YASKAWA

YRC1000micro OPTIONS
INSTRUCTIONS

FOR INFORM LANGUAGE

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
YRC1000micro INSTRUCTIONS
YRC1000micro OPERATOR'S MANUAL
YRC1000micro MAINTENANCE MANUAL
YRC1000micro ALARM CODES (MAJOR ALARMS) (MINOR ALARMS)

Have the following information available when contacting the YASKAWA Representative:
● System
● Primary Application
● Software Version *(Located on Programming Pendant by selecting: {Main Menu} - {System Info} - {Version})*
● Warranty ID *(Located on Robot Controller)*
● Robot Serial Number *(Located on Manipulator data plate)*
● Robot Sales Order Number *(Located on Robot controller data plate)*

<div style="background-color: red; color: white;">

⚠ DANGER

</div>

- This manual explains the INFORM language of the YRC1000micro system. Read this manual carefully and be sure to understand its contents before handling the YRC1000micro. Any matter not described in this manual must be regarded as "prohibited" or "improper".

- General information related to safety are described in "Chapter 1. Safety" of the YRC1000micro INSTRUCTIONS. To ensure correct and safe operation, carefully read "Chapter 1. Safety" of the YRC1000micro INSTRUCTIONS.

<div style="background-color: yellow;">

⚠ CAUTION

</div>

- In some drawings in this manual, the protective covers or shields are removed to show details. Make sure to install all the covers and shields in place before operating this product.

- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids the product warranty.

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NOTICE

</div>

- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.

- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.

- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. Be sure to tell the representative the manual number listed on the front cover.

Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the YRC1000micro.

In this manual, the Notes for Safe Operation are classified as "DANGER", "WARNING", "CAUTION", or "NOTICE".

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety Signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.
⚠ CAUTION	Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to "NOTICE".
NOTICE	NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to "NOTICE", the word "CAUTION" without the safety alert symbol may be used to indicate a message not related to personal injury.

Even items described as "CAUTION" may result in a serious accident in some situations.
At any rate, be sure to follow these important items.

> NOTE   To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as "DANGER", "WARNING" and "CAUTION".

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<div style="text-align:center; background:red; color:white; font-size:2em;">⚠ **DANGER**</div>

- Before operating the manipulator, make sure the servo power is turned OFF by performing the following operations. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.
  - Press the emergency stop button on the programming pendant or on the external control device, etc.
  - Disconnect the safety plug of the safety fence. (when in the play mode or in the remote mode).

If operation of the manipulator cannot be stopped in an emergency, personal injury and/or equipment damage may result.

Fig. : Emergency Stop Button

- Before releasing the emergency stop, make sure to remove the obstacle or error caused the emergency stop, if any, and then turn the servo power ON.

Failure to observe this instruction may cause unintended movement of the manipulator, which may result in personal injury.

Fig. : Release of Emergency Stop

TURN

- Observe the following precautions when performing a teaching operation within the manipulator's operating range:
  - Be sure to perform lockout by putting a lockout device on the safety fence when going into the area enclosed by the safety fence. In addition, the operator of the teaching operation must display the sign that the operation is being performed so that no other person closes the safety fence.
  - View the manipulator from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Always keep in mind emergency response measures against the manipulator's unexpected movement toward a person.
  - Ensure a safe place to retreat in case of emergency.

Failure to observe this instruction may cause improper or unintended movement of the manipulator, which may result in personal injury.

- Confirm that no person is present in the manipulator's operating range and that the operator is in a safe location before:
  - Turning ON the YRC1000micro power
  - Moving the manipulator by using the programming pendant
  - Running the system in the check mode
  - Performing automatic operations

Personal injury may result if a person enters the manipulator's operating range during operation. Immediately press an emergency stop button whenever there is a problem. The emergency stop buttons are located on the front panel of the YRC1000micro and on the upper right of the programming pendant.

- Read and understand the Explanation of the Warning Labels before operating the manipulator.

<div style="border:1px solid red;">

⚠ DANGER

- In the case of not using the programming pendant, be sure to supply the emergency stop button on the equipment. Then before operating the manipulator, check to be sure that the servo power is turned OFF by pressing the emergency stop button.
  Connect the external emergency stop button to the 4-14 pin and 5-15 pin of the Safety connector (Safety).

- Upon shipment of the YRC1000micro, this signal is connected by a jumper cable in the dummy connector. To use the signal, make sure to supply a new connector, and then input it.

If the signal is input with the jumper cable connected, it does not function, which may result in personal injury or equipment damage.

</div>

⚠ WARNING

- Perform the following inspection procedures prior to conducting manipulator teaching.   If there is any problem, immediately take necessary steps to solve it, such as maintenance and repair.

  – Check for a problem in manipulator movement.

  – Check for damage to insulation and sheathing of external wires.

- Return the programming pendant to a safe place after use.

If the programming pendant is left unattended on the manipulator, on a fixture, or on the floor, etc., the Enable Switch may be activated due to surface irregularities of where it is left, and the servo power may be turned ON. In addition, in case the operation of the manipulator starts, the manipulator or the tool may hit the programming pendant left unattended, which may result in personal injury and/or equipment damage.

Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the YRC1000micro controller, manipulator cables, the YRC1000micro programming pendant (optional), and the YRC1000micro programming pendant safety signal short circuit connector (optional).

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
YRC1000micro Controller	YRC1000micro
YRC1000micro Programming Pendant	Programming Pendant (optional)
Cable between the manipulator and the controller	Manipulator Cable
YRC1000micro programming pendant safety signal short circuit connector	Programming pendant safety signal short circuit connector (optional)

Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys /Symbol Keys	The keys which have characters or symbols printed on them are denoted with [ ]. e.g. [ENTER]
	Axis Keys /Numeric Keys	[Axis Key] and [Numeric Key] are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a "+" sign between them, e.g. [SHIFT]+[COORD].
	Mode Switch	Mode Switch can select three kinds of modes that are denoted as follows: REMOTE, PLAY or TEACH. (The switch names are denoted as symbols)
	Button	The three buttons on the upper side of the programming pendant are denoted as follows: START, HOLD, or EMERGENCY STOP. (The button names are denoted as symbols)
	Displays	The menu displayed in the programming pendant is denoted with { }. e.g. {JOB}

Start button*
START

Mode switch*
REMOTE
PLAY
TEACH

Hold button*
HOLD

Emergency stop button

Page key
Coordinate key
Axis keys

Shift key

Enter key

*The button/switch names are denoted as symbols.

Numeric keys

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select • • •" means that the cursor is moved to the object item and [SELECT] is pressed, or that the item is directly selected by touching the screen.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and ^{TM} are omitted.

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1   Outline of INFORM

1.1   About INFORM

1.1.1   INFORM

The robot programming language used with YRC1000micro is called INFORM. INFORM is composed of the instruction and the additional item (tag and numeric data).

$$\underline{MOVJ} \ \underline{VJ}=\underline{50.00}$$

Tag   Numeric data

Instruction

Additional item

- Instruction: It is used to execute the operation and processing. In the case of a move instruction, when a position is taught, the move instruction is automatically displayed according to the interpolation method.

- Additional item: The speed, time, etc. are set according to the type of instruction. Numeric data and character data are added to the tag that specifies the condition as necessary.

1.1.2   Type of Instruction

The instruction is divided into several types in terms of each process and operation.

Type	Content	Instruction Example
I/O Instruction	It is the instruction used to control the I/O.	DOUT, WAIT
Control Instruction	It is the instruction used to control the processing and operation.	JUMP, TIMER
Operating Instruction	It is the instruction by which the variables, etc. are used and operated.	ADD, SET
Move Instruction	It is an instruction concerning the movement and the speed.	MOVJ, REFP
Shift Instruction	It is an instruction used when a present teaching position is shifted.	SFTON, SFTOF
Instruction which adheres to instruction	It is an instruction which adheres to the instruction.	IF, UNTIL
Work Instruction	It is an instruction concerning work.	TOOLON
Optional Instruction	It is an instruction concerning optional functions. It can only be used when the function is available.	-

1.1.3   Instruction Set

To improve operation efficiency, the number of instructions to be registered is limited. All instructions are executed, regardless of the instruction set during playback, etc.

- Subset Instruction Set
  Only instructions which are used frequently can be registered in the subset instruction set. Since the number of instructions is small, the operation such as selecting or input become easier.

- Standard Instruction Set / Expanded Instruction Set
  All INFORM instructions can be registered. For these two sets, the number of additional items which can be used by each instruction is different. The following function cannot be used with a standard instruction set, but operation is easier because the number of data decreases when the instruction is registered.

  - Local Variable, Use of Array Variable

  - Use of Variable to Additional Item (Ex.: MOVJ VJ=I000)
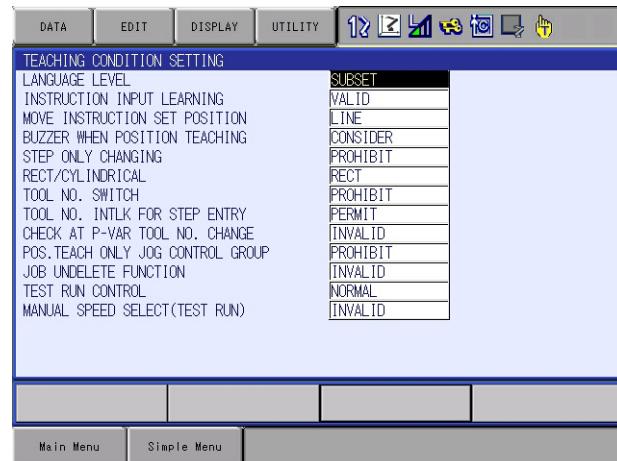
1.1.3.1   Selecting Instruction Set

Select an instruction set in the teaching condition window.

1. Select {SETUP} under the main menu

2. Select {TEACHING COND.}

   – The teaching condition setting window appears.
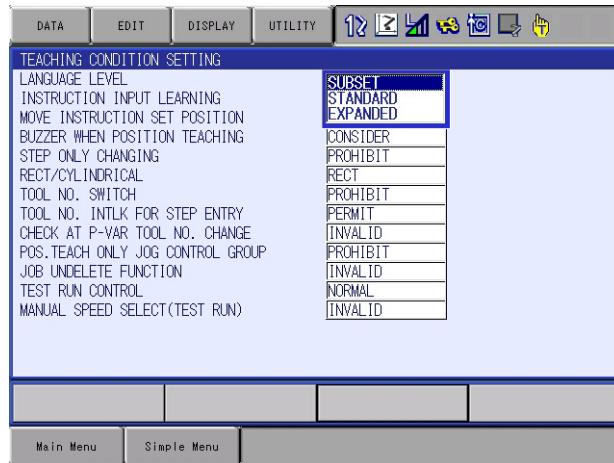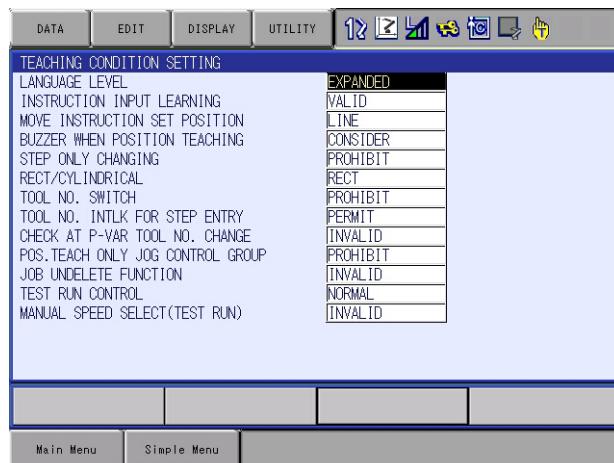
3. Select "LANGUAGE LEVEL"

– The instruction set selection dialog box appears.

4. Select the language level (instruction set)

– The language level is selected.

1.1.4   Variables to be Used in Instructions

Variables can be used as numeric data for the additional item of the instructions in the standard and expanded instruction sets.

Also, the instructions in the expanded instruction set can use local variables and array variables.

> NOTE
> - The applicable variable differs depending on the additional item.
> - The number of local variables to be used must be set in the job header display. For setting the number of local variables, refer to "Editing Local Variables" in YRC1000micro OPERATOR'S MANUAL (RE-CSO-A058).

1.1.4.1   Set Value of Variable and Numeric Data

The unit of the numeric data for the additional item of the instruction decides the set value of variable and the value of the additional item at execution.

< Example >

TIMER tag (T=)

TIMER T=I000

When a variable is used for the numeric data of the TIMER tag, the unit of numeric data is 0.001 seconds.

When 1000 is set for I000, the value when the instruction is executed is 1.000 seconds.

1.2   Registration of Instructions

1.2.1   Registration

To register instructions, press [INFORM LIST] while the job content window is shown.

1. Select {JOB} under the main menu

2. Select {JOB}

    – The job content window appears.

3. Press [INFORM LIST]

    – The job instruction group list dialog box appears.

4. Select the desired instruction group

    – The job instruction group list dialog box appears.

5. Select the desired instruction

    – The instruction is displayed in the input buffer line.

6. Press [ENTER]

    – The instruction displayed in the input buffer line is registered in the job.
       Also, if the instruction must be registered during the job, press [INSERT] before pressing [ENTER].

> SUPPLE-MENT
>
> For more details, refer to "Editing " in YRC1000micro OPERATOR'S MANUAL (RE-CSO-A058).

1.2.2   Learning Function

With the learning function, an instruction can be registered with the same additional items as those previously registered with the instruction.
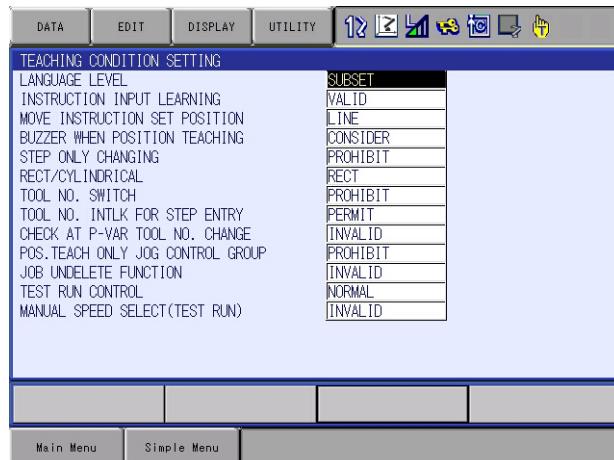
Validate the learning function to minimize the number of instruction registries.

Set the learning function to valid or invalid in the teaching condition window.

1. Select {SETUP} under the main menu
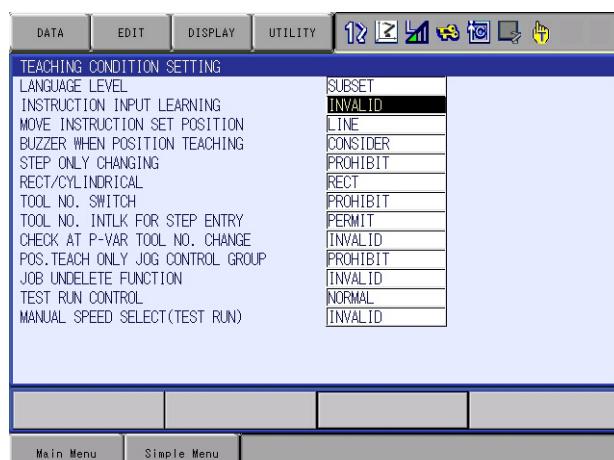
2. Select {TEACHING COND.}

    – The teaching condition setting window appears.

3. Move the cursor to "INSTRUCTION INPUT LEARNING".
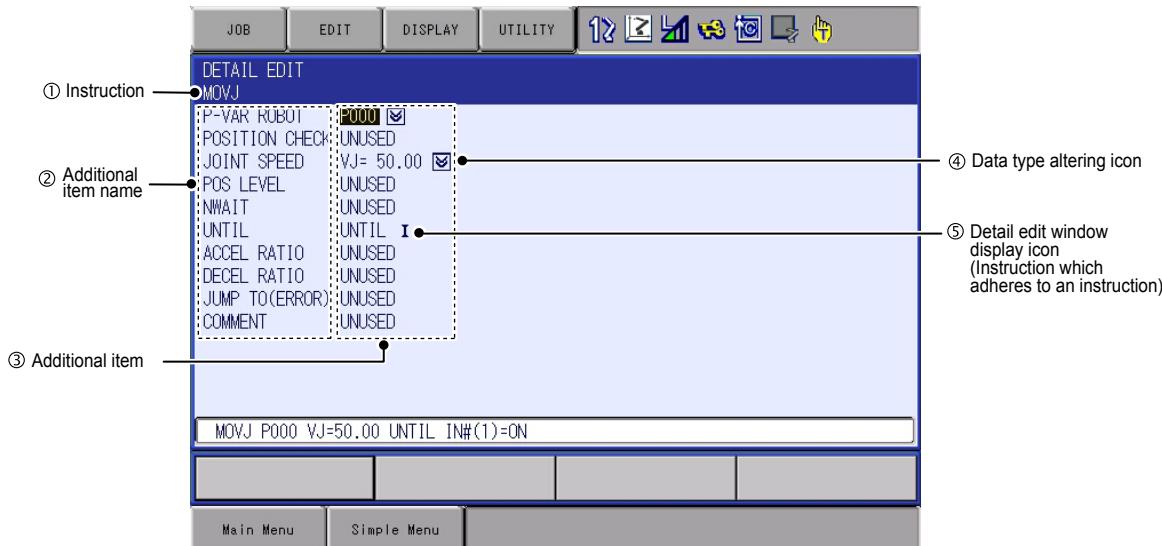
    – The condition "VALID" or "INVALID" is switched each time [SELECT] is pressed.

1.3   Detail Edit Window

All instructions have a detail edit window.

The detail edit window is used for adding, modifying, and deleting additional items in the instruction.

①Instructions
Indicates the instruction.

②Additional Item Name
Indicates the name of the additional item (type).

③Additional Item
Indicates the additional item.
The tag selection dialog box appears when the cursor is on the additional item and [SELECT] is pressed.
When "NOT USED" is selected, the tag is omitted (if it can be omitted).

④Data Type Altering Icon
Alters the type of numeric data.
For example, if the 50.00 of VJ=50.00 (constant type) is changed to I000 (integer-type variable), it becomes VJ=I000.

⑤Detail Edit Display Icon
Indicates the detail edit display is shown.

1.4   Registration of Expression
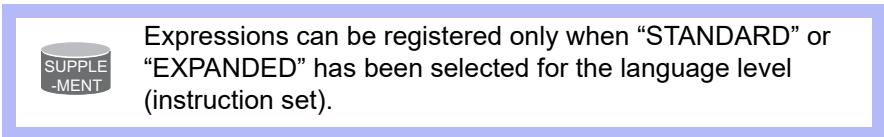
1.4.1   Expression

With INFORM, an expression can be registered to the SET instruction.
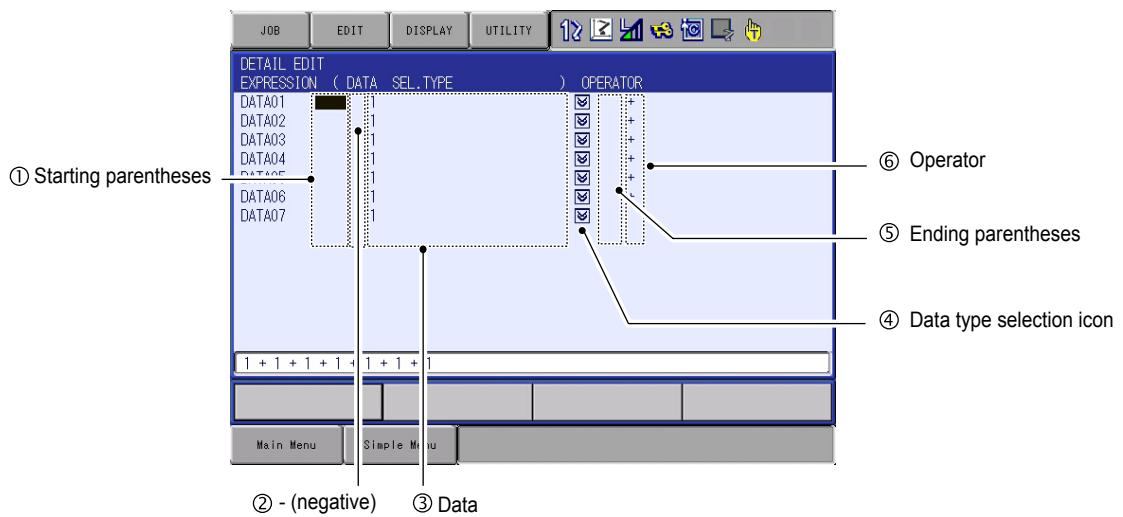
< Example >

SET <u>B000</u>   <u>(B001 + B002) / B003 - (B004 + B005) * B006</u>

Result stored destination   Expression

Register an expression in the DETAIL EDIT window.

> **SUPPLE-MENT** Expressions can be registered only when "STANDARD" or "EXPANDED" has been selected for the language level (instruction set).

The DETAIL EDIT window for expression is shown below.

① Starting parentheses
② - (negative)   ③ Data
④ Data type selection icon
⑤ Ending parentheses
⑥ Operator

①Starting parentheses
  Move the cursor to the parentheses, and press [SELECT]. Each time [SELECT] is pressed, three types of parentheses show up in the following order.

  (→ ((→ (((→ –(→ –((→ –(((

②- (negative)
  Move the cursor to the desired position, and press [SELECT]. Each time [SELECT] is pressed, the negative is alternately added and omitted and vice versa.

③**Data**

The data type of the expression is indicated. The following types of data can be registered.

• Constant (byte type, integer type, double-precision type, and real-number type)

• Byte type variable (B, B[], LB, and LB[])

• Integer type variable (I, I[], LI, and LI[])

• Double-precision type variable (D, D[], LD, and LD[])

• Real-number type variable (R, R[], LR, and LR[])

Move the cursor to the desired position, and press [SELECT] to enter the numeric value input status. Change the numeric value of the constant data and the variable number.
Change the data type by using the Data type selection icon.

④**Data type selection icon**

Change the data type in the following manner.
Move the cursor to the data type to be changed, and press [SELECT].
A dialog box with the selectable data types is displayed. Move the cursor to the data type to be selected and press [SELECT].

⑤**Ending parentheses**

Move the cursor to the parentheses and press [SELECT]. Each time [SELECT] is pressed, three types of parentheses show up in the following order.

$$) \ \rightarrow \ )) \ \rightarrow \ )))$$
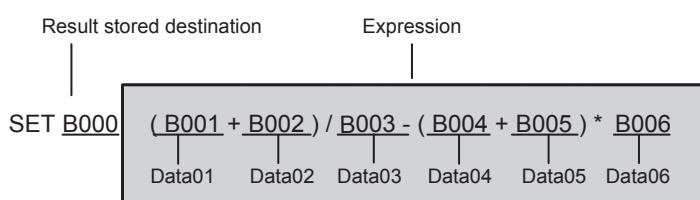
⑥**Operator**

Move the cursor to the operator to be changed and press [SELECT].
The operator selection dialog box is displayed. Move the cursor to the operator to be selected and press [SELECT].
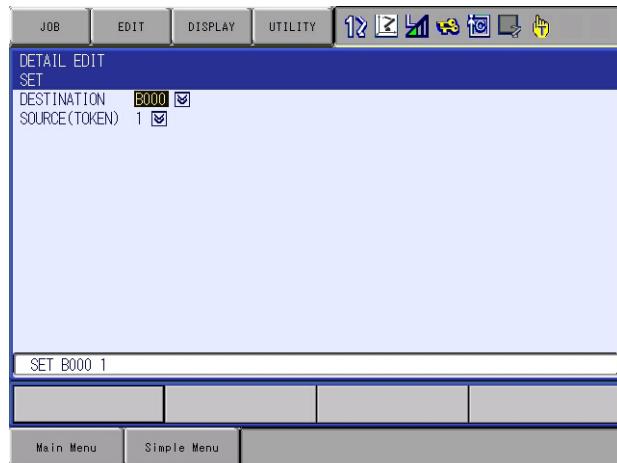
< Example of the DETAIL EDIT display for expression >
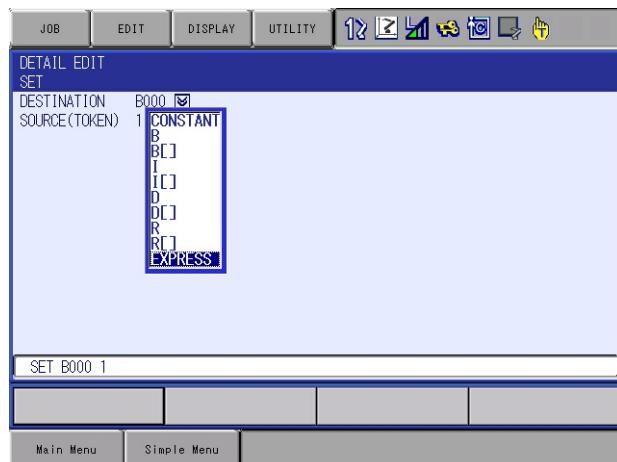
1.4.2   Registration

1. Select {JOB} under the main menu

2. Select {JOB}

3. Press [INFORM LIST]

4. Select "ARITH"

5. Select "SET"

6. Press [SELECT]

    – The DETAIL EDIT window for the SET instruction appears.

7. Move the cursor to the icon ☑ beside "SOURCE(TOKEN)"

    – The selection dialog box appears.
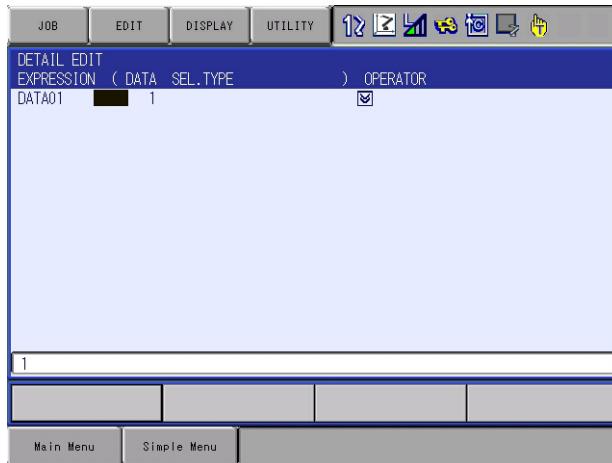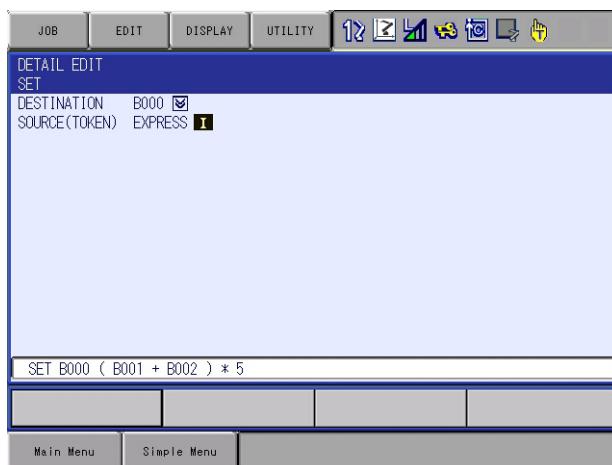
8. Select "EXPRESS"

–   The DETAIL EDIT window for expression appears.

9. Enter the expression and press [ENTER]

–   The DETAIL EDIT window for the SET instruction appears.

10. Press [ENTER]

–   The JOB CONTENT window appears.

11. Press [ENTER]

–   The SET instruction indicated in the input buffer line is registered.

1-11

1.5   Registration of Conditional Statement

1.5.1   Conditional Statement
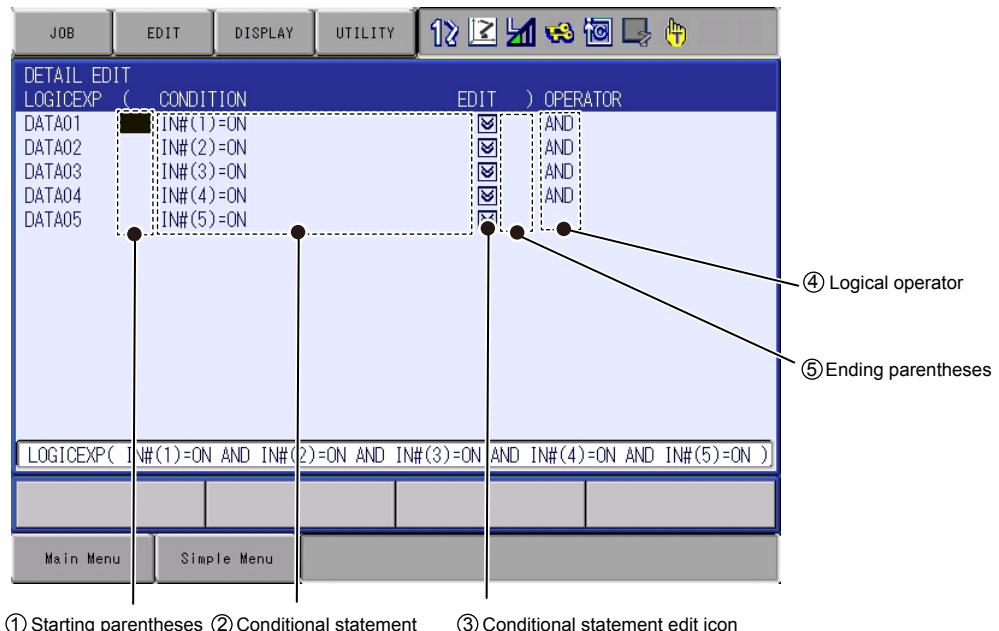
With INFORM, the conditional statements can be registered on the following instructions.

IFEXPRESS/FOREXPRESS/LOGICEXP/IFTHEN/ELESEIF/WHILE

<Example of the conditional statement>

SET FL0000   LOGICEXP (IN#(1)=ON   AND   IN#(2)=ON   OR   B000=0)

Result strored destination   Conditional statement   Conditional statement   Conditional statement

Registration of conditional statement is processed in the DETAIL EDIT window of the above-mentioned instructions. The following figure is the DETAIL EDIT window of the conditional statement.

① Starting parentheses ② Conditional statement   ③ Conditional statement edit icon

① Starting parentheses

Move the cursor to this area. Every time [SELECT] is pressed, the selected parenthesis is switched in the following order.

(→ ((→ (((

② Conditional statement

Conditional statements are shown in this area.   As for the contents which can be registered as the conditional statement, refer to *RELEXPR* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

③ Conditional statement edit icon

The DETAIL EDIT window of conditional statement is shown. Move the cursor to this icon, press [SELECT] and the detail edit window of the conditional statement (RELEXPR) is shown. The conditional statement is edited in this window.

④ **Ending parentheses**

Move the cursor to this area. Every time [SELECT] is pressed,
the selected parenthesis is switched in the following order.

$$) \rightarrow)) \rightarrow)))$$

⑤ **Logical operator**

The logical operator is shown in this area.
Move the cursor to this area, press [SELECT] and the selection dialog
box of the logical operator is shown.   Move the cursor to the logical
operator to be changed and press [SELECT].
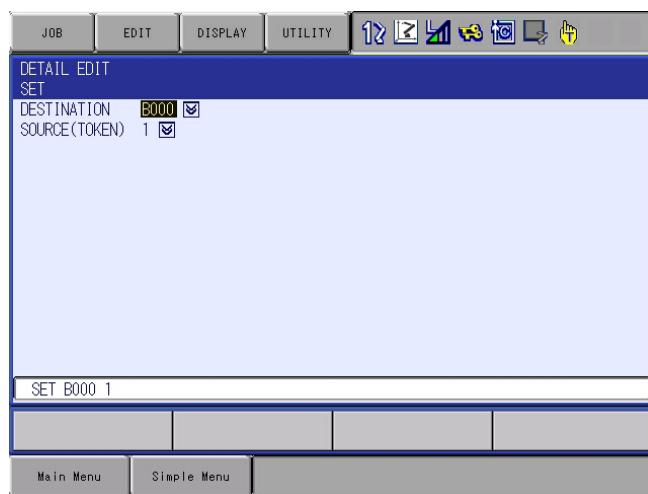
<Example of the DETAIL EDIT window of the conditional statement>

SET FL0000   LOGICEXP (IN#(1)=ON   AND   IN#(2)=ON   OR   B000=0)

Result strored destination   Conditional statement

Conditional statement

Conditional statement

Logical operator   Logical operator

1-13
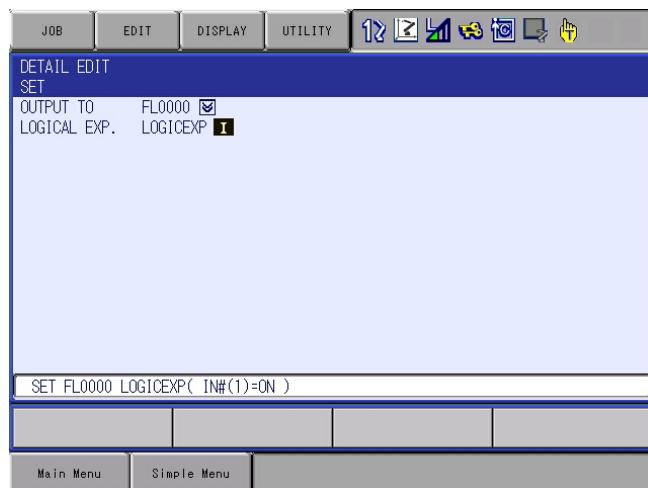
1.5.2 Registration

In the following procedures, the registration of the conditional statement is explained with a example which shows how to edit the LOGICEXP instruction in SET instruction. In the same procedures, the registration of the conditional statement is available for IFEXPRESS, FOREEXPRESS, LOGICEXP, IFTHEN, ELSEIF, and WHILE instructions.

1. Select {JOB} under the main menu.

2. Select {JOB}.

3. Press [INFORM LIST].

4. Select "ARITH".

5. Select "SET".

6. Press [SELECT].

    – The DETAIL EDIT window of SET instruction is shown.

7. Move the cursor to the icon in "DESTINATION" and press [SELECT] to choose the FL variable.

    – "LOGICAL EXP. LOGICEXP" is shown.
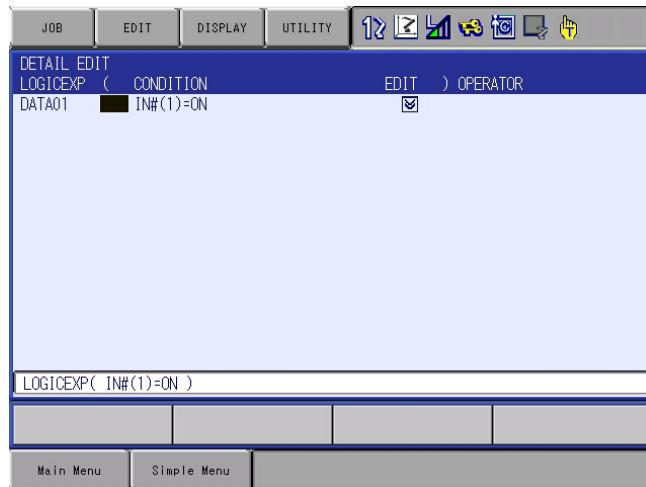
8. Move the cursor to the icon I in "LOGICAL EXP. LOGICEXP" and press [SELECT].
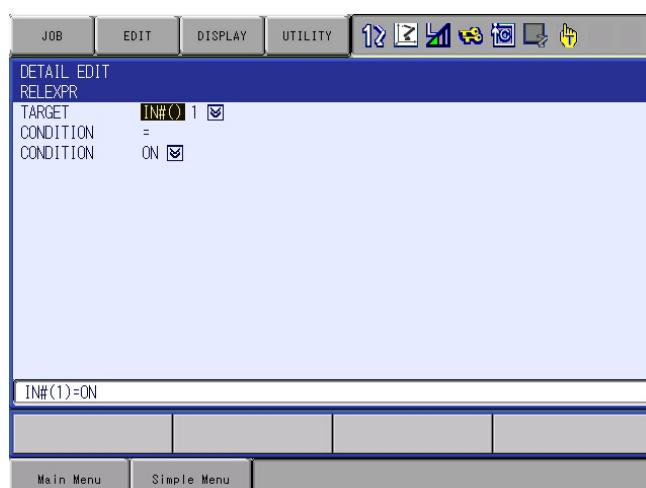
– The DETAIL EDIT window of LOGICEXP instruction is shown..

9. Move the cursor to the conditional edit icon ⊻ and press [SELECT].

– The DETAIL EDIT window of the conditional statement (RELEXPR instruction) is shown.

1-15
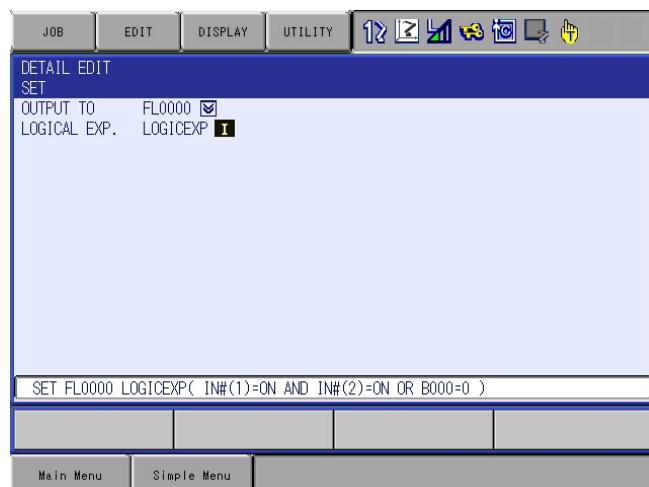
10. Input the conditional statement and press [ENTER].

– The DETAIL EDIT window of LOGICEXP instruction is shown.
Register the logical operators or parentheses in this window, and
another conditional statement can be added.

```
┌──────────┬──────────┬──────────┬──────────┬────────────────────────┐
│   JOB    │   EDIT   │ DISPLAY  │ UTILITY  │  ⟨⟩ ⬚ ⬚ ⬚ ⬚ ⬚ ⬚       │
├──────────┴──────────┴──────────┴──────────┴────────────────────────┤
│ DETAIL EDIT                                                         │
│ LOGICEXP  (    CONDITION              EDIT   ) OPERATOR             │
│ DATA01         IN#(1)=ON                ☑      AND                  │
│ DATA02         IN#(2)=ON                ☑      OR                   │
│ DATA03         B000=0                   ☑                           │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│ ┌────────────────────────────────────────────────────────────┐    │
│ │ LOGICEXP( IN#(1)=ON AND IN#(2)=ON OR B000=0 )              │    │
│ └────────────────────────────────────────────────────────────┘    │
│ ┌──────────┬──────────┬──────────┬──────────┐                      │
│ │          │          │          │          │                      │
│ └──────────┴──────────┴──────────┴──────────┘                      │
│   Main Menu    Simple Menu                                         │
└────────────────────────────────────────────────────────────────────┘
```

11. Press [ENTER].

– The DETAIL EDIT window of the SET instruction is shown.

```
┌──────────┬──────────┬──────────┬──────────┬────────────────────────┐
│   JOB    │   EDIT   │ DISPLAY  │ UTILITY  │  ⟨⟩ ⬚ ⬚ ⬚ ⬚ ⬚ ⬚       │
├──────────┴──────────┴──────────┴──────────┴────────────────────────┤
│ DETAIL EDIT                                                         │
│ SET                                                                 │
│ OUTPUT TO       FL0000 ☑                                           │
│ LOGICAL EXP.    LOGICEXP ▮                                         │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│ ┌────────────────────────────────────────────────────────────┐    │
│ │ SET FL0000 LOGICEXP( IN#(1)=ON AND IN#(2)=ON OR B000=0 )   │    │
│ └────────────────────────────────────────────────────────────┘    │
│ ┌──────────┬──────────┬──────────┬──────────┐                      │
│ │          │          │          │          │                      │
│ └──────────┴──────────┴──────────┴──────────┘                      │
│   Main Menu    Simple Menu                                         │
└────────────────────────────────────────────────────────────────────┘
```

12. Press [ENTER].

– The JOB CONTENT window is shown.

