C[#2]	EID28C[#2]	EID27C[#2]	EID26C[#2]	EID25C[#2]	EID24C[#2]
G1178	EBUFD[#2]	ECLRD[#2]	ESTPD[#2]	ESOFD[#2]	ESBKD[#2]	EMBUFD[#2]		EFIND[#2]
G1179	EMSBKD[#2]	EC6D[#2]	EC5D[#2]	EC4D[#2]	EC3D[#2]	EC2D[#2]	EC1D[#2]	EC0D[#2]
G1180	EIF7D[#2]	EIF6D[#2]	EIF5D[#2]	EIF4D[#2]	EIF3D[#2]	EIF2D[#2]	EIF1D[#2]	EIF0D[#2]
G1181	EIF15D[#2]	EIF14D[#2]	EIF13D[#2]	EIF12D[#2]	EIF11D[#2]	EIF10D[#2]	EIF9D[#2]	EIF8D[#2]
G1182	EID7D[#2]	EID6D[#2]	EID5D[#2]	EID4D[#2]	EID3D[#2]	EID2D[#2]	EID1D[#2]	EID0D[#2]
G1183	EID15D[#2]	EID14D[#2]	EID13D[#2]	EID12D[#2]	EID11D[#2]	EID10D[#2]	EID9D[#2]	EID8D[#2]
G1184	EID23D[#2]	EID22D[#2]	EID21D[#2]	EID20D[#2]	EID19D[#2]	EID18D[#2]	EID17D[#2]	EID16D[#2]
G1185	EID31D[#2]	EID30D[#2]	EID29D[#2]	EID28D[#2]	EID27D[#2]	EID26D[#2]	EID25D[#2]	EID24D[#2]
G1190		OVLS7[#2]	OVLS6[#2]	OVLS5[#2]	OVLS4[#2]	OVLS3[#2]	OVLS2[#2]	OVLS1[#2]
G1192		IGVRY7[#2]	IGVRY6[#2]	IGVRY5[#2]	IGVRY4[#2]	IGVRY3[#2]	IGVRY2[#2]	IGVRY1[#2]
G1198		NPOS7[#2]	NPOS6[#2]	NPOS5[#2]	NPOS4[#2]	NPOS3[#2]	NPOS2[#2]	NPOS1[#2]

CNC→PMC

Address	#7	#6	#5	#4	#3	#2	#1	#0
	Bit number							
F000	OP[#1]	SA[#1]	STL[#1]	SPL[#1]				RWD[#1]
F001	MA[#1]		TAP[#1]	ENB[#1]	DEN[#1]	BAL[#1]	RST[#1]	AL[#1]
F002	MDRN[#1]	CUT[#1]		SRNMV[#1]	THRD[#1]	CSS[#1]	RPDO[#1]	INCH[#1]
F003	MTCHIN[#1]	MEDT[#1]	MMEM[#1]	MRMT[#1]	MMDI[#1]	MJ[#1]	MH[#1]	MINC[#1]
F004			MREF[#1]	MAFL[#1]	MSBK[#1]	MABSM[#1]	MMLK[#1]	MBDT1[#1]
F005	MBDT9[#1]	MBDT8[#1]	MBDT7[#1]	MBDT6[#1]	MBDT5[#1]	MBDT4[#1]	MBDT3[#1]	MBDT2[#1]
F007	BF[#1]			BF[#1]	TF[#1]	SF[#1]	EFD[#1]	MF[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
F008			MF3[#1]	MF2[#1]				EF[#1]
F009	DM00[#1]	DM01[#1]	DM02[#1]	DM30[#1]				
F010	M07[#1]	M06[#1]	M05[#1]	M04[#1]	M03[#1]	M02[#1]	M01[#1]	M00[#1]
F011	M15[#1]	M14[#1]	M13[#1]	M12[#1]	M11[#1]	M10[#1]	M09[#1]	M08[#1]
F012	M23[#1]	M22[#1]	M21[#1]	M20[#1]	M19[#1]	M18[#1]	M17[#1]	M16[#1]
F013	M31[#1]	M30[#1]	M29[#1]	M28[#1]	M27[#1]	M26[#1]	M25[#1]	M24[#1]
F014	M207[#1]	M206[#1]	M205[#1]	M204[#1]	M203[#1]	M202[#1]	M201[#1]	M200[#1]
F015	M215[#1]	M214[#1]	M213[#1]	M212[#1]	M211[#1]	M210[#1]	M209[#1]	M208[#1]
F016	M307[#1]	M306[#1]	M305[#1]	M304[#1]	M303[#1]	M302[#1]	M301[#1]	M300[#1]
F017	M315[#1]	M314[#1]	M313[#1]	M312[#1]	M311[#1]	M310[#1]	M309[#1]	M308[#1]
F022	S07[#1]	S06[#1]	S05[#1]	S04[#1]	S03[#1]	S02[#1]	S01[#1]	S00[#1]
F023	S15[#1]	S14[#1]	S13[#1]	S12[#1]	S11[#1]	S10[#1]	S09[#1]	S08[#1]
F024	S23[#1]	S22[#1]	S21[#1]	S20[#1]	S19[#1]	S18[#1]	S17[#1]	S16[#1]
F025	S31[#1]	S30[#1]	S29[#1]	S28[#1]	S27[#1]	S26[#1]	S25[#1]	S24[#1]
F026	T07[#1]	T06[#1]	T05[#1]	T04[#1]	T03[#1]	T02[#1]	T01[#1]	T00[#1]
F027	T15[#1]	T14[#1]	T13[#1]	T12[#1]	T11[#1]	T10[#1]	T09[#1]	T08[#1]
F028	T23[#1]	T22[#1]	T21[#1]	T20[#1]	T19[#1]	T18[#1]	T17[#1]	T16[#1]
F029	T31[#1]	T30[#1]	T29[#1]	T28[#1]	T27[#1]	T26[#1]	T25[#1]	T24[#1]
F030	B07[#1]	B06[#1]	B05[#1]	B04[#1]	B03[#1]	B02[#1]	B01[#1]	B00[#1]
F031	B15[#1]	B14[#1]	B13[#1]	B12[#1]	B11[#1]	B10[#1]	B09[#1]	B08[#1]
F032	B23[#1]	B22[#1]	B21[#1]	B20[#1]	B19[#1]	B18[#1]	B17[#1]	B16[#1]
F033	B31[#1]	B30[#1]	B29[#1]	B28[#1]	B27[#1]	B26[#1]	B25[#1]	B24[#1]
F034						GR3O[#1]	GR2O[#1]	GR1O[#1]
F035								SPAL[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
F036	R08O[#1]	R07O[#1]	R06O[#1]	R05O[#1]	R04O[#1]	R03O[#1]	R02O[#1]	R01O[#1]
F037					R12O[#1]	R11O[#1]	R10O[#1]	R09O[#1]
F038					ENB3[#1]	ENB2[#1]	SUCLP[#1]	SCLP[#1]
F039					CHPCYL[#1]	CHPMD[#1]		
F040	AR7[#1]	AR6[#1]	AR5[#1]	AR4[#1]	AR3[#1]	AR2[#1]	AR1[#1]	AR0[#1]
F041	AR15[#1]	AR14[#1]	AR13[#1]	AR12[#1]	AR11[#1]	AR10[#1]	AR09[#1]	AR08[#1]
F044				SYCAL SYCAL[#1]	FSPPH FSPPH[#1]	FSPSY FSPSY[#1]	FSCSL[#1]	
F045	ORARA[#1]	TLMA[#1]	LDT2A[#1]	LDT1A[#1]	SARA[#1]	SDTA[#1]	SSTA[#1]	ALMA[#1]
F046	MORA2A[#1]	MORA1A[#1]	PORA2A[#1]	SLVSA[#1]	RCFNA[#1]	RCHPA[#1]	CFINA[#1]	CHPA[#1]
F047							INCSTA[#1]	PC1DEA[#1]
F049	ORARB[#1]	TLMB[#1]	LDT2B[#1]	LDT1B[#1]	SARB[#1]	SDTB[#1]	SSTB[#1]	ALMB[#1]
F050	MORA2B[#1]	MORA1B[#1]	PORA2B[#1]	SLVSB[#1]	RCFNB[#1]	RCHPB[#1]	CFINB[#1]	CHPB[#1]
F051							INCSTB[#1]	PC1DEB[#1]
F053	EKENB			BGEACT[#1]	RPALM[#1]	RPBSY[#1]	PRGDPL	INHKY
F054	UO007[#1]	UO006[#1]	UO005[#1]	UO004[#1]	UO003[#1]	UO002[#1]	UO001[#1]	UO000[#1]
F055	UO015[#1]	UO014[#1]	UO013[#1]	UO012[#1]	UO011[#1]	UO010[#1]	UO009[#1]	UO008[#1]
F056	UO107[#1]	UO106[#1]	UO105[#1]	UO104[#1]	UO103[#1]	UO102[#1]	UO101[#1]	UO100[#1]
F057	UO115[#1]	UO114[#1]	UO113[#1]	UO112[#1]	UO111[#1]	UO110[#1]	UO109[#1]	UO108[#1]
F058	UO123[#1]	UO122[#1]	UO121[#1]	UO120[#1]	UO119[#1]	UO118[#1]	UO117[#1]	UO116[#1]
F059	UO131[#1]	UO130[#1]	UO129[#1]	UO128[#1]	UO127[#1]	UO126[#1]	UO125[#1]	UO124[#1]
F060							ESEND[#1]	EREND[#1]
F061							BCLP[#1]	BUCLP[#1]
F062	PRTSF[#1]							
F063	PSYN[#1]	WATO[#1]	RCYO[#1]			PSAR[#1]	PSE2[#1]	PSE1[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
F064	TIALM	TICHK	COSP			TLCHI[#1]	TLNW[#1]	TLCH[#1]
F065		SYNMOD[#1]		RTRCTF[#1]			RGSPM[#1]	RGSPP[#1]
F066			PECK2[#1]		RTNMVS[#1]			G08MD[#1]
F070	PSW08[#1]	PSW07[#1]	PSW06[#1]	PSW05[#1]	PSW04[#1]	PSW03[#1]	PSW02[#1]	PSW01[#1]
F071							PSW10[#1]	PSW09[#1]
F072	OUT7[#1]	OUT6[#1]	OUT5[#1]	OUT4[#1]	OUT3[#1]	OUT2[#1]	OUT1[#1]	OUT0[#1]
F073				ZRNO[#1]		MD4O[#1]	MD2O[#1]	MD1O[#1]
F075	SPO[#1]	KEYO[#1]	DRNO[#1]	MLKO[#1]	SBKO[#1]	BDTO[#1]		
F076			ROV2O[#1]	ROV1O[#1]	RTAP[#1]		MP2O[#1]	MP1O[#1]
F077		RTO[#1]			HS1DO[#1]	HS1CO[#1]	HS1BO[#1]	HS1AO[#1]
F078	*FV7O[#1]	*FV6O[#1]	*FV5O[#1]	*FV4O[#1]	*FV3O[#1]	*FV2O[#1]	*FV1O[#1]	*FV0O[#1]
F079	*JV7O[#1]	*JV6O[#1]	*JV5O[#1]	*JV4O[#1]	*JV3O[#1]	*JV2O[#1]	*JV1O[#1]	*JV0O[#1]
F080	*FV15O[#1]	*FV14O[#1]	*FV13O[#1]	*FV12O[#1]	*FV11O[#1]	*FV10O[#1]	*FV9O[#1]	*FV8O[#1]
F081	–J4O[#1]	+J4O[#1]	–J3O[#1]	+J3O[#1]	–J2O[#1]	+J2O[#1]	–J1O[#1]	+J1O[#1]
F082						RVSL[#1]		
F090						ABTSP2[#1]	ABTSP1[#1]	ABTQSV[#1]
F092			TRSPS[#1]		TRACT[#1]			
F094		ZP7[#1]	ZP6[#1]	ZP5[#1]	ZP4[#1]	ZP3[#1]	ZP2[#1]	ZP1[#1]
F096		ZP27[#1]	ZP26[#1]	ZP25[#1]	ZP24[#1]	ZP23[#1]	ZP22[#1]	ZP21[#1]
F098		ZP37[#1]	ZP36[#1]	ZP35[#1]	ZP34[#1]	ZP33[#1]	ZP32[#1]	ZP31[#1]
F100		ZP47[#1]	ZP46[#1]	ZP45[#1]	ZP44[#1]	ZP43[#1]	ZP42[#1]	ZP41[#1]
F102		MV7[#1]	MV6[#1]	MV5[#1]	MV4[#1]	MV3[#1]	MV2[#1]	MV1[#1]
F104		INP7[#1]	INP6[#1]	INP5[#1]	INP4[#1]	INP3[#1]	INP2[#1]	INP1[#1]
F106		MVD7[#1]	MVD6[#1]	MVD5[#1]	MVD4[#1]	MVD3[#1]	MVD2[#1]	MVD1[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
F108		MMI7[#1]	MMI6[#1]	MMI5[#1]	MMI4[#1]	MMI3[#1]	MMI2[#1]	MMI1[#1]
F110		MDTCH7[#1]	MDTCH6[#1]	MDTCH5[#1]	MDTCH4[#1]	MDTCH3[#1]	MDTCH2[#1]	MDTCH1[#1]
F112		EADEN7[#1]	EADEN6[#1]	EADEN5[#1]	EADEN4[#1]	EADEN3[#1]	EADEN2[#1]	EADEN1[#1]
F114		TRQL7[#1]	TRQL6[#1]	TRQL5[#1]	TRQL4[#1]	TRQL3[#1]	TRQL2[#1]	TRQL1[#1]
F116		FRP7[#1]	FRP6[#1]	FRP5[#1]	FRP4[#1]	FRP3[#1]	FRP2[#1]	FRP1[#1]
F118		SYN7O[#1]	SYN6O[#1]	SYN5O[#1]	SYN4O[#1]	SYN3O[#1]	SYN2O[#1]	SYN1O[#1]
F120		ZRF7[#1]	ZRF6[#1]	ZRF5[#1]	ZRF4[#1]	ZRF3[#1]	ZRF2[#1]	ZRF1[#1]
F122	HDO7[#1]	HDO6[#1]	HDO5[#1]	HDO4[#1]	HDO3[#1]	HDO2[#1]	HDO1[#1]	HDO0[#1]
F129	*EAXSL[#1]		EOV0[#1]					
F130	EBSYA[#1]	EOTNA[#1]	EOTPA[#1]	EGENA[#1]	EDENA[#1]	EIALA[#1]	ECKZA[#1]	EINPA[#1]
F131							EABUFA[#1]	EMFA[#1]
F132	EM28A[#1]	EM24A[#1]	EM22A[#1]	EM21A[#1]	EM18A[#1]	EM14A[#1]	EM12A[#1]	EM11A[#1]
F133	EBSYB[#1]	EOTNB[#1]	EOTPB[#1]	EGENB[#1]	EDENB[#1]	EIALB[#1]	ECKZB[#1]	EINPB[#1]
F134							EABUFB[#1]	EMFB[#1]
F135	EM28B[#1]	EM24B[#1]	EM22B[#1]	EM21B[#1]	EM18B[#1]	EM14B[#1]	EM12B[#1]	EM11B[#1]
F136	EBSYC[#1]	EOTNC[#1]	EOTPC[#1]	EGENC[#1]	EDENC[#1]	EIALC[#1]	ECKZC[#1]	EINPC[#1]
F137							EABUFC[#1]	EMFC[#1]
F138	EM28C[#1]	EM24C[#1]	EM22C[#1]	EM21C[#1]	EM18C[#1]	EM14C[#1]	EM12C[#1]	EM11C[#1]
F139	EBSYD[#1]	EOTND[#1]	EOTPD[#1]	EGEND[#1]	EDEND[#1]	EIALD[#1]	ECKZD[#1]	EINPD[#1]
F140							EABUFD[#1]	EMFD[#1]
F141	EM28D[#1]	EM24D[#1]	EM22D[#1]	EM21D[#1]	EM18D[#1]	EM14D[#1]	EM12D[#1]	EM11D[#1]
F142	EM48A[#1]	EM44A[#1]	EM42A[#1]	EM41A[#1]	EM38A[#1]	EM34A[#1]	EM32A[#1]	EM31A[#1]
F145	EM48B[#1]	EM44B[#1]	EM42B[#1]	EM41B[#1]	EM38B[#1]	EM34B[#1]	EM32B[#1]	EM31B[#1]
F148	EM48C[#1]	EM44C[#1]	EM42C[#1]	EM41C[#1]	EM38C[#1]	EM34C[#1]	EM32C[#1]	EM31C[#1]

	#7	#6	#5	#4	#3	#2	#1	#0
F151	EM48D[#1]	EM44D[#1]	EM42D[#1]	EM41D[#1]	EM38D[#1]	EM34D[#1]	EM32D[#1]	EM31D[#1]
F177	EDGN[#1]	EPARM[#1]	EVAR[#1]	EPRG[#1]	EWTIO[#1]	ESTPIO[#1]	ERDIO[#1]	IOLNK[#1]
F178					SRLNO3[#1]	SRLNO2[#1]	SRLNO1[#1]	SRLNO0[#1]
F180	CLRCH8[#1]	CLRCH7[#1]	CLRCH6[#1]	CLRCH5[#1]	CLRCH4[#1]	CLRCH3[#1]	CLRCH2[#1]	CLRCH1[#1]
F182		EACNT7[#1]	EACNT6[#1]	EACNT5[#1]	EACNT4[#1]	EACNT3[#1]	EACNT2[#1]	EACNT1[#1]

PMC→CNC

Address — Bit number

Address	#7	#6	#5	#4	#3	#2	#1	#0
F1100	OP[#2]	SA[#2]	STL[#2]	SPL[#2]				RWD[#2]
F1001	MA[#2]		TAP[#2]	ENB[#2]	DEN[#2]	BAL[#2]	RST[#2]	AL[#2]
F1002	MDRN[#2]	CUT[#2]		SRNMV[#2]	THRD[#2]	CSS[#2]	RPDO[#2]	INCH[#2]
F1003	MTCHIN[#2]	MEDT[#2]	MMEM[#2]	MRMT[#2]	MMDI[#2]	MJ[#2]	MH[#2]	MINC[#2]
F1004			MREF[#2]	MAFL[#2]	MSBK[#2]	MABSM[#2]	MMLK[#2]	MBDT1[#2]
F1005	MBDT9[#2]	MBDT8[#2]	MBDT7[#2]	MBDT6[#2]	MBDT5[#2]	MBDT4[#2]	MBDT3[#2]	MBDT2[#2]
F1007	BF[#2]			BF[#2]	TF[#2]	SF[#2]	EFD[#2]	MF[#2]
F1008			MF3[#2]	MF2[#2]				EF[#2]
F1009	DM00[#2]	DM01[#2]	DM02[#2]	DM30[#2]				
F1010	M07[#2]	M06[#2]	M05[#2]	M04[#2]	M03[#2]	M02[#2]	M01[#2]	M00[#2]
F1011	M15[#2]	M14[#2]	M13[#2]	M12[#2]	M11[#2]	M10[#2]	M09[#2]	M08[#2]
F1012	M23[#2]	M22[#2]	M21[#2]	M20[#2]	M19[#2]	M18[#2]	M17[#2]	M16[#2]
F1013	M31[#2]	M30[#2]	M29[#2]	M28[#2]	M27[#2]	M26[#2]	M25[#2]	M24[#2]
F1014	M207[#2]	M206[#2]	M205[#2]	M204[#2]	M203[#2]	M202[#2]	M201[#2]	M200[#2]
F1015	M215[#2]	M214[#2]	M213[#2]	M212[#2]	M211[#2]	M210[#2]	M209[#2]	M208[#2]
F1016	M307[#2]	M306[#2]	M305[#2]	M304[#2]	M303[#2]	M302[#2]	M301[#2]	M300[#2]
F1017	M315[#2]	M314[#2]	M313[#2]	M312[#2]	M311[#2]	M310[#2]	M309[#2]	M308[#2]

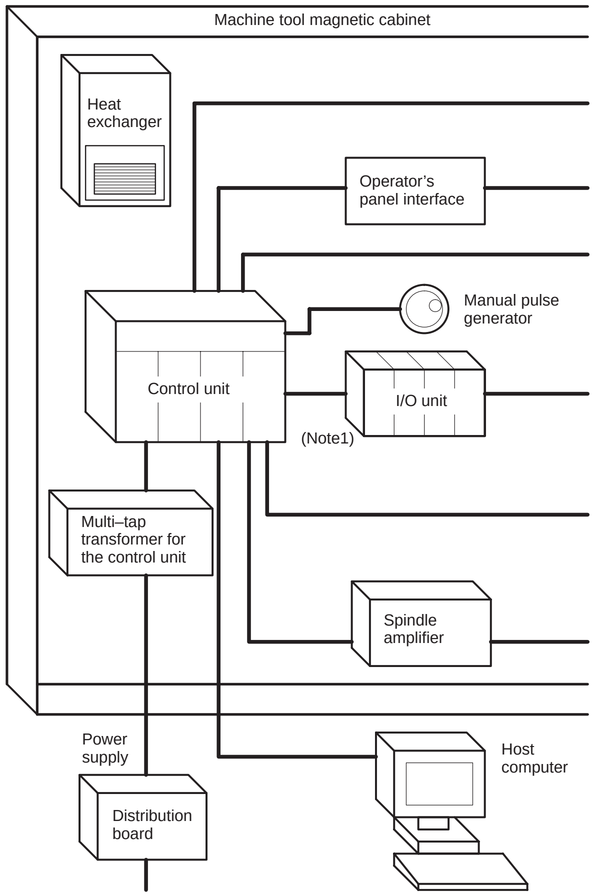
	#7	#6	#5	#4	#3	#2	#1	#0
F1022	S07[#2]	S06[#2]	S05[#2]	S04[#2]	S03[#2]	S02[#2]	S01[#2]	S00[#2]
F1023	S15[#2]	S14[#2]	S13[#2]	S12[#2]	S11[#2]	S10[#2]	S09[#2]	S08[#2]
F1024	S23[#2]	S22[#2]	S21[#2]	S20[#2]	S19[#2]	S18[#2]	S17[#2]	S16[#2]
F1025	S31[#2]	S30[#2]	S29[#2]	S28[#2]	S27[#2]	S26[#2]	S25[#2]	S24[#2]
F1026	T07[#2]	T06[#2]	T05[#2]	T04[#2]	T03[#2]	T02[#2]	T01[#2]	T00[#2]
F1027	T15[#2]	T14[#2]	T13[#2]	T12[#2]	T11[#2]	T10[#2]	T09[#2]	T08[#2]
F1028	T23[#2]	T22[#2]	T21[#2]	T20[#2]	T19[#2]	T18[#2]	T17[#2]	T16[#2]
F1029	T31[#2]	T30[#2]	T29[#2]	T28[#2]	T27[#2]	T26[#2]	T25[#2]	T24[#2]
F1030	B07[#2]	B06[#2]	B05[#2]	B04[#2]	B03[#2]	B02[#2]	B01[#2]	B00[#2]
F1031	B15[#2]	B14[#2]	B13[#2]	B12[#2]	B11[#2]	B10[#2]	B09[#2]	B08[#2]
F1032	B23[#2]	B22[#2]	B21[#2]	B20[#2]	B19[#2]	B18[#2]	B17[#2]	B16[#2]
F1033	B31[#2]	B30[#2]	B29[#2]	B28[#2]	B27[#2]	B26[#2]	B25[#2]	B24[#2]
F1034						GR3O[#2]	GR2O[#2]	GR1O[#2]
F1035								SPAL[#2]
F1036	R08O[#2]	R07O[#2]	R06O[#2]	R05O[#2]	R04O[#2]	R03O[#2]	R02O[#2]	R01O[#2]
F1037					R12O[#2]	R11O[#2]	R10O[#2]	R09O[#2]
F1038					ENB3[#2]	ENB2[#2]	SUCLP[#2]	SCLP[#2]
F1039					CHPCYL[#2]	CHPMD[#2]		
F1040	AR7[#2]	AR6[#2]	AR5[#2]	AR4[#2]	AR3[#2]	AR2[#2]	AR1[#2]	AR0[#2]
F1041	AR15[#2]	AR14[#2]	AR13[#2]	AR12[#2]	AR11[#2]	AR10[#2]	AR09[#2]	AR08[#2]
F1044				SYCAL[#2]	FSPPH[#2]	FSPSY[#2]	FSCSL[#2]	
F1045	ORARA[#2]	TLMA[#2]	LDT2A[#2]	LDT1A[#2]	SARA[#2]	SDTA[#2]	SSTA[#2]	ALMA[#2]
F1046	MORA2A[#2]	MORA1A[#2]	PORA2A[#2]	SLVSA[#2]	RCFNA[#2]	RCHPA[#2]	CFINA[#2]	CHPA[#2]
F1047							INCSTA[#2]	PC1DEA[#2]

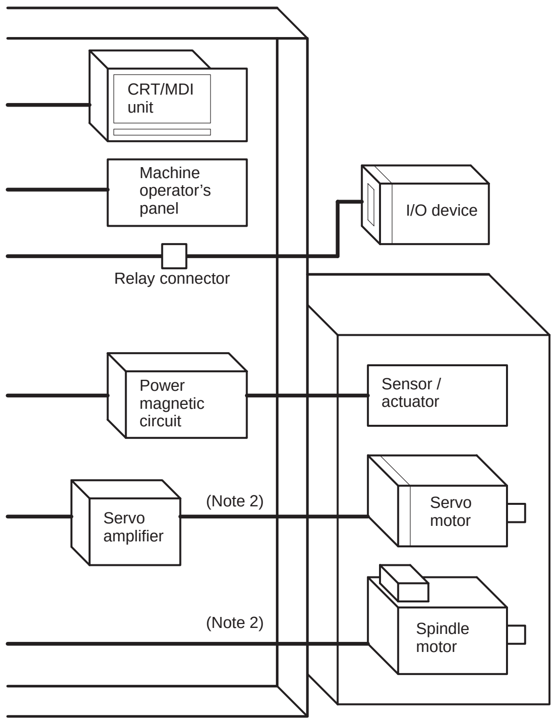
	#7	#6	#5	#4	#3	#2	#1	#0
F1049	ORARB[#2]	TLMB[#2]	LDT2B[#2]	LDT1B[#2]	SARB[#2]	SDTB[#2]	SSTB[#2]	ALMB[#2]
F1050	MORA2B[#2]	MORA1B[#2]	PORA2B[#2]	SLVSB[#2]	RCFNB[#2]	RCHPB[#2]	CFINB[#2]	CHPB[#2]
F1051							INCSTB[#2]	PC1DEB[#2]
F1053				BGEACT[#2]	RPALM[#2]	RPBSY[#2]		
F1054	UO007[#2]	UO006[#2]	UO005[#2]	UO004[#2]	UO003[#2]	UO002[#2]	UO001[#2]	UO000[#2]
F1055	UO015[#2]	UO014[#2]	UO013[#2]	UO012[#2]	UO011[#2]	UO010[#2]	UO009[#2]	UO008[#2]
F1056	UO107[#2]	UO106[#2]	UO105[#2]	UO104[#2]	UO103[#2]	UO102[#2]	UO101[#2]	UO100[#2]
F1057	UO115[#2]	UO114[#2]	UO113[#2]	UO112[#2]	UO111[#2]	UO110[#2]	UO109[#2]	UO108[#2]
F1058	UO123[#2]	UO122[#2]	UO121[#2]	UO120[#2]	UO119[#2]	UO118[#2]	UO117[#2]	UO116[#2]
F1059	UO131[#2]	UO130[#2]	UO129[#2]	UO128[#2]	UO127[#2]	UO126[#2]	UO125[#2]	UO124[#2]
F1060							ESEND[#2]	EREND[#2]
F1061							BCLP[#2]	BUCLP[#2]
F1062	PRTSF[#2]							
F1063	PSYN[#2]	WATO[#2]	RCYO[#2]			PSAR[#2]	PSE2[#2]	PSE1[#2]
F1064						TLCHI[#2]	TLNW[#2]	TLCH[#2]
F1065		SYNMOD[#2]		RTRCTF[#2]			RGSPM[#2]	RGSPP[#2]
F1066			PECK2[#2]		RTNMVS[#2]			G08MD[#2]
F1070	PSW08[#2]	PSW07[#2]	PSW06[#2]	PSW05[#2]	PSW04[#2]	PSW03[#2]	PSW02[#2]	PSW01[#2]
F1071							PSW10[#2]	PSW09[#2]
F1072	OUT7[#2]	OUT6[#2]	OUT5[#2]	OUT4[#2]	OUT3[#2]	OUT2[#2]	OUT1[#2]	OUT0[#2]
F1073				ZRNO[#2]		MD4O[#2]	MD2O[#2]	MD1O[#2]
F1075	SPO[#2]	KEYO[#2]	DRNO[#2]	MLKO[#2]	SBKO[#2]	BDTO[#2]		
F1076			ROV2O[#2]	ROV1O[#2]	RTAP[#2]		MP2O[#2]	MP1O[#2]
F1077		RTO[#2]			HS1DO[#2]	HS1CO[#2]	HS1BO[#2]	HS1AO[#2]

	#7	#6	#5	#4	#3	#2	#1	#0
F1078	*FV7O[#2]	*FV6O[#2]	*FV5O[#2]	*FV4O[#2]	*FV3O[#2]	*FV2O[#2]	*FV1O[#2]	*FV0O[#2]
F1079	*JV7O[#2]	*JV6O[#2]	*JV5O[#2]	*JV4O[#2]	*JV3O[#2]	*JV2O[#2]	*JV1O[#2]	*JV0O[#2]
F1080	*FV15O[#2]	*FV14O[#2]	*FV13O[#2]	*FV12O[#2]	*FV11O[#2]	*FV10O[#2]	*FV09O[#2]	*FV08O[#2]
F1081	–J4O[#2]	+J4O[#2]	–J3O[#2]	+J3O[#2]	–J2O[#2]	+J2O[#2]	–J1O[#2]	+J1O[#2]
F1082						RVSL[#2]		
F1090						ABTSP2[#2]	ABTSP1[#2]	ABTQSV[#2]
F1092			TRSPS[#2]		TRACT[#2]			
F1094		ZP7[#2]	ZP6[#2]	ZP5[#2]	ZP4[#2]	ZP3[#2]	ZP2[#2]	ZP1[#2]
F1096		ZP27[#2]	ZP26[#2]	ZP25[#2]	ZP24[#2]	ZP23[#2]	ZP22[#2]	ZP21[#2]
F1098		ZP37[#2]	ZP36[#2]	ZP35[#2]	ZP34[#2]	ZP33[#2]	ZP32[#2]	ZP31[#2]
F1100		ZP47[#2]	ZP46[#2]	ZP45[#2]	ZP44[#2]	ZP43[#2]	ZP42[#2]	ZP41[#2]
F1102		MV7[#2]	MV6[#2]	MV5[#2]	MV4[#2]	MV3[#2]	MV2[#2]	MV1[#2]
F1104		INP7[#2]	INP6[#2]	INP5[#2]	INP4[#2]	INP3[#2]	INP2[#2]	INP1[#2]
F1106		MVD7[#2]	MVD6[#2]	MVD5[#2]	MVD4[#2]	MVD3[#2]	MVD2[#2]	MVD1[#2]
F1108		MMI7[#2]	MMI6[#2]	MMI5[#2]	MMI4[#2]	MMI3[#2]	MMI2[#2]	MMI1[#2]
F1110		MDTCH7[#2]	MDTCH6[#2]	MDTCH5[#2]	MDTCH4[#2]	MDTCH3[#2]	MDTCH2[#2]	MDTCH1[#2]
F1112		EADEN7[#2]	EADEN6[#2]	EADEN5[#2]	EADEN4[#2]	EADEN3[#2]	EADEN2[#2]	EADEN1[#2]
F1114		TRQL7[#2]	TRQL6[#2]	TRQL5[#2]	TRQL4[#2]	TRQL3[#2]	TRQL2[#2]	TRQL1[#2]
F1116		FRP7[#2]	FRP6[#2]	FRP5[#2]	FRP4[#2]	FRP3[#2]	FRP2[#2]	FRP1[#2]
F1118		SYN7O[#2]	SYN6O[#2]	SYN5O[#2]	SYN4O[#2]	SYN3O[#2]	SYN2O[#2]	SYN1O[#2]
F1120		ZRF7[#2]	ZRF6[#2]	ZRF5[#2]	ZRF4[#2]	ZRF3[#2]	ZRF2[#2]	ZRF1[#2]
F1122	HDO7[#2]	HDO6[#2]	HDO5[#2]	HDO4[#2]	HDO3[#2]	HDO2[#2]	HDO1[#2]	HDO0[#2]
F1129	*EAXSL[#2]		EOV0[#2]					
F1130	EBSYA[#2]	EOTNA[#2]	EOTA[#2]	EGENA[#2]	EDENA[#2]	EIALA[#2]	ECKZA[#2]	EINPA[#2]

Address	#7	#6	#5	#4	#3	#2	#1	#0
F1131							EABUFA[#2]	EMFA[#2]
F1132	EM28A[#2]	EM24A[#2]	EM22A[#2]	EM21A[#2]	EM18A[#2]	EM14A[#2]	EM12A[#2]	EM11A[#2]
F1133	EBSYB[#2]	EOTNB[#2]	EOTB[#2]	EGENB[#2]	EDENB[#2]	EIALB[#2]	ECKZB[#2]	EINPB[#2]
F1134							EABUFB[#2]	EMFB[#2]
F1135	EM28B[#2]	EM24B[#2]	EM22B[#2]	EM21B[#2]	EM18B[#2]	EM14B[#2]	EM12B[#2]	EM11B[#2]
F1136	EBSYC[#2]	EOTNC[#2]	EOTC[#2]	EGENC[#2]	EDENC[#2]	EIALC[#2]	ECKZC[#2]	EINPC[#2]
F1137							EABUFC[#2]	EMFC[#2]
F1138	EM28C[#2]	EM24C[#2]	EM22C[#2]	EM21C[#2]	EM18C[#2]	EM14C[#2]	EM12C[#2]	EM11C[#2]
F1139	EBSYD[#2]	EOTND[#2]	EOTD[#2]	EGEND[#2]	EDEND[#2]	EIALD[#2]	ECKZD[#2]	EINPD[#2]
F1140							EABUFD[#2]	EMFD[#2]
F1141	EM28D[#2]	EM24D[#2]	EM22D[#2]	EM21D[#2]	EM18D[#2]	EM14D[#2]	EM12D[#2]	EM11D[#2]
F1142	EM48A[#2]	EM44A[#2]	EM42A[#2]	EM41A[#2]	EM38A[#2]	EM34A[#2]	EM32A[#2]	EM31A[#2]
F1145	EM48B[#2]	EM44B[#2]	EM42B[#2]	EM41B[#2]	EM38B[#2]	EM34B[#2]	EM32B[#2]	EM31B[#2]
F1148	EM48C[#2]	EM44C[#2]	EM42C[#2]	EM41C[#2]	EM38C[#2]	EM34C[#2]	EM32C[#2]	EM31C[#2]
F1151	EM48D[#2]	EM44D[#2]	EM42D[#2]	EM41D[#2]	EM38D[#2]	EM34D[#2]	EM32D[#2]	EM31D[#2]
F1177	EDGN[#2]	EPARM[#2]	EVAR[#2]	EPRG[#2]	EWTIO[#2]	ESTPIO[#2]	ERDIO[#2]	IOLNK[#2]
F1178					SRLNO3[#2]	SRLNO2[#2]	SRLNO1[#2]	SRLNO0[#2]
F1180	CLRCH8[#2]	CLRCH7[#2]	CLRCH6[#2]	CLRCH5[#2]	CLRCH4[#2]	CLRCH3[#2]	CLRCH2[#2]	CLRCH1[#2]
F1182		EACNT7[#2]	EACNT6[#2]	EACNT5[#2]	EACNT4[#2]	EACNT3[#2]	EACNT2[#2]	EACNT1[#2]

7.1 Configuration of CNC Machine Tool



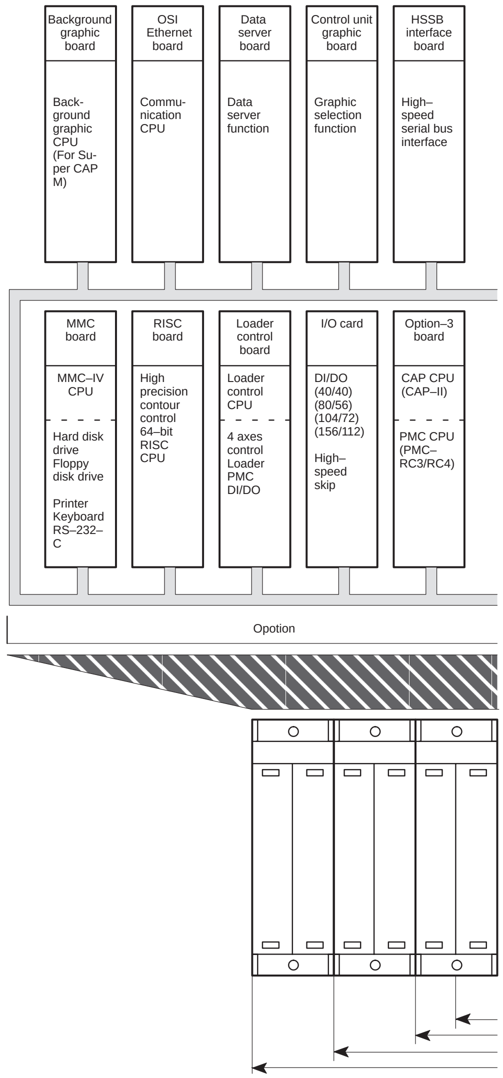


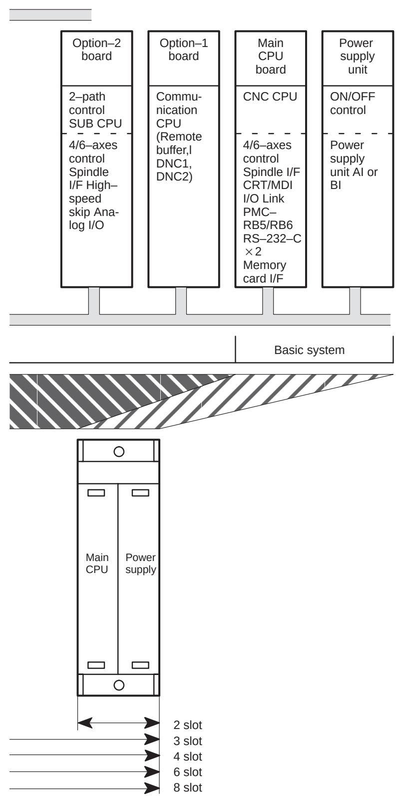
NOTE1 Refer to the "FANUC I/O Unit Model A Connecting Maintenance Manual (B-61813E)".

NOTE2 Refer to the following manuals:
"FANUC AC Servo Motor α Series Descriptions (B-65142E)"
"FANUC AC Spindle Motor α Series Descriptions (B-65152E)"
"FANUC CONTROL MOTOR AMPLIFIER α Series Descriptions (B–65162E)"

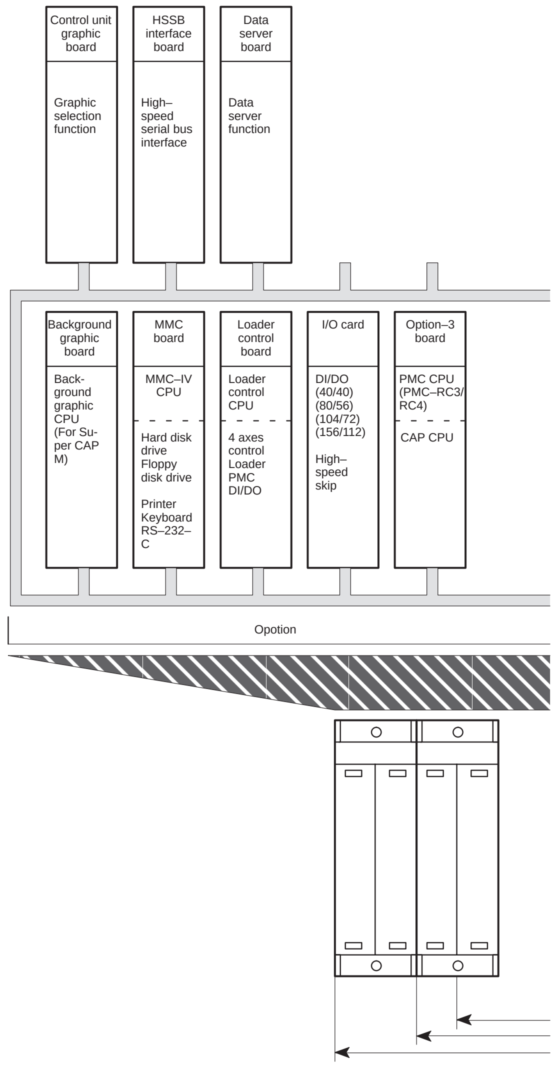
7.2 Configuration of the Control Unit

(1) For Series 16/160

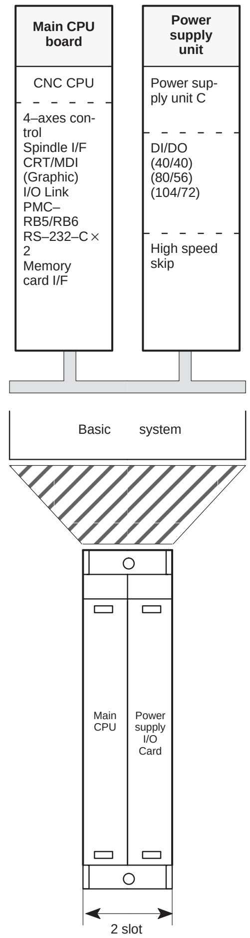


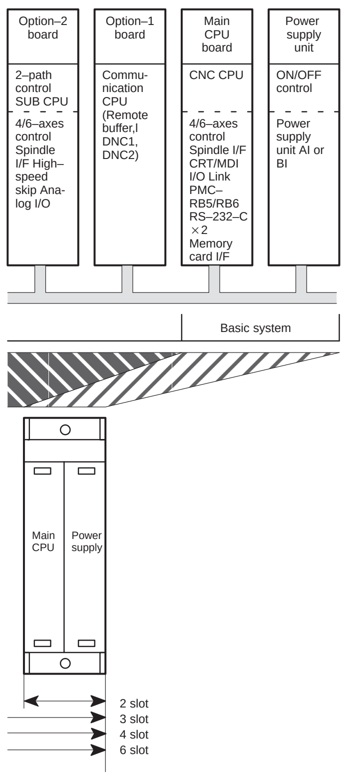

Option–2 board
2–path control SUB CPU
4/6–axes control Spindle I/F High–speed skip Ana-log I/O
Option–1 board
Commu-nication CPU (Remote buffer,I DNC1, DNC2)
Main CPU board
CNC CPU
4/6–axes control Spindle I/F CRT/MDI I/O Link PMC–RB5/RB6 RS–232–C ×2 Memory card I/F
Power supply unit
ON/OFF control
Power supply unit AI or BI
Basic system
Main CPU
Power supply
2 slot
3 slot
4 slot
6 slot
8 slot

(2) For Series 18/180



(3) When power supply C is used.



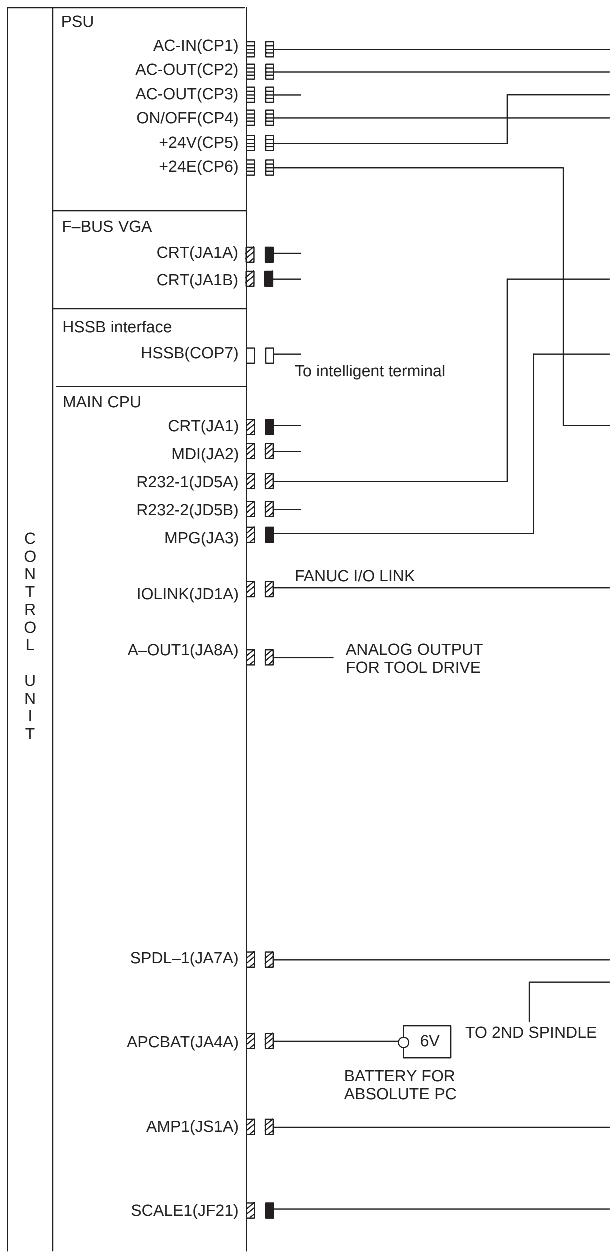


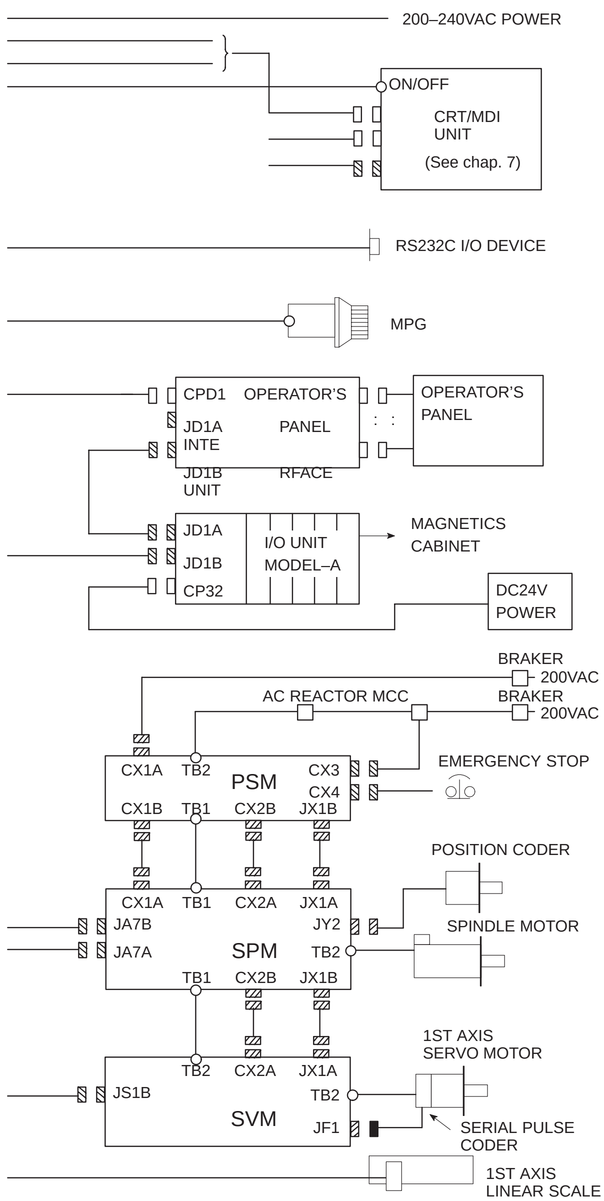
7

7.3 Total Connection

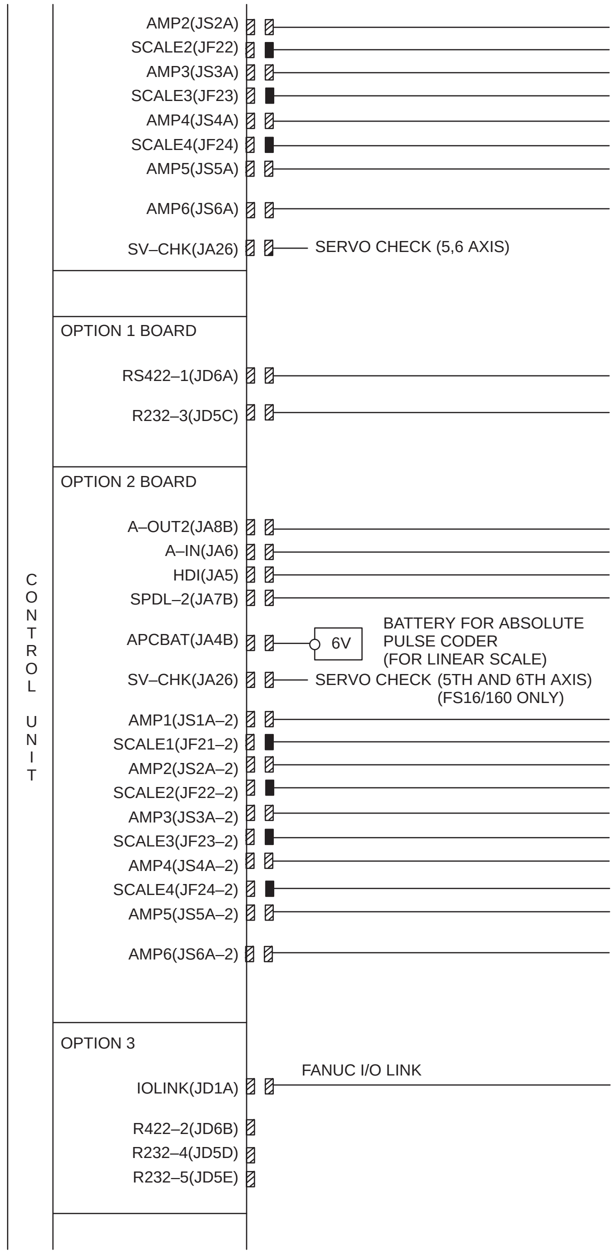
(1) When power supply unit AI/BI is used.

NOTE Refer to item 7.1.1 for CRT/MDI connection.