13. Press [ENTER].
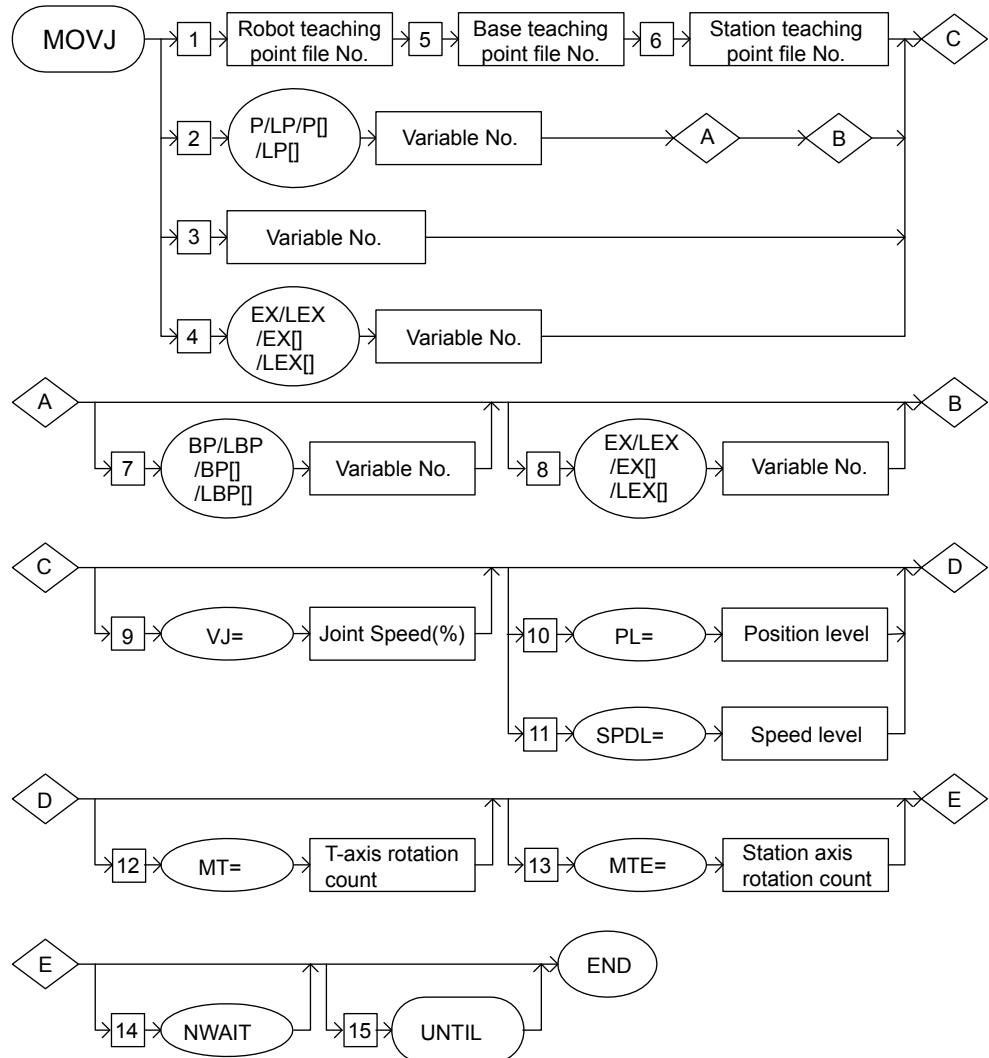
– The SET instruction indicated in the input buffer line is registered in
the job.

1-16
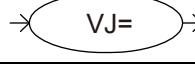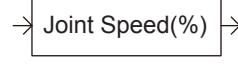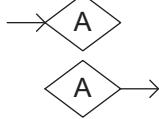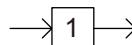
1.6   INFORM Syntax

An example of the INFORM syntax is shown in the following syntax flowchart.

The INFORM syntax chart is composed of the syntax elements (instruction, tag, and data). The order of the rows is shown with the numbers and arrows.
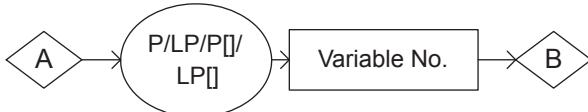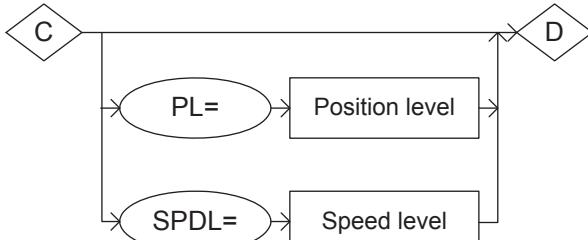
1.6.1   Example of Syntax

1.6.2 INFORM Syntax Elements

INFORM Syntax Element	Explanation	Note
MOVJ →	Indicates the instruction.	In this example, the "MOVJ" instruction is indicated.
→ VJ= →	Indicates the tag.	In this example, the "VJ=" instruction is indicated.
→ Joint Speed(%) →	Indicates the numeric data.	In this example, "Joint speed" is set with the unit %.
→ END	Indicates the end of the instruction.	
→ A ◇ / ◇ A →	Indicates the connection.	
→ 1 →	Indicates the tag order.	

1.6.3 Meaning of INFORM Syntax

INFORM Syntax	Meaning
A → P/LP/P[]/LP[] → Variable No. → B	This is an indispensable tag. In this example, it is necessary to add a tag from [P Variable /LP Variable /P Array /LP Array].
A → B (NWAIT)	This is a tag that can be omitted. In this example, the NWAIT tag can be omitted.
C → D (PL= → Position level) (SPDL= → Speed level)	This is a tag that can be selected. In this example, either PL= tag or SPDL= tag can be selected.

1.6.4   Explanation Table

The explanation table in this manual can be described as follows.

No	Tag	Explanation	Note
1	OT # (Output number)	Specify the output number signal.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.

- NO.
  Indicates the tag number. Corresponds to the number in the INFORM syntax.

- Tag
  Indicates the surface description of the tag.

- Explanation
  Provides an explanation of the tag.

1.7   The Structured Language

The structured language of which basic structure such as sequential execution, selection execution and repetition execution is added as INFORM command in order to make simplified to write and read the program regarding the job edit.

All these executions are classified the control instruction. As for a format of the each instruction, refer to *chapter 2.2 "Control Instruction"* .

1.7.1   The Type of the Structured Language

1. Selection Processing Syntax
    SWITH to CASE to DEFAILT to ENDSWITCH

2. Repetition Processing
    WHILE to ENDWHILE
    FOR to NEXT

3. Sequential Processing
    IFTHEN to ELSIF to ELSE to ENDIF

> • When use the structured language, the total number of the job lines to be added in the job will be decreased.
>
> • The following instructions can be registered with a section of a specified structured language.
>   • ELSIF,ELSE · · · a section between IFTHEN and ENDIF
>   • CASE, DEFAULT · · · a section between SWITCH and
>   ENDSWITCH
>
> NOTE
>
> • If the contents of the structured language are edited, the unedited lines of the instruction will be changed in some cases.
>   Refer to *chapter 1.7.2   "Register, Edit and Delete of the Structured Language"* for more details.
>
> • If save the job into the external device, the format appears different from the job content window in some cases.
>   Refer to *chapter 1.7.4   "Changes in the Format when Save the data to the External Device"* for more details.
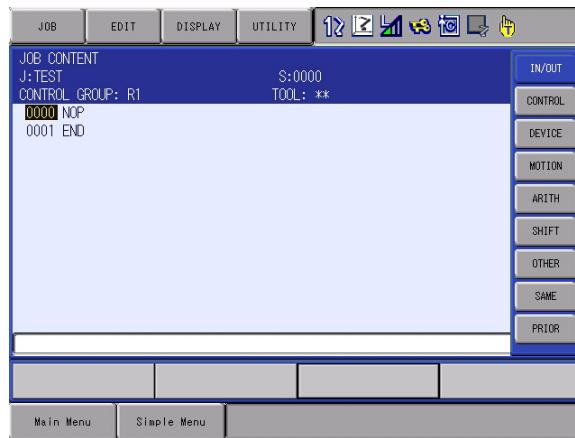
1.7.2   Register, Edit and Delete of the Structured Language

New Registration

1. Display the instruction group list in the JOB CONTENT window.
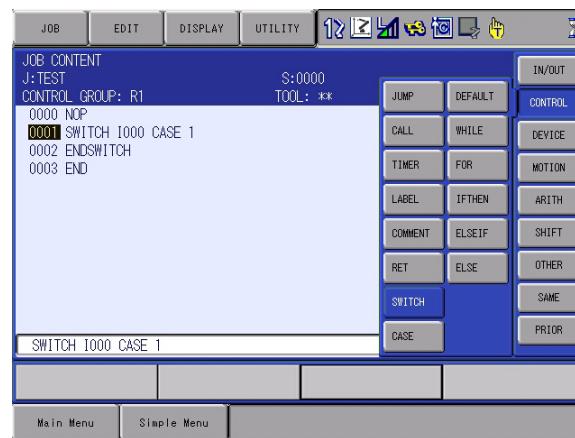
2. Select {CONTROL} in the instruction group.

    – The structured language appears in the instruction list.

3. Select the desired structured language, and press {ENTER}.

    – The displayed instruction in the input buffer line is registered into the job.

1-21

Structured Language	The motion when register the instruction
SWITCH	ENDSWITCH is also registered at the same time.
CASE	Cannot be registered in the following cases. · NOT a section between SWITCH and ENDSWITCH · DEFAULT instruction is located prior to the adding position of CASE instruction between SWITCH and ENDSWITCH.
DEFAULT	Cannot be registered in the following cases. · NOT a section between SWITCH and ENDSWITCH · CASE instruction is located behind from the adding position of DEFAULT instruction between SWITCH and ENDSWITCH.
ENDSWITCH	This instruction is not displayed in the instruction list.
WHILE	ENDWHILE is also registered at the same time.
ENDWHILE	This instruction is not displayed in the instruction list.
FOR	NEXT is also registered at the same time.
NEXT	This instruction is not displayed in the instruction list.
IFTHEN	ENDIF is also registered at the same time.
ELSEIF	Cannot be registered in the following cases. · NOT a section between IFTHEN and ENDIF. · ELSE instruction is located prior to the adding position of ELSEIF instruction between IFTHEN and ENDIF.
ELSE	Cannot be registered in the following cases. · NOT a section between IFTHEN and ENDIF. · ELSEIF instruction is located behind from the adding position of ELSEIF instruction between IFTHEN and ENDIF.
ENDIF	This instruction is not displayed in the instruction list.

Edit the registered instruction

Same as the other instructions, the contents can be edited by selecting the registered instruction.

However, the instruction without edit elements cannot be edited. Also, as for the instruction from FOR to NEXT, the edited contents are reflected to the another unedited instruction.

Structured Language	The motion when register the instruction
SWITCH	The edited contents are reflected.
CASE	The edited contents are reflected.
DEFAULT	Cannot edit the contents of this instruction.
ENDSWITCH	Cannot edit the contents of this instruction.
WHILE	The edited contents are reflected.
ENDWHILE	Cannot edit the contents of this instruction.
FOR	The contents of the I variable of the NEXT instruction making a pair are reflected at the same time.
NEXT	The contents of the I variable of the FOR instruction making a pair are reflected at the same time
IFTHEN	The edited contents are reflected.
ELSEIF	The edited contents are reflected.
ELSE	Cannot edit the contents of this instruction.
ENDIF	Cannot edit the contents of this instruction.
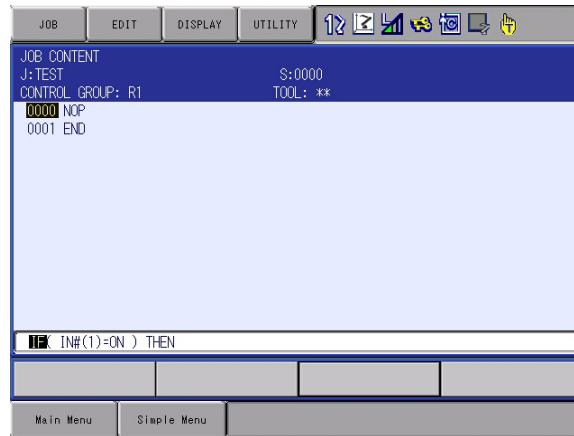
Edit a Conditional Statement

The conditional statement is added to the IFTHEN, ELSEIF and WHILE instructions.

Two or more conditional statements can be added. Also, the OR/AND setting and the judgment order for the statement can be set.
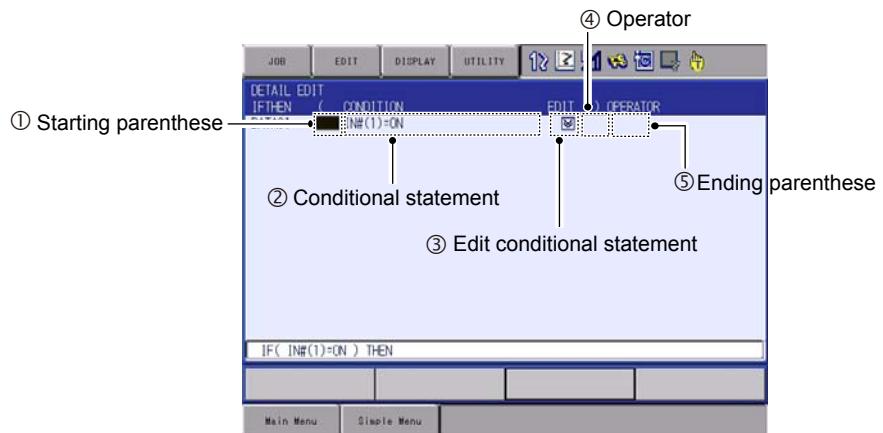
1. Select the one of the instructions from IFTHEN, ELSEIF or WHILE in the JOB CONTENT window.

   – The selected instruction appears.

2. Press {SELECT}, while the cursor of the input buffer is in the selected instruction.

   – The DETAIL EDIT window of the conditional statement appears.

1-24

①Starting parentheses, ending parentheses → Set the parentheses to set
   the priority of the judgment.

> NOTE
>
> If the set parentheses do not affect the priority of the judg-
> ment, the set parentheses will be deleted.
>
> e.g.1 Set as "IF((IN#(1)=ON AND B000=0) AND I000=0)
>   THEN".
>
> – The parentheses do not affect the priority of the
>   judgment, the parentheses will be deleted and
>   registered as follows.
>   "IF(IN#(1)=ON AND B000=0 AND I000=0) THEN"
>
> e.g.2 Set as "IF((IN#(1)=ON OR B000=0) AND I000=0)
>   THEN".
>
> – The parentheses affect the priority of the judgment,
>   and the parentheses are set according to the setting.
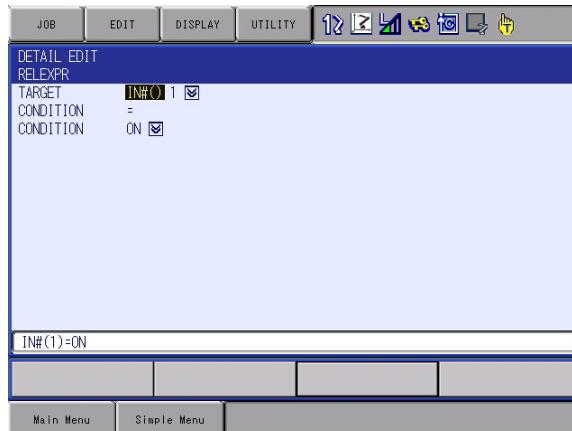
②③ Conditional statement → The conditional statement is shown by
      each item. To edit the statement, move the cursor to ③ , and press
      {SELECT}.

The DETAIL EDIT window of the each conditional statement appears.

The following table shows the contents which are configurable in the
DETAIL EDIT window.

1-25

Object		Operator	Condition
IN#()	GP input signal	=	B, LB, ON, OFF
OT#()	GP output signal	=	B, LB, ON, OFF
FL	Flag variable	=	B, LB, ON, OFF
TF	Timer flag variable	=	B, LB, ON, OFF
IG#()	GP input group	=, <>	B, LB, Constant
OG#()	GP output group	=, <>	B, LB, Constant
IGU#()	User group input	=, <>, >, >=, <, <=	D, LD, Constant
OGU#()	User group output	=, <>, >, >=, <, <=	D, LD, Constant
B/LB	Byte type variable	=, <>, >, >=, <, <=	Constant, String, B, LB, I, LI, D, LD, R, LR
I/LI	Integer type variable	=, <>, >, >=, <, <=	Constant, B, LB, I, LI, D, LD, R, LR
D/LD	Double-precision type variable	=, <>, >, >=, <, <=	Constant, B, LB, I, LI, D, LD, R, LR
R/LR	Real-number type variable	=, <>, >, >=, <, <=	Constant, B, LB, I, LI, D, LD, R, LR
S/LS	Character type variable	=, <>, >, >=, <, <=	String, S, LS
TM	Timer variable	=, <>, >, >=, <, <=	Constant, B, LB, I, LI, D, LD, R, LR
ON	Constant	Not applicable	Forcibly satisfied
OFF	Constant	Not applicable	Forcibly not satisfied

IG#(), OG#() and TM are selectable if the language level is the STANDARD and above.

LB, LI, LD, LR and LS are selectable if the language level is the EXPANDED.

If the constant is selected as the object, the conditional statement is forcibly satisfied or not satisfied depending on the selected constant.

- IF(ON)THEN: Satisfied

- IF(OFF)THEN: Not satisfied

However, when two or more conditional statements are registered and the constant is selected, there is the case that the result of the whole conditional statement depends on the result of other conditional statements as the following examples:

1. IF(ON AND IN#(1)=ON)

If both the first statement and the second statement are satisfied, the whole conditional statement is satisfied.

- The first statement: Forcibly satisfied

- The second statement: Satisfied if IN#(1) is ON

Therefore, the result of the whole conditional statement depends on whether the second statement is satisfied or not.

2. IF(OFF AND IN#(1)=ON)
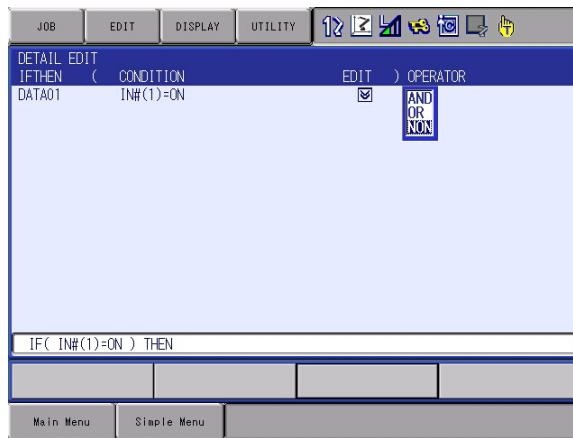
Both the first statement and the second statement are satisfied, the whole conditional statement is satisfied.

- The first statement: Forcibly not satisfied

- The second statement: Satisfied if IN#(1) is ON
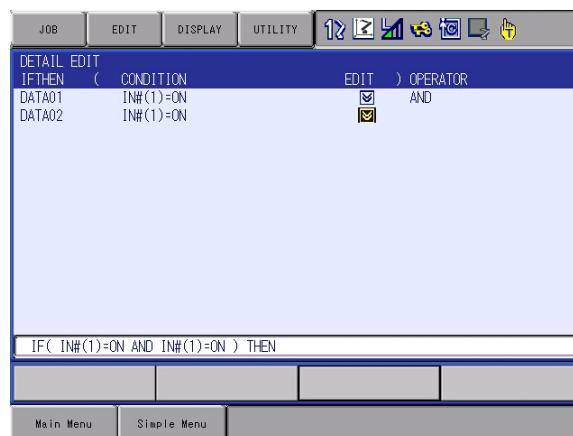
Therefore, the whole conditional statement is not satisfied regardless of the result of the second statement.

④ Operator

Add (OR connection, AND connection) or delete the conditional judgment statement.

Select OR or AND : The statement is added in the next line, and it connects between the statements by OR or AND.

Select NON : Delete the all statement lines below the selected position.

NOTE   Able to add 15 conditional judgment statements.

1-27

Delete the registered instruction

To perform {DELETE} → {ENTER}, the instructions are deleted.

However, unlike the other instructions, the multiple lines might be deleted at the same time in some cases.

Structured Language	The motion when edit the instruction
SWITCH	The all instructions between SWITCH and ENDSWITCH are deleted.
CASE	The only CASE instruction is deleted.
DEFAULT	The only DEFAULT instruction is deleted.
ENDSWITCH	Cannot delete in this line of the instruction.
WHILE	The all instructions between WHILE and ENDWHILE are deleted.
ENDWHILE	Cannot delete in this line of the instruction.
FOR	The all instructions between FOR and NEXT are deleted.
NEXT	Cannot delete in this line of the instruction.
IFTHEN	The all instructions between IFTHEN and ENDIF are deleted.
ELSEIF	The only ELSEIF instruction is deleted.
ELSE	The only ELSE instruction is deleted.
ENDIF	Cannot delete in this line of the instruction.

Copy or cut

The structured language cannot be copied or cut without selecting the another instruction which makes a pair with the selected structured language.

Structured Language	The motion when copy/cut the instruction
SWITCH	Cannot be copied/cut if the ENDSWITCH instruction which makes a pair with the selected SWITCH instruction is not selected at the same time.
CASE	This instruction is copied/cut by itself.
DEFAULT	This instruction is copied/cut by itself.
ENDSWITCH	Cannot be copied/cut if the SWITCH instruction which makes a pair with the selected ENDSWITCH instruction is not selected at the same time.
WHILE	Cannot be copied /cut if the ENDWHILE instruction which makes a pair with the selected WHILE instruction is not selected at the same time.
ENDWHILE	Cannot be copied/cut if the WHILE instruction which makes a pair with the selected ENDWHILE instruction is not selected at the same time.
FOR	Cannot be copied/cut if the NEXT instruction which makes a pair with the selected FOR instruction is not selected at the same time.
NEXT	Cannot be copied/cut if the FOR instruction which makes a pair with the selected NEXT instruction is not selected at the same time.
IFTHEN	Cannot be copied/cut if the ENDIF instruction which makes a pair with the selected IFTHEN instruction is not selected at the same time.

Structured Language	The motion when copy/cut the instruction
ELSEIF	Cannot be copied/cut by itself This instruction is copied/cut if the all instructions between IFTHEN and ENDIF including this instruction are selected.
ELSE	Cannot be copied/cut by itself This instruction is copied/cut if the all instructions between IFTHEN and ENDIF including this instruction are selected.
ENDIF	Cannot be copied/cut if the IFTHEN instruction which makes a pair with the selected ENDIF instruction is not selected at the same time.

Comment out

Some of the instructions cannot comment out the structured language without selecting the another instruction making a pair. The edit lock has no limitation.

Structured Language	The motion when comment out the instruction
SWITCH	Cannot be commented out if the ENDSWITCH instruction which makes a pair with the selected SWITCH instruction is not selected at the same time.
CASE	Cannot be commented out if the all instructions between SWITCH and ENDSWITCH including this CASE instruction are not selected.
DEFAULT	Cannot be commented out if the all instructions between SWITCH and ENDSWITCH including this DEFALT instruction are not selected.
ENDSWITCH	Cannot be commented out if the SWITCH instruction which makes a pair with the selected ENDSWITCH instruction is not selected at the same time.
WHILE	The ENDWHILE instruction which makes a pair with the selected WHILE instruction is commented out at the same time.
ENDWHILE	The WHILE instruction which makes a pair with the selected ENDWHILE instruction is commented out at the same time.
FOR	The NEXT instruction which makes a pair with the selected FOR instruction is commented out at the same time.
NEXT	The FOR instruction which makes a pair with the selected NEXT instruction is commented out at the same time.
IFTHEN	Cannot be commented out if the ENDIF instruction which makes a pair with the selected IFTHEN instruction is not selected at the same time.
ELSEIF	Cannot be commented out if the all instructions between IFTHEN and ENDIF including this ELSEIF instruction are not selected.
ELSE	Cannot be commented out if the all instructions between IFTHEN and ENDIF including this ELSE instruction are not selected.
ENDIF	Cannot be commented out if the IFTHEN instruction which makes a pair with the selected ENDIF instruction is not selected at the same time.

1.7.3   Multiplexing of the Structured Language

In a section where the structured language is used, another section of the structured language can be added.

In the following example, the process in the dotted line(repeating the 20 times of I001=1 to 20) is performed by the numbers in the solid line (repeating 10 times of I000=1 to 10). Therefore, "INC B000" is performed by 20x10=200 times.

```
NOP
SET B000 0
FOR I000=1 TO 10
   FOR I001=1 TO 20
      INC B000
   NEXT I001
NEXT I000
END
```

The level of multiplexing for the structured language is set by the following parameter.

Parameter	Description	Initial value
S2C694	Structured language Multiplexing max value 1 to 20 : able to be multiplexing level 1 to 20 Except above : able to be multiplexing till level 10	0

The following error is shown if the multiplexing above the set level is attempted.

   Error2271: Nesting level limit over

   Error sub-code: Multiplexing level max value +1

The added instruction is shown with the indent. Therefore, the difference of the level can be confirmed. The indent length per 1 level is set by the following parameter..

Parameter	Description	Initial value
S2C693	Structured language Number of the indent character when process the multiplexing of the structured language. 1 to 4 : the length of the indent 1 to 4 bytes 0 : the length of the indent 1 byte.	0

The length of the indent 1 byte

```
0000 NOP
0001 FOR I000 = 1 TO 10
0002   INC B000
0003 NEXT I000
0004 END
```

The length of the indent 4 bytes

```
0000 NOP
0001 FOR I000 = 1 TO 10
0002      INC B000
0003 NEXT I000
0004 END
```

1.7.4   Changes in the Format when Save the data to the External Device

If the job with the structured language is saved in the external device, there is the case that a format of instruction is different from the expression in the job content window.

IF ~ ELSEIF ~ ELSE ~ ENDIF statement (single condition)

Format in the JOB CONTENT window	Format when save into the external device
IF(IN#(1) = ON) THEN	IFTHENEXP IN#(1)=ON
DOUT OT#(1) ON	DOUT OT#(1) ON
ELSEIF(B000=1) THEN	ELSEIFEXP B000=1
DOUT OT#(2) ON	DOUT OT#(2) ON
ELSE	ELSE
DOUT OT#(3) ON	DOUT OT#(3) ON
ENDIF	ENDIF

IF ~ ELSEIF ~ ELSE ~ ENDIF statement (multiple condition)

Format in the JOB CONTENT window

IF(IN#(1)   = ON AND B000=0) THEN

    DOUT OT#(1) ON

ELSEIF(B000=1 AND (I000=2 OR D000=3)) THEN

    DOUT OT#(2) ON

 ELSE

   DOUT OT#(3) ON

 ENDIF

Format when save into the external device

IFTHENEXP IN#(1)=ON ANDEXP B000=0

    DOUT OT#(1) ON

ELSEIFEXP B000=1 ANDEXP (I000=2 OREXP D000=3)

    DOUT OT#(2) ON

ELSE

    DOUT OT#(3) ON

ENDIF

WHILE ~ ENDWHILE statement

*The multiple condition is divided by operator ANDEXP and OREXP as well as IFTHEN ~ ENDIF statement.

```
Format in the JOB CONTENT window
  WHILE ( IN#(1) =ON )

     DOUT OT#(1) ON

  ENDWHILE
```

```
Format when save into the external device
  WHILEEXP IN#(1)=ON

     DOUT OT#(1) ON

  ENDWHILE
```

SWITCH ~ CASE ~ DEFAULT ~ ENDSWITCH statement

The format does not change.

FOR ~ NEXT statement

The format does not change.

2　INFORM Explanation

2.1　I/O Instructions
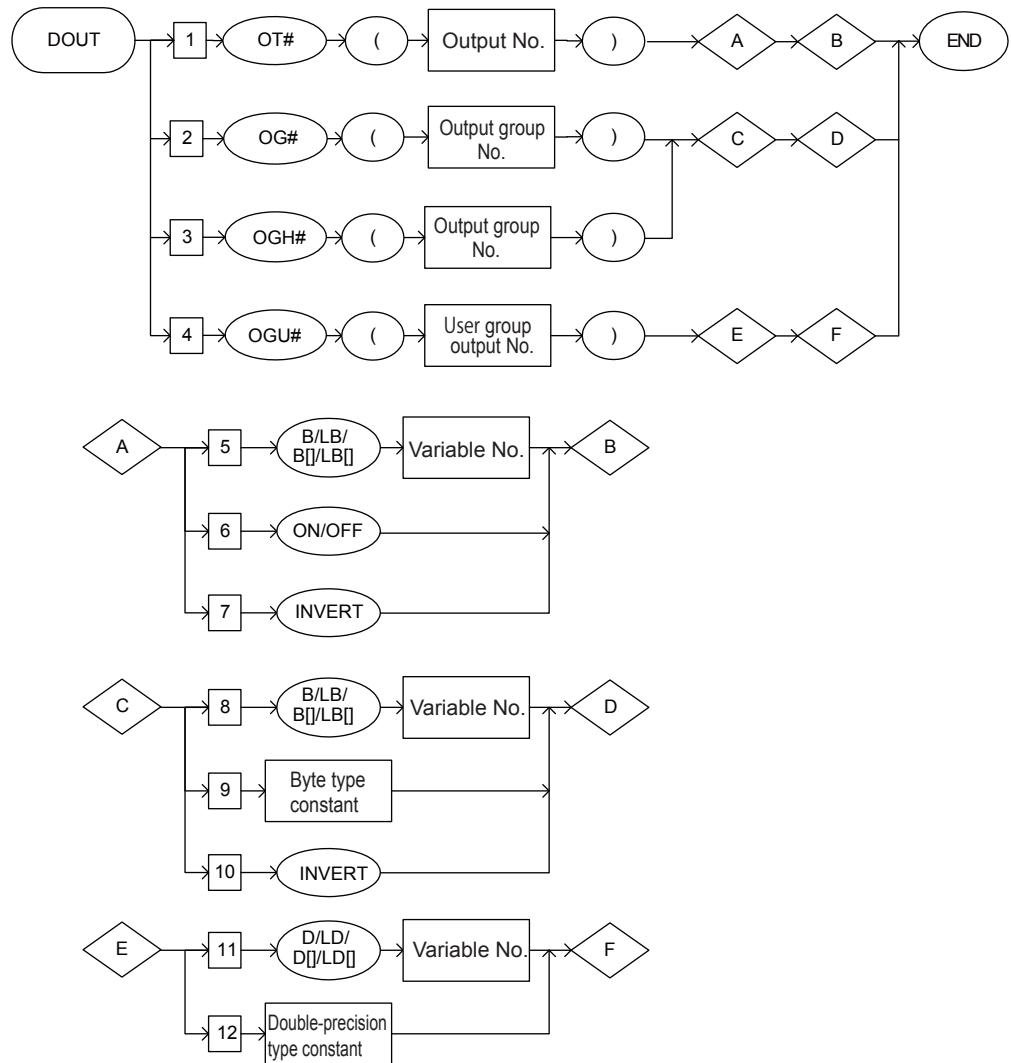
DOUT

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Turns the GP output signal ON and OFF.

Syntax

Explanation

1. OT# (Output number) /OG# (Output group number) / OGH# (Output group number)/OGU# (User group output number)

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	OT# (Output number)	Specify the number of output signal.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
2	OG# (Output group number)	Specify the group number of output signal (1group 8 points).	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
3	OGH# (Output group number)	Specify the group number of output signal (1group 4 points).	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.
4	OGU# (User group output number)	Specify the user group number of output signal	No:1 to 64 Variable B/I/D/LB/LI/LD can be used.

SUPPLE -MENT

Output signal

Output signal OT#(xx) is 1 point, OGH#(xx) is 1 group 4 points, and OG#(xx) is 1 group 8 points.

OT#(8)	OT#(7)	OT#(6)	OT#(5)	OT#(4)	OT#(3)	OT#(2)	OT#(1)
OGH#(2)				OGH#(1)			
OG#(1)							

The user group output OGU#(x) consists of the output signal which is set in the user group output setting file. For details and the setting procedure, refer to "User Group Input and Output" in YRC1000micro INSTRUCTIONS (RE-CTO-A222).

2. OT# (Output number) /OG# (Output group number) / OGH# (Output group number)

When OT# (output number) is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
5	B Variable number/ LB Variable number / B [Array number]/ LB [Array number]	The least significant bit of the specified byte type variable specifies on/off of the output signal.	Least significant bit: 0: OFF 1: ON
6	ON/OFF	Specify on/off of the output signal.	
7	INVERT	Refers the current signal status to output OFF when the status is ON, and output ON when the status is OFF.	

3. B Variable number / LB Variable number / B [Array number] / LB [Array number] / Byte type constant

When OG# (Output group number) or OGH# (Output group number) is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
8	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify ON/OFF of the corresponding output signal when the content of the specified byte type variable is expressed in bits.	bit: 0: OFF 1: ON
9	Byte type constant	When the specified byte type constant is expressed in bit form, the corresponding on/off output signal is specified.	
10	INVERT	Refers the current signal status to output OFF when the status is ON, and output ON when the status is OFF.	

4. D Variable number / LD Variable number / D [Array number] / LD [Array number] / Double-precision type constant

When OGU# (User group output number) is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify ON/OFF of the corresponding output signal when the content of the specified double precision type variable is expressed in bits.	bit: 0: OFF 1: ON
12	Double-precision type constant	Specify ON/OFF of the corresponding output signal when the specified double precision type constant is expressed in bits.	

Example

(1) DOUT OT#(12) ON
     GP output signal no. 12 is turned ON.

(2) SET B000 24
     DOUT OG#(3) B000
     B000=24(Decimal)= 00011000(Binary)

OT#(24)	OT#(23)	OT#(22)	OT#(21)	OT#(20)	OT#(19)	OT#(18)	OT#(17)
			OG#(3)				

ON

GP output signals nos. 20 and 21 are turned on.

(3) SET D000 -2147483648
     DOUT OGU#(6) D000
     <User group output setting：OGU#(6)>
     Star point: 40   Point: 32   Parity: NONE
     D000 = -2147483648 (Decimal) = 10000000000000000000000000000000
     (Binary)

OT#(47)	OT#(46)	OT#(45)	OT#(44)	OT#(43)	OT#(42)	OT#(41)	OT#(40)
OGU#(6)							

OT#(55)	OT#(54)	OT#(53)	OT#(52)	OT#(51)	OT#(50)	OT#(49)	OT#(48)
OGU#(6)							

OT#(63)	OT#(62)	OT#(61)	OT#(60)	OT#(59)	OT#(58)	OT#(57)	OT#(56)
OGU#(6)							

OT#(71)	OT#(70)	OT#(69)	OT#(68)	OT#(67)	OT#(66)	OT#(65)	OT#(64)
OGU#(6)							

                                                                    ON

GP output signal no.71 is turned ON.

2-4
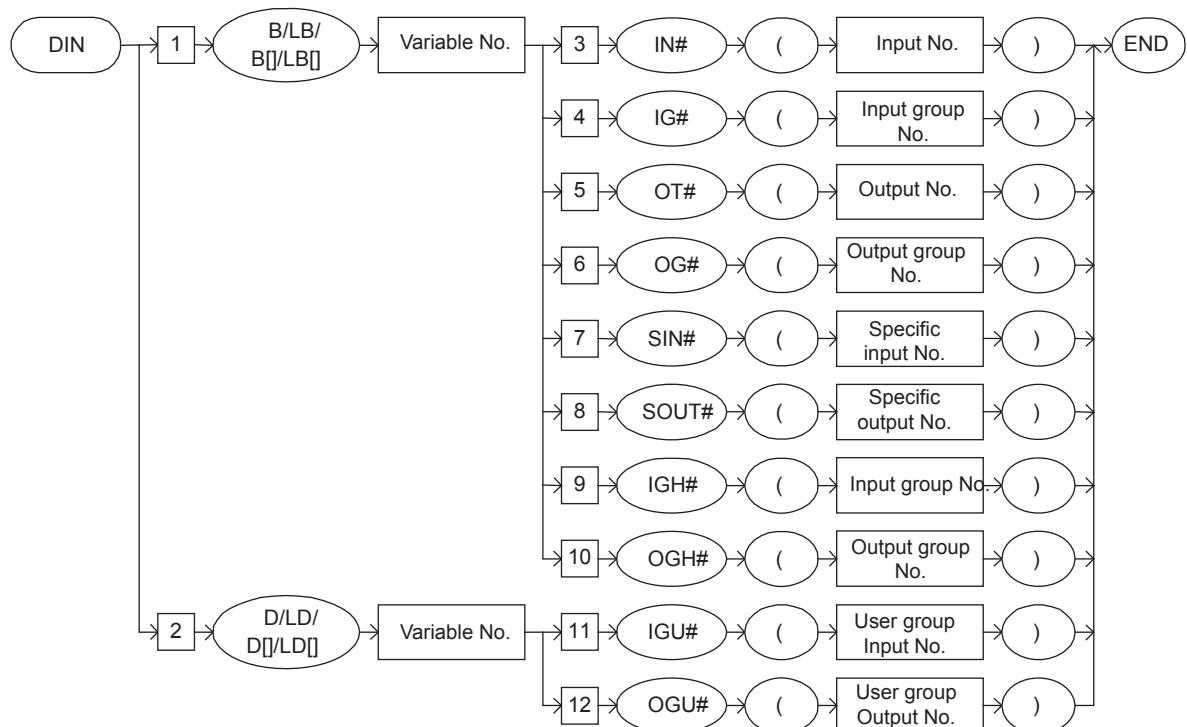
DIN

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

The signal status is read in the byte type/double precision type variable.