200–240VAC POWER
ON/OFF
CRT/MDI UNIT
(See chap. 7)
RS232C I/O DEVICE
MPG
CPD1
OPERATOR'S PANEL INTERFACE UNIT
JD1A
JD1B
OPERATOR'S PANEL
JD1A
JD1B
CP32
I/O UNIT MODEL–A
MAGNETICS CABINET
DC24V POWER
BRAKER
200VAC
AC REACTOR MCC
BRAKER
200VAC
EMERGENCY STOP
CX1A
TB2
PSM
CX3
CX4
CX1B
TB1
CX2B
JX1B
POSITION CODER
CX1A
TB1
CX2A
JX1A
JA7B
JY2
SPINDLE MOTOR
JA7A
SPM
TB2
TB1
CX2B
JX1B
1ST AXIS SERVO MOTOR
TB2
CX2A
JX1A
JS1B
TB2
SVM
JF1
SERIAL PULSE CODER
1ST AXIS LINEAR SCALE

7


AMP2(JS2A)
SCALE2(JF22)
AMP3(JS3A)
SCALE3(JF23)
AMP4(JS4A)
SCALE4(JF24)
AMP5(JS5A)
AMP6(JS6A)
SV–CHK(JA26)
SERVO CHECK (5,6 AXIS)
OPTION 1 BOARD
RS422–1(JD6A)
R232–3(JD5C)
OPTION 2 BOARD
A–OUT2(JA8B)
A–IN(JA6)
HDI(JA5)
SPDL–2(JA7B)
APCBAT(JA4B)
6V
BATTERY FOR ABSOLUTE PULSE CODER (FOR LINEAR SCALE)
SV–CHK(JA26)
SERVO CHECK (5TH AND 6TH AXIS) (FS16/160 ONLY)
CONTROL UNIT
AMP1(JS1A–2)
SCALE1(JF21–2)
AMP2(JS2A–2)
SCALE2(JF22–2)
AMP3(JS3A–2)
SCALE3(JF23–2)
AMP4(JS4A–2)
SCALE4(JF24–2)
AMP5(JS5A–2)
AMP6(JS6A–2)
OPTION 3
IOLINK(JD1A)
FANUC I/O LINK
R422–2(JD6B)
R232–4(JD5D)
R232–5(JD5E)

2ND AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO 1ST AXIS)

3RD AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO 1ST AXIS)

4TH AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO 1ST AXIS)

5TH AXIS SERVO AMP/MOTOR/PC
(CONNECTION CONFORMS TO 1ST AXIS)

6TH AXIS SERVO AMP/MOROR/PC
(CONNECTION CONFORMS TO 1ST AXIS)

REMOTE BUFFER OR DNC1 (RS422)

REMOTE BUFFER (RS232C)

ANALOG OUTPUT FOR TOOL DRIVE

ANALOG I/O

HIGH SPEED DI

CONNECTION CONFORMS TO THAT OF
MAIN CPU BOARD

SUB 1ST AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO MAIN 1ST AXIS)

SUB 2ND AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO MAIN 1ST AXIS)

SUB 3RD AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO MAIN 1ST AXIS)

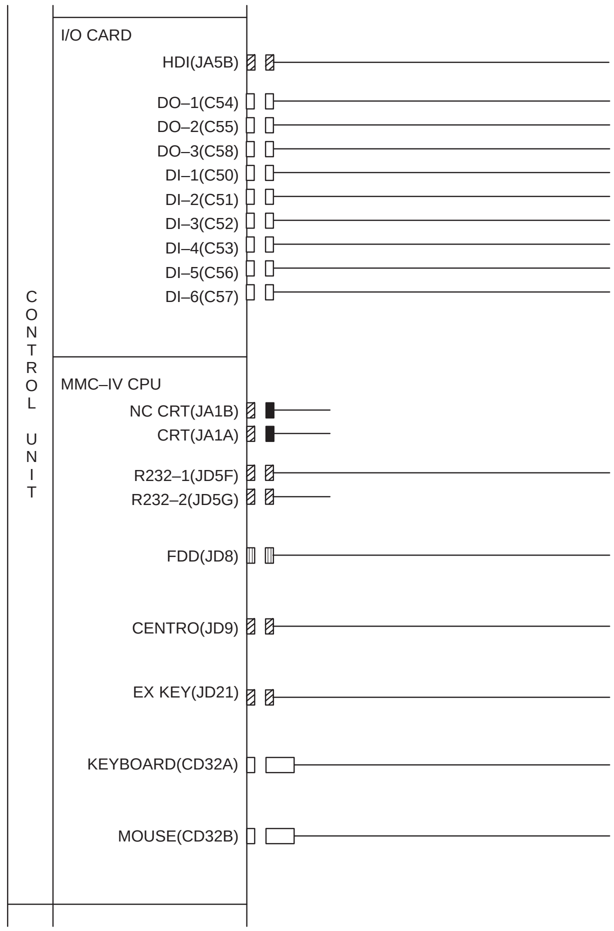
SUB 4TH AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO MAIN 1ST AXIS)

SUB 5TH AXIS SERVO AMP/MOTOR/PC
(CONNECTION CONFORMS TO MAIN 1ST AXIS)

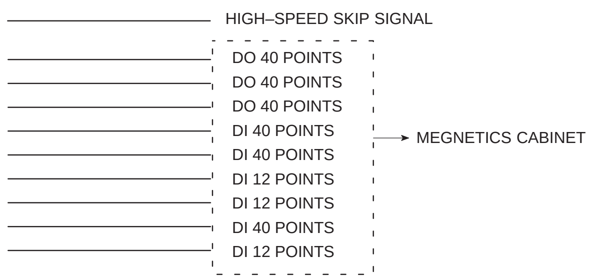
SUB 6TH AXIS SERVO AMP/MOTOR/PC
(CONNECTION CONFORMS TO MAIN 1ST AXIS)

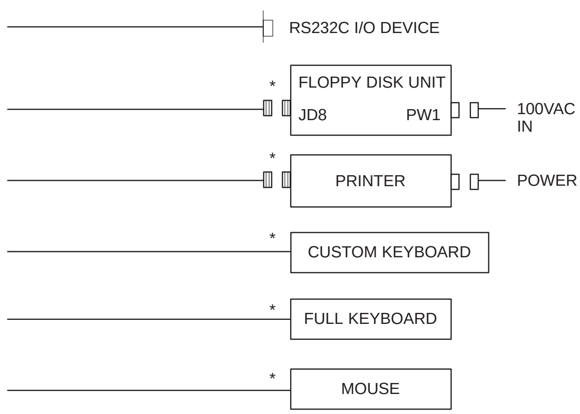
FS16/160
ONLY

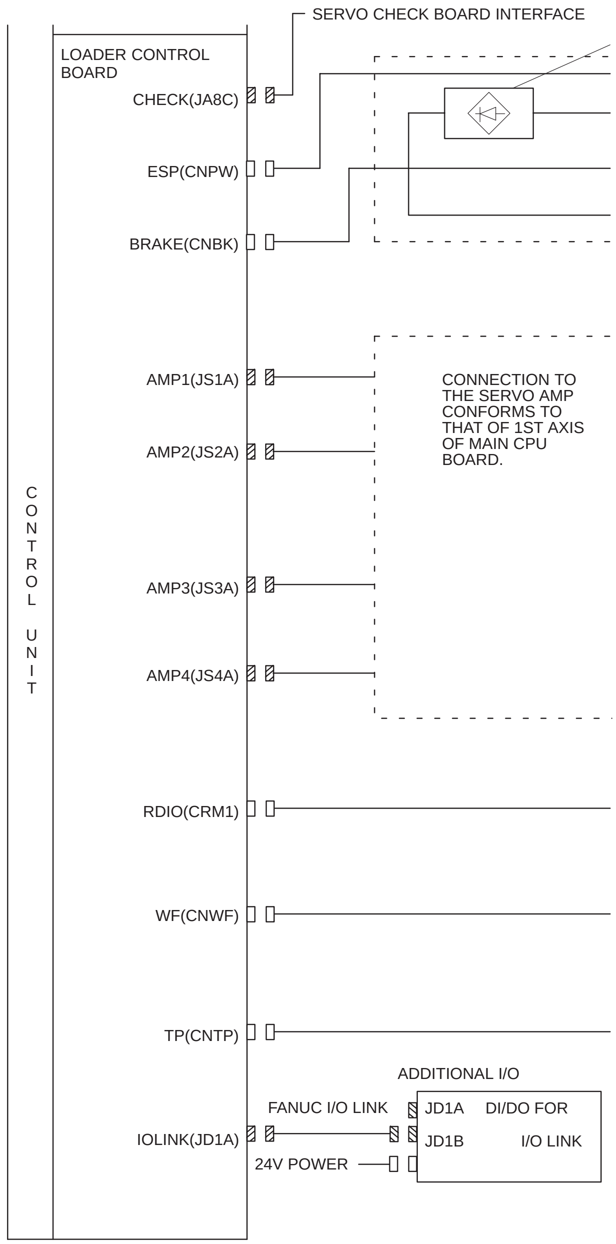
TO I/O UNIT MODEL A (FOR PMC–RC)



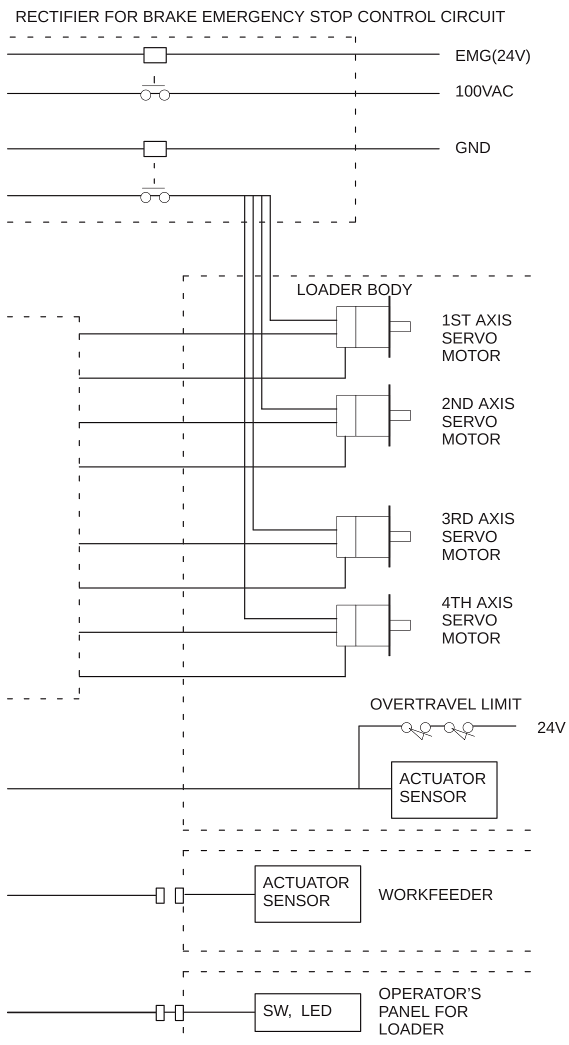
* USED FOR DEVELOPMENT OF AN APPLICATION.
CANNOT BE USED FOR ACTUAL RUNNING.


HIGH–SPEED SKIP SIGNAL
DO 40 POINTS
DO 40 POINTS
DO 40 POINTS
DI 40 POINTS
DI 40 POINTS
DI 12 POINTS
DI 12 POINTS
DI 40 POINTS
DI 12 POINTS
MEGNETICS CABINET


RS232C I/O DEVICE
*
FLOPPY DISK UNIT
JD8
PW1
100VAC
IN
*
PRINTER
POWER
*
CUSTOM KEYBOARD
*
FULL KEYBOARD
*
MOUSE



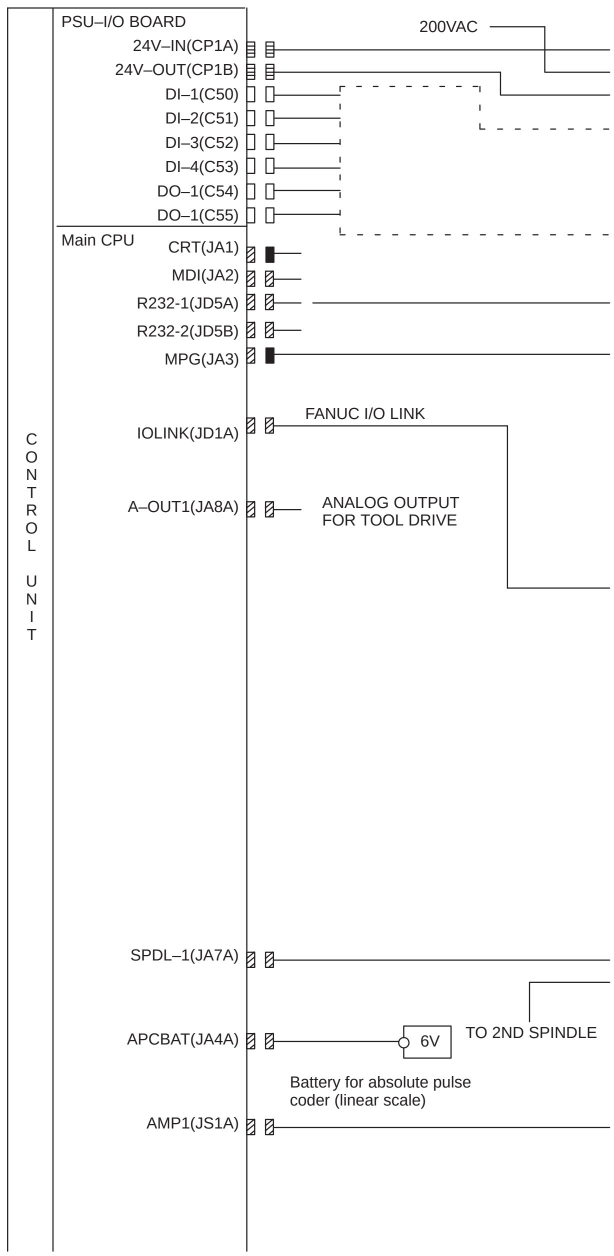
SERVO CHECK BOARD INTERFACE
LOADER CONTROL BOARD
CHECK(JA8C)
ESP(CNPW)
BRAKE(CNBK)
AMP1(JS1A)
AMP2(JS2A)
CONNECTION TO THE SERVO AMP CONFORMS TO THAT OF 1ST AXIS OF MAIN CPU BOARD.
CONTROL UNIT
AMP3(JS3A)
AMP4(JS4A)
RDIO(CRM1)
WF(CNWF)
TP(CNTP)
ADDITIONAL I/O
FANUC I/O LINK
JD1A
DI/DO FOR
JD1B
I/O LINK
IOLINK(JD1A)
24V POWER

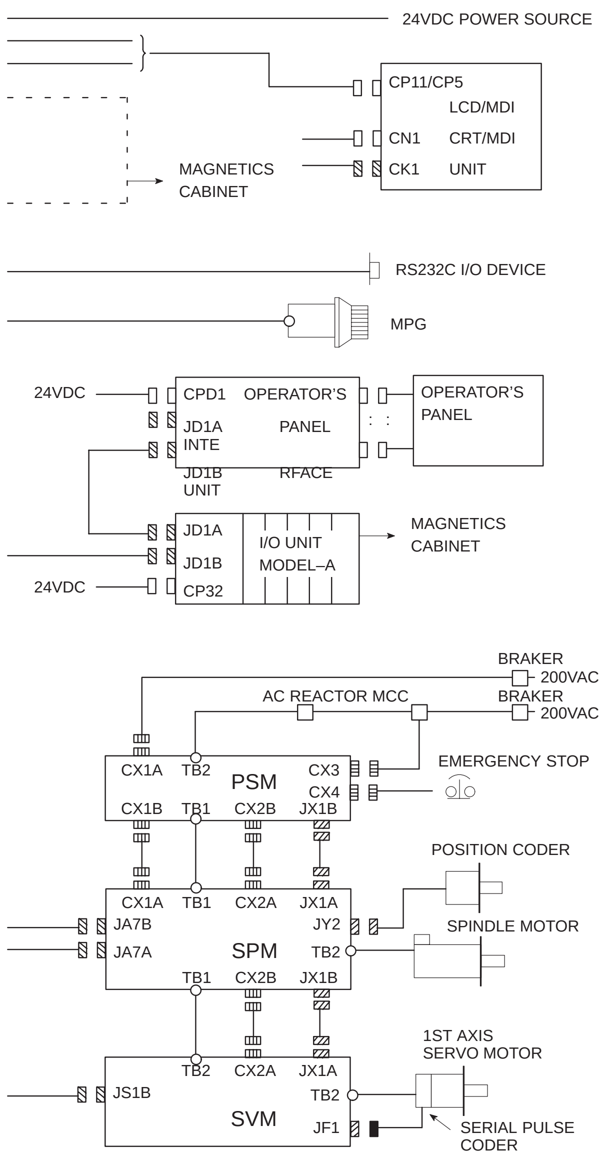

RECTIFIER FOR BRAKE EMERGENCY STOP CONTROL CIRCUIT
EMG(24V)
100VAC
GND
LOADER BODY
1ST AXIS SERVO MOTOR
2ND AXIS SERVO MOTOR
3RD AXIS SERVO MOTOR
4TH AXIS SERVO MOTOR
OVERTRAVEL LIMIT
24V
ACTUATOR SENSOR
ACTUATOR SENSOR
WORKFEEDER
SW, LED
OPERATOR'S PANEL FOR LOADER

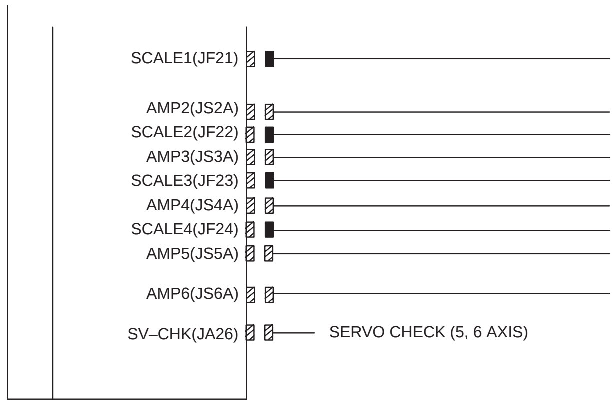
7

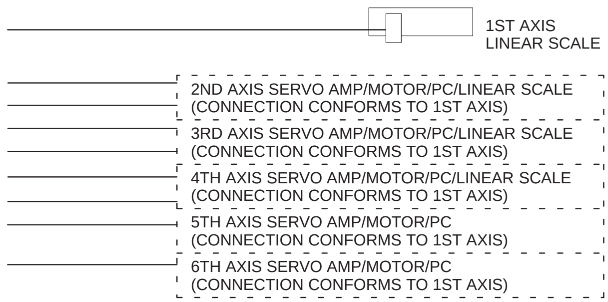
(2) When power supply C is used

NOTE Refer to item (3) for CRT/MDI connection.



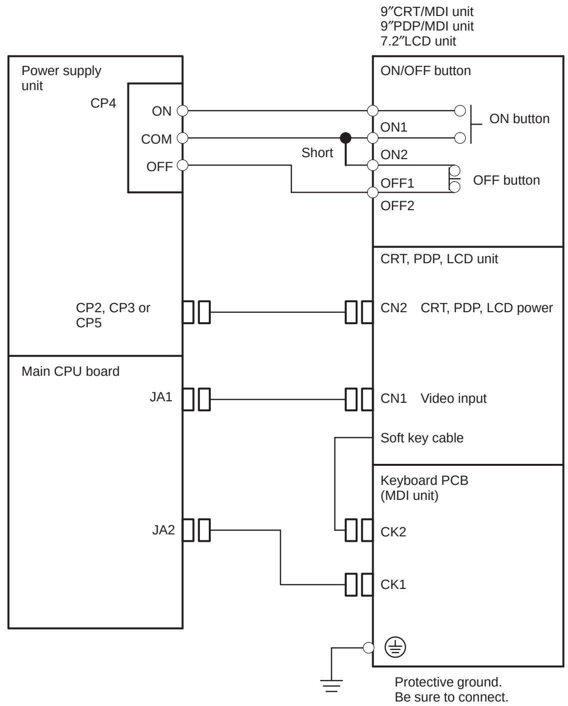

24VDC POWER SOURCE
CP11/CP5
LCD/MDI
CN1
CRT/MDI
CK1
UNIT
MAGNETICS
CABINET
RS232C I/O DEVICE
MPG
24VDC
CPD1
OPERATOR'S
JD1A
PANEL
INTE
JD1B
RFACE
UNIT
OPERATOR'S
PANEL
JD1A
I/O UNIT
MODEL–A
JD1B
CP32
24VDC
MAGNETICS
CABINET
BRAKER
200VAC
AC REACTOR MCC
BRAKER
200VAC
EMERGENCY STOP
CX1A
TB2
PSM
CX3
CX4
CX1B
TB1
CX2B
JX1B
POSITION CODER
CX1A
TB1
CX2A
JX1A
JA7B
JY2
SPINDLE MOTOR
JA7A
SPM
TB2
TB1
CX2B
JX1B
1ST AXIS
SERVO MOTOR
TB2
CX2A
JX1A
JS1B
TB2
SVM
JF1
SERIAL PULSE
CODER


SCALE1(JF21)
AMP2(JS2A)
SCALE2(JF22)
AMP3(JS3A)
SCALE3(JF23)
AMP4(JS4A)
SCALE4(JF24)
AMP5(JS5A)
AMP6(JS6A)
SV–CHK(JA26)
SERVO CHECK (5, 6 AXIS)


1ST AXIS
LINEAR SCALE
2ND AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO 1ST AXIS)
3RD AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO 1ST AXIS)
4TH AXIS SERVO AMP/MOTOR/PC/LINEAR SCALE
(CONNECTION CONFORMS TO 1ST AXIS)
5TH AXIS SERVO AMP/MOTOR/PC
(CONNECTION CONFORMS TO 1ST AXIS)
6TH AXIS SERVO AMP/MOTOR/PC
(CONNECTION CONFORMS TO 1ST AXIS)

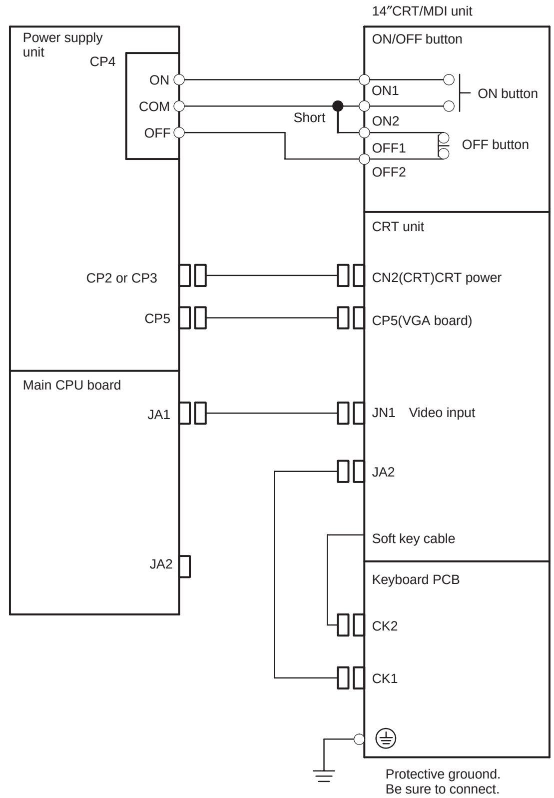
(3) CRT/MDI unit interface

(a) When 9″CRT/MDI or 9″PDP/MDI is used (MMC–IV cannot be used)



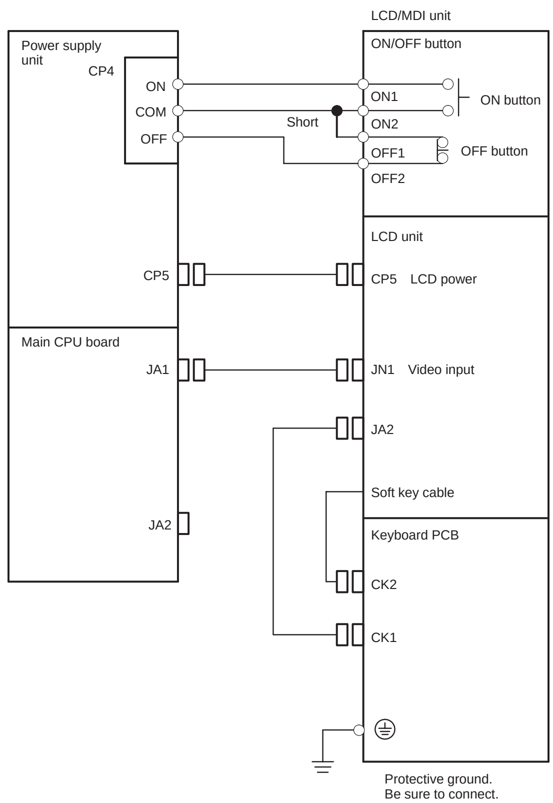
The separate display unit is not provided with an ON/OFF button.

(b) When 14″CRT/MDI is used (MMC–IV cannot be used)

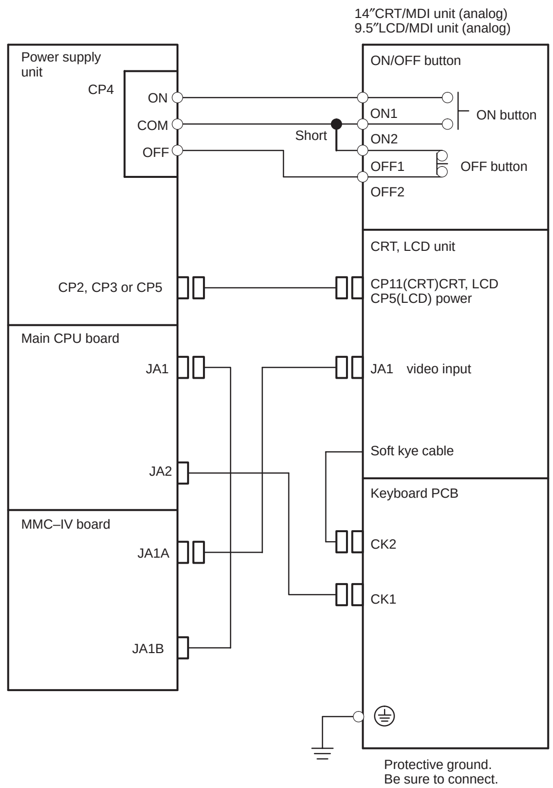


7

(c) When LCD/MDI is used (MMC–IV cannot be used)

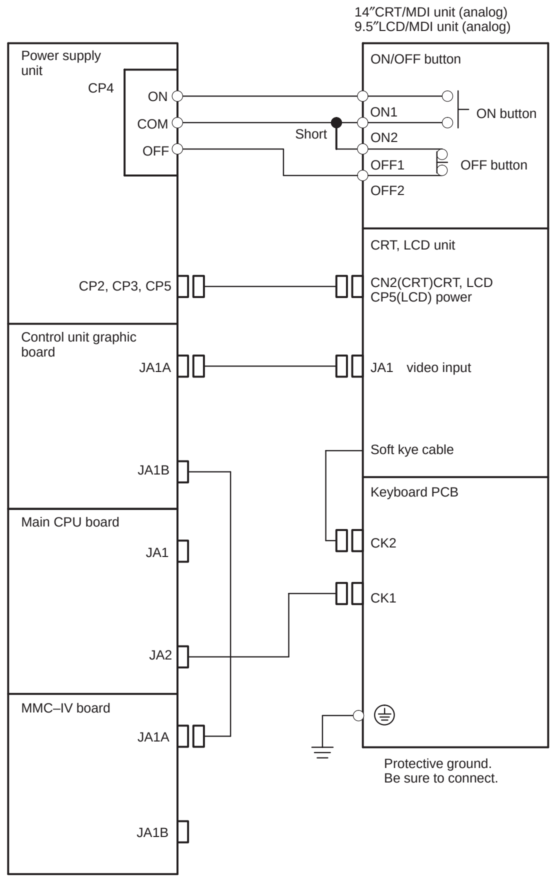


(d) When MMC–IV is provided without NC's graphic function



7

(e) When MMC–IV is provided with NC's graphic function.



7.4 Configuration of the Printed Circuit Boards and LED Display

7.4.1 Power unit configuration and LED display

(1) Parts layout

Drawing number: A16B–1212–0901 (Power supply unit AI)
A16B–1212–0871 (Power supply unit BI)
A20B–1005–0420 (Power supply unit)

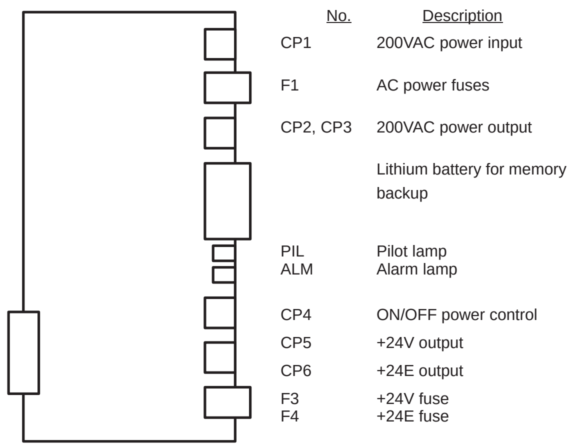


Fig. 7.4.1 Power Unit Parts Layout

(2) LED display

Table 7.4.1 (a) LED Display of the Power Unit

No.	LED display	NC status
1	PIL ■ (green)	200 VAC power is supplied to connector CP1.
2	ALM ■ (red)	Indicates that overvoltage, overcurrent, or voltage drop occurs at the output of the direct current power supply.

(3) Maintenance parts

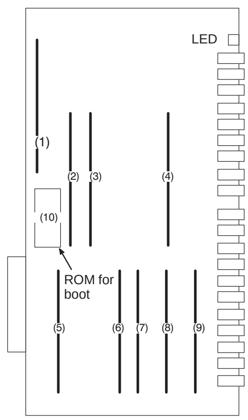
Table 7.4.1 (b) Maintenance Parts List

Power supply	Symbol	Rating	Individual code
AI	F1	7.5A	A60L-0001-0245#GP75
	F3	3.2A	A60L-0001-0075#3.2
	F4	5AS	A60L-0001-0046#5.0
BI	F1	7.5A	A60L-0001-0245#GP75
	F3	5A	A60L-0001-0075#5.0
	F4	5AS	A60L-0001-0046#5.0
C	–	7.5A	A60L-0001-0046#7.5R
Lithium battery code (For power supply AI, BI)			A98L-0031-0012
Lithium battery code (For ppower supply C)			A98L–0031–0006

7.4.2 Configuration main CPU board and LED display

(1) Parts layout

Drawing number: A16B–3200–0190 (Series 16)
A16B–3200–0210 (Series 18)



Connector name	Connector number	Use
CRT	JA1	CRT video signal
MDI	JA2	MDI keyboard
R232–1	JD5A	RS–232–C serial port
R232–2	JD5B	RS–232–C serial port
MPG	JA3	Manual pulse generator
IOLINK	JD1A	FANUC I/O LINK
SPDL–1	JA7A	Serial spindle
A–OUT1	JA8A	Analog output
APCBAT	JA4A	Battery for use with the APC
SERVO1	JS1A	Axis 1 servo amplifier
SERVO2	JS2A	Axis 2 servo amplifier
SERVO3	JS3A	Axis 3 servo amplifier
SERVO4	JS4A	Axis 4 servo amplifier
SERVO5	JS5A	Axis 5 servo amplifier
SERVO6	JS6A	Axis 6 servo amplifier
SCALE1	JF21	Axis 1 scale
SCALE2	JF22	Axis 2 scale
SCALE3	JF23	Axis 3 scale
SCALE4	JF24	Axis 4 scale
SV–CHK	JA26	SERVO CHECK

Fig. 7.4.2 Parts Layout for the Main CPU Board

Table 7.4.2 (a) Module List for the Main CPU Board

No.	Name	Specifications	Function	Display of system configuration screen
(1)	DRAM module	A20B–2901–0941	CNC system RAM	DRAM:4MB
		A20B–2901–0942		DRAM:2MB
		A20B–2902–0461		DRAM:8MB
(2)	SRAM module	A20B–2902–0350	Expanded SRAM	ADDITIONAL SRAM:256KB
		A20B–2902–0351		ADDITIONAL SRAM:768KB
		A20B–2902–0352		ADDITIONAL SRAM:2.25MB
(3)	FROM/ SRAM module	A20B–2902–0341	CNC system, Servo system Graphic system, SRAM for system	FLASH ROM MODULE:4MB
		A20B–2902–0343		FLASH ROM MODULE:2MB
		A20B–2902–0411		FLASH ROM MODULE:6MB
		A20B–2902–0410		FLASH ROM MODULE:8MB
		A20B–2902–0500		FLASH ROM MODULE: 12MB
(4)	Spindle module	A20B–2901–0980	Spindle control	SERIAL SPINDLE LSI ANALOG SPINDLE LSI
		A20B–2901–0981		SERIAL SPINDLE LSI
		A20B–2901–0982		ANALOG SPINDLE LSI
(5)	PMC module	A20B–2902–0480	PMC control	SLOTxx PMC MODULE SLC : MOUNTED
		A20B–2902–0481		SLOTxx PMC MODULE SLC : ––
(6)	HSSBC module	A20B–2902–0490	CRT text display control	CRTC MODULE : HSSB
	CRTC module	A20B–2902–0271		CRTC MODULE:9″CRT
		A20B–2902–0275		CRTC MODULE:VGA
		A20B–2902–0276		CRTC MODULE:9″CRT

(7)	Servo module	A20B–2902–0070 A20B–2902–0061	Servo control 5th or 6th axis	SERVO 5/6 AXIS
(8)	Servo module	A20B–2902–0070 A20B–2902–0061	Servo control 3rd or 4th axis	SERVO 3/4 AXIS
(9)	Servo module	A20B–2902–0070 A20B–2902–0061	Servo control 1st or 2nd axis	SERVO 1/2 AXIS

(2) LED display

(a) LED display transition when the power is turned on

□ : Off　　■ : Lit　　★ : Flashing

The STATUS LEDs are green and the ALARM LEDs are red.

Table 7.4.2 (b) LED Display (1) for the Main CPU Board

No.	LED display		NC status
1	STATUS	□□□□	When power is off
2	STATUS	■■■■	Startup status immediately after power is turned on
3	STATUS	■□■■	Waiting for each processor to set its ID within the system
4	STATUS	□□■■	All processors have completed setting their IDs within the system
5	STATUS	■■□■	Completion of FANUC BUS startup
6	STATUS	□■□■	Completion of PMC startup
7	STATUS	■□□■	Completion of setting information of hardware configuration for each board within the system
8	STATUS	□□□■	Completion of each processor’s startup within the system
9	STATUS	■■■□	Completion of the initial execution of the PMC ladder
10	STATUS	□■■□	Waiting for digital servo system startup
11	STATUS	■□□□	Startup has been completed and the system is now in normal operation mode.

(b) LED display when an error occurs

Table 7.4.2 (c) LED Display (2) for the Main CPU Board

No.	LED display		NC status
1	STATUS ALARM	□■□□ ■■□	RAM parity error occurred in the main CPU board or a servo alarm occurred in the option 2 board.
2	STATUS ALARM	□■□□ □■■	Servo alarm (SERVO WATCHDOG ALARM) occurred.
3	STATUS ALARM	□■□□ □■□	Some other system error occurred.
4	STATUS ALARM	■■■■ ×■×	The system had been stopped before the CPU was activated.

(c) LED display when the system is activated without the option 2 board (having the sub-CPU) mounted

Table 7.4.2 (d) LED Display (3) for the Main CPU Board

No.	LED display	NC status
1	STATUS ■■□□ ALARM □□□	An error occurred at SRAM on the Option 2 board (having the sub-CPU). Replace the Option 2 board.

7.4.3 Configuration of the option 1 board and LED display

(1) Parts layout

Drawing number : A16B-2200-0913 (communications function with remote buffer)

: A16B-2200-0914 (communications function with DNC1)

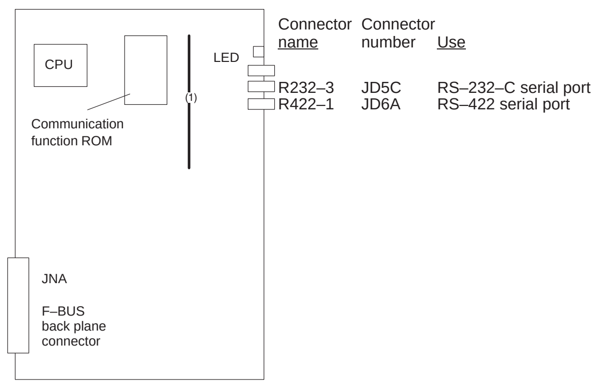
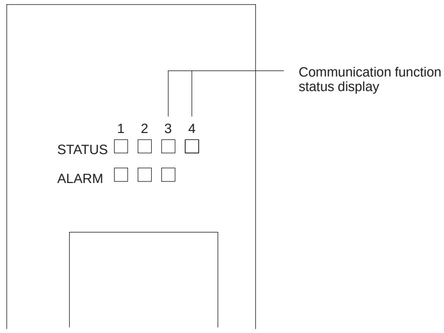


Fig. 7.4.3 (a) Parts Layout for the Option 1 Board

Table 7.4.3 (a) Module List for the Option 1 Board

No.	Name of module	Specifications	Function	Display of system configuration screen
1	Communication control module	A20B–2900–0361	Communication control	COMMUNICATION MOUNTED

(2) LED display



(a) LED display for the communications function (remote buffer)

(i) LED display transition when the power is turned on

□ : Off ■ : Lit ★ : Flashing × : Don't care

The STATUS LEDs are green and the ALARM LEDs are red.

Table 7.4.3 (b) LED Display (1) for the Option 1 Board

No.	LED display	NC status
1	STATUS ■■■■ ALARM ■□□	Startup status immediately after the power has been turned on
2	STATUS ××□■ ALARM □□□	Remote buffer startup stage has terminated and the system is now in normal operation mode.

(ii) LED display when an error occurs

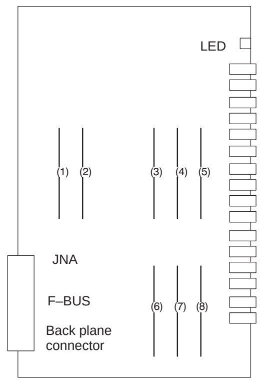
Table 7.4.3 (c) LED Display (2) for the Option 1 Board

No.	LED display	NC status
1	STATUS ××★★ ALARM □□□	A fault occurred in the communications control of the option 1 board

7.4.4 Configuration of option 2 board and LED display

(1) Parts layout

Drawing number : A16B-2203-0030 (SUB CPU and additional axis for Series 16)
A16B-2203-0031 (additional axis only for Series 16)
A16B-2203-0033 (SUB CPU for Series 18)



Connector name	Connector number	Use
HDI	JA5	High-speed skip signal
A-IN	JA6	Analog input
SPDL-2	JA7B	Serial spindle
A- OUT2	JA8B	Analog output
APCBAT	JA4B	Battery for use with the APC
AMP1	JS1A-2	Axis 1 servo amplifier
AMP2	JS2A-2	Axis 2 servo amplifier
AMP3	JS3A-2	Axis 3 servo amplifier
AMP4	JS4A-2	Axis 4 servo amplifier
AMP5	JS5A-2	Axis 5 servo amplifier
AMP6	JS6A-2	Axis 6 servo amplifier
SCALE1	JF21-2	Axis 1 scale
SCALE2	JF22-2	Axis 2 scale
SCALE3	JF23-2	Axis 3 scale
SCALE4	JF24-2	Axis 4 scale
SV- CHK	JA26	Servo check

Fig. 7.4.4 (a) Parts Layout of the Option 2 board for Series 16

Table 7.4.4 (a) Module List of the Option 2 Board for Series 16

No.	Name	Specifications	Function	Display of system configuration screen
(1)	FROM module	A20B–2902–0081	2nd path macro	FLASH ROM MODULE:4MB
		A20B–2902–0082		FLASH ROM MODULE:2MB
(2)	SRAM module	A20B–2902–0350	CNC system RAM	ADDITIONAL SRAM: 256KB
		A20B–2902–0351		ADDITIONAL SRAM: 768KB
		A20B–2902–0352		ADDITIONAL SRAM: 2.25MB
(3)	DRAM module	A20B–2901–0941	CNC system RAM	DRAM:4MB
		A20B–2901–0942		DRAM:2MB
		A20B–2902–0461		DRAM:8MB
(4)	Spindle module	A20B–2901–0984	Spindle control	SERIAL SPINDLE LSI ANALOG SPINDLE LSI
		A20B–2901–0985		SERIAL SPINDLE LSI
		A20B–2901–0986		ANALOG SPINDLE LSI
(5)	HAM module	A20B–2900–0280	Analog I/O+HDI	H–SKIP DI & ANALOG I/O: HDI+ANALOG
		A20B–2900–0281	HDI	H–SKIP DI & ANALOG I/O: HDI
(6)	Servo module	A20B–2902–0070	Servo control 5th or 6th axis	SERVO 5/6 AXIS
		A20B–2902–0061		
(7)	Servo module	A20B–2902–0070	Servo control 3rd or 4th axis	SERVO 3/4 AXIS
		A20B–2902–0061		
(8)	Servo module	A20B–2902–0070	Servo control 1st or 2nd axis	SERVO 1/2 AXIS
		A20B–2902–0061		

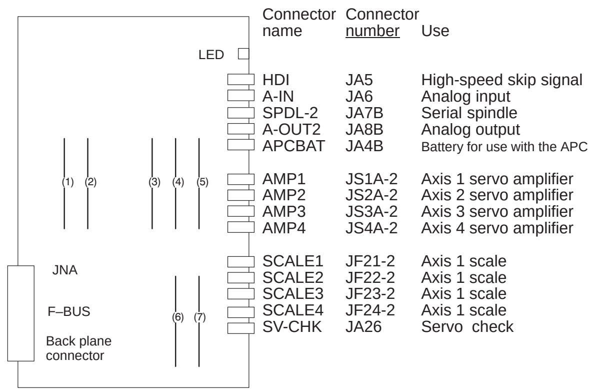


Fig. 7.4.4 (b) Parts Layout of the Option 2 board for Series 18

Table 7.4.4 (b) Module List of the Option 2 Board for Series 18

No.	Name	Specifications	Function	Display of system configuration screen
(1)	FROM module	A20B–2902–0081	2nd path macro	FLASH ROM MODULE:4MB
		A20B–2902–0082		FLASH ROM MODULE:2MB
(2)	SRAM module	A20B–2902–0350	CNC system RAM	ADDITIONAL SRAM: 256KB
		A20B–2902–0351		ADDITIONAL SRAM: 768KB
		A20B–2902–0352		ADDITIONAL SRAM: 2.25MB
(3)	DRAM module	A20B–2901–0941	CNC system RAM	DRAM:4MB
		A20B–2901–0942		DRAM:2MB
		A20B–2902–0461		DRAM:8MB
(4)	Spindle module	A20B–2901–0984	Spindle control	SERIAL SPINDLE LSI ANALOG SPINDLE LSI
		A20B–2901–0985		SERIAL SPINDLE LSI
		A20B–2901–0986		ANALOG SPINDLE LSI
(5)	HAM module	A20B–2900–0280	Analog I/O+HDI	H–SKIP DI & ANALOG I/O: HDI+ANALOG
		A20B–2900–0281	HDI	H–SKIP DI & ANALOG I/O: HDI
(6)	Servo module	A20B–2902–0070	Servo control 3rd or 4th axis	SERVO 3/4 AXIS
		A20B–2902–0061		
(7)	Servo module	A20B–2902–0070	Servo control 1st or 2nd axis	SERVO 1/2 AXIS
		A20B–2902–0061		

7

(2) LED display

(a) LED display for the sub-CPU

(i) LED display transition when the power is turned on

□ : Off ■ : Lit ★ : Flashing

The STATUS LEDs are green and the ALARM LEDs are red.

Table 7.4.4 (c) LED Display (1) for the Option 2 Board

No.	LED display		NC status
1	STATUS	□□□□	When power is off
2	STATUS	■■■■	Startup status immediately after power is turned or CPU is not running
3	STATUS	□■■■	Initializing RAM
4	STATUS	■□■■	Software ID has been set, initialization of keys, ALL CLEAR
5	STATUS	□□■■	Waiting for software initialization 1
6	STATUS	■■□■	Waiting for software initialization 2, Initializing SRAM
7	STATUS	□■□■	Initializing position coder
8	STATUS	□■■□	Waiting for digital servo system startup
9	STATUS	■□□□	Startup has been completed and the system is now in normal operation mode.

(ii) LED display when an error occurs

Table 7.4.4 (d) LED Display (2) for the Option 2 Board

No.	LED display		NC status
1	STATUS ALARM	□■□□ ■□□	RAM parity error occurred. Replace the RAM MODULE.
2	STATUS ALARM	□■□□ □□■	Servo alarm (watch dog, etc.) occurred.
3	STATUS ALARM	□■□□ □□□	Other alarm occurred.

(iii) LED display when system is not started

Table 7.4.4 (e) LED Display (3) for the Option 2 Board

No.	LED display		Case and required action
1	STATUS ALARM	■■■■ ■□□	An SRAM parity error occurred. Replace the option 2 board. In addition, check the LED display for the main CPU board.
2	STATUS ALARM	■■□□ ■□□	A DRAM parity alarm occurred. Replace the DRAM module.
3	STATUS ALARM	■■□□ □□□	A DRAM module of at least 2M is not mounted, or another alarm occurred. Check and replace the DRAM module.

(b) LED display for additional axes

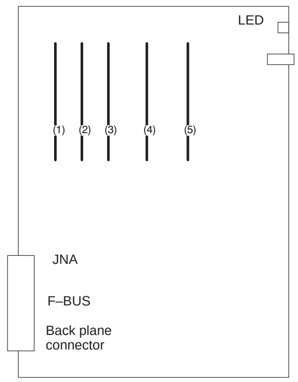
Table 7.4.4 (f) LED Display (4) for the Option 2 Board

No.	LED display		NC status
1	STATUS	□□□□	Power is off.
2	STATUS	■■■■	Initialization has been terminated (normal state) after power on.
3	STATUS ALARM	■■■■ □□■	A servo alarm (such as watchdog alarm) was issued.

7.4.5 Configuration of the option 3 board and LED display

(1) Parts layout

Drawing number : A16B-3200-0055 (PMC-RC and CAP II)
A16B-3200-0054 (PMC-RC only)
A16B-3200-0057 (CAP II only)



Connector name	Connector number	Use
IOLINK	JD1A2	FANUC I/O LINK

Fig. 7.4.5 (a) Parts Layout of the Option 3 Board

Table 7.4.5 (a) Module List of the Option 3 Board

No.	Name	Specifications	Function	Display of system configuration screen
(1)	ROM module for CAP	A20B–2900–0290	CAP–II system	SYSTEM ROM MODULE :1MB
		A20B–2900–0291		SYSTEM ROM MODULE :768KB
(2)	ROM module for CAP	A20B–2901–0390	CPU for CAP–II	No. display
(3)	ROM module for CAP	A20B–2901–0413	DRAM+ SRAM for CAP–II	SRAM MODULE :512KB DRAM MODULE :512KB
(4)	DRAM module for PMC	A20B–2902–0191	DRAM for PMC	ADDITIONAL DRAM(MGR) DRAM(APPLICATION) :2MB
		A20B–2902–0192		ADDITIONAL DRAM(MGR) DRAM(APPLICATION) :1MB
		A20B–2902–0193		ADDITIONAL DRAM(MGR) DRAM(APPLICATION) :512KB
		A20B–2902–0194		ADDITIONAL DRAM(MGR)
		A20B–2902–0196		DRAM :2MB
		A20B–2902–0197		DRAM :1MB
		A20B–2902–0198		DRAM :512KB
(5)	PMC module	A20B–2901–0960		PMC MODULE:PMP2
		A20B–2902–0250		PMC MODULE:PMP2

(2) LED display

The STATUS LEDs in the front upper section of the option 3 board are used for two independent functions as shown in the figure on the right.

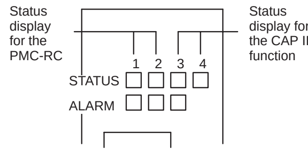


Fig. 7.4.5 (b) Location of LED Display for the Option 3 Board

(a) LED display for the graphics display function when CAP II is not installed

(i) LED display transition when the power is turned on

□ : Off ■ : Lit ★ : Flashing
× : Don't care

The STATUS LEDs are green and the ALARM LEDs are red.

Table 7.4.5 (b) LED Display (1) for the Option 3 Board

No.	LED display	NC status
1	STATUS ■■■■	Startup status immediately after power is turned on
2	STATUS ××□■	Waiting for each processor in the system to set its ID
3	STATUS ××■□	Waiting for each processor in the system to complete startup
4	STATUS ××□□	The CAP II function startup has been completed and the system is now in normal operation.

(ii) LED display when an error occurs

Table 7.4.5 (c) LED Display (2) for the Option 3 Board

No.	LED display	NC status
1	STATUS ××★★	NMI from another board (STATUS LEDs 3 and 4 are flashing simultaneously). Check other boards' LED displays.
2	STATUS ××□★	A CAP II sub-memory parity error occurred. Initialize the sub-memory.
3	STATUS ××★□	A bus error occurred (incorrect memory access). Replace the option 3 board.
4	STATUS ××★★	A ROM parity error occurred (STATUS LEDs 3 and 4 are flashing alternately). Replace the CAP II ROM module.

(b) LED display for the PMC-RC functions

(i) LED display transition when the power is turned on

□ : Off ■ : Lit ★ : Flashing × : Don't care

The STATUS LEDs are green and the ALARM LEDs are red.

Table 7.4.5 (d) LED Display (3) for the Option 3 Board

No.	LED display		NC status
1	STATUS	■■××	Startup status immediately after power is turned on
2	STATUS	□■××	Waiting for each processor in the system to set its ID
3	STATUS	■□××	Waiting for each processor in the system to complete startup
4	STATUS	□□××	The PMC-RC function startup has been completed and the system is now in normal operation.

(ii) LED display when an error occurs

Table 7.4.5 (e) LED Display (4) for the Option 3 Board

No.	LED display		NC status
1	STATUS	★★××	NMI from another board (LEDs are flashing simultaneously). Check other boards' LED displays.
2	STATUS	□★××	The parity error of the memory for LADDER or work occurred. Initialize the memory for LADDER or replace it for work RAM MODULE.
3	STATUS	★□××	A bus error occurred (incorrect memory access). Replace the option 3 board.
4	STATUS	■★××	Communication error occurred in I/O Link. Check the Link device and the cables.
5	STATUS	★■××	The parity error etc. occurred in the PMC control module. Replace the PMC control module.
6	STATUS	★★××	A checksum error occurred in the system program memory. The DRAM module for the PMC may have failed.

(c) Alarm LED display (common to CAP II and PMC-RC)

Table 7.4.5 (f) LED Display (4) for the Option 3 Board

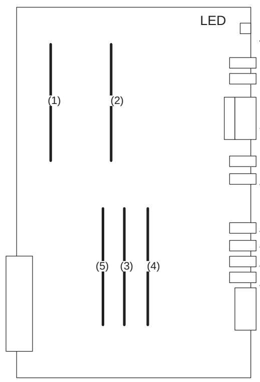
No.	LED display		Description	NC status
1	ALARM	□□■	An I/O link error occurred.	Check the link devices and cables.
2	ALARM	□■□	A parity error occurred in the SRAM for CAP–II	The SRAM module for CAP-II may be out of order.
3	ALARM	□■■	A parity error occurred in the DRAM for PMC	Option 3 board or the DRAM module for PMC may have failed.
4	ALARM	■□□	A parity error occurred in the DRAM for CAP–II	The DRAM module for CAP-II may have failed.
5	ALARM	■□■	A parity error occurred in the DRAM for PMC	Option 3 board or the DRAM module for PMC may have failed.
6	ALARM	■■□	The CPU for PMC is not started	Check whether the main board has been activated normally.
7	ALARM	■■■	The operation of the PMC module is abnormal	The PMC module may have failed.

7

7.4.6 Configuration of the loader control board and LED display

(1) Parts layout

Drawing number : A16B-2203-0080



Connector name	Connector number	Use
BRAKE	CNBK	Brake output
ESP	CNPW	Emergency stop
IO–1	CNWF	DI/DO for workpiece feeder
TP	CNTP	DI/DO for teach pendant
IOLINK	JD1A	FANUC I/O LINK
A–OUT	JA8	Servo waveform check output
AMP1	JS1A	Servo amplifier for first axis
AMP2	JS2A	Servo amplifier for second axis
AMP3	JS3A	Servo amplifier for third axis
AMP4	JS4A	Servo amplifier for fourth axis
IO- 2	CRM1	DI/ DO for loader main body AMP1

Fig. 7.4.6 (a) Parts Layout of the Loader Control Board

Table 7.4.6 (a) Module List for the Loader Control Board

No.	Name	Specifications	Function	Display of system configuration screen
(1)	FROM module	A20B–2902–0082	ROM for macro of loader side	FLASH ROM MODULE:2MB
(2)	DRAM module	A20B–2901–0941	Loader system RAM	DRAM:4MB
		A20B–2901–0942		DRAM:2MB
(3)	Servo module	A20B–2902–0070	Servo control 3rd or 4th axis	SERVO 3/4 AXIS
		A20B–2902–0061		
(4)	Servo module	A20B–2902–0070	Servo control 1st or 2nd axis	SERVO 1/2 AXIS
		A20B–2902–0061		
(5)	PMC module	A20B–2900–0142	PMC control	PMC MODULE: BSI+SLC
		A20B–2900–0143		PMC MODULE: BSI

(2) LED display

(i) LED display transition when the power is turned on

□ : Off ■ : Lit ★ : Flashing

The STATUS LEDs are green and the ALARM LEDs are red.

Table 7.4.6 (b) LED Display (1) for the Loader Control Board

No.	LED display		NC status
1	STATUS	□□□□	When power is off
2	STATUS	■■■■	Startup status immediately after power is turned or CPU is not running
3	STATUS	□■■■	Initializing RAM
4	STATUS	■□■■	Software ID has been set, initialization of keys, ALL CLEAR
5	STATUS	□□■■	Waiting for software initialization 1
6	STATUS	■■□■	Waiting for software initialization 2, Initializing SRAM
7	STATUS	□■□■	Initializing position coder
8	STATUS	□■■□	Waiting for digital servo system startup
9	STATUS	■□□□	Startup has been completed and the system is now in normal operation mode.

(ii) LED display when an error occurs

Table 7.4.6 (c) LED Display (2) for the Loader Control Board

No.	LED display		NC status
1	STATUS	□■□□	RAM parity error occurred.
	ALARM	■□□	Replace the RAM MODULE.
2	STATUS	□■□□	Servo alarm (watch dog, etc.) occurred.
	ALARM	□□■	
3	STATUS	□■□□	Other alarm occurred.
	ALARM	□□□	

7.4.7 Configuration of I/O card

(1) Sink type output

Name	Code	Function
I/O card (sink type output)	A16B-2200-0950	DI : 104 DO : 80 With high-speed skip
	A16B-2200-0951	DI : 104 DO : 72 With high-speed skip
	A16B-2200-0952	DI : 80 DO : 56 With high-speed skip
	A16B-2200-0953	DI : 40 DO : 40 With high-speed skip
	A16B-2200-0954	High-speed skip only
	A16B-2200-0955	DI : 104 DO : 80 Without high-speed skip
	A16B-2200-0956	DI : 104 DO : 72 Without high-speed skip
	A16B-2200-0957	DI : 80 DO : 56 Without high-speed skip
	A16B-2200-0958	DI : 40 DO : 40 Without high-speed skip
I/O card add-on board	A20B-9001-0480	DI : 52 DO : 40 Use with A16B-2200-0950 or A16B-2200-0955 listed above

NOTE This printed circuit board has no LED display.

(2) Sink type output

Name	Code	Function
I/O card (sink type output)	A16B-2202-0720	DI : 104 DO : 80 With high-speed skip
	A16B-2202-0721	DI : 104 DO : 72 With high-speed skip
	A16B-2202-0722	DI : 80 DO : 56 With high-speed skip
	A16B-2202-0723	DI : 40 DO : 40 With high-speed skip
	A16B-2202-0725	DI : 104 DO : 80 Without high-speed skip
	A16B-2202-0726	DI : 104 DO : 72 Without high-speed skip
	A16B-2202-0727	DI : 80 DO : 56 Without high-speed skip
	A16B-2202-0728	DI : 40 DO : 40 Without high-speed skip
I/O card add-on board	A20B-8001-0150	DI : 52 DO : 40 Use with A16B-2200-0950 or A16B-2200-0955 listed above

NOTE This printed circuit board has no LED display.

7.4.8 Configuration of the I/O card with power supply (for power supply C) and LED display

(1) Sink type output

Name	Code	Function
I/O card (sink type output)	A16B–2202–0690	DI : 104 DO : 72
	A16B–2202–0691	DI : 80 DO : 56
	A16B–2202–0692	DI : 40 DO : 40
Power supply	A20B–1005–0420	To be used with the above I/O card

- LED display

PIL (Green)	Lights when DC input power voltage is applied to CP1A

(2) Source type output

Name	Code	Function
I/O card (sink type output)	A16B–2202–0870	DI : 104 DO : 72
	A16B–2202–0871	DI : 80 DO : 56
	A16B–2202–0872	DI : 40 DO : 40
Power supply	A20B–1005–0420	To be used with the above I/O card

- LED display

PIL (Green)	Lights when DC input power voltage is applied to CP1A

7.4.9 Configuration of the background graphic board and LED display

(1) Parts layout

Drawing number : A16B-2203-0032

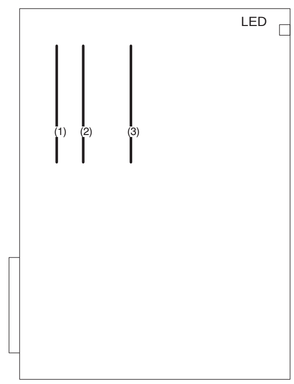


Fig. 7.4.9 (a) Parts Layout of the Background Graphic Board

Table 7.4.9 (a) Module List of the Background Graphic Board

No.	Name	Specifications	Function	Display of system configuration screen
(1)	FROM module	A20B–2902–0081	Background graphic system	FLASH ROM MODULE:4MB
		A20B–2902–0082		FLASH ROM MODULE:2MB
(2)	SRAM module	A20B–2902–0350	System RAM	ADDITIONAL SRAM: 256KB
		A20B–2902–0351		ADDITIONAL SRAM: 768KB
		A20B–2902–0352		ADDITIONAL SRAM: 2.25MB
(3)	DRAM module	A20B–2901–0941	System RAM	DRAM:4MB
		A20B–2902–0461		DRAM:8MB

(2) LED display

(a) LED display transition when the power is turned on
The STATUS LEDs are green and the ALARM LEDs are red.

□ : OFF ■ : ON

Table 7.4.9 (b) LED Display (1) for Background Graphic Board

No.	LED display		NC status
1	STATUS	□□□□	When power is off
2	STATUS	■■■■	Startup status immediately after power is turned or CPU is not running
3	STATUS	□■■■	Initializing RAM
4	STATUS	■□■■	Software ID has been set, initialization of keys, ALL CLR
5	STATUS	□□■■	Waiting for software initialization 1
6	STATUS	■■□■	Waiting for software initialization 2, Initializing SRAM
7	STATUS	■□□□	Initialization has been completed (steady state).