Syntax

Explanation

1. B Variable Number / LB Variable Number / B [Array Number] / LB [Array Number] / D Variable Number / LD Variable Number / D [Array Number] / LD [Array Number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	B Variable Number/ LB Variable Number/ B [Array Number]/ LB [Array Number]	Specify the number of byte type variable which reads the signal status.	
2	D Variable Number/ LD Variable Number/ D [Array Number]/ LD [Array Number]	Specify the number of double precision type variable which reads the signal status.	

2. IN#(Input number) / IG#(Input group number) / OT#(Output number) /OG#(Output group number) / SIN#(Specific input number) / SOUT#(Specific output number) / IGH#(Input group number) / OGH#(Output group number)

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, one of the tags is selected from the following table

No	Tag	Explanation	Note
3	IN# (Input number)	Specify the number of GP input signal to read the signal status	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
4	IG# (Input group number)	Specify the number of the GP input group (1 group 8 points) signal to read the signal status.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
5	OT# (Output number)	Specify the number of the GP output signal to read the signal status.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
6	OG# (Output group number)	Specify the number of the GP output group signal (1 group 8 points) to read the signal status.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
7	SIN# (Specific input number)	Specify the number of the specific input signal to read the signal status.	No:1 to 1280 Variable B/I/D/LB/LI/LD can be used.
8	SOUT# (Specific output number)	Specify the number of the specific output signal to read the signal status.	No:1 to 2400 Variable B/I/D/LB/LI/LD can be used.
9	IGH# (Input group number)	Specify the number of the GP input group (1 group 4 points) signal to read the signal status.	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.
10	OGH# (Output group number)	Specify the number of the GP output group (1 group 4 points) signal to read the signal status.	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.

3. IGU#(User group input number) / OGU#(User group output number)

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, one of the tags is selected from the following table

No	Tag	Explanation	Note
11	IGU#(User group input number)	Specify the number of the user group input signal to read the signal status.	No:1 to 64 Variable B/I/D/LB/LI/LD can be used.
12	IG#(User group output number)	Specify the number of the user group output signal to read the signal status.	No:1 to 64 Variable B/I/D/LB/LI/LD can be used.

SUPPLE-MENT   **Input signal**

Input signal IN#(xx) is 1 point, IGH#(xx) is 1 group 4 points, and IG#(xx) is 1group 8 points.

IN#(8)	IN#(7)	IN#(6)	IN#(5)	IN#(4)	IN#(3)	IN#(2)	IN#(1)
IGH#(2)				IGH#(1)			
IG#(1)							

The user group input IGU#(x) consists of the input signal which is set in the user group input setting file. For details and the setting procedure, refer to "User Group Input and Output" in YRC1000micro INSTRUCTIONS (RE-CTO-A222).

SUPPLE-MENT   When confirming information from multiple signals at the same time at a conditional branch of a job in the system where I/O is externally controlled, retrieve signal status using DIN and perform conditional branching of the job using the values of the signal status that have been retrieved.

Signal information will not be affected by external factors when information from multiple signals is retrieved at one time using DIN.

If signal information is retrieved for each signal separately, external controls during intervals between retrievals may change the information.

Example

(1) DIN B016 IN#(12)
The ON/OFF status of GP input signal no.12 is read in byte type variable No.16. When the GP input signal No.12 is on, the status of the GP input signal is B016=1 (decimal)=00000001(binary).

(2) DIN B002 OG#(8)
The ON/OFF status of GP output signal number from no. 57 to no.64 is read in byte type variable No.2.
In the following cases, the status of the GP output signal is B002=150 (decimal)= 10010110 (binary).

OT#(64)	OT#(63)	OT#(62)	OT#(61)	OT#(60)	OT#(59)	OT#(58)	OT#(57)
OG#(8)							

ON

(3) DIN D003 IGU#(9)
<User group input setting: IGU#(9)>
Star point: 40   Point: 32   Parity: NONE

The on/off status of the GP input number from no.40 to no.71 is read in the double precision type variable No.3.
In the following cases, the status of the GP input signal is D003 = -2147483648 (decimal) = 10000000000000000000000000000000 (binary).

IN#(47)	IN#(46)	IN#(45)	IN#(44)	IN#(43)	IN#(42)	IN#(41)	IN#(40)
IGU#(6)							

IN#(55)	IN#(54)	IN#(53)	IN#(52)	IN#(51)	IN#(50)	IN#(49)	IN#(48)
IGU#(6)							

IN#(63)	IN#(62)	IN#(61)	IN#(60)	IN#(59)	IN#(58)	IN#(57)	IN#(56)
IGU#(6)							

IN#(71)	IN#(70)	IN#(69)	IN#(68)	IN#(67)	IN#(66)	IN#(65)	IN#(64)
IGU#(6)							
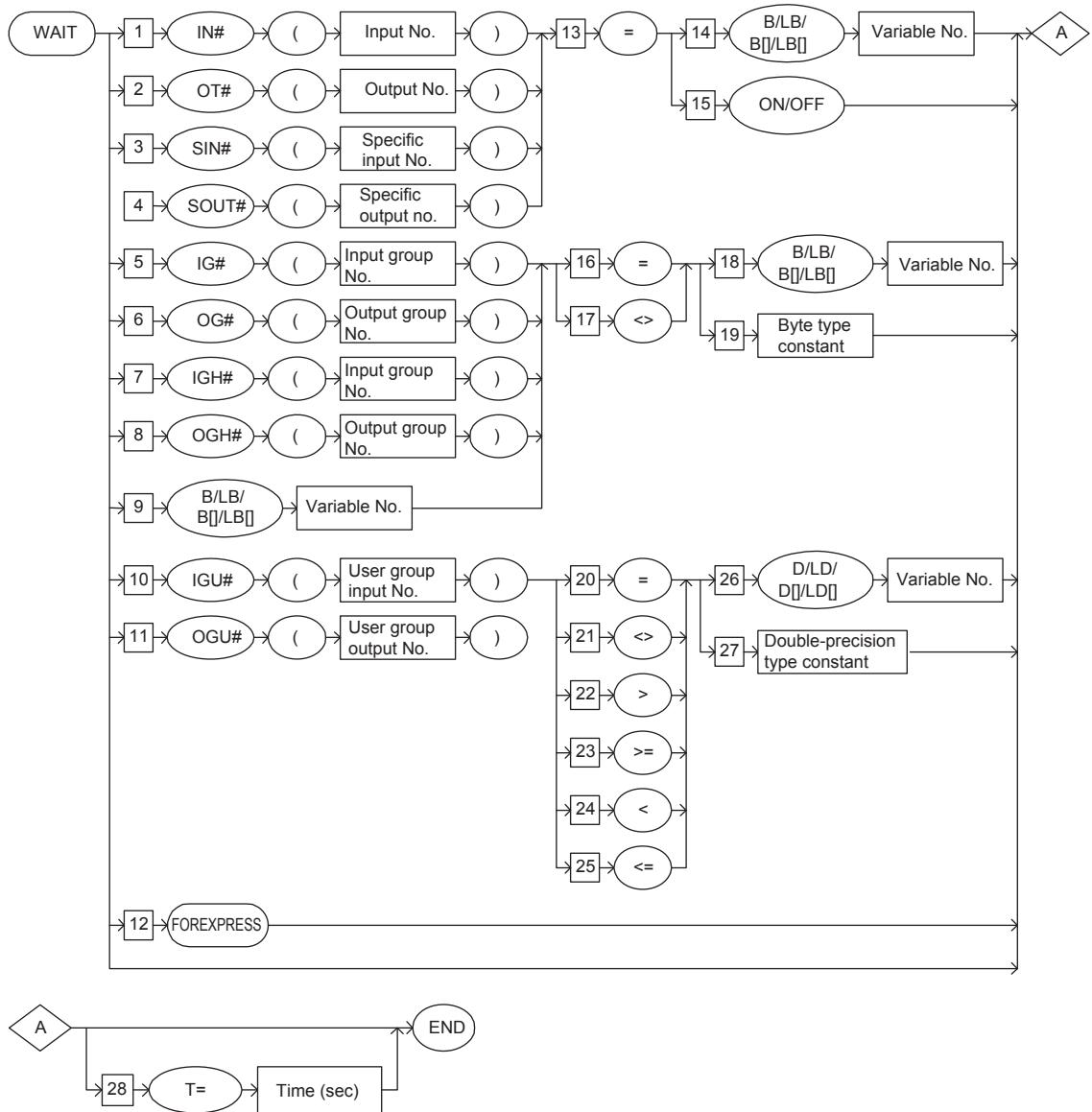
ON

WAIT

Function

Wait until the various statuses coincide with the specified status.

Syntax

<div style="border:1px solid black; display:inline-block; background:#1a1a1a; color:white; padding:4px 12px;">**Explanation**</div>

1. IN#(Input number) / OT#(Output number) / SIN#(Specific input numbe) / SOUT#(Specific output number) / IG#(Input group number) / OG#(Output group number) / IGH#(Input group number) / OGH#(Output group number) / B Variable Number / LB Variable Number / B[Array Number] / LB[Array Number] / IGU#(User group input number) / OGU#(User group output number) / FOREXPRESS

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	IN# (Input number)	Specify the number of the GP input signal for the waiting condition.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
2	OT# (Output number)	Specify the number of the GP output signal for the waiting condition.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
3	SIN# (Specific input number)	Specify the number of the specific input signal for the waiting condition.	No:1 to 1280 Variable B/I/D/LB/LI/LD can be used.
4	SOUT# (Specific output number)	Specify the number of the specific output signal for the waiting condition.	No:1 to 2400 Variable B/I/D/LB/LI/LD can be used.
5	IG# (Input group number)	Specify the number of GP input group (1 group 8 points) signal for the waiting condition.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
6	OG# (Output group number)	Specify the number of GP output group (1 group 8 points) signal for the waiting condition.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
7	IGH# (Input group number)	Specify the number of GP input group (1 group 4 points) signal for the waiting condition.	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.
8	OGH# (Output group number)	Specify the number of GP output group (1 group4 points) signal for the waiting condition.	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable for the waiting condition.	
10	IGU# (User group input number)	Specifythe number of the user group input signal for the waiting condition.	No:1 to 64 Variable B/I/D/LB/LI/LD can be used.
11	OGU# (User group output number)	Specify the number of the user group output signal for the waiting condition.	No:1 to 64 Variable B/I/D/LB/LI/LD can be used.
12	FOREXPRESS	Specify the FOREXPRESS instruction. The FOREXPRESS instruction evaluates various conditions.	Refer to *IFEXPRESS* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

2. =

When an IN# (input number), OT# (output number), SIN# (specific input number), or SOUT# (specific output number) is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
13	=	It is equal.	

3. B Variable number /LB Variable number / B [Array number] / LB [Array number] / ON / OFF

When an IN# (input number), OT# (output number), SIN# (specific input number), or
SOUT# (specific output number) is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table after the equal sign (=) is added from the table in part 2 of this Explanation.

No	Tag	Explanation	Note
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify byte type variable which becomes a waiting condition.	Least significant bit: 0:OFF 1:ON
15	ON/OFF	Specify on/off of the waiting condition.	

4. =/<>

When an IG# (input group number), OG# (output group number), IGH# (input group number), OGH# (output group number), B variable number, LB variable number, B [array number], or LB [array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
16	=	It is equal.	
17	<>	It is not equal.	

5. B Variable number / LB Variable number / B [Array number] / LB [Array number] / Byte type constant

When an IG# (input group number), OG# (output group number), IGH# (input group number), OGH# (output group number), B variable number, LB variable number, B [array number], or LB [array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table after "=" or "<>" are added from the table in part 4 of this Explanation.

No	Tag	Explanation	Note
18	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify byte type variable which becomes a waiting condition.	
19	Byte type constant	The waiting condition is specified by byte type constant.	

6. = / <> / > / >= / < / <=

When an IGU# (user group input number), or OGU# (user group output number) is selected from the table in part 1 of this Explanation, one of the tags is selected from the following table

No	Tag	Explanation	Note
20	=	It is equal.	
21	<>	It is not equal.	
22	>	It is greater than.	
23	>=	It it greater than or equal.	
24	<	It is less than.	
25	<=	It is less than or equal.	

7. D Variable number /LD Variable number / D [Array number] / LD [Array number] / Double-precision type constant

When either OG# (output group number), or OGH# (output group number) is selected from the table in part 1 of this Explanation, one of the tags is selected from the following table after one of the signs (= / <> / > / >= / < / <=) is added from the table in part 6 of this Explanation.

No	Tag	Explanation	Note
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double-precision type variable which becomes a waiting condition.	
27	Double-precision type constant	Specify the waiting condition by the double precision type constant.	

8. T=time

The following tag can be added or omitted.

No	Tag	Explanation	Note
28	T=time	Specify the waiting time. When the condition is specified and the specified waiting time passes, the next instruction is executed even if the various statuses do not coincide with the condition.	Time: 0.001 to 65.535 seconds It is possible to specify at time by the I/LI/I/LI variable (Units: 0.001 seconds).

Example

(1) WAIT IN#(12)=ON
Waits until GP input signal no.12 is turned on.

(2) SET B000 5
SET B002 16
WAIT SIN#(B000)=B002 T=3.000
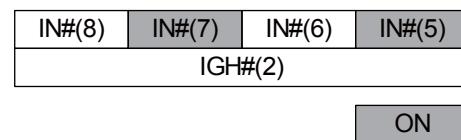
B002=16 (Decimal)=00010000 (Binary)
Waits until specific input signal no.5 is turned off.
However, after three seconds, even if the signal is not turned off,
the next instruction is executed.

(3) WAIT IGH#(2)<>5
5 (Decimal)=0101 (Binary)

IN#(8)	IN#(7)	IN#(6)	IN#(5)
IGH#(2)			

	ON
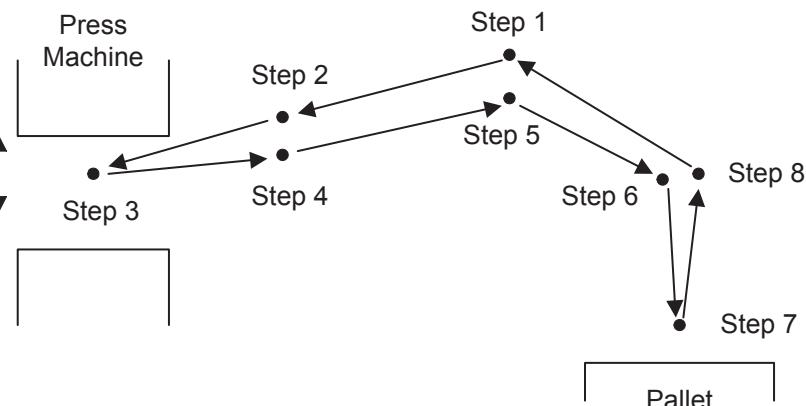
Waits until GP input signal nos.5 and 7 are turned off and GP input
signal nos. 6 and 8 are turned on.

(4) Operation example

```
000 NOP
001 MOVJ VJ=100.0
002 MOVJ VJ=100.0
    WAIT IN#(1)=ON
003 MOVJ VJ=100.0
004 MOVJ VJ=100.0
005 MOVJ VJ=100.0
006 MOVJ VJ=100.0
007 MOVJ VJ=100.0
008 MOVJ VJ=100.0
009 END
```

Press Machine

Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 8

Pallet

The robot cannot be moved to step 3 while the press is closed.
Open/close of the press machine (Open: ON, Shut: OFF) is allo-
cated to GP input signal No.1.
The robot waits until GP input signal No.1 turns on at step 2.

2-13

PULSE

SUBSET	STANDARD	EXPANDED
Available	Available	Available
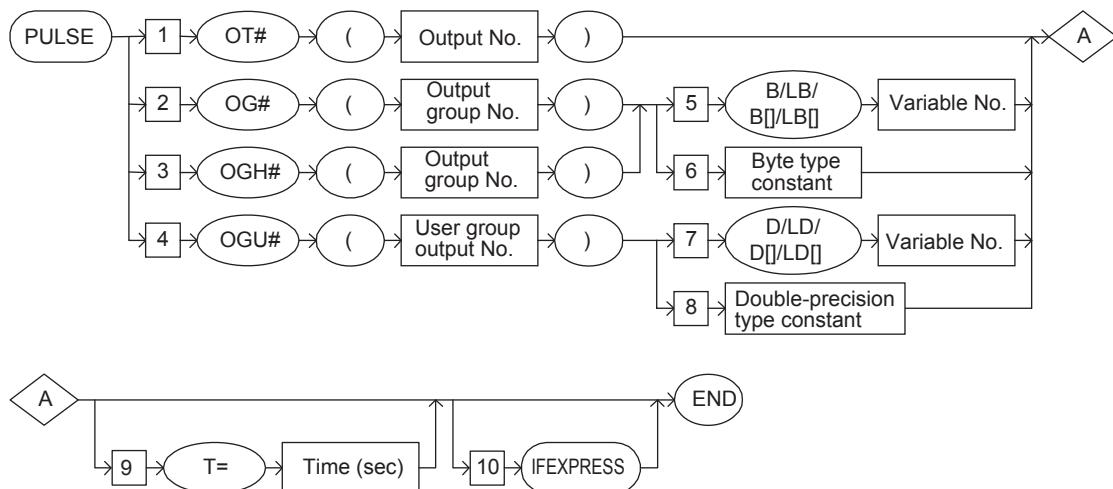
Function

The pulse signal is output to the GP output signal only for the specified time.

The PULSE instruction executes the next instruction without waiting for the completion of pulse output (the specified output time).
However, in case the pulse output of the previous executed PULSE instruction is not completed, this time PULSE instruction is executed after the completion when the instruction is executed continuously for the same signal.

Syntax

Explanation

1. OT# (output number) / OG# (output group number) / OGH# (output group number)/OGU# (user output group number)

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	OT# (Output number)	Specify the number of the signal to which the pulse signal is output.	No.: 1 to 4096 Variable B/I/D/LB/LI/ LD can be used.
2	OG# (Output group number)	Specify the group number of the signal (1 group 8 points) to which the pulse signal is output.	No.: 1 to 512 Variable B/I/D/LB/LI/ LD can be used.
3	OGH# (Output group number)	Specify the group number of the signal (1 group 4 points) to which the pulse signal is output.	No.: 1 to 1024 Variable B/I/D/LB/LI/ LD can be used.
4	OGU# (User group output number)	Specify the user group number of output signal	No.: 1 to 64 Variable B/I/D/LB/LI/ LD can be used.

2. B Variable number / LB Variable number / B [Array number] / LB [Array number] / Byte type constant

When OG# (output group number) or OGH# (output group number) in the above table is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
5	B Variable number/ LB Variable number/ B [Array Number] / LB [Array Number]	Specify ON/OFF of the corresponding pulse output signal when the content of the specified byte type variable is expressed in bits.	Bit: 0: OFF 1: ON
6	Byte type constant	Specify ON/OFF of the corresponding pulse output signal when the specified byte type constant is expressed in bits.	

3. D Variable number / LD Variable number / D [Array number] / LD [Array number] / Double-precision type constant

When OGU# (User group output number) is selected from the table in part 1 of this Explanation, one of the tags is selected from the following table.

No.	Tag	Explanation	Note

7	D Variable number/ LD Variable number/ D [Array Number] / LB [Array Number]	Specify ON/OFF of the corresponding pulse output signal when the content of the specified double precision type variable is expressed in bits.	Bit:
			  0: OFF
			  1: ON

8	Double-precision type constant	Specify ON/OFF of the corresponding pulse output signal when the specified double precision type constant is expressed in bits.	

4. T=Time

The following tag can be added or omitted.

No.	Tag	Explanation	Note
9	T=Time	Specify the time to output. The pulse signal is output during the specified time T.	Time: 0.001 to 65.535 seconds It is possible to specify at time by the I/LI/I[]/LI[] variable (Units: 0.001 seconds). When the time is not specified, the pulse signal is output during 0.300 seconds.

5. IFEXPRESS

The following tag can be added or omitted.

No.	Tag	Explanation	Note
10	IFEXPRESS	Specify the IFEXPRESS instruction. The IFEXPRESS instruction evaluates various conditions and specifies the condition to execute the PULSE instruction.	Refer to *IFEXPRESS* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

Example
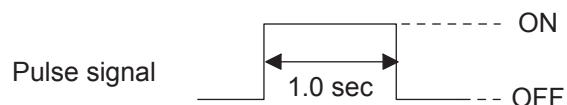
(1) PULSE OT#(128)
     The pulse signal is output for 0.300 seconds to GP output signal
     No.128.

(2) SET B000 5
      PULSE OT#(B000) T=1.000

     The pulse signal is output for 1.000 seconds to GP output signal
     No.5.

(3) SET B000 24
     PULSE OG#(3) B000

     B000=24 (Decimal)=00011000 (Binary)

OT#(24)	OT#(23)	OT#(22)	OT#(21)	OT#(20)	OT#(19)	OT#(18)	OT#(17)
OG#(3)							

ON

     The pulse signal is output for 0.300 seconds to the GP output sig-
     nal No. 20 and 21.

ANTOUT

The ANTOUT instruction can be used only with parameter S4C008.

SUBSET	STANDARD	EXPANDED	Parameter
Not available	Available	Available	S2C646

Function

Carries out the anticipation output function to adjust the timing of the signal output.

Anticipation output function

SUPPLE
-MENT

This is a function to advance/delay the timing for output of 32 GP output signals and 16 GP output group signals.

The signal can be output before or after the manipulator reaches the step.
The anticipation output function is a signal output timing adjustment function to advance or delay the output timing of 32 general-purpose output signals and 16 general-purpose output group signals. The signal can be output before or after the manipulator reaches the step.

This function corrects work timing errors due to delays in the motions of a peripheral device and/or the manipulator.

Setting the time to a negative value (-) advances the signal output.
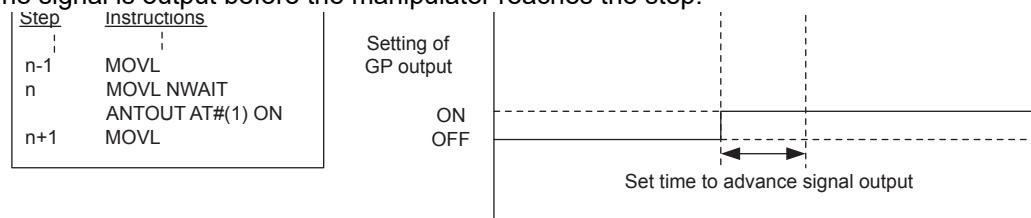
This can be used to correct work timing errors due to delays in the motions of a peripheral device.

Setting the time to a positive value (+) delays the signal output.

This can be used to correct work timing errors due to delays in the motions of the manipulator.

<Advanced signal output>
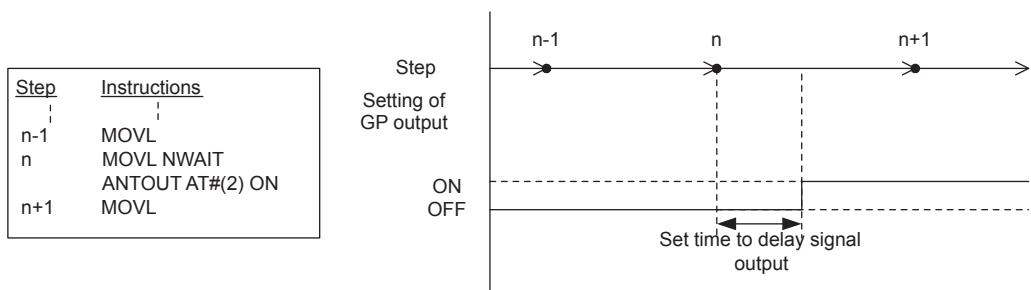
The signal is output before the manipulator reaches the step.

```
Step     Instructions

n-1      MOVL
n        MOVL NWAIT
         ANTOUT AT#(1) ON
n+1      MOVL
```

Setting of
GP output

ON
OFF

Set time to advance signal output

<Delayed signal output>
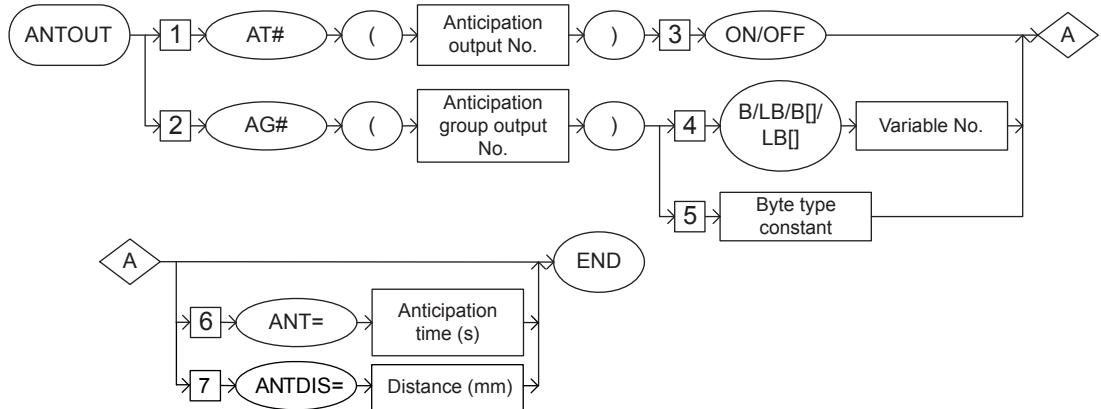
The signal is output after the manipulator reaches the step.

```
Step     Instructions

n-1      MOVL
n        MOVL NWAIT
         ANTOUT AT#(2) ON
n+1      MOVL
```

Step

n-1   n   n+1

Setting of
GP output

ON
OFF

Set time to delay signal output

Syntax

Explanation

1. AT# (Anticipation output number) / AG# (Anticipation group output number)
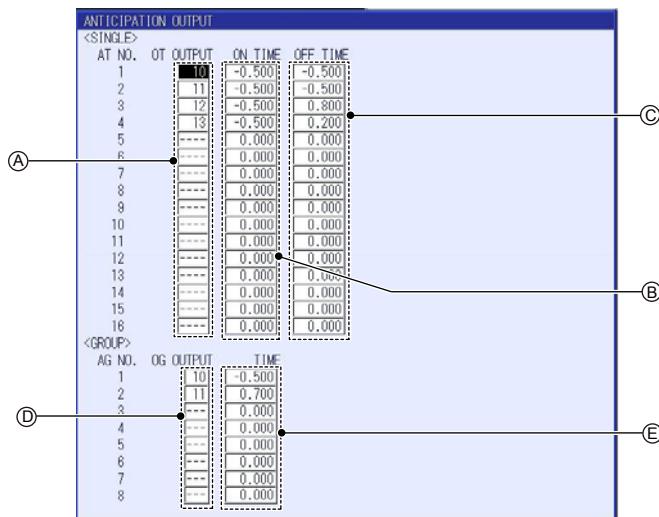
One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	AT# (Anticipation output number)	Specify the number of the signal whose timing is adjusted.	No.: 1 to 32 Variable B/I/D/LB/LI/LD can be used.
2	AG# (Anticipation group output number)	Specify the group number of the signal whose timing is adjusted.	No.: 1 or 16 Variable B/I/D/LB/LI/LD can be used.

SUPPLE
-MENT

Settings for the anticipation output signal

Set the number of the output signal for the anticipation output in the ANTICIPATION OUT-PUT display.

A. OT OUTPUT (Setting range: 1 to 4096)

Allocate the number of the general-purpose output whose signal timing is to be adjusted to AT NO. 1 to 32.

B. ON TIME (Setting range: -32.768 to 32.767 seconds)

Set the delay/advance time for turning ON the signal.

C. OFF TIME (Setting range: -32.768 to 32.767 seconds)

Set the delay/advance time for turning OFF the signal.

D. OG OUTPUT (Setting range: 1 to 512)

Allocate the group number of the general-purpose output whose signal timing is to be adjusted to AG NO. 1 and 16.

E. TIME (Setting range: -32.768 to 32.767 seconds)

Set the delay/advance time for carrying out the group output.

2. ON/OFF

When an AT# (anticipation output number) is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
3	ON/OFF	Specify the ON/OFF status of the signal whose output timing is adjusted.	

3. B Variable number / LB Variable number / B [Array number] / LB [Array number] / Byte type constant

When an AG# (anticipation group output number) is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note

4	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify ON/OFF of the corresponding output signal when the content of the specified byte type variable is expressed in bits.	Bit:
			  0: OFF
			  1: ON

5	Byte type constant	Specify ON/OFF of the corresponding output signal when the specified byte type constant is expressed in bits.	

4. ANT=Anticipation time

The following tag can be added or omitted.

No.	Tag	Explanation	Note
6	ANT=Anticipation time	Specify the timing of the anticipation time for the output signal timing.	Units: seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.001 seconds) When the time is not specified, the time set in the anticipation file is applied.

5. ANTDIS=Distance
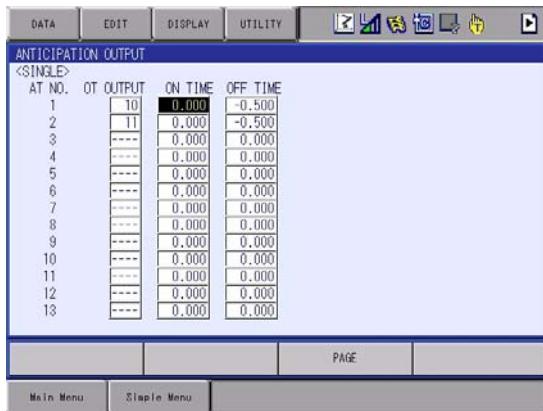
The following tag can be added or omitted.

No.	Tag	Explanation	Note
7	ANTDIS=Distance	Specify the anticipation distance for the output signal timing.	Units: mm Variable I/LI/I[]/LI[] can be used. (Units: 0.01 mm) When the distance is not specified, the time set in the anticipation file is applied.

Example

(1) Step   Instructions
     n-1   MOVL V=100
     n   MOVL V=100 NWAIT
                           ANTOUT AT#(1) ON
     n+1   MOVL V=100

Turns ON the general-purpose signal number 10 0.5 seconds before the manipulator reaches the step.(Advanced signal output)

2-22

2.2   Control Instruction
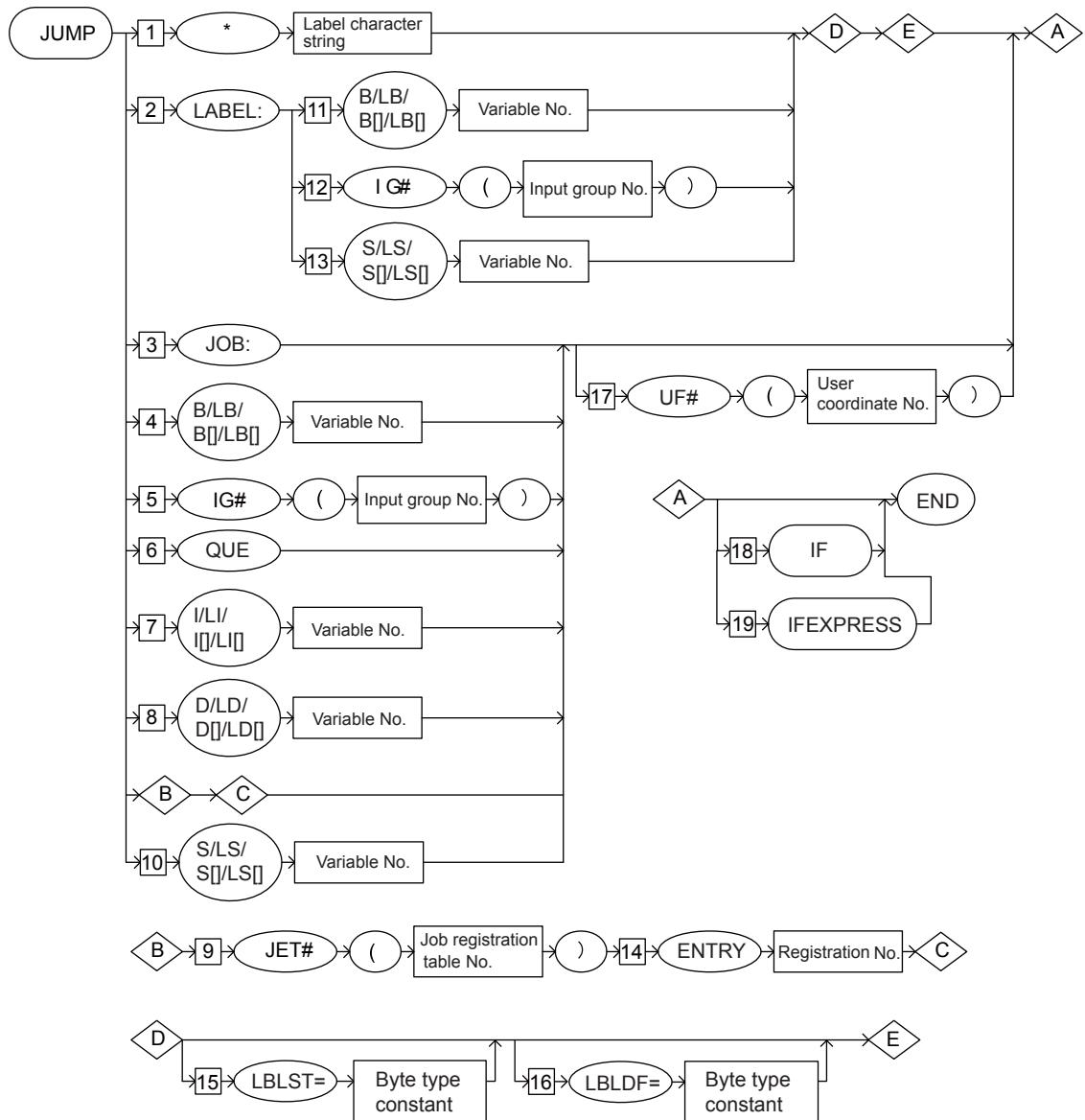
JUMP

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Jumps to specified label or job.

Syntax

Explanation

1. ***Label character string /LABEL:/JOB:/B Variable number /LB Variable number /B [Array number] /LB [Array number] /IG# (Input group number) / QUE/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/ D [Array number]/LD [Array number]/ JET# (Job registration table number)/S Variable number/LS Variable number/ S [Array number]/LS [Array number]**

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	*Label strings	Specify the label string.	String: eight characters
2	LABEL:	The numerical value specified by byte type variable or input group number is considered a label.	
3	JOB:	Specify the job.	
4	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	The numerical value specified by byte type variable is considered to be a job.	
5	IG#(Input group number)	The numerical value specified by the input group number is considered to be a job. When the input group number is IG#(x)≠0, a jump to the job of the numerical value is executed.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
6	QUE	A jump to the job stored in the queue is executed.	Available only in the queue function (option: S2C641).
7	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	The numerical value specified by the integer type variable is considered to be the job.	
8	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	The numerical value specified by the double-precision type variable is considered to be the job.	
9	JET# (Job registration table number)	Specify the job registration table number. The job of the jump destination can be registered in the job registration table.	No.: 1 to 3 Variable B/I/D/LB/LI/LD can be used. Available only with the job registration table function (option: S2C443)
10	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	The character string specified by the character string type variable is considered to be the job.	

2. B Variable number / LB Variable number / B [Array number] / LB [Array number] / IG# (Input group number)/S Variable number / LS Variable number / S [Array number] / LS [Array number]

When a LABEL: is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table/

No	Tag	Explanation	Note
11	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable in which the numerical value for the label is set.	
12	IG#(Input group number)	Specify the input group number of the numerical value for the label.	No:1 to 512 B/I/D/LB/LI/LD Variable can be used.
13	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the character string type variable in which the character string for the label is set.	

3. ENTRY=Registration number

When a JET#(job registration table number) is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
14	ENTRY=Registration number	Specify the registration number of the job registered in the specified job registration table.	No.: 1 to 1024 Variable B/B[]/LB/LB[]/I/ I[] can be used.

4. LBLST=Search starting position

When a *label character string "LABEL" is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
15	LBLST=Search starting position	Specify the search position of the label.	No.: 0 to 2 0: Job tip 1: Current position (Default) 2: End

5. LBLDF=Search direction

When a *label character string "LABEL" is selected from the table in part 1 of this Explanation, the following tag can be added.

No.	Tag	Explanation	Note
16	LBLDF=Search direction	Specify the search direction number of the label.	No.: 0 to 1 0: Search forward (Default) 1: Search backward

6. UF# (User coordinate number)

When JOB:, B variable number, LB variable number, B [Array number], LB [Array number], IG# (Input group number), QUE, I Variable number, LI Variable number, I [Array number], LI [Array number], D Variable number, LD Variable number, D [Array number], LD [Array number], or JET# (Job registration table number) is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
17	UF# (User coordinate number)	Specify the coordinates of the job.	Available only in the relative job function.

7. IF / IFEXPRESS

One of the tags can be selected from the following table.

No	Tag	Explanation	Note
18	IF	Specify the IF instruction. The IF instruction evaluates various conditions.	Refer to *IF* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
19	IFEXPRESS	Specify the IFEXPRESS instruction. The IFEXPRESS instruction evaluates various conditions.	Refer to *IFEXPRESS* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

Example

(1)   JUMP *1
        Jumps to *1.

(2)   JUMP JOB:TEST1 UF#(2)
        Jumps to the job named TEST1. TEST1 works in user coordinate
        system No.2.

(3)   SET B000 1
        JUMP B000 IF IN#(14)=ON
        If input signal no.14 is on, it jumps to job "1".

2-26
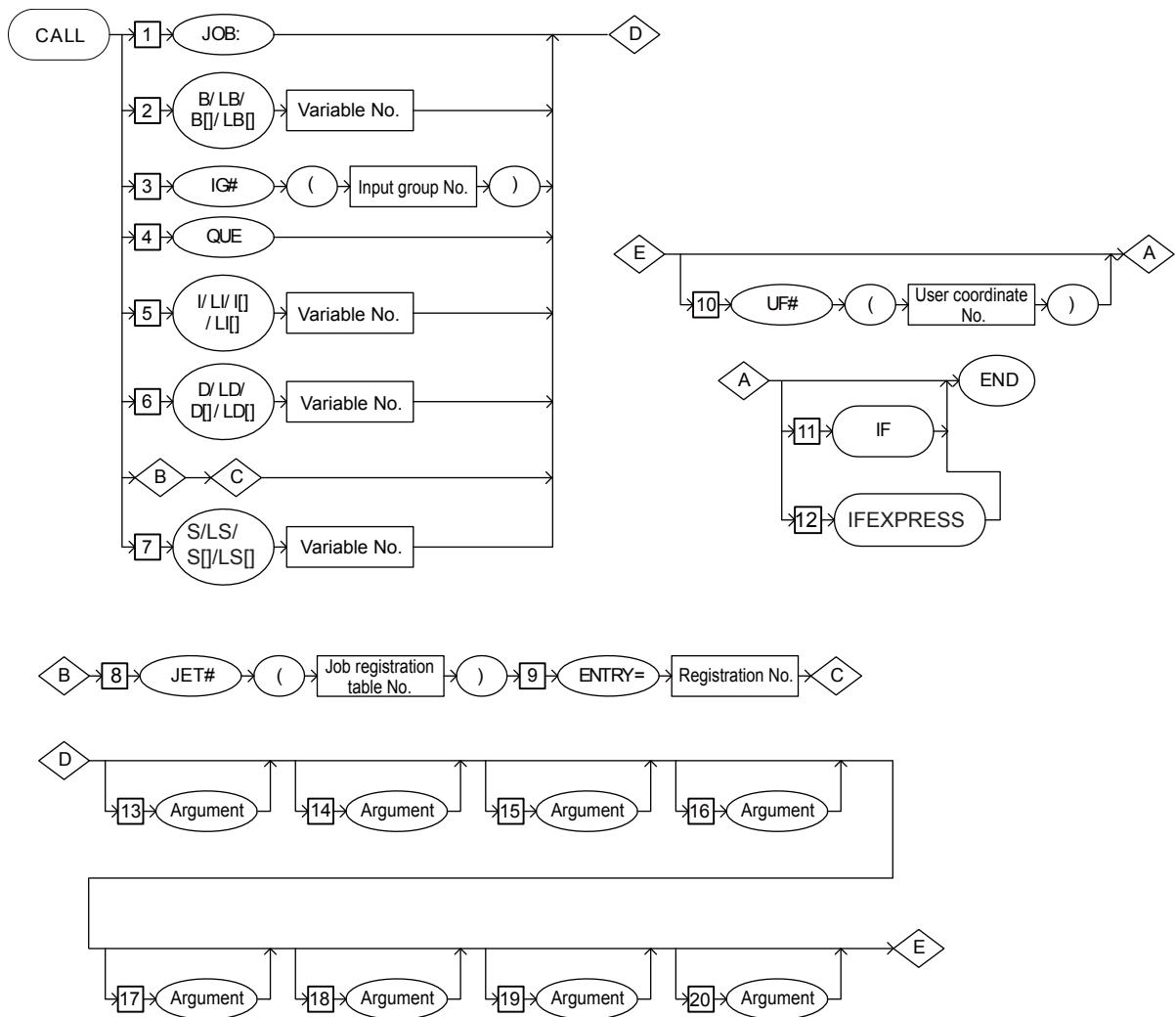
CALL

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Calls the specified job.

Syntax

```
Argument ──▶┌─┐─▶╭───────╮─▶┌──────────────┐─────────────────▶╭───────╮
            │1│  │ B/ LB │   │ Variable No. │                  │ E N D │
            └─┘  ╰───────╯   └──────────────┘                  ╰───────╯
            ┌─┐─▶╭───────╮─▶┌──────────────┐─────────────────▶
            │2│  │ I/LI  │   │ Variable No. │
            └─┘  ╰───────╯   └──────────────┘
            ┌─┐─▶╭───────╮─▶┌──────────────┐─────────────────▶
            │3│  │ D/LD  │   │ Variable No. │
            └─┘  ╰───────╯   └──────────────┘
            ┌─┐─▶╭───────╮─▶┌──────────────┐─────────────────▶
            │4│  │ R/LR  │   │ Variable No. │
            └─┘  ╰───────╯   └──────────────┘
            ┌─┐─▶╭───────╮─▶┌──────────────┐─────────────────▶
            │5│  │ S/LS  │   │ Variable No. │
            └─┘  ╰───────╯   └──────────────┘
            ┌─┐─▶╭───────╮─▶┌──────────────┐─────────────────▶
            │6│  │ P/LP  │   │ Variable No. │
            └─┘  ╰───────╯   └──────────────┘
            ┌─┐─▶╭───────╮─▶┌──────────────┐─────────────────▶
            │7│  │ BP/LBP│   │ Variable No. │
            └─┘  ╰───────╯   └──────────────┘
            ┌─┐─▶╭───────╮─▶┌──────────────┐─────────────────▶
            │8│  │ EX/LEX│   │ Variable No. │
            └─┘  ╰───────╯   └──────────────┘
            ┌─┐─▶┌───────────────────┐───────────────────────▶
            │9│  │ Byte type constant│
            └─┘  └───────────────────┘
            ┌──┐─▶┌──────────────────┐──────────────────────▶
            │10│  │ Integer type     │
            └──┘  │ constant         │
                  └──────────────────┘
            ┌──┐─▶┌──────────────────┐──────────────────────▶
            │11│  │ Double-precision │
            └──┘  │ type constant    │
                  └──────────────────┘
            ┌──┐─▶┌──────────────────┐──────────────────────▶
            │12│  │ Real type        │
            └──┘  │ constant         │
                  └──────────────────┘
            ┌──┐─▶┌──────────────────┐──────────────────────▶
            │13│  │ Character type   │
            └──┘  │ constant         │
                  └──────────────────┘
```
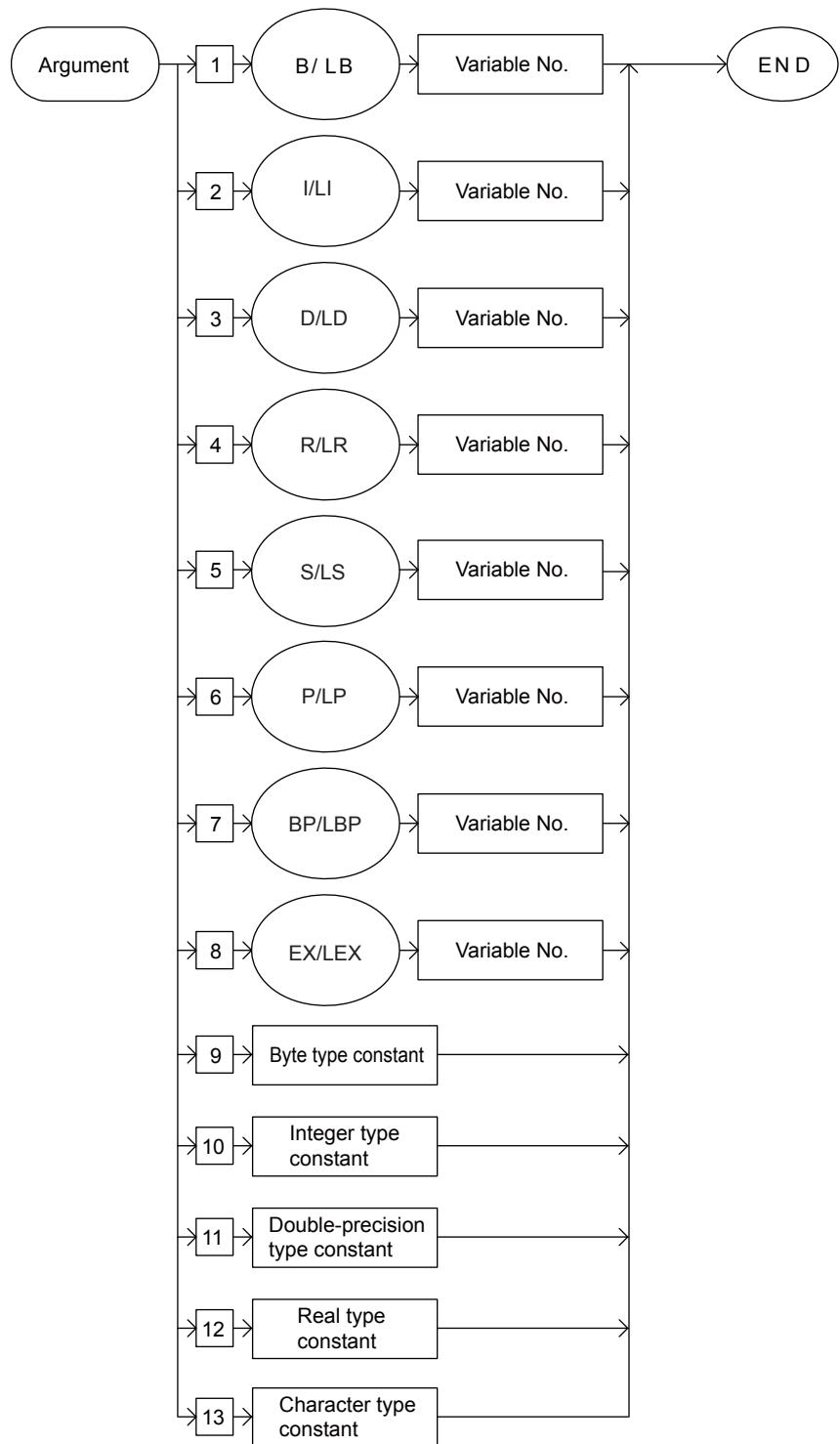
Explanation

1. JOB: / B Variable number / LB Variable number / B [Array number] / LB [Array number] / IG#(Input group number) / QUE/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/ D [Array number]/ LD [Array number]/ JET# (Job registration table number)/S Variable number/LS Variable number/ S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	JOB:	Specify a job to be called.	
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	The numerical value specified by the byte type variable is considered as the job to be called.	
3	IG# (Input group number)	The numerical value specified by the input group number is considered as the job to be called.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
4	QUE	The job stored in the queue is called.	Available only in the queue function (option: S2C641).
5	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	The numerical value specified by the integer type variable is considered as the job to be called.	
6	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	The numerical value specified by the double-precision type variable is considered as the job to be called.	
7	JET# (Job registration table number)	Specify the table number of the job registration. The job to be called can be registered in the job registration table.	No.: 1 to 3 Variable B/I/D/LB/LI/LD can be used. Available only in the job registration table function (option: S2C443)
8	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	The character string specified by the character string type variable is considered to be the job.	

2-29

2. ENTRY=Registration number

When a JET#(job registration table number) is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
9	ENTRY=Registration number	Specify the registration number of the job registered in the specified job registration table.	No.: 1 to 1024 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[] can be used.

3. UF# (User coordinate number)

The following tag can be added or omitted.

No	Tag	Explanation	Note
10	UF# (User coordinate number)	Specify the user coordinate system of the job to be called.	Available only in the relative job function.

4. IF/IFEXPRESS

Select one of the following tags.

No	Tag	Explanation	Note
11	IF	Specify the IF instruction.	Refer to *IF* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*
12	IFEXPRESS	Specify the IFEXPRESS instruction. The IFEXPRESS instruction evaluates various conditions.	Refer to *IFEXPRESS* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

5. Argument

The following tag can be added or omitted.

No	Tag	Explanation	Note
13 to 20	Argument (all types of variables and constants)	Eight arguments (from 12 to 19) can be passed to the job to be called. All types of variables and constants can be used as arguments.	

2-30

Example

 (1) CALL JOB:TEST1
    The job named TEST1 is called.

 (2) SET B000 1
    CALL B000 IF IN#(14)=ON
    If input signal No.14 is on, it calls the job "1".

5. 1 Outline (CALL Instruction with Argument)

The CALL can pass 8 arguments to the called job. Also, the RET instruction can return the one return value to the calling job. This enables the transfer of information without using the global variable to pass information. Thus, it makes the management of information easier, the number of lines of the calling job fewer, and the process simpler.

(1) CALL Instruction with Argument

For example, when creating the job which only waits for incoming in order to wait for the incoming of I/Os, the input number's incoming to be waited for had to be set to the global variable, and the information had to be passed from the calling job to the called job. For example, the case when the input of specified three points are IN#(1), IN#(5), and IN#(7) is as follows:

<Calling Job>

NOP

SET B000 1

SET B001 5

SET B002 7

CALL JOB: WAIT_INPUT

          :

<Called Job>

Job name: WAIT_INPUT

NOP

WAIT IN#(B000)   ON

WAIT IN#(B001)   ON

WAIT IN#(B002)   ON

RET

This makes the calling job program long, and the global variable will be used only for this information transfer.

By using the CALL instruction with argument, the above can be described as follows:

<Calling Job>

NOP

CALL JOB: WAIT_INPUT (1, 5, 7)

          :

<Called Job>

Job name: WAIT_INPUT

NOP

GETARG LB000, IARG#(1)// INPUT NUMBER 1 (receiving the argument 1)

GETARG LB001, IARG#(2)// INPUT NUMBER 2 (receiving the argument 1)

GETARG LB002, IARG#(3)// INPUT NUMBER 3 (receiving the argument 1)

WAIT IN#(LB000)   ON

WAIT IN#(LB001)   ON

WAIT IN#(LB002)   ON

RET

This makes the calling job program only one-line long. Also, the called job can be made by using only the local variable.

(2) RET Instruction with Return Value

For example, to create the job which adds any two register values, the register number had to be passed from the calling job, and in the called job, the calculation result had to be entered in any of the global variable, then the calling job has to refer to that. This can be described as follows:

<Calling Job>

NOP

SET B000 1

SET B001 2

CALL JOB: ADD_REG

GET I0100   I099   ; Returns the calculation result to I099

<Called Job>

Job name: ADD_REG

NOP

GETREG I000 MREG#(B000)

GETREG I099 MREG#(B001)

ADD I099 I000

RET

By using the CALL instruction with argument and the RET instruction with return value, the above can be described as follows:

<Calling Job>

NOP

CALL JOB: ADD_REG (1, 2)

GETS I001 $RV   ; Receives the addition result as the return value at $RV

<Called Job>

Job name: ADD_REG

NOP

GETARG   LB000   IARG#(1)// Register 1

GETARG   LB001   IARG#(2)// Register 2

GETREG LI000 MREG#(LB000)

GETREG LI001 MREG#(LB001)

ADD LI001 I000

RET LI001   ; Returns the addition result as the return value

Thus, the global variable to receive and pass the answer is no longer necessary.

5. 2 Operating Procedure

(1) Addition of Argument to CALL Instruction

1) Creating a Called Job

As an example, the job which resets 8 I/Os specified by arguments is created as follows:
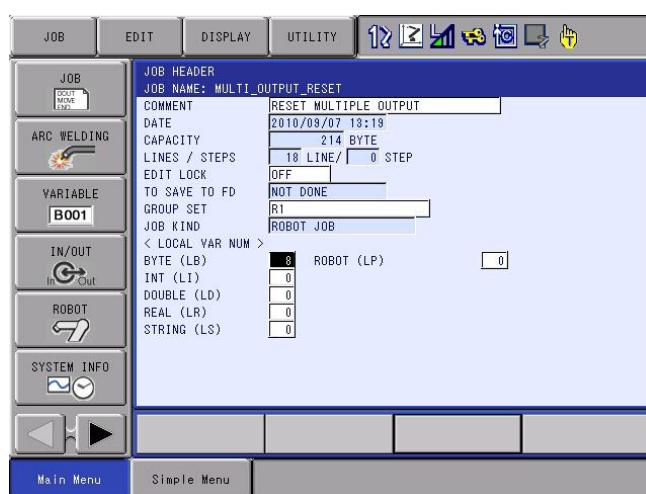
1. Create a job.
    As the example below, the job "MULTI_OUTPUT_RESET" is created.
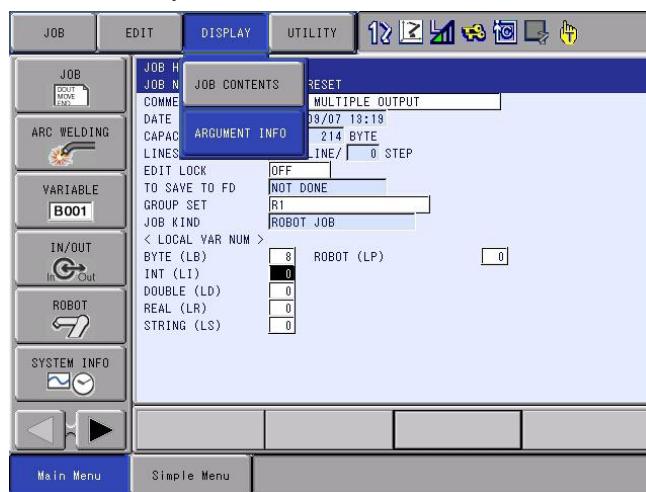
2. Register local variables.
    Arguments will be received by local variables. Thus, at least, the local variables to receive arguments must be defined. In the example, 8 byte-type variables are defined.
    Open "JOB HEADER" and make the setting of <LOCAL VAR NUM>.
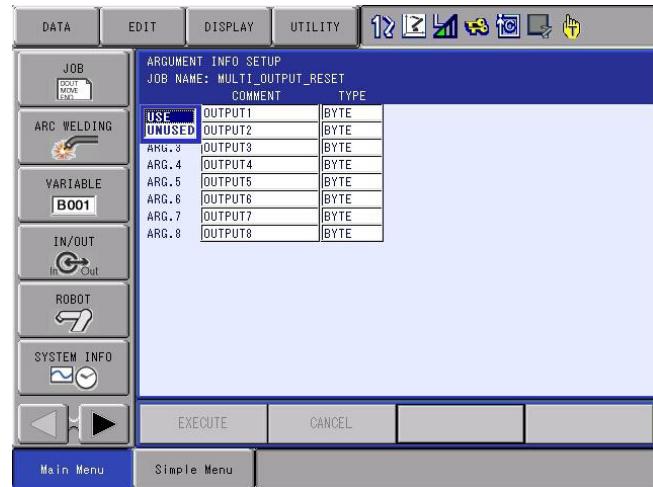
3. Define arguments.
    As shown below, select the pull-down menu {DISPLAY}, then {ARGUMENT INFO}.
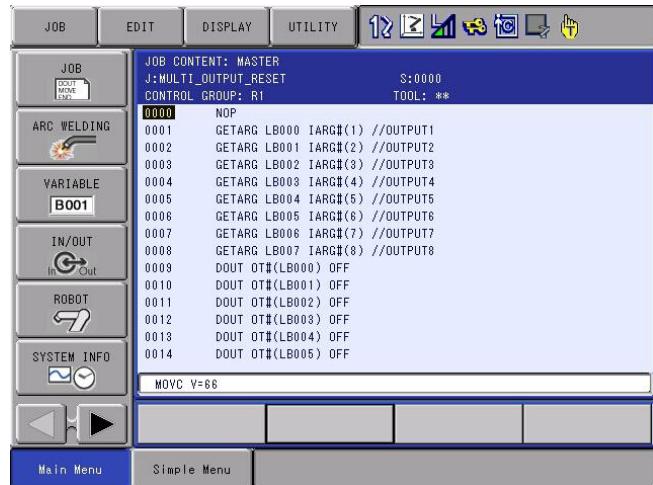
The following display appears. Then, make the setting of arguments. Set "ARG. 1 to 8" on the left to "USE", set "OUTPUT1 to 8" as "COMMENT", then select "BYTE" as "TYPE". Select {EXECUTE} to complete the registration of arguments.

4. Describe the job content.

(1) Describe lines to receive arguments.
Press [INFORM LIST], and select {CONTROL}, then "GETARG" to register instructions to receive arguments. (To register the GETARG instruction, select {Main Menu}, {SETUP}, then {TEACHING COND.}, and set "LANGUAGE LEVEL" to "EXPANDED".) In this case, the above-mentioned COMMENT will be automatically displayed as the comments on the line of GETARG instructions as shown below. Note that arguments must be received by the local variable.
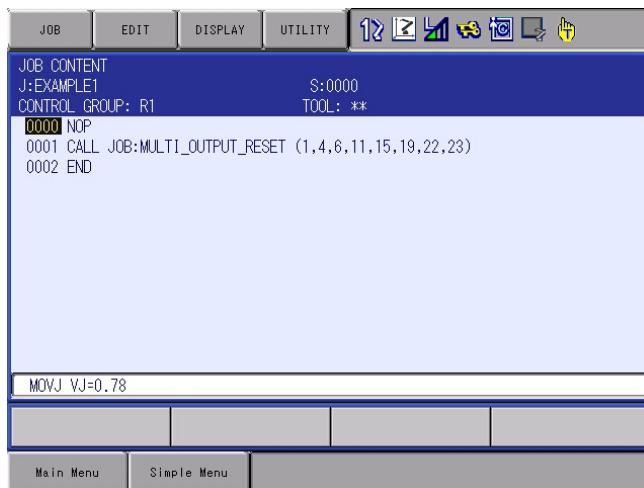
(2)   The job content is as follows:

NOP
GETARG LB000 IARG#(1)   //OUTPUT1
GETARG LB000 IARG#(2)   //OUTPUT2
GETARG LB000 IARG#(3)   //OUTPUT3
GETARG LB000 IARG#(4)   //OUTPUT4
GETARG LB000 IARG#(5)   //OUTPUT5
GETARG LB000 IARG#(6)   //OUTPUT6
GETARG LB000 IARG#(7)   //OUTPUT7
GETARG LB000 IARG#(8)   //OUTPUT8
DOUT OT#(LB000) OFF
DOUT OT#(LB001) OFF
DOUT OT#(LB002) OFF
DOUT OT#(LB003) OFF
DOUT OT#(LB004) OFF
DOUT OT#(LB005) OFF
DOUT OT#(LB006) OFF
DOUT OT#(LB007) OFF
RET

(3)   Describe the calling job.
As shown below, call "MULTI_OUTPUT_RESET" in the job.
In this case, if the called job has 8 arguments, 8 arguments must
be listed here. If the numbers are not the same, "Alarm 4608:
WRONG EXECUTION OF GETARG INST" occurs at execution.

```
  JOB        EDIT      DISPLAY     UTILITY    1? 2 ⚄ 📶 ⊕ 🔟 ⬛ ✋

JOB CONTENT
J:EXAMPLE1                        S:0000
CONTROL GROUP: R1                 TOOL: **
0000 NOP
0001 CALL JOB:MULTI_OUTPUT_RESET (1,4,6,11,15,19,22,23)
0002 END




  MOVJ VJ=0.78


    Main Menu      Simple Menu
```

(2) RET Instruction with Return Value

1) Creating a Called Job

As an example, the job which returns 2 specified register values as the
return value is created as follows:

1. Create a job.
As the example below, the job "ADD_REG" is created.

2-36
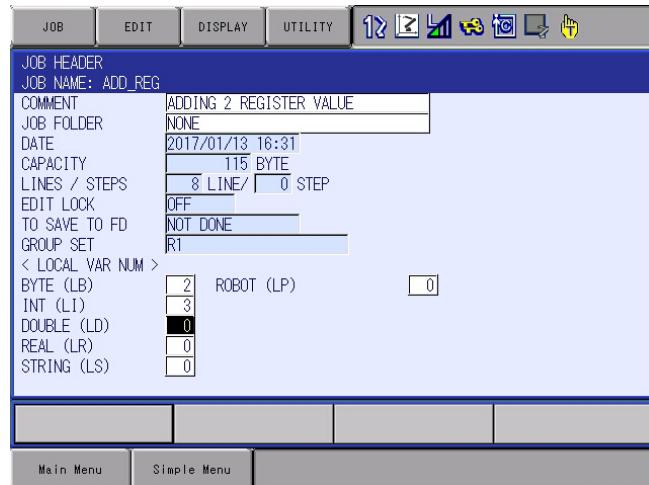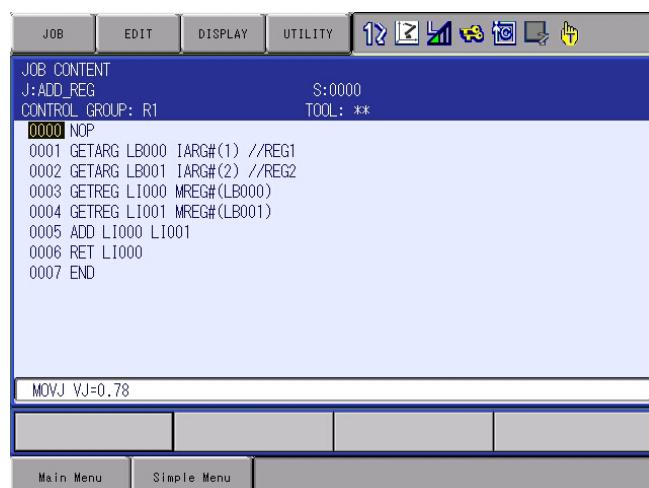
2. Register local variables.
    Register 2 byte-type variables and 3 integer-type variables.

```
┌──────┬──────┬─────────┬─────────┐
│ JOB  │ EDIT │ DISPLAY │ UTILITY │  [icons]
└──────┴──────┴─────────┴─────────┘
JOB HEADER
JOB NAME: ADD_REG
COMMENT            ADDING 2 REGISTER VALUE
JOB FOLDER         NONE
DATE               2017/01/13 16:31
CAPACITY                    115 BYTE
LINES / STEPS          8 LINE/    0 STEP
EDIT LOCK          OFF
TO SAVE TO FD      NOT DONE
GROUP SET          R1
< LOCAL VAR NUM >
BYTE (LB)              2    ROBOT (LP)          0
INT (LI)              3
DOUBLE (LD)          0
REAL (LR)             0
STRING (LS)           0


    Main Menu      Simple Menu
```

3. Define arguments.
    As shown below, define 2 arguments.

```
┌──────┬──────┬─────────┬─────────┐
│ DATA │ EDIT │ DISPLAY │ UTILITY │  [icons]
└──────┴──────┴─────────┴─────────┘
ARGUMENT INFO SETUP
JOB NAME: ADD_REG
            COMMENT        TYPE
ARG.1    REG1          BYTE
ARG.2    REG2          BYTE
------
------
------
------
------
------


     EXECUTE         CANCEL

   Main Menu      Simple Menu
```

4. Describe the job content.
    Describe the job content as shown below. LI000 is added as the return
    value at the RET instruction. Thus, the addition result will be returned
    as the return value.

```
┌──────┬──────┬─────────┬─────────┐
│ JOB  │ EDIT │ DISPLAY │ UTILITY │  [icons]
└──────┴──────┴─────────┴─────────┘
JOB CONTENT
J:ADD_REG                        S:0000
CONTROL GROUP: R1                TOOL: **
0000 NOP
0001 GETARG LB000 IARG#(1) //REG1
0002 GETARG LB001 IARG#(2) //REG2
0003 GETREG LI000 MREG#(LB000)
0004 GETREG LI001 MREG#(LB001)
0005 ADD LI000 LI001
0006 RET LI000
0007 END



  MOVJ VJ=0.78


   Main Menu      Simple Menu
```

2-37
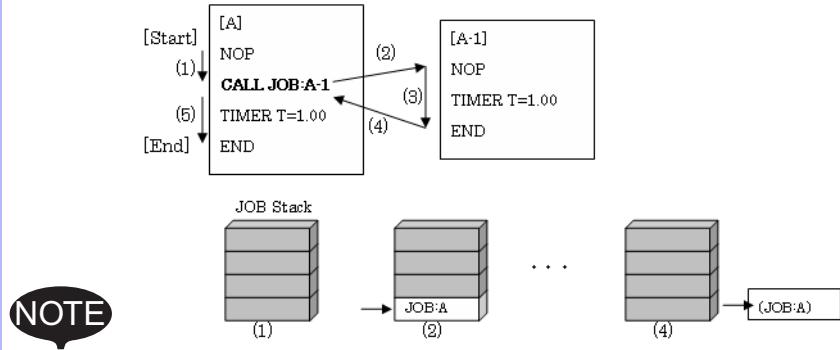
(1) Describe the calling job.
As shown below, describe the calling job. The register numbers to specify are the registers 0 and 1 as "CALL JOB: ADD_REG (0, 1)" shows.
The return value is received at GETS I000 $RV. Thus, the addition result will be returned to I000.

2-38
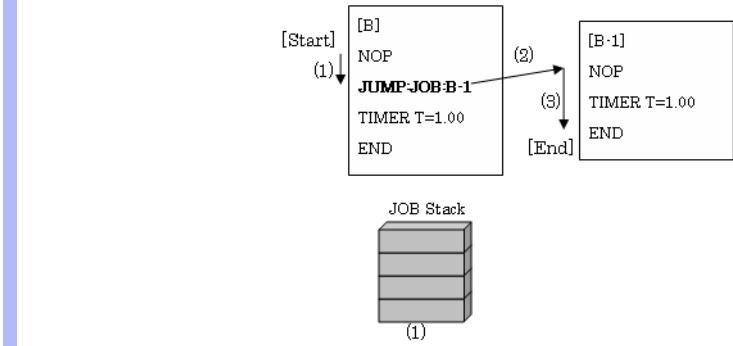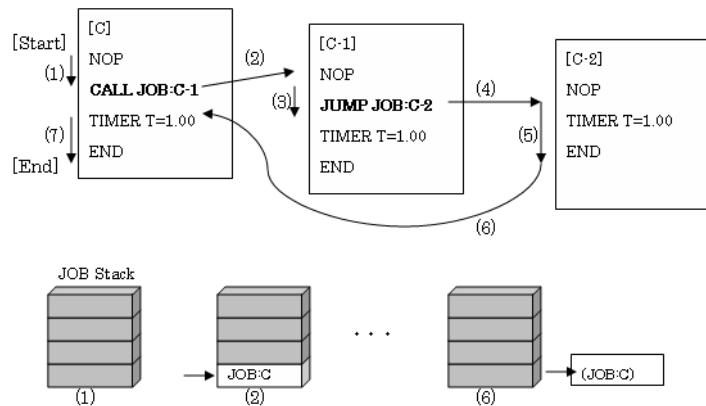
JOB Stack

When CALL instruction is executed, a specified job is called up and the information of the calling job is stored in the JOB stack. By executing END or RET instruction, the job execution goes back to the calling job, referring to the information in the JOB stack.

NOTE
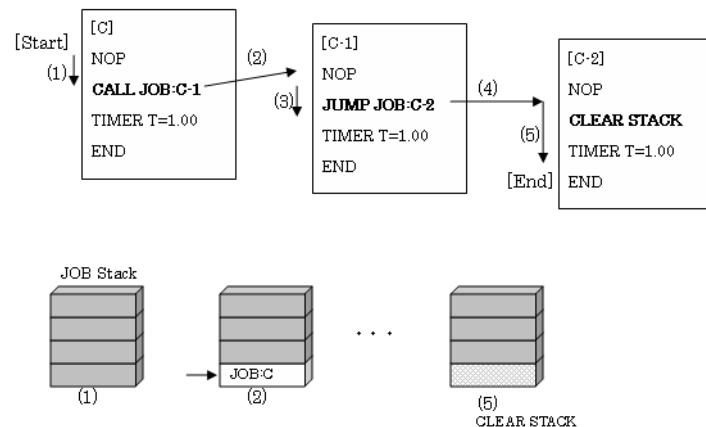
The JUMP:JOB instruction calls up a specified job, however, the information of the calling job isn't stored in the JOB stack, so the job execution doesn't go back to the calling job.

2-39

Even when executing JUMP:JOB instruction in the job called by CALL instruction, the job execution goes back to the calling job by executing END or RET instruction after that, referring to the content of the JOB stack.

NOTE
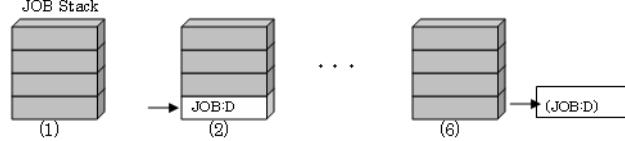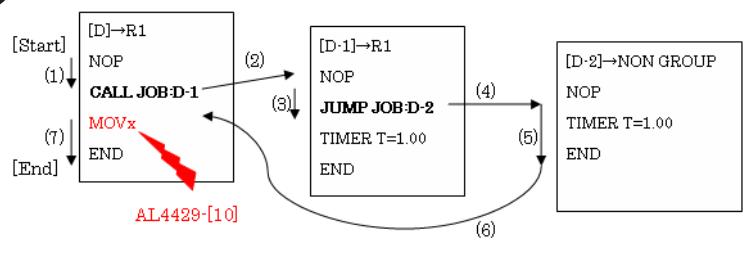
At this time, the control goes back without going through the job which JUMP:JOB instruction is executed, so the manipulator may make an unintentional motion. If there isn't any special reasons, use CLEAR STACK instruction before or after the JUMP:JOB instruction to clear the JOB stack.

NOTE

This is the case that CALL instruction is executed in a job with control groups ([D] in the figure below) to call a job with control groups ([D-1]), and JUMP:JOB instruction is executed in the job ([D-1]) to call a job without control groups. When the job execution turns back to the job with control groups ([D]) from the job without control groups ([D-2]) by executing END or RET instruction and a move instruction is executed after that, "AL4429: WRONG SPECIFIED CONTROL GROUP [10]" occurs and the move instruction is prohibited from executing.
Also in this case, as mentioned above, use CLEAR STACK instruction before or after executing JUMP:JOB instruction to clear the JOB stack.
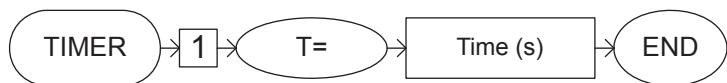
TIMER

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Stops for the specified time.

Syntax

Explanation

1. T=timer

The following tag.must be added.

No	Tag	Explanation	Note
1	T=timer	Specify the stopping time.	Timer: 0.001 to 65.535 seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.001 seconds)

Example

   (1) TIMER T=12.500
        Stops for 12.5 seconds.

   (2) SET I002 50
        TIMER T=I002
        Stops for 0.05 seconds.
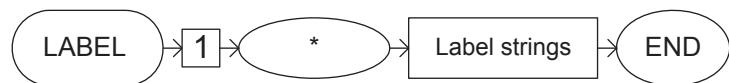
*(LABEL)

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Specify the label for the jump.

Syntax

```
LABEL → 1 → ( * ) → Label strings → END
```
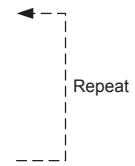
Explanation

1. *Label strings

The following tag must be added.

No	Tag	Explanation	Note
1	*Label strings	Specify the label strings.	String: 8 characters

Example

(1) NOP
   *1
   JUMP JOB:1 IF IN#(1)=ON
   JUMP JOB:2 IF IN#(2)=ON
   JUMP *1
    END

Repeat

IF GP input signal No.1 and No.2 are off, if loops infinitely between "*1" and "JUMP *1".

NOTE   The label is effective only in the same job. It does not jump to the same label in other jobs.

'(COMMENT)

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Specify the comment.

Syntax

COMMENT → 1 → ' → Comment strings → END

Explanation

1. 'Comment strings

The following tag must be added.

No	Tag	Explanation	Note
1	'Comment strings	Specify the comment.	String: 32 characters

Example

(1) NOP
    'Waiting Position
    MOVJ VJ=100.00
    MOVJ VJ=100.00
    MOVJ VJ=25.00
    'Operation Start
    TOOLON
    MOVL V=138
    'Operation end
    TOOLOF
    MOVJ VJ=25.00
    'Waiting Position
    MOVJ VJ=100.00
    END
    The comment clarifies the job content.
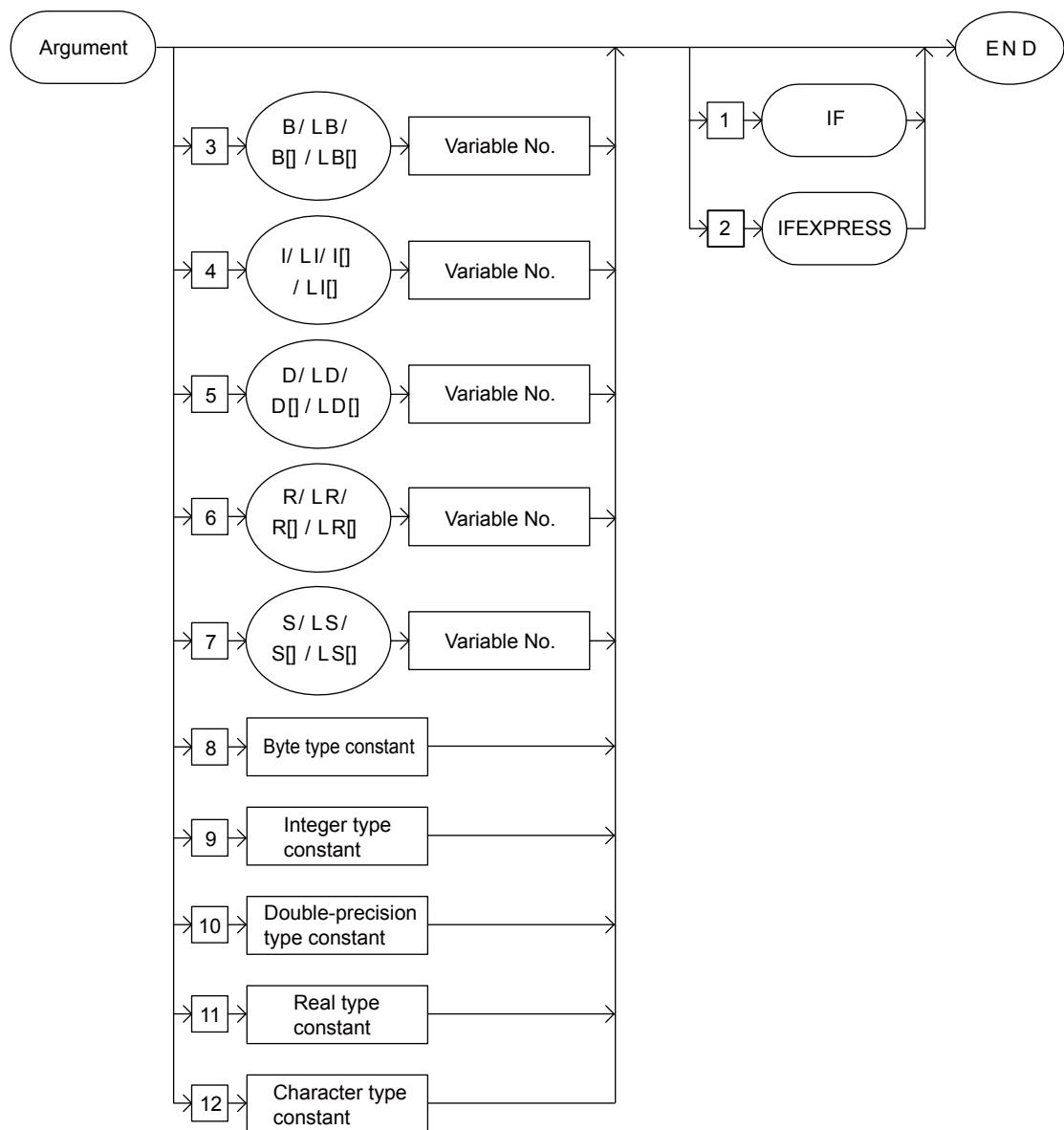
RET

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Returns from the called job to the calling job.