(b) LED display when an error occurs

□ : OFF ■ : ON

Table 7.4.9 (c) LED Display (2) for Background Graphic Board

No.	LED display	NC status
1	STATUS □■□□ ALARM ■□□	RAM parity error occurred.

(c) LED display when system is not started

□ : OFF ■ : ON

Table 7.4.9 (d) LED Display (3) for Background Graphic Board

No.	LED display	NC status
1	STATUS ■■■■ ALARM ■□□	SRAM parity error occurred.
2	STATUS ■■□□ ALARM ■□□	DRAM parity error occurred.

7.4.10 Configuration of the 64–bit RISC board and LED display

(1) Parts layout

Drawing number : A16B–3200–0150

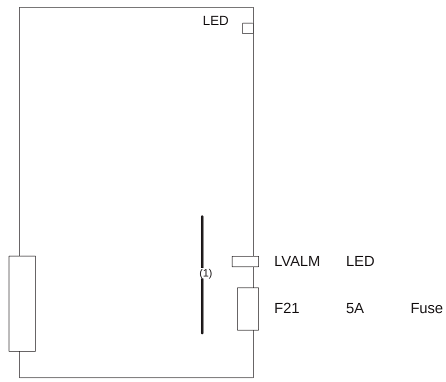


Fig. 7.4.10 Parts Layout of the 64–bit RISC Board

Table 7.4.10 (a) Module List for the 64–bit RISC Board

No.	Name	Specifications	Function	
(1)	FPROM module	A20B–2901–0292	ROM for RISC board system	ROM : 512KB

(2) LED display

(a) LED display transition when the power is turned on
The STATUS LEDs are green and the ALARM LEDs are red.

□ : OFF ■ : ON

Table 7.4.10 (a) LED Display (1) for the 64–bit RISC Board

No.	LED display		NC status
1	STATUS	□□□□	When power is off
2	STATUS	■■■■	Start up status immediately after power is turned or CPU is not turning
3	STATUS	□□□■	DRAM or SRAM test in progress (If an error was detected during a test, the LEDs remain in the state in which they were during the test.)
4	STATUS	□□■□	ROM test in progress (If an error was detected during a test, the LEDs remain in the state in which they were during the test.)
5	STATUS	■□□□	Waiting for a main CPU request (1)
6	STATUS	■□□■	Waiting for a main CPU request (2)
7	STATUS	■□■□	Waiting for a main CPU request (3)
8	STATUS	■■□□	Waiting for a main CPU request (4)

(b) LED display transition when the power is turned on

□ : OFF ★ : Blink

Table 7.4.10 (b) LED Display (2) for the 64–bit RISC Board

No.	LED display		NC status
1	STATUS	□□□★	Waiting for RISC mode to selected
2	STATUS	□★□★	Waiting for an NC statement to be entered
3	STATUS	□★★□	Command being executed in RISC mode
4	STATUS	★□□□	Resetting
5	STATUS	★□★★	Override 0 for pre–interpolation acceleration/deceleration (waiting for the override level to be changed)

(c) LED display upon occurrence of an error

□ : OFF ■ : ON

Table 7.4.10 (c) LED Display (3) for the 64–bit RISC Board

No.	LED display		NC status
1	STATUS	□□□■	An error occurred on the RISC board during the DRAM or SRAM test
2	STATUS	□□■□	An error occurred in the ROM module during a test.
3	STATUS	□□■■	A sync signal from the main CPU was not detected.
4	STATUS	□■□□	An error occurred when the F–BUS was accessed.
5	STATUS	■■■□	System error

(d) Alarm LED display

□ : OFF ■ : ON

Table 7.4.10 (d) LED Display (4) for the 64–bit RISC Board

No.	LED display		NC status
1	STATUS	■□□	The RISC CPU has not been started.
2	STATUS	□■□	SRAM parity
3	STATUS	□□■	DRAM parity

Table 7.4.10 (e) LED Display (5) for the 64–bit RISC Board

No.	LED display		NC status
1	LVALM	■	RISC board or Power abnormal The RISC board or power supply unit may be defective.

(3) Maintenance parts

Table 7.4.10 (f) Maintenance Parts List

Symbol	Rating	Specifications
F21	5A	A60L–0001–0075#5.0

8.1 How to Enter the Parameters

(1) Enabling writing the parameters

1 Enter the MDI mode or emergency stop state.

2 Press the OFFSET SETTING key several times to display the handy screen for setting.

3 Move the cursor to the PARAMETER WRITE field and enter 1 and then INPUT .

4 Alarm 100 occurs. Press the CAN and RESET keys simultaneously to temporarily stop the alarm.

(2) Entering the parameters

1 Press the SYSTEM key on the CRT/MDI panel several times to select the parameter screen.

```
PARAMETER (SETTING)                         O1234 N12345

0000              SEQ               INI   ISO   TVC
       0    0    0    0    0    0    0    0
0001                                      FCV
       0    0    0    0    0    0    0    0
0012  RMV                                       MIR
  X    0    0    0    0    0    0    0    0
  Y    0    0    0    0    0    0    0    0
  Z    0    0    0    0    0    0    0    0
  B    0    0    0    0    0    0    0    0
0020  I/O  CHANNEL                              0
                                     S    0   T0000

   REF  ****  ***  ***             10:15:30
[PARAM]   [DGNOS]    [PMC]    [SYSTEM]    [(OPRT)]
```

2 Pressing soft key [(OPRT)] displays the operation menu including the items below.

Enter a parameter number and press [NO.SRH] : Searches for the specified number.

Soft key [ON:1] : Sets the value at which the cursor is positioned to 1. (Only for bit parameters)

Soft key [OFF:0] : Sets the value at which the cursor is positioned to 0. (Only for bit parameters)

Soft key [+INPUT] : Adds the entered value to the value at which the cursor is positioned. (Only for word parameters)

Soft key [INPUT] : Sets the value at which the cursor is positioned to the entered value. (Only for word parameters)

Soft key [READ] : Inputs parameters from the reader/punch interface.

Soft key [PUNCH] : Outputs parameters to the reader/punch interface.

3 Convenient methods for entering data

3–1 To change data in units of bits

Pressing [←] or [→] changes the cursor to 1-bit size, which enables setting data in units of bits (only for bit parameters).

3–2 Use [EOB] to continuously set data starting from the cursor position.

(Example 1)

When [1] [2] [3] [4] [EOB] [4] [5] [6] [7] [EOB] [9] [9] [9] [9] [INPUT] is entered,

0	→	1234
0		4567
0		9999
0		0

(Example 2)

When [1] [2] [3] [4] [EOB] [EOB] [9] [9] [9] [9] [INPUT] is entered,

0	→	1234
0		0
0		9999
0		0

3–3 Use [=] to enter the same data.

(Example)

When [1] [2] [3] [4] [EOB] [=] [EOB] [=] [INPUT] is entered,

0	→	1234
0		1234
0		1234
0		0

3–4 For bit parameters

(Example)

When [1] [1] [EOB] [=] [EOB] [=] [INPUT] is entered,

0 0 0 0 0 0 0 0	→	0 0 0 1 1 0 0 0
0 0 0 0 0 0 0 0		0 0 0 1 1 0 0 0
0 0 0 0 0 0 0 0		0 0 0 1 1 0 0 0
0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0

4 After all necessary parameters are entered, reset the PARAMETER WRITE field to 0 on the SETTING screen.

8.2 Parameter List

1) Setting . . . . (No. 0000 –)
2) Reader/Puncher interface . . . . (No. 0100 –)
3) Axis control/Incremental system . . . . (No. 1000 –)
4) The coordinate system . . . . (No. 1200 –)
5) Stroke limit . . . . (No. 1300 –)
6) Feedrate . . . . (No. 1400 –)
7) Acceleration/Deceleration . . . . (No. 1600 –)
8) Servo . . . . (No. 1800 –)
9) DI/DO . . . . (No. 3000 –)
10) CRT/MDI, Display, and Edit . . . . (No. 3100 –)
11) Program . . . . (No. 3400 –)
12) Pitch error compensation . . . . (No. 3600 –)
13) Spindle control . . . . (No. 3700 –)
14) Tool offset . . . . (No. 5000 –)
15) Grinding–wheel wear compensation . . . . (No. 5071 –)
16) Canned cycle . . . . (No. 5100 –)
17) Rigid tapping . . . . (No. 5200 –)
18) Scaling/Coordinate rotation . . . . (No. 5400 –)
19) Uni-directional positioning . . . . (No. 5430 –)
20) Polar coordinate interpolation . . . . (No. 5450 –)
21) Normal direction control . . . . (No. 5480 –)
22) Index table indexing . . . . (No. 5500 –)
23) Involute interpolation . . . . (No. 5600 –)
24) Exponential interpolation . . . . (No. 5630 –)
25) Straightness compensation . . . . (No. 5710 –)
26) Custom macro . . . . (No. 6000 –)
27) Pattern data input . . . . (No. 6100 –)
28) Skip functions . . . . (No. 6200 –)
29) Automatic tool offset . . . . (No. 6240 –)
30) External data input/output . . . . (No. 6300 –)
31) Graphic display . . . . (No. 6500 –)
32) Run hour · parts count display . . . . (No. 6700 –)
33) Tool life management . . . . (No. 6800 –)
34) Position switch function . . . . (No. 6900 –)
35) Manual operation/automatic operation . . . . (No. 7000 –)
36) Manual handle feed/Handle interruption . . . . (No. 7100 –)
37) Butt-type reference position setting . . . . (No. 7181 –)
38) Software operator’s panel . . . . (No. 7200 –)
39) Program restart . . . . (No. 7300 –)
40) High speed machining . . . . (No. 7500 –)
    High speed cycle machining
    High speed remote buffer
41) Polygon turning . . . . (No. 7600 –)
42) External pulse input . . . . (No. 7680 –)
43) Hobbing machine and electric gear box . . . . (No. 7700 –)
44) Axis control by PMC . . . . (No. 8000 –)

45) Two-path control .... (No. 8100 –)
46) Inclined axis control .... (No. 8200 –)
47) B-axis function (T series) .... (No. 8240 –)
48) Simple synchronous control .... (No. 8300 –)
49) Program check termination .... (No. 8341 –)
50) Chopping .... (No. 8360 –)
51) High–precision contour control (M series) .... (No. 8400 –)
52) Macro executer and etc. .... (No. 8650 –)

Data Types and Valid Data Ranges of Parameters

Data Type	Valid data range	Data Type	Valid data range
Bit	0 or 1	Word	0 to ±32767
Bit axis		Word axis	
Byte	0 to ±127 0 to 255	2–word	0 to ±99999999
Byte axis		2–word axis	

NOTE1 There is something to which the range of setting is limited depending on the parameter No.
NOTE2 A part of the parameter can be input with the setting screen.
NOTE3 In the description of a bit-type parameter, the explanation written at the left-hand side of a slash (/) corresponds to setting 0, and that at the right-hand side corresponds to setting 1.
NOTE4 <Axis> indicated at the right column in a parameter list shows that the corresponding parameters are specified for each axis.

1) Parameters for SETTING

Number	Contents	Remarks
0000	For Setting	
#7 : #6 : #5 SEQ : #4 : #3 : #2 INI : #1 ISO : #0 TVC :	 Automatic insertion of sequence No. is, not performed (0)/performed (1) Input increment by mm (0)/by inch (1) Data output by EIA code (0)/by ISO code (1) TV check is not performed (0)/performed (1)	 PRM3216
0001	Parameter relating to tape format	
#7 : #6 : #5 : #4 : #3 : #2 : #1 FCV : #0 :	 FS16 standard (0)/FS15 Tape format (1)	

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0002	Parameter relating to tape format	
#7 SJZ : #6 : #5 : #4 : #3 : #2 : #1 : #0 RDG :	For manual reference position return, deceleration dogs are used when a reference position is not established, and positioning is performed when a reference position is established (0)/deceleration dogs are used at all times (1) Remote diagnosis is not performed (0)/ performed (1)	M series PRM 1005#3=1

0012	Parameter for axis detaching, mirror image	<Axis>
#7 RMV : #6 : #5 : #4 : #3 : #2 : #1 : #0 MIR :	Detach of the each axis is not performed (0)/ performed (1) Setting of mirror image for each axis is OFF (0)/ON (1)	PRM 1005#7

0020	Selection of channel for input/output devices				
Setting	0	1	2	3 (remote buffer)	
Common	PRM0100				
Output format	PRM 0101	PRM 0111	PRM 0121	PRM 0131	
Specification number	PRM 0102	PRM 0112	PRM 0122	PRM 0132	
Transfer rate	PRM 0103	PRM 0113	PRM 0123	PRM 0133	
Transfer method	Not set			PRM 0135 #3=0	PRM 0135 #3=1
Connector number	JD5A		JD5B	JD5C	JD6A

10 : DNC1/DNC2
12 : DNC1#2
20 : Data transfer to and from the Power Mate of group 0 via the I/O Link.
to
35 : Data transfer to and from the Power Mate of group 15 via the I/O Link.

2) For reader/puncher interface

Number	Contents	Remarks
0100	Common to each channel	
#7 ENS : #6 IOP : #5 ND3 : #4 : #3 NCR : #2 : #1 CTV : #0 :	Reading of data by EIA code, if NULL code is red in the data, ignore it (0)/make alarm (1) Input/output of an NC program is stopped by resetting the CNC (0)/by pressing the [STOP] soft key (1). DNC operation is performed to read blocks one by one (0)/until the buffer becomes full (1). When output EOB by ISO code, LF, CR, CR (0) /CR output (1) TV check in control-out is performed (0)/not performed (1) 	ALM001
0101	Parameter relating to CHANNEL 1 (I/O CHANNEL=0)	
#7 NFD : #6 : #5 : #4 : #3 ASI : #2 : #1 : #0 SB2 :	FEED before & after of data is output (0)/not output (1) Data input by EIA or ISO code (0)/ASCII code (1) Number of stop bit is 1 bit (0)/2 bits (1)	
0102	Spec. No. of I/O devices of CHANNEL 1 (I/O CHANNEL=0)	
0 : 1 : 2 : 3 : 4 : 5 : 6 :	RS-232-C (Except of under-mentioned) FANUC CASSETTE B1/B2 FANUC CASSETTE F1 FANUC PROGRAM FILE Mate, FANUC FA Card, FSP-H, FANUC FLOPPY CASSETTE RS-232-C (Control codes DC1 to DC4 are not used.) PORTABLE TAPE READER FSP-G, FSP-H, FANUC PPR	
0103	Baud rate setting of CHANNEL 1 (I/O CHANNEL=0)	
1 : 2 : 3 : 4 : 6 :	50 Baud 7 : 600 Baud 100 Baud 9 : 2400 Baud 110 Baud 10 : 4800 Baud 150 Baud 11 : 9600 Baud 300 Baud 12 :19200 Baud	
0111	Parameter relating to CHANNEL 1 (I/O CHANNEL=1)	PRM0101
0112	Spec. No. of I/O devices of CHANNEL 1 (I/O CHANNEL=1)	PRM0102

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Number	Contents	Remarks
0113	Baud rate setting of CHANNEL 1 (I/O CHANNEL=1)	PRM0103
0121	Parameter relating to CHANNEL 2 (I/O CHANNEL=2)	PRM0101
0122	Spec. No. of I/O devices of CHANNEL 2 (I/O CHANNEL=2)	PRM0102
0123	Baud rate setting of CHANNEL 2 (I/O CHANNEL=2)	PRM0103
0131	Parameter relating to CHANNEL 3 (I/O CHANNEL=3)	PRM0101
0132	Spec. No. of I/O devices of CHANNEL 3 (I/O CHANNEL=3)	PRM0102
0133	Baud rate setting of CHANNEL 3 (I/O CHANNEL=3)	PRM0103
0134	Parameter relating to REMOTE BUFFER	
#7 : #6 : #5 CLK : #4 NCD : #3 : #2 SYN : #1 PRY : #0 :	 Baud rate clock of RS-422 interface is used, inner clock (0)/outer clock (1) CD (Signal quality detection) of RS-232-C interface, checked (0)/not checked (1) “SYN”, “NAK” code in protocol B is not controlled (0)/controlled (1) Without parity bit (0)/With parity bit (1)	
0135	Parameter relating to REMOTE BUFFER	
#7 RMS : #6 : #5 : #4 : #3 R42 : #2 PRA : #1 ETX : #0 ASC :	In case of extended protocol A, the byte location of SAT data part is, usually not appointed 0 (0)/ send back unconditionally (1) Interface is, RS-232-C (0)/RS-422 (1) Communication protocol is B (0)/A (1) The END CODE for protocol A is, CR code (0)/ EXT code (1) in ASCII/ISO Communication code except of NC data is ISO code (0)/ASCII code (1)	
0140	Parameter relating to BCC check	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 :	 A BCC value is checked (0)/not checked (1).	

Number	Contents	Remarks
0141	System for connection between the CNC and host (DNC1 interface) (0: PTP, 1: Multi-point)	
0142	Station address of the CNC (DNC1 interface) (2-52)	
0143	Time limit specified for the timer monitoring a response (1 – 60) [sec]	
0144	Time limit specified for the timer monitoring the EOT signal (1 – 60) [sec]	
0145	Time required for switching RECV and SEND (1 – 60) [sec]	
0146	Number of times the system retries holding communication (1 – 10) [Number of times]	
0147	Number of times the system sends the message in response to the NAK signal (1 – 10) [Number of times]	
0148	Number of characters in overrun (10 – 255) [Characters]	
0149	Number of characters in the data section of the communication packet (80 – 256) [Characters]	
0161	Communication method	
#7 SRS : #6 : #5 PEO : #4 SRP : #3 : #2 SRL : #1 : #0 :	The number of stop bits is 1 (0)/2 (1). Vertical parity is based on odd parity (0)/even parity (1). A vertical parity check is not made (0)/made (1). The serial interface character consists of 7 bits (0)/8 bits (1).	When PRM 1401#4=1
0171	Number of data items transferred from the PLC to NC (1 to 32).	
0172	Number of data items transferred from the NC to PLC (1 to 32).	
0173	Station address (1 to 15)	
0174	Baud rate	
0 : 2400 2 : 9600 4 : 38400 6 : 76800 [bps] 1 : 4800 3 : 19200 5 : 57600		

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Number	Contents	Remarks
0175	Monitoring timer used from the completion of local station connection preparation sequence to the start of a normal sequence	1–32767 [msec]
0176	Polling time monitoring timer	
0177	Monitoring timer used from the start of SAI transmission to the end of BCC transmission	
0178	Timer used from the completion of reception to the start of transmission	
0201	Transfer condition	PRM 0002#0=1
#7 : #6 : #5 : #4 : #3 : #2 NCR : The EOB code used in output is “LF,CR,CR” (0)/“LF” only (1). #1 ASC : The code used for data output is ISO (0)/ASCII (1). #0 SB2 : The number of stop bits is 1 (0)/2 (1).		
0203	Baud rate (for remote diagnosis)	
1 : 50 4 : 150 7 : 600 10 : 4800 2 : 100 5 : 200 8 : 1200 11 : 9600 3 : 110 6 : 300 9 : 2400 [bps]		
0204	Channel used for remote diagnosis	
0, 1 : Reader/punch interface channel 1, 2 : Channel 2		
0206	Device ID number for remote diagnosis (0 to 20)	
0211	Password 1 for remote diagnose (All remote diagnosis functions)	
0212	Password 2 for remote diagnose (Part programs)	
0213	Password 3 for remote diagnose (Parameters)	
0221	Keyword 1 for remote diagnose	PRM 0211
0222	Keyword 2 for remote diagnose	PRM 0212
0223	Keyword 3 for remote diagnose	PRM 0213
0231	Output format for DNC1 interface #2	PRM 0101
0233	Baud rate for DNC1 interface #2	PRM 0103
0241	System for connection between the CNC and host (DNC1 interface) (1 : PTP, 2 : Multi–point)	
0242	Station address of the CNC (DNC1 interface #2) (2 – 52)	

Number	Contents	Remarks
0900	Data server function	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 DSV :	 The data server function is enabled (0)/ disabled (1)	
0911	Altemate MDI character	
0912	Character not provided in MDI keys	

3) Parameter for Axis control/Incremental system

Number	Contents	Remarks
1001	Parameter relating to least input increment	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 INM :	 Least command increment on linear axis is, mm system (0)/inch system (1)	
1002	Parameter relating to number of control axis	
#7 : #6 : #5 XIK :	 When an axis-by-axis interlock signal is applied during nonlinear positioning, only the interlock axis is stopped (0)/all axes are stopped (1).	
#4 :		
#3 AZR :	For G28, specified when a reference position has not yet been established, deceleration dogs are used (0)/ALM 90 is issued (1).	M series
#2 SFD :	The reference position shift function is not used (0)/used (1).	PRM 1005#1
#1 DLZ :	Reference position return function without dog is, disable (0)/enable (1)	
#0 JAX :	Number of simultaneous controlled axis in manual operation is, 1 axis (0)/3 axis (1)	

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>1004</td><td>Parameter relating to least input increment</td><td></td></tr>
<tr><td>b7 IPR :
b6 :
b5 :
b4 :
b3 :
b2 :
b1 ISC :
b0 ISA :</td><td>Least input increment of each axis is set to 1 time (0)/10 times (1) as of least command increment
<table><tr><th>ISC</th><th>ISA</th><th>CODE</th><th>Least input increment</th></tr><tr><td>0</td><td>0</td><td>IS–B</td><td>0.001 mm or 0.001 deg</td></tr><tr><td>0</td><td>1</td><td>IS–A</td><td>0.01 mm or 0.01 deg</td></tr><tr><td>1</td><td>0</td><td>IS–C</td><td>0.0001 mm or 0.0001 deg</td></tr></table></td><td>M series</td></tr>
<tr><td>1005</td><td>Parameter relating to external deceleration</td><td><Axis></td></tr>
<tr><td>#7 RMB :</td><td>Setting to detach of axis control for each axis is not effective (0)/effective (1)</td><td></td></tr>
<tr><td>#6 MCC :</td><td>At axis removal, the MCC is turned off (0)/only motor activation is turned off (1).</td><td>PRM 0012#7</td></tr>
<tr><td>#5 EDM :</td><td>External deceleration in the negative (–) direction is applicable to rapid traverse (0)/ rapid traverse and cutting feed (1).</td><td>PRM1426, 1427</td></tr>
<tr><td>#4 EDP :</td><td>External deceleration in the positive (+) direction is applicable to rapid traverse (0)/ rapid traverse and cutting feed (1).</td><td>PRM1426, 1427</td></tr>
<tr><td>#3 HJZ :</td><td>For manual reference position return when a reference position is established, deceleration dogs are used (0)/the setting of bit 7 of parameter No. 0002 is followed.</td><td>M series</td></tr>
<tr><td>#2 :</td><td></td><td></td></tr>
<tr><td>#1 DLZ :</td><td>Function for setting the reference position without dogs disabled (0)/enabled (1)</td><td>PRM 1002#1</td></tr>
<tr><td>#0 ZRN :</td><td>A command is issued in automatic operation before a return to reference position has not been performed since the power was turned on, an alarm is generated (0)/alarm is not generated (1)</td><td></td></tr>
<tr><td>1006</td><td>Parameter relating to controlled axis</td><td><Axis></td></tr>
<tr><td>#7 :</td><td></td><td></td></tr>
<tr><td>#6 :</td><td></td><td></td></tr>
<tr><td>#5 ZMI :</td><td>Initial set for direction of reference position return and backlash compensation is, + direction (0)/ – direction (1)</td><td></td></tr>
<tr><td>#4 :</td><td></td><td></td></tr>
<tr><td>#3 DIA :</td><td>The command of amount of travel for each axis is made by radius (0)/diameter (1)</td><td>T series</td></tr>
<tr><td>#2 :</td><td></td><td></td></tr>
<tr><td>#1 ROS :</td><td>The machine coordinate system of a rotation axis is of rotation axis type (0)/linear axis type (1).</td><td>When PRM 1006#0=1</td></tr>
<tr><td>#0 ROT :</td><td>The setting of axis is, linear axis (0)/rotary axis (1)</td><td></td></tr>
</table>

Number	Contents	Remarks
1007	Parameter relating to rotation axis	
#7 : #6 : #5 : #4 : #3 RAA : #2 : #1 : #0 :	 Absolute commands for a rotation axis conform to bit 1 of PRM1008#1 (0)/the end point coordinate is the absolute value of the command value while the rotation direction is determined from the sign of the command value (1).	
1008	Setting of rotation axis	<Axis>
#7 : #6 : #5 : #4 : #3 RAA : #2 RRL : #1 RAB : #0 ROA :	 The rotation direction and end point coordinates specified by an absolute command follow the setting of #1 (0)/the end point coordinates are represented by the absolute values of specified values, and the direction is represented by the sign of the specified values (1). Relative coordinates are not rounded by the amount of the shift per one rotation (0)/are rounded by the amount of the shift per one rotation (1) In the absolute commands, the axis rotates in the direction in which the distance to the target is longer (0)/shorter (1) The roll over function of a rotation axis is invalid (0)/valid (1)	 Rotation axis control PRM1260 PRM 1006#0=1
1010	Setting of number of CNC controlled axis (1 to number of controlled axes)	
1020	Setting of name of each axis used for programming	
	X : 88 Y : 89 Z : 90 A : 65 B : 66 C : 67 U : 85 V : 86 W : 87	<Axis> PRM3405 for T series

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Number	Contents	Remarks
1022	Setting of each axis in the basic coordinate system	<Axis>
	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	Setting of axis number for each servo axis (1 to No. of controlled axis)	<Axis>

4) Parameter for Coordinate system

Number	Contents	Remarks
1201	Parameters for coordinates	
#7 WZR :	Upon reset, the workpiece coordinate system is not returned (0)/returned (1) to that specified with G54	T series
#6 :		
#5 AWK :	When to change workpiece origin offset, value is changed from preprocessing step (0)/ changed immediately (1)	
#4 :		
#3 FPC :	When the floating reference position is set, the relative position display is not preset (0)/is preset (1)	
#2 ZCL :	When manual reference position return is performed the local coordinate system is, not canceled (0)/canceled (1)	
#1 ZPI :	The coordinate value of automatic coordinate system is set PRM 1250 (0)/PRM 1250 & PRM 1251 (1)	PRM1250, 1251
#0 ZPR :	When manual reference position return is performed the automatic coordinate system is not set (0)/set automatically (1)	
1202	Workpiece origin offset	
#7 :		
#6 :		
#5 :		
#4 :		
#3 RLC :	Upon reset, the local coordinate system is not canceled (0)/canceled (1).	
#2 G50 :	When the workpiece coordinate system function is selected, coordinate system setting is executed (0)/an alarm is issued (1).	ALM010 T series
#1 EWS :	The meanings of the workpiece shift value and external workpiece origin offset value are the same (0)/different (1).	T series
#0 EWD :	The shift direction of the external workpiece origin offset is the same as the sign (0)/ opposite to the sign (1).	T series

Number	Contents	Remarks
1220	Offset of the external workpiece origin	<Axis>
1221	Offset of the workpiece origin in workpiece coordinate system 1 (G54)	<Axis>
1222	Offset of the workpiece origin in workpiece coordinate system 2 (G55)	OFFSET screen
1223	Offset of the workpiece origin in workpiece coordinate system 3 (G56)	
1224	Offset of the workpiece origin in workpiece coordinate system 4 (G57)	
1225	Offset of the workpiece origin in workpiece coordinate system 5 (G58)	
1226	Offset of the workpiece origin in workpiece coordinate system 6 (G59)	
1240	Coordinate value of the first reference position on each axis in the machine coordinate system	<Axis>
1241	Coordinate value of the second reference position on each axis in the machine coordinate system	<Axis>
1242	Coordinate value of the third reference position on each axis in the machine coordinate system	<Axis>
1243	Coordinate value of the fourth reference position on each axis in the machine coordinate system	<Axis>
1244	Coordinate value of the floating reference position	<Axis> Set automatically
1250	Coordinate value of the reference position used when automatic coordinate system setting is performed (mm input)	<Axis> PRM 1201#1=0
1251	Coordinate value of the reference position on each axis used for setting a coordinate system automatically when input is performed in inches	<Axis> PRM 1201#1=1
1260	The amount of travel per rotation	
1290	Distance between two opposed tool posts in mirror image	T series

5) Parameters of Stroke Limit

Number	Contents	Remarks
1300	Relating to Stroke Limit	
#7 BFA : #6 LZR : #5 RL3 : #4 : #3 : #2 LMS : #1 : #0 OUT :	When a command that exceeds a stored stroke limit is issued, an alarm is generated after the stroke limit is exceeded (0)/before the limit is exceeded (1) The stored stroke limits are checked during the time from power-on to manual return to the reference position (0)/not checked (1) Stored stroke limit3 release signal RLSOT3 is disabled (0)/enabled (1) The EXLM signal for switching stored stroke limit is disable (0)/enable (1) An inhibition area of the second stored stroke limits is set, inside (0)/outside (1)	PRM1320, 1321, 1326, 1327
1301	Stroke limit check performed before movement	
#7 PLC : #6 : #5 : #4 : #3 : #2 NPC : #1 : #0 :	Stroke limit check before movement is not performed (0)/performed (1) As part of the stroke limit check performed before movement, the movement specified in G31 (skip) and G37 (automatic tool length measurement (for M series) or automatic tool compensation (for T series)) blocks is checked (0)/not checked (1)	
1310	Relating to Stroke Limit	<Axis>
#7 : #6 : #5 : #4 : #3 : #2 : #1 OT3 : #0 OT2 :	 Stored stroke limits 3 for each axis are, not checked (0)/checked (1) When the inside of the stored stroke limits 2 is set as the inhibition area, whether stored stroke limits 2 are checked for each axis is set, stored stroke limits 2 are not checked (0)/ checked (1)	
1320	Coordinate value I of stored stroke limit 1 in the positive direction on each axis	<Axis>
1321	Coordinate value I of stored stroke limit 1 in the negative direction on each axis	<Axis>

Number	Contents	Remarks
1322	Coordinate value of stored stroke limit 2 in the positive direction on each axis	<Axis>
1323	Coordinate value of stored stroke limit 2 in the negative direction on each axis	<Axis>
1324	Coordinate value of stored stroke limit 3 in the positive direction on each axis	<Axis>
1325	Coordinate value of stored stroke limit 3 in the negative direction on each axis	<Axis>
1326	Coordinate value II of stored stroke limit 1 in the positive direction on each axis	<Axis> PRM 1300#2=1
1327	Coordinate value II of stored stroke limit 1 in the negative direction on each axis	<Axis> PRM 1300#2=1
1330	Profile of a chuck 0 : Holds a workpiece on the inner surface. 1 : Holds a workpiece on the outer surface.	T series
1331	Dimensions of the claw of a chuck (L) [Increment system]	T series
1332	Dimensions of the claw of a chuck (W) (Radius value) [Increment system]	T series
1333	Dimensions of the part of a claw at which a workpiece is held (L1) [Increment system]	T series
1334	Dimensions of the part of a claw at which a workpiece is held (W1) (Radius value) [Increment system]	T series
1335	Chuck position CZ along the X-axis (workpiece coordinate system) [Increment system]	T series
1336	Chuck position CZ along the Z-axis (workpiece coordinate system) [Increment system]	T series
1341	Length of a tailstock (L) [Increment system]	T series
1342	Diameter of a tailstock (D) [Increment system]	T series
1343	Length of a tailstock (L1) [Increment system]	T series
1344	Diameter of a tailstock (D1) [Increment system]	T series
1345	Length of a tailstock (L2) [Increment system]	T series
1346	Diameter of a tailstock (D2) [Increment system]	T series
1347	Diameter of the hole of a tailstock (D3) [Increment system]	T series
1348	Z coordinate of a tailstock (TZ) (Workpiece coordinate system) [Increment system]	T series

6) Parameter of Feedrate

Number	Contents	Remarks
1401	Parameter relating to Feedrate	
#7 : #6 RDR : #5 TDR : #4 RFO : #3 : #2 JZR : #1 LRP : #0 RPD :	 Dry run for rapid traverse command is, disable (0)/enable (1) Dry run during tapping in the tapping cycle (G74, G84) (including rigid tapping) is enable (0)/ disable (1) When cutting feedrate override is 0% during rapid traverse, the machine tool does not stop moving (0)/stops moving (1) Manual return to the reference position at Jog feedrate is not performed (0)/performed (1) Positioning (G00) is nonlinear (0)/linear (1). Manual rapid traverse before the completion of return to reference position is disable (0)/enable (1)	T series
1402	Parameter relating to Manual feed per revolution	
#7 : #6 : #5 : #4 JRV : #3 OV2 : #2 : #1 : #0 NPC :	 Manual feed per revolution is, not performed (0)/performed (1) The secondary feedrate override value is 1% (PMCDGN G013) (0)/0.01% (G094, G095) (1). The feed per rotation command is ineffective when a position coder is not provided (0)/ provided (1)	T series
1403	Units used for feed per minute, threading retract	T series
#7 RTV : #6 : #5 : #4 : #3 : #2 : #1 : #0 MIF :	Overriding during threading retraction is enabled (0)/disabled (1). The unit of F for feed per minute is [mm/min] (0)/0.001 mm/min] (1).	

Number	Contents	Remarks
1404	Helical interpolation, reference position return	
	#7 : #6 : #5 : #4 : #3 : #2 F8A : With inch input, Valid data range for an F command in feed per minute mode 9600 deg/min (0)/24000 deg/min (1) #1 DLF : After a reference position has been established, a manual reference position return operation is performed at the rapid traverse rate (PRM1420) (0)/at the manual rapid traverse rate (PRM1424) (1). #0 HFC : When helical interpolation involves a linear axis that is longer than an arc, the maximum feedrate is clamped to the feedrate along the linear axis (0)/the combined feedrate along the linear axis and arc (1).	
1410	Dry run rate (feedrate of jog override is 100%) [mm/min]	
1411	Cutting feedrate in the automatic mode at power-on [mm/min]	M series
1414	Feedrate for reverse movement by the retrace function [mm/min]	M series 0: Programmed command
1420	Rapid traverse rate for each axis (Rapid traverse override is 100%) [mm/min]	<Axis>
1421	F0 rate of rapid traverse override for each axis [mm/min]	<Axis>
1422	Maximum cutting feedrate for each axis [mm/min]	<Axis> PRM1430
1423	Manual continuous feedrate for each axis (jog feedrate) [mm/min]	<Axis>
1424	Manual rapid traverse rate for each axis If 0 is set, the rate set in PRM1420 is assumed [mm/min]	<Axis>
1425	FL rate of return to the reference position for each axis [mm/min]	<Axis>
1426	External deceleration rate of cutting feed [mm/min]	<Axis> PRM 1005#4, 5
1427	External deceleration rate of rapid traverse for each axis [mm/min]	

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<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>1428</td><td>Feedrate for reference position return before establishing reference position [mm/min]
<table>
<tr><td colspan="2" rowspan="3"></td><td colspan="2">Before a reference position is set</td><td colspan="2">After a reference position is set</td></tr>
<tr><td colspan="2">Reference position return feedrate setting function</td><td colspan="2">Reference position return feedrate setting function</td></tr>
<tr><td>Disabled</td><td>Enabled</td><td>Disabled</td><td>Enabled</td></tr>
<tr><td colspan="2">Reference position return by G28</td><td rowspan="2">PRM1420</td><td rowspan="4">PRM1428</td><td colspan="2" rowspan="2">PRM1420</td></tr>
<tr><td colspan="2">Raped traverse command (G00) in automatic operation</td></tr>
<tr><td rowspan="2">Manual reference position return</td><td>Without dogs*1</td><td rowspan="2">PRM1424</td><td colspan="2">PRM1420 or PRM1424*2</td></tr>
<tr><td>With dogs</td><td>PRM1424</td><td>PRM1428</td></tr>
<tr><td colspan="2">Manual raped traverse</td><td colspan="2">PRM1423 or PRM1424*1</td><td colspan="2">PRM1424</td></tr>
</table>
*1 To be selected with bit 0 of PRM1401
*2 To be selected with bit 1 of PRM1404</td><td><Axis>
M series</td></tr>
<tr><td>1430</td><td>Maximum cutting feedrate for each axis [mm/min]</td><td><Axis>
M series
PRM1422</td></tr>
<tr><td>1431</td><td>Maximum cutting feedrate for all axes in the look-ahead control mode [mm/min]</td><td>M series</td></tr>
<tr><td>1432</td><td>Maximum cutting feedrate for each axis in the look-ahead control mode [mm/min]</td><td><Axis>
M series
PRM 1431</td></tr>
<tr><td>1450</td><td>Change of feedrate for one graduation on the manual pulse generator during F1 digit feed
$\Delta F = \frac{\text{Fmax1 or Fmax2}}{100 \times (\text{PRM1450})}$
Fmax1=PRM 1460
Fmax2=PRM 1461</td><td>M series</td></tr>
<tr><td>1451</td><td>Feedrate for F1 digit command F1 [mm/min]</td><td rowspan="9">M series
Setting entry is acceptable. It is possible to increase and decrease according to F1D signal.</td></tr>
<tr><td>1452</td><td>Feedrate for F1 digit command F2 [mm/min]</td></tr>
<tr><td>1453</td><td>Feedrate for F1 digit command F3 [mm/min]</td></tr>
<tr><td>1454</td><td>Feedrate for F1 digit command F4 [mm/min]</td></tr>
<tr><td>1455</td><td>Feedrate for F1 digit command F5 [mm/min]</td></tr>
<tr><td>1456</td><td>Feedrate for F1 digit command F6 [mm/min]</td></tr>
<tr><td>1457</td><td>Feedrate for F1 digit command F7 [mm/min]</td></tr>
<tr><td>1458</td><td>Feedrate for F1 digit command F8 [mm/min]</td></tr>
<tr><td>1459</td><td>Feedrate for F1 digit command F9 [mm/min]</td></tr>
<tr><td>1460</td><td>Upper limit of feedrate for F1 digit command (F1 to F4) [mm/min]</td><td rowspan="2">M series</td></tr>
<tr><td>1461</td><td>Upper limit of feedrate for F1 digit command (F5 to F9) [mm/min]</td></tr>
</table>

7) Parameters of acceleration/deceleration control

Number	Contents	Remarks
1601	Parameter relating to acceleration/deceleration	
	#7 : #6 ACD : Automatic corner deceleration function is used (0)/not used (1) #5 NCI : Imposition check at deceleration is performed (0)/not performed (1) #4 RTO : Block overlap in rapid traverse is not performed (0)/performed (1) #3 : #2 OVB : Cutting feed block overlap is not performed (0)/ is performed (1). #1 : #0 :	 PRM 1722 M series
1602	Acceleration/deceleration control	
	#7 : #6 LS2 : Acceleration/deceleration after cutting feed interpolation during look-ahead control is exponential (0)/linear (1). #5 : #4 CSD : Automatic corner deceleration is controlled by angle (0)/feedrate (1). #3 : #2 : #1 : #0 FWB : Linear acceleration/deceleration before interpolation is type A (0)/type B (1)	 G08.1
1610	Acceleration/deceleration control	<Axis>
	#7 : #6 : #5 : #4 JGL : Acceleration/deceleration for manual feed is exponential (0)/linear or bell-shaped (1). #3 : #2 : #1 CTB : On an axis-by-axis basis, bell-shaped acceleration/deceleration after cutting feed interpolation is not used (0)/used (1). #0 CTL : On an axis-by-axis basis, linear acceleration/deceleration after cutting feed interpolation is not used (0)/used (1).	 PRM 1610#0,#1, 1624 PRM1622 PRM1622
1620	Time constant of linear acceleration/ deceleration in rapid traverse for each axis [msec]	<Axis>
1621	Time constant T2 used in bell-shaped acceleration/deceleration in rapid traverse for each axis [msec]	<Axis>
1622	Time constant of exponential function acceleration/deceleration in cutting feed for each axis [msec]	<Axis>

Number	Contents	Remarks
1623	FL rate of exponential function acceleration/ deceleration in cutting feed for each axis [mm/min]	<Axis>
1624	Time constant of exponential function acceleration/deceleration in manual continuous feed for each axis [msec]	<Axis>
1625	FL rate of exponential function acceleration/ deceleration in manual continuous feed for each axis [mm/min]	<Axis>
1626	Time constant of exponential function acceleration/deceleration in the thread cutting cycle for each axis (G92 in G code system A) [msec]	<Axis> T series
1627	FL rate of exponential function acceleration/ deceleration in the thread cutting cycle for each axis (G92 in G code system A) [mm/min]	<Axis> T series
1630	Maximum machining speed during linear acceleration/deceleration before interpolation [mm/min]	In look-ahead control mode, PRM1770, 1771 are enabled.
1631	Time until the machining speed reaches the maximum speed during acceleration/ deceleration before interpolation [msec]	
1710	Minimum deceleration ratio (MDR) of the inner circular cutting rate in automatic corner override [%]	M series Automatic corner override
1711	Angle (θp) to recognize the inner corner in automatic override [deg]	
1712	Amount of automatic override for an inner corner [%]	
1713	Distance Le from the starting point in inner corner automatic override	
1714	Distance Ls up to the ending point in inner corner automatic override	
1722	Rapid traverse deceleration ratio when blocks in rapid traverse are overlapped [%]	<Axis> PRM 1601#4
1730	Maximum allowable feedrate for arc radius R	Feedrate clamping for feedrate based on an arc radius
1731	Arc radius R for a maximum allowable feedrate based on an arc radius	
1732	Minimum allowable clamping feedrate for feedrate based on an arc radius	
1740	Critical angle subtended by two blocks specifying automatic corner deceleration [0.001 deg]	M series

Number	Contents	Remarks
1741	Feedrate for terminating automatic corner deceleration (for acceleration/deceleration after interpolation)	<Axis> M series
1762	Time constant of exponential acceleration/ deceleration in cutting feed in look-ahead control mode [msec]	<Axis> M series
1763	FL rate for exponential acceleration/ deceleration in cutting feed in look-ahead control mode [mm/min]	<Axis> M series
1768	Time constant of linear acceleration/ deceleration in cutting feed in look-ahead control mode [msec]	M series
1770	Maximum machining speed during linear acceleration/deceleration before interpolation [mm/min]	Acceleration/ deceleration before interpolation (look-ahead control mode) M series
1771	Time needed until the machining speed reaches the maximum machining speed during acceleration/deceleration before interpolation [msec]	
1777	Minimum allowable feedrate for automatic corner deceleration (for acceleration/ deceleration before interpolation)	<Axis> M series
1778	Minimum speed of for the automtic corner deceleration function (for linear acceleration/ deceleration before interpolation)	<Axis> M series
1779	Critical angle subtended by two blocks for automatic corner deceleration (for look–ahead control)	M series
1780	Allowable feedrate difference for the corner deceleration function based on a feedrate difference (acceleration/deceleration before interpolation)	
1781	Allowable feedrate difference for the corner deceleration function based on a feedrate difference (acceleration/deceleration after interpolation)	<Axis>
1783	Allowable error in automatic corner deceleration based on a feedrate difference (linear acceleration/deceleration after interpolation)	<Axis>
1784	Feedrate for overtravel alarm deceleration during acceleration/deceleration before interpolation (stroke limit)	

8) Parameters of Servo

Number	Contents	Remarks
1800	Backlash compensation, DRDY alarm	
#7 :		
#6 :		
#5 TRC :	The servo trace function is disabled (0)/ enabled (1).	PRM 1870
#4 RBK :	Backlash compensation applied separately for cutting feed and rapid traverse is not performed (0)/performed (1)	PRM 1851, 1852
#3 FFR :	The feed-forward function is enabled for cutting only (0)/cutting and rapid traverse (1).	
#2 OZR :	If manual reference position return is performed using the feed hold function when there is a remaining distance to travel, a miscellaneous function is being executed, a dwell operation is being performed, or a canned cycle is being executed, ALM091 is issued (0)/not issued (1).	
#1 CVR :	A servo alarm is generated when DRDY is set ON before output of MCON (0)/alarm is not generated (1)	ALM 404
#0 :		

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>1801</td><td>Parameter relating to inposition</td><td></td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 CIN : In-position width parameter setting when a block for cutting is followed by another block for cutting
#4 CCI : In-position width parameter setting when a block for cutting is followed by another block for cutting
<table>
<tr><th>CIN</th><th>CCI</th><th>PRM1826</th><th>PRM1827</th></tr>
<tr><td>0</td><td>0</td><td>Same as rapid traverse</td><td>(Not used)</td></tr>
<tr><td>1</td><td>0</td><td>When the next block specifies an operation other than cutting</td><td>When the next block also specifies cutting</td></tr>
<tr><td>1</td><td>1</td><td>When rapid traverse is to be performed regardless of what is specified by the next block</td><td>When cutting feed is to be performed regardless of what is specified by the next block</td></tr>
</table>
#3 :
#2 :
#1 PM2 : Spindle-to-motor gear ratio when the speed control function based on the servo motor is used
#0 PM1 : Spindle-to-motor gear ratio when the speed control function based on the servo motor is used
<table>
<tr><th>PM2</th><th>PM1</th><th>Magnification</th></tr>
<tr><td>0</td><td>0</td><td>1/1</td></tr>
<tr><td>0</td><td>1</td><td>1/2</td></tr>
<tr><td>1</td><td>0</td><td>1/4</td></tr>
<tr><td>1</td><td>1</td><td>1/8</td></tr>
</table>
$$\text{Magnification} = \frac{\text{spindle speed}}{\text{motor speed}}$$
</td><td>PRM1826, 1827

T series

T series</td></tr>
<tr><td>1802</td><td>Speed control based on the servo motor</td><td>T series</td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 DPS : In speed control based on the servo motor, a position coder is used (0)/not used (1).
#4 :
#3 :
#2 :
#1 :
#0 CTS : Speed control based on the servo motor is not applied (0)/applied (1).</td><td></td></tr>
</table>

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>1804</td><td>VRDY OFF ignore signal</td><td></td></tr>
<tr><td colspan="2">#7 :
#6 SAK : When the IGNVRY signal is 1 or the IGNVRYx signal for each axis is 1, SA is set to 0 (0)/ 1 (1).
#5 :
#4 :
#3 :
#2 :
#1 :
#0 :</td><td></td></tr>
<tr><td>1815</td><td>Parameter relating to position detector</td><td><Axis></td></tr>
<tr><td colspan="2">#7 ZMG : The reference position method is the grid method (0)/magnetic switch method (1).
#6 :
#5 APC : Position transducer is incremental position transducer (0)/absolute pulse coder (1)
#4 APZ : When the absolute position detector is used, machine position and absolute position transducer is not corresponding (0)/ corresponding (1)
#3 :
#2 :
#1 OPT : A separate pulse coder is not used (0)/ used (1)
#0 :</td><td></td></tr>
<tr><td>1816</td><td>Parameter relating to detection multiply</td><td><Axis></td></tr>
<tr><td colspan="2">#7 :
#6 DM3 :
#5 DM2 :
#4 DM1 :
#3 :
#2 :
#1 :
#0 :
<table>
<tr><th>DM3</th><th>DM2</th><th>DM1</th><th>DMR</th><th>DM3</th><th>DM2</th><th>DM1</th><th>DMR</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1/2</td><td>1</td><td>0</td><td>0</td><td>5/2</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>3</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>3/2</td><td>1</td><td>1</td><td>0</td><td>7/2</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>2</td><td>1</td><td>1</td><td>1</td><td>4</td></tr>
</table>
Detection unit = $\dfrac{\text{Move amount per one rotation of the motor}}{\text{Position feedback pulse per one rotation of the motor} \times \text{DMR}}$</td><td>Flexible feed gear In case of parameter (No. 2084 and 2085 are not used.)</td></tr>
<tr><td>1817</td><td>Tandem control</td><td><Axis></td></tr>
<tr><td colspan="2">#7 :
#6 TAN : Tandem control is not applied (0)/applied (1).
#5 :
#4 :
#3 :
#2 :
#1 :
#0 :</td><td></td></tr>
</table>

Number	Contents	Remarks
1819	Follow-up, feed-forward	<Axis>
#7 NAH : #6 : #5 : #4 : #3 : #2 : #1 : #0 FUP :	In look-ahead control mode, the advance feed-forward function is used (0)/not used (1). When the servo system is turned off, a follow-up operation is performed based on *FLWU (0)/is not performed (1).	M series
1820	Command multiply for each axis (CMR) $CMR = \frac{\text{Least command increment}}{\text{Detection unit}}$ CMR $<$ 1 Setting value = (1/CMR) +100 CMR $\geqq$ 1 Setting value = $2 \times$ CMR	<Axis>
1821	Reference counter capacity for each axis [Detection unit]	<Axis>
1825	Servo loop gain for each axis [0.01 sec^{-1}]	<Axis> Std=3000
1826	Inposition width for each axis [Detection unit]	<Axis>
1827	Inposition width for successive cutting feed blocks for each axis [Detection unit]	<Axis> T series PRM 1801#4
1828	Positioning deviation limit for each axis in movement [Detection unit] Setting value = $\frac{\text{Rapid traverse}}{60 \times \text{PRM 1825}} \times \frac{1}{\text{Detecting unit}} \times 1.2$	<Axis> PRM 1420 PRM 1825
1829	Positioning deviation limit for each axis in the stopped state [Detection unit]	<Axis> Std=5000
1832	Feed stop positioning deviation for each axis [Detection unit]	<Axis>
1836	Servo error amount where reference position return is possible [Detection unit]	<Axis> PRM 2000#0
1850	Grid shift for each axis [Detection unit]	<Axis>
1851	Backlash compensating value for each axis [Detection unit]	<Axis>
1852	Backlash compensating value used for rapid traverse for each axis [Detection unit]	<Axis> PRM 1800#4=1
1870	Number of the program for storing servo trace data	
1871	Program number where servo trace data is stored (when the program number is 8 digits)	

Number	Contents	Remarks
1874	Numerator of the conversion coefficient for inductosyn position detection	<Axis>
1875	Denominator of the conversion coefficient for inductosyn position detection	<Axis>
1876	One-pitch interval of the inductosyn	<Axis>
1877	Amount of inductosyn shift	<Axis>
1880	Abnormal load detection alarm timer [msec]	
1890	Detection speed of the servo motor speed detection function [rpm]	
1891	Signal output address of the servo motor speed detection function [rpm]	
2000	Parameter for servo	<Axis>
#7 : #6 : #5 : #4 : #3 PRMCAL : #2 : #1 DGPRM : #0 PLC01 :	 Automatic calculation of parameter values according to the number of PC pulses is not performed (0)/performed (1) When the power is turned on, the digital servo parameter specific to the motor is set (0)/not set (1). Incremental system is 1/1000mm (0)/ 1/10000mm (1)	PRM2023, 2024, 1836
2001	Parameter for pulse coder	<Axis>
#7 AMR7: #6 AMR6: #5 AMR5: #4 AMR4: #3 AMR3: #2 AMR2: #1 AMR1: #0 AMR0:	(see table below)	

#7	#6	#5	#4	#3	#2	#1	#0	Motor type
1	0	0	0	0	0	1	0	5-0
0	0	0	0	0	0	1	1	4-0S, 3-0S
0	0	0	0	0	0	0	0	Servo Motor α series

Number	Contents	Remarks
2003	Parameter for velocity control	<Axis>
	#7 VOFST : VCMD is not offset (0)/offset (1)	
	#6 OVSCMP : Overshoot compensation is invalidated (0)/validated (1)	PRM 2045
	#5 BLENBL : In speed control, backlash compensation is, not improved (0)/proved (1)	PRM 2048
	#4 IPSPRS : In speed control, 1 pulse when the direction is reversed one pulse is not ignored (0)/ignored (1)	
	#3 PIENBL : Velocity control by IP control (0)/PI control (1)	
	#2 OBENBL : Velocity control observer is not used (0)/ used (1)	PRM 2047, 2050, 2051
	#1 TGALRM : The detecting level of the motor rotation without feedback alarm is set to standard (0)/set by parameter 1892 (1)	PRM 2064
	#0 *NDL8 : 0	
2004	Parameter for pulse coder	<Axis>
	#7 : #6 : #5 : #4 : #3 TRW1 : #2 TRW0 : #1 TINB0 : #0 TINA0 : The standard value for this parameter is set when the power is turned on. Do not set it to other than the standard value	
2005	Parameter for servo	<Axis>
	#7 :	
	#6 BRKCTL : Gravity shaft break control function is ineffective (0)/effective (1)	PRM2083
	#5 :	
	#4 :	
	#3 :	
	#2 :	
	#1 FEEDFD : Feedforward function is ineffective (0)/ effective (1)	PRM2068, 2069, 2092
	#0 :	
2006	Parameter for servo	<Axis>
	#7 :	
	#6 DCBEMF : While decelerating, back electromotive force compensation is ineffective (0)/ effective (1)	
	#5 :	
	#4 ACCFB : Acceleration feedback while stopping function is ineffective (0)/effective (1)	
	#3 :	
	#2 PKVER : Current loop gain velocity depending variable function is ineffective (0)/ effective (1)	PRM 2074
	#1 :	
	#0 FCBLCM : In fully closed feedback, backlash compensation pulses are dealt normally (0)/not used (1)	PRM 2048

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>2009</td><td>Parameter for servo</td><td><Axis></td></tr>
<tr><td colspan="2">#7 BLSTP : Backlash acceleration stop function is ineffective (0)/effective (1)
#6 BLCUT : Backlash acceleration stop function in cutting mode is ineffective (0)/effective (1)
#5 :
#4 :
#3 :
#2 ADBLSH : New type backlash acceleration stop function is ineffective (0)/effective (1)
#1 :
#0 SERDMY : Dummy function for the serial pulse coder is not used (0)/used (1)</td><td>PRM2066, 2082

PRM2048, 2087</td></tr>
<tr><td>2010</td><td>Parameter for servo</td><td><Axis></td></tr>
<tr><td colspan="2">#7 POLENB : Function for switching the punch and laser is not used (0)/used (1)
#6 :
#5 :
#4 :
#3 BLTEN : Multiply backlash acceleration amount is ×1 (0)/×10 (1)
#2 :
#1 :
#0 :</td><td>PRM2048</td></tr>
<tr><td>2012</td><td>Parameter for servo</td><td><Axis></td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 VCMD2 :
#4 VCMD1 :
<table>
<tr><th>VCMD2</th><th>VCMD1</th><th>Serial PC</th></tr>
<tr><td>0</td><td>0</td><td>0.9155 rpm/5V</td></tr>
<tr><td>0</td><td>1</td><td>14 rpm/5V</td></tr>
<tr><td>1</td><td>0</td><td>234 rpm/5V</td></tr>
<tr><td>1</td><td>1</td><td>3750 rpm/5V</td></tr>
</table>
#3 :
#2 :
#1 MCNFB : Machine velocity feedback function is ineffective (0)/effective (1)
#0 :</td><td>PRM2088</td></tr>
<tr><td>2015</td><td>High-speed positioning function</td><td><Axis></td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 :
#4 :
#3 :
#2 :
#1 SSG1 : Integration function at low speed is not used (0)/used (1)
#0 PGTWN : Polygonal lines for the position gain are not used (0)/used (1)</td><td>PRM2029, 2030
PRM2028</td></tr>
</table>

Number	Contents	Remarks
2019	Digital servo function	<Axis>
	#7 DFBCT : The dual feedback function is not used (0)/ used (1). #6 : #5 : #4 : #3 : #2 : #1 : #0 :	
2020	Motor model	<Axis>
2021	Load inertia ratio (LDINT)	<Axis>
2022	Motor rotation direction (DIRCTL) 111=CCW, –111=CW	<Axis>
2023	No. of speed detection feedback pulses (PULCO)	<Axis> PRM 2000#0

	PRM 2000#0=0	PRM 2000#0=1
Serial PC A/α PC	8192	819

Number	Contents	Remarks
2024	No. of position detection feedback pulses (PPLS)	<Axis> PRM 2000#0

1 Position detecting by built-in type of pulse coder

	PRM 2000#0=0	PRM 2000#0=1
Serial PC A/α PC	12500	1250

2 In case of separate type of position detector, Setting value=the feedback pulse/motor one revolution $\times 4$
When bit 0 of parameter No. 2000 is 1, use the value obtained by dividing, by 10, the value used when this bit is 0.

Number	Contents	Remarks
2028	Speed at which the position gain is doubled	<Axis> PRM 2015#0
2029	Speed at which the integration function is disabled during acceleration	<Axis> PRM 2015#1
2030	Speed at which the integration function is enabled during deceleration	
2031	Simplified synchronization alarm detection level (TCDIFF)	<Axis>
2032	Integral gain change–over parameter (PUNCH)	<Axis>
2033	Vibration–damping control position feedback pulse (PFBPLS)	<Axis>

Number	Contents	Remarks
2034	Vibration–damping control gain (GAINBT)	<Axis>
2035	Number of directly set feed–forward shifts (FMFSFL)	<Axis>
2036	Slave axis damping compensation (SBDMPL)	<Axis>
2037	(Reserve)	<Axis>
2038	Spindle feed back coefficient	<Axis>
2039	Second–stage acceleration of the Two–stage backlash acceleration function (BL3QUT)	<Axis>
2040	Current loop gain (PK1)	<Axis>
2041	Current loop gain (PK2)	<Axis>
2042	Current loop gain (PK3)	<Axis>
2043	Velocity loop gain (PK1V)	<Axis>
2044	Velocity loop gain (PK2V)	<Axis>
2045	Imperfect integration coefficient (PK3V)	<Axis>
2046	Velocity loop gain (PK4V)	<Axis>
2047	Velocity control observer parameter (POA1)	<Axis>
2048	Velocity control backlash compensation impovement (BLCMP)	<Axis>
2049	Maximum zero width of dual feedback	<Axis>
2050	Velocity control observer parameter (POK1)	<Axis>
2051	Velocity control observer parameter (POK2)	<Axis>
2052	Not used	<Axis>
2053	Current dead band compensation (PPMAX)	<Axis>
2054	Current dead band compensation (PDDP)	<Axis>
2055	Current dead band compensation (PHYST)	<Axis>
2056	Back electromotive force compensation (EMFCMP)	<Axis>
2057	Current phase control (PVPA)	<Axis>
2058	Current phase control (PALPH)	<Axis>
2059	Back electromotive force compensation (EMFBAS)	<Axis>
2060	Torque limit (TQLIM)	<Axis>
2061	Back electromotive force compensation (EMFLMT)	<Axis>
2062	Overload protection coefficient (OVC1)	<Axis>
2063	Overload protection coefficient (OVC2)	<Axis>

Number	Contents	Remarks
2064	TG alarm level (TGALMLV)	<Axis> PRM 2003#1
2065	Overload protection coefficient (OVCLMT)	<Axis>
2066	250 μ sec acceleration feedback (PK2VAUX)	<Axis>
2067	Torque command filter (TCFIL)	<Axis>
2068	Feedforward coefficient (FALPH)	<Axis>
2069	Feedforward filter coefficient (VFFLT)	<Axis>
2070	Backlash compensation acceleration parameter (ERBLM)	<Axis>
2071	Backlash compensation acceleration parameter (PBLCT)	<Axis>
2072	Static–friction compensation acceleration (SFCCML)	<Axis>
2073	Static–friction compensation stop decision time (PSPTL)	<Axis>
2074	Velocity depending type current loop gain (AALPH)	<Axis>
2076	Acceleration feedback gain (WKAC)	<Axis>
2077	Overshoot provention counter (OSCTP)	<Axis>
2078	Numerator of dual position feedback conversion coefficient	<Axis>
2079	Denominator of dual position feedback conversion coefficient	<Axis>
2080	Primary delay time constant of dual position feedback	<Axis>
2081	Zero width of dual position feedback	<Axis>
2082	Backlash acceleration stop amount (BLEND)	<Axis>
2083	Gravity axis break control timer (MOFCT)	<Axis> PRM 2005#6
2084	Flexible feed gear numerator n	<Axis>
2085	Flexible feed gear denominator m	<Axis>
$\frac{n}{m} = \frac{\text{Position feedback pulses/motor rev.}}{1,000,000}$		
2086	Rated current parameter (RTCURR)	<Axis>
2087	New type backlash acceleration torque offset (TCPRLD)	<Axis>

Number	Contents	Remarks
2088	Machine velocity feedback gain (MCNFB)	<Axis> PRM 2012#2
	$\text{PRM 2088} = 4096 \times \alpha \times \dfrac{\text{PRM 2023}}{\text{PRM 2024}}$	
2089	Base pulse for backlash acceleration (BLBSL)	<Axis>
2091	Nonlinear switch input amount	<Axis>
2092	Advance feed-forward coefficient [0.01%]	<Axis>
2093	Incomplete integral (speed command mode) (VMPK3V)	<Axis>
2094	Second backlash acceleration (BLCMP2)	<Axis>
2095	Mechanical distortion compensation (AHDRT)	<Axis>
2096	Radius parameter for radial error serial output (RADUS)	<Axis>
2097	Static–friction compensation stop (SMCNT)	<Axis>
2098	Phase progress compensation coefficient in deceleration (PIPVPL)	<Axis>
2099	1 pulse suppress level (ONEPSL)	<Axis>
2102	Final clamp value of the actual current limit (DBLMI)	<Axis>
2103	Restored amount in abnormal load detection (ABVOF)	<Axis>
2104	Threshold in the alarm of abnormal load detection (ABTSH)	<Axis>
2105	Torque constant (TRQCST)	<Axis>
2107	Speed loop gain override (VLGOVR)	<Axis>
2109	Fine Acc/Dec time constant (BELLTC)	<Axis>
2110	Current phase control 2 (MGSTCM)	<Axis>
2111	Deceleration torque limit (DETQLM)	<Axis>
2112	Linear motor AMR conversion factor (AMRDML)	<Axis>
2113	Notch filter cutoff frequency (NFILT)	<Axis>
2114	Second–stage acceleration multiplier of the Two–stage backlash acceleration function (BL3OVR)	<Axis>
2115	Arbitrary data serial output address (SRTADL)	<Axis>
2116	Abnormal load detection friction compensation (FRCCMP)	<Axis>

Number	Contents	Remarks
2118	Maximum value for dual position feedback error difference detection (DERMXL)	<Axis>
2121	Super–precision pulse conversion factor (SBPDNL)	<Axis>
2122	Super–precision detection resistance conversion factor (SBAMPL)	<Axis>

9) Parameter of DI/DO

Number	Contents	Remarks
3001	Parameter for Interface	
#7 MHI : Exchange of strobe and completion signals for the M, S, T and B codes are normal (0)/ high speed (1) #6 : #5 : #4 : #3 : #2 RWM : RRW signal is put out only when the tape reader is being rewound (0)/ when a program in memory is being rewound (1) #1 : #0 :		
3002	Override polarity	
#7 : #6 : #5 : #4 IOV : The manual feed and cutting feed override signal uses negative logic (0)/positive logic (1). #3 : #2 : #1 : #0 :		
3003	Parameter for Interlock signal	
#7 MVG : During dynamic graphic processing, the axis movement in-progress signal is output (0)/not output (1). #6 MVX : The axis movement in-progress signal is set to 0 at the time of distribution completion (0)/ in-position (1). #5 DEC : Deceleration signals (*DEC1 to *DEC8) for manual reference position return specify deceleration when they are 0 (0)/when they are 1 (1) #4 : #3 DIT : Interlock for each axis direction is, enable (0)/ disable (1) #2 ITX : Interlock signals for each axis is, enable (0)/ disable (1) #1 : #0 ITL : Interlock signal is enable (0)/ disable (1) *IT, STLK		T series +MIT1 - –MIT4 *IT1 - *IT8 *IT, STLK (T)

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Number	Contents	Remarks
3004	Overtravel	
#7 : #6 : #5 OTH : #4 : #3 : #2 : #1 : #0 :	 The hardware overtravel function is used (0)/ not used (1).	
3006	Reference position return deceleration signal	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 GDC :	 The address of the reference position return deceleration signal is X009 (0)/G196 (1).	
3010	Delay time of strobe signals MF, SF, TF, BF [msec]	
3011	Acceptable width of M, S, T and B function completion signal (FIN) [msec]	
3017	Output time of reset signal RST [16 msec]	
3030	Allowable number of digits for the M code (1 - 8)	
3031	Allowable number of digits for the S code (1 - 5)	
3032	Allowable number of digits for the T code (1 - 8)	
3033	Allowable number of digits for the B code (1 - 8)	

10) Parameters of CRT/MDI, Display, and Edit

Number	Contents	Remarks
3100	Parameter for CRT / MDI	
#7 COR : #6 : #5 : #4 FPT : #3 FKY : #2 : #1 : #0 :	9-inch high resolution CRT is used as a monochrome display (0)/color display (1) The CAP-II keyboard is not used (0)/used (1). The standard keys are used for MDI keyboard (0)/ The full keys are used (1)	T series
3101	CRT	
#7 SBA : #6 : #5 : #4 BGD : #3 : #2 : #1 KBF : #0 :	The current positions are displayed in the order of tool post 1 then tool post 2 (0)/tool post 2 then tool post 1 (1). The display of a foreground program in the background is disabled (0)/enabled (1). At screen or mode switching, the key buffer is cleared (0)/not cleared (1).	T series (2-path control)
3102	The selection of language used in the display on theCRT (Option)	English is a standard
#7 : #6 SPN : #5 HNG : #4 ITA : #3 CHI : #2 FRN : #1 GRM : #0 JPN :	 Spanish Korean (Hangul character) Italian Chinese (Taiwanese) French German Japanese	When all the bits are set to 0, English is used.
3103	Current position display order	
#7 ABR : #6 : #5 : #4 : #3 : #2 : #1 : #0 :	When the absolute and relative current positions are displayed, tool post 1 is displayed on the first screen, then tool post 2 is displayed on the second screen (0)/ a selected tool post is displayed on the first screen, then the tool post that is not selected is displayed on the second screen (1).	T series (2-path control)

Number	Contents	Remarks
3104	Parameters for position display	
#7 DAC : #6 DAL : #5 DRC : #4 DRL : #3 PPD : #2 : #1 : #0 MCN :	For displaying absolute positions, cutter compensation (M series) or tool-tip radius compensation (T series) is considered (0)/not considered (1) For displaying absolute positions, tool length compensation (M series) or tool offset (T series) is considered (0)/not considered (1) For displaying relative positions, cutter compensation (M series) or tool-tip radius compensation (T series) is considered (0)/not considered (1) For displaying relative positions, tool length compensation (M series) or tool offset (T series) is considered (0)/not considered (1) When a coordinate system is set, the relative position display is not preset (0)/preset (1) The machine position display is not displayed according to the unit of input (0)/displayed according to the unit of input (1)	PRM 0000#2
3105	Parameters for data display	
#7 SMF : #6 : #5 : #4 : #3 : #2 DPS : #1 PCF : #0 DPF :	During simplified synchronous control, movement along a slave axis is included (0)/ not included (1) in the actual speed display. Actual spindle speed and T code are not always displayed (0)/always displayed (1) The movement of the PMC controlled axes are added to the actual speed display (0)/not added (1) Display of the actual speed on the current position display screen, program check screen and program screen(MDI mode)is, not displayed (0)/displayed (1)	M series

Number	Contents	Remarks
3106		
#7 OHS : #6 DAK : #5 SOV : #4 OPH : #3 SPD : #2 : #1 GPL : #0 :	Operation history sampling is performed (0)/not performed (1). For absolute coordinate display in three-dimensional coordinate conversion, programmed coordinates are displayed (0)/ coordinates in the workpiece coordinate system are displayed (1). A spindle override value is not displayed (0)/ displayed (1). The operation history screen is not displayed (0)/displayed (1). Names for actual spindle speed values are displayed regardless (0)/depending (1) of the selected spindle position coder. On the program list screen, the list–by–group function is disabled1 (0)/enabled (1).	 M series PRM 3105#2 T series
3107	Parameters for program display	
#7 MDL : #6 : #5 DMN : #4 SOR : #3 : #2 DNC : #1 : #0 NAM :	Display of the modal state on the program display screen is, not displayed (0)/displayed (1) The G code menu is displayed (0)/not displayed (1) In the Display of the program directory, programs are listed in the order of registration (0)/in the order of program number (1) Upon reset, the program display for DNC operation is not cleared (0)/cleared (1) In the Program list, only program numbers are indicated (0)/program numbers and program names (1)	MDI mode
3108	T code display	
#7 : #6 : #5 : #4 : #3 : #2 PCT : #1 : #0 :	 For T code display, programmed T numbers are displayed (0)/PMC T numbers are displayed (1).	 M series

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Number	Contents	Remarks
3109	Parameter for display of tool offset	
#7 :		
#6 BGO :	When the <OFFSET> function key on the background drawing screen is pressed, the machining screen is displayed (0)/background drawing data is displayed (1).	
#5 :		
#4 :		
#3 :		
#2 IKY :	On the tool compensation screen, the [INPUT] soft key is displayed (0)/not displayed (1).	T series
#1 DWT :	At the display of tool wear/geometry compensation, the character “W” is displayed at the left of each number (0)/not displayed (1)	Com-pensation memory B
#0 :		
3111	Parameter for CRT display	
#7 NPA :	When an alarm is generated, the display shifts to the alarm screen (0)/does not shift (1)	
#6 OPS :	The speedometer on the operating monitor screen indicates the spindle motor (0)/speed of the spindle (1)	
#5 OPM :	The operating monitor is not displayed (0)/ displayed (1)	
#4 :		
#3 :		
#2 SVP :	The synchronization errors displayed on the spindle adjustment screen is the instant values (0)/peak hold values (1)	
#1 SPS :	The spindle setting screen is not displayed (0)/ displayed (1)	
#0 SVS :	The servo setting screen is displayed (0)/not display (1)	
3112	Parameter for servo waveform display	
#7 :		
#6 :		
#5 OPH :	The operation history log function is displayed (0)/enable (1).	
#4 :		
#3 EAH :	As alarm history information, macro alarm and external alarm messages are recorded (0)/not recorded (1).	
#2 OMH :	The history of external operator messages is not displayed (0)/displayed (1).	
#1 :		
#0 SGD :	Generally used graphic display (0)/servo waveform display (1)	

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>3113</td><td>External operator message</td><td></td></tr>
<tr><td>#7 MS1 :

#6 MS0 :

#5 :
#4 :
#3 :
#2 :
#1 :
#0 MHC :</td><td>Selects the number of external operator message history data characters and the number of history items.
<table>
<tr><th>MS1</th><th>MS0</th><th>Number of characters</th><th>Number of history items</th></tr>
<tr><td>0</td><td>0</td><td>255</td><td>8</td></tr>
<tr><td>0</td><td>1</td><td>200</td><td>10</td></tr>
<tr><td>1</td><td>0</td><td>100</td><td>18</td></tr>
<tr><td>1</td><td>1</td><td>50</td><td>32</td></tr>
</table>
The external operator message history can be deleted (0)/cannot be deleted (1).</td><td></td></tr>
<tr><td>3114</td><td>Changing the screens</td><td></td></tr>
<tr><td>#7 :
#6 ICS :

#5 IUS :

#4 IMS :

#3 ISY :

#2 IOF :

#1 IPR :

#0 IPO :</td><td>
When the <CUSTOM> function key is pressed while the custom screen is being displayed : the screen is changed (0)/the screen is not changed (1).
When the <CUSTOM> or <GRAPH> function key is pressed while the user or graph screen is being displayed : the screen is changed (0)/ the screen is not changed (1).
When the <MESSAGE> function key is pressed while the message screen is being displayed : the screen is changed (0)/the screen is not changed (1).
When the <SYSTEM> function key is pressed while the system screen is being displayed : the screen is changed (0)/the screen is not changed (1).
When the <OFFSET/SETTING> function key is pressed while the offset/setting screen is being displayed : the screen is changed (0)/ the screen is not changed (1).
When the <PROG> function key is pressed while the program screen is being displayed : the screen is changed (0)/the screen is not changed (1).
When the <POS> function key is pressed while the position display screen is being displayed : the screen is changed (0)/the screen is not changed (1).</td><td></td></tr>
</table>

Number	Contents	Remarks
3115	Parameter for current position display	<Axis>
#7 : #6 : #5 : #4 : #3 : #2 SFM : #1 NDA : #0 NDP :	 In current position display, axis name subscripts are provided for all coordinates (0)/ machine coordinates only (1). Absolute coordinates and relative coordinates are displayed (0)/not displayed (only machine coordinates being displayed) (1). The current position for each axis is, displayed (0)/not displayed (1)	 2-path control
3120	Time from the output of an alarm to the termination of sampling [msec]	
3122	Time interval used to record time data in operation history [Minute]	
3123	Time until screen clear function is applied [Minute]	
3130	Axis display order for current position display screens	2-path control
3131	Subscript for the name of each axis	2-path control
3132	Axis name (absolute coordinate) for current position display	
3133	Axis name (relative coordinate) for current position display	
3134	Axis display order on workpiece coordinate system screen and workpiece shift screen	
3141	Name of the path (first character)	2-path control
⋮	⋮	
3147	Name of the path (seventh character)	

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>3151</td><td>Number of the axis for which the first load meter for the servo motor is used</td><td rowspan="9">PRM
3111#5</td></tr>
<tr><td>3152</td><td>Number of the axis for which the second load meter for the servo motor is used</td></tr>
<tr><td>3153</td><td>Number of the axis for which the third load meter for the servo motor is used</td></tr>
<tr><td>3154</td><td>Number of the axis for which the fourth load meter for servo motor is used</td></tr>
<tr><td>3155</td><td>Number of the axis for which the fifth load meter for servo motor is used</td></tr>
<tr><td>3156</td><td>Number of the axis for which the sixth load meter for servo motor is used</td></tr>
<tr><td>3157</td><td>Number of the axis for which the seventh load meter for servo motor is used</td></tr>
<tr><td>3158</td><td>Number of the axis for which the eighth load meter for servo motor is used</td></tr>
<tr><td>3160</td><td>Rated load of the load meter for each axis</td></tr>
<tr><td>3201</td><td>Parameter for program registration</td><td></td></tr>
<tr><td colspan="2">#7 :
#6 NPE : At the program registration, M02, M30 and M99 is assumed as completion of registration (0)/ not assumed (1)
#5 N99 : When an M99 block is specified, program registration is terminated (0)/not terminated (1).
#4 :
#3 :
#2 REP : When program registration, if the program number is same as an existing one, an alarm is generated (0)/the existing program is deleted then the new program is registered (1)
#1 RAL : In case of the program registeration, all programs are registered (0)/only one program is registered (1)
#0 RDL : In case of program registration by MINP signal, the new program is registered following the programs already registered (0)/all registered programs are deleted, then the new program is registered (1)</td><td>PRM
3201#6=0

EXRD
signal</td></tr>
</table>

Number	Contents	Remarks
3202	Parameter for program protect	
#7 : #6 PSR : #5 : #4 NE9 : #3 : #2 CND : #1 OLV : #0 NE8 :	 Search for the program number of a protected program is disabled (0)/enabled (1) Editing of programs with program numbers 9000 to 9999 are not inhibited (0)/inhibited (1) With the [ARRANGE] soft key, main program arrangement is not performed (0)/performed (1). When a program other than the selected program is deleted or output the display of the selected program is not held (0)/held (1). Editing of programs with program numbers 8000 to 8999 are not inhibited (0)/inhibited (1)	
3203	MDI operation	
#7 MCL : #6 MER : #5 MIE : #4 PIO : #3 : #2 : #1 : #0 :	Whether a program coded in the MDI mode is cleared by reset (0)/not cleared (1) When MDI operation is terminated in single block mode, program deletion is not performed (0)/performed (1). During MDI operation, program editing is enabled (0)/disabled (1). Program input/output is performed on a tool-post-by-tool-post basis (0)/on a two-path basis (1).	T series (2-path control)
3204	Small MDI panel	
#7 : #6 : #5 SPR : #4 P9E : #3 P8E : #2 EXK : #1 : #0 PAR :	 Program numbers in the 9000 range for specific programs are not added (0)/added (1) with 90000000 Editing of subprograms 90000000 to 99999999 are not inhibited (0)/inhibited (1) Editing of subprograms 80000000 to 89999999 is not inhibited (0)/inhibited (1) With the small MDI panel, the input character extension function is not used (0)/used (1). With the small MDI panel, [,] is used without modification (0)/used as (,) (1).	
3210	Password	O9000～O9999 PRM 3202#4
3211	Keyword	
3216	Increment in sequence numbers inserted automatically	PRM 0000#5=1

Number	Contents	Remarks
3290	Parameter for protect of data input	
	#7 KEY : The KEY1 to KEY4 signals are used (0)/KEY1 is used for program protection (1). #6 MCM: Macro variable input from the MDI panel is enabled regardless of which mode is set (0)/ enabled in MDI mode only. #5 : #4 IWZ : During operation, workpiece origin offset and workpiece shift value modification are enabled (0)/disabled (1). #3 WZO: Input of workpiece origin offset with MDI keys is not inhibited (0)/inhibit (1) #2 MCV : Input of Macro variables with MDI keys is, not inhibited (0)/inhibited (1) #1 GOF : Input of a tool geometry compensation value with MDI keys is not inhibited (0)/inhibited (1) #0 WOF: Input of a tool wear compensation value with MDI keys is not inhibited (0)/inhibited (1)	
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	

11) Parameters for programs

Number	Contents	Remarks
3401	Parameter for G code	
	#7 GSC : The G code system of lathe is A/B/C type #6 GSB : The G code system of lathe is A/B/C type	T series T series

GSC	GSB	G code
0	0	G code system A
0	1	G code system B
1	0	G code system C

Number	Contents	Remarks
	#5 ABS : When in the MDI operation, program command is assumed as an incremental command (0)/ absolute command (1)	PRM 3401#4=1
	#4 MAB : When in the MDI operation, switching between the absolute and incremental commands is performed by G90 or G91 (0)/depending on the ABS setting in parameter 3401#5 (1)	
	#3 :	
	#2 :	
	#1 FCD : When an F code is specified before a G code, a feedrate is determined by the modal G code (0)/G code in the same block (1).	T series
	#0 DPI : When a decimal point is omitted in an address, the least input increment is assumed (0)/the unit of mm, inches, or sec. is assumed (1)	Calculation type

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<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>3402</td><td>Parameter for G code</td><td></td></tr>
<tr><td colspan="2">#7 G23 : Upon power-up, G22 is set (0)/G23 is set (1).
#6 CLR : Cause reset state the CNC with Reset signal(0)/cause clear state (1)
#5 :
#4 :
#3 G91 : When the power is turned, the mode is G90 (0)/G91 (1)
#2 G19 : When the power is turned, the mode is G17/G18/G19
#1 G18 : When the power is turned, the mode is G17/G18/G19
<table><tr><th>G19</th><th>G18</th><th>G17, G18, or G19 mode</th></tr><tr><td>0</td><td>0</td><td>G17 mode (plane XY)</td></tr><tr><td>0</td><td>1</td><td>G18 mode (plane ZX)</td></tr><tr><td>1</td><td>0</td><td>G19 mode (plane YZ)</td></tr></table>#0 G01 : When the power is turned, the mode is G00 (0)/G01 (1)</td><td>T series

M series
M series</td></tr>
<tr><td>3403</td><td>Circular interpolation</td><td></td></tr>
<tr><td colspan="2">#7 :
#6 AD2 : Specification of the same address two or more times in a block is enabled (0)/disabled (1)
#5 CIR : When R, I, J, and K are not specified for circular interpolation, a linear movement is made (0)/an alarm is issued (1).
#4 :
#3 :
#2 :
#1 :
#0 :</td><td>ALM5074
ALM022</td></tr>
<tr><td>3404</td><td>Parameter for M function</td><td></td></tr>
<tr><td colspan="2">#7 M3B : The number of M code that can be specified in one block is one (0)/up to three (1)
#6 EOR : When EOR(%) is read, an alarm is issued (0)/ not issued (1).
#5 M02 : The cursor returns to the beginning of the program when M02 is read (0)/not return (1)
#4 M30 : When M30 is read, the cursor returns to the beginning of the program (0)/does not return to the beginning of the program (1).
#3 :
#2 SBP : An address P of the block including M198 is indicating a file number (0)/a program number (1)
#1 POL : For a command address allowing a decimal point, omission of the decimal point is enabled (0)/disabled (1)
#0 NOP : In program execution, only O, EOB, and N are not ignored (0)/ignored (1).</td><td>PRM 6030 (#2 SBP)
ALM5073 (#1 POL)
M series (#0 NOP)</td></tr>
</table>

Number	Contents	Remarks
3405	Parameter for Direct drawing dimension program	
#7 QAB : #6 QLC : #5 DDP : #4 CCR : #3 G36 : #2 PPS : #1 DWL : #0 AUX :	Passing point signal output specifies a remaining distance to travel (0)/coordinate along a major axis (1). A remaining distance to travel, specified by the passing point signal output, represents a total distance along all axes (0)/distance along a major axis (1). An angle commands by direct drawing dimension programming is normal specification (0)/a supplementary angle is given (1) The addresses "C" "R" are used for chamfering and corner rounding (0)/The address "I" "K" ",R" ",C" (1) G code for automatic tool compensation is G36/G37 (0)/G37.1/G37.2 (1). Passing point signal output is not used (0)/used (1). Dwell operation is performed on an every-second basis at all times (0)/on an every-rotation basis during feed per rotation (1). The least increment of the command of the second miscellaneous function specified with a decimal point is assumed to be 0.001 (0)/ depending on the input increment (1)	T series T series T series T series T series T series
3406	G code clear	PRM 3402#6=1
#7 C07 : #6 : #5 C05 : #4 C04 : #3 C03 : #2 C02 : #1 C01 : #0 :	Upon reset, the G codes in group 07 are cleared (0)/not cleared (1). Upon reset, the G codes in group 05 are cleared (0)/not cleared (1). Upon reset, the G codes in group 04 are cleared (0)/not cleared (1). Upon reset, the G codes in group 03 are cleared (0)/not cleared (1). Upon reset, the G codes in group 02 are cleared (0)/not cleared (1). Upon reset, the G codes in group 01 are cleared (0)/not cleared (1).	

Number	Contents	Remarks
3407	G code clear	PRM 3402#6=1
#7 C15 : #6 C14 : #5 C13 : #4 : #3 C11 : #2 C10 : #1 C09 : #0 C08 :	Upon reset, the G codes in group 15 are cleared (0)/not cleared (1). Upon reset, the G codes in group 14 are cleared (0)/not cleared (1). Upon reset, the G codes in group 13 are cleared (0)/not cleared (1). Upon reset, the G codes in group 11 are cleared (0)/not cleared (1). Upon reset, the G codes in group 10 are cleared (0)/not cleared (1). Upon reset, the G codes in group 09 are cleared (0)/not cleared (1). Upon reset, the G codes in group 08 are cleared (0)/not cleared (1).	M series M series M series M series
3408	G code clear	PRM 3402#6=1
#7 : #6 : #5 : #4 C20 : #3 C19 : #2 C18 : #1 C17 : #0 C16 :	 Upon reset, the G codes in group 20 are cleared (0)/not cleared (1). Upon reset, the G codes in group 19 are cleared (0)/not cleared (1). Upon reset, the G codes in group 18 are cleared (0)/not cleared (1). Upon reset, the G codes in group 17 are cleared (0)/not cleared (1). Upon reset, the G codes in group 16 are cleared (0)/not cleared (1).	 M series M series M series M series
3409	Clear	PRM 3402#6=1
#7 CFH : #6 : #5 : #4 : #3 : #2 : #1 : #0 C24 :	Upon reset, F, H, and D (M series) or F and T (T series) are cleared (0)/not cleared (1). Upon reset, the G codes in group 24 are cleared (0)/not cleared (1).	 M series
3410	Tolerance of arc radius [Setting unit]	
3411	M code preventing buffering 1	
3412	M code preventing buffering 2	
⋮	⋮	
3419	M code preventing buffering 9	
3420	M code preventing buffering 10	

Number	Contents	Remarks
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	
3441	Start number of the M codes corresponding to the set numbers 100 to 199	
3442	Start number of the M codes corresponding to the set numbers 200 to 299	
3443	Start number of the M codes corresponding to the set numbers 300 to 399	
3444	Start number of the M codes corresponding to the set numbers 400 to 499	

Number	Contents	Remarks
3450	Second miscellaneous function command	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 AUP :	When a command for the second miscellaneous function contains a decimal point or negative sign the command is invalid (0)/valid (1).	M series
3460	Address for second miscellaneous function <table><tr><td>Addres</td><td>A</td><td>B</td><td>C</td><td>U</td><td>V</td><td>W</td></tr><tr><td>Set value</td><td>65</td><td>66</td><td>67</td><td>85</td><td>86</td><td>87</td></tr></table>Address B is assumed when a value other than the above is set.	M series

12) Parameters for Pitch Error Compensation

Number	Contents	Remarks
3620	Number of the pitch error compensation point for the reference position for each axis	Valid data range : 0 - 1023
3621	Number of pitch error compensation points of negative direction for each axis	
3622	Number of pitch error compensation points of positive direction for each axis	
3623	Magnification for pitch error compensation for each axis	0 - 100
3624	Interval between pitch error compensation points for each axis [Setting unit]	

13) Parameters for Spindle Control

Number	Contents	Remarks
3700	Parameter for Cs axis	
#7 : #6 : #5 : #4 : #3 : #2 : #1 NRF : #0 :	At the first G00 command after the serial spindle is switched to C axis conturing control mode, the positioning is done after returning to the reference position (0)/with normal positioning (1)	Serial spindle

Number	Contents	Remarks
3701	Parameter for the number of connections in serial spindle control	
#7 : #6 : #5 SS3 : The third spindle is not used (0)/used (1) #4 SS2 : The second spindle is not used (0)/used (1) #3 : #2 : #1 ISI : Specifies whether the serial spindle interface is used (0)/note used (1) #0 :		
3702	Parameter for spindle orientation function (O.S.S)	
#7 ECS : With tool post 1, Cs contour control is used (0)/ not used (1). #6 ESS : With tool post 1, a serial spindle is used (0)/not used (1). #5 EAS : With tool post 1, S analog output is used (0)/ not used (1). #4 ESI : The spindle positioning function is used (0)/not used (1). #3 OR2 : The stop position external-setting type orientation function O.S.S is not used at the second spindle motor (0)/ used (1) #2 OR1 : The stop position external-setting type orientation function O.S.S is not used at the first spindle motor (0)/ used (1) #1 EMS : Multi–spindle control function is used (0)/not used (1) #0 OR3 : The spindle orientation function based on an externally set stop position is not used (0)/ used (1) by the third spindle motor.		T series (2-path control) T series (2-path control) T series (2-path control) T series (2-path control) T series (2-path control)
3703	Number of spindles	T series (2-path control)
#7 : #6 : #5 : #4 : #3 : #2 : #1 RSI : Spindle command selection affects (0)/does not affect (1) commands from SIND for the first spindle #0 2SP : 1 spindle control (0)/2 spindle control (1)		

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Number	Contents	Remarks
3705	Parameter for gear shift of spindle	
#7 :		
#6 SFA :	The SF signal is output when gears are switched (0)/irrespective of whether gears are switched (1)	M series
#5 NSF :	When an S code command is issued in constant surface-speed control, SF is output (0)/not output (1)	M series
#4 EVS :	With an S command, S codes and SF are not output (0)/output (1).	T series
#3 SGT :	The gear switching method during G84 and G74 is method A (0)/method B (1)	M series PRM3761, 3762
#2 SGB :	The gear switching method is method A (0)/ method B (1)	M series PRM3741, 3743
#1 GST :	The SOR signal is used for spindle orientation (0)/gear shift (1)	M series PRM3751, 3752
#0 ESF :	The SF signal output condition is such that S codes and SF are output with all S commands (0)/not output when constant surface speed control is used or the spindle speed is clamped (1).	PRM 3705#5
3706	Parameter for the voltage polarity of spindle	
#7 TCW :	The voltage polarity when the spindle speed voltage is output	
#6 CWM :	The voltage polarity when the spindle speed voltage is output	
#5 ORM :	The voltage polarity during spindle orientation is positive (0)/negative (1)	
#4 GTT :	Spindle gear selection is based on M type (0)/ T type (1).	M series PRM 3705#0
#3 PCS :	When multi-spindle control is used, feedback signal selection, independent of the position coder selection signal of the other tool post, is disabled (0)/enabled (1).	T series (2-path control) SLPCA signal SLPCB signal
#2 :		
#1 PG2 :	The gear ratio of spindle to position coder (×1, ×2, ×4, ×8)	
#0 PG1 :	The gear ratio of spindle to position coder (×1, ×2, ×4, ×8)	

	PG2	PG1
×1	0	0
×2	0	1
×4	1	0
×8	1	1

TCW	CWM	Volt. polarity
0	0	M03, M04 = +
0	1	M03, M04 = –
1	0	M03 = +, M04 = –
1	1	M03 = –, M04 = +

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>3707</td><td>Parameter for gear shift of spindle</td><td>T series</td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 :
#4 :
#3 :
#2 :
<table>
<tr><th>P22</th><th>P21</th><th></th></tr>
<tr><td>0</td><td>0</td><td>×1</td></tr>
<tr><td>0</td><td>1</td><td>×2</td></tr>
<tr><td>1</td><td>0</td><td>×4</td></tr>
<tr><td>1</td><td>1</td><td>×8</td></tr>
</table>
#1 P22 : The gear ratio of spindle to second position coder
#0 P21 : The gear ratio of spindle to second position coder</td><td></td></tr>
<tr><td>3708</td><td>Parameter for spindle speed arrival signal</td><td></td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 :
#4 SVD : When the SIND signal is on, the detection of spindle speed fluctuation is disable (0)/enable (1)
#3 :
#2 :
#1 SAT : The check of the spindle speed arrival signal at the start of executing the thread cutting block is performed with PRM3708#0=1 (0)/always performed (1)
#0 SAR : The spindle speed arrival signal is not checked (0)/checked (1)</td><td>T series

SAR signal</td></tr>
<tr><td>3709</td><td>Parameter for spindle</td><td></td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 :
#4 :
#3 :
#2 MSI : The SIND signal in multi-spindle control is valid only when the first spindle is selected (0)/for each spindle (1)
#1 :
#0 SAM : The sampling frequency to obtain the average spindle speed is 4 (0)/1 (1)</td><td>T series</td></tr>
<tr><td>3730</td><td>Dta used for adjusting the gain of the analog output of spindle speed [0.1%]</td><td></td></tr>
<tr><td>3731</td><td>Compensation value for the offset voltage of the analog output of the spindle speed</td><td></td></tr>
</table>

Number	Contents	Remarks
3732	The number of spindle revolutions during spindle orientation or the spindle motor velocity during spindle gear shift [rpm] For a serial spindle $\text{Set value} = \dfrac{\text{Spindle motor speed during spindle gear shift}}{\text{Maximum spindle motor speed}} \times 16383$ For an analog spindle $\text{Set value} = \dfrac{\text{Spindle motor speed during spindle gear shift}}{\text{Maximum spindle motor speed}} \times 4095$	PRM 3705#1
3735	Minimum clamp speed of the spindle motor $\text{Set value} = \dfrac{\text{Minimum clamp speed of the spindle motor}}{\text{Maximum spindle motor speed}} \times 4095$	M series
3736	Maximum clamp speed of the spindle motor $\text{Set value} = \dfrac{\text{Maximum clamp speed of the spindle motor}}{\text{Maximum spindle motor speed}} \times 4095$	M series
3740	Time elapsed prior to checking the spindle speed arrival signal (SAR) [msec]	
3741	Maximum spindle speed for gear 1 [rpm]	
3742	Maximum spindle speed for gear 2 [rpm]	
3743	Maximum spindle speed for gear 3 [rpm]	
3744	Maximum spindle speed for gear 4 [rpm]	T series
3751	Spindle motor speed when switching from gear 1 to gear 2	M series PRM 3705#2=1
3752	Spindle motor speed when switching from gear 2 to gear 3 $\text{Set value} = \dfrac{\text{Spindle motor speed when the gears are switched}}{\text{Maximum spindle motor speed}} \times 4095$	
3761	Spindle speed when switching from gear 1 to gear 2 during tapping [rpm]	M series PRM 3705#3=1
3762	Spindle speed when switching from gear 2 to gear 3 during tapping [rpm]	
3770	Axis as the calculation reference in constant surface speed control	M series
3771	Minimum spindle speed in constant surface-speed control mode (G96) [rpm]	
3772	Maximum spindle speed (constant surface-speed control) [rpm]	

Number	Contents	Remarks
3811	Maximum spindle speed for gear 1 of the 2nd spindle [rpm]	
3812	Maximum spindle speed for gear 2 of the 2nd spindle [rpm]	
3820	Gain adjustment data for the 3rd spindle [0.1%]	
3821	Velocity offset compensation value for the 3rd spindle	
3822	Maximum speed of the third spindle [rpm]	
3831	Maximum spindle speed for gear 1 of the 3rd spindle [rpm]	
3832	Maximum spindle speed for gear 2 of the 3rd spindle [rpm]	

[Parameters for Cs conturing control axis]

Number	Contents	Remarks
3900	Number of the servo axis whose loop gain is to be changed according to the set value of parameter 3901 to 3904 when the Cs conturing axis is controlled (Set value 0 to 8)	1st group for the 1st spindle
3901	Loop gain for the servo axis when the spindle gear 1 selection	
3902	Loop gain for the servo axis when the spindle gear 2 selection	
3903	Loop gain for the servo axis when the spindle gear 3 selection	
3904	Loop gain for the servo axis when the spindle gear 4 selection	
3910	Number of the servo axis whose loop gain is to be changed according to the set value of parameter 3911 to 3914 when the Cs conturing axis is controlled (Set value 0 to 8)	2nd group for the 1st spindle
3911	Loop gain for the servo axis when the spindle gear 1 selection	
3912	Loop gain for the servo axis when the spindle gear 2 selection	
3913	Loop gain for the servo axis when the spindle gear 3 selection	
3914	Loop gain for the servo axis when the spindle gear 4 selection	

Number	Contents	Remarks
3920	Number of the servo axis whose loop gain is to be changed according to the set value of parameter 3921 to 3924 when the Cs conturing axis is controlled (Set value 0 to 8)	3rd group for the 1st spindle
3921	Loop gain for the servo axis when the spindle gear 1 selection	
3922	Loop gain for the servo axis when the spindle gear 2 selection	
3923	Loop gain for the servo axis when the spindle gear 3 selection	
3924	Loop gain for the servo axis when the spindle gear 4 selection	
3930	Number of the servo axis whose loop gain is to be changed according to the set value of parameter 3931 to 3934 when the Cs conturing axis is controlled (Set value 0 to 8)	4th group for the 1st spindle
3931	Loop gain for the servo axis when the spindle gear 1 selection	
3932	Loop gain for the servo axis when the spindle gear 2 selection	
3933	Loop gain for the servo axis when the spindle gear 3 selection	
3934	Loop gain for the servo axis when the spindle gear 4 selection	
3940	Number of the servo axis whose loop gain is to be changed according to the set value of parameter 3941 to 3944 when the Cs conturing axis is controlled (Set value 0 to 8)	5th group for the 1st spindle
3941	Loop gain for the servo axis when the spindle gear 1 selection	
3942	Loop gain for the servo axis when the spindle gear 2 selection	
3943	Loop gain for the servo axis when the spindle gear 3 selection	
3944	Loop gain for the servo axis when the spindle gear 4 selection	

[Parameters for serial spindle (α series spindle amplifier)]

Number	Contents	Remarks
4000	Parameter of rotation direction of spindle	
	#7 : #6 DEFDRT : The direction to which the differential speed function is applied and the direction specified in the feedback signal is the same (0)/reversed (1) #5 DEFMOD : The differential speed function is not used (0)/used (1) #4 RETSV : In reference position return in the servo mode, the return direction viewed from the spindle is counterclockwise (0)/clockwise (1) #3 RETRN : The direction of return to reference position is CCW (0)/ CW (1) #2 POSC1 : The spindle and the position coder rotate the same direction (0)/ the opposite direction each other (1) #1 ROTA2 : The spindle rotate to CCW with +command (0)/to CW (1) #0 ROTA1 : The spindle and the spindle motor rotate to the same direction (0)/ to the opposite direction each other (1)	From spindle side
4001	Parameter for using of detector	
	#7 CAXIS3 : The position coder of Cs axis control and the spindle rotate to the same direction (0)/ to opposite direction each other (1) #6 CAXIS2 : The position coder signal for Cs axis control is not used to detection of speed (0)/used (1) #5 CAXIS1 : Not use the position coder of Cs axis control (0)/use (1) #4 : #3 MGSEN: The magnetic senser and the spindle rotate to the same direction (0)/opposite direction each other (1) #2 POSC2 : The position coder is not used (0)/used (1) #1 : #0 MRDY1 : The MRDY signal is not used (0)/used (1)	

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Number	Contents	Remarks
4002	Cs contour control	

#7 PCEN : In servo mode, CMR is disabled (0)/ enabled (1).
#6 SYCDRT : When spindle synchronous control is applied, the rotation direction function is enabled (0)/disabled (1).
#5 SVMDRT : In servo mode, the rotation direction function is enabled (0)/disabled (1).
#4 CSDRCT : When Cs contour control is applied, the rotation direction function is enabled (0)/ disabled (1).
#3 :
#2 CSDET3 :
#1 CSDET2 :
#0 CSDET1 :

CSDET 3	CSDET 2	CSDET 1	Number of pulses
0	0	0	360000 p/rev
0	0	1	180000
0	1	0	120000
0	1	1	90000
1	0	0	60000
1	0	1	40000
1	1	0	20000
1	1	1	10000

Number	Contents	Remarks
4003		

#7 PCPL2 : Position coder signal setting (See the table below.)
#6 PCPL1 : Position coder signal setting (See the table below.)
#5 :
#4 PCTYPE : Position coder signal setting (See the table below.)

PCPL2	PCPL1	PCTYPE	Built-in sensor	High-resolution magnetic pulse coder	Remarks
0	0	0	256 λ/rev	65 ϕ	Position coder, high-resolution position coder
0	0	1	128 λ/rev	–	–
0	1	0	512 λ/rev	130 ϕ	–
0	1	1	64 λ/rev	–	–
1	0	0	–	195 ϕ	–
1	1	0	384 λ/rev	97.5 ϕ	–

#3 DIRCT2 : The direction of rotation at the spindle orientation
#2 DIRCT1 : The direction of rotation at the spindle orientation

DIRECT 2	DIRECT 1	
0	0	Direction of rotation immediately before spindle orientation
0	1	Direction of rotation immediately before spindle orientation
1	0	The counter-clockwise in view of the motor shaft
0	1	The clockwise in view of the motor shaft

#1 PCCNCT : A motor’s built-in sensor is not used (0)/ used (1).
#0 PCMGSL : The system of the orientation is position coder system (0)/magnetic senser system (1)

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Number	Contents	Remarks
4004	Detector selection	
#7 : #6 : #5 : #4 BISGAN : A standard built-in sensor is used (0)/a built-in sensor with a non-standard gain is used (1). #3 REFTYP : The external one-rotation signal is detected on its rising edge (0)/falling edge (1). #2 EXTRF : The external one-rotation signal is not used (0)/used (1). #1 SPDBIS : A separate built-in sensor is not used (0)/ used (1). #0 HRPC : A high-resolution position coder is not used (0)/used (1).		PRM 4003#1=1
4006		
#7 BLTRGD : Rigid tapping using a motor's built-in sensor is not performed (0)/performed (1). #6 PRMCHK : Parameters are transferred from the NC (0)/the data being used currently is checked (1). #5 ALGOVR : The spindle analog override value is 0% to 100% (0)/0% to 120% (1). #4 : #3 SYCREF : In spindle synchronization, the one-rotation signal is automatically detected (0)/not detected (1). #2 SPDUNT : The unit of motor speed is 1 rpm (0)/10 rpm (1). #1 GRUNIT : The gear ratio resolution is 0.01 (0)/0.001 (1). #0 :		PRM4056 to 4059
4007		
#7 PHAICL : Motor voltage pattern when no load is applied #6 PCALCL : Alarms related to the position coder signal are detected (0)/not detected (1). #5 PCLS : Disconnection of a high-resolution magnetic pulse coder and position coder is detected (0)/not detected (1). #4 : #3 : #2 : #1 : #0 :		

Number	Contents	Remarks
4009		
	#7 : #6 OVRTYP : Analog override is of linear function type (0)/quadratic function type (1). #5 TRSPRM : Output compensation method #4 LDTOUT : During acceleration/deceleration, the load detection signal is not output (0)/output (1). #3 PCGEAR : The arbitrary gear function between the spindle and position coder is disabled (0)/ enabled (1). #2 ALSP : When a serial communication alarm is issued, the power is not turned off until the motor has stopped (0)/the power is turned off immediately (1). #1 RVSVCM : In slave operation, the sub-spindle and main spindle rotate in the same direction (0)/opposite directions (1). #0 VLPGAN : The setting of a velocity loop gain is used without modification (0)/used after division by 16 (1).	Depends on the motor model.
4011	Number of speed detector pulses	
	#7 POLE2: The number of motor poles is set by bit 3 (0)/ is 8 (1). #6 : #5 ADJG : Acceleration/deceleration status determination condition (for each model) #4 MXPW : Setting of maximum power during acceleration/deceleration (for each model) #3 POLE1: The number of motor poles is 2 (0)/4 (1). #2 VDT3 : Speed detector setting (Following table) #1 VDT2 : Speed detector setting (Following table) #0 VDT1 : Speed detector setting (Following table)	

VDT3	VDT2	VDT1	Number of pulse
0	0	0	64 λ/rev
0	0	1	128 λ/rev
0	1	0	256 λ/rev
0	1	1	512 λ/rev
1	0	0	192 λ/rev
1	0	1	384 λ/rev

Number	Contents	Remarks
4012		
	#7 : #6 : #5 : #4 : #3 : #2 : #1 PWM2 : } PWM setting (Set 00 usually.) #0 PWM1 :	

Number	Contents	Remarks
4013	Data of the dead zone of current	
#7 PWM3K: Setting of a PWM carrier wave in the output switching low-speed characteristics area (for each model) #6 DS5 : #5 DS4 : #4 DS3 : The data of the dead zone of current (Set automatically) #3 DS2 : #2 DS1 : #1 ESED : The Cs contour control one-rotation signal is detected on either edge (0)/on the rising edge at all times (1). #0 ESEC : The position coder one-rotation signal is detected on either edge (0)/on the rising edge at all times (1).		
4014	Spindle switching, MCC confirmation	
#7 : #6 : #5 SLVEN : The slave operation function is disabled (0)/enabled (1). #4 : #3 CHGCLT: Output switching (between high speed and low speed) is checked using the RCH signal (0)/the MCC contact signal (1). #2 AXSLCT : The spindle switching (between the main spindle and sub-spindle) MCC contact check function is disabled (0)/enabled (1). #1 AXSUB : During sub-spindle rotation, the spindle switching function is disabled (0)/enabled (1). #0 AXISSL : The spindle switching function is disabled (0)/enabled (1).		
4015	Parameter of rotation direction of spindle	
#7 : #6 : #5 : #4 : #3 : #2 SPDSW : The output switching function is not provided (0)/provided (1) #1 SPLDMT: The spindle load monitor function is disabled (0)/enabled (1). #0 ORIENT : The orientation function is not provided (0)/ provided (1)		

Number	Contents	Remarks
4016	One-rotation signal error detection function	
#7 RFCHK3 : In spindle orientation, spindle synchronization, or rigid tapping reference position return mode, the position coder one-rotation signal is not detected again (0)/detected again (1). #6 RFCHK2 : The position coder one-rotation signal error detection function is disabled (0)/enabled (1). #5 RFCHK1 : The Cs contour control one-rotation signal error detection function is disabled (0)/ enabled (1). #4 CMTVL : Cs contour control setting (Usually 0.) #3 FFSMTH : The feed-forward smoothing function is disabled (0)/enabled (1). #2 : #1 : #0 :		
4017	One-rotation signal error detection function	
#7 NRROEV : With an orientation command from the stop state, the shortcut function is disabled (0)/enabled (1). #6 : #5 : #4 : #3 : #2 RFCHK4 : During normal rotation, the position coder one-rotation signal error detection function is disabled (0)/enabled (1). #1 : #0 :		
4019		
#7 PRLOAD : Automatic parameter setting is not performed (0)/performed (1). #6 : #5 : #4 SDTCHG : In output switching, the function for switching at a speed detection level or lower operates independently of speed detection (0)/at the speed detection level or lower (1). #3 : #2 SSTTRQ : When the speed is 0, speed clamping is disabled (0)/enabled (1). #1 : #0DTTMCS : Cs contour control dead zone compensation is disabled (0)/enabled (1).		
4020	Maximum motor speed [rpm]	
4021	Maximum speed when the C axis is controlled [rpm]	
4022	Speed arrival detection level [0.1%]	

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Number	Contents	Remarks
4023	Speed detection level [0.1%]	
4024	Speed zero detection level [0.01%]	
4025	Torque limit value [%]	
4026	Load detection level 1 (LDT1 signal) [%]	
4027	Load detection level 2 (LDT2 signal) [%]	
4028	Output limit pattern	
4029	Output limit value [%]	
4030	Soft start (0)/stop time (1) [rpm/sec]	
4031	Position coder method orientation stop position	
4032	Acceleration deceleration time constant when the spindle synchronization is controlled [rpm/sec]	
4033	Arrival level for the spindle synchronization speed [rpm]	
4034	Shift amount when the spindle phase synchronization is controlled [p]	
4035	Spindle phase synchronization compensation data	
4036	Feed forward factor	
4037	Velocity loop feed forward factor	
4038	Spindle orientation speed [rpm]	
4040	Normal velocity loop proportional gain (High gear)	
4041	Normal velocity loop proportional gain (Low gear)	
4042	Velocity loop proportional gain during orientation (High gear)	
4043	Velocity loop proportional gain during orientation (Low gear)	
4044	Velocity loop proportional gain in servo mode/ synchronous control (High gear)	
4045	Velocity loop proportional gain in servo mode/synchronous control (Low gear)	
4046	Velocity loop proportional gain when the Cs axis is controlled (High gear)	
4047	Velocity loop proportional gain when the Cs axis is controlled (Low gear)	
4048	Normal velocity loop integral gain (High gear)	
4049	Normal velocity loop integral gain (Low gear)	

Number	Contents	Remarks
4050	Velocity loop integral gain during orientation (High gear)	
4051	Velocity loop integral gain during orientation (Low gear)	
4052	Velocity loop integral gain in servo mode/synchronous control (High gear)	
4053	Velocity loop integral gain in servo mode/synchronous control (Low gear)	
4054	Velocity loop integral gain when the Cs axis is controlled (High gear)	
4055	Velocity loop integral gain when the Cs axis is controlled (Low gear)	
4056	Number of motor rotation in one revolution of the spindle (High gear) [×100]	
4057	Number of motor rotation in one revolution of the spindle (Medium high gear) [×100]	
4058	Number of motor rotation in one revolution of the spindle (Medium low gear) [×100]	
4059	Number of motor rotation in one revolution of the spindle (Low gear) [×100]	
4060	Position gain during orientation (High gear)	
4061	Position gain during orientation (Medium high gear)	
4062	Position gain during orientation (Medium low gear)	
4063	Position gain during orientation (Low gear)	
4064	Position gain change ratio when orientation is completed [%]	
4065	Position gain in servo mode/synchronous control (High gear)	
4066	Position gain in servo mode/synchronous control (Medium high gear)	
4067	Position gain in servo mode/synchronous control (Medium low gear)	
4068	Position gain in servo mode/synchronous control (Low gear)	
4069	Position gain when the Cs axis is controlled (High gear)	
4070	Position gain when the Cs axis is controlled (Medium high gear)	
4071	Position gain when the Cs axis is controlled (Medium low gear)	

Number	Contents	Remarks
4072	Position gain when the Cs axis is controlled (Low gear)	
4073	Grid shift amount in servo mode [0 – 4095p]	
4074	Reference position return speed in Cs contouring control mode or servo mode [rpm]	
4075	Orientation completion signal detection level	
4076	Motor velocity limit value during orientation [%]	
4077	Orientation stop position shift amount [%]	
4078	MS signal constant (Magnetic senser system orientation)	
4079	MS signal gain adjustment (Magnetic senser system orientation)	
4080	Regenerative power limit	
4081	Delay time prior motor power shut-off [msec]	
4082	Acceleration/deceleration time setting [sec]	
4083	Motor voltage during normal rotation [%]	
4084	Motor voltage during orientation [%]	
4085	Motor voltage in servo mode [%]	
4086	Motor voltage when the Cs axis is controlled [%]	
4087	Over-speed level [%]	
4088	Excessive velocity deviation detection level when the motor is constrained [0.01%]	
4089	Excessive velocity deviation detection level when the motor is rotated [0.1%]	
4090	Overload detection level [%]	
4091	Position gain change ratio when returning to the origin in the servo mode [%]	
4092	Position gain change ratio when returning to the reference position in Cs axis control [%]	
4094	Disturbance torque compensation constant	
4095	Speed meter output voltage adjustment value [0.1%]	
4096	Load meter output voltage adjustment value [0.1%]	
4097	Spindle velocity feedback gain	
4098	Speed that enables position coder signal detection [rpm]	
4099	Delay time for energizing the motor [msec]	