Syntax
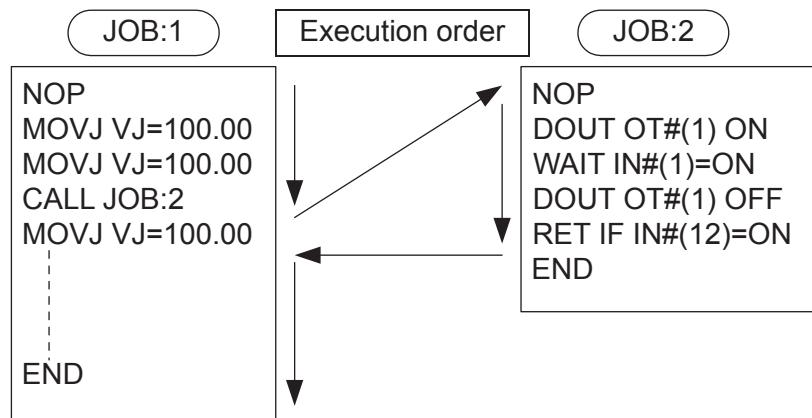
```
Argument ──┬─────────────────────────────────────────┬──┬──────────────┬── E N D
           │                                          │  │              │
           ├─ 3 ─ (B/ LB/ B[] / LB[]) ─ Variable No. ─┤  ├─ 1 ─ ( IF )──┤
           │                                          │  │              │
           ├─ 4 ─ (I/ LI/ I[] / LI[]) ─ Variable No. ─┤  └─ 2 ─(IFEXPRESS)
           │                                          │
           ├─ 5 ─ (D/ LD/ D[] / LD[]) ─ Variable No. ─┤
           │                                          │
           ├─ 6 ─ (R/ LR/ R[] / LR[]) ─ Variable No. ─┤
           │                                          │
           ├─ 7 ─ (S/ LS/ S[] / LS[]) ─ Variable No. ─┤
           │                                          │
           ├─ 8 ─ Byte type constant ─────────────────┤
           │                                          │
           ├─ 9 ─ Integer type constant ──────────────┤
           │                                          │
           ├─ 10 ─ Double-precision type constant ────┤
           │                                          │
           ├─ 11 ─ Real type constant ────────────────┤
           │                                          │
           └─ 12 ─ Character type constant ───────────┘
```

Explanation

1. IF/IFEXPRESS

Select one of the following tags

No	Tag	Explanation	Note
1	IF	Specify the IF instruction. The IF instruction evaluates various conditions.	Refer to *IF* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
2	IFEXPRESS	Specify the IFEXPRESS instruction. The IFEXPRESS instruction evaluates various conditions.	Refer to *IFEXPRESS* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

Example

(1) RET IF IN#(12)=ON
If GP input signal No.12 is on, it returns to the job of the call origin.

JOB:1	Execution order	JOB:2
NOP MOVJ VJ=100.00 MOVJ VJ=100.00 CALL JOB:2 MOVJ VJ=100.00 END		NOP DOUT OT#(1) ON WAIT IN#(1)=ON DOUT OT#(1) OFF RET IF IN#(12)=ON END

2. Return Value

The following tag can be added or omitted.

No	Tag	Explanation	Note
3 to 12	Variables other than position type variables and constants	Return the return value to the call-origin job.	

Arguments can be added to the CALL instruction, and the return value can be returned with the RET instruction. Variables other than the position type variables (P variable, BP variable, EX variable, and PX variable) and constants can be returned as the return value.

At the call-origin job, the return value is received by the GETS instruction. For details, refer to "5. Argument " in the explanation of the CALL instruction.

Example

The following example is the case when the value returned from JOB: SAMPLE is received by I000.

CALL   JOB: SAMPLE

GETS I000 $RV

In this case, at JOB: SAMPLE, the argument must be added to RET as follows:

NOP

         :

RET   LI000

END

NOP

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out no operation.

Syntax

$$\text{NOP} \longrightarrow \text{END}$$

Example

(1) NOP
     END
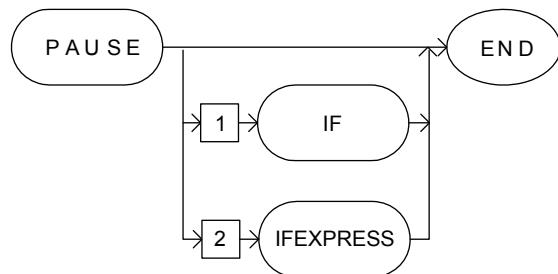
PAUSE

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stops the job temporarily.

Syntax

Explanation

1. IF/IFEXPRESS

Select one of the following tags

No	Tag	Explanation	Note
1	IF	Specify the IF instruction. The IF instruction evaluates various conditions.	Refer to *IF* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
2	IFEXPRESS	Specify the IFEXPRESS instruction. The IFEXPRESS instruction evaluates various conditions.	Refer to *IFEXPRESS* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

Example

(1)   PAUSE IF IN#(12)=ON
      Stops the job temporarily if general-purpose input signal number 12 is ON.

CWAIT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Releases the NWAIT execution (which simultaneously executes the manipulator operation and instructions excluding the move instruction) and waits for the next instruction line to be carried out.

CWAIT is used with the NWAIT tag, an additional item of a move instruction.

Syntax

CWAIT ———————→ END

Example

(1) <Step>   <Instructions>
     n-1   MOVL V=100
     n   MOVL V=100 NWAIT
                            DOUT OT#(1) ON
                            CWAIT
                            DOUT OT#(1) OFF
     n+1   MOVL V=100

Turns ON the general-purpose output signal number 1 when the manipulator starts moving from the step n-1 to the step n, and turns it OFF when the manipulator reaches the step n.
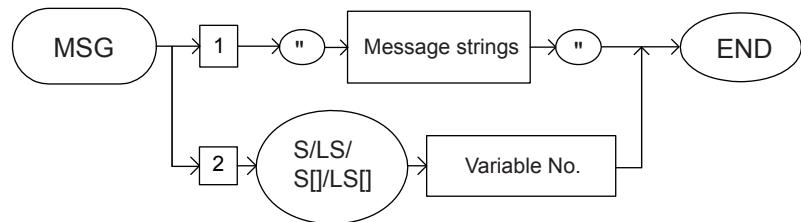
MSG

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Displays the message.

Syntax

Explanation

1. "Message strings"/S Variable number/LS Variable number/ S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	'Message strings	Specify the message.	String: 32 characters
2	S Variable number/ LS Variable number/ LS [Array number] S [Array number]	Specify the character type variable number.	
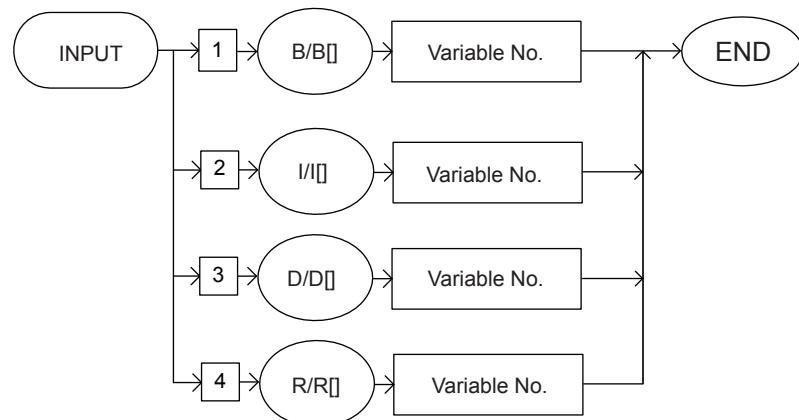
INPUT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Displays the value input window accordance with the specified variable.

Syntax

Explanation

1. B Variable number/ B [Array number] /I Variable number/ I [Array number]/D Variable number/ D [Array number]/R Variable number/ R [Array number]
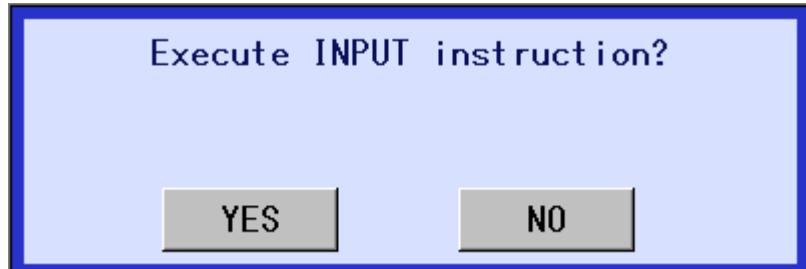
One of the tags is selected from the following table.

No	Tag	Explanation	Note
1	B Variable number/ B [Array number]	Specify the byte type variable number to set value by numeric value input.	
2	I Variable number/ I [Array number]	Specify the integer type variable number to set value by numeric value input.	
3	D Variable number/ D [Array number]	Specify the double-precision integer type variable number to set value by numeric value input.	
4	R Variable number/ R [Array number]	Specify the real type variable number to set value by numeric value input.	

Example

(1) INPUT B000

The following dialog appears when execute the instruction.

When select {NO}, INPUT instruction is ended.

When select {YES}, the following input window appears.
Input "100" and press {ENTER}. "100" is stored into B000, and
INPUT instruction is ended.

ADVINIT
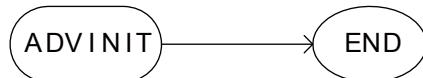
SUBSET	STANDARD	EXPANDED
Not available	Not available	Available

Function

When the same variable is used for multiple systems in the optional independent control function, ADVINIT controls the timing to change the variable data among the systems.

ADVINIT is an instruction used to control YRC1000micro internal processing, therefore, executing this instruction does not affect the job.

Syntax

ADVINIT ───────→ END

ADVSTOP

SUBSET	STANDARD	EXPANDED
Not available	Not available	Available

Function

When the same variable is used for multiple systems in the optional independent control function, ADVSTOP controls the access timing of the variable data among the systems.

ADVSTOP is an instruction used to control YRC1000micro internal processing, therefore, executing this instruction does not affect the job.

Syntax

```
(A D V S T O P) ――――――→ (E N D)
```

PRINT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available
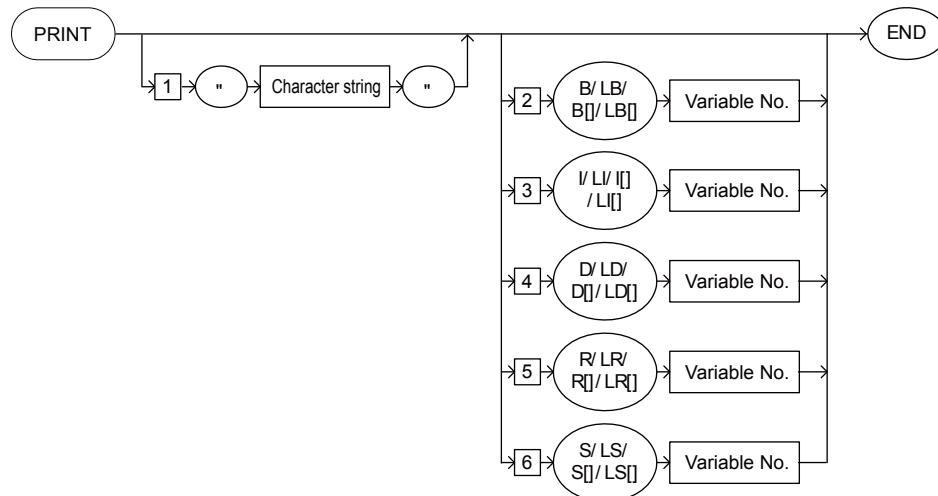
Function

Shows the specified character string and variable on the terminal display.

* Terminal display: Select {Main Menu}, {IN/OUT}, then {TERMINAL} to show it.

If the independent control function is enabled, the page is different for each task.

Syntax

PRINT <Data 1> <Data 2>

Explanation

1. Character string: Shows the specified character string on the terminal display.

The following tag can be added or omitted.

No	Tag	Explanation	Note
1	Character string	Specify the character string to be shown on the terminal display.	<Data 1> String: 32 characters

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2. B Variable number / LB Variable number / B [Array number] / LB [Array number] / I Variable number / LI Variable number / I [Array number] / LI [Array number] / D Variable number / LD Variable number / D [Array number] / LD [Array number] / R Variable number / LR Variable number / R [Array number] / LR [Array number] / S Variable number / LS Variable number / S [Array number] / LS [Array number]

Select one of the above 2. to add or omit.

* To show the character string and variable on the terminal display, specify "character string%*" as the character string tag of the above 1. (%x (hexadecimal),%o (octal),%d (decimal),%s (character string),%f (real number),%e (exponent))

| No	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number.	\<Data 2\>
3	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number.	\<Data 2\>
4	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double-precision type variable number.	\<Data 2\>
5	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number.	\<Data 2\>
6	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the character type variable number.	\<Data 2\>

Example

(1) PRINT "TEST"
Show TEST on the terminal display.

```
JOB CONTENT: MASTER
J:SAMPLE                              S:0000
CONTROL GROUP: R1                     TOOL: **
0000 NOP
0001 PRINT "TEST"
0002 END

  MOVC V=66

TERMINAL  : MASTER
TEST
```

(2) PRINT "TEST\n"
Show TEST on the terminal display, and start a new line.

```
JOB CONTENT: MASTER
J:SAMPLE                              S:0000
CONTROL GROUP: R1                     TOOL: **
0000 NOP
0001 PRINT "TEST1 \n"
0002 PRINT "TEST2"
0003 END
  MOVC V=66

TERMINAL  : MASTER
TEST1
TEST2
```

(3) PRINT "TEST%d" B001
Show TEST on the terminal display, and display the value of B001
in decimal notation.

```
JOB CONTENT: MASTER
J:SAMPLE                              S:0000
CONTROL GROUP: R1                     TOOL: **
0000 NOP
0001 PRINT "TEST %d" B001
0002 END

  MOVC V=66

TERMINAL  : MASTER
TEST 10
```

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(4) PRINT B001
   Show the value of B001 on the terminal display.


```
JOB CONTENT: MASTER
J:SAMPLE                          S:0000
CONTROL GROUP: R1                 TOOL: **
0000 NOP
0001 PRINT B001
0002 END

  MOVC V=66

TERMINAL  : MASTER
10
```

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CLS

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Deletes the character string shown on the terminal display.

Syntax

C L S → E N D

Example

(1) CLS
Deletes the character string shown on the terminal display.

<Before executing CLS instruction>

<After executing CLS instruction>
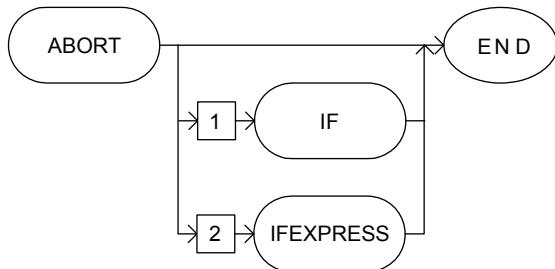
ABORT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Suspends playback, and shows "Robot is stopped by execution ABORT command." on the human interface display area.

After the playback is suspended by ABORT instruction, it will not restart until the job is reselected on the JOB SELECT window.

Syntax

Explanation

1. IF/EXPRESS

Select one of the following tags

No	Tag	Explanation	Note
1	IF	Specify the IF instruction. The IF instruction evaluates various conditions.	Refer to *IF* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
2	IFEXPRESS	Specify the IFEXPRESS instruction. The IFEXPRESS instruction evaluates various conditions.	Refer to *IFEXPRESS* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

Example

(1)   ABORT
Stops the playback of job, and displays the message "Robot is stopped by execution ABORT command."

(2)   ABORT IF B000=1
Stops the playback of job when B000 is 1, and displays the message "Robot is stopped by execution ABORT command."
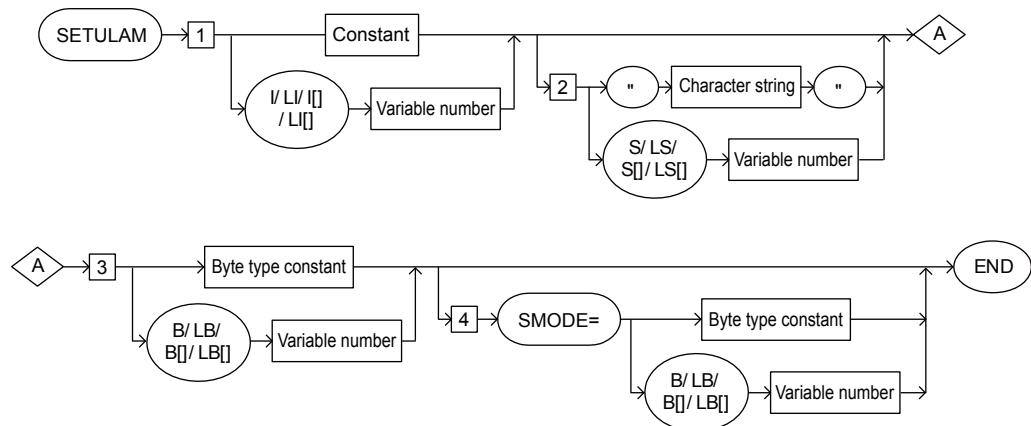
SETUALM

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Generates an alarm with any given number, name and sub code.

Syntax

Explanation

1. Alarm Code

Add the following tag.

No	Tag	Explanation	Note
1	I Variable number/ LI Variable number/ I [Variable number]/ LI [Variable number]/ [Constant]	Specify the integer type variable number.	Number: 8000 to 8999

2. Alarm Name

The following tag can be added or omitted.

No	Tag	Explanation	Note
2	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]/ [Character string]	Specify the alarm name.	String: 32 characters S variable: 16 characters

3. Subcode

Add the following tag.

No	Tag	Explanation	Note
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]/ [Byte type constant]	Specify the byte type variable number.	Number: 0 to 255

4. SMODE (Operation Stop Mode)

The following tag can be added or omitted.

No	Tag	Explanation	Note
4	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]/ [Byte type constant]	Specify SMODE (operation stop mode).	Number: 0: All Tasks Job Stop 1: No Job Stop 2: Each Task Job Stop

Example

(1) SETUALM 8000 0
     The alarm with the alarm number 8000 and subcode 0 occurs.

(2) SETUALM 8000 "ALM" 0 SMODE=1
     The alarm with the alarm number 8000, alarm name ALM, and subcode 0 occurs.
     If SMODE is 1, the job does not stop.

NOTE

By this instruction, the execution of job is stopped according to SMODE after the alarm occurs.

It does not guarantee that the execution of job stops immediately after the instruction is executed.

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DIALOG

SUBSET	STANDARD	EXPANDED	PARAMETER
Not available	Available	Available	S2C400
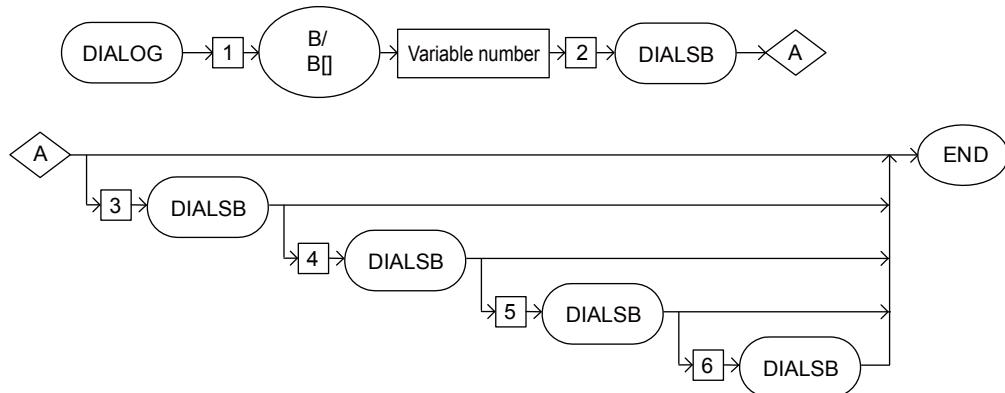
Function

Shows the dialog during the execution of job.

If the current display is not the PLAYBACK window, the PLAYBACK window is displayed when the dialog is shown by the execution of DIALOG instruction.

The job does not proceed while the dialog is shown (waiting for button input).

Syntax

Explanation

1. B Variable number / B [Array number]: Selection result

Select the first, second, third, fourth, and fifth button to store 1, 2, 3, 4, and 5 in the specified B variable respectively.

Make sure to add the following tag.

No	Tag	Explanation	Note
1	B Variable number/ B [Array number]	Specify the byte type variable number.	

Make sure to add the following tag for the first DIALSB in the DIALOG instruction.

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2. DIALSB (First)

Shows a message and one button in the dialog.
For details, refer to *DIALSB* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

Make sure to add the following tag.

No	Tag	Explanation	Note
2	DIALSB	Select the button shown by this instruction to store 1 in the selection result.	

3. DIALSB (Second and after)

Adds a message and one button in the dialog.
For details, refer to *DIALSB* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

The following tag can be added or omitted.

No	Tag	Explanation	Note
3	DIALSB	Select the button shown by this instruction to store 2 in the selection result.	
4	DIALSB	Select the button shown by this instruction to store 3 in the selection result.	
5	DIALSB	Select the button shown by this instruction to store 4 in the selection result.	
6	DIALSB	Select the button shown by this instruction to store 5 in the selection result.	

Example

The variable settings are shown below.

(1) DIALOG B000 DIALSB B001 B002 S000 B003 B004 S001
Shows the message of S000 at coordinates (B001, B002), and shows the button with the name of S001 at coordinates (B003, B004).
When the button is clicked, the result is stored in B000.

```
PLAYBACK: MASTER
J:SAMPLE                              S:0000
CONTROL GROUP: R1                     TOOL: **
0001 DIALOG B000 DIALSB B001 B002 S000 B003 B004 S001
0002 END



                      MESSAGE1
                       B1
```

(2) DIALOG B000 DIALSB B001 B002 S000 B003 B004 S001
              DIALSB B005 B006 S002 B007 B008 S003
Shows the message of S000 at coordinates (B001, B002), and shows the button with the name of S001 at coordinates (B003, B004).
Shows the message of S002 at coordinates (B005, B006), and shows the button with the name of S003 at coordinates (B007, B008).
When the button is clicked, the result is stored in B000.
(With B1, 1 is stored. With B2, 2 is stored.)

```
PLAYBACK: MASTER
J:SAMPLE                              S:0000
CONTROL GROUP: R1                     TOOL: **
0001 DIALOG B000 DIALSB B001 B002 S000 B003 B004 S001 DIALSB B0
0002 END

                    MESSAGE1
                     B1
                    MESSEAGE2
                     B2
```

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(3) DIALOG B000 DIALSB B001 B002 S000 B003 B004 S001
            DIALSB B005 B006 S002 B007 B008 S003
            DIALSB B009 B010 S004 B011 B012 S005
            DIALSB B013 B014 S006 B015 B016 S007
            DIALSB B017 B018 S008 B019 B020 S009

Shows the message of S000 at coordinates (B001, B002), and shows the button with the name of S001 at coordinates (B003, B004).

Shows the message of S002 at coordinates (B005, B006), and shows the button with the name of S003 at coordinates (B007, B008).
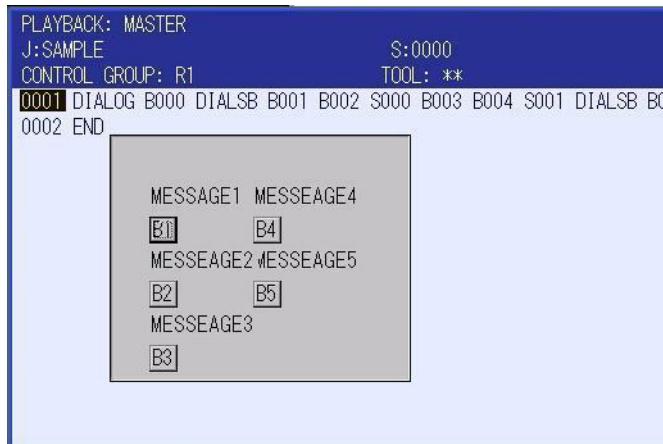
Shows the message of S004 at coordinates (B009, B010), and shows the button with the name of S005 at coordinates (B011, B012).

Shows the message of S006 at coordinates (B013, B014), and shows the button with the name of S007 at coordinates (B015, B016).

Shows the message of S008 at coordinates (B017, B018), and shows the button with the name of S009 at coordinates (B019, B020).

When the button is clicked, the result is stored in B000.

(1, 2, 3, 4, and 5 is stored with B1, B2, B3, B4, and B5, respectively.)

SWITCH

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

This instruction refers to the specified variable, and determines the next instruction to perform.

Combining the CASE instruction or the DEFAULT instruction enables to branch the more than three directions.

This instruction is a structured language.
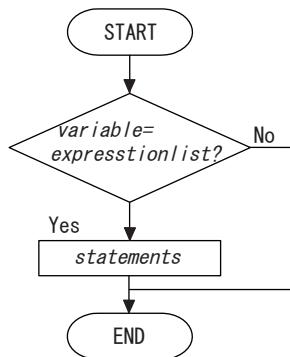
Syntax

SWITCH *variable* CASE *expressionlist*

[*statements*]

ENDSWITCH

Specified item	Contents
variable	Indicates the variable to use the conditional branch. I variable or LI variable can be specified.
expresstionlist	The branch destination of *variable.* Must be specified.
statements	The series of processing to be executed when *variable* value is equal to *expresstionlist.*

```
          ( START )
              |
              v
        /  variable=   \    No
       <  expresstionlist? >-----+
        \              /         |
              |                  |
         Yes  v                  |
       |  statements  |          |
              |                  |
              v<-----------------+
          ( END )
```

CASE

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

This instruction adds a branch of the next instruction for the SWITCH instruction.

This instruction can be registered between SWITCH and ENDSWITCH. The multiple CASE instructions can be registered within range.

This instruction is a structured language.

Syntax

SWITCH *variable* CASE *expressionlist*

[*statements*]

CASE *expressionlist-n*

[*statements-n*]
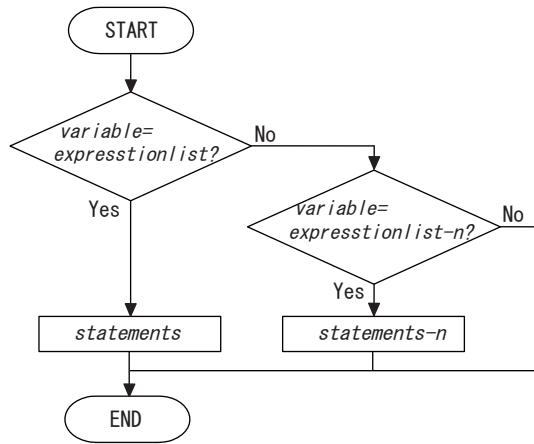
ENDSWITCH

Specified item	Contents
variable	Indicates the variable to use the conditional branch. I variable or LI variable can be specified.
expresstionlist	This is the first branch destination of *variable.* Must be specified.
expresstionlist-n	This is a branch destination of *variable after second branch.*
statements	The series of processing to be executed when *variable* value is equal to *expresstionlist.*
statements-n	The series of processing to be executed when *variable* value is equal to *expresstionlist-n.*

DEFAULT

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

This instruction determines a location to execute the instruction when the instruction does not corresponded to the any branches of the SWITCH.

This instruction can be only registered between SWITCH and ENDSWITCH.

Able to register only one instruction within a range.

This instruction is a structured language.

Syntax

SWITCH *variable* CASE *expresstionlist*

[*statements*]

CASE *expresstionlist-n*

[*statements-n*]

DEFAULT

[*statements-default*]

ENDSWITCH

Specified item	Contents
variable	Indicates the variable to use the conditional branch. I variable or LI variable can be specified.
expresstionlist	This is the first branch destination of *variable.* Must be specified.
expresstionlist-n	This is a branch destination of *variable after second branch.*
statements	The series of processing to be executed when *variable* value is equal to *expresstionlist.*
statements-n	The series of processing to be executed when *variable* value is equal to *expresstionlist-n.*
statements-default	The series of processing to be executed when *variable* value and *expresstionlist* or *expressionlist-n* does not correspond.

```
              ┌───────────┐
              │   START   │
              └───────────┘
                    │
                    ▼
              ╱ variable=  ╲        No
             ╱ expresstionlist? ╲────────────┐
             ╲               ╱                │
              ╲            ╱                  ▼
                  │                    ╱ variable=     ╲     No
                 Yes                  ╱ expresstionlist-n? ╲──────┐
                  │                   ╲                 ╱         │
                  │                    ╲             ╱           │
                  │                        │                     │
                  │                       Yes                    │
                  ▼                        ▼                     ▼
            ┌──────────┐          ┌──────────────┐    ┌──────────────────┐
            │statements│          │ statements-n │    │statements-default│
            └──────────┘          └──────────────┘    └──────────────────┘
                  │
                  ▼
              ┌───────┐
              │  END  │
              └───────┘
```

WHILE

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Determines true or false of the added conditional expression, and execute the series of instructions within a range when it is true.

Repeats the instruction as long as the conditional expression is true.

This instruction is a structured language.
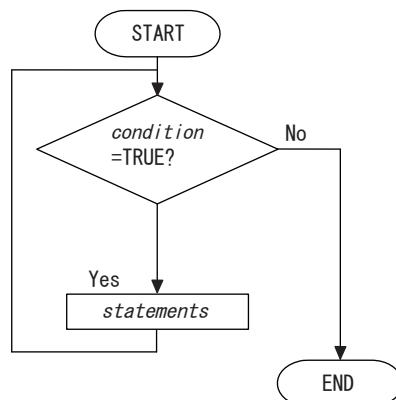
Syntax

WHILE (*condition*)

[*statements*]

ENDWHILE

Specified item	Contents
condition	The conditional expression to determine true or false. Able to specify up to six conditional expressions by using the "AND", "OR" and brackets "()".
statements	The series of processing to be executed when *variable* value is equal to *expresstionlist.*

FOR

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Executes the repetition of the series of the instructions for specified number of times within a range.

This instruction is a structured language.
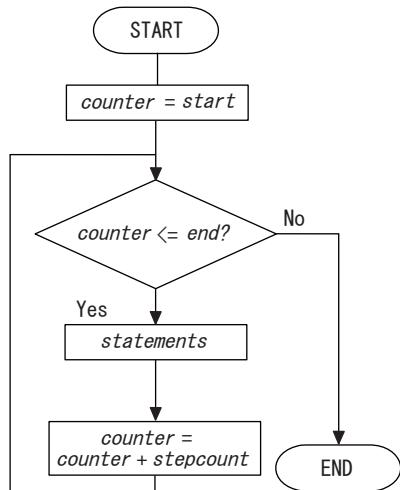
Syntax

FOR *counter=start* TO *end* STEP *stepcount*

[*statements*]

ENDSWITCH

Specified item	Contents
counter	Specify the variable to use the loop counter. Able to specify the I variable or LI variable.
start	Specify the initial value of the argument counter.
end	Specify the end value of the argument counter.
stepcount	Specify the add value to the argument counter by each loop. When omitted, it is added by one value.
statements	The series of processing to be executed within the loop.

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IFTHEN

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Determines true or false of the added conditional expression, and then execute the next instruction.

Enables to operate the sequential processing by combining the ELSEIF instruction and ELSE instruction.

This instruction is a structured language.
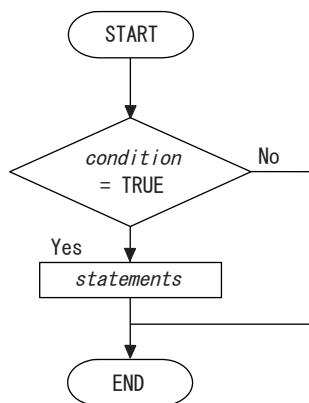
Syntax

IF (*condition*)THEN

[*statements*]

ENDIF

Specified item	Contents
condition	The conditional expression to determine true or false. Able to specify up to six conditional expressions by using the "AND", "OR" and brackets "()".
statements	The series of processing to be executed when the argument *condition* is true.

ELSEIF

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Executes the new conditional expression if the conditional expression of the IFTHEN instruction or the ELSEIF instruction is false.

This instruction can be registered only between IFTHEN and ENDIF.
The multiple ELSIF instructions can be registered within a range.

This instruction is a structured language.

Syntax

IF (*condition*)THEN

[*statements*]

ELSEIF(*condition-elseif*)THEN

[*statements-elseif*]

ENDIF

Specified item	Contents
condition *condition-elseif*	The conditional expression to determine true or false. Able to specify up to six conditional expressions by using the "AND", "OR" and brackets "()".
statements	The series of processing to be executed when the argument *condition* is true.
statements-elseif	The series of processing to be executed when the argument *condition-elseif* is true.

```
                    ┌─────────┐
                    │  START  │
                    └────┬────┘
                         │
                         ▼
                   ╱condition ╲        No
                  ╱  = TRUE?   ╲──────────┐
                  ╲            ╱          │
                   ╲          ╱           ▼
                    Yes               ╱condition-elseif╲   No
                     │               ╱    = TRUE?       ╲─────┐
                     │               ╲                  ╱     │
                     │                ╲                ╱      │
                     │                   Yes                  │
                     ▼                    │                   │
              ┌────────────┐    ┌──────────────────┐          │
              │ statements │    │ statements-elseif│          │
              └──────┬─────┘    └─────────┬────────┘          │
                     │                    │                   │
                     │                    └───────────────────┤
                     ▼                                         │
                ┌─────────┐◄───────────────────────────────────┘
                │   END   │
                └─────────┘
```

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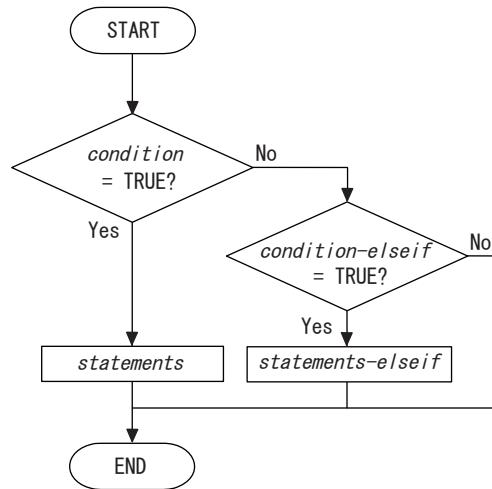
ELSE

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

This instruction determines a location to execute the instruction when the all instructions do not corresponded to the any branches of the SWITCH.

This instruction can be registered only between SWITCH and ENDSWITCH.

Able to register only one instruction within a range.

This instruction is a structured language.

Syntax

IF (*condition*)THEN

[*statements*]

ELSEIF(*condition-elseif*)THEN

[*statements-elseif*]

ELSE

[*statements-else*]

ENDIF

Specified item	Contents
condition *condition-elseif*	The conditional expression to determine true or false. Able to specify up to six conditional expressions by using the "AND", "OR" and brackets "()".
statements	The series of processing to be executed when the argument *condition* is true.
statements-elseif	The series of processing to be executed when the argument *condition-elseif* is true.
statements-else	The series of processing to be executed when all of the defined conditional expressions before ELSE instruction are false.

2-78

```
                        ┌─────────┐
                        │  START  │
                        └─────────┘
                             │
                             ▼
                          ╱─────╲              No
                    ╱ condition  ╲──────────────┐
                    ╲  = TRUE?   ╱               │
                          ╲─────╱                ▼
                             │                ╱─────╲            No
                            Yes        ╱ condition-elseif ╲───────┐
                             │         ╲    = TRUE?       ╱        │
                             │               ╲─────╱              │
                             │                  │                 │
                             │                 Yes                │
                             ▼                  ▼                 ▼
                    ┌────────────┐    ┌──────────────────┐  ┌──────────────────┐
                    │ statements │    │ statements-elseif│  │ statements-else  │
                    └────────────┘    └──────────────────┘  └──────────────────┘
                             │                  │                 │
                             ◄──────────────────┴─────────────────┘
                             ▼
                        ┌─────────┐
                        │   END   │
                        └─────────┘
```

2-79
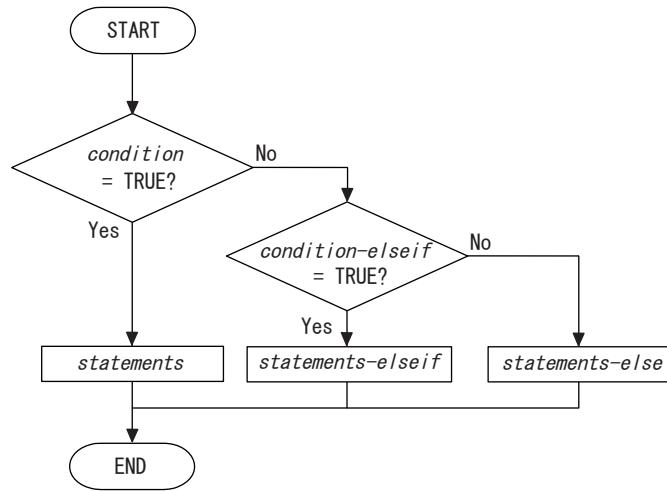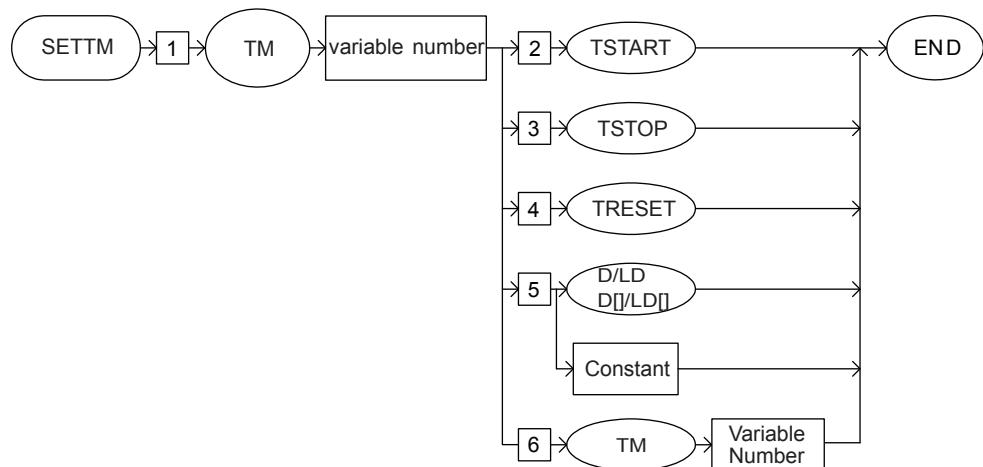
SETTM

SUBSET	STANDARD	EXPANDED
Not Available	Available	Available

Function

Execute these function, such as to start measuring, to end, to reset, and to set the time.

Syntax

Explanation

1. TM variable number
Add the following tag.

No	Tag	Explanation	Note
1	TM variable number	Specify the TM variable number for the measurement time writing.	Number: 0 to 59
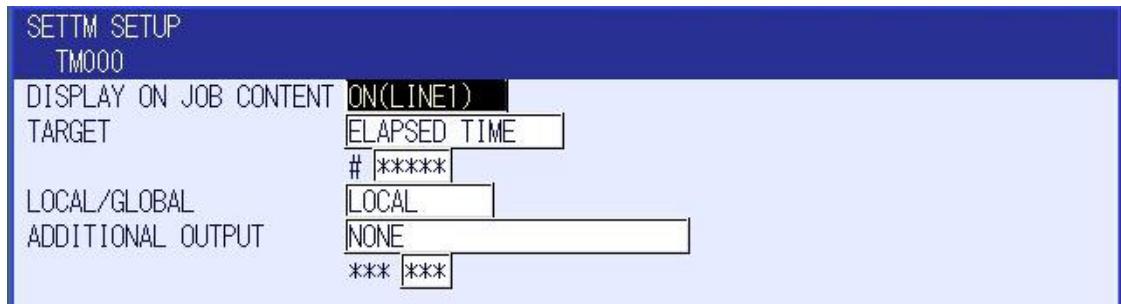
2. TMSTART/TSTOP/TRESET/D Variable number/LD Variable number/D [Arrangement number]/LD [Arrangement number]/Constant/TM Variable number

Select one of them shown in the table below.

No	Tag	Explanation	Note
2	TSTART	Specify to start the time measurement.	
3	TSTOP	Specify to finish the time measurement.	
4	TRESET	Specify to reset the time measurement.	
5	D Variable number / LD Variable number / D [Arrangement number]/ LD [Arrangement number]/ [Constant]	Specify the time measurement by the integer type variable.	Number: -2147483648 to 2147483647
6	TM variable number	Specify the time measurement by timer variable.	Number: 0 to 59

Example

The motion setting of SETTM is shown below.


```
SETTM SETUP
  TM000
DISPLAY ON JOB CONTENT  ON(LINE1)
TARGET                  ELAPSED TIME
                        # *****
LOCAL/GLOBAL            LOCAL
ADDITIONAL OUTPUT       NONE
                        *** ***
```

(1) SETTM TM000 TSTART
     Starts measuring and sets the measurement time on TM000.

(2) SETTM TM000 TSTOP
     Finishes measuring and sets the measurement time on TM000.

(3) SETTM TM000 TRESET
     Sets 0 for the measurement time of TM000.

(4) SETTM TM000 1000
     Sets 1000 for the measurement time of TM000, and starts measuring at the same time.

(5) SETTM TM000 TM001
     Sets TM001 for measuring time of TM000, and starts measuring at the same time.

2.3 Operating Instruction

CLEAR
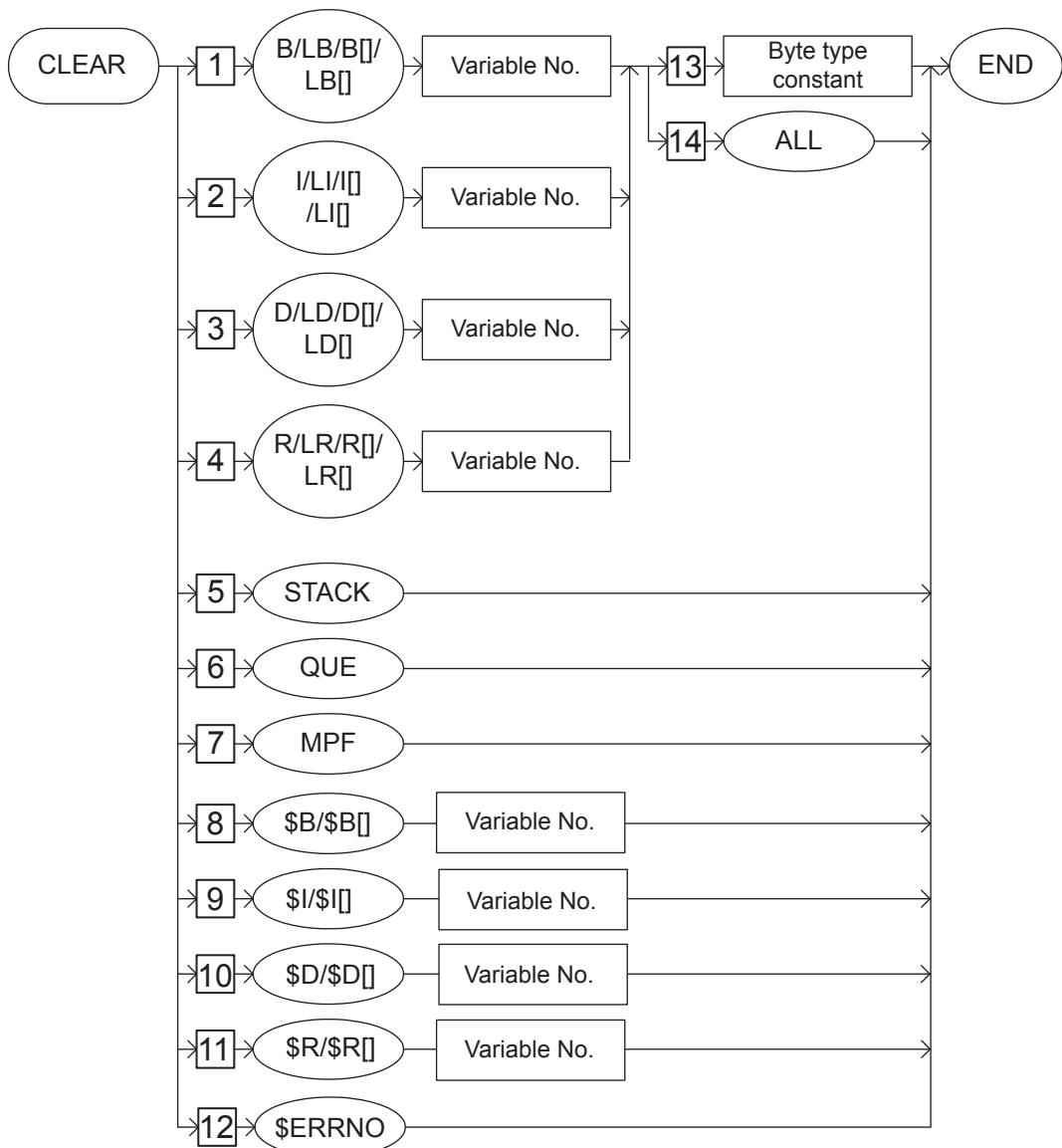
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

In Data 1, the variable content from the specified number on, is cleared to 0 only by the amount specified in Data 2.

Syntax

CLEAR   <Data 1>   <Data 2>

Explanation

1. B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number/ LR Variable number /R [Array number] /LR [Array number] /STACK/QUE/MPF/$B Variable number /$B [Array number] /$I Variable number /$I [Array number] /$D Variable number /$D [Array number] /$R Variable number /$R [Array number] / $ERRNO

One of the tags must be selected from the following table.
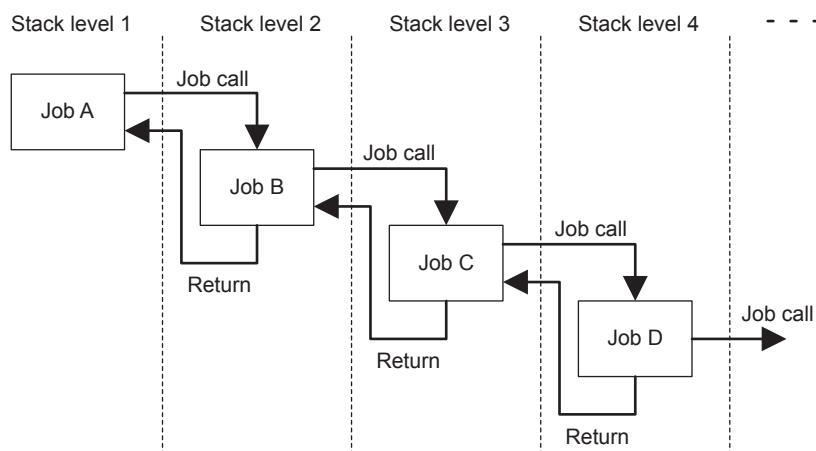
No	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be cleared.	< Data 1 >
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be cleared.	< Data 1 >
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable to be cleared.	< Data 1 >
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real type variable to be cleared.	< Data 1 >
5	STACK	Clear all the job call stack. The stack has twelve stack levels in total (the stack level 12) and stores the called position.	< Data 1 >
6	QUE	Clear all the job queues.	<Data 1> Available only with the job queue function (option: S2C641)
7	MPF	Clear all the contents of the memo play file.	<Data 1> Available only with the optional memo play function.
8	$B Variable number/ $B [Array number]	Specify the byte type system variable to clear.	<Data 1>
9	$I Variable number/ $I [Array number]	Specify the integer type system variable to clear.	<Data 1>

No	Tag	Explanation	Note
10	$D Variable number/ $D [Array number]	Specify the double precision type system variable to clear.	<Data 1>
11	$R Variable number/ $R [Array number]	Specify the real type system variable to clear.	<Data 1>
12	$ERRNO	Clear the all error status.	<Data 1> Available only with the optional system job function

SUPPLE -MENT

About the job call stack

The stack has twelve stack levels in total (the stack level 12) and stores the called position.
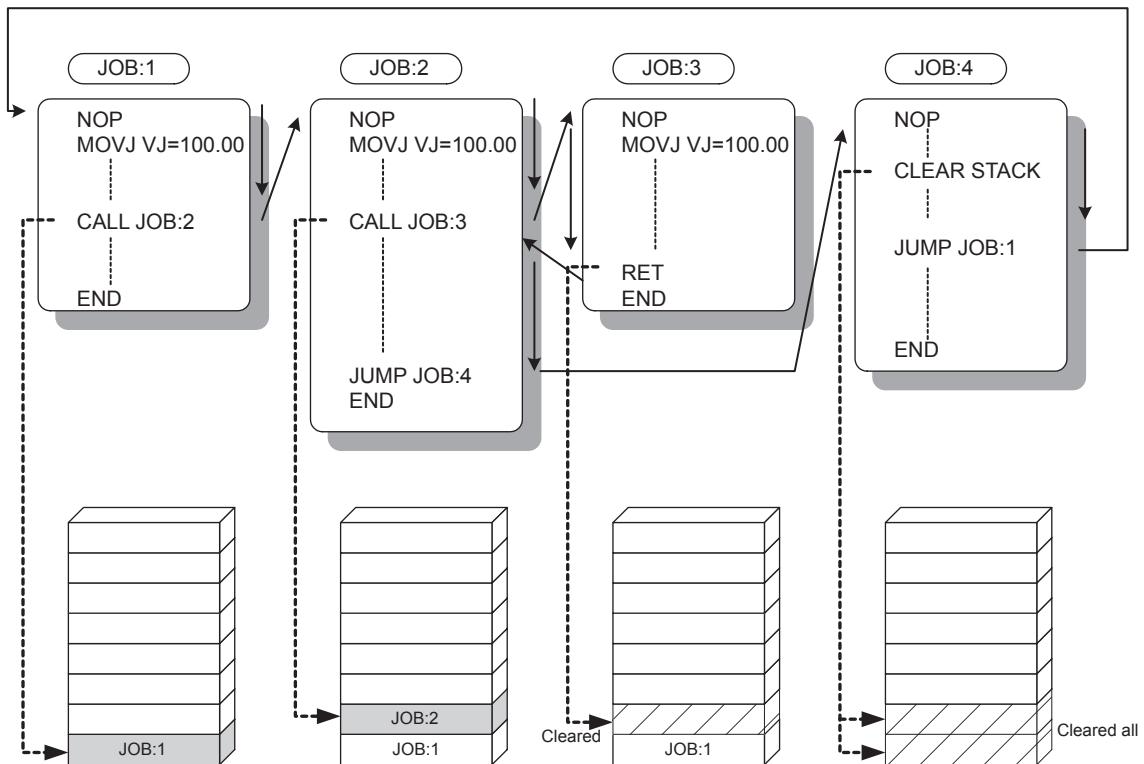
2. Byte type constant /ALL

When a B Variable number, LB Variable number, B [Array number], LB [Array number], I Variable number, LI Variable number, I [Array number], LI [Array number], D Variable number, LD Variable number, D [Array number], LD [Array number], R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
13	Byte type constant	Specify the number cleared starting from the number of the specified variable.	<Data 2>
14	ALL	All variables starting from the number of the specified variable are cleared.	<Data 2>

Example

(1) CLEAR B003 10
     The content of the variables from B003 to B0012 are cleared to 0.

(2) CLEAR D010 ALL
     The content of all the double precision type variables is cleared to 0 starting from D010.

(3) CLEAR STACK
     All the job call stacks are cleared.
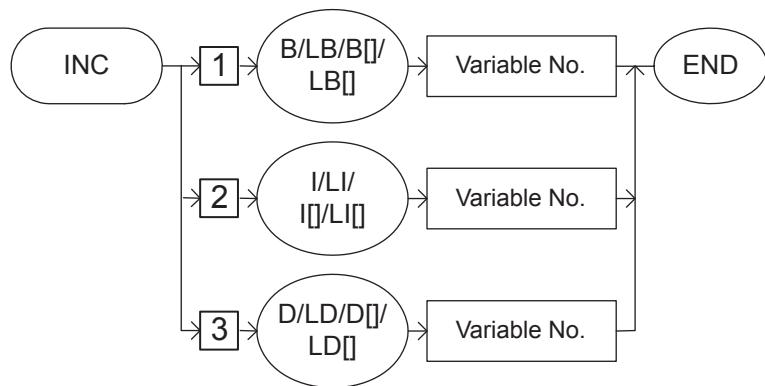
INC

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Adds one to the content of the specified variable.

Syntax

Explanation

1. B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number/ LI Variable number /I [Array number] /LI [Array number] /D Variable number/ LD Variable number /D [Array number] /LD [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable.	
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable.	
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable.	

Example

(1) NOP
    SET B000 200
    *1
    MOVJ VJ=100.00   1 is repeatedly added to B000
    MOVJ VJ=50.00   until it reaches 200.

    INC B000   1 is added to B000.
    JUMP *1 IF B000=0
    END
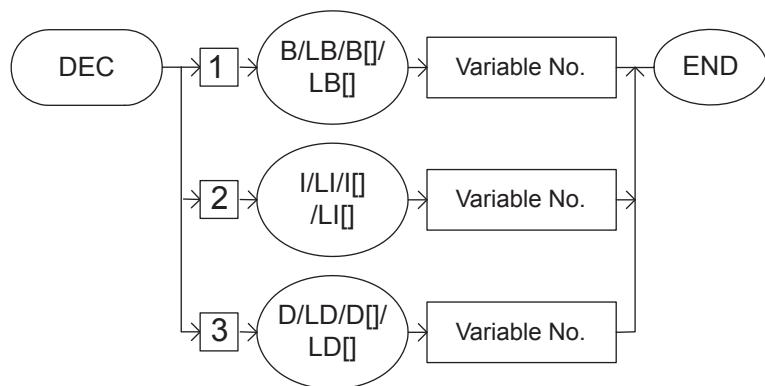
DEC

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Subtracts 1 from a specified variable.

Syntax

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable from which 1 is subtracted.	
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable from which 1 is subtracted.	
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable from which 1 is subtracted.	

Example

(1) NOP
     SET B000 200
     *1
     MOVJ VJ=100.00   1 is repeatedly subtracted
     MOVJ VJ=50.00   from B000 until it reaches 0.

     DEC B000   1 is subtracted from B000.
     JUMP *1 IF B000=0
     END

SET
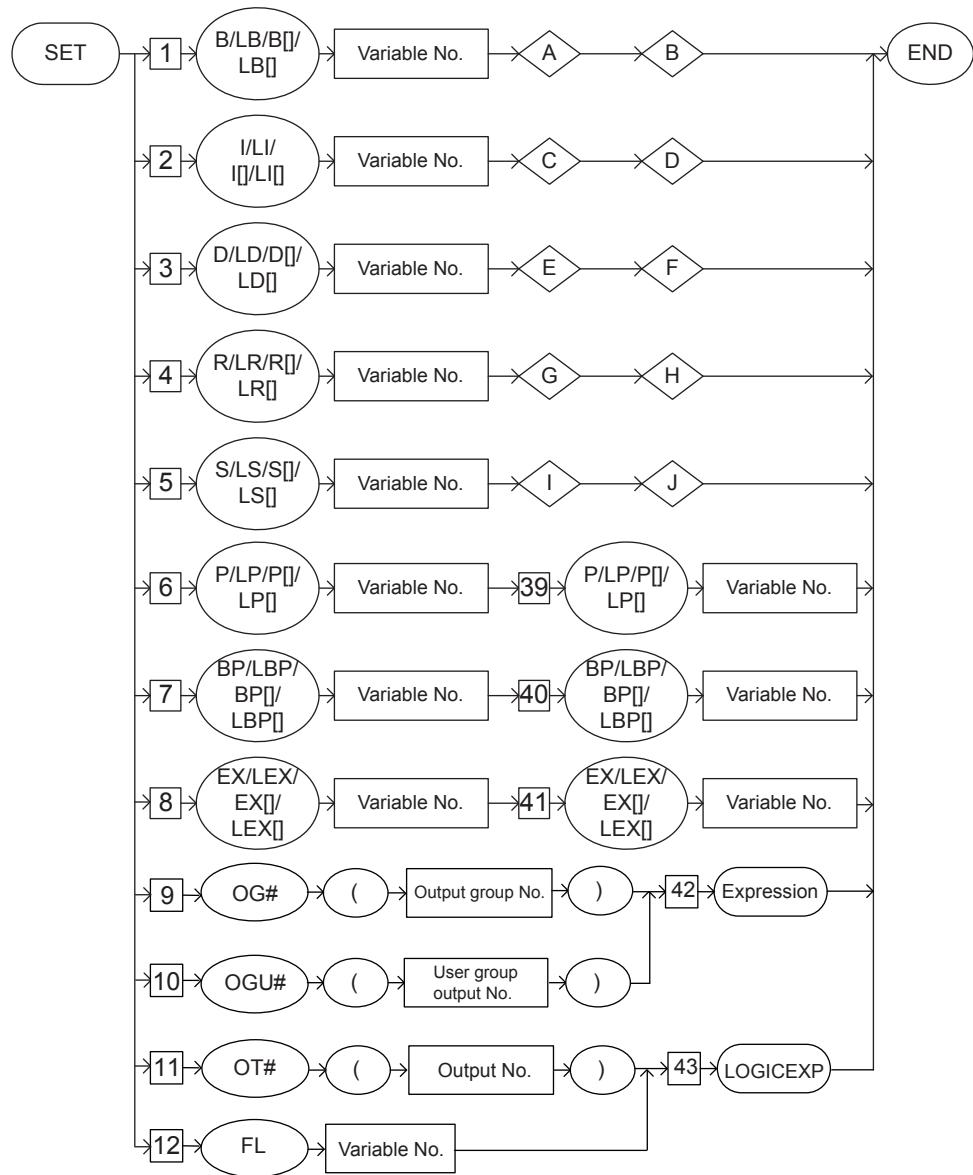
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function
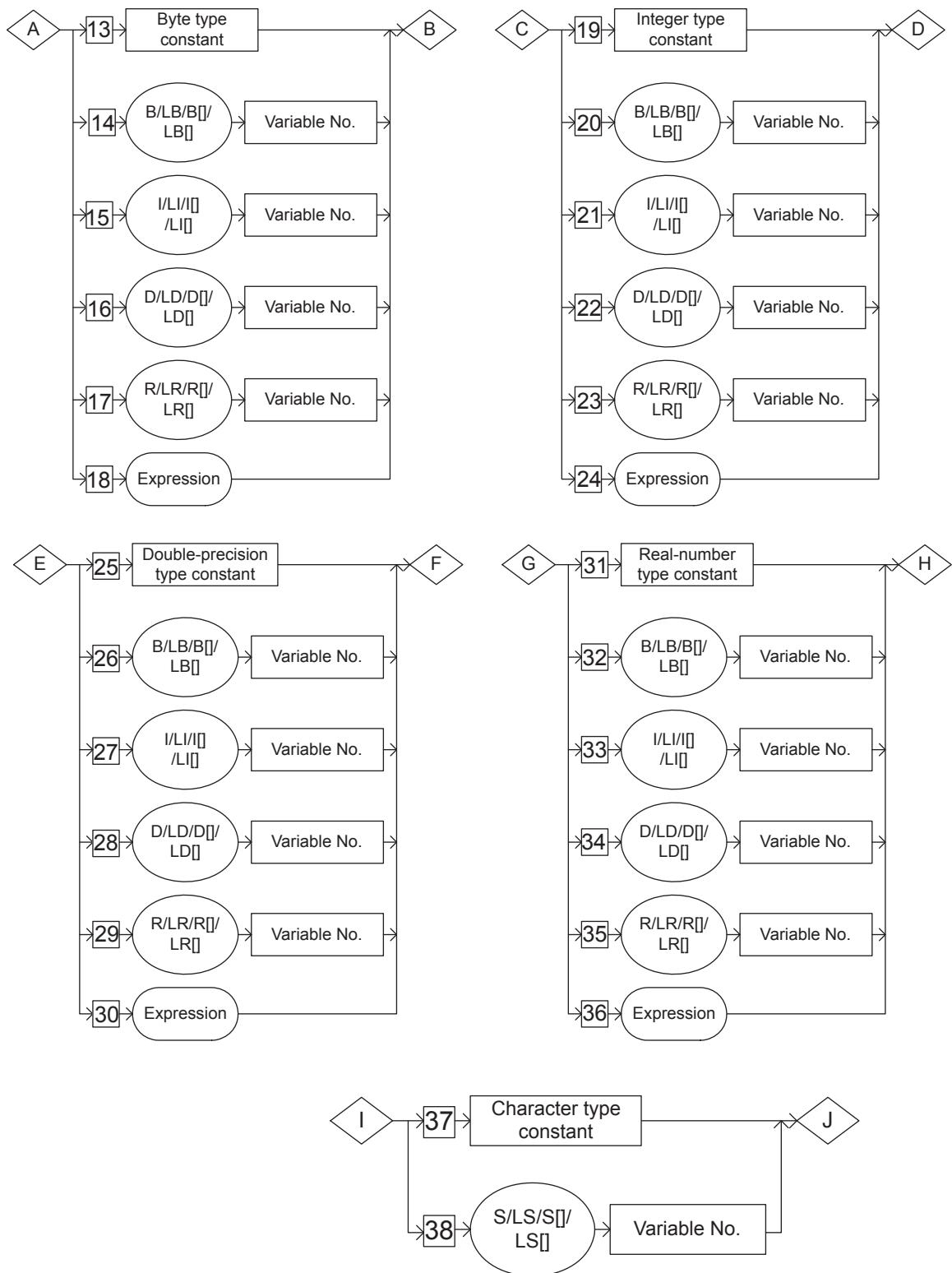
Sets Data 2 to Data 1.

Syntax

SET   <Data 1>   <Data 2>

```
⟨A⟩→|13|→ Byte type constant →⟨B⟩      ⟨C⟩→|19|→ Integer type constant →⟨D⟩

  →|14|→ (B/LB/B[]/LB[]) → Variable No. →      →|20|→ (B/LB/B[]/LB[]) → Variable No. →

  →|15|→ (I/LI/I[]/LI[]) → Variable No. →       →|21|→ (I/LI/I[]/LI[]) → Variable No. →

  →|16|→ (D/LD/D[]/LD[]) → Variable No. →       →|22|→ (D/LD/D[]/LD[]) → Variable No. →

  →|17|→ (R/LR/R[]/LR[]) → Variable No. →       →|23|→ (R/LR/R[]/LR[]) → Variable No. →

  →|18|→ (Expression)                           →|24|→ (Expression)


⟨E⟩→|25|→ Double-precision type constant →⟨F⟩   ⟨G⟩→|31|→ Real-number type constant →⟨H⟩

  →|26|→ (B/LB/B[]/LB[]) → Variable No. →       →|32|→ (B/LB/B[]/LB[]) → Variable No. →

  →|27|→ (I/LI/I[]/LI[]) → Variable No. →       →|33|→ (I/LI/I[]/LI[]) → Variable No. →

  →|28|→ (D/LD/D[]/LD[]) → Variable No. →       →|34|→ (D/LD/D[]/LD[]) → Variable No. →

  →|29|→ (R/LR/R[]/LR[]) → Variable No. →       →|35|→ (R/LR/R[]/LR[]) → Variable No. →

  →|30|→ (Expression)                           →|36|→ (Expression)


             ⟨I⟩→|37|→ Character type constant →⟨J⟩

                →|38|→ (S/LS/S[]/LS[]) → Variable No. →
```

Explanation

1. B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number] /S Variable number /LS Variable number /S [Array number] /LS [Array number] /P Variable number /LP Variable number /P [Array number] /LP [Array number] /BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number] /EX Variable number /LEX Variable number / EX [Array number] /LEX [Array number]/OG# (Output group number)/OGU# (User group output number)/ OT# (Output number)/FL Variable number

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to which the data is set.	< Data1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to which the data is set.	< Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable to which the data is set.	< Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real type variable to which the data is set.	< Data 1>
5	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable to which the data is set.	< Data 1>
6	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis positional variable to which the data is set.	< Data 1>
7	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis positional variable to which the data is set.	< Data 1>
8	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis positional variable to which the data is set.	< Data 1>

No	Tag	Explanation	Note
9	OG# (Output group number)	Specify the number of GP output group signal (1 group 8 points) to which the data is set.	< Data 1> No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
10	OGU# (User output group number)	Specify the number of user group output signal to which the data is set.	< Data 1> No:1 to 64 Variable B/I/D/LB/LI/LD can be used.
11	OT# (Output number)	Specify the number of GP output signal to which the data is set.	< Data 1> No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
12	FL Variable number	Specify the flag variable number to which the data is set.	< Data 1>

2. Byte type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] / LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]/Expression

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
13	Byte type constant	Specify the byte type constant.	< Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable.	< Data 2>
15	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable.	< Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable.	< Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real type variable.	< Data 2>
18	Expression	Specify the expression.	<Data 2> For details of setting the expression, refer to *chapter 1.4 "Registration of Expression"* .

3. Integer type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] / R Variable number /LR Variable number /R [Array number] /LR [Array number]/Expression

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
19	Integer type constant	Specify the integer type constant.	< Data 2>
20	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable.	< Data 2>
21	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable.	< Data 2>
22	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable.	< Data 2>
23	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real type variable.	< Data 2>
24	Expression	Specify the expression.	<Data 2> For details of setting the expression, refer to *chapter 1.4 "Registration of Expression"* .

4. Double precision type constant /B Variable number / LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]/ Expression

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
25	Double precision type constant	Specify the double precision type constant.	< Data 2>
26	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable.	< Data 2>
27	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable.	< Data 2>
28	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable.	< Data 2>
29	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real type variable.	< Data 2>
30	Expression	Specify the expression.	<Data 2> For details of setting the expression, refer to *chapter 1.4 "Registration of Expression"* .

5. Real type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] / LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]/Expression

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
31	Real type constant	Specify the real type constant.	< Data 2>
32	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable.	< Data2>
33	I Variable number/ LI Variable numb er/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable.	< Data 2>
34	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable.	< Data 2>
35	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real type variable.	< Data 2>
36	Expression	Specify the expression.	<Data 2> For details of setting the expression, refer to *chapter 1.4 "Registration of Expression"* .

6. Character type constant /S Variable number /LS Variable number /S [Array number] /LS [Array number]

When an S Variable number, LS Variable number, S [Array number], or LS [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
37	Character type constant	Specify the character type data.	< Data 2>
38	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable.	< Data 2>

7. P Variable number /LP Variable number /P [Array number] /LP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added..

No	Tag	Explanation	Note
39	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis position variable.	< Data 2>

8. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a BP Variable number, LBP Variable number, BP [Array number], or LBP [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added..

No	Tag	Explanation	Note
40	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [[Array number]	Specify the number of the base axis position variable.	< Data 2>

9. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When an EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No	Tag	Explanation	Note
41	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position variable.	< Data 2>

10. Expression

When OG# (output group number) or OGU# (user group output number) is selected from the table in part 1 of this Explanation, the following tag must be added.

No	Tag	Explanation	Note
42	Expression	Specify the expression.	< Data 2> For details of the setting of expression, refer to *chapter 1.4 "Registration of Expression"*

11. LOGICEXP

When OT# (output number) or FL Variable is selected from the table in
part 1 of this Explanation, the following tag must be added.

No	Tag	Explanation	Note
43	LOGICEXP	Specify the LOGICEXP instruction. This instruction determines whether a conditional statement is true or false.	< Data 2> Refer to LOGICEXP in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

Example

(1) SET B000 0
     0 is set in B000.

(2) SET P000 P001
     The content of P001 is set in P000.

(3) SET OT#(1) LOGICEXP (IN#(1)=ON AND IN#(2)=ON)
     When both the GP input no.1 and 2 are ON, the GP
     output no.1 becomes ON.
     Otherwise, the GP output no.1 is OFF.

(4) SET FL0010 LOGICEXP(B000=1 OR I000=1)
     When the content of B000 is 1 or the content of I000 is 1, FL0010
     becomes ON. Otherwise, FL0010 is OFF.

ADD
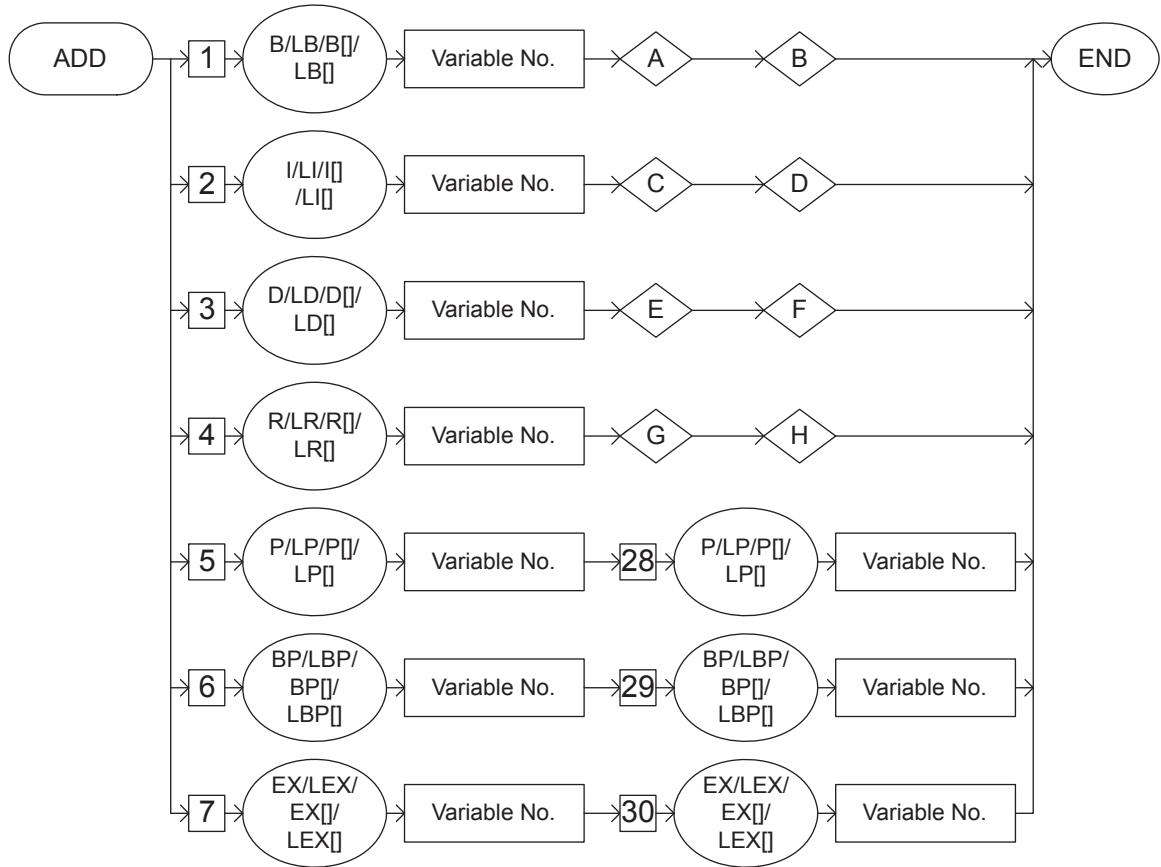
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function
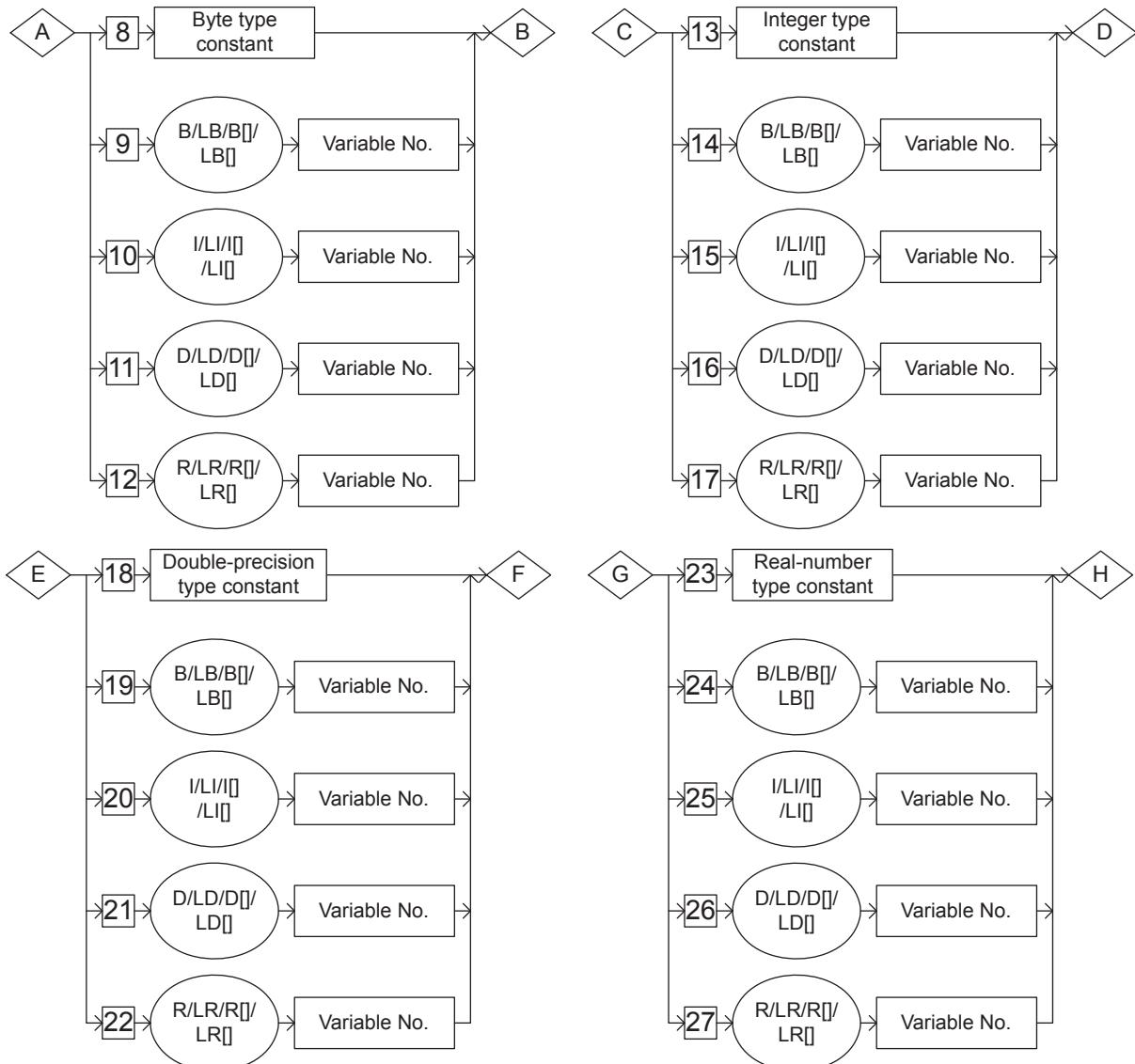
Adds Data 1 and Data 2, and stores the result in Data 1.

Syntax

Add   <Data 1>   <Data 2>

A → 8 → Byte type constant → B

9 → B/LB/B[]/LB[] → Variable No.

10 → I/LI/I[]/LI[] → Variable No.

11 → D/LD/D[]/LD[] → Variable No.

12 → R/LR/R[]/LR[] → Variable No.

C → 13 → Integer type constant → D

14 → B/LB/B[]/LB[] → Variable No.

15 → I/LI/I[]/LI[] → Variable No.

16 → D/LD/D[]/LD[] → Variable No.

17 → R/LR/R[]/LR[] → Variable No.

E → 18 → Double-precision type constant → F

19 → B/LB/B[]/LB[] → Variable No.

20 → I/LI/I[]/LI[] → Variable No.

21 → D/LD/D[]/LD[] → Variable No.

22 → R/LR/R[]/LR[] → Variable No.

G → 23 → Real-number type constant → H

24 → B/LB/B[]/LB[] → Variable No.

25 → I/LI/I[]/LI[] → Variable No.

26 → D/LD/D[]/LD[] → Variable No.

27 → R/LR/R[]/LR[] → Variable No.

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be added.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be added.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be added.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be added.	<Data 1>
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis position type variable to be added.	<Data 1>
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis position type variable to be added.	<Data 1>
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position type variable to be added.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specify the byte type data to be added.	<Data 2>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be added.	<Data 2>
10	I Variable number/LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be added.	<Data 2>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be added.	<Data 2>
12	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be added.	<Data 2>

3. Integer type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
13	Integer type constant	Specify the integer type data to be added.	<Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte-type variable to be added.	<Data 2>

No.	Tag	Explanation	Note
15	I Variable number/LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be added.	<Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be added.	<Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be added.	<Data 2>

4. Double-precision type constant/B Variable number/ LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
18	Double-precision type constant	Specify the double-precision type data to be added.	<Data 2>
19	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be added.	<Data 2>
20	I Variable number/LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be added.	<Data 2>
21	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be added.	<Data 2>
22	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be added.	<Data 2>

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5. Real-number type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an R Variable number, LR Variable number, R [Array number]. or LR [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
23	Real-number type constant	Specify the real-number type data to be added.	<Data 2>
24	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be added.	<Data 2>
25	I Variable number/LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be added.	<Data 2>
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be added.	<Data 2>
27	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be added.	<Data 2>

6. P Variable number/LP Variable number/P [Array number]/LP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No.	Tag	Explanation	Note
28	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis position type variable to be added.	<Data 2>

7. BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]

When a BP Variable number, LBP Variable number, BP [Array number], or LBP [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added..

No.	Tag	Explanation	Note
29	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis position type variable to be added.	<Data 2>

8. EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

When an EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No	Tag	Explanation	Note
30	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position type variable to be added.	<Data 2>

Example

(1)   ADD B000 10
        Adds 10 to B000, and stores the result in B000.

(2)   ADD I000 I001
        Adds I001 to I000, and stores the result in I000.

(3)   ADD P000 P001
        Adds P001 to P000, and stores the result in P000.