Number	Contents	Remarks
4100	Base velocity of the motor output specification [rpm]	
4101	Limit value of the motor output specification [%]	
4102	Base speed [rpm]	
4103	Magnetic flux weakening start velocity [rpm]	
4104	Current loop proportional gain during normal operation	
4105	Current loop proportional gain when the Cs axis is controlled	
4106	Current loop integral gain during normal operation	
4107	Current loop integral gain when the Cs axis is controlled	
4108	Zero point of current loop integral gain	
4109	Current loop proportional gain velocity factor [%]	
4110	Current conversion sconstant	
4111	Secondary current factor for exceiting current	
4112	Current expectation constant	
4113	Slip constant	
4114	High-speed rotation slip compensation constant	
4115	Compensation constant of voltage applied to motor in the dead zone [%]	
4116	Electromotive force compensation constant [%]	
4117	Electromotive force phase compensation constant [%]	
4118	Electromotive force compensation velocity factor [%]	
4119	Time constant of voltage filter for electromotive force compensation [msec]	
4120	Dead zone compensation data [%]	
4121	Time constant for changing the torque [msec]	
4122	Velocity filter [0.1 msec]	
4123	Overload detection time setting [sec]	
4124	Voltage compensation factor during deceleration	
4125	Time during automatic running [0.1sec]	
4126	Velocity command during automatic running [rpm]	

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Number	Contents	Remarks
4127	Load meter displayed value for maximum output [%]	
4128	Maximum output zero point [rpm]	
4129	Secondary current factor during rigid tapping	
4130	Constant for compensating for the phase of the electromotive force at deceleration	
4131	Time constant of the speed detection filter at the Cs contour control	
4132	Conversation constant of the phase-V current	
4133	Motor model code	
4135	Grid shift amount when the Cs axis is controlled	

[Parameter for low speed driving when the output switching function is used]

Number	Contents	Remarks
4136	Motor voltage during normal rotation [%]	
4137	Motor voltage in the servo mode [%]	
4138	Base speed of the motor output specifications [rpm]	
4139	Limit value of the motor output specifications [%]	
4140	Base speed [rpm]	
4141	Magnetic flux weakening start velocity [rpm]	
4142	Current loop proportional gain during normal operation	
4143	Current loop integral gain during normal operation	
4144	Zero point of the current loop integral gain	
4145	Velocity factor of the current loop proportional gain [%]	
4146	Current conversion constan	
4147	Secondary current factor for activating current	
4148	Current expectation constant	
4149	Slip constant	
4150	High speed rotation slip compensation constant	
4151	Compensation constant for voltage applied to motor in the dead zone [%]	
4152	Electromotive force compensation constant [%]	

Number	Contents	Remarks
4153	Electromotive force phase compensation constant [%]	
4154	Voltage factor of the electromotive force compensation [%]	
4155	Voltage compensation factor during deceleration	
4156	Slip compensation gain	
4157	Time constant for changing the torque [msec]	
4158	Maximum output zero point [rpm]	
4159	Secondary current factor during rigit tapping	
4160	Hysteresis of the speed detection level	
4161	Constsnt for compensating for the phase of the electromotive for at deceleration	
4162	Velocity loop integral gain (High) in Cs contour control cutting feed	
4163	Velocity loop integral gain (Low) in Cs contour control cutting feed	
4164	Conversion constant of phase V current	
4165	Time constant of voltage filter for eletromotive force compensation	
4166	Regenerative power limit	
4167	Reserved	
4168	Overload current alarm detection level (for low speed characteristic)	
4169	Overload current alarm detection time constant	
4170	Overload current alarm detection level (for high speed characteristic)	
4171	Arbitrary gear data between spindle and Position coder (HIGH no. of teeth on the spindle)	
4172	Arbitrary gear data between spindle and position coder (HIGH no. of teeth on PC)	
4173	Arbitrary gear data between spindle and position coder (LOW no. of teeth on spindle)	
4174	Arbitrary gear data between spindle and position coder (LOW no. of teeth on PC)	
4175	Delay timer at ON of electromagnetic contactor in unit (S series) Spindle analog override zero level (α series)	

[Parameters for spindle switching function is used (Sub–spindle)]

Number	Contents	Remarks
4176 to 4190	Bit parameter	
4191	Bit parameter (User can not set)	
4192 to 4194	Bit parameter	
4195	Bit parameter (Automatic setting by parameter)	
4196	Maximum motor speed	
4197	Reached speed level	
4198	Speed detection level	
4199	Speed zero detection level	
4200	Torque limit value	
4201	Load detection level 1	
4202	Output limit pattern	
4203	Output limit value	
4204	Position coder method orientation stop position	
4205	Orientation speed	
4206	Proportional gain (HIGH) of the normal velocity loop	
4207	Proportional gain (LOW) of the normal velocity loop	
4208	Velocity loop proportional gain during orientation (HIGH)	
4209	Velocity loop proportional gain during orientation (LOW)	
4210	Velocity loop proportional gain in the servo mode (HIGH)	
4211	Velocity loop proportional gain in the servo mode (LOW)	
4212	Normal velocity loop integral gain	
4213	Velocity loop integral gain during orientation	
4214	Velocity loop integral gain in the servo mode (HIGH)	
4215	Reserved	
4216	Gear ratio (HIGH)	
4217	Gear ratio (LOW)	
4218	Position gain during orientation (HIGH)	
4219	Position gain during orientation (LOW)	

Number	Contents	Remarks
4220	Position gain change ratio when orientation is completed	
4221	Position gain in the servo mode (HIGH)	
4222	Position gain in the servo mode (LOW)	
4223	Grid shift amount in the servo mode	
4224	Reserved	
4225	Reserved	
4226	Detection level of orientation completion signal	
4227	Motor velocity limit value during orientation	
4228	Shift amount of orientation stop position	
4229	MS signal constant = $(L/2)/(2\times\pi\times H)\times 4096$	
4230	MS signal gain adjustment	
4231	Regenerative power limit	
4232	Delay time up to motor power shut–off	
4233	Acceleration/deceleration time setting	
4234	Spindle load monitor observer gain 1	
4235	Spindle load monitor observer gain 2	
4236	Motor voltage during normal rotation	
4237	Motor voltage during orientation	
4238	Motor voltage in the servo mode	
4239	Position gain change ratio when returning to the origin in the servo mode	
4240	Feed forward coefficient	
4241	Feed forward coefficient in velocity loop	
4242	Reserved	
4243	Arbitrary gear data between spindle and position coder (SUB/HIGH no. of teeth on spindle)	
4244	Arbitrary gear data between spindle and position coder (SUB/HIGH no. of teeth on PC)	
4245	Arbitrary gear data between spindle and position coder (SUB/LOW no. of teeth on spindle)	
4246	Arbitrary gear data between spindle and position coder (SUB/LOW no. of teeth on PC)	
4247	Spindle load monitor magnetic flux compensation time constant (for high–speed characteristic on the MAIN side)	
4248	Spindle load motor torque constant (for high–speed characteristic on the MAIN side)	

Number	Contents	Remarks
4249	Spindle load monitor observer gain 1 (on the MAIN side)	
4250	Spindle load monitor observer gain 2 (on the MAIN side)	
4251	Spindle load monitor magnetic flux compensation time constant (for low–speed characteristic on the MAIN side)	
4252	Spindle load monitor magnetic flux compensation time constant (for high–speed characteristic)	
4253	Spindle load monitor magnetic flux compensation time constant (for low–speed characteristic)	
4254	Slip correction gain (for high–speed characteristic)	
4255	Slip correction gain (for low–speed characteristic)	
4256	Base velocity of the motor output specifications	
4257	Limit value for the motor output specifications	
4258	Base speed	
4259	Magnetic flux weakening start velocity	
4260	Current loop proportional gain during normal operation	
4261	Current loop integral gain during normal operation	
4262	Zero point of current loop integral gain	
4263	Velocity factor of current loop proportional gain	
4264	Current conversion constant	
4265	Secondary current factor for excitation current	
4266	Current expectation constant	
4267	Slip constant	
4268	Compensation constant for high–speed rotation slip	
4269	Compensation constant for voltage applied to motor in the dead zone	
4270	Electromotive force compensation constant	
4271	Phase compensation constant of electromotive force	
4272	Compensation velocity factor for electromotive force	
4273	Time constant for changing the torque	
4274	Displayed value of load meter for maximum output	

Number	Contents	Remarks
4275	Maximum output zero point	
4276	Secondary current factor in rigid tapping	
4277	Constant for compensating for the phase of the electromotive force at deceleration	
4278	Time constant of the speed detection filter	
4279	Reserved	
4280	Time constant of voltage filter for electromotive force compensation	
4281	Spindle load monitor torque constant (for low–speed characteristic on the MAIN side)	
4282	Spindle load monitor torque constant (for high–speed characteristic)	
4283	Spindle load monitor torque constant (for low–speed characteristic)	
4284	Motor voltage during normal rotation	
4285	Motor voltage in the servo mode	
4286	Base speed of the motor output specifications	
4287	Limit value for the motor output specifications	
4288	Base speed	
4289	Magnetic flux weakening start velocity	
4290	Current loop proportional gain during normal operation	
4291	Current loop integral gain during normal operation	
4292	Zero point of current loop integral gain	
4293	Velocity factor of current loop proportional gain	
4294	Current conversion constant	
4295	Secondary current factor for excitation current	
4296	Current expectation constant	
4297	Slip constant	
4298	Compensation constant for high–speed rotation slip	
4299	Compensation constant for voltage applied to motor in the dead zone	
4300	Electromotive force compensation constant	
4301	Phase compensation constant for electromotive force	
4302	Compensation velocity factor for electromotive force	
4303	Time constant for changing the torque	
4304	Maximum output zero point	

Number	Contents	Remarks
4305	Secondary current factor in rigid tapping	
4306	Constant for compensating for the phase of the electromotive force at deceleration	
4307	Limit of regenerative power	
4308	Time constant of voltage filter for electromotive voltage compensation	
4309	Motor model code	
4310	Reserved	
4311	Reserved	
4312	Position coder method orientation end signal width 2 (MAIN)	
4313	Magnetic sensor method orientation end signal width 1 (MAIN)	
4314	Magnetic sensor method orientation end signal width 2 (MAIN)	
4315	Magnetic sensor method orientation stop position shift amount (MAIN)	
4316	Position coder method orientation end signal width 2 (SUB)	
4317	Magnetic sensor method orientation end signal width 1 (SUB)	
4318	Magnetic sensor method orientation end signal width 2 (SUB)	
4319	Magnetic sensor method orientation stop position shift amount (SUB)	
4320	Spindle orientation deceleration constant (MAIN/HIGH)	
4321	Spindle orientation deceleration constant deceleration (MAIN/MEDIUM HIGH)	
4322	Spindle orientation deceleration constant deceleration (MAIN/MEDIUM LOW)	
4323	Spindle orientation deceleration constant deceleration (MAIN/LOW)	
4324	Spindle orientation deceleration constant deceleration (SUB/HIGH)	
4325	Spindle orientation deceleration constant deceleration (SUB/LOW)	
4326	Width of pulses when switching to the spindle orientation control mode (MAIN)	
4327	Width of pulses when switching to the spindle orientation control mode (SUB)	
4328	Position coder–based spindle orientation command multiplication (MAIN)	

Number	Contents	Remarks
4329	Position coder–based spindle orientation command multiplication (SUB)	
4330	Motor excitation delay time at spindle orientation (MAIN)	
4331	Motor excitation delay time at spindle orientation (SUB)	
4332	Reserved	
4333	Reserved	
4334	No. of arbitrary pulses of speed detector (MAIN)	
4335	No. of arbitrary pulses of speed detector (SUB)	
4336	Magnetic flux change point for spindle synchronus acc./dec. time calculation.	
4337	Velocity compensation factor of velocity loop gain (MAIN)	
4338	Velocity compensation factor of velocity loop gain (SUB)	
4339	Torque clamp level	
4340	Bell–shaped acceleration/deceleration time constant for spindle synchronization	
4341	Abnormal load detection level	
4342	Reserved	
4343	N pulse suppress	
4344	Loock–ahead feed forward coefficient	
4345	Spindle motor speed command detection level	
4346	Incomplete integral coefficient	
4347	Detection level for spindle 1–to–2 speed difference at slave operation	
4348	Overload current alarm detection level (for low speed characteristic)	
4349	Overload current alarm detection time constant	
4350	Overload current alarm detection level (for high speed characteristic)	
4351	Compensation for current detection offset	

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Number	Contents	Remarks
4800	Parameter for synchronization control of spindle	
#7 : #6 : #5 : #4 : #3 : #2 : #1 ND2 : #0 ND1 :	 In controlling the spindle synchronization, the direction of the second spindle motor rotation is the direction indicated by the command sign (0)/the opposite direction (1) In controlling the spindle synchronization, the direction of the first spindle motor rotation is the direction indicated by the command sign (0)/the opposite direction (1)	
4810	Error pulse between two spindles when phase synchronizing in the serial spindle synchronization control mode	
4811	Allowable error count for the error pulse between two spindles in the serial spindle synchronization control mode	
4900	Spindle fluctuation detection	T series
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 FLR :	 The allowable rate and fluctuation rate of parameter No. 4911 and No. 4912 are indicated in 1% steps (0)/0.1% steps (1).	
4911	Ratio (q) of the spindle speed which is assumed to the specified spindle speed	
4912	Spindle speed fluctuation ratio (r) for which no alarm is activated in the spindle speed fluctuation detection function	
4913	Spindle speed fluctuation value (d) for which no alarm is activated in the spindle speed fluctuation detection function	
4914	Time (p) elapsed from when the commanded spindle speed is changed to the start of spindle speed fluctuation detection	

Number	Contents	Remarks
4950	Spindle positioning	T series
#7 IMB	: Semi-fixed angle positioning by M code follows specification A (0)/specification B (1).	
#6 ESI	: Spindle positioning conforms to the conventional specification (0)/extended specification (1).	
#5	:	
#4	:	
#3	:	
#2 ISZ	: When an M code for orientation is specified, orientation by canceling rotation mode is performed (0)/not performed (1).	
#1 IDM	: The positioning direction for the spindle using a M code is the positive direction (0)/the negative direction (1)	
#0 IOR	: Resetting the system in the spindle positioning mode does not releases the mode (0)/releases the mode (1)	
4960	M code specifying the spindle orientation	
4961	M code releasing the spindle positioning mode	
4962	M code specifying the angle for the spindle positioning	
4963	Basic rotation angle specified by a M code in the spindle positioning mode	T series
4964	Number of M codes for specifying a spindle positioning angle	
4970	Servo loop gain of the spindle	
4971	Servo loop gain multiplier of the spindle for gear 1	
4972	Servo loop gain multiplier of the spindle for gear 2	
4973	Servo loop gain multiplier of the spindle for gear 3	
4974	Servo loop gain multiplier of the spindle for gear 4	

14) Parameters for tool offset

Number	Contents	Remarks
5000		M series
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 SBK :	 For a block that is internally created by cutter compensation, single block mode is disabled (0)/enabled (1).	
5001	Parameter for tool offset	M series
#7 : #6 EVO : #5 TPH : #4 : #3 TAL : #2 OFH : #1 TLB : #0 TLC :	 Tool offset is effective from next H code (0)/ next block (1) Tool offset number is D (0)/H (1) In the tool length compensation C, generates an alarm when two or more axes are offset (0)/ not generate (1) The address to appoint the offset number of tool length and tool radius is D (0)/H (1) Tool length compensation axis is always Z axis (0)/axis perpendicular to plane specification (1) (G17, G18, G19) Tool length compensation A·B (0)/Tool length compensation C (1)	PRM 5001#1
5002	Parameter for tool offset	T series
#7 WNP: #6 LWM: #5 LGC : #4 LGT : #3 : #2 : #1 LGN : #0 LD1 :	Specifies whether the valid direction of the virtual tool used for tool-tip radius compensation is specified with a geometry offset number (0)/a wear offset number (1) when the tool geometry and wear compensation option is selected. Tool offset is executed in the T code block (0)/ together with the axis movement (1) Tool geometry compensation is not canceled by offset number 0 (0)/canceled (1) Tool geometry compensation is compensated by the shift of the coordinate system (0)/by the tool movement (1) Geometry offset number of tool offset is the same as wear offset number (0)/executed by the tool selection number (1) Wear offset number of tool offset is specified using the lower two digits of a T code (0)/lower one digit of a T code (1)	#6: PRM 5002#4=1 #1: PRM 5002#0

Number	Contents	Remarks
5003	Parameter for tool offset	
#7 TGC :	Tool geometry compensation is not cleared by reset (0)/cleared by reset (1)	PRM 5003#6=1 T series
#6 LVC :	Tool compensation vector is not cleared by reset (0)/cleared by reset (1)	T series
LVK :	Tool length compensation vector is cleared by reset (0)/not cleared (1)	M series
#5 :		
#4 BCK :	When a cutter compensation interference check finds that the direction of movement differs from the offset direction of machining by 90 to 270 degrees, an alarm is issued (0)/not issued (1).	
#3 ICK :	In MPCC mode, a cutter compensation interference check is made (0)/not made (1).	
#2 CCN :	During movement to a middle point in automatic reference position return operation, the offset vector is canceled (0)/not canceled (1).	
#1 SUV :	When G40,G41,G42 are specified independently, the start up conforms to the standard specification (0)/moves by a distance corresponding to the offset vector which is vertical to the next block movement (1)	M series
#0 SUP :	Start up in cutter compensation C is type A (0)/B (1)	M series
5004	Parameters for tool offset	
#7 :		
#6 :		
#5 :		
#4 :		
#3 :		
#2 ODI :	The cutter compensation value is a radius value (0)/diameter value (1).	M series
#1 ORC :	Tool compensation value is set by the diameter specification (0)/set by the radius specification (1)	T series
#0 :		
5005	Parameters for tool offset	T series
#7 :		
#6 :		
#5 QNI :	The tool compensation number in the offset write mode by the tool compensation direct input B is not selected automatically (0)/selected automatically (1)	0: PRM5020
#4 :		
#3 :		
#2 PRC :	When direct input of tool offset value, a PRC signal is not used (0)/used (1)	
#1 :		
#0 CNI :	On the offset screen, Y-axis offset screen, and macro screen, [INP.C] is displayed (0)/not displayed (1).	

Number	Contents	Remarks
5006		
#7 : #6 : #5 : #4 : #3 : #2 : #1 TGC : #0 OIM :	 A T code, specified in a block containing G50, G04, or G10, is valid (0)/causes ALM254 to be issued (1). Inch-metric conversion of tool compensation values is not performed (0)/performed (1).	 T series
5008	Cutter compensation C, Tool nose radius compensation	
#7 : #6 : #5 : #4 : #3 : #2 : #1 CNC : #0 CN1 :	 During interference check for cutter compensation C (M series) or tool nose radius compensation (T series), when the direction of movement after application of the offset differs from the programmed direction by between 90° and 270° an alarm (0)/no alarm (1) is issued. Interference check for cutter compensation C (M series) or tool–tip radius compensation (T series) is performed (0)/not performed (1).	
5010	Limit value that ignores the vector when a tool moves on the outside of a corner during tool nose radius compensation	T series
	Limit value that ignores the vector when a tool moves on the outside of a corner during cutter compensation C	M series
5011	Value for determining the norm of a tool compensation vector in three-dimensional tool compensation	M series
5013	Maximum value of tool wear compensation	T series
5014	Maximum value of incremental input for tool wear compensation	T series
5015	Distance (XP) between reference position and X axis + contact surface	T series
5016	Distance (XM) between reference position and X axis – contact surface	
5017	Distance (ZP) between reference position and Z axis + contact surface	
5018	Distance (ZM) between reference position and Z axis – contact surface	

Number	Contents	Remarks
5020	Tool compensation number in the measured tool compensation value direct input B function	T series PRM 5005#5=0
5030	Minimum acceptable diameter of the grinding wheel for wear check	M series

15) Parameters for grinding–wheel wear compensation

Number	Contents	Remarks
5071	Number of first axis for grinding–wheel wear compensation	M series
5072	Number of second axis for grinding–wheel wear compensation	M series
5081	Coordinate of first compensation center along first axis on compensation plane	M series
5082	Coordinate of first compensation center along second axis on compensation plane	M series
5083	Coordinate of second compensation center along first axis on compensation plane	M series
5084	Coordinate of second compensation center along second axis on compensation plane	M series
5085	Coordinate of third compensation center along first axis on compensation plane	M series
5086	Coordinate of third compensation center along second axis on compensation plane	M series

16) Parameters for canned cycles

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>5101</td><td>Parameter for canned cycles</td><td></td></tr>
<tr><td>#7 M5B :</td><td>In drilling canned cycles G76 and G87, output M05 before an oriented spindle stop (0)/not output (1)</td><td>M series</td></tr>
<tr><td>#6 M5T :</td><td>In tapping cycles G74 and G84, not output M05 (0)/output M05 (1) before the spindle rotation direction is turned to reverse</td><td>T series</td></tr>
<tr><td>#6 M5T :</td><td>In tapping cycles G74 and G84, output M05 (0)/not output M05 (1) before the spindle rotation direction is turned to reverse</td><td>M series</td></tr>
<tr><td>#5 RD2 :</td><td>Set the axis and direction in which the tool in G76 and G87 is got free</td><td>M series</td></tr>
<tr><td>#4 RD1 :</td><td>Set the axis and direction in which the tool in G76 and G87 is got free
<table>
<tr><th>RD2</th><th>RD1</th><th>G17</th><th>G18</th><th>G19</th></tr>
<tr><td>0</td><td>0</td><td>+X</td><td>+Z</td><td>+Y</td></tr>
<tr><td>0</td><td>1</td><td>–X</td><td>–Z</td><td>–Y</td></tr>
<tr><td>1</td><td>0</td><td>+Y</td><td>+X</td><td>+Z</td></tr>
<tr><td>1</td><td>1</td><td>–Y</td><td>–X</td><td>–Z</td></tr>
</table></td><td>M series</td></tr>
<tr><td>#3 ILV :</td><td>The initial point position in drilling canned cycle is not updated by reset (0)/updated by reset (1)</td><td>T series</td></tr>
<tr><td>#2 RTR :</td><td>G83 and G87 specify a high-speed peck drilling cycle (0)/specify a peck drilling cycle (1)</td><td>T series
PRM5114</td></tr>
<tr><td>#1 EXC :</td><td>An external operation command (EF) is not sent out #y G81 (0)/sent out by G81 (1)</td><td>M series</td></tr>
<tr><td>#0 FXY :</td><td>The drilling axis in drilling canned cycle is always Z axis (0)/an axis selected using program (1)</td><td>M series</td></tr>
<tr><td>5102</td><td>Canned cycle</td><td>T series</td></tr>
<tr><td>#7 RDI :</td><td>In the FS15 format, R in a canned cycle for drilling specifies a radius (0)/axis (1).</td><td></td></tr>
<tr><td>#6 RAB :</td><td>In the FS15 format, R in a canned cycle for drilling is incremental (0)/absolute with G code system A, or depends on G90/G91 for G code systems B and C (1).</td><td></td></tr>
<tr><td>#5 :</td><td></td><td></td></tr>
<tr><td>#4 :</td><td></td><td></td></tr>
<tr><td>#3 F16 :</td><td>In a canned cycle for drilling, the FS15 format is enabled (0)/disabled (1).</td><td></td></tr>
<tr><td>#2 QSR :</td><td>Before execution of G70 to G73, a Q sequence number check is not made (0)/made (1).</td><td></td></tr>
<tr><td>#1 RMC :</td><td>With G71/72, a command other than for monotone increase or decrease does not issue an alarm (0)/issues an alarm (1).</td><td></td></tr>
<tr><td>#0 :</td><td></td><td></td></tr>
</table>

Number	Contents	Remarks
5103	Canned cycle	M series
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 SIJ : In the FS15 format, a shift value in a boring canned cycle G76 or G86 is specified by address Q (0)/address I, J, or K (1).		
5110	C-axis clamp M code in drilling canned cycle	T series
5111	Dwell time when C axis unclamping is specified in drilling canned cycle	T series
5112	Spindle forward-rotation M code in drilling canned cycle	T series
5113	Spindle reverse-rotation M code in drilling canned cycle	T series
5114	Return and clearance of drilling canned cycle G83	T series PRM 5101#2
	Return of high-speed, peck drilling cycle G73	M series
5115	Clearance of canned cycle G83	M series
5130	Chamfering in thread cutting cycles G76 and G92	T series
5132	Depth of cut in multiple repetitive canned cycles G71 and G72	T series
5133	Escape in multiple repetitive canned cycles G71 & G72	
5135	Escape in multiple repetitive canned cycle G73 in X axis direction	
5136	Escape in multiple repetitive canned cycle G73 in Z axis direction	
5137	Division count in multiple repetitive canned cycle G73	
5139	Return in multiple canned cycle G74 and G75	
5140	Minimum depth of cut in multiple repetitive canned cycle G76	
5141	Finishing allowance in multiple repetitive canned cycle G76	
5142	Repetition count of final finishing in multiple repetitive canned cycle G76	
5143	Tool nose angle in multiple repetitive canned cycle G76	

Number	Contents	Remarks
5160		M series
#7 : #6 : #5 : #4 : #3 : #2 NOL : When the depth of cut per action is satisfied in a peck drilling cycle of a small diameter, the feed and spindle speed are not changed (0)/ changed (1) #1 OLS : When an overload torque signal is received in a peck drilling cycle of a small diameter, the feed and spindle speed are not changed (0)/ changed (1) #0 :		
5163	M code that specifies the peck drilling cycle mode of a small diameter	M series
5164	Percentage of the spindle speed to be changed when the tool is retracted after an overload torque signal is received [%]	M series
5165	Percentage of the spindle speed to be changed when the tool is retracted without an overload torque signal received [%]	M series
5166	Percentage of cutting feedrate to be changed when the tool is retracted after an overload torque signal is received [%]	M series
5167	Percentage of the cutting feedrate to be changed when the tool is retracted without an overload torque signal received [%]	M series
5168	Lower limit of the percentage of the cutting feedrate in a peck drilling cycle of a small diameter [%]	M series
5170	Number of the macro variable to which the total number of retractions during cutting is output	M series
5171	Number of the macro variable to which the total umber of retractions because of an overload signal is output	M series
5172	Speed of retraction to point R when no address I is issued [mm/min]	M series
5173	Speed of advancing to the position just before the bottom of a hole when no address I is issued [mm/min]	M series
5174	Clearance in a peck drilling cycle of a small diameter [0.001mm]	M series

17) Parameters for rigid tapping

Number	Contents	Remarks
5200	Parameter for rigid tapping	
#7 SRS :	When multi-spindle control is used, the spindle selection signal is G027.0 and G027.1 (0)/ G061.4 and G061.5 (1).	T series
#6 FHD :	Feed hold and single block in rigid tapping are validated (0)/invalidated (1)	
#5 PCP :	In rigid tapping, a high-speed peck tapping cycle is used (0)/not used (1)	M series PRM5213
#4 DOV :	Override during extraction in rigid tapping is invalidated (0)/validated (1)	PRM5211
#3 SIG :	When gears are changed for rigid tapping, the use of SIND is not permitted (0)/permitted (1)	
#2 CRG :	When a rigid mode cancel command is specified, the rigid mode is not canceled before RGTAP signal is set low (0)/canceled (1)	
#1 VGR :	Any gear ration between spindle and position coder in rigid tapping is not used (0)/used (1)	PRM3706, 5221 to 5234
#0 G84 :	G74 and G84 are not used as a rigid tapping G code (0)/used (1)	PRM5210
5201	Parameter for rigid tapping	
#7 :		
#6 :		
#5 :		
#4 OV3 :	Overriding by program is disabled (0)/enabled (1)	
#3 OVU :	The increment unit of the override PRM5211 is 1% (0)/ 10% (1)	
#2 TDR :	Cutting time constant in rigid tapping uses a same parameter during cutting and extraction (0)/not use a same parameter (1)	PRM5261 to 5264, 5271 to 5274
#1 :		
#0 NIZ :	Rigid tapping smoothing processing is disabled (0)/enabled (1).	M series
5202	Rigid tapping	
#7 :		
#6 :		
#5 :		
#4 :		
#3 :		
#2 :		
#1 :		
#0 ORI :	When rigid tapping is started, orientation is not performed (0)/performed (1).	M series

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Number	Contents	Remarks
5203	Rigid tapping by the manual handle	M series
#7 : #6 : #5 : #4 : #3 : #2 : #1 HRM : #0 HRG :	 When the tapping axis moves in the negative direction, the direction in which the spindle rotates is determined as follows: In G84 mode, the spindle rotates in a normal direction (0)/reverve (1). In G74 mode, the spindle rotates in reverse (0)/ a normal derection (1). Rigid tapping by the manual handle is disabled (0)/enabled (1).	
5204	Rigid tapping	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 DGN :	 The diagnosis screen displays a rigid tapping synchronization error (0)/spindle and tapping axis error ratio difference (1).	
5210	Rigid tapping mode specification M code	0=M29
5211	Override value during rigid tapping extraction	PRM 5200#4
5212	M code that specifies a rigid tapping mode (0 – 65535)	PRM5210
5213	Escape or cutting start point in peck tapping cycle	PRM 5200#5
5214	Rigid tapping synchronization error width	ALM411

Number	Contents	Remarks
5221	Number of gear teeth on the spindle side in rigid tapping (1st gear)	PRM 5200#1
5222	Number of gear teeth on the spindle side in rigid tapping (2nd gear)	
5223	Number of gear teeth on the spindle side in rigid tapping (3rd gear)	
5224	Number of gear teeth on the spindle side in rigid tapping (4th gear)	T series
5231	Number of gear teeth on the position coder side in rigid tapping (1st gear)	
5232	Number of gear teeth on the position coder side in rigid tapping (2nd gear)	
5233	Number of gear teeth on the position coder side in rigid tapping (3rd gear)	
5234	Number of gear teeth on the position coder side in rigid tapping (4th gear)	T series
5241	Maximum spindle speed in rigid tapping (1st gear)	
5242	Maximum spindle speed in rigid tapping (2nd gear)	
5243	Maximum spindle speed in rigid tapping (3rd gear)	
5244	Maximum spindle speed in rigid tapping (4th gear)	T series
5261	Acceleration/deceleration time constant for every gear in rigid tapping (1st gear)	PRM 5201#2
5262	Acceleration/deceleration time constant for every gear in rigid tapping (2nd gear)	
5263	Acceleration/deceleration time constant for every gear in rigid tapping (3rd gear)	
5264	Acceleration/deceleration time constant for every gear in rigid tapping (4th gear)	T series
5271	Acceleration/deceleration time constant during extraction in rigid tapping (1st gear)	PRM 5201#2
5272	Acceleration/deceleration time constant during extraction in rigid tapping (2nd gear)	
5273	Acceleration/deceleration time constant during extraction in rigid tapping (3rd gear)	
5274	Acceleration/deceleration time constant during extraction in rigid tapping (4th gear)	T series
5280	Position control loop gain of spindle and tapping axis in rigid tapping (Common in each gear)	PRM5281 to 5284

Number	Contents	Remarks
5281	Position control loop gain of spindle and tapping axis in rigid tapping (1st gear)	PRM 5280=0
5282	Position control loop gain of spindle and tapping axis in rigid tapping (2nd gear)	
5283	Position control loop gain of spindle and tapping axis in rigid tapping (3rd gear)	
5284	Position control loop gain of spindle and tapping axis in rigid tapping (4th gear)	T series
5291	Spindle loop gain multiplier in the rigid tapping mode (for gear 1)	
5292	Spindle loop gain multiplier in the rigid tapping mode (for gear 2)	
5293	Spindle loop gain multiplier in the rigid tapping mode (for gear 3)	
5294	Spindle loop gain multiplier in the rigid tapping mode (for gear 4) Loop gain multiplier = $2048 \times E/L \times \alpha \times 1000$ E : Voltage in the velocity command at 1000 rpm L : Rotation angle of the spindle per one rotation of the spindle motor α : Unit used for the detection	T series
5300	Imposition width of tapping axis in rigid tapping [Detection unit]	
5301	Imposition width of spindle in rigid tapping [Detection unit]	
5310	Limit value of tapping axis positioning deviation during movement in rigid tapping	PRM5314
5311	Limit value of spindle positioning deviation during movement in rigid tapping	
5312	Limit value of tapping axis positioning deviation during stop in rigid tapping	
5313	Limit value of spindle positioning deviation during stop in rigid tapping	
5314	Limit of position deviation during movement along the tapping axis for rigid tapping (0 to 99999999)	PRM5310 when 0 is specified
5321	Spindle backlash in rigid tapping (1st gear)	T series
	Spindle backlash in rigid tapping	M series
5322	Spindle backlash in rigid tapping (2nd gear)	T series
5323	Spindle backlash in rigid tapping (3rd gear)	T series
5324	Spindle backlash in rigid tapping (4th gear)	T series
5382	Overshoot in rigid tapping return	M series

18) Parameters for scaling/coordinate rotation

Number	Contents	Remarks
5400	Parameter for scaling/coordinate rotation	
#7 SCR : #6 XSC : #5 : #4 : #3 : #2 : #1 : #0 RIN :	Scaling magnification unit is 0.00001 times (0)/ 0.001 times (1) Axis scaling and programmable mirror image are invalidated (0)/validated (1) Angle command of coordinate rotation is specified by an absolute method (0)/by an incremental method (1)	M series M series PRM 5401#0
5401	Parameter for scaling	M series
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 SCL :	Scaling for each axis is invalidated (0)/ validated (1)	PRM5421
5410	Angle used when coordinate rotation angle is not specified	
5411	Magnification used when scaling magnification is not specified	M series PRM 5400#6
5421	Scaling magnification for each axis	M series PRM 5400#7

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19) Parameter for uni-direction positioning

Number	Contents	Remarks
5431	Uni–direction positioning	M series
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 MDL :	Specifies whether the G code for uni-directional positioning (G60) is included in one-shot G codes (00 group) (0)/modal G codes (01 group) (1)	
5440	Positioning direction and approach in uni-directional positioning for each axis [Detection unit]	M series

20) Parameters for polar coordinate interpolation

Number	Contents	Remarks
5450	Automatic speed control	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 AFC : In polar coordinate interpolation mode, automatic speed control is not applied (0)/ applied (1).		
5460	Axis (linear axis) specification for polar coordinate interpolation	
5461	Axis (rotary axis) specification for polar coordinate interpolation	
5462	Maximum cutting feedrate during polar coordinate interpolation [mm/min]	
5463	Allowable automatic override percentage in polar coordinate interpolation	

21) Parameter for normal direction control

Number	Contents	Remarks
5480	Number of the axis for controlling the normal direction	M series
5481	Rotation speed of normal direction control axis	M series
5482	Limit value that ignores the rotation insertion of direction control axis	M series
5483	Limit value of movement that is executed at the normal direction angle of a preceding block	M series

22) Parameters for indexing index table

Number	Contents	Remarks
5500	Parameters of indexing index table	M series
#7 IDX :	Index table indexing sequence is Type A (0)/ Type B (1)	
#6 :		
#5 :		
#4 G90 :	Indexing command is judged according to the G90/G91 mode (0)/judged by an absolute command (1)	
#3 INC :	Rotation in the G90 mode is not set to the shorter way around the circumference (0)/set to the shorter way around the circumference (1)	PRM 5511=0
#2 ABS :	Displaying absolute coordinate value is not rounded by 360 degrees (0)/rounded by 360 degrees (1)	PRM 5500#3
#1 REL :	Relative position display is not rounded by 360 degrees (0)/rounded by 360 degrees (1)	
#0 DDP :	Decimal point input method is conventional method (0)/electronic calculator method (1)	PRM 3401#0=0
5511	Negative-direction rotation command M code	M series
5512	Unit of index table indexing angle	M series

23) Parameter for involute interpolation

Number	Contents	Remarks
5610	Limit of initial permissible error during involute interpolation [0.001mm]	M series

24) Parameters for exponential interpolation

Number	Contents	Remarks
5630	Distribution amount	M series
#7 :		
#6 :		
#5 :		
#4 :		
#3 :		
#2 :		
#1 :		
#0 SPN :	A distribution amount along a linear axis in exponential interpolation is specified by PRM5643 (0)/K in G02.3 or G03.3 (1).	
5641	Number of a linear axis subject to exponential interpolation	M series
5642	Number of a rotation axis subject to exponential interpolation	M series
5643	Distribution amount (span value) for a linear axis subject to exponential interpolation	M series

25) Parameters for straightness compensation

Number	Contents	Remarks
5711	Axis number of moving axis 1	
5712	Axis number of moving axis 2	
5713	Axis number of moving axis 3	
5721	Axis number of compensation axis 1 for moving axis 1	
5722	Axis number of compensation axis 2 for moving axis 2	
5723	Axis number of compensation axis 3 for moving axis 3	
5731	Compensation point number a of moving axis 1	
5732	Compensation point number b of moving axis 1	
5733	Compensation point number c of moving axis 1	
5734	Compensation point number d of moving axis 1	
5741	Compensation point number a of moving axis 2	
5742	Compensation point number b of moving axis 2	
5743	Compensation point number c of moving axis 2	
5744	Compensation point number d of moving axis 2	
5751	Compensation point number a of moving axis 3	
5752	Compensation point number b of moving axis 3	
5753	Compensation point number c of moving axis 3	
5754	Compensation point number d of moving axis 3	
5761	Compensation corresponding compensation point number a of moving axis 1	
5762	Compensation corresponding compensation point number b of moving axis 1	
5763	Compensation corresponding compensation point number c of moving axis 1	
5764	Compensation corresponding compensation point number d of moving axis 1	
5771	Compensation corresponding compensation point number a of moving axis 2	
5772	Compensation corresponding compensation point number b of moving axis 2	
5773	Compensation corresponding compensation point number c of moving axis 2	
5774	Compensation corresponding compensation point number d of moving axis 2	

Number	Contents	Remarks
5781	Compensation corresponding compensation point number a of moving axis 3	
5782	Compensation corresponding compensation point number b of moving axis 3	
5783	Compensation corresponding compensation point number c of moving axis 3	
5784	Compensation corresponding compensation point number d of moving axis 3	

26) Parameters for custom macro

Number	Contents	Remarks
6000	Parameter for custom macro	
#7 : #6 : #5 SBM : #4 : #3 V15 : #2 : #1 : #0 G67 :	 In the custom macro statement, the single block stop is not valid (0)/valid (1) The system variables for tool compensation are the same as those used with FS16 (0)/ FS15 (1). A G67 specified in modal call cancel mode issues an alarm (0)/is ignored (1).	M series
6001	Parameter for custom macro	
#7 CLV : #6 CCV : #5 TCS : #4 CRD : #3 PV5 : #2 : #1 PRT : #0 :	Local variables #1 through #33 are cleared to “vacant” by reset (0)/not cleared by reset (1) Common variables #100 through #149 are cleared to “vacant” by reset (0)/not cleared by reset (1) Custom macro is not called using a T code (0)/ called (1) When ISO code is used in the B/D PRINT mode, output only “LF” (0)/output “LF” and “CR” (1) The output macro variables are #500 and up (0)/#100 and up and #500 and up (1). When data is output using a DPRINT command, outputs a space for reading zero (0)/outputs no data (1)	O9000

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Number	Contents	Remarks
6003	Parameter for custom macro	
#7 MUS : #6 MCY : #5 MSB : #4 MPR : #3 TSE : #2 MIN : #1 MSK : #0 :	Interrupt-type custom macro is not used (0)/ used (1) Custom macro interrupt during cycle operation is not performed (0)/performed (1) The local variable of interrupt program is macrotype (0)/subprogram type (1) M code for custom macro interrupt valid/invalid is standard (M96/M97) (0)/using parameter setting (1) Interrupt signal UNIT uses edge trigger method (0)/status trigger method (1) Custom macro interrupt is Type I (0)/Type II (1) Absolute coordinate during custom macro interrupt is not set to the skip coordinate (0)/set (1)	M96: PRM6033 to 6034
6010	Setting of hole pattern "*" of EIA code (*0 to *7)	
6011	Setting of hole pattern "=" of EIA code (=0 to =7)	
6012	Setting of hole pattern "#" of EIA code (#0 to #7)	
6013	Setting of hole pattern " [" of EIA code ([0 to [7)	
6014	Setting of hole pattern "] " of EIA code (]0 to]7)	
6030	M code that calls the program entered in file	M198
6033	M code that validates a custom macro interrupt	PRM 6003#4=1
6034	M code that invalidates a custom macro interrupt	
6036	Number of custom macro valiables common to paths (100 - 199)	T series (2-path control)
6037	Number of custom macro valiables common to paths (500 - 599)	T series (2-path control)
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	

Number	Contents	Remarks
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	
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 custom macro of program number 9004	
6075	M code that calls the custom macro of program number 9005	
6076	M code that calls the custom macro of program number 9006	
6077	M code that calls the custom macro of program number 9007	
6078	M code that calls the custom macro of program number 9008	
6079	M code that calls the custom macro of program number 9009	
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	

Number	Contents	Remarks
6088	M code that calls the custom macro of program number 9028	
6089	M code that calls the custom macro of program number 9029	
6090	ASCII code that calls the subprogram of program number 9004	
6091	ASCII code that calls the subprogram of program number 9005	

27) Parameters for pattern data input

Number	Contents	Remarks
6101	First variable number displayed on pattern data screen 1	
6102	First variable number displayed on pattern data screen 2	
6103	First variable number displayed on pattern data screen 3	
6104	First variable number displayed on pattern data screen 4	
6105	First variable number displayed on pattern data screen 5	
6106	First variable number displayed on pattern data screen 6	
6107	First variable number displayed on pattern data screen 7	
6108	First variable number displayed on pattern data screen 8	
6109	First variable number displayed on pattern data screen 9	
6110	First variable number displayed on pattern data screen 10	

28) Parameters for skip function

Number	Contents	Remarks
6200	Parameter for skip function	
#7 SKF :	Dry run, override and automatic acceleration/deceleration for G31 skip command are disabled (0)/enabled (1)	
#6 SRE :	The edge of the high-speed skip signal which triggers skipping is the rising edge (0)/falling edge (1)	
#5 SLS :	For multi-step skip, high-speed skip is not used (0)/used (1).	PRM6202, to 6206
#4 HSS :	The high-speed skip signal is not used (0)/used (1)	
#3 MIT :	For skip, the MIT signal is disabled (0)/enabled (1).	T series
#2 :		
#1 SK0 :	SKIP and the multi-step skip signal are valid when set to 1 (0)/0 (1).	X004
#0 GSK :	For skip, SKIPP (G06.6) is disabled (0)/ enabled (1).	T series
6201	High-speed skip	
#7 :		
#6 :		
#5 CSE :	For repetitive high–speed skip command G31P90, either the rising or falling edge of the high–speed skip signal is effective depending on the setting of PRM6200#6 (0)/ both edges are effective (1).	M series
#4 IGX :	For high-speed skip, SKIP (X4.7), SKIPP (G06.6), and +MIT1 to –MIT2 (X4.2 to X4.5) are enabled (0)/disabled (1).	
#3 TSA :	When the torque limit skip is used, torque limit arrival is monitored for : All axes (0) those axes that are specified in G31.	T series
#2 TSE :	When the skip function, based on the torque limit arrival signal is used, the skip position stored in a system variable is a position reflecting a servo system delay (0)/a position independent of a servo system delay (1).	T series
#1 SEB :	Acceleration/deceleration and servo delay are not considered (0)/considered (1) using the actual values	
#0 SEA :	Acceleration/deceleration and servo delay are not considered (0)/considered (1) using the calculated values	

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Number	Contents	Remarks
6202	High-speed skip signal/multi-step skip signal selection	
#7 1S8	: For high-speed skip, the HD17 signal is not used (0)/used (1). Alternatively, for G31 P1/Q1, the SKIP8 signal is not used (0)/used (1).	
#6 1S7	: For high-speed skip, the HD16 signal is not used (0)/used (1). Alternatively, for G31 P1/Q1, the SKIP7 signal is not used (0)/used (1).	
#5 1S6	: For high-speed skip, the HD15 signal is not used (0)/used (1). Alternatively, for G31 P1/Q1, the SKIP6 signal is not used (0)/used (1).	
#4 1S5	: For high-speed skip, the HD14 signal is not used (0)/used (1). Alternatively, for G31 P1/Q1, the SKIP5 signal is not used (0)/used (1).	
#3 1S4	: For high-speed skip, the HD13 signal is not used (0)/used (1). Alternatively, for G31 P1/Q1, the SKIP4 signal is not used (0)/used (1).	
#2 1S3	: For high-speed skip, the HD12 signal is not used (0)/used (1). Alternatively, for G31 P1/Q1, the SKIP3 signal is not used (0)/used (1).	
#1 1S2	: For high-speed skip, the HD11 signal is not used (0)/used (1). Alternatively, for G31 P1/Q1, the SKIP2 signal is not used (0)/used (1).	
#0 1S1	: For high-speed skip, the HD10 signal is not used (0)/used (1). Alternatively, for G31 P1/Q1, the SKIP signal is not used (0)/used (1).	
6203	Multi-step skip signal selection	
#7 2S8	: For G31 P2/Q2, the SKIP8 signal is not used (0)/used (1).	
#6 2S7	: For G31 P2/Q2, the SKIP7 signal is not used (0)/used (1).	
#5 2S6	: For G31 P2/Q2, the SKIP6 signal is not used (0)/used (1).	
#4 2S5	: For G31 P2/Q2, the SKIP5 signal is not used (0)/used (1).	
#3 2S4	: For G31 P2/Q2, the SKIP4 signal is not used (0)/used (1).	
#2 2S3	: For G31 P2/Q2, the SKIP3 signal is not used (0)/used (1).	
#1 2S2	: For G31 P2/Q2, the SKIP2 signal is not used (0)/used (1).	
#0 2S1	: For G31 P2/Q2, the SKIP signal is not used (0)/used (1).	

Number	Contents	Remarks
6204	Multi-step skip signal selection	
#7 3S8 : #6 3S7 : #5 3S6 : #4 3S5 : #3 3S4 : #2 3S3 : #1 3S2 : #0 3S1 :	For G31 P3/Q3, the SKIP8 signal is not used (0)/used (1). For G31 P3/Q3, the SKIP7 signal is not used (0)/used (1). For G31 P3/Q3, the SKIP6 signal is not used (0)/used (1). For G31 P3/Q3, the SKIP5 signal is not used (0)/used (1). For G31 P3/Q3, the SKIP4 signal is not used (0)/used (1). For G31 P3/Q3, the SKIP3 signal is not used (0)/used (1). For G31 P3/Q3, the SKIP2 signal is not used (0)/used (1). For G31 P3/Q3, the SKIP signal is not used (0)/used (1).	
6205	Multi-step skip signal selection	
#7 4S8 : #6 4S7 : #5 4S6 : #4 4S5 : #3 4S4 : #2 4S3 : #1 4S2 : #0 4S1 :	For G31 P4/Q4, the SKIP8 signal is not used (0)/used (1). For G31 P4/Q4, the SKIP7 signal is not used (0)/used (1). For G31 P4/Q4, the SKIP6 signal is not used (0)/used (1). For G31 P4/Q4, the SKIP5 signal is not used (0)/used (1). For G31 P4/Q4, the SKIP4 signal is not used (0)/used (1). For G31 P4/Q4, the SKIP3 signal is not used (0)/used (1). For G31 P4/Q4, the SKIP2 signal is not used (0)/used (1). For G31 P4/Q4, the SKIP signal is not used (0)/used (1).	
6206	Multi-step skip signal selection	
#7 DS8 : #6 DS7 : #5 DS6 : #4 DS5 : #3 DS4 : #2 DS3 : #1 DS2 : #0 DS1 :	For G04, the SKIP8 signal is not used (0)/used (1). For G04, the SKIP7 signal is not used (0)/used (1). For G04, the SKIP6 signal is not used (0)/used (1). For G04, the SKIP5 signal is not used (0)/used (1). For G04, the SKIP4 signal is not used (0)/used (1). For G04, the SKIP3 signal is not used (0)/used (1). For G04, the SKIP2 signal is not used (0)/used (1). For G04, the SKIP signal is not used (0)/used (1).	

Number	Contents	Remarks
6207	High-speed skip	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 IOC : For the high-speed skip signal, the option 2 board is used (0)/the I/O card is used (1).		
6208	Continuous high-speed skip signal selection	M series
#7 9S8 : For continuous high-speed skip, the HD17 signal is not used (0)/used (1). #6 9S7 : For continuous high-speed skip, the HD16 signal is not used (0)/used (1). #5 9S6 : For continuous high-speed skip, the HD15 signal is not used (0)/used (1). #4 9S5 : For continuous high-speed skip, the HD14 signal is not used (0)/used (1). #3 9S4 : For continuous high-speed skip, the HD13 signal is not used (0)/used (1). #2 9S3 : For continuous high-speed skip, the HD12 signal is not used (0)/used (1). #1 9S2 : For continuous high-speed skip, the HD11 signal is not used (0)/used (1). #0 9S1 : For continuous high-speed skip, the HD10 signal is not used (0)/used (1).		
6220	Period during which input is ignored for continuous high–speed skip signal [8msec]	M series

29) Parameters for automatic tool compensation (T series) and automatic tool length compensation (M series)

Number	Contents	Remarks
6240	Signal logic	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 AE0 :	A measuring position is assumed to be reached when XAE, YAE, or ZAE is 1 (0)/0 (1).	
6241	Feedrate during measurement of automatic tool compensation	T series
	Feedrate during measurement of automatic tool length compensation	M series
6251	γ value on X axis during automatic tool compensation	T series
	γ value during automatic tool length compensation	M series
6252	γ value on Z axis during automatic tool compensation	T series
6254	ε value on X axis during automatic tool compensation	T series
	ε value during automatic tool length compensation	M series
6255	ε value on Z axis during automatic tool compensation	T series

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30) Parameters for external data input/output

Number	Contents	Remarks
6300	Parameter for external program number search	
#7 : #6 : #5 : #4 ESR : #3 : #2 : #1 : #0 :	External program number search is disabled (0)/ enabled (1)	

31) Parameters for graphic display

Number	Contents	Remarks
6500	Parameter for graphic display	
#7 : #6 NZM : #5 DPO : #4 : #3 DPA : #2 GUL : #1 SPC : #0 GRL :	 The screen image is not enlarged (0)/enlarged (1) by specifying the center of the screen and magnification. Current position is not appear on the machining profile drawing or tool path drawing screen (0)/ appear (1) Current position display is the actual position to ensure tool nose radius compensation (0)/ programmed position (1) The positions of X1– and X2–axes are not replaced (0)/are replaced (1) with each other in the coordinate system specified with PRM6509. Graphic display (2–path control) is done on two spindles and two tool posts (0)/on one spindle and two tool posts (1) Graphic display Tool post 1 is displayed on the left, and tool post 2 is displayed on the right (0) Tool post 1 is displayed on the right, and tool post 2 is displayed on the left (1)	 T series M series T series T series (2-path control) T series (2-path control) T series (2-path control)
6501	Parameter for graphic display	
#7 : #6 : #5 CSR : #4 FIM : #3 RID : #2 3PL : #1 TLC : #0 ORG :	 Center position of tool in tool path drawing is marked with ■ (0)/with × (1) Machining profile drawing in solid drawing is displayed in the coarse mode (0)/fine mode (1) In solid drawing, a plane is drawn without edges (0)/with edges (1) Tri-plane drawing in solid drawing is drawn by the first angle projection (0)/third angle projection (1) In solid drawing, the tool length compensation is not executed (0)/executed (1) Drawing when coordinate system is altered during drawing, draws in the same coordinate system (0)/draws in the new coordinate system (1)	 M series M series M series M series M series
6509	Coordinate system for drawing a single spindle	T series (2–path control)
6510	Drawing coordinate system	T series

Number	Contents	Remarks
6511	Right margin in solid drawing	M series
6512	Left margin in solid drawing	
6513	Upper margin in solid drawing	
6514	Lower margin in solid drawing	
6515	Change in cross-section position in tri-plane drawing	
6520	C-axis number for dynamic graphic display	T series

32) Parameters for displaying operation time and number of parts

Number	Contents	Remarks
6700	Parameter for number of parts	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 PCM :	M code that counts the number of machined parts are specified by M02, M30 and PRM 6710 (0)/only M code specified by PRM 6710 (1)	PRM6710
6710	M code that counts the total number of machined parts and the number of machined parts	
6711	Number of machined parts	
6712	Total number of machined parts (M02, M03, PRM 6710)	
6713	Number of required parts (Required parts finish signal PRTSF is output to PMC)	DGN F62.7
6750	Integrated value of power-on period [Minute]	
6751	Operation time [msec] (Integrated value of time during automatic operation)	
6752	Operation time [Minute] (Integrated value of time during automatic operation)	
6753	Integrated value of cutting time [msec]	
6754	Integrated value of cutting time [Minute]	
6755	Integrated value of general-purpose [msec] integrating meter drive signal (TMRON) ON time	DGN G53.0

Number	Contents	Remarks
6756	Integrated value of general-purpose integrating meter drive signal (TMRON) ON time [Minute]	
6757	Operation time [msec] (Integrated value of one automatic operation time)	
6758	Operation time [Minute] (Integrated value of one automatic operation time)	

33) Parameters for tool life management

Number	Contents	Remarks
6800	Parameter for tool life management	
#7 M6T :	T code in the same block as M06 is judged as a back number (0)/as a next tool group command (1)	M series
#6 IGI :	Tool back number is not ignored (0)/ignored (1)	M series
#5 SNG :	At the input of a tool skip signal when tools other than those under tool life management are selected, skips a tool that is used last or specified (0)/ignores a tool skip signal (1)	
#4 GRS :	Data clear during the input of tool exchange reset signal clears only the execution data of specified groups (0)/the execution data of all entered groups (1)	
#3 SIG :	Not input the group number using a tool group signal during tool skip (0)/input the group number (1)	
#2 LTM :	Tool life is specified by the number of times (0) /by time (1)	
#1 GS2 :	Setting the combination of the number of tool life : groups and the number of tools	
#0 GS1 :	Setting the combination of the number of tool life : groups and the number of tools	

GS2	GS1	M series		T series	
		Group count	Tool count	Group count	Tool count
0	0	1–16 1–64	1–16 1–32	1–16 1–16	1–16 1–32
0	1	1–32 1–28	1–8 1–16	1–32 1–32	1–8 1–16
1	0	1–64 1–256	1–4 1–8	1–64 1–64	1–4 1–8
1	1	1–128 1–512	1–2 1–4	1–16 1–128	1–16 1–4

The values on the lower row in the table apply when the 512–(M series) or 128–(T series) –tool–life–management–group option is provided.

Number	Contents	Remarks
6801	Parameter for tool life management	
#7 M6E : #6 EXG : #6 EXT : #5 EIS : #4 : #3 EMD : #2 LFV : #1 TSM : #0 CUT :	When T code is specified in the same block as M06, the T code is processed as a next selected group number/the tool group life is counted immediately Using G10, tool life management data is registered after data for all tool groups has been cleared (0)/data can be added/modified/deleted for a specified group only (1). Specifies whether the extended tool life management function is not used (0) / is used (1) When the life of a tool is measured in time–based units, the life is counted every four seconds (0)/every second (1) Specifies when an asterisk (*) indicating that a tool has been exhausted is displayed. When the next tool is selected (0) / When the tool life is exhausted (1) Specifies whether life count override is disabled (0) / enabled (1) when the extended tool life management function is used. When a tool takes several tool numbers, life is counted for each of the same tool numbers (0)/ for each tool (1) The tool life management using cut length is not performed (0) / is performed (1)	PRM 6800#7 T series M series PRM 6800#2 M series M series T series M series
6810	Tool life control ignored number	M series
6811	Tool life count restart M code	T series

34) Parameters of position switch functions

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Number	Contents	Remarks
6901	Position switch	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 IGP :	 During follow–up for the absolute position detector, position switch signals are output (0)/ not output (1)	
6910	Axis corresponding to the 1st position switch	
6911	Axis corresponding to the 2nd position switch	
6912	Axis corresponding to the 3rd position switch	
6913	Axis corresponding to the 4th position switch	

Number	Contents	Remarks
6914	Axis corresponding to the 5th position switch	
6915	Axis corresponding to the 6th position switch	
6916	Axis corresponding to the 7th position switch	
6917	Axis corresponding to the 8th position switch	
6918	Axis corresponding to the 9th position switch	
6919	Axis corresponding to the 10th position switch	
6930	Maximum operation range of the 1st position switch	
6931	Maximum operation range of the 2nd position switch	
6932	Maximum operation range of the 3rd position switch	
6933	Maximum operation range of the 4th position switch	
6934	Maximum operation range of the 5th position switch	
6935	Maximum operation range of the 6th position switch	
6936	Maximum operation range of the 7th position switch	
6937	Maximum operation range of the 8th position switch	
6938	Maximum operation range of the 9th position switch	
6939	Maximum operation range of the 10th position switch	
6950	Minimum operation range of the 1st position switch	
6951	Minimum operation range of the 2nd position switch	
6952	Minimum operation range of the 3rd position switch	
6953	Minimum operation range of the 4th position switch	
6954	Minimum operation range of the 5th position switch	
6955	Minimum operation range of the 6th position switch	
6956	Minimum operation range of the 7th position switch	
6957	Minimum operation range of the 8th position switch	

Number	Contents	Remarks
6958	Minimum operation range of the 9th position switch	
6959	Minimum operation range of the 10th position switch	

35) Manual operation / Automatic operation

Number	Contents	Remarks
7001	Manual intervention/return function	
#7 MFM : For the manual linear or circular interpolation function, modifying a value specified with a command during jog feed in the guidance direction, immediately starts moving according to the new value (0)/stops moving (1). #6 : #5 : #4 : #3 : #2 : #1 : #0 MIN : The manual intervention/return function is disabled (0)/enabled (1).		
7050	Retrace function	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 RV1 : When the tool moves backwards after feed hold during forward feed with the retrace function, the block is split at the feed hold position and stored (0)/stored without being split (1).		

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36) Parameters for manual handle feed / Interrupts

Number	Contents	Remarks
7100	Parameter for manual pulse generator	
#7 : #6 : #5 : #4 HPF : #3 HCL : #2 : #1 THD : #0 JHD :	 If the specified manual handle feedrate exceeds the rapid traverse rate, handle pulses exceeding the rapid traverse rate are ignored (0)/are not ignored such that the tool is moved then stopped (1). The clearing of a handle interrupt travel distance is invalid (0)/valid (1). Manual pulse generator in TEACH IN JOG mode is invalid (0)/valid (1) Manual pulse generator in JOG mode is invalid (0)/valid (1)	
7101	Parameter for manual pulse generator	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 IOL :	 Manual pulse generator interface on the main CPU board (0) / provided in the machine operator’s panel interface for I/O link (1)	
7102	Rotation direction	<Axis>
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 HNG :	 Axis movement direction for rotation direction of manual pulse generator is same in direction (0) / reverse in direction (1)	 T series

Number	Contents	Remarks
7104	Handle feed in the tool axis direction	M series
#7 : #6 : #5 : #4 3D2 : For tool axis direction handle feed and right angle direction handle feed, the machine coordinates when the mode is set or when a reset is performed (0)/the coordinates specified with PRM7145 (1) are set as the coordinates of the second rotation axis. #3 3D1 : For tool axis direction handle feed and right angle direction handle feed, the machine coordinates when the mode is set or when a reset is performed (0)/the coordinates specified with PRM7144 (1) are set as the coordinates of the first rotation axis. #2 CXC : Tool axis direction handle feed or perpendicular direction handle feed is performed with 5–axis machine (0)/4–axis machine (1). #1 : #0 TLX : When the rotation axis is at the origin, the tool axis is in the Z direction (0)/X direction (1).		
7110	Number of manual pulse generator used	
7113	Manual handle feed magnification m (1–127)	
7114	Manual handle feed magnification n (0–1000)	
7120	Axis configuration for using the tool axis direction handle feed or perpendicular direction handle feed 1: A-C 2: B-C 3: A-B (A: Master) 4: A-B (B: Master)	M series
7121	Axis selection in tool axis direction handle feed mode	M series
7141	Axis selection in the X direction for the radial tool axis handle feed	M series
7142	Axis selection in the Y direction for the radial tool axis handle feed	M series
7144	Coordinate of the first rotation axis for tool axis direction handle feed and radial tool axis handle feed	M series
7145	Coordinate of the second rotation axis for tool axis handle feed and radial tool axis handle feed	M series

37) Parameters for butt-type reference position setting

Number	Contents	Remarks
7181	First withdrawal distance in butt-type reference position setting	
7182	Second withdrawal distance in butt-type reference position setting	
7183	First butting feedrate in butt-type reference position setting	
7184	Second butting feedrate in butt-type reference position setting	
7185	Withdrawal feedrate (common to the first and second butting operations) in butt-type reference position setting	
7186	Torque limit value in butt-type reference position setting	

38) Parameters for software operator’s panel

Number	Contents	Remarks
7200	Parameter for software operator’s panel	
#7 : #6 OP7 : Feed hold is not performed on software operator’s panel (0) / performed (1) #5 OP6 : Protect key is not performed on software operator’s panel (0) / performed (1) #4 OP5 : OBS,SBK,MLK,DRN are not performed on software operator’s panel (0) / performed (1) #3 OP4 : Override is not performed on software operator’s panel (0) /performed (1) #2 OP3 : MPG’s axis selection is not performed on software operator’s panel (0) / performed (1) #1 OP2 : JOG feed axis selection is not performed on software operator’s panel (0) / performed (1) #0 OP1 : Mode selection is not performed on software operator’s panel (0) /performed (1)		
7210	Jog movement axis and its direction on software operator’s panel ↑	
7211	Jog movement axis and its direction on software operator’s panel ↓	
7212	Jog movement axis and its direction on software operator’s panel →	
7213	Jog movement axis and its direction on software operator’s panel ←	
7214	Jog movement axis and its direction on software operator’s panel ↙	
7215	Jog movement axis and its direction on software operator’s panel ↗	

Number	Contents	Remarks
7216	Jog movement axis and its direction on software operator's panel	
7217	Jog movement axis and its direction on software operator's panel	
7220	Name of general-purpose switch on software operator's panel	
	PRM.No.7220 - No.7227 -SIGNAL 1 Sets the character code PRM.No.7228 - No.7235 -SIGNAL 2 Sets the character code PRM.No.7236 - No.7243 -SIGNAL 3 Sets the character code PRM.No.7244 - No.7251 -SIGNAL 4 Sets the character code PRM.No.7252 - No.7259 -SIGNAL 5 Sets the character code PRM.No.7260 - No.7267 -SIGNAL 6 Sets the character code PRM.No.7268 - No.7275 -SIGNAL 7 Sets the character code PRM.No.7276 - No.7283 -SIGNAL 8 Sets the character code	
7283	Name of general-purpose switch on software operator's panel	

39) Parameters for program restart

Number	Contents	Remarks
7310	Movement sequence to program restart position	
7351	Macro variable start number where data for the tool retract and recover	

40) Parameter for high-speed machining

Number	Contents	Remarks
7501	Parameter for high speed cycle machining	
#7 IPC : #6 IT2 : #5 IT1 : #4 IT0 : #3 : #2 : #1 : #0 CSP :	The system does not monitor (0)/monitors (1) whether a distribution process is stopped with high–speed remote buffer or in a high–speed cycle. IT2 IT1 IT0 0 0 0 Interpolates the G05 data in 8ms 0 0 1 Interpolates the G05 data in 4ms 0 1 0 Interpolates the G05 data in 2ms 0 1 1 Interpolates the G05 data in 1ms 1 0 0 Interpolates the G05 data in 16ms Cs contouring control function dedicated to a piston lathe is not used (0)/used (1).	T series
7502	High speed machining	
#7 : #6 : #5 : #4 : #3 L8M : #2 : #1 PMC : #0 SUP :	In high-speed machining with an interpolation period of 8 msec, learning control is not exercised (0)/exercised (1). A PMC axis control command in high-speed machining is ignored (0)/executed (1). In high-speed remote buffer operation and high-speed cycle machining, acceleration/deceleration is not used (0)/used (1).	M series
7505	High–speed cutting	<Axis>
#7 : #6 : #5 : #4 : #3 : #2 : #1 HUN : #0 HSC :	Unit of data to be distributed during machining a high–speed cycle is the same as the least input increment (0)/ten times the least input increment (1). Not used (0)/used (1) for high–speed distribution in each axis.	T series

Number	Contents	Remarks
7510	Control axis count in high-speed remote buffer	T series
	Maximum number of simultaneously controlled axes when G05 is specified during high-speed cycle machining (0) /control axis count in high-speed remote buffer (1)	M series
7511	Extension of data variables used for machining in a high–speed cycle <table><tr><th>Set Value</th><th>Means</th></tr><tr><td>0</td><td>Variables #200000 to #85535 are used.</td></tr><tr><td>1</td><td>Variables #200000 to #232767 are used.</td></tr><tr><td>2</td><td>Variables #200000 to #265535 are used.</td></tr><tr><td>3</td><td>Variables #200000 to #298303 are used.</td></tr><tr><td>4</td><td>Variables #200000 to #331072 are used.</td></tr><tr><td>5</td><td>Variables #200000 to #363839 are used.</td></tr><tr><td>6</td><td>Variables #200000 to #396607 are used.</td></tr><tr><td>7</td><td>Variables #200000 to #429375 are used.</td></tr><tr><td>8</td><td>Variables #200000 to #462143 are used.</td></tr></table>	

41) Parameters for polygon turning

Number	Contents	Remarks
7600	Parameter for returns to reference position	T series
#7 PLZ : #6 : #5 : #4 : #3 : #2 : #1 : #0 :	The sequence of returns to the reference position of synchronous axis using G28 command is same as a return to reference position manually (0)/by positioning (1)	
7602	Inter-spindle polygon function	T series
#7 : #6 :		
#5 COF :	In spindle polygon turning, phase control is exercised (0)/not exercised (1).	
#4 HST :	The spindle does not stop (0)/stops to set the polygon mode (1).	7602#5=0
#3 HSL :	For phase synchronization, the second spindle is shifted (0)/the first spindle is shifted (1).	7602#5=0
#2 HDR :	The phase synchronization shift direction is not reversed (0)/reversed (1).	7602#5=0
#1 SNG :	In spindle polygon turning, the synchronization axis rotation direction is not reversed (0)/ reversed (1).	
#0 MNG:	In spindle polygon turning, the spindle rotation direction is not reversed (0)/reversed (1).	

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Number	Contents	Remarks
7603	Inter-spindle polygon function	T series
#7 PST : The polygon spindle stop signal *PLSST (G038.0) is not used (0)/used (1). #6 : #5 RDG : As the phase command value R, the diagnosis screen displays a specified value (0)/actual shift pulse data (1). #4 : #3 : #2 : #1 QDR : The synchronization axis rotation direction depends on the sign of Q (0)/the rotation direction of the first spindle (1). #0 RPL : Upon reset, spindle polygon mode is canceled (0)/not canceled (1).		ALM218
7610	Control axis number of tool rotation axis for polygon turning	T series
7620	Movement of tool rotation axis per revolution	
7621	Upper-limit rotation speed of tool rotation axis	
7631	Allowable spindle speed deviation level in spindle polygon turning	
7632	Steady state confirmation time duration in spindle polygon turning	

42) Parameters for the external pulse input

Number	Contents	Remarks
7681	Setting 1 for the ratio of an axis shift amount to external pulses (M)	M series
7682	Setting 2 for the ratio of an axis shift amount to external pulses (N)	M series

43) Parameters for the hobbing machine and electric gear box

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>7700</td><td>Hobbing machine/electric gear box</td><td>M series</td></tr>
<tr><td colspan="2">#7 :
#6 DPS : Display of actual spindle speed the hob–axis (0)/the spindle speed (1) speed is displayed.
#5 RTO : Gear ratio for the spindle and position coder specified in parameter 3706 disabled (0)/ enabled (1) (Always specify 0.)
#4 :
#3 MLT : Unit of data for the magnification for compensating C–axis servo delay 0.001 (0)/ 0.0001 (1)
#2 HDR : Setting of the direction for compensating a helical gear (1 is usually specified.)
#1 CMS : The position manually set with a single rotation signal is canceled (0)/not canceled (1) when a synchronization cancel command is issued.
#0 HBR : Performing a reset does not cancel (0)/cancel (1) synchronization of the C–axis to the hob axis (G81).</td><td>PRM7714</td></tr>
<tr><td>7701</td><td>Hobbing machine</td><td>M series</td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 DLY : Compensating C–axis servo delay with G84 is disabled (0)/enabled (1)
#4 JHD : While the C–axis and hob axis are synchronized with each other, jogging and handle feeds around the C–axis are disabled (0)/enabled (1)
#3 :
#2 SM3 :
#1 SM2 :
#0 SM1 :
<table>
<tr><th>SM3</th><th>SM2</th><th>SM1</th><th>Number of times the pulse is sampled</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>2</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>16</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>32</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>4</td></tr>
</table></td><td></td></tr>
<tr><td>7709</td><td>Number of the axial feed axis for a helical gear</td><td>M series</td></tr>
<tr><td>7710</td><td>Number of the axis synchronized with the hob axis</td><td>M series</td></tr>
<tr><td>7711</td><td>Gear ratio for the hob axis and position coder</td><td>M series</td></tr>
<tr><td>7712</td><td>Time constant for C–axis acceleration/deceleration during rotation with the hob axis and C–axis synchronized with each other [ms]</td><td>M series</td></tr>
<tr><td>7713</td><td>FL speed of C–axis acceleration/deceleration during rotation with the hob axis and C–axis synchronized each other [deg/min]</td><td>M series</td></tr>
</table>

Number	Contents	Remarks
7714	Magnification 2 for compensation of C–axis servo delay by G83	M series PRM 7700#3
7715	Magnification 1 for compensation of C–axis servo delay by G83	M series PRM 7700#3
7730	Retraction function	<Axis> M series
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 RTR :	 Specifies whether the retraction function is effective for each axis. Retraction is disabled (0)/enabled (1).	
7740	Feedrate during retraction for each axis [mm/min]	<Axis> M series
7741	Retracted distance for each axis [0.001mm]	<Axis> M series
7771	Number of EGB axis	M series
7772	Number of position detector pulses per rotation about tool axis [Detection unit]	M series
7773	Number of position detector pulses per rotation about workpiece axis [Detection unit]	M series

44) Parameters for axis control by PMC

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>8001</td><td>Parameter for axis control by PMC</td><td></td></tr>
<tr><td colspan="2">#7 SKE : Skip signal uses same as CNC (0) / PMC particular signal (1)
#6 AUX : The number of bytes for the code of an auxiliary function (12H) command to be output is 1 (0 to 255) (0)/2 (0 to 65535) (1)
#5 NCC : If a program command is specified for a PMC–controlled axis, an alarm is issued if the axis is controlled by the PMC, the CNC command otherwise being valid (0)/an alarm is always issued (1).
#4 :
#3 RDE : Dry run signal for rapid traverse command is invalid (0) / valid (1)
#2 OVE : Dry run and override signals use the same signal as CNC (0) / PMC particular signal (1)
#1 :
#0 MLE : Machine lock for PMC control axis is valid (0) /invalid (1)</td><td>DGN X004#7
DGN X004#6
P/S 139
DGN G150,151</td></tr>
<tr><td>8002</td><td>Parametr for axis control by PMC</td><td></td></tr>
<tr><td colspan="2">#7 FR2 : Set the command unit of feedrate per revolution
#6 FR1 :
<table>
<tr><th>FR2</th><th>FR1</th><th>Metric input</th><th>Inch input</th></tr>
<tr><td>0</td><td>0</td><td rowspan="2">0.0001 mm/rev</td><td rowspan="2">0.000001 inch/rev</td></tr>
<tr><td>1</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0.001 mm/rev</td><td>0.00001 inch/rev</td></tr>
<tr><td>1</td><td>0</td><td>0.01 mm/rev</td><td>0.0001 inch/rev</td></tr>
</table>
#5 PF2 : Set the the feedrate unit of feed
#4 PF1 :
<table>
<tr><th>PF2</th><th>PF1</th><th>Feedrate unit</th></tr>
<tr><td>0</td><td>0</td><td>1/1</td></tr>
<tr><td>0</td><td>1</td><td>1/10</td></tr>
<tr><td>1</td><td>0</td><td>1/100</td></tr>
<tr><td>1</td><td>1</td><td>1/1000</td></tr>
</table>
#3 F10 : Sets the command unit of feedrate per minute (1mm/min, 10mm/min)
#2 SUE : In external pulse synchronization, acceleration/deceleration is enabled (exponential) (0)/disabled (1).
#1 DWE: With IS-C, the unit of dwell is 1 msec (0)/ 0.1 msec (1).
#0 RPD : Rapid traverse rate of PMC control axis is set by PRM 1420 (0) / specified by PMC control command (1)</td><td></td></tr>
</table>

8

Number	Contents	Remarks
8003	Inch input/Metric input	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 PIM :	When only the axes controlled by the PMC are used, the linear axis is influenced (0)/not influenced (1) by inch/millimeter input.	
8004	Axis control	
#7 NDI :	A move command along a PMC axis is specified using a diameter value (0)/radius value (1).	T series PRM 1006#3=1
#6 NCI :	In deceleration, an in-position check is made (0)/not made (1).	
#5 DSL :	If axis switching is specified when axis switching is disabled, ALM139 is issued (0)/ axis switching is valid for a system not specified (1).	ALM139
#4 G8R :	For rapid traverse and cutting feed along a PMC axis, look-ahead control is disabled (0)/ enabled (1).	PRM 1819#7=0
#3 G8C :	For cutting feed along a PMC axis, look-ahead control is disabled (0)/enabled (1).	PRM 1819#7=0
#2 JFM :	A feedrate for continuous feed is normal (0)/ multiplied by 200 (1).	
#1 NMT :	If the PMC and NC specify commands at the same time, an alarm is issued (0)/no alarm is issued if the commands do not include a move command (1).	ALM130
#0 :		
8005		
#7 : #6 : #5 : #4 : #3 : #2 : #1 CDI :	If diameter input is specified for PMC–controlled axes, the amount of travel becomes double the specified value while the specified feedrate is used as is (0)/both the specified amount of travel and feedrate are used as is (1).	T series PRM 1006#3
#0 :		
8010	DI/DO group selection for each axis during PMC axis control	
8022	Upper-limit rate of feed per revolution during PMC axis control	

45) Parameters for two-path control

Number	Contents	Remarks
8100		2-path control
#7 : #6 DSB : #5 COF : #4 : #3 : #2 : #1 IAL : #0 RST :	 The special single block function is disabled (0)/enabled (1). A separate tool compensation memory area is used for each tool post (0)/a common tool compensation memory area is shared by the tool posts (1). When an alarm is raised in one tool post in the automatic operation mode, the other tool post enters the feed hold state and stops (0)/ continues operation without stopping (1) Reset key on the CRT/MDI panel effective for both paths (0)/for the tool post selected by the path select signal (1)	 T series T series T series
8110	Queuing M code range (minimum value)	2-path control
8111	Queuing M code range (maximum value)	
8140	Checking interference between tool posts	T series (2-path control)
#7 : #6 : #5 ZCL : #4 IFE : #3 IFM : #2 IT0 : #1 TY1 : #0 TY0 :	 Specifies whether interference along the Z axis is checked (0)/is not checked (1) Specifies whether interference between tool posts is checked (0)/is not checked (1) Specifies whether interference between tool post is checked (0)/is not checked (1) in the manual operation mode When offset number 0 is specified by the T code, checking interference between tool posts is stopped until an offset number other than 0 is specified by the next T code (0)/checking interference between tool posts is continued according to the previously specified offset number (1) Specifies the relationship between the coordinate systems of the two tool posts.	
8151	Distance along the X axis between the reference positions of tool posts 1 and 2	T series (2-path control)
8152	Distance along the Z axis between the reference positions of tool posts 1 and 2	

Number	Contents	Remarks
8160	Synchronous, composite, or superimposed control	<Axis> T series (2-path control)
#7 NRS :	When the system is reset, synchronous, composite, or superimposed control is released (0)/not released (1)	
#6 SPE :	The synchronization deviation is the difference between the positioning deviation of the master axis and that of the slave axis (0)/the slave axis plus the acceleration/deceleration delay (1)	
#5 :		
#4 :		
#3 :		
#2 ZSI :	Machine coordinates along the Z–axis for the other path subject to mixed control are fetched with the sign as is (0)/inverted (1)	PRM 8160#0
#1 XSI :	The machine coordinates along the X–axis for the other path subject to mixed control are fetched with the sign as is (0)/inverted (1)	PRM 8160#0
#0 MXC :	During mixed control of the X– or Z–axis, measurement direct input function B for tool compensation performs calculation based on: Machine coordinates for the path being controlled (0)/another path subject to mixed control (1)	
8161	Composite control	<Axis> T series (2-path control)
#7 :		
#6 :		
#5 :		
#4 :		
#3 :		
#2 :		
#1 CZM :	When two Cs contour axes are subject to mixed control, the function for mixing zero point return commands for Cs contour axes is not used (0)/used (1)	
#0 NMR :	When an axis subject to mixed control is placed in servo–off state mixed control is stopped (0)/mixed control is not stopped to disable follow–up for the axis (1)	

Number	Contents	Remarks
8162	Synchronous, composite, superimposed control	<Axis> T series (2-path control)
#7 MUM:	During axis recomposition, a movement along an axis is enabled (0)/disabled (1).	
#6 MCD:	When mixed control is applied, the coordinate system direction for the relevant axes remains the same without applying mirror image (0)/is reversed by applying mirror image (1).	
#5 MPS:	When composite control is terminated, the workpiece coordinate system is not set (0)/set (1) automatically	
#4 MPM:	When composite control is started, the workpiece coordinate system is not set automatically (0)/set automatically (1)	
#3 OMR:	Superimposed mirror–image control is not applied (0)/applied (1)	
#2 PKU:	In the parking state, The absolute, relative, and machine coordinates are not updated (0)/ The absolute and relative coordinates are updated. The machine coordinates are not updated (1)	
#1 SER:	The synchronization deviation is not detected (0)/detected (1)	
#0 SMR:	Synchronous mirror–image control is not applied (0)/applied (1)	
8163	Axis recomposition	<Axis> T series (2-path control)
#7 NUM:	In cases other than synchronous axis recomposition, a command for movement along an axis can be specified (0)/cannot be specified (1).	
#6 :		
#5 :		
#4 SCD:	In synchronous control, the coordinates of the master axis and slave axis are the same (0)/ opposite (1).	
#3 SCM:	Workpiece coordinates are calculated from the master axis and slave axis (0)/from the slave axis (1).	
#2 SPS:	When synchronous control is terminated, the coordinate system of the master axis is set (0)/ not set (1).	
#1 SPM:	When synchronous control is started, the coordinate system of the master axis is set (0)/not set (1).	
#0 MDX:	During axis recomposition, the coordinates of the local system are displayed (0)/the coordinates of the other system are displayed (1).	

Number	Contents	Remarks
8180	Master axis with which an axis is synchronized under synchronous control	T series (2-path control)
8181	Synchronization error limit of each axis [Detection unit]	T series (2-path control)
8182	Display of the synchronization error of an axis [Detection unit]	T series (2-path control)
8183	Axis under composite control in path 1 corresponding to an axis of path 2	T series (2-path control)
8184	Coordinates of the reference point of an axis on the coordinate system of another axis under composite control [0.001mm]	T series (2-path control)
8185	Workpiece coordinates at the reference position	<Axis> T series (2-path control)
8186	Master axis under superimposed control	T series (2-path control)
8190	Rapid traverse rate of an axis under superimposed control [mm/min]	T series (2-path control)
8191	F0 velocity of rapid traverse override of an axis under superimposed control [mm/min]	T series (2-path control)
8192	Linear acceleration/deceleration time constant in rapid traverse of an axis under superimposed control [msec]	T series (2-path control)
8193	Maximum cutting feedrate under superimposed control [mm/min]	T series (2-path control)
8194	Maximum cutting feedrate of an axis under superimposed control [mm/min]	T series (2-path control)

46) Parameters for inclined axis control

Number	Contents	Remarks
8200	Inclined axis control	
#7 : #6 : #5 : #4 : #3 AZR : #2 : #1 : #0 AAC :	 The machine tool is moved (0)/is not moved (1) along the Z axis during manual reference position return along the Y axis under inclined axis control Does not perform (0)/performs (1) inclined axis control	
8210	Inclination angle for inclined axis control	
8211	Axis number of a slanted axis subject to slanted axis control	
8212	Axis number of a Cartesian axis subject to slanted axis control	

47) Parameters for B-axis function (T series)

Number	Contents	Remarks
8240		T series
#7 MST : #6 ABS : #5 SOV : #4 TEM : #3 REF : #2 : #1 : #0 :	When an M command for starting B-axis operation is specified, FIN is awaited (0)/not awaited (1). A B-axis command is incremental (0)/absolute (1). G110 overlaps the next block (0)/does not overlap the next block (1). When offsetting is performed in a T block, a movement along the axis is made after the M function (0)/the M function is performed after a movement along the axis (1). Reference position return operation is the same as manual reference position return operation (0)/positioning is performed when a reference position is established (1).	

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Number	Contents	Remarks
8241	Miscellaneous function	T series
#7 : #6 : #5 : #4 : #3 : #2 MDF : When the execution of a B-axis operation command is started, G98 mode is set (0)/G99 mode is set (1). #1 MDG: When the execution of a B-axis operation command is started, G00 mode is set (0)/G01 mode is set (1). #0 FXC : G84 rotates the spindle in the forward or reverse direction after M05 (0)/without M05.		
8242	Offset value	T series
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 COF : A separate B-axis offset value is used for each tool post (0)/a common B-axis offset value is shared by the tool posts (1).		T series (2-path control)
8250	Axis number used for B-axis control	T series
8251	M code for specifying the start of first program operation	T series
8252	M code for specifying the start of second program operation	T series
8253	M code for specifying the start of third program operation	T series
8257	T code number for tool offset cancellation	T series
8258	Clearance, used in canned cycle G83, for the B–axis	T series

48) Parameters for simple synchronous control

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>8301</td><td>Axis number of the master axis</td><td>M series</td></tr>
<tr><td colspan="2">#7 SOF : The synchronization function is not used (0)/ used (1).
#6 :
#5 :
#4 :
#3 :
#2 :
#1 SY1 :
#0 SY0 :
<table>
<tr><th>SY1</th><th>SY0</th><th></th></tr>
<tr><td>0</td><td>0</td><td>The simple synchronous control is not performed</td></tr>
<tr><td>0</td><td>1</td><td>The X axis is the master axis</td></tr>
<tr><td>1</td><td>0</td><td>The Y axis is the master axis</td></tr>
<tr><td>1</td><td>1</td><td>The Z axis is the master axis</td></tr>
</table></td><td></td></tr>
<tr><td>8302</td><td>Simple synchronous control</td><td>M series</td></tr>
<tr><td colspan="2">#7 :
#6 :
#5 :
#4 :
#3 :
#2 :
#1 ATS : Automatic setting of grid positioning for simplified synchronous control is not started (0)/started (1)
#0 ATE : Automatic setting of grid positioning for simplified synchronous control is disabled (0)/ enabled (1)</td><td></td></tr>
<tr><td>8311</td><td>Axis number of the master axis for an axis subject to synchronous control
T series : Set the axis number (0 to 7) of the master axis for each axis.
<table>
<tr><th rowspan="2"></th><th colspan="2">Setting</th></tr>
<tr><th>Tens digit</th><th>Units digit</th></tr>
<tr><td>Parameter for the first axis</td><td>Master axis for the second axis</td><td>Master axis for the first axis</td></tr>
<tr><td>Parameter for the second axis</td><td>Master axis for the fourth axis</td><td>Master axis for the third axis</td></tr>
<tr><td>Parameter for the third axis</td><td>Master axis for the sixth axis</td><td>Master axis for the fifth axis</td></tr>
<tr><td>Parameter for the fourth axis</td><td>Master axis for the eighth axis</td><td>Master axis for the seventh axis</td></tr>
</table>
When the master axis for the fourth axis is the second axis, set 00, 20, 00, and 00.
M series: Set the axis number (1 to 8) of the master axis for each axis.</td><td><Axis></td></tr>
<tr><td>8312</td><td>Slave axis mirror image setting (100 or more: Reversed)</td><td><Axis>
T series</td></tr>
<tr><td>8313</td><td>Limit of the difference between the amount of positioning deviation of the m</td><td></td></tr>
<tr><td>8314</td><td>Allowable error in synchronization error check</td><td><Axis>
M series</td></tr>
</table>

Number	Contents	Remarks
8315	Maximum compensation value for synchronization	<Axis> M series Alarm 407
8316	Difference between reference counters for master and slave axes [Detection unit]	M series
8317	Torque difference alarm detection time [msec]	M series

49) Program check termination

Number	Contents	Remarks
8341	Program number subject to check termination	
8342	Sequence number subject to check termination	
8343	Program number where collation is to be stopped (when an 8–digit program number is used)	

50) Parameters for chopping

Number	Contents	Remarks
8360	Chopping	M series
#7 CHPX : On the chopping screen, the chopping speed can be set (0)/not be set (1) #6 : #5 : #4 : #3 : #2 : #1 : #0 CPRPD : A rapid traverse override for a section from the current position to the R point is determined as follows: A chopping override is enabled (0)/ An ordinary rapid traverse override is enabled (1)		
8370	Chopping axis	M series
8371	Chopping reference point (R point) [Increment system]	M series
8372	Chopping upper dead point [Increment system]	M series
8373	Chopping lower dead point [Increment system]	M series
8374	Chopping speed [mm/min]	M series
8375	Maximum chopping feedrate [mm/min]	M series
8376	Chopping compensation scaling factor [%]	M series
8377	Compensation start tolerance [Increment system]	M series

51) High–precision control (M series)

<table>
<tr><th>Number</th><th>Contents</th><th>Remarks</th></tr>
<tr><td>8400</td><td>Parameter 1 for determining a linear acceleration/deceleration before interpolation</td><td>M series</td></tr>
<tr><td>8401</td><td>Parameter 2 for determining a linear acceleration/deceleration before interpolation</td><td>M series</td></tr>
<tr><td>8402</td><td>Acceleration/deceleration before interpolation</td><td>M series</td></tr>
<tr><td colspan="2">#7 BADO:
#6 :
#5 DST : Be sure to set 1.
#4 BLK : Be sure to set 0.
#3 :
#2 :
#1 NWBL:
#0 :
<table>
<tr><th>BADO</th><th>NWBL</th><th>Meaning</th></tr>
<tr><td>0</td><td>0</td><td>Linear type is used for acceleration/deceleration prior to pre–read interpolation</td></tr>
<tr><td>1</td><td>1</td><td>Bell–shape type is used for acceleration/deceleration prior to pre–read interpolation</td></tr>
</table></td><td></td></tr>
<tr><td>8403</td><td>Stored stroke limit</td><td>M series</td></tr>
<tr><td colspan="2">#7 SGO : When a G00 code is specified in the RISC mode, the setting of #1 is followed (0)/G00 is executed in a simplified manner in HPCC mode (1).
#6 :
#5 :
#4 :
#3 PLC2 : In HPCC mode, a strokek check before movement for the stored stroke limit –2 is not performed (0)/performed (1)
#2 PLC1 : In HPCC mode, a strokek check before movement for stored stroke limit 1 is not performed (0)/performed (1)
#1 MSU : If A G00, M, S, T, or B code is specified in HPCC mode, an alarm is issued (0)/the command is executed (1).
#0 :</td><td>PRM 8403#1=1</td></tr>
<tr><td>8410</td><td>Allowable velocity difference in velocity determination considering the velocity difference at corners [mm/min]</td><td>M series</td></tr>
<tr><td>8416</td><td>Look-ahead bell-shaped acceleration/deceleration before interpolation</td><td>M series</td></tr>
</table>

Number	Contents	Remarks
8451	Automatic velocity control	M series
#7 NOF : #6 : #5 : #4 ZAG : #3 : #2 : #1 : #0 USE :	In a block where automatic velocity control is validated, the F command is validated (0)/ ignored (1) The velocity is not determined (0)/determined (1) according to the angle at which the machine descends along the Z–axis Automatic velocity control is not applied (0)/ applied (1)	
8452	Range of velocity fluctuation to be ignored [%] (Standard setting: 10)	M series
8456	Area–2 override [%] (Standard setting: 80)	M series
8457	Area–3 override [%] (Standard setting: 70)	M series
8458	Area–4 override [%] (Standard setting: 60)	M series
8455	Automatic velocity control	
#7 : #6 : #5 : #4 : #3 : #2 : #1 CTY : #0 CDC :	 Be sure to set to 1. Be sure to set to 0.	
8464	Initial feedrate for automatic feedrate control	M series
8465	Maximum allowable feedrate for automatic feedrate control	M series
8470	Parameter for determining allowable acceleration in velocity calculation considering acceleration [msec]	M series
8475	Automatic velocity control	M series
#7 : #6 : #5 : #4 : #3 CIR : #2 BIP : #1 : #0 :	 The function of automatic velocity control considering acceleration and deceleration during circular interpolation is not used (0)/ used (1) The function of deceleration at corners is not used (0)/used (1). (Always set 1.)	

Number	Contents	Remarks
8480	Interpolation period	M series
#7 : #6 RI2 : #5 RI1 : #4 RI0 : #3 : #2 : #1 : #0 :	Always set the following values. RI2 / RI1 / RI0 0 / 1 / 0	
8481	Rapid traverse rate in HPCC mode	M series PRM 8403#7
8485	Smooth interpolation	M series
#7 : #6 : #5 CDSP: #4 : #3 : #2 : #1 : #0 :	 Disables (0)/enables (1) smooth interpolation in HPCC mode.	
8486	Maximum travel distance of a block where smooth interpolation is applied [Input increment]	M series

52) Parameters for macro executor and etc.

Number	Contents	Remarks
8650	Key code	
#7 : #6 : #5 : #4 : #3 : #2 : #1 CNA : #0 RSK :	 If an NC alarm is issued while the C executor user screen is displayed, the screen is changed according to PRM3111#7 (0)/is not changed (1). Upon reset, key codes are not passed to the application (0)/passed to the application (1).	

Number	Contents	Remarks
8701	Read method	
#7 : #6 CTV : #5 : #4 : #3 : #2 : #1 PLD : #0 :	 When CAP II is provided, 1 must be specified. Read operation is performed after the P-code loader is cleared (0)/without clearing the P-code loader (1).	
8703	MAP	
#7 : #6 : #5 : #4 : #3 : #2 : #1 LCL : #0 DLF :	 A change in the internal state of the NC is not reported to the host (0)/reported to the host (1). If file transfer using MAP, for example, is terminated, an incomplete file is not deleted (0)/ deleted (1).	
8760	Number of a program transferred to the Power Mate by using the I/O Link	
8781	Amount of DRAM used with the C executor [64k Byte]	
8801	Bit parameter 1 for machine tool builder	
8802	Bit parameter 2 for machine tool builder	
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	
8901	Maintenance	
#7 : #6 : #5 : #4 : #3 : #2 : #1 : #0 FAN :	 A fan motor error is detected (0)/not detected (1). (Use inhibited)	

Number	Contents	Remarks
9000	Macro executor	
#7 : #6 : #5 MKG : The graphic screen is displayed (0)/not displayed (1) #4 RSC : When reset, #100 to #149 in the P-CODE is cleared (0)/not cleared (1) #3 : #2 STP : Conversational macros are executed (0)/not executed (1) #1 NDP : The P-CODE variables screen is not displayed (0)/displayed (1) #0 SQN : While the P-CODE is executed, O and N numbers represent those for the user program (0)/those for the P-CODE (1)		PRM9002, 9003
9002	Break program number for the conversational macro	PRM 9000#2
9003	Break sequence number for the conversational macro	

9.1 Alarms Displayed on NC Screen

9.1.1 Program errors (P/S alarm)

Number	Message	Contents
000	PLEASE TURN OFF POWER	A parameter which requires the power off was input, turn off power.
001	TH PARITY ALARM	TH alarm (A character with incorrect parity was input). Correct the program or tape.
002	TV PARITY ALARM	TV alarm (The number of characters in a block is odd). This alarm will be generated only when the TV check is effective.
003	TOO MANY DIGITS	Data exceeding the maximum allowable number of digits was input. (Refer to the item of max. programmable dimensions.)
004	ADDRESS NOT FOUND	A numeral or the sign “ – ” was input without an address at the beginning of a block. Modify the program .
005	NO DATA AFTER ADDRESS	The address was not followed by the appropriate data but was followed by another address or EOB code. Modify the program.
006	ILLEGAL USE OF NEGATIVE SIGN	Sign “ – ” input error (Sign “ – ” was input after an address with which it cannot be used. Or two or more “ – ” signs were input.) Modify the program.
007	ILLEGAL USE OF DECIMAL POINT	Decimal point “ . ” input error (A decimal point was input after an address with which it can not be used. Or two decimal points were input.) Modify the program.
009	ILLEGAL ADDRESS INPUT	Unusable character was input in significant area. Modify the program.
010	IMPROPER G–CODE	An unusable G code or G code corresponding to the function not provided is specified. Modify the program.
011	NO FEEDRATE COMMANDED	Feedrate was not commanded to a cutting feed or the feedrate was inadequate. Modify the program.
014	ILLEGAL LEAD COMMAND (T series)	In variable lead threading, the lead incremental and decremental outputted by address K exceed the maximum command value or a command such that the lead becomes a negative value is given. Modify the program.
	CAN NOT COMMAND G95 (M series)	A synchronous feed is specified without the option for threading / synchronous feed. Modify the program.

Number	Message	Contents
015	TOO MANY AXES COMMANDED (M series)	An attempt was made to move the machine along the axes, but the number of the axes exceeded the specified number of axes controlled simultaneously. Alternatively, in a block where where the skip function activated by the torque–limit reached signal (G31 P99/P98) was specified, either moving the machine along an axis was not specified, or moving the machine along multiple axes was specified. Specify movement only along one axis.
	TOO MANY AXES COMMANDED (T series)	An attempt has been made to move the tool along more than the maximum number of simultaneously controlled axes. Alternatively, no axis movement command or an axis movement command for two or more axes has been specified in the block containing the command for skip using the torque limit signal (G31 P99/98). The command must be accompanied with an axis movement command for a single axis, in the same block.
020	OVER TOLERANCE OF RADIUS	In circular interpolation (G02 or G03), difference of the distance between the start point and the center of an arc and that between the end point and the center of the arc exceeded the value specified in parameter No. 3410.
021	ILLEGAL PLANE AXIS COMMANDED	An axis not included in the selected plane (by using G17, G18, G19) was commanded in circular interpolation. Modify the program.
022	NO CIRCLE RADIUS	The command for circular interpolation lacks arc radius R or coordinate I, J, or K of the distance between the start point to the center of the arc.
023	ILLEGAL RADIUS COMMAND (T series)	In circular interpolation by radius designation, negative value was commanded for address R. Modify the program.
025	CANNOT COMMAND F0 IN G02/G03 (M series)	F0 (fast feed) was instructed by F1 –digit column feed in circular interpolation. Modify the program.
027	NO AXES COMMANDED IN G43/G44 (M series)	No axis is specified in G43 and G44 blocks for the tool length offset type C. Offset is not canceled but another axis is offset for the tool length offset type C. Modify the program.
028	ILLEGAL PLANE SELECT	In the plane selection command, two or more axes in the same direction are commanded. Modify the program.

Number	Message	Contents
029	ILLEGAL OFFSET VALUE (M series)	The offset values specified by H code is too large. Modify the program.
	ILLEGAL OFFSET VALUE (T series)	The offset values specified by T code is too large. Modify the program.
030	ILLEGAL OFFSET NUMBER (M series)	The offset number specified by D/H code for tool length offset or cutter compensation is too large. Modify the program.
	ILLEGAL OFFSET NUMBER (T series)	The offset number in T function specified for tool offset is tool large. Modify the program.
031	ILLEGAL P COMMAND IN G10	In setting an offset amount by G10, the offset number following address P was excessive or it was not specified. Modify the program.
032	ILLEGAL OFFSET VALUE IN G10	In setting an offset amount by G10 or in writing an offset amount by system variables, the offset amount was excessive. Modify the program.
033	NO SOLUTION AT CRC (M series)	A point of intersection cannot be determined for cutter compensation. Modify the program.
	NO SOLUTION AT CRC (T series)	A point of intersection cannot be determined for tool nose radius compensation. Modify the program.
034	NO CIRC ALLOWED IN ST–UP /EXT BLK (M series)	The start up or cancel was going to be performed in the G02 or G03 mode in cutter compensation C. Modify the program.
	NO CIRC ALLOWED IN ST–UP /EXT BLK (T series)	The start up or cancel was going to be performed in the G02 or G03 mode in tool nose radius compensation. Modify the program.
035	CAN NOT COMMANDED G39 (M series)	G39 is commanded in cutter compensation B cancel mode or on the plane other than offset plane. Modify the program.
	CAN NOT COMMANDED G31 (T series)	Skip cutting (G31) was specified in tool nose radius compensation mode. Modify the program.
036	CAN NOT COMMANDED G31 (M series)	Skip cutting (G31) was specified in cutter compensation mode. Modify the program.
037	CAN NOT CHANGE PLANE IN CRC (M seires)	G40 is commanded on the plane other than offset plane in cutter compensation B. The plane selected by using G17, G18 or G19 is changed in cutter compensation C mode. Modify the program.
	CAN NOT CHANGE PLANE IN NRC (T seires)	The offset plane is switched in tool nose radius compensation. Modify the program.

Number	Message	Contents
038	INTERFERENCE IN CIRCULAR BLOCK (M seires)	Overcutting will occur in cutter compensation C because the arc start point or end point coincides with the arc center. Modify the program.
	INTERFERENCE IN CIRCULAR BLOCK (T series)	Overcutting will occur in tool nose radius compensation because the arc start point or end point coincides with the arc center. Modify the program.
039	CHF/CNR NOT ALLOWED IN NRC (T series)	Chamfering or corner R was specified with a start–up, a cancel, or switching between G41 and G42 in tool nose radius compensation. The program may cause overcutting to occur in chamfering or corner R. Modify the program.
040	INTERFERENCE IN G90/G94 BLOCK (T series)	Overcutting will occur in tool nose radius compensation in canned cycle G90 or G94. Modify the program.
041	INTERFERENCE IN CRC (M seires)	Overcutting will occur in cutter compensation C. Two or more blocks are consecutively specified in which functions such as the auxiliary function and dwell functions are performed without movement in the cutter compensation mode. Modify the program.
	INTERFERENCE IN NRC (T seires)	Overcutting will occur in tool nose radius compensation. Modify the program.
042	G45/G48 NOT ALLOWED IN CRC (M series)	Tool offset (G45 to G48) is commanded in cutter compensation. Modify the program.
043	ILLEGAL T–CODE COMMAND (M series)	In a system using the DRILL–MATE with an ATC, a T code was not specified together with the M06 code in a block. Alternatively, the Tcode was out of range.
044	G27–G30 NOT ALLOWED IN FIXED CYC (M sries)	One of G27 to G30 is commanded in canned cycle mode. Modify the program.
046	ILLEGAL REFERENCE RETURN COMMAND	Other than P2, P3 and P4 are commanded for 2nd, 3rd and 4th reference position return command. Modify the program.
047	ILLEGAL AXIS SELECT (M series)	Two or more parallel axes (in parallel with a basic axis) have been specified upon start–up of three–dimensional tool compensation or three–dimensional coordinate conversion.
048	BASIC 3 AXIS NOT FOUND (M series)	Start–up of three–dimensional tool compensation or three–dimensional coordinate conversion has been attempted, but the three basic axes used when Xp, Yp, or Zp is omitted are not set in parameter No. 1022.

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Number	Message	Contents
050	CHF/CNR NOT ALLOWED IN THRD BLK (M series)	Optional chamfering or corner R is commanded in the thread cutting block. Modify the program.
	CHF/CNR NOT ALLOWED IN THRD BLK(T series)	Chamfering or corner R is commanded in the thread cutting block. Modify the program.
051	MISSING MOVE AFTER CHF/CNR (M series)	Improper movement or the move distance was specified in the block next to the optional chamfering or corner R block. Modify the program.
	MISSING MOVE AFTER CHF/CNR (T series)	Improper movement or the move distance was specified in the block next to the chamfering or corner R block. Modify the program.
052	CODE IS NOT G01 AFTER CHF/CNR (M series)	The block next to the chamfering or corner R block is not G01,G02 or G03. Modify the program.
	CODE IS NOT G01 AFTER CHF/CNR (T series)	The block next to the chamfering or corner R block is not G01. Modify the program.
053	TOO MANY ADDRESS COMMANDS (M series)	For systems without the arbitary angle chamfering or corner R cutting, a comma was specified. For systems with this feature, a comma was followed by something other than R or C Correct the program.
	TOO MANY ADDRESS COMMANDS (T seires)	In the chamfering and corner R commands, two or more of I, K and R are specified. Otherwise, the character after a comma(",") is not C or R in direct drawing dimensions programming. Modify the program.
054	NO TAPER ALLOWED AFTER CHF/CNR (T series)	A block in which chamfering in the specified angle or the corner R was specified includes a taper command. Modify the program.
055	MISSING MOVE VALUE IN CHF/CNR (M series)	In the arbitrary angle chamfering or corner R block, the move distance is less than chamfer or corner R amount. Modify the program.
	MISSING MOVE VALUE IN CHF/CNR (T series)	In chamfering or corner R block, the move distance is less than chamfer or corner R amount. Modify the program.
056	NO END POINT & ANGLE IN CHF/CNR (T series)	Neither the end point nor angle is specified in the command for the block next to that for which only the angle is specified (A). In the chamfering comman, I(K) is commanded for the X(Z) axis. Modify the program.
057	NO SOLUTION OF BLOCK END (T series)	Block end point is not calculated correctly in direct dimension drawing programming.

Number	Message	Contents
058	END POINT NOT FOUND (M series)	In a arbitrary angle chamfering or corner R cutting block, a specified axis is not in the selected plane. Modify the program.
	END POINT NOT FOUND (T series)	Block end point is not found in direct dimension drawing programming. Modify the program.
059	PROGRAM NUMBER NOT FOUND	In an external program number search, a specified program number was not found. Otherwise, a program specified for searching is being edited in background processing. Check the program number and external signal. Or discontinue the background eiting.
060	SEQUENCE NUMBER NOT FOUND	Commanded sequence number was not found in the sequence number search. Check the sequence number.
061	ADDRESS P/Q NOT FOUND IN G70–G73 (T series)	Address P or Q is not specified in G70, G71, G72, or G73 command. Modify the program.
062	ILLEGAL COMMAND IN G71–G76 (T series)	1) The depth of cut in G71 or G72 is zero or negative value. 2) The repetitive count in G73 is zero or negative value. 3) The negative value is specified to Δi or Δk is zero in G74 or G75. 4) A value other than zero is specified to address U or W though Δi or Δk is zero in G74 or G75. 5) A negative value is specified to Δd, though the relief direction in G74 or G75 is determined. 6) Zero or a negative value is specified to the height of thread or depth of cut of first time in G76. 7) The specified minimum depth of cut in G76 is greater than the height of thread. 8) An unusable angle of tool tip is specified in G76. Modify the program.
063	SEQUENCE NUMBER NOT FOUND (T series)	The sequence number specified by address P in G70, G71, G72, or G73 command cannot be searched. Modify the program.
064	SHAPE PROGRAM NOT MONOTONOUSLY (T series)	A target shape which cannot be made by monotonic machining was specified in a repetitive canned cycle (G71 or G72).

Number	Message	Contents
065	ILLEGAL COMMAND IN G71–G73 (T series)	1) G00 or G01 is not commanded at the block with the sequence number which is specified by address P in G71, G72, or G73 command. 2) Address Z(W) or X(U) was commanded in the block with a sequence number which is specified by address P in G71 or G72, respectively. Modify the program.
066	IMPROPER G–CODE IN G71–G73 (T series)	An unallowable G code was commanded beween two blocks specified by address P in G71, G72, or G73. Modify the program.
067	CAN NOT ERROR IN MDI MODE (T series)	G70, G71, G72, or G73 command with address P and Q. Modify the program.
069	FORMAT ERROR IN G70–G73 (T series)	The final move command in the blocks specified by P and Q of G70, G71, G72, and G73 ended with chamfering or corner R. Modify the program.
070	NO PROGRAM SPACE IN MEMORY	The memory area is insufficient. Delete any unnecessary programs, then retry.
071	DATA NOT FOUND	The address to be searched was not found. Or the program with specified program number was not found in program number search. Check the data.
072	TOO MANY PROGRAMS	The number of programs to be stored exceeded 63 (basic), 125 (option), 200 (option), 400 (option) or 1000 (option). Delete unnecessary programs and execute program registeration again.
073	PROGRAM NUMBER ALREADY IN USE	The commanded program number has already been used. Change the program number or delete unnecessary programs and execute program registeration again.
074	ILLEGAL PROGRAM NUMBER	The program number is other than 1 to 9999. Modify the program number.
075	PROTECT	An attempt was made to register a program whose number was protected.
076	ADDRESS P NOT DEFINED	Address P (program number) was not commanded in the block which includes an M98, G65, or G66 command. Modify the program.
077	SUB PROGRAM NESTING ERROR	The subprogram was called in five folds. Modify the program.

Number	Message	Contents
078	NUMBER NOT FOUND	A program number or a sequence number which was specified by address P in the block which includes an M98, M99, M65 or G66 was not found. The sequence number specified by a GOTO statement was not found. Otherwise, a called program is being edited in background processing. Correct the program, or discontinue the background editing.
079	PROGRAM VERIFY ERROR	In memory or program collation, a program in memory does not agree with that read from an external I/O device. Check both the programs in memory and those from the external device.
080	G37 ARRIVAL SIGNAL NOT ASSERTED (M series)	In the automatic tool length measurement function (G37), the measurement position reach signal (XAE, YAE, or ZAE) is not turned on within an area specified in parameter 6254 6255 (value ε). This is due to a setting or operator error.
	G37 ARRIVAL SIGNAL NOT ASSERTED (T series)	In the automatic tool compensation function (G36, G37), the measurement position reach signal (XAE or ZAE) is not turned on within an area specified in parameter 6254 (value ε). This is due to a setting or operator error.
081	OFFSET NUMBER NOT FOUND IN G37 (M series)	Tool length automatic measurement (G37) was specified without a H code. (Automatic tool length measurement function) Modify the program.
	OFFSET NUMBER NOT FOUND IN G37 (T series)	Automatic tool compensation (G36, G37) was specified without a T code. (Automatic tool compensation function) Modify the program.
082	H–CODE NOT ALLOWED IN G37 (M series)	H code and automatic tool compensation (G37) were specified in the same block. (Automatic tool length measurement function) Modify the program.
	T–CODE NOT ALLOWED IN G37 (T series)	T code and automatic tool compensation (G36, G37) were specified in the same block. (Automatic tool compensation function) Modify the program.
083	ILLEGAL AXIS COMMAND IN G37 (M series)	In automatic tool length measurement, an invalid axis was specified or the command is incremental. Modify the program.
	ILLEGAL AXIS COMMAND IN G37 (T series)	In automatic tool compensation (G36, G37), an invalid axis was specified or the command is incremental. Modify the program.

Number	Message	Contents
085	COMMUNICATION ERROR	When entering data in the memory by using Reader / Puncher interface, an overrun, parity or framing error was generated. The number of bits of input data or setting of baud rate or specification No. of I/O unit is incorrect.
086	DR SIGNAL OFF	When entering data in the memory by using Reader / Puncher interface, the ready signal (DR) of reader / puncher was turned off. Power supply of I/O unit is off or cable is not connected or a P.C.B. is defective.
087	BUFFER OVERFLOW	When entering data in the memory by using Reader / Puncher interface, though the read terminate command is specified, input is not interrupted after 10 characters read. I/O unit or P.C.B. is defective.
088	LAN FILE TRANS ERROR (CHANNEL–1)	File data transfer via OSI–ETHERNET has been stopped due to a transfer error.
089	LAN FILE TRANS ERROR (CHANNEL–2)	File data transfer via OSI–ETHERNET has been stopped due to a transfer error.
090	REFERENCE RETURN INCOMPLETE	The reference position return cannot be performed normally because the reference position return start point is too close to the reference position or the speed is too slow. Separate the start point far enough from the reference position, or specify a sufficiently fast speed for reference position return. Check the program contents.
091	REFERENCE RETURN INCOMPLETE	Manual reference position return cannot be performed when automatic operation is halted.
092	AXES NOT ON THE REFERENCE POINT	The commanded axis by G27 (Reference position return check) did not return to the reference position.
094	P TYPE NOT ALLOWED (COORD CHG)	P type cannot be specified when the program is restarted. (After the automatic operation was interrupted, the coordinate system setting operation was performed.) Perform the correct operation according to th operator's manual.
095	P TYPE NOT ALLOWED (EXT OFS CHG)	P type cannot be specified when the program is restarted. (After the automatic operation was interrupted, the external workpiece offset amount changed.) Perform the correct operation according to th operator's manual.

Number	Message	Contents
096	P TYPE NOT ALLOWED (WRK OFS CHG)	P type cannot be specified when the program is restarted. (After the automatic operation was interrupted, the workpiece offset amount changed.) Perform the correct operation according to the operator's manual.
097	P TYPE NOT ALLOWED (AUTO EXEC)	P type cannot be directed when the program is restarted. (After power ON, after emergency stop or P / S 94 to 97 reset, no automatic operation is performed.) Perform automatic operation.
098	G28 FOUND IN SEQUENCE RETURN	A command of the program restart was specified without the reference position return operation after power ON or emergency stop, and G28 was found during search. Perform the reference position return.
099	MDI EXEC NOT ALLOWED AFT. SEARCH	After completion of search in program restart, a move command is given with MDI. Move axis before a move command or don't interrupt MDI operation.
100	PARAMETER WRITE ENABLE	On the PARAMETER (SETTING) screen, PWE (parameter writing enabled) is set to 1. Set it to 0, then reset the system.
101	PLEASE CLEAR MEMORY	The power turned off while rewriting the memory by program edit operation. If this alarm has occurred, press <RESET> while pressing <PROG>, and only the program being edited will be deleted. Register the deleted program.
109	FORMAT ERROR IN G08	A value other than 0 or 1 was specified after P in the G08 code, or no value was specified.
110	DATA OVERFLOW	The absolute value of fixed decimal point display data exceeds the allowable range. Modify the program.
111	CALCULATED DATA OVERFLOW	The result of calculation turns out to be invalid, an alarm No.111 is issued. -10^{47} to -10^{-29}, 0, 10^{-29} to 10^{47} Modify the program.
112	DIVIDED BY ZERO	Division by zero was specified. (including tan 90°) Modify the program.
113	IMPROPER COMMAND	A function which cannot be used in custom macro is commanded. Modify the program.
114	FORMAT ERROR IN MACRO	There is an error in other formats than <Formula>. Modify the program.