SUB
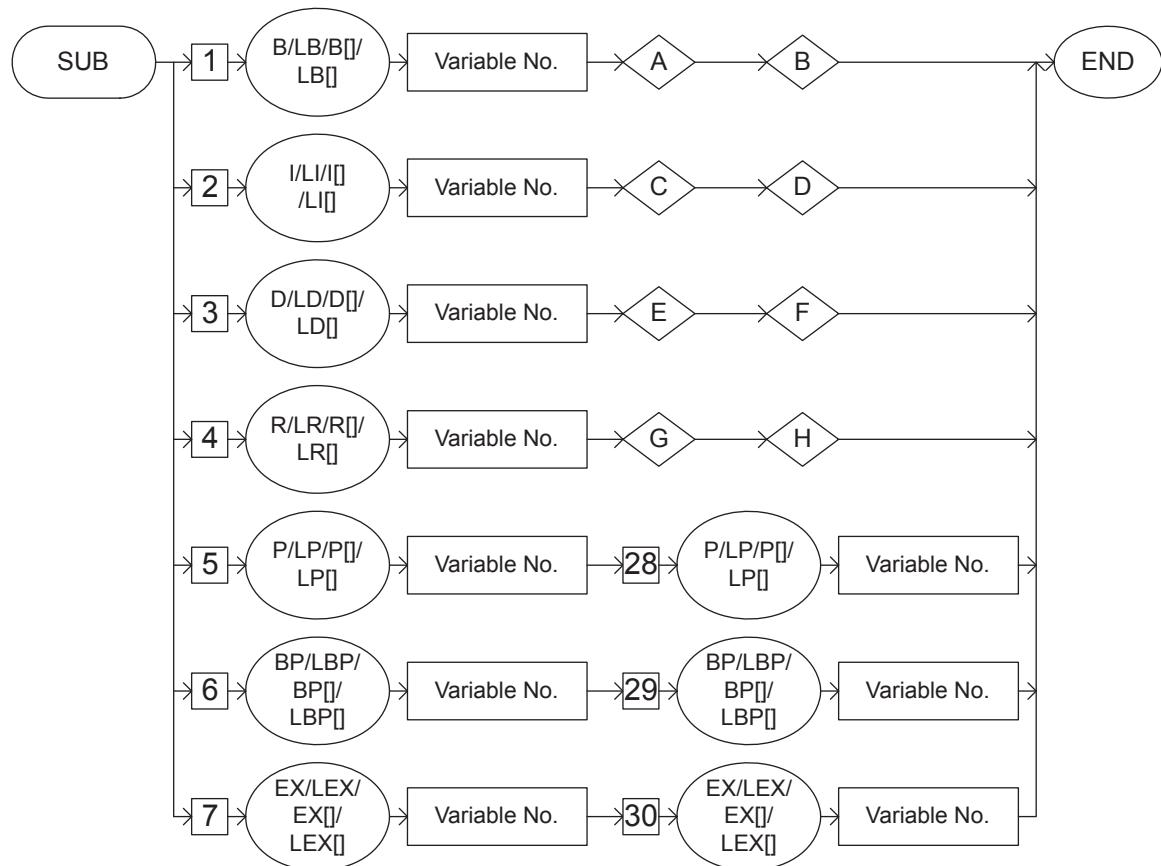
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function
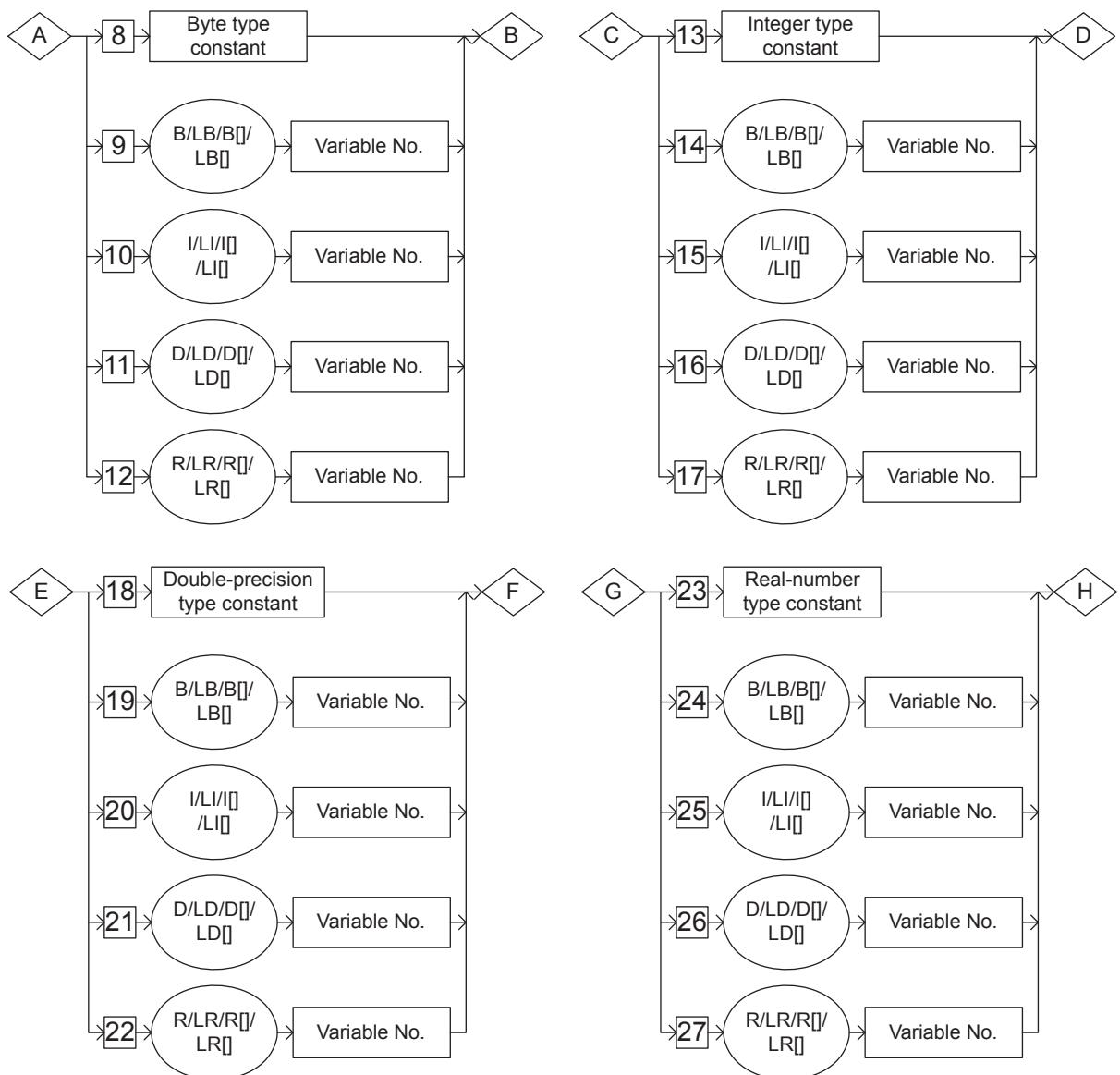
Subtracts Data 2 from Data 1, and stores the result in Data 1.

Syntax

SUB   <Data 1>   <Data 2>

A → [8] → Byte type constant → B
→ [9] → (B/LB/B[]/LB[]) → Variable No.
→ [10] → (I/LI/I[]/LI[]) → Variable No.
→ [11] → (D/LD/D[]/LD[]) → Variable No.
→ [12] → (R/LR/R[]/LR[]) → Variable No.

C → [13] → Integer type constant → D
→ [14] → (B/LB/B[]/LB[]) → Variable No.
→ [15] → (I/LI/I[]/LI[]) → Variable No.
→ [16] → (D/LD/D[]/LD[]) → Variable No.
→ [17] → (R/LR/R[]/LR[]) → Variable No.

E → [18] → Double-precision type constant → F
→ [19] → (B/LB/B[]/LB[]) → Variable No.
→ [20] → (I/LI/I[]/LI[]) → Variable No.
→ [21] → (D/LD/D[]/LD[]) → Variable No.
→ [22] → (R/LR/R[]/LR[]) → Variable No.

G → [23] → Real-number type constant → H
→ [24] → (B/LB/B[]/LB[]) → Variable No.
→ [25] → (I/LI/I[]/LI[]) → Variable No.
→ [26] → (D/LD/D[]/LD[]) → Variable No.
→ [27] → (R/LR/R[]/LR[]) → Variable No.

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Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be subtracted.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be subtracted.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be subtracted.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be subtracted.	<Data 1>
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis position type variable to be subtracted.	<Data 1>
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis position type variable to be subtracted.	<Data 1>
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position type variable to be subtracted.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specify the byte type data to be subtracted.	<Data 2>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be subtracted.	<Data 2>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be subtracted.	<Data 2>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be subtracted.	<Data 2>
12	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be subtracted.	<Data 2>

3. Integer type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
13	Integer type constant	Specify the integer type data to be subtracted.	<Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be subtracted.	<Data 2>

No.	Tag	Explanation	Note
15	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be subtracted.	<Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be subtracted.	<Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be subtracted.	<Data 2>

4. Double-precision type constant/B Variable number/ LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
18	Double-precision type constant	Specify the double-precision type data to be subtracted.	<Data 2>
19	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be subtracted.	<Data 2>
20	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be subtracted.	<Data 2>
21	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be subtracted.	<Data 2>
22	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be subtracted.	<Data 2>

5. Real-number type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
23	Real-number type constant	Specify the real-number type data to be subtracted.	<Data 2>
24	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be subtracted.	<Data 2>
25	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be subtracted.	<Data 2>
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be subtracted.	<Data 2>
27	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be subtracted.	<Data 2>

6. P Variable number/LP Variable number/P [Array number]/LP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No.	Tag	Explanation	Note
28	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis position type variable to be subtracted.	<Data 2>

7. BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]

When a BP Variable number, LBP Variable number, BP [Array number], or LBP [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No.	Tag	Explanation	Note
29	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis position type variable to be subtracted.	<Data 2>

8. EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

When an EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No.	Tag	Explanation	Note
30	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position type variable to be subtracted.	<Data 2>

Example

   (1) SUB B000 10
      Subtracts 10 from B000, and stores the result in B000.

   (2) SUB I000 I001
      Subtracts I001 from I000, and stores the result in I000.

   (3) SUB P000 P001
      Subtracts P001 from P000, and stores the result in P000.

MUL
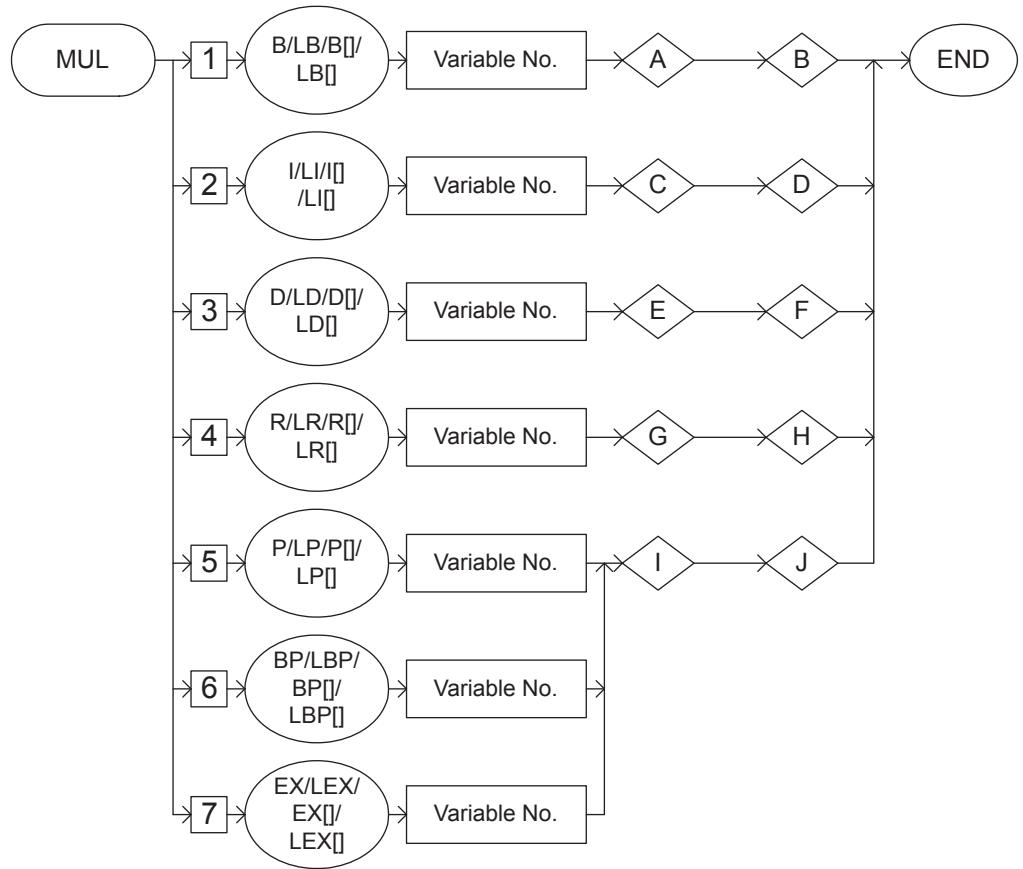
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function
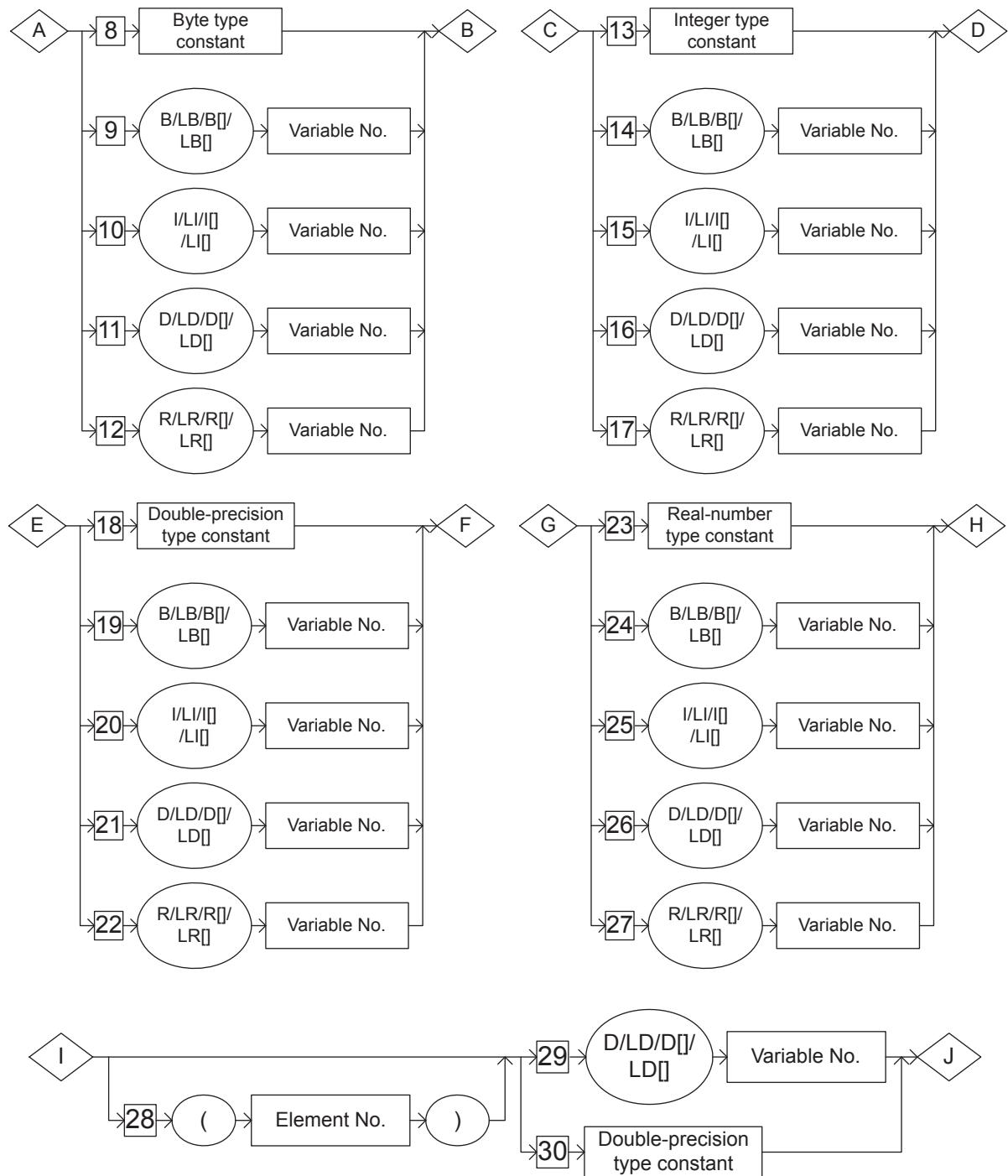
Multiplies Data 1 by Data 2, and stores the result in Data 1.

Syntax

MUL <Data 1> <Data 2>

A	8	Byte type constant	B
	9	B/LB/B[]/LB[]	Variable No.
	10	I/LI/I[]/LI[]	Variable No.
	11	D/LD/D[]/LD[]	Variable No.
	12	R/LR/R[]/LR[]	Variable No.

C	13	Integer type constant	D
	14	B/LB/B[]/LB[]	Variable No.
	15	I/LI/I[]/LI[]	Variable No.
	16	D/LD/D[]/LD[]	Variable No.
	17	R/LR/R[]/LR[]	Variable No.

E	18	Double-precision type constant	F
	19	B/LB/B[]/LB[]	Variable No.
	20	I/LI/I[]/LI[]	Variable No.
	21	D/LD/D[]/LD[]	Variable No.
	22	R/LR/R[]/LR[]	Variable No.

G	23	Real-number type constant	H
	24	B/LB/B[]/LB[]	Variable No.
	25	I/LI/I[]/LI[]	Variable No.
	26	D/LD/D[]/LD[]	Variable No.
	27	R/LR/R[]/LR[]	Variable No.

I	28	(	Element No.	)	29	D/LD/D[]/LD[]	Variable No.	J
					30	Double-precision type constant		

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be multiplied.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be multiplied.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be multiplied.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be multiplied.	<Data 1>
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis position type variable to be multiplied.	<Data 1>
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis position type variable to be multiplied.	<Data 1>
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position type variable to be multiplied.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specify the byte type data to be multiplied.	<Data 2>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be multiplied.	<Data 2>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be multiplied	<Data 2>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be multiplied.	<Data 2>
12	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be multiplied.	<Data 2>

3. Integer type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
13	Integer type constant	Specify the integer type data to be multiplied.	<Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be multiplied.	<Data 2>

No.	Tag	Explanation	Note
15	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be multiplied.	<Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be multiplied.	<Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be multiplied.	<Data 2>

4. Double-precision type constant/B Variable number/ LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
18	Double-precision type constant	Specify the double-precision type data to be multiplied.	<Data 2>
19	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be multiplied.	<Data 2>
20	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be multiplied.	<Data 2>
21	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be multiplied.	<Data 2>
22	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be multiplied.	<Data 2>

5. Real-number type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
23	Real-number type constant	Specify the real-number type data to be multiplied.	<Data 2>
24	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be multiplied.	<Data 2>
25	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be multiplied.	<Data 2>
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be multiplied.	<Data 2>
27	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be multiplied.	<Data 2>

6. (Element number)

When a P Variable number, LP Variable number, P [Array number], LP [Array number], BP Variable number, LBP Variable number, BP [Array number], LBP [Array number], EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No.	Tag	Explanation	Note
28	(Element number)	Specify the element of the position type variable to be multiplied. If omitted, all the elements of the position type variable are specified.	Element number: 1 to 255 Variable B/LB can be used.

> **Element of position type variable**
>
> SUPPLE-MENT
>
> The element of position type variable differs depending on the type of variable as follows.
>
> • Robot axis position type variable
>
> <Pulse type>
>
> (1): 1st axis data, (2): 2nd axis data, (3): 3rd axis data, (4) 4th axis data, (5): 5th axis data, (6) 6th axis data, (7): 7th axis data, (8): 8th axis data
>
> <XYZ type>
>
> (1): X axis data, (2): Y axis data, (3) Z axis data,
> (4): Rx axis data
> (5): Ry axis data, (6): Rz axis data, (7): Re axis data
>
> • Base axis position type variable
>
> (1): 1st axis data, (2): 2nd axis data...
>
> • Station axis position type variable
>
> (1): 1st axis data, (2): 2nd axis data...

7. D Variable number/LD Variable number/D [Array number]/LD [Array number]/ Double-precision type constant

When a P Variable number, LP Variable number, P [Array number], LP [Array number], BP Variable number, LBP Variable number, BP [Array number], LBP [Array number], EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table after (Element number) of 6.

No.	Tag	Explanation	Note
29	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision variable by which the element of position type variable is multiplied.	<Data 2>
30	Double-precision type constant	Specify the double-precision type data by which the element of position type variable is multiplied.	<Data 2>

Example

    (1) MUL B000 10
         Multiplies B000 by 10, and stores the result in B000.

    (2) MUL I000 I001
         Multiplies I000 by I001, and stores the result in I000.

    (3) SET D000 2
         MUL P000 (3) D000
         Multiplies the Z axis data of P000 by D000 (D000=2), and stores the result in P000.

DIV
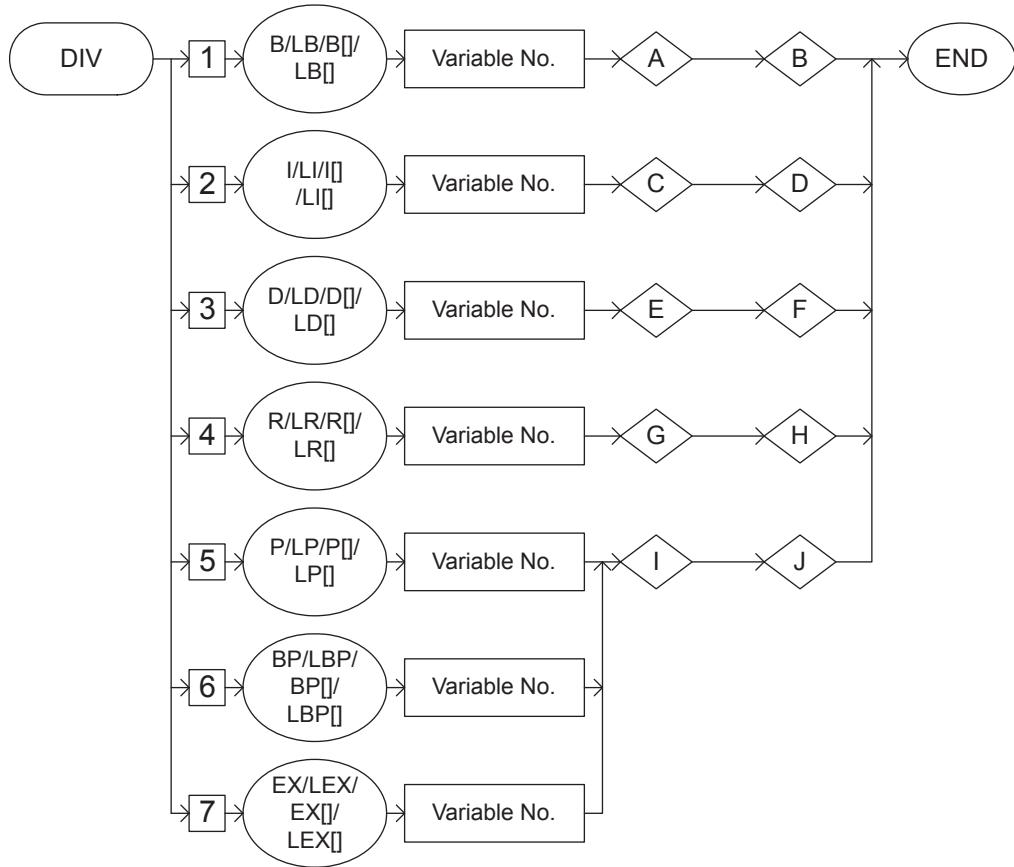
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function
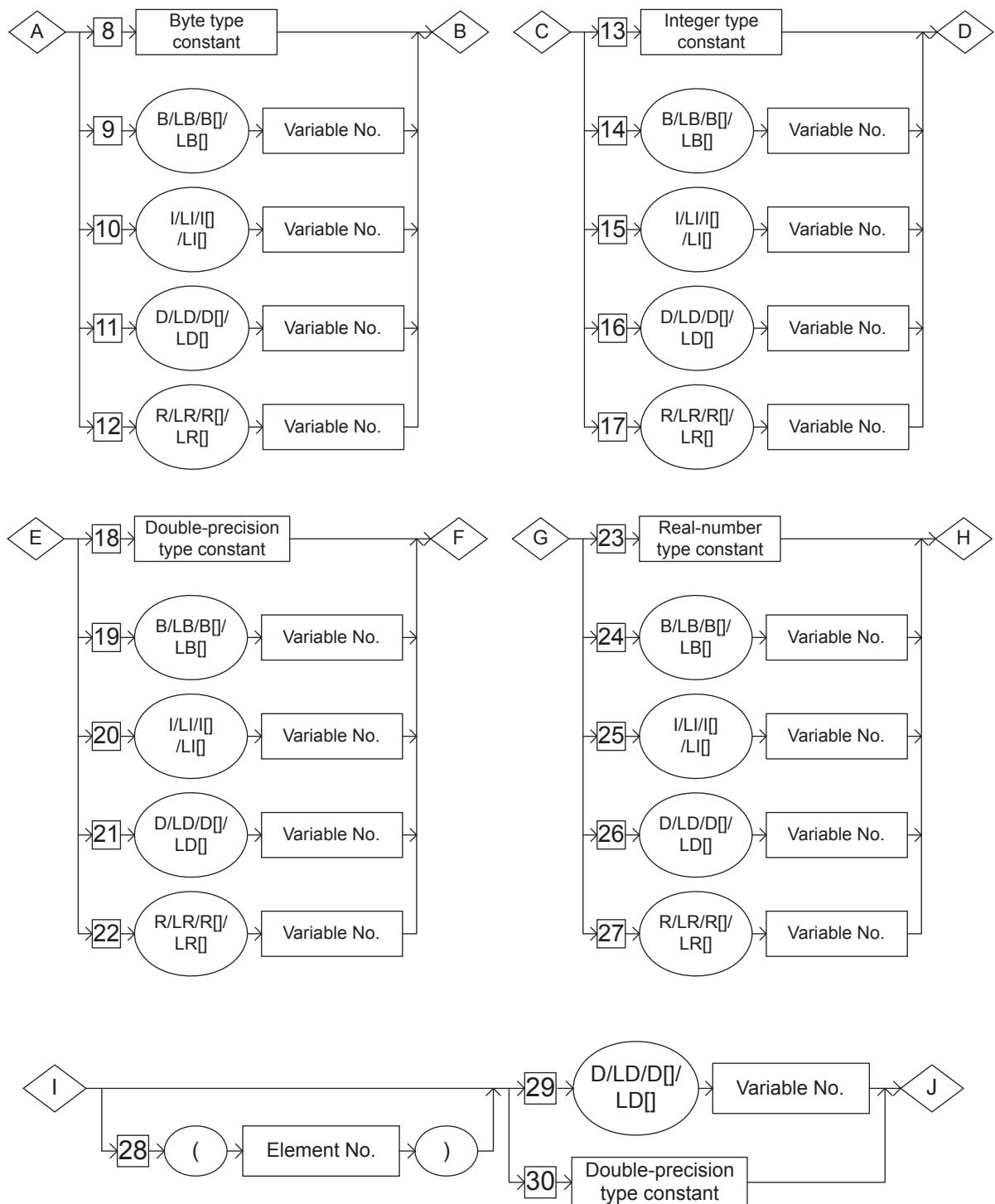
Divides Data 1 by Data 2, and stores the result in Data 1.

Syntax

DIV <Data 1> <Data 2>

A	8	Byte type constant		B
	9	B/LB/B[]/ LB[]	Variable No.	
	10	I/LI/I[] /LI[]	Variable No.	
	11	D/LD/D[]/ LD[]	Variable No.	
	12	R/LR/R[]/ LR[]	Variable No.	

C	13	Integer type constant		D
	14	B/LB/B[]/ LB[]	Variable No.	
	15	I/LI/I[] /LI[]	Variable No.	
	16	D/LD/D[]/ LD[]	Variable No.	
	17	R/LR/R[]/ LR[]	Variable No.	

E	18	Double-precision type constant		F
	19	B/LB/B[]/ LB[]	Variable No.	
	20	I/LI/I[] /LI[]	Variable No.	
	21	D/LD/D[]/ LD[]	Variable No.	
	22	R/LR/R[]/ LR[]	Variable No.	

G	23	Real-number type constant		H
	24	B/LB/B[]/ LB[]	Variable No.	
	25	I/LI/I[] /LI[]	Variable No.	
	26	D/LD/D[]/ LD[]	Variable No.	
	27	R/LR/R[]/ LR[]	Variable No.	

I					J
	28	(	Element No.	)	
	29	D/LD/D[]/ LD[]	Variable No.		
	30	Double-precision type constant			

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Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to be divided.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to be divided.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be divided.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to be divided.	<Data 1>
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis position type variable to be divided.	<Data 1>
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis position type variable to be divided.	<Data 1>
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position type variable to be divided.	<Data 1>

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2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specify the byte type data by which Data 1 is divided.	<Data 2>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable by which Data 1 is divided.	<Data 2>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable by which Data 1 is divided.	<Data 2>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable by which Data 1 is divided.	<Data 2>
12	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable by which Data 1 is divided.	<Data 2>

3. Integer type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
13	Integer type constant	Specify the integer type data by which Data 1 is divided.	<Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable by which Data 1 is divided.	<Data 2>

No.	Tag	Explanation	Note
15	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable by which Data 1 is divided.	<Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable by which Data 1 is divided.	<Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable by which Data 1 is divided.	<Data 2>

4. Double-precision type constant/B Variable number/ LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
18	Double-precision type constant	Specify the double-precision type data by which Data 1 is divided.	<Data 2>
19	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable by which Data 1 is divided.	<Data 2>
20	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable by which Data 1 is divided.	<Data 2>
21	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable by which Data 1 is divided.	<Data 2>
22	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable by which Data 1 is divided.	<Data 2>

5. Real-number type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
23	Real-number type constant	Specify the real-number type data by which Data 1 is divided.	<Data 2>
24	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable by which Data 1 is divided.	<Data 2>
25	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable by which Data 1 is divided.	<Data 2>
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable by which Data 1 is divided.	<Data 2>
27	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable by which Data 1 is divided.	<Data 2>

6. (Element number)

When a P Variable number, LP Variable number, P [Array number], LP [Array number], BP Variable number, LBP Variable number, BP [Array number], LBP [Array number], EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No.	Tag	Explanation	Note
28	(Element number)	Specify the element of the position type variable by which Data 1 is divided. If omitted, all the elements of the position type variable are specified. As for the Element, refer to "Element of position type variable" of "6.(Element number)" in MUL instruction.	Element number: 1 to 255 Variable B/LB can be used.

7. D Variable number/LD Variable number/D [Array number]/LD [Array number]/Double-precision type constant

When a P Variable number, LP Variable number, P [Array number], LP [Array number], BP Variable number, LBP Variable number, BP [Array number], LBP [Array number], EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, one of the tags must be selected from the following table after (Element number) of 6.

No.	Tag	Explanation	Note
29	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision variable by which the element of the position type variable is divided.	\<Data 2\>
30	Double-precision type constant	Specify the double-precision type data by which the element of the position type variable is divided.	\<Data 2\>

Example

(1) DIV B000 10
Divides B000 by 10, and stores the result in B000.

(2) DIV I000 I001
Divides I000 by I001, and stores the result in I000.

(3) SET D000 2
DIV P000 (3) D000
Divides the Z axis data by D000 (D000=2), and stores the result in P000.

CNVRT
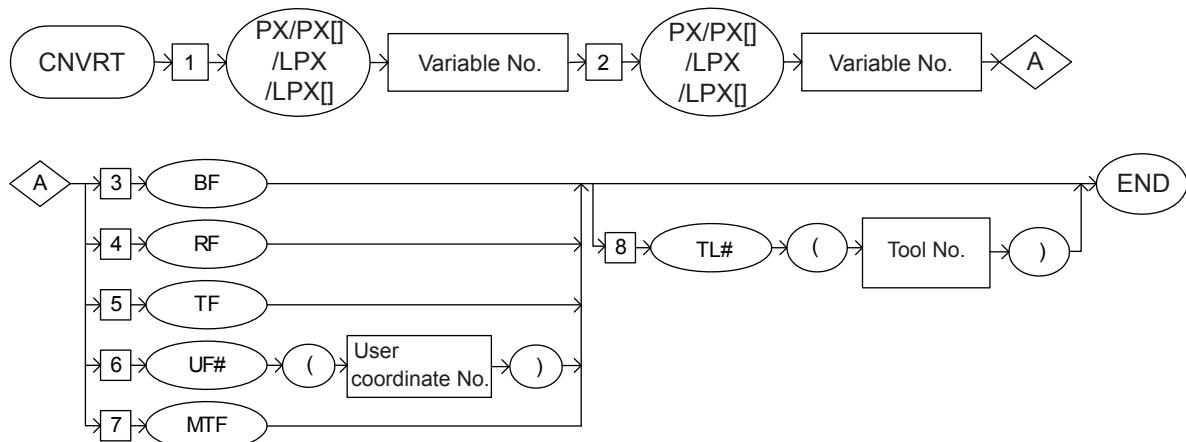
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Converts the pulse type position type variable of Data 2 to the XYZ type position type variable in the specified coordinate system, and stores the result in Data 1.

Syntax

CNVRT <Data 1> <Data 2> Coordinate system designation

Explanation

1. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the number of the expanded position type variable where the converted data is stored.	<Data 1>

> **SUPPLE-MENT**
>
> **Expanded position type variables**
>
> The expanded position type variable is a position type variable that depends on the control group in the job.
>
> <Example>
>
> • When the control group is R1:
>   PX000 indicates P000.
>
> • When the control group is R1 + B1:
>   PX000 indicates P000 and BP000.
>
> • When the control group is R1 + B1 + ST1:
>   PX000 indicates P000 + BP000 + EX000.
>
> • When the control group is R1 + R2 + B1 + B2 + ST1 in the coordinated job (master R1 + B1):
>   PX000 indicates the following:
>   P000: R2 (slave), P001: R1 (master)
>   BP000: B2 (slave), BP001: B1 (master)
>   EX000: ST1

2. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
2	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the number of the expanded position type variable to be converted.	<Data 2>

3. BF/RF/TF/UF# (User coordinate number)/MTF

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
3	BF	Specify the conversion in the base coordinate system.	
4	RF	Specify the conversion in the robot coordinate system.	
5	TF	Specify the conversion in the tool coordinate system.	
6	UF# (User coordinate number)	Specify the conversion in the user coordinate system.	No.: 1 to 63 Variable B/I/D/LB/LI/LD can be used.
7	MTF	Specify the conversion on the master tool coordinate system. On the master tool coordinate system, the data is converted to a position relative to the master manipulator.	Available only with the optional independent coordinate function.

4. TL# (Tool Number)

The following tag can be added or omitted.

No.	Tag	Explanation	Note
8	TL# (Tool number)	Specify the tool number.	No.: 0 to 63 Variable B/I/D/LB/LI/LD can be used.

Example

(1) CNVRT PX000 PX001 BF

For the job R1, the pulse type position data of P001 is converted to the XYZ type position data in the base coordinate system and stores the converted data in P000.

AND
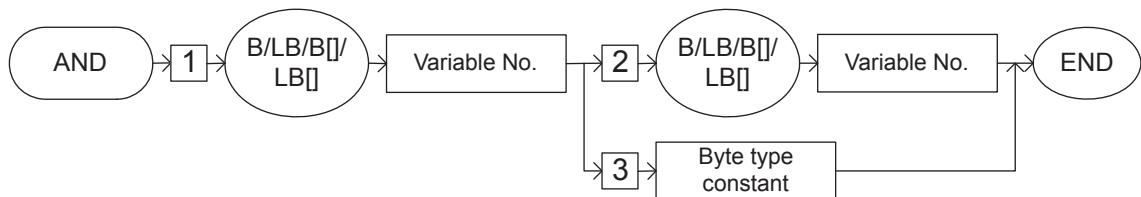
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out logical multiplication of Data 1 and Data 2, and stores the result in Data 1.

Syntax

AND <Data 1> <Data 2>

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable for which the logical multiplication is carried out.	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/Byte type constant

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable for which the logical multiplication is carried out.	<Data 2>
3	Byte type constant	Specify the byte type data for which the logical multiplication is carried out.	<Data 2>

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Example

(1) SET B000 5
SET B010 1
AND B000 B010

Carries out the logical multiplication of B000 (0000 0101) and B010 (0000 0001), and stores the result (0000 0001=1) in B000.
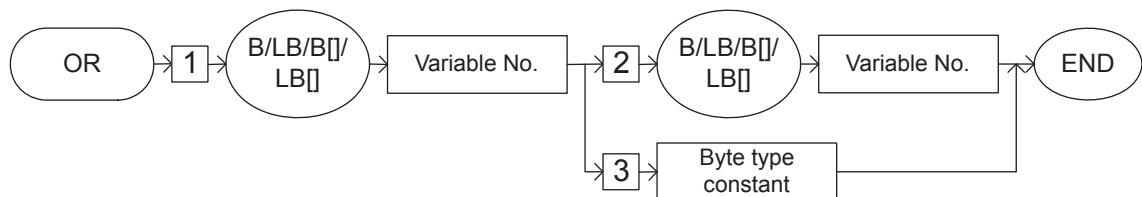
(1)

OR

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out the logical sum of Data 1 and Data 2, and stores the result in Data 1.

Syntax

OR <Data 1> <Data 2>

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable for which the logical sum is carried out.	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/Byte type constant

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable for which the logical sum is carried out.	<Data 2>
3	Byte type constant	Specify the byte type data for which the logical sum is carried out.	<Data 2>

Example

(1) SET B000 5
     SET B010 10
     OR B000 B010

     Carries out the logical sum of B000 (0000 0101) and B010 (0000 1010), and stores the result (0000 1111=15) in B000.
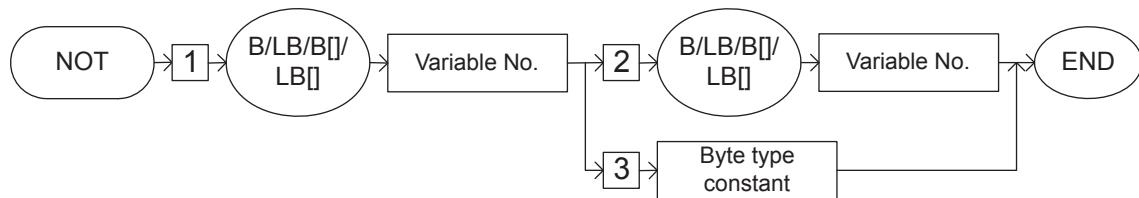
(1)

NOT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out the logical negation of Data 2, and stores the result in Data 1.

Syntax

NOT <Data 1>   <Data 2>

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to store the result of logical negation.	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/Byte type constant

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable for which the logical negation is carried out.	<Data 2>
3	Byte type constant	Specify the byte type data for which the logical negation is carried out.	<Data 2>

Example

(1) SET B000 0
     SET B010 1
     NOT B000 B010

     Carries out the logical negation of B010 (0000 0001), and stores
   the result (1111 1110=254) in B000.