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Number	Message	Contents
115	ILLEGAL VARIABLE NUMBER	A value not defined as a variable number is designated in the custom macro or in high–speed cycle machining. The header contents are improper. This alarm is given in the following cases: High speed cycle machining 1) The header corresponding to the specified machining cycle number called is not found. 2) The cycle connection data value is out of the allowable range (0 – 999). 3) The number of data in the header is out of the allowable range (0 – 32767). 4) The start data variable number of executable format data is out of the allowable range (#20000 – #85535). 5) The last storing data variable number of executable format data is out of the allowable range (#85535). 6) The storing start data variable number of executable format data is overlapped with the variable number used in the header. Modify the program.
116	WRITE PROTECTED VARIABLE	The left side of substitution statement is a variable whose substitution is inhibited. Modify the program.
118	PARENTHESIS NESTING ERROR	The nesting of bracket exceeds the upper limit (quintuple). Modify the program.
119	ILLEGAL ARGUMENT	The SQRT argument is negative. Or BCD argument is negative, and other values than 0 to 9 are present on each line of BIN argument. Modify the program.
122	FOUR FOLD MACRO MODAL–CALL	The macro modal call is specified four fold. Modify the program.
123	CAN NOT USE MACRO COMMAND IN DNC	Macro control command is used during DNC operation. Modify the program.
124	MISSING END STATEMENT	DO – END does not correspond to 1 : 1. Modify the program.
125	FORMAT ERROR IN MACRO	<Formula> format is erroneous. Modify the program.
126	ILLEGAL LOOP NUMBER	In DOn, 1≦ n ≦3 is not established. Modify the program.
127	NC, MACRO STATEMENT IN SAME BLOCK	NC and custom macro commands coexist. Modify the program.

Number	Message	Contents
128	ILLEGAL MACRO SEQUENCE NUMBER	The sequence number specified in the branch command was not 0 to 9999. Or, it cannot be searched. Modify the program.
129	ILLEGAL ARGUMENT ADDRESS	An address which is not allowed in <Argument Designation > is used. Modify the program.
130	ILLEGAL AXIS OPERATION	An axis control command was given by PMC to an axis controlled by CNC. Or an axis control command was given by CNC to an axis controlled by PMC. Modify the program.
131	TOO MANY EXTERNAL ALARM MESSAGES	Five or more alarms have generated in external alarm message. Consult the PMC ladder diagram to find the cause.
132	ALARM NUMBER NOT FOUND	No alarm No. concerned exists in external alarm message clear. Check the PMC ladder diagram.
133	ILLEGAL DATA IN EXT. ALARM MSG	Small section data is erroneous in external alarm message or external operator message. Check the PMC ladder diagram.
135	ILLEGAL ANGLE COMMAND (M series)	The index table indexing positioning angle was instructed in other than an integral multiple of the value of the minimum angle. Modify the program.
	SPINDLE ORIENTATION PLEASE (T series)	Without any spindle orientation , an attept was made for spindle indexing. Perform spindle orientation.
136	ILLEGAL AXIS COMMAND (M series)	In index table indexing.Another control axis was instructed together with the B axis. Modify the program.
	C/H–CODE & MOVE CMD IN SAME BLK. (T series)	A move command of other axes was specified to the same block as spindle indexing addresses C, H. Modify the program.
137	M–CODE & MOVE CMD IN SAME BLK. (T series)	A move command of other axes was specified to the same block as M–code related to spindle indexing. Modify the program.
138	SUPERIMPOSED DATA OVERFLOW	The total distribution amount of the CNC and PMC is too large during superimposed control of the extended functions for PMC axis control.
139	CAN NOT CHANGE PMC CONTROL AXIS	An axis is selected in commanding by PMC axis control. Modify the program.
141	CAN NOT COMMAND G51 IN CRC (M series)	G51 (Scaling ON) is commanded in the tool offset mode. Modify the program.
142	ILLEGAL SCALE RATE (M series)	Scaling magnification is commanded in other than 1 – 999999. Correct the scaling magnification setting (G51 P_p… or parameter 5411 or 5421).

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Number	Message	Contents
143	SCALED MOTION DATA OVERFLOW (M series)	The scaling results, move distance, coordinate value and circular radius exceed the maximum command value. Correct the program or scaling mangification.
144	ILLEGAL PLANE SELECTED (M series)	The coordinate rotation plane and arc or cutter compensation C plane must be the same. Modify the program.
145	ILLEGAL CONDITIONS IN POLAR COORDINATE INTERPOLATION	The conditions are incorrect when the polar coordinate interpolation starts or it is canceled. 1) In modes other than G40, G12.1/G13.1 was specified. 2) An error is found in the plane selection. Parameters No. 5460 and No. 5461 are incorrectly specified. Modify the value of program or parameter.
146	IMPROPER G CODE	G codes which cannot be specified in the polar coordinate interpolation mode was specified. See Chapter 4 and modify the program.
148	ILLEGAL SETTING DATA (M series)	Automatic corner override deceleration rate is out of the settable range of judgement angle. Modify the parameters (No.1710 to No.1714)
149	FORMAT ERROR IN G10L3 (M series)	A code other than Q1,Q2,P1 or P2 was specified as the life count type in the extended tool life management.
150	ILLEGAL TOOL GROUP NUMBER	Tool Group No. exceeds the maximum allowable value. Modify the program.
151	TOOL GROUP NUMBER NOT FOUND	The tool group commanded in the machining program is not set. Modify the value of program or parameter.
152	NO SPACE FOR TOOL ENTRY	The number of tools within one group exceeds the maximum value registerable. Modify the number of tools.
153	T–CODE NOT FOUND	In tool life data registration, a T code was not specified where one should be. Modify the program.
154	NOT USING TOOL IN LIFE GROUP (M series)	When the group is not commanded, H99 or D99 was commanded. Modify the program.
155	ILLEGAL T–CODE IN M06 (M series)	In the machining program, M06 and T code in the same block do not correspond to the group in use. Modify the program.
	ILLEGAL T–CODE IN M06 (T series)	Group No.ΔΔ which is specified with TΔΔ 88 of the machining program do not included in the tool group in use. Modify the program.
156	P/L COMMAND NOT FOUND	P and L commands are missing at the head of program in which the tool group is set. Modify the program.

Number	Message	Contents
157	TOO MANY TOOL GROUPS	The number of tool groups to be set exceeds the maximum allowable value. (See parameter No. 6800 bit 0 and 1) Modify the program.
158	ILLEGAL TOOL LIFE DATA	The tool life to be set is too excessive. Modify the setting value.
159	TOOL DATA SETTING INCOMPLETE	During executing a life data setting program, power was turned off. Set again.
160	MISMATCH WATING M–CODE T series (At two–path)	Diffrent M code is commanded in heads 1 and 2 as waiting M code. Modify the program.
	G72.1 NESTING ERROR (M series)	A subprogram which performs rotational copy with G72.1 contains another G72.1 command.
161	G72.2 NESTING ERROR (M series)	A subprogram which performs parallel copy with G72.2 contains another G72.2 command.
163	COMMAND G68/G69 INDEPENDENTLY (T series (At two–path))	G68 and G69 are not independently commanded in balance cut. Modify the program.
169	ILLEGAL TOOL GEOMETRY DATA (T series (At two–path))	Incorrect tool figure data in interference check. Set correct data, or select correct tool figure data.
175	ILLEGAL G107 COMMAND	Conditions when performing circular interpolation start or cancel not correct. To change the mode to the cylindrical interpolation mode, specify the command in a format of “G07.1 rotation–axis name radius of cylinder.”
176	IMPROPER G–CODE IN G107 (M series)	Any of the following G codes which cannot be specified in the cylindrical interpolation mode was specified. 1) G codes for positioning: G28,, G73, G74, G76, G81 – G89, including the codes specifying the rapid traverse cycle 2) G codes for setting a coordinate system: G52,G92, 3) G code for selecting coordinate system: G53, G54–G59 Modify the program.
	IMPROPER G–CODE IN G107 (T series)	Any of the following G codes which cannot be specified in the cylindrical interpolation mode was specified. 1) G codes for positioning: G28, G76, G81 – G89, including the codes specifying the rapid traverse cycle 2) G codes for setting a coordinate system: G50, G52 3) G code for selecting coordinate system: G53, G54–G59 Modify the program.
177	CHECK SUM ERROR (G05 MODE)	Check sum error Modify the program.

Number	Message	Contents
178	G05 COMMANDED IN G41/G42 MODE	G05 was commanded in the G41/G42 mode. Correct the program.
179	PARAM. (NO. 7510) SETTING ERROR	The number of controlled axes set by the parameter 7510 exceeds the maximum number. Modify the parameter setting value.
180	COMMUNICATION ERROR (REMOTE BUF)	Remote buffer connection alarm has generated. Confirm the number of cables, parameters and I/O device.
181	FORMAT ERROR IN G81 BLOCK (M series) (hobbing machine, EGB)	G81 block format error 1) T (number of teeth) has not been instructed. 2) Data outside the command range was instructed by either T, L, Q or P. 3) Calculation of the synchronization coefficient has resulted in an overflow. Modify the program.
182	G81 NOT COMMANDED (M series) (hobbing machine)	G83 (C axis servo lag quantity offset) was instructed though synchronization by G81 has not been instructed. Correct the program.
183	DUPLICATE G83 (COMMANDS) (M series) (hobbing machine)	G83 was instructed before canceled by G82 after compensating for the C axis servo lag quantity by G83.
184	ILLEGAL COMMAND IN G81 (M series) (hobbing machine, EGB)	A command not to be instructed during synchronization by G81 was instructed. 1) A C axis command by G00, G27, G28, G29, G30, etc. was instructed. 2) Inch/Metric switching by G20, G21 was instructed.
185	RETURN TO REFERENCE POINT (M series) (hobbing machine)	G81 was instructed without performing reference position return after power on or emergency stop. Perform reference position return.
186	PARAMETER SETTING ERROR (M series) (hobbing machine, EGB)	Parameter error regarding G81 1) The C axis has not been set to be a rotary axis. 2) A hob axis and position coder gear ratio setting error. Modify the parameter.
190	ILLEGAL AXIS SELECT (M series)	In the constant surface speed control, the axis specification is wrong. (See parameter No. 3770.) The specified axis command (P) contains an illegal value. Modify the program.

Number	Message	Contents
194	SPINDLE COMMAND IN SYNCHRO–MODE	A contour control mode, spindle positioning (Cs–axis control) mode, or rigid tapping mode was specified during the serial spindle synchronous control mode. Correct the program so that the serial spindle synchronous control mode is released in advance.
195	MODE CHANGE ERROR	Switching command to contouring mode, Cs axis control or rigid tap mode or switching to spindle command mode is not correctly completed. (This occurs when the response to switch to the spindle control unit side with regard to the switching command from the NC is incorrect. This alarm is not for the purposes of warning against mistakes in operation, but because continuing operation in this condition can be dangerous it is a P/S alarm.)
197	C–AXIS COMMANDED IN SPINDLE MODE	The program specified a movement along the Cs–axis when the signal CON(DGN=G027#7) was off. Correct the program, or consult the PMC ladder diagram to find the reason the signal is not turned on.
199	MACRO WORD UNDEFINED	Undefined macro word was used. Modify the custom macro.
200	ILLEGAL S CODE COMMAND	In the rigid tap, an S value is out of the range or is not specified. Modify the program.
201	FEEDRATE NOT FOUND IN RIGID TAP	In the rigid tap, no F value is specified. Modify the program.
202	POSITION LSI OVERFLOW	In the rigid tap, spindle distribution value is too large. (System error)
203	PROGRAM MISS AT RIGID TAPPING	In the rigid tap, position for a rigid M code (M29) or an S command is incorrect. Modify the program.
204	ILLEGAL AXIS OPERATION	In the rigid tap, an axis movement is specified between the rigid M code (M29) block and G84 or G74 for M series (G84 or G88 for T series) block. Modify the program.
205	RIGID MODE DI SIGNAL OFF	Rigid mode DI signal is not ON when G84 or G74 for M series (G84 or G88 for T series) is executed though the rigid M code (M29) is specified.Consult the PMC ladder diagram to find the reason the DI signal (DGNG061.1) is not turned on.
206	CAN NOT CHANGE PLANE (RIGID TAP) (M series)	Plane changeover was instructed in the rigid mode. Modify the program.

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Number	Message	Contents
210	CAN NOT COMAND M198/M199	M198 and M199 are executed in the schedule operation. M198 is executed in the DNC operation. Modify the program. 1) The execution of an M198 or M99 command was attempted during scheduled operation. Alternatively, the execution of an M198 command was attempted during DNC operation. Modify the program. 2) The execution of an M99 command was attempted by an interrupt macro during pocket machining in a multiple repetitive canned cycle.
211	G31 (HIGH) NOT ALLOWED IN G99	G31 is commanded in the per revolution command when the high–speed skip option is provided. Modify the program.
212	ILLEGAL PLANE SELECT (M series)	The arbitrary angle chamfering or a corner R is commanded or the plane including an additional axis. Modify the program.
	ILLEGAL PLANE SELECT (T series)	The direct drawing dimensions programming is commanded for the plane other than the Z–X plane. Modify the program.
213	ILLEGAL COMMAND IN SYNCHRO–MODE (M series)	Movement is commanded for the axis to be synchronously controlled. Any of the following alarms occurred in the operation with the simple synchronization control. 1) The program issued the move command to the slave axis. 2) The program issued the manual continuous feed/manual handle feed/incremental feed command to the slave axis. 3) The program issued the automatic reference position return command without specifying the manual reference position return after the power was turned on. 4) The difference between the position error amount of the master and slave axes exceeded the value specified in parameter NO.8313.
	ILLEGAL COMMAND IN SYNCHRO–MODE (T series)	A move command has been specified for an axis subject to synchronous control.
214	ILLEGAL COMMAND IN SYNCHRO–MODE	Coordinate system is set or tool compensation of the shift type is executed in the synchronous control. Modify the program.
217	DUPLICATE G51.2 (COMMANDS) (T series)	G51.2/G251 is further commanded in the G51.2/G251 mode. Modify the program.

Number	Message	Contents
218	NOT FOUND P/Q COMMAND IN G251 (T series)	P or Q is not commanded in the G251 block, or the command value is out of the range. Modify the program.
219	COMMAND G250/G251 INDEPENDENTLY (T series)	G251 and G250 are not independent blocks.
220	ILLEGAL COMMAND IN SYNCHR–MODE (T series)	In the synchronous operation, movement is commanded by the NC program or PMC axis control interface for the synchronous axis.
221	ILLEGAL COMMAND IN SYNCHR–MODE (T series)	Polygon machining synchronous operation and axis control or balance cutting are executed at a time. Modify the program.
222	DNC OP. NOT ALLOWED IN BG.–EDIT (M series)	Input and output are executed at a time in the background edition. Execute a correct operation.
224	RETURN TO REFERENCE POINT (M series)	Reference position return has not been performed before the automatic operation starts. Perform reference position return only when bit 0 of parameter 1005 is 0.
	TURN TO REFERENCE POINT (T series)	Reference position return is necessary before cycle start.
225	SYNCHRONOUS/MIXED CONTROL ERROR (T series (At two–path))	This alarm is generated in the following circumstances. (Searched for during synchronous and mixed control command.) 1) When there is a mistake in axis number parameter setting. 2) When there is a mistake in control commanded. Modify the program or the parameter.
226	ILLEGAL COMMAND IN SYNCHRO–MODE (T series (At two–path))	A travel command has been sent to the axis being synchronized in synchronous mode. Modify the program or the parameter.
229	CAN NOT KEEP SYNCHRO–STATE (T series (2–path control))	This alarm is generated in the following circumstances. 1) When the synchro/mixed state could not be kept due to system overload. 2) The above condition occurred in CMC devices (hardware) and synchro–state could not be kept. (This alarm is not generated in normal use conditions.)
230	R CODE NOT FOUND (M series (grinding machine))	The infeed quantity R has not been instructed for the G161 block. Or the R command value is negative. Modify the program.

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Number	Message	Contents
231	ILLEGAL FORMAT IN G10 OR L50	Any of the following errors occurred in the specified format at the programmable–parameter input. 1) Address N or R was not entered. 2) A number not specified for a parameter was entered. 3) The axis number was too large. 4) An axis number was not specified in the axis–type parameter. 5) An axis number was specified in the parameter which is not an axis type. Correct the program. 6) An attempt was made to reset bit 4 of parameter 3202 (NE9) or change parameter 3210 (PSSWD) when they are protected by a password. Modify the program.
232	TOO MANY HELICAL AXIS COMMANDS (M series)	Three or more axes (in the normal direction control mode two or more axes) were specified as helical axes in the helical interpolation mode. Modify the program
233	DEVICE BUSY	When an attempt was made to use a unit such as that connected via the RS–232–C interface, other users were using it.
239	BP/S ALARM	While punching was being performed with the function for controlling external I/O units ,background editing was performed.
240	BP/S ALARM	Background editing was performed during MDI operation.
241	ILLEGAL FORMAT IN G02.2/G03.2 (M series)	The end point, I, J, K, or R is missing from a command for involute interpolation.
242	ILLEGAL COMMAND IN G02.2/G03.2 (M series)	An invalid value has been specified for involute interpolation. • The start or end point is within the basic circle. • I, J, K, or R is set to 0. • The number of rotations between the start of the involute curve and the start or end point exceeds 100.
243	OVER TOLERANCE OF END POINT (M series)	The end point is not on the involute curve which includes the start point and thus falls outside the range specified with parameter No. 5610.
244	P/S ALARM (T series)	In the skip function activated by the torque limit signal, the number of accumulated erroneous pulses exceed 32767 before the signal was input. Therefore, the pulses cannot be corrected with one distribution. Change the conditions, such as feed rates along axes and torque limit, and try again.

Number	Message	Contents
245	T–CODE NOT ALOWEE IN THIS BLOCK (T series)	One of the G codes, G50, G10, and G04, which cannot be specified in the same block as a T code, was specified with a T code.
250	Z AXIS WRONG COMMAND (ATC) (M series)	A value for the Z–axis has been specified in a block for the tool exchange command (M06T_) on a system with DRILL–MATE ARC installed.
251	ATC ERROR (M series)	This alarm is issued in the following cases (DRILL–MATE): • An M06T_ command contains an unusable T code. • An M06 command has been specified when the Z machine coordi nate is positive. • The parameter for the current tool number (No. 7810) is set to 0. • An M06 command has been specified in canned cycle mode. • A reference position return command (G27 to G44) and M06 command have been specified in the same block. • An M06 command has been specified in tool compensation mode (G41 to G44). • An M06 command has been specified without performing reference position return after power–on or the release of emergency stop. • The machine lock signal or Z–axis ignore signal has been turned on during tool exchange. • A pry alarm has been detected during tool exchange. Refer to diagnosis No. 530 to determine the cause.
252	ATC SPINDLE ALARM (M series)	An excessive error arose during spindle positioning for ATC. For details, refer to diagnosis No. 531. (Only for DRILL–MATE)
253	G05 IS NOT AVAILABLE (M series)	Binary input operation using high–speed remote buffer (G05) or high–speed cycle machining (G05) has been specified in advance control mode (G08P1). Execute G08P0; to cancel advance control mode, before executing these G05 commands.
5000	ILLEGAL COMMAND CODE (M series)	The specified code was incorrect in the high–precision contour control (HPCC) mode.
5003	ILLEGAL PARAMETER (HPCC) (M series)	There is an invalid parameter.
5004	HPCC NOT READY (M series)	High–precision contour control is not ready.

Number	Message	Contents
5006	TOO MANY WORD IN ONE BLOCK (M series)	The number of words specified in a block exceeded 26 in the HPCC mode.
5007	TOO LARGE DISTANCE (M series)	In the HPCC mode, the machine moved beyond the limit.
5009	PARAMETER ZERO (DRY RUN) (M series)	The maximum feedrate (parameter No. 1422) or the feedrate in dry run (parameter No. 1410) is 0 in the HPCC model.
5010	END OF RECORD	The end of record (%) was specified. I/O is incorrect. modify the program.
5011	PARAMETER ZERO (CUT MAX) (M series)	The maximum cutting feedrate (parameter No. 1422)is 0 in the HPCC mode.
5012	G05 P10000 ILLEGAL START UP (HPCC) (M series)	G05 P10000 has been specified in a mode from which the system cannot enter HPCC mode.
5013	HPCC: CRC OFS REMAIN AT CANCEL (M series)	G05P0 has been specified in G41/G42 mode or with offset remaining.
5014	TRACE DATA NOT FOUND (M series)	Transfer cannot be performed because no trace data exists.
5015	NO ROTATION AXIS (M series)	The specified rotation axis does not exist for tool axis direction handle feed.
5016	ILLEGAL COMBINATION OF M CODE	M codes which belonged to the same group were specified in a block. Alternatively,an M code which must be specified without other M codes in the block was specified in a block with other M codes.
5018	POLYGON SPINDLE SPEED ERROR (T series)	In G51.2 mode, the speed of the spindle or polygon synchronous axis either exceeds the clamp value or is too small. The specified rotation speed ratio thus cannot be maintained.
5020	PARAMETER OF RESTART ERROR	An erroneous parameter was specified for restarting a program. A parameter for program restart is invalid.
5030	ILLEGAL COMMAND (G100) (T series)	The end command (G110) was specified before the registratioin start command (G101, G102, or G103) was specified for the B–axis.
5031	ILLEGAL COMMAND (G101, G102, G103) (T series)	While a registration start command (G101, G102, or G103) was being executed, another registration start command was specified for the B–axis.
5032	NEW PRG REGISTERED IN B–AXS MOVE (T series)	While the machine was moving about the B–axis, at attempt was made to register another move command.

Number	Message	Contents
5033	NO PROG SPACE IN MEMORY B–AXS (T series)	Commands for movement about the B–axis were not registered because of insufficient program memory.
5034	PLURAL COMMAND IN G110 (T series)	Multiple movements were specified with the G110 code for the B–axis.
5035	NO FEEDRATE COMMANDED B–AXS (T series)	A feedrate was not specified for cutting feed about the B–axis.
5036	ADDRESS R NOT DEFINED IN G81–G86 (T series)	Point R was not specified for the canned cycle for the B–axis.
5037	ADDRESS Q NOT DEFINED IN G83 (T series)	Depth of cut Q was not specified for the G83 code (peck drilling cycle). Alternatively, 0 was specified in Q for the B–axis.
5038	TOO MANY START M–CODE COMMAND (T series)	More than six M codes for starting movement about the B–axis were specified.
5039	START UNREGISTERED B–AXS PROG (T series)	An attempt was made to execute a program for the B–axis which had not been registered.
5040	CAN NOT COMMANDED B–AXS MOVE (T series)	The machine could not move about the B–axis because parameter No.8250 was incorrectly specified, or because the PMC axis system could not be used.
5041	CAN NOT COMMANDED G110 BLOCK (T series)	Blocks containing the G110 codes were successively specified in tool–tip radius compensation for the B–axis.
5043	TOO MANY G68 NESTING (M series)	Three–dimensional coordinate conversion G68 has been specified three or more times.
5044	G68 FORMAT ERROR (M series)	A G68 command block contains a format error. This alarm is issued in the following cases: 1) I, J, or K is missing from a G68 command block (missing coordi nate rotation option). 2) I, J, and K are 0 in a G68 command block. 3) R is missing from a G68 command block.

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Number	Message	Contents
5046	ILLEGAL PARAMETER (ST.COMP)	The parameter settings for straightness compensation contain an error. Possible causes are as follows: 1) A parameter for a movement axis or compensation axis contains an axis number which is not used. 2) More than 128 pitch error compensation points exist between the negative and positive end points. 3) Compensation point numbers for straightness compensation are not assigned in the correct order. 4) No straightness compensation point exists between the pitch error compensation points at the negative and positive ends. 5) The compensation value for each compensation point is too large or too small.
5050	ILL–COMMAND IN CHOPPING MODE (M series)	A command for switching the major axis has been specified for circular threading. Alternatively, a command for setting the length of the major axis to 0 has been specified for circular threading.
5051	M–NET CODE ERROR	Abnormal character received (other than code used for transmission)
5052	M–NET ETX ERROR	Abnormal ETX code
5053	M–NET CONNECT ERROR	Connection time monitoring error (parameter No. 175)
5054	M–NET RECEIVE ERROR	Polling time monitoring error (parameter No. 176)
5055	M–NET PRT/FRT ERROR	Vertical parity or framing error
5057	M–NET BOARD SYSTEM DOWN	Transmission timeout error (parameter No. 177) ROM parity error CPU interrupt other than the above
5058	G35/G36 FORMAT ERROR (T series)	A command for switching the major axis has been specified for circular threading. Alternatively, a command for setting the length of the major axis to 0 has been specified for circular threading.
5059	RADIUS IS OUT OF RANGE (T series)	A radius exceeding nine digits has been specified for circular interpolation with the center of the arc specified with I, J, and K.

Number	Message	Contents
5060	ILLEGAL PARAMETER IN G02.3/G03.3 (M series)	Parameter setting is illegal. No. 5641 (setting of the linear axis) is not specified. No. 5641 specifies an axis other than a linear axis. No. 5642 (setting of the rotation axis) is not specified. No. 5642 specifies an axis other than a rotation axis. The CNC cannot control the linear or rotation axis (the value of No. 1010 is exceeded).
5061	ILLEGAL FORMAT IN G02.3/G03.3 (M series)	The command for exponential interpolation (G02.3/G03.3) contains a format error. Address I, J, or K is not specified. Addresses I, J, and K are 0.
5062	ILLEGAL COMMAND IN G02.3/G03.3 (M series)	The command for exponential interpolation (G02.3/G03.3) contains an illegal value. The specified value is not suitable for exponential interpolation (for example, a negative value is subject to ln).
5063	IS NOT PRESET AFTER REF. (M series)	The position counter was not preset before the start of workpiece thickness measurement. This alarm is issued in the following cases: (1) An attempt has been made to start measurement without first establishing the origin. (2) An attempt has been made to start measurement without first presetting the position counter after manual return to the origin.
5064	DIFFERRENT AXIS UNIT (IS–B, IS–C) (M series)	Circular interpolation has been specified on a plane consisting of axes having different increment systems.
5065	DIFFERENT AXIS UNIT (PMC AXIS) (M series)	Axes having different increment systems have been specified in the same DI/DO group for PMC axis control. Modify the setting of parameter No. 8010.
5066	RESTART ILLEGAL SEQUENCE NUMBER (M series)	Sequence number 7xxx has been read during search for the next sequence number at program restart for the return/restart function.
5068	G31 P90 FORMAT ERROR (M series)	No movement axis or more than one movement axis has been specified.
5069	WHL–C ; ILLEGAL P–DATA	Erroneous P data has been specified for center selection during grinding wheel wear compensation.
5073	NO DECIMAL POINT	No decimal point has been specified for an address requiring a decimal point.
5074	ADDRESS DUPLICATION ERROR	The same address has been specified two or more times in a single block. Alternatively, two or more G codes in the same group have been specified in a single block.

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Number	Message	Contents
5082	DATA SERVER ERROR	This alarm is detailed on the data server message screen.
5085	SMOOTH IPL ERROR 1	The smooth interpolation command block contains an invalid command format.

NOTE HPCC : High precision contour control

9.1.2 Background edit alarm (BP/S alarm)

Number	Message	Contents
???	BP/S alarm	BP/S alarm occurs in the same number as the P/S alarm that occurs in ordinary program edit. (070, 071, 072, 073, 074 085,086,087 etc.)
140	BP/S alarm	It was attempted to select or delete in the background a program being selected in the foreground. **(Note)** Use background editing correctly.

NOTE Alarm in background edit is displayed in the key input line of the background edit screen instead of the ordinary alarm screen and is resettable by any of the MDI key operation.

9.1.3 Absolute pulse coder (APC) alarm

Number	Message	Contents
300	nth–axis origin return	Manual reference position return is required for the nth–axis (n=1 – 8).
301	APC alarm: nth–axis communication	nth–axis (n=1 – 8) APC communication error. Failure in data transmission Possible causes include a faulty APC, cable, or servo interface module.
302	APC alarm: nth–axis over time	nth–axis (n=1 – 8) APC overtime error. Failure in data transmission. Possible causes include a faulty APC, cable, or servo interface module.
303	APC alarm: nth–axis framing	nth–axis (n=1 – 8) APC framing error. Failure in data transmission. Possible causes include a faulty APC, cable, or servo interface module.
304	APC alarm: nth–axis parity	nth–axis (n=1 – 8) APC parity error. Failure in data transmission. Possible causes include a faulty APC, cable, or servo interface module.
305	APC alarm: nth–axis pulse error	nth–axis (n=1 – 8) APC pulse error alarm. APC alarm.APC or cable may be faulty.

Number	Message	Contents
306	APC alarm: nth–axis battery voltage 0	nth–axis (n=1 – 8) APC battery voltage has decreased to a low level so that the data cannot be held. APC alarm. Battery or cable may be faulty.
307	APC alarm: nth–axis battery low 1	nth–axis (n=1 – 8) axis APC battery voltage reaches a level where the battery must be renewed. APC alarm. Replace the battery.
308	APC alarm: nth–axis battery low 2	nth–axis (n=1 – 8) APC battery voltage has reached a level where the battery must be renewed (including when power is OFF). APC alarm .Replace battery.
309	APC ALARM: n AXIS ZRN IMPOSSIBL	Return to the origin has been attempted without first rotating the motor one or more times. Before returning to the origin, rotate the motor one or more times then turn off the power.

9.1.4 Serial pulse coder (APC) alarm

When either of the following alarms is issued, a possible cause is a faulty serial pulse coder or cable.

Number	Message	Contents
350	SPC ALARM: n AXIS PULSE CODER	The n axis (axis 1–8) pulse coder has a fault. Refer to diagnosis display No. 202 for details.
351	SPC ALARM: n AXIS COMMUNICATION	n axis (axis 1–8) serial pulse coder communication error (data transmission fault) Refer to diagnosis display No. 203 for details.

- The details of serial pulse coder alarm No.350

  The details of serial pulse corder alarm No. 350 (pulse corder alarm) are displayed in the diagnosis display (No. 202) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
202		CSA	BLA	PHA	RCA	BZA	CKA	SPH

#6 (CSA) : The serial pulse corder is defective. Replace it.

#5 (BLA) : The battery voltage is low. Replace the batteries. This alarm has nothing to do with alarm No. 350 (serial pulse coder alarm).

#4 (PHA) : The serial pulse coder or feedback cable is defective. Replace the serial pulse coder or cable.

#3 (RCA) : The serial pulse coder is defective. Replace it.

#2 (BZA) : The pulse coder was supplied with power for the first time.
Make sure that the batteries are connected.
Turn the power off, then turn it on again and perform a reference position return. This alarm has nothing to do with alarm No. 350 (serial pulse coder alarm).

#1 (CKA) : The serial pulse coder is defective. Replace it.

#0 (SPH) : The serial pulse coder or feedback cable is defective. Replace the serial pulse coder or cable.

- The details of serial pulse coder alarm No.351

  The details of serial pulse coder alarm No. 351 (communication alarm) are displayed in the diagnosis display (No. 203) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
203	DTE	CRC	STB	PRM				

#7 (DTE) : The serial pulse coder encountered a communication error. The pulse coder, feedback cable, or feedback receiver circuit is defective. Replace the pulse coder, feedback cable, or NC–axis board.

#6 (CRC) : The serial pulse coder encountered a communication error. The pulse coder, feedback cable, or feedback receiver circuit is defective. Replace the pulse coder, feedback cable, or NC–axis board.

#5 (STB) : The serial pulse coder encountered a communication error. The pulse coder, feedback cable, or feedback receiver circuit is defective.
Replace the pulse coder, feedback cable, or NC–axis board.

#4 (PRM) : An invalid parameter was found. Alarm No. 417 (invalid servo parameter) is also issued.

9.1.5 Servo alarms

Number	Message	Contents
400	SERVO ALARM: n–TH AXIS OVERLOAD	The n–th axis (axis 1–8) overload signal is on. Refer to diagnosis display No. 201 for details.
401	SERVO ALARM: n–TH AXIS VRDY OFF	The n–th axis (axis 1–8) servo amplifier READY signal (DRDY) went off. Refer to procedure of trouble shooting.
404	SERVO ALARM: n–TH AXIS VRDY ON	Even though the n–th axis (axis 1–8) READY signal (MCON) went off, the servo amplifier READY signal (DRDY) is still on. Or, when the power was turned on, DRDY went on even though MCON was off. Check that the servo interface module and servo amp are connected.
405	SERVO ALARM: (ZERO POINT RETURN FAULT)	Position control system fault. Due to an NC or servo system fault in the reference position return, there is the possibility that reference position return could not be executed correctly. Try again from the manual reference position return.
407	SERVO ALARM: EXCESS ERROR	The difference in synchronous axis position deviation exceeded the set value.
409	SERVO ALARM: n AXIS TORQUE ALM	Abnormal servo motor load has been detected. Alternatively, abnormal spindle motor load has been detected in Cs mode.

Number	Message	Contents
410	SERVO ALARM: n–TH AXIS – EXCESS ERROR	The position deviation value when the n–th axis (axis 1–8) stops is larger than the set value. Refer to procedure of troubleshooting.
411	SERVO ALARM: n–TH AXIS – EXCESS ERROR	The position deviation value when the n–th axis (axis 1–8) moves is larger than the set value. Refer to procedure of troubleshooting.
413	SERVO ALARM: n–th AXIS – LSI OVERFLOW	The contents of the error register for the n–th axis (axis 1–8) exceeded $\pm 2^{31}$ power. This error usually occurs as the result of an improperly set parameters.
414	SERVO ALARM: n–TH AXIS – DETECTION RELATED ERROR	N–th axis (axis 1–8) digital servo system fault. Refer to diagnosis display No. 200 and No.204 for details.
415	SERVO ALARM: n–TH AXIS – EXCESS SHIFT	A speed higher than 511875 units/s was attempted to be set in the n–th axis (axis 1–8). This error occurs as the result of improperly set CMR.
416	SERVO ALARM: n–TH AXIS – DISCONNECTION	Position detection system fault in the n–th axis (axis 1–8) pulse coder (disconnection alarm). Refer to diagnosis display No. 201 for details.
417	SERVO ALARM: n–TH AXIS – PARAMETER INCORRECT	This alarm occurs when the n–th axis (axis 1–8) is in one of the conditions listed below. (Digital servo system alarm) 1) The value set in Parameter No. 2020 (motor form) is out of the specified limit. 2) A proper value (111 or –111) is not set in parameter No.2022 (motor revolution direction). 3) Illegal data (a value below 0, etc.) was set in parameter No. 2023 (number of speed feedback pulses per motor revolution). 4) Illegal data (a value below 0, etc.) was set in parameter No. 2024 (number of position feedback pulses per motor revolution). 5) Parameters No. 2084 and No. 2085 (flexible field gear rate) have not been set. 6) A value outside the limit of {1 to the number of control axes} or a non–continuous value (Parameter 1023 (servo axis number) contains a value out of the range from 1 to the number of axes, or an isolated value (for example, 4 not prceded by 3).was set in parameter No. 1023 (servo axisnumber).

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Number	Message	Contents
420	SERVO ALARM: n AXIS SYNC TORQUE (M series)	During simple synchronous control, the difference between the torque commands for the master and slave axes exceeded the value set in parameter No. 2031.
421	SERVO ALARM: n AXIS EXCESS ER (D)	The difference between the errors in the semi–closed loop and closed loop has become excessive during dual position feedback. Check the values of the dual position conversion coefficients in parameters No. 2078 and 2079.

NOTE If any of servo alarms 400 to 421 occurs, investigate the cause of the alarm and take appropriate action, as described in the maintenance manual.

- Details of servo alarm No.414

The details of servo alarm No. 414 are displayed in the diagnosis display (No. 200 and No.204) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
200	OVL	LV	OVC	HCA	HVA	DCA	FBA	OFA

#7 (OVL) : An overload alarm is being generated. (This bit causes servo alarm No. 400. The details are indicated in diagnostic data No.201).

#6 (LV) : A low voltage alarm is being generated in servo amp.

#5 (OVC) : A overcurrent alarm is being generated inside of digital servo.

#4 (HCA) : An abnormal current alarm is being generated in servo amp.

#3 (HVA) : An overvoltage alarm is being generated in servo amp.

#2 (DCA) : A regenerative discharge circuit alarm is being generated in servo amp.

#1 (FBA) : A disconnection alarm is being generated. (This bit causes servo alarm No.416. The details are indicated in diagnostic data No.201).

#0 (OFA) : An overflow alarm is being generated inside of digital servo.

	#7	#6	#5	#4	#3	#2	#1	#0
204		OFS	MCC	LDA	PMS			

#6 (OFS) : A current conversion error has occured in the digital servo.

#5 (MCC) : A magnetic contactor contact in the servo amplifier has welded.

#4 (LDA) : The LED indicates that serial pulse coder C is defective

#3 (PMS) : A feedback pulse error has occured because the feedback cable is defective.

- Details of servo alarms No.400 and No. 416

The details of servo alarms No. 400 and No. 416 are displayed in the diagnosis display (No. 201) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
201	ALD			EXP				

When OVL equal 1 in diagnostic data No.200 (servo alarm No. 400 is being generated):

#7 (ALD) 0 : Motor overheating

1 : Amplifier overheating

When FBAL equal 1 in diagnostic data No.200 (servo alarm No. 416 is being generated):

ALD	EXP	Alarm details
1	0	Built–in pulse coder disconnection (hardware)
1	1	Separately installed pulse coder disconnection (hardware)
0	0	Pulse coder is not connected due to software.

9.1.6 Overtravel alarms

If this alarm occurs, manually move the machine in the direction opposite to that in which the machine was moving when the alarm occurred, then reset the alarm.

Number	Message	Contents
500	OVER TRAVEL : +n	Exceeded the n–th axis (axis 1–8) + side stored stroke limit I. (Parameter No.1320 or 1326 **Note**)
501	OVER TRAVEL : –n	Exceeded the n–th axis (axis 1–8) – side stored stroke limit I. (Parameter No.1321 or 1327 **Note**)
502	OVER TRAVEL : +n	Exceeded the n–th axis (axis 1–8) + side stored stroke limit II. (Parameter No.1322)
503	OVER TRAVEL : –n	Exceeded the n–th axis (axis 1–8) – side stored stroke limit II. (Parameter No.1323)
504	OVER TRAVEL : +n	Exceeded the n–th axis (axis 1–8) + side stored stroke limit III. (Parameter No.1324)
505	OVER TRAVEL : –n	Exceeded the n–th axis (axis 1–8) – side stored stroke limit III. (Parameter No.1325)
506	OVER TRAVEL : +n	Exceeded the n–th axis (axis 1–8) + side hardware OT.
507	OVER TRAVEL : –n	Exceeded the n–th axis (axis 1–8) – side hardware OT.
508	INTERFERENCE: +n (T series (two–path control))	A tool moving in the positive direction along the n axis has fouled another tool post.
509	INTERFERENCE: –n (T series (two–path control))	A tool moving in the negative direction along the n axis has fouled another tool post.

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Number	Message	Contents
510	OVER TRAVEL: +n	Alarm for stroke check prior to movement. The end point specified in a block falls within the forbidden area defined with the stroke limit in the positive direction along the N axis. Correct the program.
511	OVER TRAVEL: –n	Alarm for stroke check prior to movement. The end point specified in a block falls within the forbidden area defined with the stroke limit in the negative direction along the N axis. Correct the program.

NOTE1 Overtravel alarm numbers 504 and 505 apply only to the T series.
NOTE2 Parameters 1326 and 1327 are effective when EXLM(stroke limit switch signal) is on.

9.1.7 Overheat alarms

Number	Message	Contents
700	OVERHEAT: CONTROL UNIT	Control unit overheat Check that the fan motor operates normally, and clean the air filter.
701	OVERHEAT: FAN MOTOR	The fan motor on the top of the cabinet for the contorl unit is overheated. Check the operation of the fan motor and replace the motor if necessary.
704	OVERHEAT: SPINDLE	Spindle overheat in the spindle fluctuation detection 1) If the cutting load is heavy, relieve the cutting condition. 2) Check whether the cutting tool is share. 3) Another possible cause is a faulty spindle amp.

9.1.8 Rigid tapping alarms

Number	Message	Contents
740	RIGID TAP ALARM: EXCESS ERROR	The positional deviation of the stopped spindle has exceeded the set value during rigid tapping.
741	RIGID TAP ALARM: EXCESS ERROR	The positional deviation of the moving spindle has exceeded the set value during rigid tapping.
742	RIGID TAP ALARM: LSI OVERFLOW	An LSI overflow has occurred for the spindle during rigid tapping.

9.1.9 Serial spindle alarms

Number	Message	Contents
749	S–SPINDLE LSI ERROR	It is serial communication error while system is executing after power supply on. Following reasons can be considered. 1) Optical cable connection is fault or cable is not connected or cableis cut. 2) MAIN CPU board or option 2 board is fault. 3) Spindle amp. printed board is fault. If this alarm occurs when CNC power supply is turned on or when his alarm can not be cleared even if CNC is reset, turn off the power supply also turn off the power supply in spindle side.
750	SPINDLE SERIAL LINK START FAULT	This alarm is generated when the spindle control unit is not ready for starting correctly when the power is turned on in the system with the serial spindle. The four reasons can be considered as follows: 1) An improperly connected optic cable, or the spindle control unit's power is OFF. 2) When the NC power was turned on under alarm conditions other than SU–01 or AL–24 which are shown on the LED display of the spindle control unit. In this case, turn the spindle amplifier power off once and perform startup again. 3) Other reasons (improper combination of hardware) This alarm does not occur after the system including the spindle control unit is activated. 4) The second spindle (when SP2, bit 4 of parameter No. 3701, is 1) is in one of the above conditions 1) to 3). See diagnostic display No. 409 for details.
751	FIRST SPINDLE ALARM DETECTION (AL–XX)	This alarm indicates in the NC that an alarm is generated in the spindle unit of the system with the serial spindle. The alarm is displayed in form AL–XX (XX is a number). Refer to 9.1.11 **Alarms displayed on spindle servo unit** .The alarm number XX is the number indicated on the spindle amplifier. The CNC holds this number and displays on the screen.
752	FIRST SPINDLE MODE CHANGE FAULT	This alarm is generated if the system does not properly terminate a mode change. The modes include the Cs contouring, spindle positioning, rigid tapping, and spindle control modes. The alarm is activated if the spindle control unit does not respond correctly to the mode change command issued by the NC.
754	SPINDLE–1 ABNORMAL TORQUE ALM	Abnormal first spindle motor load has been detected.

Number	Message	Contents
761	SECOND SPINDLE ALARM DETECTION (AL–XX)	Refer to alarm No. 751. (For 2nd axis)
762	SECOND SPINDLE MODE CHANGE FAULT	Refer to alarm No. 752.(For 2nd axis)
764	SPINDLE–2 ABNORMAL TORQUE ALM	Same as alarm No. 754 (for the second spindle)
771	SPINDLE–3 ALARM DETECT (AL–XX)	Same as alarm No. 751 (for the third spindle)
772	SPINDLE–3 MODE CHANGE EROR	Same as alarm No. 752 (for the third spindle)
774	SPINDLE–3 ABNORMAL TORQUE ALM	Same as alarm No. 754 (for the third spindle)

- The details of spindle alarm No.750

The details of spindle alarm No. 750 are displayed in the diagnosis display (No. 409) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
409					SPE	S2E	S1E	SHE

#3 (SPE) 0 : In the spindle serial control, the serial spindle parameters fulfill the spindle unit startup conditions.

1 : In the spindle serial control, the serial spindle parameters do not fulfill the spindle unit startup conditions.

#2 (S2E) 0 : The second spindle is normal during the spindle serial control startup.

1 : The second spindle was detected to have a fault during the spindle serial control startup.

#1 (S1E) 0 : The first spindle is normal during the spindle serial control startup.

1 : The first spindle was detected to have a fault during the spindle axis serial control startup.

#0 (SHE) 0 : The serial communications module in the CNC is normal.

1 : The serial communications module in the CNC was detected to have a fault.

9.1.10 System alarms

(These alarms cannot be reset with reset key.)

Number	Message	Contents
900	ROM PARITY	ROM parity error (CNC/OMM/Servo) Replace the number of ROM.
914	SRAM PARITY (2N)	A RAM parity error occurred in RAM for part program storage or additional SRAM. Clear the memory, or replace the main CPU board or additional SRAM. Then, set all data, including parameters, again.
915	SRAM PARITY (2+1)	
916	DRAM PARITY	RAM parity error in DRAM module. Replace the DRAM module.
920	SERVO ALARM (MAIN)	Servo alarm (1st to 4th axis). A watchdog alarm or a RAM parity error in the servo module occurred. Replace the servo control module on the main CPU board.
922	SERVO ALARM (OPT2)	Servo alarm (5th to 8th axis). A watchdog alarm or a RAM parity error in the servo module occurred. Replace the servo control module on the option 2 board.
924	SERVO MODULE SETTING ERROR	The digital servo module is not installed. Check that the servo control module or servo interface module on the main CPU or option 2 board is mounted securely.
930	CPU INTERRUPUT	CPU error (abnormal interrupt) The main CPU board is faulty.
950	PMC SYSTEM ALARM	Fault occurred in the PMC.The PMC control module on the main CPU board or option 3 board may be faulty.
951	PMC WATCH DOG ALARM	Fault occurred in the PMC–RC (watchdog alarm).Option 3 board may be faulty.
972	NMI OCCURRED IN OTHER MODULE	NMI occurred in a board other than the main CPU board. Option 1 to 3 may be faulty.
973	NON MASK INTERRUPT	NMI occurred for an unknown reason.
974	F–BUS ERROR	FANUC BUS is error. MAIN CPU board and option 1 to 3 boards may be faulty.
975	BUS ERROR (MAIN)	MAIN CPU board is BUS error. MAIN CPU board may be faulty.

9

9.1.11 Alarms displayed on spindle servo unit

Alarm No.	Meaning	Description	Remedy
"A" display	Program ROM abnormality (not installed)	Detects that control program is not started (due to program ROM not installed, etc.)	Install normal program ROM
AL–01	Motor overheat	Detects motor speed exceeding specified speed excessively.	Check load status. Cool motor then reset alarm.
AL–02	Excessive speed deviation	Detects motor speed exceeding specified speed excessively.	Check load status. Reset alarm.
AL–03	DC link section fuse blown	Detects that fuse F4 in DC link section is blown (models 30S and 40S).	Check power transistors, and so forth. Replace fuse.
AL–04	Input fuse blown. Input power open phase.	Detects blown fuse (F1 to F3), open phase or momentary failure of power (models 30S and 40S).	Replace fuse. Check open phase and power supply regenerative circuit operation.
AL–05	Control power supply fuse blown	Detects that control power supply fuse AF2 or AF3 is blown (models 30S and 40S).	Check for control power supply short circuit . Replace fuse.
AL–07	Excessive speed	Detects that motor rotation has exceeded 115% of its rated speed.	Reset alarm.
AL–08	High input voltage	Detects that switch is flipped to 200 VAC when input voltage is 230 VAC or higher (models 30S and 40S).	Flip switch to 230 VAC.
AL–09	Excessive load on main circuit section	Detects abnormal temperature rise of power transistor radiator.	Cool radiator then reset alarm.
AL–10	Low input voltage	Detects drop in input power supply voltage.	Remove cause, then reset alarm.
AL–11	Overvoltage in DC link section	Detects abnormally high direct current power supply voltage in power circuit section.	Remove cause, then reset alarm.
AL–12	Overcurrent in DC link section	Detects flow of abnormally large current in direct current section of power cirtcuit.	Remove cause, then reset alarm.
AL–13	CPU internal data memory abnormality	Detects abnormality in CPU internal data memory. This check is made only when power is turned on.	Remove cause, then reset alarm.
AL–15	Spindle switch/output switch alarm	Detects incorrect switch sequence in spindle switch/output switch operation.	Check sequence.

Alarm No.	Meaning	Description	Remedy
AL–16	RAM abnormality	Detects abnormality in RAM for external data. This check is made only when power is turned on.	Remove cause, then reset alarm.
AL–18	Program ROM sum check error	Detects program ROM data error.This check is made only when power is turned on.	Remove cause, then reset alarm.
AL–19	Excessive U phase current detection circuit offset	Detects excessive U phase current detection ciucuit offset. This check is made only when power is turned on.	Remove cause, then reset alarm.
AL–20	Excessive V phase current detection circuit offset	Detects excessive V phase current detection circuit offset. This check is made only when power is turned on.	Remove cause, then reset alarm.
AL–24	Serial transfer data error	Detects serial transfer data error (such as NC power supply turned off, etc.)	Remove cause, then reset alarm.
AL–25	Serial data transfer stopped	Detects that serial data transfer has stopped.	Remove cause, then reset alarm.
AL–26	Disconnection of speed detection signal for Cs contouring control	Detects abnormality in position coder signal(such as unconnected cable and parameter setting error).	Remove cause, then reset alarm.
AL–27	Position coder signal disconnection	Detects abnormality in position coder signal (such as unconnected cable and adjustment error).	Remove cause, then reset alarm.
AL–28	Disconnection of position detection signal for Cs contouring control	Detects abnormality in position detection signal for Cs contouring control (such as unconnected cable and adjustment error).	Remove cause, then reset alarm.
AL–29	Short–time overload	Detects that overload has been continuously applied for some period of time (such as restraining motor shaft in positioning).	Remove cause, then reset alarm.
AL–30	Input circuit overcurrent	Detects overcurrent flowing in input circuit.	Remove cause, then reset alarm.

9

Alarm No.	Meaning	Description	Remedy
AL–31	Speed detection signal disconnection motor restraint alarm or motor is clamped.	Detects that motor cannot rotate at specified speed or it is detected that the motor is clamped. (but rotates at very slow speed or has stopped). (This includes checking of speed detection signal cable.)	Remove cause, then reset alarm.
AL–32	Abnormality in RAM inside the LSI used for serial data transfer. This check is made only when power is turned on.	Detects abnormality in RAM inside the LSI used for serial data transfer. This check is made only when power is turned on.	Remove cause, then reset alarm.
AL–33	Insufficient DC link section charging	Detects insufficient charging of direct current power supply voltage in power circuit section when magnetic contactor in amplifier is turned on (such as open phase and defectifve charging resistor).	Remove cause, then reset alarm.
AL–34	Parameter data setting beyond allowable range of values	Detects parameter data set beyond allowable range of values.	Set correct data.
AL–35	Excessive gear ratio data setting	Detects gear ratio data set beyond allowable range of values.	Set correct data.
AL–36	Error counter overflow	Detects error counter overflow.	Correct cause, then reset alarm.
AL–37	Speed detector parameter setting error	Detects incorrect setting of parameter for number of speed detection pulses.	Set correct data.
AL–39	Alarm for indicating failure in detecting 1–rotation signal for Cs contouring control	Detects 1–rotaion signal detection failure in Cs contouring contorl.	Make 1–rotaion signal adjustment. Check cable shield status.
AL–40	Alarm for indicating 1–rotation signal for Cs contouring control not detected	Detects that 1–rotation signal has not occurred in Cs contouring control.	Make 1–rotaion signal adjustment.
AL–41	Alarm for indicating failure in detecting position coder 1–rotaion signal.	Detects failure in detecting position coder 1–rotation signal.	Make signal adjustment for signal conversion circuit. Check cable shield status.
AL–42	Alarm for indicating position coder 1–rotation signal not detected	Detects that position coder 1–rotation signal has not issued.	Make 1–rotation signal adjustment for signal conversion circuit.

Alarm No.	Meaning	Description	Remedy
AL–43	Alarm for indicating disconnection of position coder signal for differential speed mode	Detects that main spindle position coder signal used for differential speed mode is not connected yet (or is disconnected).	Check that main spindle position coder signal is connected to connector CN12.
AL–46	Alarm for indicating failure in detecting position coder 1–rotation signal in thread cutting operation.	Detects failure in detecting position coder 1–rotation signasl in thread cutting operation.	Make 1–rotation signal adjustment for signal conversion circuit. Check cable shield status.
AL–47	Position coder signal abnormality	Detects incorrect position coder signal count operation.	Make signal adjustment for signal conversion circuit. Check cable shield status.
AL–48	Position coder 1–rotation signal abnormailty	Detects that occurrence of position coder 1–rotation signal has stopped.	Make 1–rotation signal adjustment for signal conversion circuit.
AL–49	The converted differential speed is too high.	Detects that speed of other spindle converted to speed of local spindle has exceeded allowable limit in differential mode.	Calculate differential speed by multiplying speed of other spindle by gear ratio. Check if calculated value is not greater than maximum speed of motor.
AL–50	Excessive speed command calculation value in spindle synchronization control	Detects that speed command calculation value exceeded allowable range in spindle synchronization control.	Calculate motor speed by multiplying specified spindle speed by gear ratio. Check if calculated value is not greater than maximum speed of motor.
AL–51	Undervoltage at DC link section	Detects that DC power supply voltage of power circuit has dropped (due to momentary power failure or loose contact of magnetic contactor).	Remove cause, then reset alarm.
AL–52	ITP signal abnormality I	Detects abnormality in synchronization signal (ITP signal) used in software.	Replace servo amp. PCB.
AL–53	ITP signal abnormality II	Detects abnormality in synchronization signal (ITP signal) used in hardware.	Replace servo amp. PCB.
AL–54	Overload current alarm	Detects that excessive current flowed in motor for long time.	Remove overload of motor and reset the alarm.
AL–55	Power line abnormality in spindle switching/output switching	Detects that switch request signal does not match power line status check signal.	Check if power line status, check signal is processed normally.

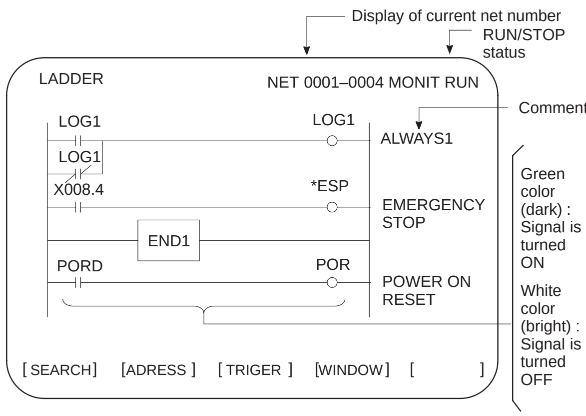
10.1 Dynamic Display of Sequence Program

(1) Display method

1 Press the SYSTEM key, then press the soft key [PMC].

2 Dynamic display of sequence program by pressing [PMCLAD] soft key.

(2) Display contents



(3) Searching for the signal (SEARCH)

1 Press the [SEARCH] soft key.

2 Using the following keys as described below, search for desired signal.

- The signals being displayed can be changed by using the PAGE ⬇, ⬆ PAGE, ⬇, and ⬆ keys.
- [TOP]: Locates the top of the ladder program.
- [BOTTOM] : Locates the end of the ladder program.
- Address.bit [SRCH] or Single name [SRCH] :
  Search a specified address unconditionally.
- Address.bit [W-SRCH] or Single name or [W-SRCH] :
  Searches for a specified address, for the write coils.
- Net number [N-SRCH]:
  Displays the ladder program from the specified net address.
- Function instruction number [F-SRCH] or Function instruction name [F-SRCH]: Searches for the specified function instruction.
- [ADRESS]:
  Displays the address and bit number of the specified signal.
- [SYMBOL]:
  Displays the symbol of the specified signal. (The address of the specified signal is displayed if a symbol was not specified when the program was created.)

(4) Turning off the monitor display when the trigger signal changes (TRIGER)

When the preset trigger signal changes, the system turns off the monitor display. By using this function, the states of all signals can be accurately read when the trigger signal changes.

1 Press the [TRIGER] soft key.

2 Press the [INIT] soft key to initialize the trigger parameters.

3 Specify the trigger conditions.

- To turn off the monitor display at the signal's rising edge (as the signal changes from 0 to 1), enter the desired data and press the required keys in the order shown below.

Signal name/address | EOB | Trigger checkpoint | EOB

Count [TRGON]

✻ Trigger checkpoint:

0: Before the first level of the ladder program is executed

1: After the first level of the ladder program is executed

2: After the second level of the ladder program is executed

3: After the third level of the ladder program is executed

Example) To set the system so that it turns off the monitor display when the external reset signal (ERS) is input three times, enter the required data and press the required keys in the order shown below:

ERS | EOB | 2 | EOB | 3 [TRGON]

The specified trigger conditions are displayed at the top of the screen.

TRIGER *MODE : ON G008. 7 : 2 : 003 NET 0001-00005

Specified conditions are displayed.

To turn off the monitor display at the signal's falling edge (as the signal changes from 1 to 0), enter the desired data and press the required keys in the order shown below.

Signal name/address | EOB | Trigger checkpoint | EOB

Count [TRGOFF]

4 Press the [START] soft key to activate the trigger function.

✻ While the trigger function is operating, TRG is displayed at the lower right corner of the screen. When the trigger conditions are satisfied, TRG disappears and the monitor screen is locked.

5 To interrupt the trigger function, press the [STOP] soft key while the function is effective.

→ In this case, the specified trigger conditions remain effective. Pressing the [START] soft key reinstates the trigger function.

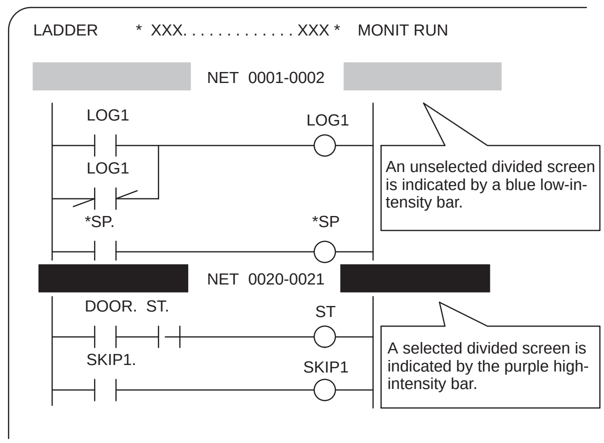
6 To search for the instruction where the program was stopped by the trigger function and blink that instruction, press the [TRGSRC] soft key.

(5) Displaying a divided ladder program (WINDOW)
A ladder program can be divided into up to six sections, and the individual sections displayed on the screen simultaneously.

1 Press the [WINDOW] soft key.

2 Press the [DIVIDE] soft key to divide the dynamic display screen into the desired number of sections.

⁜ Each time the key is pressed, the screen is divided.



3 To select the desired divided screen, press the [SELECT] soft key as many times as necessary to move the purple bar to the desired screen.

⁜ The normal search function can be used within each divided screen.

4 To change the width of a selected divided screen, press the [WIDTH] soft key.

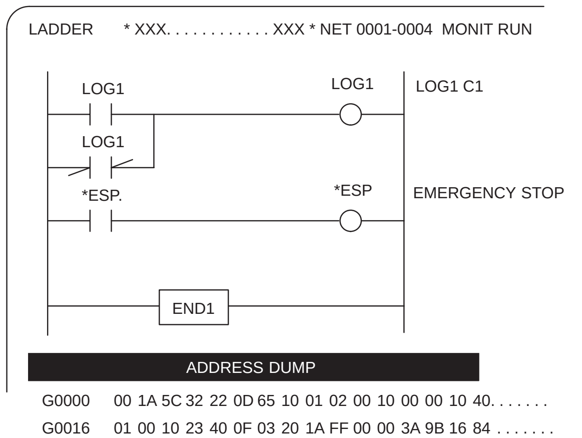
- Pressing the [EXPAND] soft key increases the number of lines displayed on a divided screen.
- Pressing the [SHRINK] soft key decreases the number of lines displayed on a divided screen.

5 To terminate the display of a selected divided screen, press the [DELETE] soft key.

⁜ To terminate screen division, press the [CANCEL] soft key.

(6) Dumping (DUMP)
The states of the signals corresponding to a ladder program can be displayed in hexadecimal, together with the ladder program itself.

1 Press the [DUMP] soft key.



✻ When the screen is divided, the states of the signals are displayed in the lower divided screen.

- To change the data notation

  [BYTE] : Data is displayed in units of bytes.
  Example) G0000 00 16 84 00 ...

  [WORD] : Data is displayed in units of two bytes.
  Example) G0000 1600 0084 ...

  [D.WORD] : Data is displayed in units of two words, or four bytes.
  Example) G0000 00841600 ...

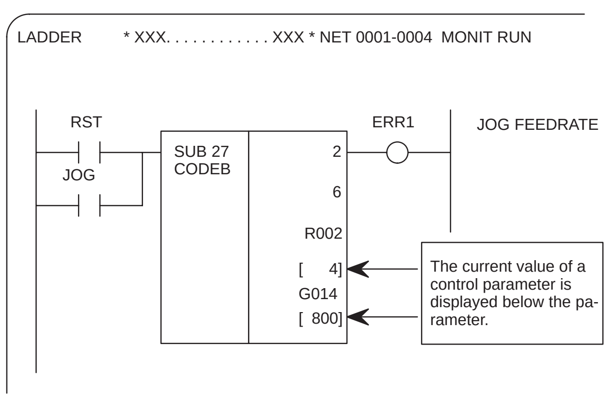
  ✻ When WORD or D.WORD is specified, data is displayed with the high-order byte placed first.

- To search for an address

  Use the [PAGE ⬇], [⬆ PAGE], and [SRCH] keys, as in the normal search function.

(7) Displaying the function-instruction parameters (DPARA/NDPARA)
The states of the control parameters used in function instructions are displayed together with the ladder program.

1 Press the [DPARA] soft key.



10

- * The data notation (binary or BCD) varies with the function instructions.

2 To terminate the display of parameters, press the [NDPARA] soft key.

(8) Editing the program being executed (ONLEDT: on-line editing)
A sequence program can be edited while a program is being executed, without stopping its execution.

* This function is available only while the edit function is enabled.

1 Press the [ONLEDT] soft key to start the on-line editing function. The cursor appears on the screen.

2 Modify the program, following the usual editing procedure.
The following changes can be made by means of on-line editing.

- Changing the type of contacts (┤├, ┤/├)
- Changing the addresses of contacts and coils
- Changing the addresses of control parameters used in function instructions
  - * The operations that can be performed in on-line editing are restricted to those that do not change the memory size of the program. To perform other operations, such as addition, insertion, and deletion, use the ordinary editing function.

3 To terminate on-line editing, press the ◁ key.

* Changes made in on-line editing are temporary. To save a changed program, set K18.3 (K901.3 for the RB6/RC4) to 1 or transfer the program to the DRAM by using the COPY function from the I/O screen. To enable the use of the program when the system is next turned on, write it to the FROM from the I/O screen.

PMCPRM

	#7	#6	#5	#4	#3	#2	#1	#0
K018 or K901								

#3 0: The ladder program is not transferred to the RAM after on-line editing.

→ To transfer the program, press the following keys in the order shown, using the COPY function from the I/O screen: [COPY], [EXELAD], [EXEC]

1: A ladder program is automatically transferred to the RAM after on-line editing.

10.2 Display of PMC Diagnosis Screen

(1) Display method

1. Press the SYSTEM key.
2. Press the [PMC] soft key.
3. Display of PMC diagnosis screen by pressing [PMC/DGN] soft key.

10.2.1 Title screen (TITLE)

Display of the title data which is wrote at the ladder programming time.

```
PMC TITLE DATA #1                                        MONIT RUN

          PMC PROGRAM NO.       :
          EDITION NO.           :
          PMC CONTROL PROGRAM
           SERIES  :  4067  EDITION  :  01
          (SERIES  :  EDITION  :    )
          PMC TYPE CONTROL :  RB5  PROGRAM : RB5
             MEMORY USED     :   KB
             LADDER          :   KB
             SYMBOL          :   KB
             MESSAGE         :   KB
             SCAN TIME       :   MS
             SCAN MAX        :   MS   MIN :           MS

    [  TITLE  ]   [ STATUS]   [ ANALYS]   [  TRACE ]   [          ]
```

1) 1st page

```
PMC PROGRAM NO.  :              } Set at
EDITION NO.      :              } LADDER
                                } programming
                                } time.

PMC CONTROL PROGRAM
SERIES :        EDITTION :
(SERIES:        EDITTION :   )
PMC TYPE CONTROL  :      PROGRAM :      Display of a
   MEMORY  USED   :     KB              serial number
   LADDER         :     KB              and version
   SYMBOL         :     KB              number of
   MESSAGE        :     KB              PMC control
   SCAN TIME      :     MS              software, used
   SXAN MAX       :     MS   MIN :    MS  memory area
                                        and scan time.
```

2) 2nd page
MACHINE TOOL BUILDER NAME :
MACHINE TOOL NAME :
CNC & PMC TYPE NAME :
PROGRAM DRAWING NO. :
3) 3rd page
DATE OF PRGRAMING :
PROGRAM DESIGNED BY :
ROM WRITTEN BY :
REMARKS :

$\Bigg\}$ Set at LADDER diagram programming time.

10.2.2 Status screen (STATUS)

Display of ON/OFF condition for I/O signals, internal relays, etc.

```
PMC SIGNAL STATUS                              MONIT RUN

ADDRESS    7    6    5    4    3    2    1    0
          ED7  ED6  ED5  ED4  ED3  ED2  ED1  ED0      ← Signal name
G0000      0    0    0    0    1    0    1    0       ← Status of signal
          ED15ED14ED13ED12ED11ED10ED9ED8                 0 : ON
G0001      0    0    0    0    0    0    0    0          1 : OFF
          ESTBEA6  EA5  EA4  EA3  EA2  EA1  EA0
G0002      0    0    0    0    0    0    0    0

G0003      0    0    0    0    0    0    0    0
                              FIN
G0003      0    0    0    0    0    0    0    0


[SEARCH]  [        ]  [        ]  [        ]  [        ]
```

1 Search the diagnosis number by pressing PAGE ↑ PAGE ↓ keys.

2 Searching the specified address or signal name by pressing [SEARCH] soft key when inputted of Address and number or Single name

10.2.3 Alarm screen (ALARM)

Display of an alarm when an alarm occured in PMC program.

```
PMC ALARM MESSAGE                              MONIT RUN
      ALARM NOTHING











[ TITLE ]  [ STATUS]  [ ALARM ]  [ TRACE ]  [        ]
```

10.2.4 Trace screen (TRACE)

Record the signal status to the trace memory when the specified signal is changed.

(1) Trace parameter screen (TRCPRM)

```
PMC SIGNAL TRACE                                      MONIT RUN

      TRACE MODE              :
      (0:1BYTE/1:2BYTE/2:WORD)
1ST TRACE ADDRESS CONDITION
      ADDRESS TYPE            :   (0:PMC/1:PHY)
      ADDRESS                 :
      MASK DATA
2ND TRACE ADDRESS CONDITION
      ADDRESS TYPE            :   (0:PMC/1:PHY)
      ADDRESS                 :
      MASK DATA               :



[ T.DISP ]  [ EXEC ]  [      ]  [      ]  [      ]
```

(a) TRACE MODE: Select the trace mode.

0= 1 byte address signal trace

1= Independent 2 byte address signal trace

2= Continuous 2 byte address signal trace

(b) ADDRESS TYPE: 0= Set the trace address by PMC address

1= Set the trace address by physical address (Using mainly by C language)

(c) ADDRESS : Set the trace address

(d) MASK DATA : Specify the trace bit by hexadecimal code. For example, set the "E1" when trace the bit 7, 6, 5 and 0. Not execute the tracing when the bit 4, 3, 2 and 1 is changed, but, the signal status should recorded at tracing time.

(e.g)	#7	#6	#5	#4	#3	#2	#1	#0
	1	1	1	0	0	0	0	1:E1

≪ Correspond table between binary and hexadecimal code ≫

0000_2 : 0_{16}	0001_2 : 1_{16}	0010_2 : 2_{16}	0011_2 : 3_{16}
0100_2 : 4_{16}	0101_2 : 5_{16}	0110_2 : 6_{16}	0111_2 : 7_{16}
1000_2 : 8_{16}	1001_2 : 9_{16}	1010_2 : A_{16}	1011_2 : B_{16}
1100_2 : C_{16}	1101_2 : D_{16}	1110_2 : E_{16}	1111_2 : F_{16}

(e) [EXEC] soft key :

Start of tracing.
Clear the trace memory and trace memory contents are update when the specified signal are changed from previous ones.
The trace memory are always maintained up to the previous results for 256 bytes from the latest ones regardless of the time lapse.
(2 byte tracing = 128 times.)

(f) [T.DISP] soft key : Display of trace memory contents.

(2) Trace memory screen (T.DISP)

```
PMC SIGNAL TRACE                                      MONIT RUN

   1ST ADDRESS=X008(E1)        2ND ADDRESS=G000(FF)   <- Trace address and mask data in ( )
NO.    7 6 5 4 3 2 1 0          7 6 5 4 3 2 1 0
0000   . . . . . . . .          . . . . . . . .
0001   1 0 0 0 0 0 1 1          0 0 0 0 0 0 0 0
0002   1 1 0 0 0 0 0 0          0 0 0 0 0 0 0 0
0003   0 1 0 0 0 0 0 0          0 0 0 0 0 0 0 0       <- Newest status
0004   . . . . . . . .          . . . . . . . .
0005   . . . . . . . .          . . . . . . . .
0006   . . . . . . . .          . . . . . . . .
0007   . . . . . . . .          . . . . . . . .
0008   . . . . . . . .          . . . . . . . .

[TRCPRM] [ STOP ] [        ] [        ] [        ]
```

[TRCPRM] soft key : Return to trace parameter setting screen

[STOP] soft key : Stop the trace operation.

[EXEC] soft key : Re-start of tracing (Clear the memory).

10.2.5 Displaying memory data (M.SRCH)

(1) Displaying memory data on the screen

- Enter the physical start address of the memory area storing the data to be displayed, then press the [SEARCH] soft key. Then, 256 bytes of memory data, starting from the specified address, appear on the screen.
- The memory storing the data to be displayed can be changed by using the [↑ PAGE] and [PAGE ↓] keys.
- The display format can be changed by using the [BYTE], [WORD], and [D.WORD] soft keys.

(2) Memory data input function

- Setting K17.4 (K900.4 for the RB6/RC4) to 1 enables data to be input, in hexadecimal, to the address to which the cursor is positioned.

10.2.6 Signal waveform display function screen (ANALYS)

(1) Parameter setting screen (1st page)

```
PMC SIGNAL ANALISYS(PARAM)                    MONIT STOP

SAMPLING TIME        :          10(1–10 SEC)

TRIGGER ADDRESS      :          G0007.2

CONDITON             :          0
(0:START 1:TRIGGER–ON 2:TRIGGER–OFF)

TRIGGER MODE         :          0
(0:AFTER 1:ABOUT 2:BEFORE 3:ONLY)

[ SCOPE ] [ DELETE ] [ INIT ] [ADDRESS] [        ]
```

SAMPLE TIME: Set the sampling time.

TRIGGER ADDRESS: Specify the trigger address when execute the record by trigger.

CONDITION: Set the recording start condition.

0: Execute by [START] soft key.

1: Press [START] soft key than execute a rising edge of trigger signal.

2: Press [START] soft key than execute a fall edge of trigger signal.

TRIGGER MODE: Set the trigger mode.

0: Record the PMC signal AFTER trigger signal.

1: Record the PMC signal AROUND trigger signal.

2: Record the PMC signal BEFORE trigger signal.

3: Record the PMC signal ONLY trigger signal be formed.

(2) Parameter setting screen (2nd page)

```
PMC SIGNAL ANALISYS (PARAM)                    MONIT STOP

              SIGNAL ADDRESS

     1 : X0000.0            9  : Y0000.0
     2 : X0000.1           10  : R0000.1
     3 : X0002.0           11  :
     4 : X0005.0           12  :
     5 :                   13  :
     6 :                   14  :
     7 :                   15  :
     8 :                   16  :

[ SCOPE ] [ DELETE ] [  INIT  ] [ ADRESS] [        ]
```

Specify 16 kinds recording signals

(a) [SCOPE] soft key : Select the signal wave display screen.

(b) [DELETE] soft key : Delete of the data on the cursor.

(c) [INIT] soft key : Initializes the signal waveform display parameters.

(d) [ADRESS] or [SYMBOL] soft key : Toggles between address display and symbol display.

```
PMC SIGNAL ANALISYS(PARAM)                     MONIT STOP

  SAMPLING TIME    :       10  CONDITION     : 1
  TRIGGER ADDRESS:   G0007.2   TRIGGER MODE  : 0


           ┤ - - - - - ├ - - - - - ┤ - - - - - ┤ - -
X0000.0  ─────────────────────────────────────────
X0000.1  ─────────────────────────────────────────
X0002.0  ─────────────────────────────────────────
X0005.0  ─────────────────────────────────────────
           ┤ - - - - - ├ - - - - - ┤ - - - - - ┤ - -
           0                                 256(MSEC)

[SGNPRM ] [ START ] [ T.SRCH ] [ADDRESS] [        ]
```

NOTE The above figure is a screen for the attachment to a graphic function.
If a graphic function is not attached, it is displayed “ ■ ”.

(a) [SGNPRM] soft key : Return to PMC parameter screen
(b) [START] soft key : Start register
(c) [T. SRCH] soft key :
(d) [ADRESS] or [SYMBOL] soft key : Change to address or symbol of signal.
(e) [EXCHG] soft key : Change the signal displaying procedure
- Press [EXCHG] soft key.
- Move the cursor to an exchanging signal.
- Press [SELECT] soft key.
- Move the cursor to one’ s new address.
- Exchange the signal when press [TO] soft key then press [EXEC] soft key.

(f) [SCALE] soft key : Change the holizontal scaling time for graphics.
Scaling time is changed 256, 512 and 1024msec when press this key.
(g) ← → CURSOR : Move the holizontal time of displaying on CRT to BEFORE/REVERSE.

10.3 PMC Parameter

10.3.1 Input of PMC parameter from MDI

1 Select MDI mode or depress EMERGENCY STOP button.

2 [PWE] set to “1” on SETTING screen or PROGRAM PROTECT signal (KEY4) turn to “1”.

	PWE	KEY4	
Timer	○		
Counter	○	○	either one
Keep relay	○		
Data table	○	○	either one

3 Select the display screen by soft key.

[TIMER] : Timer screen

[COUNTER] : Counter screen

[KEEPRL] : Keep relay screen

[DATA] : Data table screen

4 Move the cursor to desired number.

5 Input the Numeral and press INPUT key then the data inputted.

6 [PWE] on SETTING screen or [KEY4] return to “0” after data set.

10.3.2 Timer screen (TIMER)

The variable timer (SUB 3) time is set.

Page number (change by page cursor key)

Specified timer number by program

Refer the address by ladder program

Setting time by msec unit

```
PMC PARAMETER (TIMER) #001                    MONIT RUN

NO.  ADDRESS      DATA   NO.  ADDRESS      DATA
01     T00         480   11     T20           0
02     T02         960   12     T22           0
03     T04           0   13     T24           0
04     T06           0   14     T26           0
05     T08           0   15     T28           0
06     T10           0   16     T30           0
07     T12           0   17     T32           0
08     T14           0   18     T34           0
09     T16           0   19     T36           0
10     T18           0   20     T38           0

[ TIMER ]  [COUNTR]  [KEEPRL]  [ DATA ]  [SETING]
```

Setting time : Timer No. 1 – 8 =Max.=1572.8 sec, each 48msec.
Up to 262.1 seconds in units of 8 ms for timer Nos. 9 to 40 subsequent timers (timer Nos. 9 to 150 in the RB6/RC4)

10.3.3 Counter screen (COUNTER)

Set and display the preset values and integrated values of the counter instruction (SUB 5).

Page number (change by page cursor key)

Preset value (MAX. value) (The min. value specified in the program)

Integrated value

PMC PARAMETER (COUNTER) #001 MONIT RUN

NO.	ADDRESS	PRESET	CURRENT
01	C00	100	1
02	C04	50	2
03	C08	0	0
04	C12	0	0
05	C16	0	0
06	C20	0	0
07	C24	0	0
08	C28	0	0
09	C32	0	0
10	C36	0	0

Up to 9999 can be set for PRESET and CURRENT for counter Nos. 1 to 20 (1 to 50 for the RB6/RC4)

[TIMER] [COUNTR] [KEEPRL] [DATA] [SETING]

Refer the address by ladder program

Specified counter number by program

10.3.4 Keep relay screen (KEEPRL)

Refer the address by ladder program

PMC PARAMETER (KEEP RELAY) MONIT STOP

NO.	ADDRESS	DATA	NO.	ADDRESS	DATA
01	K00	00000000	11	K10	00000000
02	K01	00000000	12	K11	00000000
03	K02	00000000	13	K12	00000000
04	K03	00000000	14	K13	00000000
05	K04	00000000	15	K14	00000000
06	K05	00000000	16	K15	00000000
07	K06	00000000	17	K16	00000000
08	K07	00000000	18	K17	00000000
09	K08	00000000	19	K18	00000000
10	K09	00000000	20	K19	00000000

[TIMER] [COUNTR] [KEEPRL] [DATA] [SETING]

: Reserved by PMC control software. Can’ t used other purpose.

i) Control of battery-powered memory

	#7	#6	#5	#4	#3	#2	#1	#0
K16	MWRTF2	MWRTF1						

#7 MWRTF2

#6 MWRTF1 : Write status for battery-powered memory

ii) PMC system parameter

Since the system uses keep relays K17 to K19 (K900 to K902 for the RB6/RC4), they cannot be used by a sequence program.

	#7	#6	#5	#4	#3	#2	#1	#0
K17 or K900	DTBLDSP	ANASTAT	TRCSTART	MEMINP		AUTORUN	PRGRAM	LADMASK

#7 (DTBLDSP) 0 : The PMC parameter data table control screen is displayed.

1 : The PMC parameter data table control screen is not displayed.

#6 (ANASTAT) 0 : Pressing the soft key to execution starts sampling by the signal waveform display function.

1 : The signal waveform display function automatically starts sampling at power on.

∗ This bit is only effective for those models for which the signal waveform display function is applicable.

#5 (TRCSTAT) 0 : Pressing the [EXEC] soft key starts tracing by the signal trace function.

1 : The signal trace function automatically starts tracing at power on.

#4 (MEMINP) 0 : Data cannot be input by using the memory contents display function.

1 : Data can be input by using the memory contents display function.

#2 (AUTORUN) 0 : The sequence program automatically starts at power on.

1 : Pressing the soft key to sequence program execution starts the sequence program.

#1 (PRGRAM) 0 : The built-in programmer function does not operate. (Also, the programmer menu is not displayed.)

1 : The built-in programmer function operates. (The programmer menu is displayed.)

#0 (LADMASK) 0 : The ladder programs are displayed dynamically (PCLAD).

1 : The ladder programs are not displayed dynamically (PCLAD).

	#7	#6	#5	#4	#3	#2	#1	#0
K018 or K901	IGNDINT		CHKPRTY	CALCPRTY	TRNSRAM	TRGSTAT	DBGSTAT	IGNKEY

#7 (IGNDINT) 0 : The system initializes the CRT when the screen is switched to the PMCMDI screen.

1 : The system does not initialize the CRT when the screen is switched to the PMCMDI screen.

＊ This flag is valid for the PMC-RC3/RC4. When the screen is switched to the PMCMDI screen, PMC control software determines whether the system initialize the CRT, by checking this flag. When this flag is on, an application program must initialize the CRT.

#5 (CHKPRTY) 0 : The system performs parity check for the system ROM, program ROM and program RAM.

1 : The system does not perform parity check for the system ROM, program ROM, or program RAM.

#4 (CALCPRTY) 0 : The built-in programmer function calculates the RAM parity.

1 : The built-in programmer function does not calculate the RAM parity.

#3 (TRNSRAM) 0 : After on-line editing, the ladder program is not automatically transferred to the backup RAM.

1 : After on-line editing, the ladder program is automatically transferred to the backup RAM.

#2 (TRGSTAT) 0 : The trigger stop function does not automatically start at power on.

1 : The trigger stop function starts automatically at power on.

#1 (DBGSTAT) 0 : The C debug function does not start automatic break processing at power on.

1 : The C debug function starts automatic break processing at power on.

＊ This flag is effective for the PMC-RC3/RC4.

#0 (IGNKEY) 0 : Function keys are enabled for a user program on the user screen.

1 : Function keys are disabled for a user program on the user screen.

＊ This flag is effective for the PMC-RC3/RC4. When this bit is set to 1, the user screen cannot be switched to the NC screen by using the function keys. A program which invariably sets this bit to 0, or which switches the user screen to the NC screen, must be prepared.

	#7	#6	#5	#4	#3	#2	#1	#0
K019 or K902							C-REJECT	FROM–WRT

#1 (C-REJECT) 0 : The system activates a C program.
1 : The system does not activate a C program.

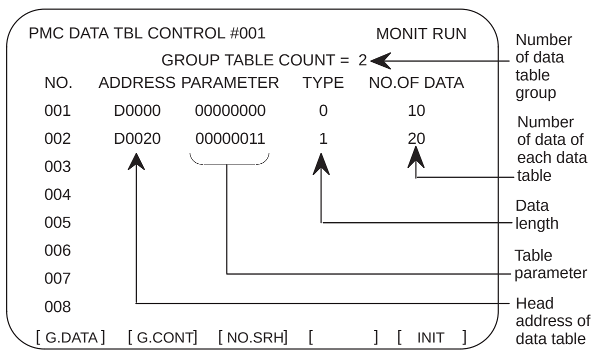
⁎ This flag is effective for the PMC-RC3/RC4.

#0 (FROM_WRT) 0 : After editing a ladder or C program, does not automatically write it to F–ROM.
1 : After editing a ladder or C program, automatically writes it to F–ROM.

NOTE Set all unused bits to 0.

10.3.5 Data table screen (DATA)

1) DATA TABLE SETTING screen (C. DATA)



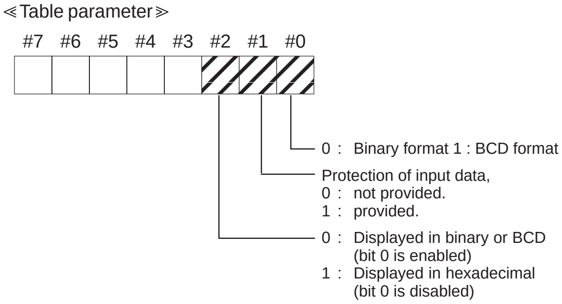
(a) [G.DATA] soft key : Select the data display screen of data table.

(b) $\boxed{\text{No. of group}}$ [G.CONT] : Set the number of group for data table.

(c) $\boxed{\text{No. of group}}$ [NO.SRH] : Move the cursor to specified group.

(d) [INIT] soft key : Initialize of data table setting.
No. of group is 1, ADDRESS is D0000, PARAMETER is 00000000, TYPE is 0, NO. OF DATA is 3000 (8000 for the RB6/RC4).

≪Table parameter≫



≪TYPE≫

0 : 1byte 1 : 2bytes 2 : 4bytes

2) Data setting screen (G. DATA)

```
                          Group number
                          Number of page

PMC  PRM  (DATA)  001/001                          MONIT RUN

        NO.       ADDRESS       DATA
        000        D0000           0
        001        D0001           0
        002        D0002           0
        003        D0003           0
        004        D0004           0
        005        D0005           0
        006        D0006           0
        007        D0007           0
        008        D0008           0
        009        D0009           0

[ C.DATA ]  [G–SRCH]  [SEARCH]  [          ]  [          ]
```

(a) [C.DATA] soft key : Return to data table setting screen.

(b) $\boxed{\text{Group No.}}$ [G-SRCH] : Move the cursor to head of specified group.

(c) $\boxed{\text{Address}}$ [SEARCH] : Searching the specified address in currentup group.

10.3.6 Setting screen

Part of the PMC system parameters can be set on this screen.

```
PMC PRM (SETTING)                                  MONIT RUN

PROGRMMER ENABEL        =  0(0:NO 1:YES)                      (K17.1)
LADDER START            =  0(0:AUTO 1:MANUAL)                 (K17.2)
RAM WRITE ENABLE        =  0(0:NO 1:YES)                      (K17.4)
SIGNAL TRACE START      =  0(0:MANUAL 1:AUTO)                 (K17.5)
SIGNAL ANALYS START     =  0(0:MANUAL 1:AUTO)                 (K17.6)
DATA TBL CNTL SCREEN    =  0(0:YES 1:NO)                      (K17.7)
FUNC KEY INP (CUSTOM)   =  0(0:AVAL 1:IGNORE)                 (K18.0)✻
DEBUG FUNC START        =  0(0:MANUAL 1:AUTO)                 (K18.1)✻
SIGNAL TRIGGER START    =  0(0:MANUAL 1:AUTO)                 (K18.2)
TRANS LADDER (ONLEDT)   =  0(0:MANUAL 1:AUTO)                 (K18.3)
INIT PMC-MDI SCREEN     =  0(0:YES 1:NO)                      (K-18.7)✻

[  NO  ]  [  YES  ]  [          ]  [          ]  [          ]
```

✻ Only for the PMC-RC3/RC4

✻ Values in parentheses indicate the addresses of the corresponding keep relays.

10.4 Input/Output of PMC Data

10.4.1 Start of the built-in type PMC programmer

When the PMC data are input/output with I/O device unit via reader/puncher interface, the built-in type PMC programmer should starts by as following operation.

✻ As following operation is not required when the data set from MDI.

1 Select the PMC screen

Press SYSTEM key and press [PMC] softkey.

2 Confirm to the built-in type PMC programmer is running.

```
PMC CONTROL SYSTEM MENU                              MONIT RUN

  SELECT ONE OF FOLLOWING SOFT KEYS

    PMCLAD      :  DYNAMIC LADDER DISPLAY
    PMCDGN      :  DIAGNOSIS FUNCTION
    PMCPRM      :  PARAMETER (T/C/K/D)
    RUN/STOP    :  RUN/STOP SEQUENCE PROGRAM
    EDIT        :  EDIT SEQUENCE PROGRAM
    I/O         :  I/O SEQUENCE PROGRAM
    SYSPRM      :  SYSTEM PARAMETER
    MONIT       :  PMC MONITOR



[ PMCLAD] [PMCDGN] [PMCPRM] [        ] [        ]
```

parts are displayed, starts of the built-in type PMC programmer. The card editor is not used on FS16 but it has PMC-RB system. This case, [RUN/STOP] and [I/O] function can used but editing of sequence program is impossible.

3 Keep relay K17.1 (K900.1 for the RB6/RC4) should set to “1” if the built-in type PMC programmer is not start yet.

10.4.2 Input/output method

1 Press ▷ key in the initial menu screen, then display to [I/O] softkey.

2 Display next screen

```
PMC I/O PROGRAM                                      MONIT RUN

  CHANNEL       =  1

  DEVICE        =  HOST

  FUNCTION      =

  DATA KIND     =




[ EXEC ] [CANCEL] [ (NO.) ] [        ] [        ]
```

10

3 Enter the desired channel number, then press the INPUT key to set the number for CHANNEL.

1 : JD5A of the main CPU board

2 : JD5B of the main CPU board

4 Specify the I/O unit to be used for DEVICE.

HOST:	I/O operation with FAPT LADDER (on the P-G, P-G Mate, or personal computer)
FDCAS:	I/O operation with a Floppy Cassette Adaptor
F-ROM:	I/O operation with a flash EEPROM
M-CARD:	I/O operation with a memory card
OTHERS:	I/O operation with other I/O units

5 Specify the desired function with FUNCTION.

WRITE:	Outputting data
READ:	Inputting data
COMPARE:	Comparing data in memory with that in an external device
DELETE:	Deleting files on a floppy disk or memory card
LIST:	Listing the files on a floppy disk or memory card
BLANK:	Checking whether the flash EEPROM is empty
ERASE:	Clearing the data in the flash EEPROM
FORMAT:	Formatting a memory card (all data on the memory card is deleted.)

6 Specify the desired type of data to be output at KIND DATA.

ALL:	Ladder programs and executable C data
LADDER:	Ladder programs
PARAM:	PMC parameters

7 When FDCAS or M-CARD is specified for the device, a file can be specified for FILE NO. by either its file number or file name.

8 Specify the RS-232C conditions for each device with SPEED.

9 Check that the settings are correct. Then, press the [EXEC] soft key.

10.4.3 Copy function (COPY)

Changes made during on-line editing are transferred to the corresponding editing ladder program.

10.5 Functional Instruction

10.5.1 Functional instruction list

1) Kind of functional instruction and contents of processing

No.	Instruc-tion	SUB No.	Contents of processing	PMC -RB5	PMC -RB6	PMC -RC3	PMC -RC3
1	END 1	1	1st level program end				
2	END 2	2	2nd level program end				
3	END 3	48	3rd level program end	Not Pro-vided	Not pro-vided		
4	TMR	3	Timer				
5	TMRB	24	Fixed timer				
6	TMRC	54	Timer				
7	DEC	4	Decording				
8	DECB	25	Binary code de-cording				
9	CTR	5	Counter				
10	CTRC	55	Counter				
11	ROT	6	Rotation control				
12	ROTB	26	Binary rotation control				
13	COD	7	Code conversion				
14	CODB	27	Binary code conversion				
15	MOVE	8	Data transfer after logical product				
16	MOVOR	28	Data transfer after logical sum				
17	MOVB	43	One-byte transfer				
18	MOVW	44	Two-byte transfer				
19	MOVN	45	Specified-byte transfer				
20	COM	9	Common line control				
21	COME	29	Common line control end				
22	JMP	10	Jump				
23	JMPE	30	Jump end				
24	JMPB	68	Label jump 1				
25	JMPC	73	Label jump 2				
26	LBL	69	Label designation				
27	PARI	11	Parity check				
28	DCNV	14	Data conversion				

No.	Instruc-tion	SUB No.	Contents of processing	PMC -RB5	PMC -RB6	PMC -RC3	PMC -RC3
29	DCNVB	31	Binary data conversion				
30	COMP	15	Comparison				
31	COMPB	32	Binary comparison				
32	COIN	16	Coincidence check				
33	SFT	33	Shift register				
34	DSCH	17	Data search				
35	DSCHB	34	Binary data search				
36	XMOV	18	Index data transfer				
37	XMOVB	35	Binary index data transfer				
38	ADD	19	BCD addition				
39	ADDB	36	Binary addition				
40	SUB	20	BCD subtraction				
41	SUBB	37	Binary subtraction				
42	MUL	21	BCD multiplication				
43	MULB	38	Binary multiplication				
44	DIV	22	BCD division				
45	DIVB	39	Binary division				
46	NUME	23	Definition of constant				
47	NUMEB	40	Definition of binary constant				
48	DISP	49	Message display	Note)	Note)	Note)	Note)
49	DISPB	41	Extended message display				
50	EXIN	42	External data input				
51	AXCTL	53	PMC axis control				
52	WINDR	51	Window data read				
53	WINDW	52	Window data write				
54	FNC9X	9X	Specified function instruc-tion	Not pro-vided	Not pro-vided		
55	MMC3R	88	MMC–III win-dow data read				
56	MMC3W	89	MMC–III win-dow data write				
57	MMCWR	98	MMC–II window data read				

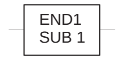
No.	Instruc-tion	SUB No.	Contents of processing	PMC -RB5	PMC -RB6	PMC -RC3	PMC -RC3
58	MMCWW	99	MMC–II window data write				
59	DIFU	57	Rising-edge detection				
60	DIFD	58	Falling-edge detection				
61	EOR	59	Logical exclusive OR				
62	AND	60	Logical AND				
63	OR	61	Logical OR				
64	NOT	62	Logical not				
65	END	64	Program end				
66	CALL	65	Subprogram conditional call				
67	CALLU	66	Subprogram unconditional call				
68	SP	71	Subprogram				
69	SPE	72	Subprogram end				

NOTE For the Series 16–C, the DISP instruction can be used to support compatibility with the Series 16–A. For the Series 16–C, however, the DISPB instruction is recommended, as it supports extended functions, such as high-speed display and Kanji character display. When both DISP and DISPB instructions are used in the Series 16–C, the Kanji character display function supported by the DISPB instruction cannot be used.

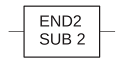
10

10.5.2 Detail of function command

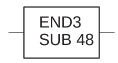
(1)
1st level program end



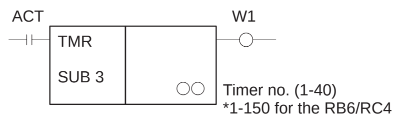
(2)
2nd level program end



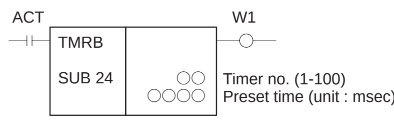
(3)
3rd level program end
(PMC–RC3/RC4 only)



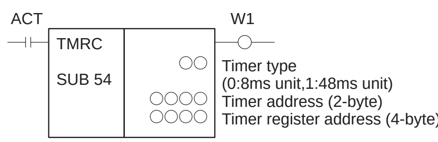
(4)
Valiable timer



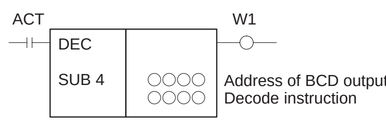
(5)
Fixed timer



(6)
Valiable timer



(7)
Decode

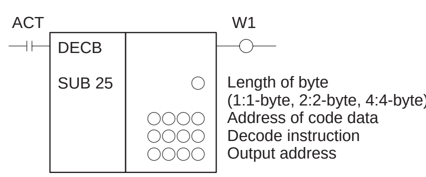


[Decode instruction]
○○ ○○ ← Pos. of digit

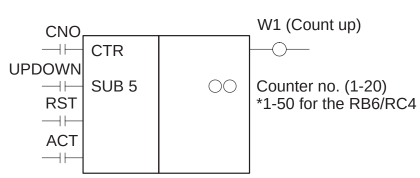
01 : Decodes lower 1-digit only.
10 : Decodes upper 1-digit only.
11 : Decodes 2-digit.

Number : Number to be decoded.

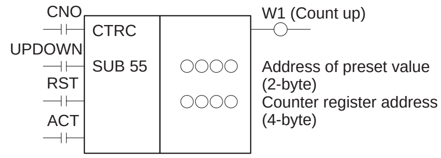
(8)
Binary
decode



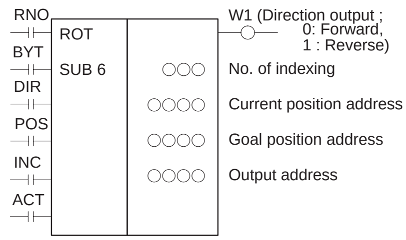
(9)
Counter



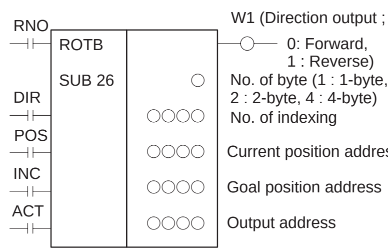
(10)
Counter



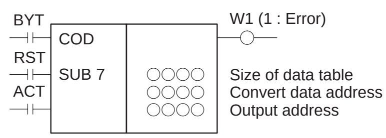
(11)
Rotation control



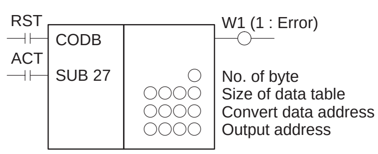
(12)
Binary rotation
control



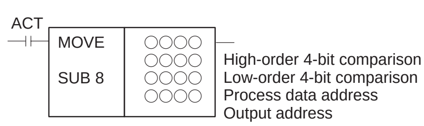
(13)
Code conversion



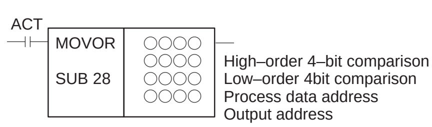
(14)
Binary code
conversion



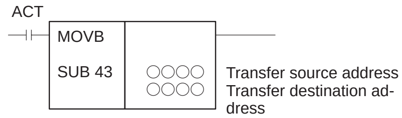
(15)
Logical
product
transfer



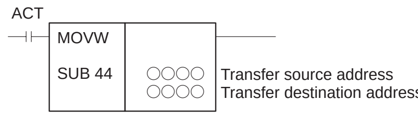
(16)
Data
Transfer
after logical
sum



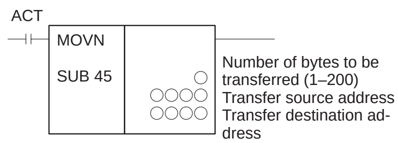
(17)
One–byte transfer



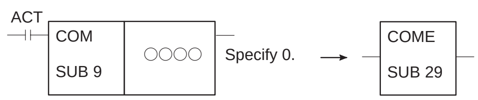
(18)
Two–byte transfer



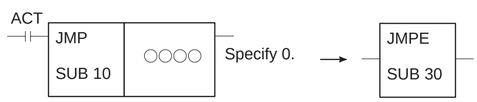
(19)
Specified–byte transfer



(20, 21)
Common line control

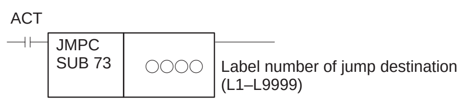


(22, 23)
Jump

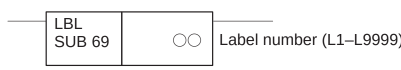


(24)
Label jump 1

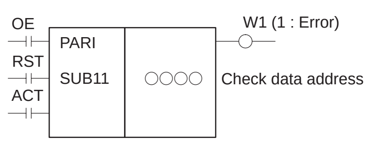
(25)
Label jump 2



(26)
Label designation

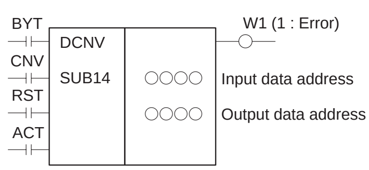


(27)
Parity check



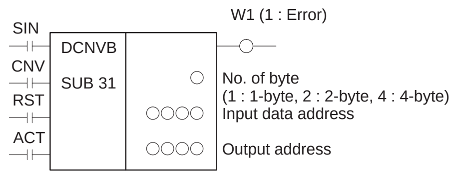
OE 0 : Even-parity check, 1 : Odd-parity check

(28)
Data conversion



CNV 0 : Binary to BCD-code, 1 : BCD to Binary-code

(29)
Extended data conversion



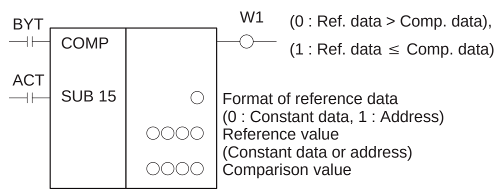
SIN When converts BCD to binary ; 0 : Positive, 1 : Negative

[Operation output register]

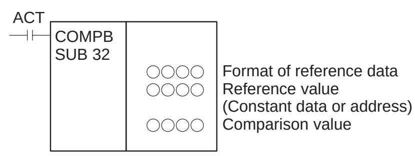
	#7	#6	#5	#4	#3	#2	#1	#0
R9000			V				N	Z

V : Overflow, Z : Zero, N : Negative

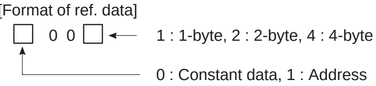
(30)
Comparison



(31)
Comparison for binary data



[Format of ref. data]

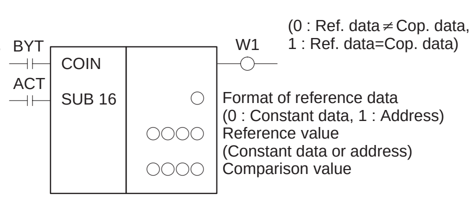


[Operation output register]

	#7	#6	#5	#4	#3	#2	#1	#0
R9000			V				N	Z

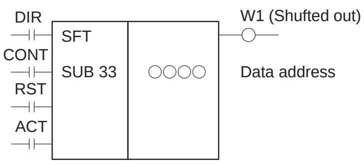
V : Overflow, Z : Ref. data=Comp. data,
N : Ref. data<Comp. data

(32)
Coincidence check



10

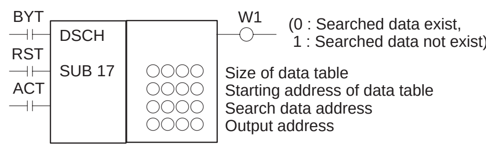
(33)
Shift register



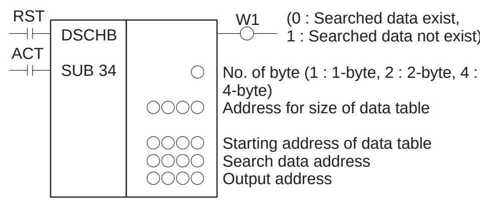
DIR 0 : Left-shift, 1 : Right-shift

CONT 0 : Shift in with 0, 1 : Shift in with 0/1 depend last bit

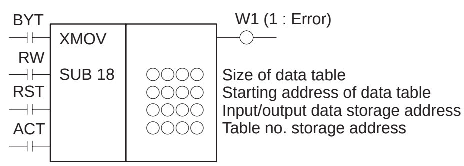
(34)
Data serch



(35)
Binary data search

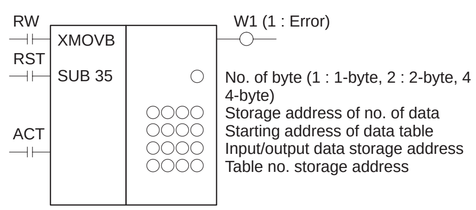


(36)
Indexed data transfer



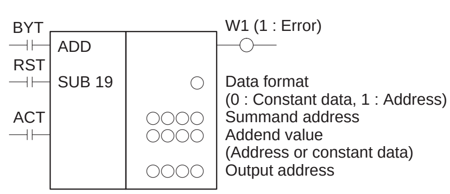
RW 0 : Read mode, 1 : Write mode

(37)
Binary index modifier data transfer

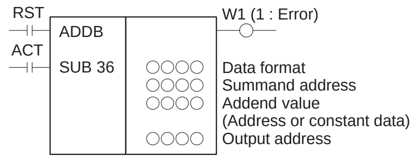


RW 0 : Read mode, 1 : Write mode

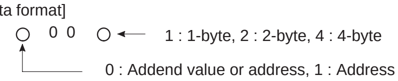
(38)
Addition



(39)
Binary addition



[Data format]

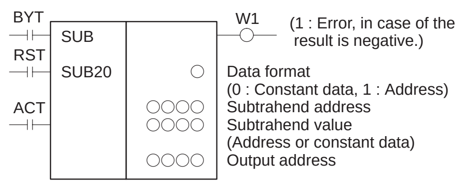


[Operation output register]

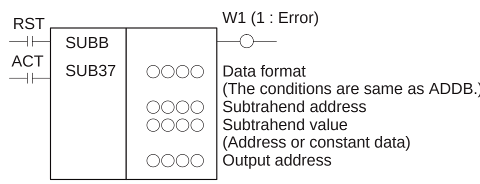
	#7	#6	#5	#4	#3	#2	#1	#0
R9000			V				N	Z

V : Overflow, Z : Zero, N : Negative

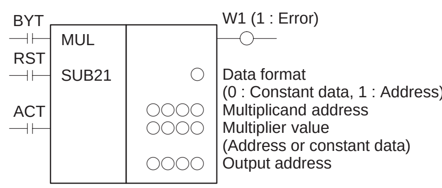
(40)
Subtraction



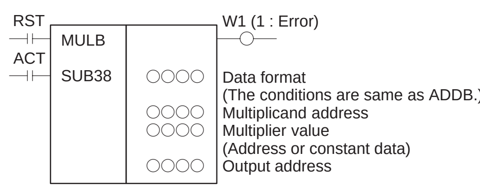
(41)
Binary Subtraction



(42)
Multiplication



(43)
Binary Multiplication



(44) Division

BYT, RST, ACT — DIV SUB22 — W1 (1 : Error)

○ Data format
(0 : Constant data, 1 : Address)
○○○○ Dividend address
○○○○ Devier value
(Address or constant data)
○○○○ Output address

(45) Binary division

RST, ACT — DIVB SUB39 — W1 (1 : Error)

○○○○ Data format
(The conditions are same as ADDB.)
○○○○ Dividend address
○○○○ Devier value
(Address or constant data)
○○○○ Output address
(The remainder-data is putput to operation register R9002-R9005.)

(46) Definition of constant

BYT, ACT — NUME SUB23

○○○○ Constant data
○○○○ Output address

(47) Binary definition of constant

ACT — NUMEB SUB40

○ No. of byte
(1 : 1-byte, 2 : 2-byte, 4 : 4-byte)
○○○○ Constant data
○○○○ Output address

(48) Message display

ACT — DISP SUB49 — W1 (Processing end)

○○○○ Sum of step for message data
○○○○ No. of step for 1-message data
○○○○ Message control address

(49) Extended message display

ACT — DISPB SUB41 — W1 (Processing end)

○○○○ Number of message data

(50) External data input

ACT — EXIN SUB42 — W1 (Processing end)

○○○○ Control data address

(51) PMC axis control

RST, ACT — AXCTL SUB 53 — W1 (processing completed)

○ DI/DO signal group number
○○○○ Data address for axis control instruction

(52) Window data reading

ACT — WINDR SUB51 — W1 (Transfer end)

○○○○ Control data address

Item	Input	Function	Parameters	Output / parameter description
(53) Window data writing	ACT	WINDW SUB52	○○○○	W1 (Transfer end) Control data address
(54) Arbitrary function command (PMC–RC3/RC4)	ACT	FNC9X SUB 90–97	○○○○	W1 (Processing end) Control data address
(55) MMC–III window data read	ACT	MMC3R SUB88	○○○○ ○○○○ ○○○○ ○○○○	W1 (processing completed) Buffer designation address Offset address Data length address Input data address
(56) MMC–III window data write	ACT	MMC3W SUB89	○○○○ ○○○○ ○○○○ ○○○○	W1 (processing completed) Buffer designation address Offset address Data length address Input data address
(57) Window data reading for MMC–II	ACT	MMCWR SUB 98	○○○○ ○○○○	W1 (Transfer end) Input data storage address Input data length storage address
(58) Window data writing for MMC–II	ACT	MMCWW SUB 99	○○○○ ○○○○	W1 (Transfer end) Output data storage address Output data length storage address
(59) Rising edge detection	ACT	DIFU SUB 57	○○○○	W1 (rising–edge detection) Rising edge number (1 – 256)
(60) Falling edge detection	ACT	DIFD SUB 58	○○○○	W1 (falling–edge detection) Falling edge number (1 – 256)
(61) Logical exclusive OR	ACT	EOR SUB 59	□ 0 0 □ ○○○○ ○○○○ ○○○○	Format designation Address of data to be manipulated Operating data (address or constant) Operation result output address

(62) Logical AND

ACT	AND SUB 60	□ 0 0 □	Format designation
		○○○○	Address of data to be manipulated
		○○○○	Operating data (address or constant)
		○○○○	Operation result output address

(63) Logical OR

ACT	OR SUB 61	□ 0 0 □	Format designation
		○○○○	Address of data to be manipulated
		○○○○	Operating data (address or constant)
		○○○○	Operation result output address

(64) Logical NOT

ACT	NOT SUB 62	□ 0 0 □	Format specification
		○○○○	Address of data to be manipulated
		○○○○	Operation result output address

(65) Program end

END SUB 64

(66) Subprogram conditional call

ACT	CALL SUB 65	○○○○	Subprogram number (P1 to P512 for the PMC–RB5/RC3) (P1 to P2000 for the PMC–RB6/RC4)

(67) Subprogram uniconditional call

CALLU SUB 66	○○○○	Subprogram number (P1 to P512 for the PMC–RB5/RC3) (P1 to P2000 for the PMC–RB6/RC4)

(68) Subprogram

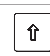
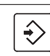
SP SUB71	○○○○	Subprogram number (P1 to P512 for the PMC–RB5/RC3) (P1 to P2000 for the PMC–RB6/RC4)

(69) Subprogram end

SPE SUB72

11. CORRESPONDENCE BETWEEN ENGLISH KEY AND SYMBOLIC KEY

Table : Correspondence between English key and Symbolic key

Name	English key	Symbolic key
CANCEL key	CAN	
POSITION key	POS	
PROGRAM key	PROG	
OFFSET/SETTING key	OFFSET SETTING	
CUSTOM key	CUSTOM	
SYSTEM key	SYSTEM	
MESSAGE key	MESSAGE	
GRAPH key	GRAPH	
CNC/MMC key	CNC / MMC	
SHIFT key	SHIFT	
INPUT key	INPUT	
ALTER key	ALTER	
INSERT key	INSERT	
DELETE key	DELETE	
PAGE UP key	↑ PAGE	
PAGE DOWN key	PAGE ↓	
HELP key	HELP	
RESET key	RESET	
CUSTOM/GRAPH key	CUSTOM GRAPH	

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MEMO