XOR
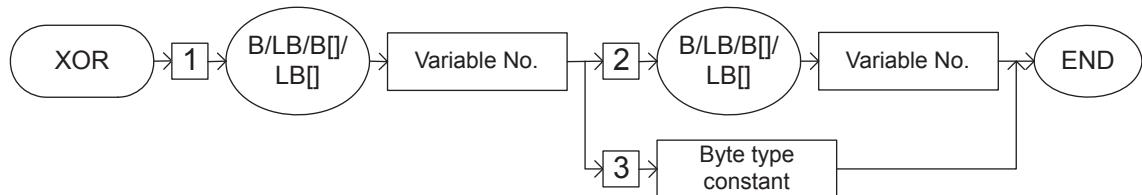
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out the logical exclusive OR of Data 1 and Data 2, and stores the result in Data 1.

Syntax

XOR <Data 1> <Data 2>

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable for which the exclusive OR is carried out.	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/Byte type constant

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable for which the exclusive OR is carried out.	<Data 2>
3	Byte type constant	Specify the byte type data for which the exclusive OR is carried out.	<Data 2>

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Example

(1) SET B000 1
SET B010 5
XOR B000 B010

Carries out the exclusive OR of B000 (0000 0001) and B010 (0000 0101), and stores the result (0000 0100=4) in B000.

MFRAME

| SUBSET	STANDARD	EXPANDED
Not available	Available	Available
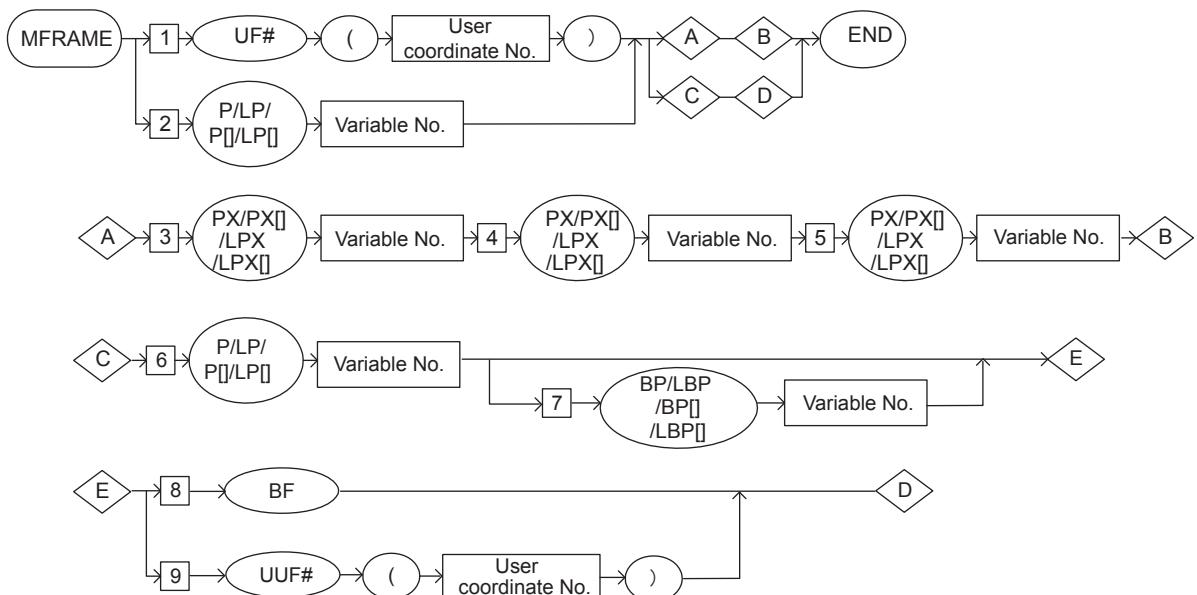
Function

By using this instruction, the user coordinates are generated from the position data in either of the following two methods.

- Method 1: Generating the user coordinates from three position data: Data 1, Data 2 and Data 3.

  - Data 1 shows the position data of the defined point ORG

  - Data 2 shows the position data of the defined point XX

  - Data 3 shows the position data of the defined point XY

- Method 2: Generating the user coordinates from Data 4 which is one position data by directly specifying the position of the user coordinates in Data 4 in either of the following two methods.

  - Specifying the position in the base coordinate system.

  - Specifying the position in the user coordinates.

Syntax

MFRAME the user coordinates specification <DATA 1> <DATA 2> <DATA 3>
MFRAME the user coordinates specification <DATA 4> the coordinate system specification

Explanation

1. UF# (User coordinate number)/P Variable number/LP Variable number/P [Array number]/LP [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	UF# (User coordinate number)	Allocates the number for the user coordinate to be created.	No.: 1 to 63 Variable B/I/D/LB/LI/LD can be used.
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the position type variable where the coordinate values of the user coordinate to be created is stored.	

2. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
3	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the number of the expanded position type variable where the position data of the user coordinate's defined point ORG has been stored.	<Data 1>

3. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
4	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the number of the expanded position type variable where the position data of the user coordinate's defined point XX has been stored.	<Data 2>

4. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

The following tag must be added..

No	Tag	Explanation	Note
5	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the number of the expanded position type variable where the position data of the user coordinate's defined point XY has been stored.	<Data 3>

5. P Variable number/LP Variable number/P [Array number]/LP [Array number]

The following tag must be added.

No	Tag	Explanation	Note
6	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the position type variable where the value of the user coordinates is stored.	<Data 4>

6. BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]

The following tag can be added or omitted.

No	Tag	Explanation	Note
7	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the position type variable where the value of the user coordinates (the base axis position) is stored.	

7. BF/UUF# (User coordinate number)/

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
8	BF	Specify the position in the base coordinate system.	
9	UUF# (User coordinate number)	Specify the position in the user coordinate system.	No.: 1 to 63 Variable B/I/D/LB/LI/LD can be used.

Example

(1) MFRAME UF#(1) PX000 PX001 PX002

For the job R1, the user coordinate number 1 is created according to three types of position data; P000, P001, and P002 of the user coordinate system.

(2) MFRAME UF#(1) P000 BF

The user coordinate no.1 is created at the position which is defined by the value of P000.

(3) MFRAME UF#(1) P000 UUF#(2)

The user coordinate no.1 is created at the position which is defined by the value of P000 in the user coordinate no.2.

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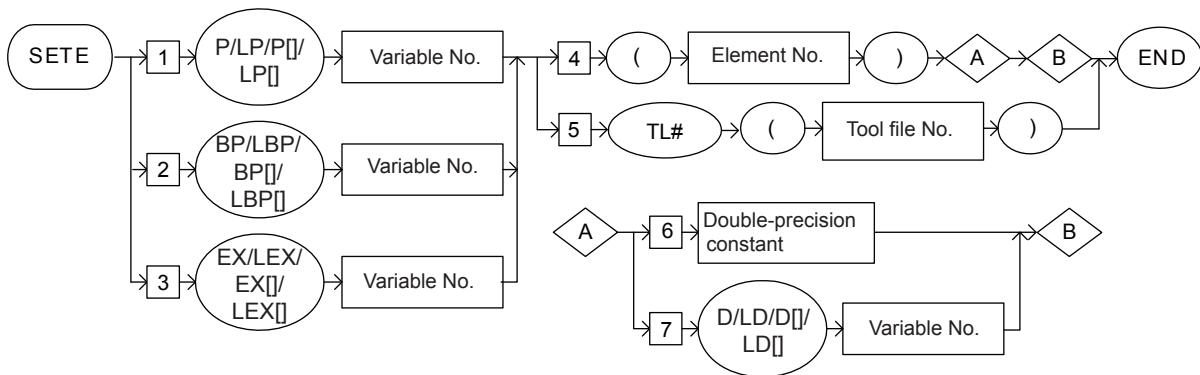
SETE

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Sets Data 2 in the element of position type variable of Data 1.

Syntax

SETE <Data 1> <Data 2>

Explanation

1. P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the robot axis position type variable where Data 2 is set as an element.	<Data 1>
2	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis position type variable where Data 2 is set as an element.	<Data 1>
3	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position type variable where Data 2 is set as an element.	<Data 1>

2. (Element number)/TL# (Tool file number)

One of the tags must be from the following table.

No.	Tag	Explanation	Note
4	(Element number)	Specify the element of the position type variable to be set. As for the Element, refer to "Element of position type variable" of "6.(Element number)" in MUL instruction.	<Data 2> Element No.: 1 to 255 Variable B/LB can be used.
5	TL# (Tool file number)	Specify the tool file number to be set. Unable to set to the base axis position type variable and the station axis type variable. When the tool number tab is locked in the teaching condition window, only tool No. "0" is able to be set.	<Data 2> No.: 0 to 63

3. Double-precision type constant/D Variable number/ LD Variable number/D [Array number]/LD [Array number]

When an element number is selected from the table in part 2 above, one of the tags must be selected from the following table.

No.	Tag	Explanation	Note
6	Double-precision type constant	Specify the double-precision type data to be set.	
7	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to be set.	

Example

(1) SETE P000 (3) 2000

2000 is set in the Z axis data of P000.

(2) SETE P000 TL#(1)

1 is set in the tool data of P000.

GETE
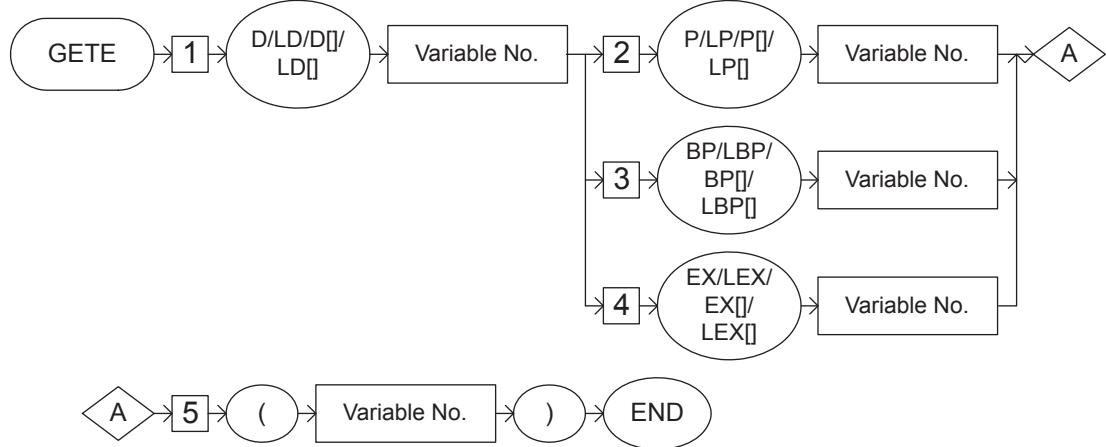
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the element of position type variable of Data 2 in Data 1.

Syntax

GETE <Data 1> <Data 2> (Element number)

Explanation

1. D Variable number/LD Variable number/D [Array number]/LD [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable where the element of position type variable is stored.	<Data 1>

2. P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

One of the tags must be from the following table.

No.	Tag	Explanation	Note
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number	Specify the number of the robot axis position type variable to be set.	<Data 2>
3	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the number of the base axis position type variable to be set.	<Data 2>
4	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the number of the station axis position type variable to be set.	<Data 2>

3. (Element number)

The following tag must be added.

No.	Tag	Explanation	Note
5	(Element number)	Specify the number of the of the position type variable element to be stored. As for the Element, refer to "Element of position type variable" of "6.(Element number)" in MUL instruction.	Element No.: 1 to 255 Variable B/LB can be used.

Example

(1) GETE D000 P000 (3)

The Z axis data of P000 is stored in D000.

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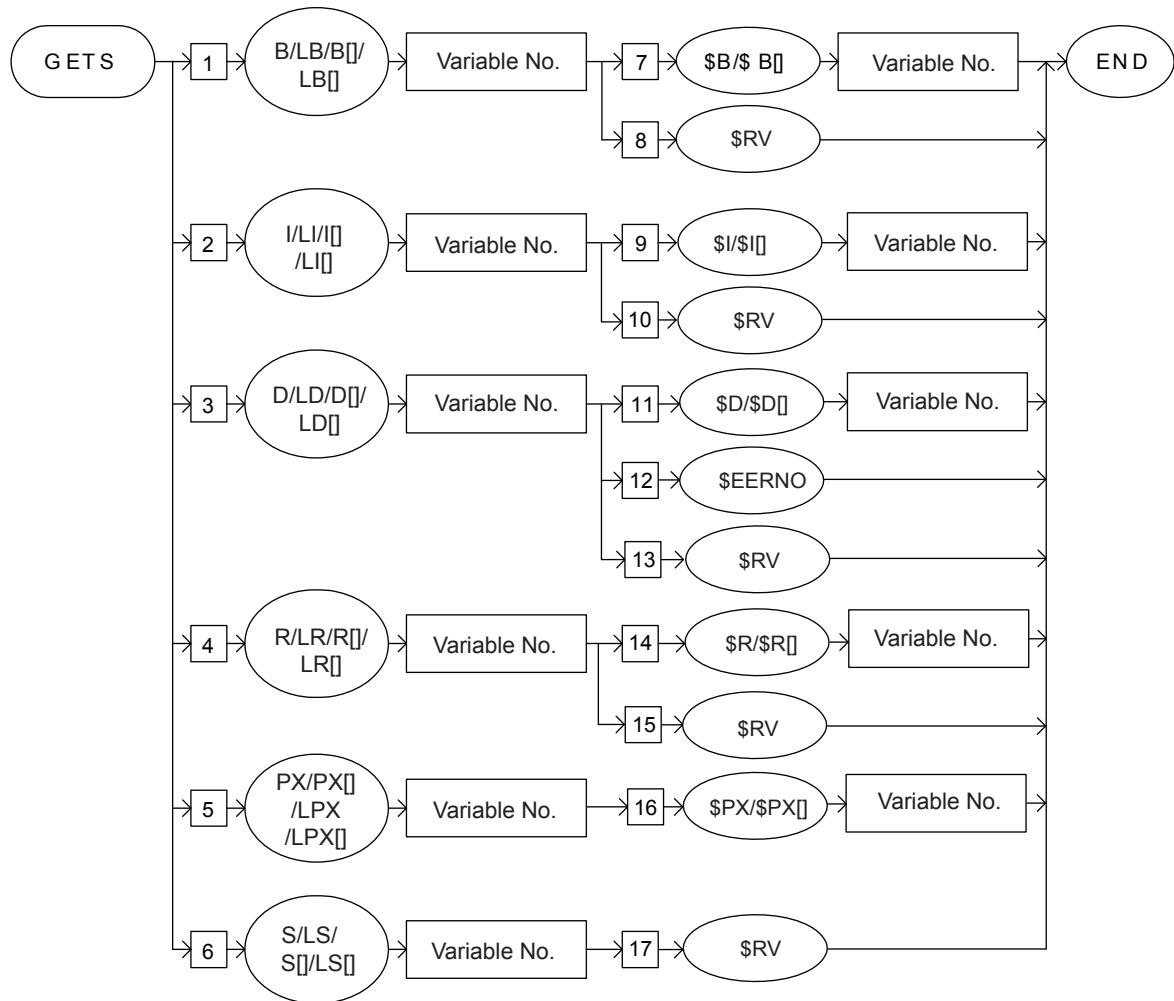
GETS

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the system variable of Data 2 in Data 1.

Syntax

GETS <Data 1> <Data 2>

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]/S Variable number/LS Variable number/S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable where the system variable is stored.	\<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable where the system variable is stored.	\<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable where the system variable is stored.	\<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable where the system variable is stored.	\<Data1>
5	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the number of the expanded position type variable where the system variable is stored.	\<Data 1>
6	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character string type variable where the system variable is stored.	\<Data 1>

System variable

The system variables are written by the controller system and can be referred only by a GETS instruction. The following system variables are available.

System Variable	Type	No.	Explanation
$B type variable	Byte type	$B001	Execution series number (0 to 17)
		$B002	Detected /Not detected by the optional SRCH/ NSRCH instruction 0: Not detected, 1: Detected
		$B008	Result of the optional SYSTART instruction 1: Normal termination, 0: Abnormal termination
		$B009	Result of the SETFILE/GETFILE instruction 0: Normal termination, Other than 0: Abnormal termination
		$B014	Result of the optional HSEN instruction 1: Setting status completed, 0: Others
		$B016	The number of RIN#(1)s detected by the optional NSRCH instruction
		$B017	The number of RIN#(2)s detected by the optional NSRCH instruction
		$B018	The number of RIN#(3)s detected by the optional NSRCH instruction
		$B019	The number of RIN#(4)s detected by the optional NSRCH instruction
		$B020	The number of RIN#(5)s detected by the optional NSRCH instruction
		$B021	The number of RIN#(6)s detected by the optional NSRCH instruction
$PX type variable	Expanded position type	$PX000	Current value (pulse type)
		$PX001	Current value (XYZ type)
		$PX002	Position detected by the optional SRCH instruction (pulse type)
		$PX003	Position detected by the optional STCH instruction (XYZ type)
		$PX004	Current value excluding the shift amount (XYZ type)
		$PX005	Teaching position (pulse type)
		$PX006	Operation target position (pulse type)

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System Variable	Type	No.	Explanation
$PX type variable	Expanded position type	$PX007	Current position excluding the shift amount and profiling amount (XYZ type)
		$PX008	F/B pulse → current value (XYZ type)
		$PX0010	F/B pulse
		$PX040	Path correction amount (available only with the optional COMARC function)
		$PX041	Base coordinate shift amount
		$PX042	Robot coordinate shift amount
		$PX043	Tool coordinate shift amount
		$PX044	User coordinate shift amount
		$PX045	3D shift amount
		$PX050	Each axis torque command position
		$PX100 to $PX149	RIN#(1)'s detected position by the optional NSRCH instruction (pulse type)
		$PX150 to $PX199	RIN#(1)'s detected position by the optional NSRCH instruction (XYZ type)
		$PX200 to $PX249	RIN#(2)'s detected position by the optional NSRCH instruction (pulse type)
		$PX250 to $PX299	RIN#(2)'s detected position by the optional NSRCH instruction (XYZ type)
		$PX300 to $PX349	RIN#(3)'s detected position by the optional NSRCH instruction (pulse type)
		$PX350 to $PX399	RIN#(3)'s detected position by the optional NSRCH instruction (XYZ type)

Continued

Continued

System Variable	Type	No.	Explanation
$PX type variable	Expanded position type	$PX400 to $PX449	RIN#(4)'s detected position by the optional NSRCH instruction (pulse type)
		$PX450 to $PX499	RIN#(4)'s detected position by the optional NSRCH instruction (XYZ type)
		$PX500 to $PX549	RIN#(5)'s detected position by the optional NSRCH instruction (pulse type)
		$PX550 to $PX599	RIN#(5)'s detected position by the optional NSRCH instruction (XYZ type)
		$PX600 to $PX649	RIN#(6)'s detected position by the optional NSRCH instruction (pulse type)
		$PX650 to $PX699	RIN#(6)'s detected position by the optional NSRCH instruction (XYZ type)

2. $B Variable number/$B [Array number]/$RV

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added

No.	Tag	Explanation	Note
7	$B Variable number/ $B [Array number]	Specify the number of the byte type system variable to be stored.	<Data 2>
8	$RV	Receive the returned value of the job	<Data 2>

3. $I Variable number/$I [Array number]/$RV

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No.	Tag	Explanation	Note
9	$I Variable number/ $I [Array number]	Specify the number of the integer type system variable to be stored.	<Data 2>
10	$RV	Receive the returned value of the job	<Data 2>

4. $D Variable number/$D [Array number]/$ERRNO /$RV

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No.	Tag	Explanation	Note
11	$D Variable number/ $D [Array number]	Specify the number of the double-precision type system variable to be stored.	<Data 2>
12	$ERRNO	Specify the error status	<Data 2>
13	$RV	Receive the returned value of the job	<Data 2>

5. $R Variable number/$R [Array number]/$RV

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No.	Tag	Explanation	Note
14	$R Variable number/ $R [Array number]	Specify the number of the real-number type system variable to be stored.	<Data 2>
15	$RV	Receives the returned value of the job	<Data 2>

6. $PX Variable number/$PX [Array number]

When a PX Variable number, LPX Variable number, PX [Array number], or LPX [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added,

No.	Tag	Explanation	Note
16	$PX Variable number/ $PX [Array number]	Specify the number of the expanded position type system variable to be stored.	<Data 2>

7. $RV

When a S Variable number, LS Variable number, S [Array number], or LS [Array number] is selected from the table in part 1 of this Explanation, the following tag must be added.

No.	Tag	Explanation	Note
17	$RV	Receives the returned value of the job	<Data 2>

Example

(1)   GETS B000 $B002

The result of the SRCH instruction is stored in B000.

(2)   GETS PX000 $PX000

For the job R1, the pulse type current value is stored in P000.

SQRT
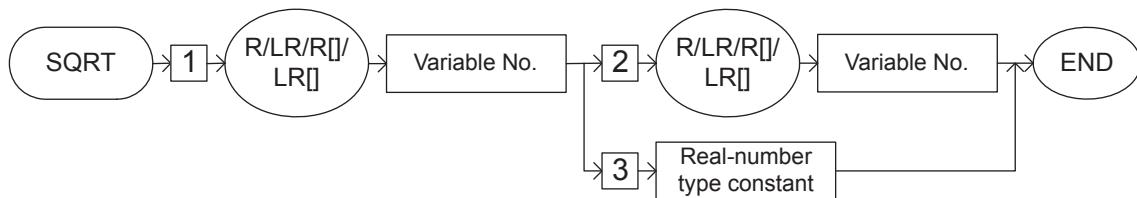
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the square root of Data 2, and stores the result in Data 1.

Syntax

SQRT <Data 1> <Data 2>

Explanation

1. R Variable number/LR Variable number/R [Array number]/LR [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to store the result.	<Data 1>

2. R Variable number/LR Variable number/R [Array number]/LR [Array number]/Real-number type constant

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable whose square root is calculated.	<Data 2>
3	Real-number type constant	Specify the real-number type data whose square root is calculated.	<Data 2>

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Example

(1) SQRT R000 2

1.414214E + 00 is stored in R000.

SIN
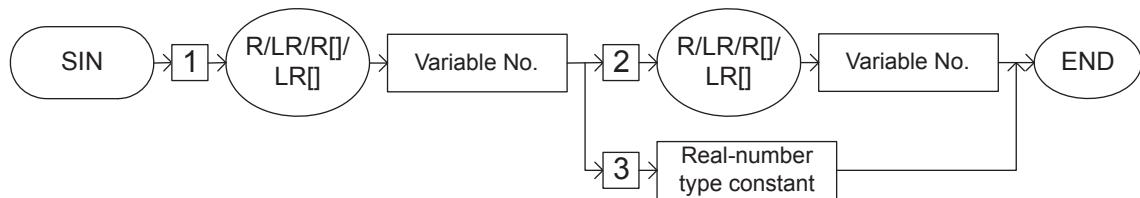
| SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the sine of Data 2(Units: deg), and stores the result in Data 1.

Syntax

SIN <Data 1> <Data 2>

Explanation

1. R Variable number/LR Variable number/R [Array number]/LR [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to store the result.	<Data 1>

2. R Variable number/LR Variable number/R [Array number]/LR [Array number]/Real-number type constant

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable whose sine is calculated.	<Data 2>
3	Real-number type constant	Specify the real-number type data whose sine is calculated.	<Data 2>

Example

(1) SIN R000 60

8.660254E - 01 is stored in R000.

COS
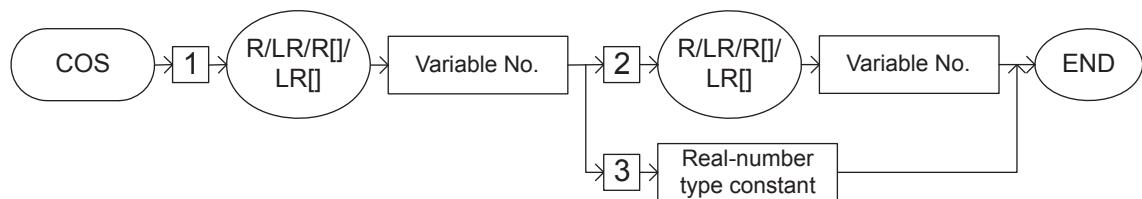
| SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the cosine of Data 2(Units: deg), and stores the result in Data 1.

Syntax

COS <Data 1> <Data 2>

Explanation

1. R Variable number/LR Variable number/R [Array number]/LR [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to store the result.	<Data 1>

2. R Variable number/LR Variable number/R [Array number]/LR [Array number]/Real-number type constant

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable whose cosine is calculated.	<Data 2>
3	Real-number type constant	Specify the real-number type data whose cosine is calculated.	<Data 2>

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Example

(1) COS R000 60

5.000000E - 01 is stored in R000.

ATAN
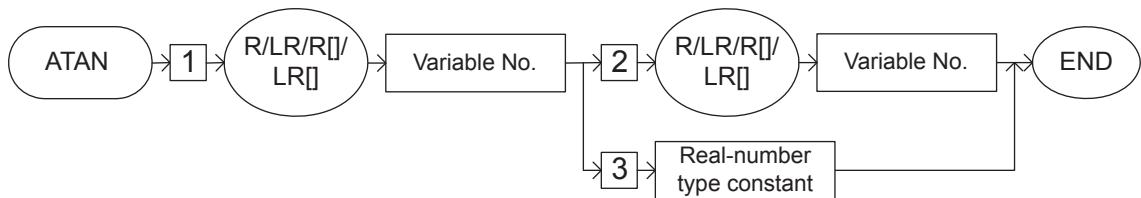
| SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the arc tangent of Data 2, and stores the result in Data 1.

Syntax

ATAN <Data 1> <Data 2>

Explanation

1. R Variable number/LR Variable number/R [Array number]/LR [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable to store the result.	<Data 1>

2. R Variable number/LR Variable number/R [Array number]/LR [Array number]/Real-number type constant

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real-number type variable whose arc tangent is calculated.	<Data 2>
3	Real-number type constant	Specify the real-number type data whose arc tangent is calculated.	<Data 2>

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Example

(1) ATAN R000 60

 8.904516E + 01 is stored in R000.

MULMAT
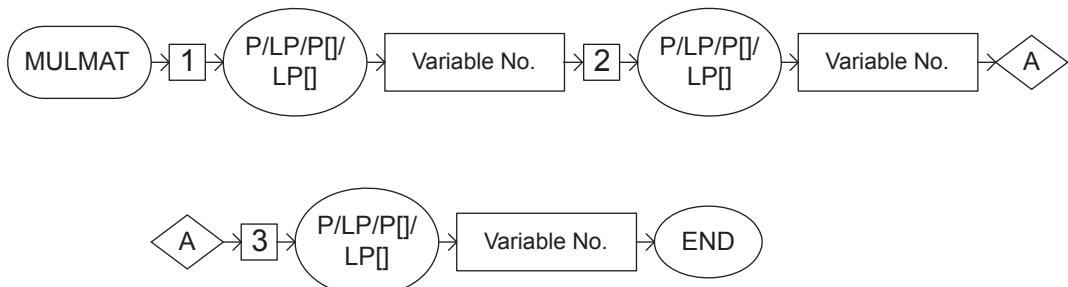
| SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the matrix multiplication of Data 2 and Data 3, and stores the result in Data 1.

Syntax

MULMAT <Data 1> <Data 2> <Data 3>

Explanation

1. P Variable number/LP Variable number/P [Array number]/LP [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the position type variable to store the result.	<Data 1>

2. P Variable number/LP Variable number/P [Array number]/LP [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the position type variable for which the matrix multiplication is calculated.	<Data 2>

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3. P Variable number/LP Variable number/P [Array number]/LP [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
3	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the position type variable for which the matrix multiplication is calculated.	<Data 3>

Example

SUPPLE-MENT

MULMAT and INVMAT instructions

The amount of shift for a three-dimensional shift can be obtained by using the MULMAT and INVMAT instructions.

The instructions, exclusive to the YRC1000micro, to obtain the shift amount are used for the optional three-dimensional shift function. However, the amount of the three-dimensional shift can be also obtained by using the standard instructions, MULMAT and INVMAT.

The target value for a three-dimensional shift can be calculated by the following equation.

Pnew=P3d $\times$ Pold

Where Pnew: Target position after a three-dimensional shift

P3d: Three-dimensional shift amount

Pold: Taught position

The amount of a three-dimensional shift can be obtained as follows:

P3d=Pnew $\times$ Pold^{-1}

(1)   MOVL P010 V=500
     GETS PX020 $PX001   Stores the current XYZ type value in P020.
     INVMAT P021 P010   Calculates the inverse matrix of the taught position.
     MULMAT P023 P020 P021   The amount of the three-dimensional

INVMAT
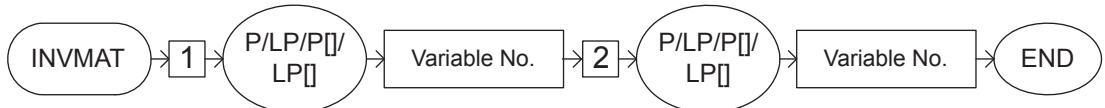
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the inverse matrix of Data 2, and stores the result in Data 1.

Syntax

INVMAT <Data 1> <Data 2>

Explanation

1. P Variable number/LP Variable number/P [Array number]/LP [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the position type variable to store the result.	<Data 1>

2. P Variable number/LP Variable number/P [Array number]/LP [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the number of the position type variable for which the inverse matrix is calculated.	<Data 2>

Example

(1) MOVL P010 V=500
     GETS PX020 $PX001   Stores the current XYZ type value in P020.
     INVMAT P021 P010   Calculates the inverse matrix of the taught position.
     MULMAT P023 P020 P021   The amount of the three-dimensional

GETPOS
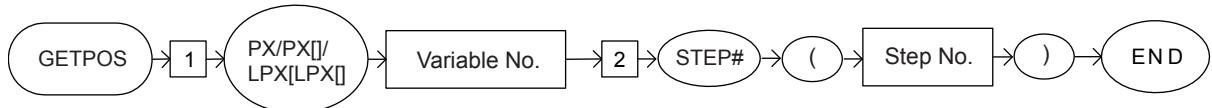
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the position data of the data2 (step number) in Data 1.

Syntax

GETPOS <Data 1> <Data 2>

Explanation

1. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
1	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the expanded position type variable to store the teaching position data.	<Data 1>

2. STEP# (Step number)

The following tag must be added.

No.	Tag	Explanation	Note
2	STEP# (Step number)	Specify the step number of the teaching position data to store.	<Data 2> No.: 1 to 999 Variable B/I/D/LB/LI/LD can be used.

Example

(1) GETPOS PX000 STEP# (1)

In case of R1 job, stores the teaching position data of the first step in P000.

# VAL
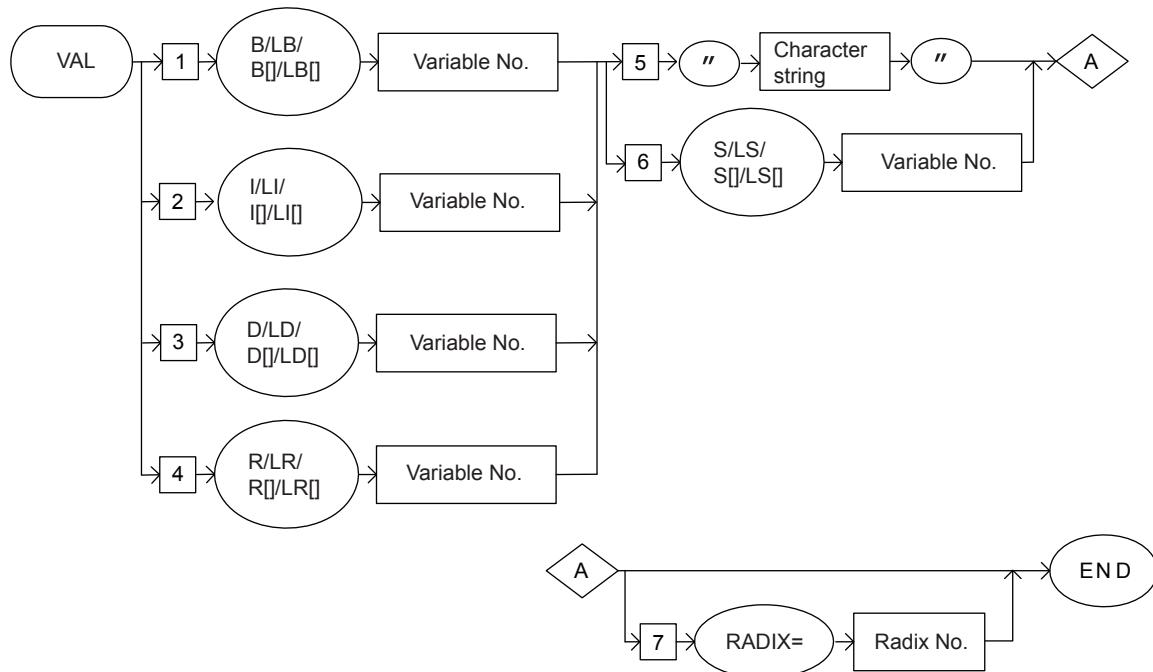
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Converts the numeric values of the character string (ASCII) in the data2 into the real value, and stores the result in data1.

Syntax

VAL <Data 1> <Data 2> radix number

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to store the converted value.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to store the converted value.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable to store the converted value.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real type variable to store the converted value.	<Data 1>

2. Character string/ S Variable number/LS Variable number/S [Array number]/LS [Array number]

One of the tags must be selected from the following table

No.	Tag	Explanation	Note
5	Character string	Specify the character string to convert	<Data 2>
6	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable to convert the character string	<Data 2>

3. RADIX=radix number

The following tag can be added or omitted

No.	Tag	Explanation	Note
7	RADIX=radix number	Specify the radix number to convert the value	

Example

(1) VAL B000 "123"

123 is stored in B000.

(2) VAL B000 "111" RADIX=2

7 is stored in B000.

VAL2STR
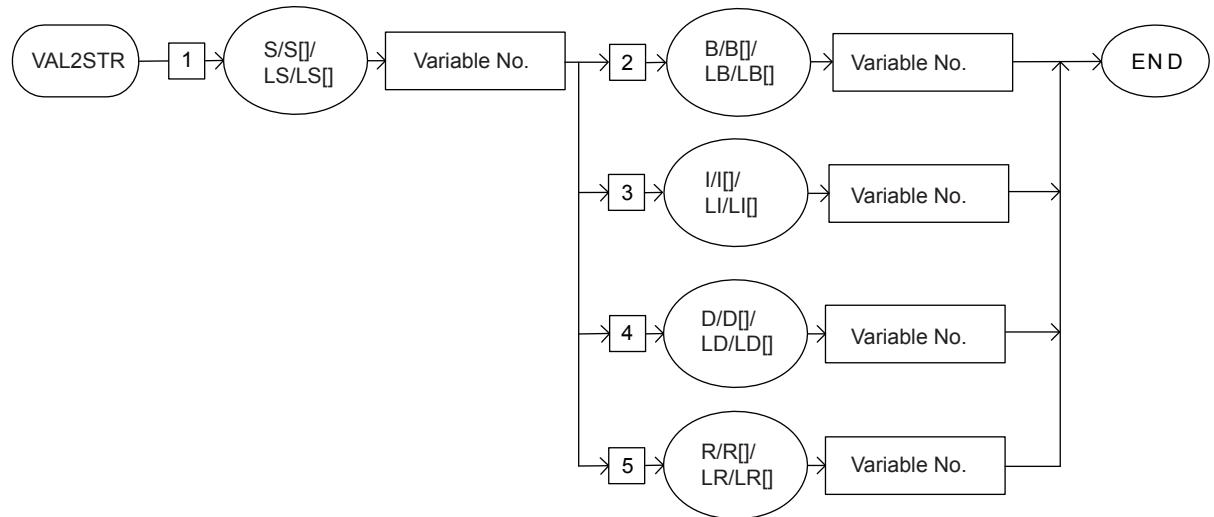
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

The data2 value, which is converted into the character, is stored in the data1.

Syntax

VAL2STR <Data 1> <Data 2>

Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable to store the data	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to covert into the character string.	<Data 2>
3	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to covert into the character string.	<Data 2>
4	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable to covert into the character string.	<Data 2>
5	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the number of the real type variable to covert into the character string.	<Data 2>

Example

(1) VAL2STR S000 B000

The character string "255" i stored in S000 when [255] is stored in B000.

ASC
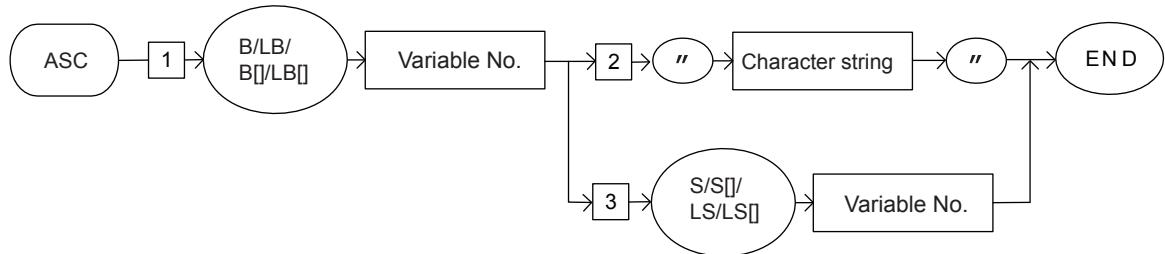
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Retrieves the first character code of the character string (ASCII) of the data2, and stores it in Data 1.

Syntax

ASC <Data 1> <Data 2>

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to store the character code.	<Data 1>

2. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	Character string	Specify the character string to retrieve the character code.	<Data 2>
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable stored the character string to retrieve the character code.	<Data 2>

Example

(1) ASC B000 "ABC"

The first character code "A" from the character string "ABC" is stored in B000.

CHR$
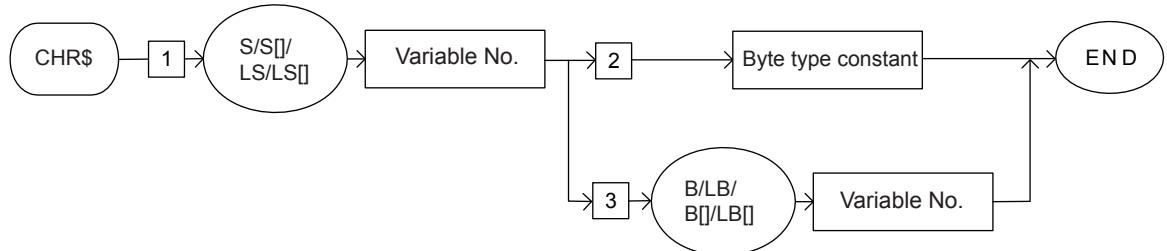
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

The character (ASCII), which contains the character code of the data2 is retrieved, and it is stored in Data 1.

Syntax

CHR$ <Data 1> <Data 2>

Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the byte type variable to store the retrieved character from the character code.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	Byte type constant	Specify the character code to retrieve the character code.	<Data 2>
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable stored the character code to retrieve the character.	<Data 2>

Example

(1) CHR$ S000 65

The letter "A" ,which is the character code 65, is stored in S000.

MID$
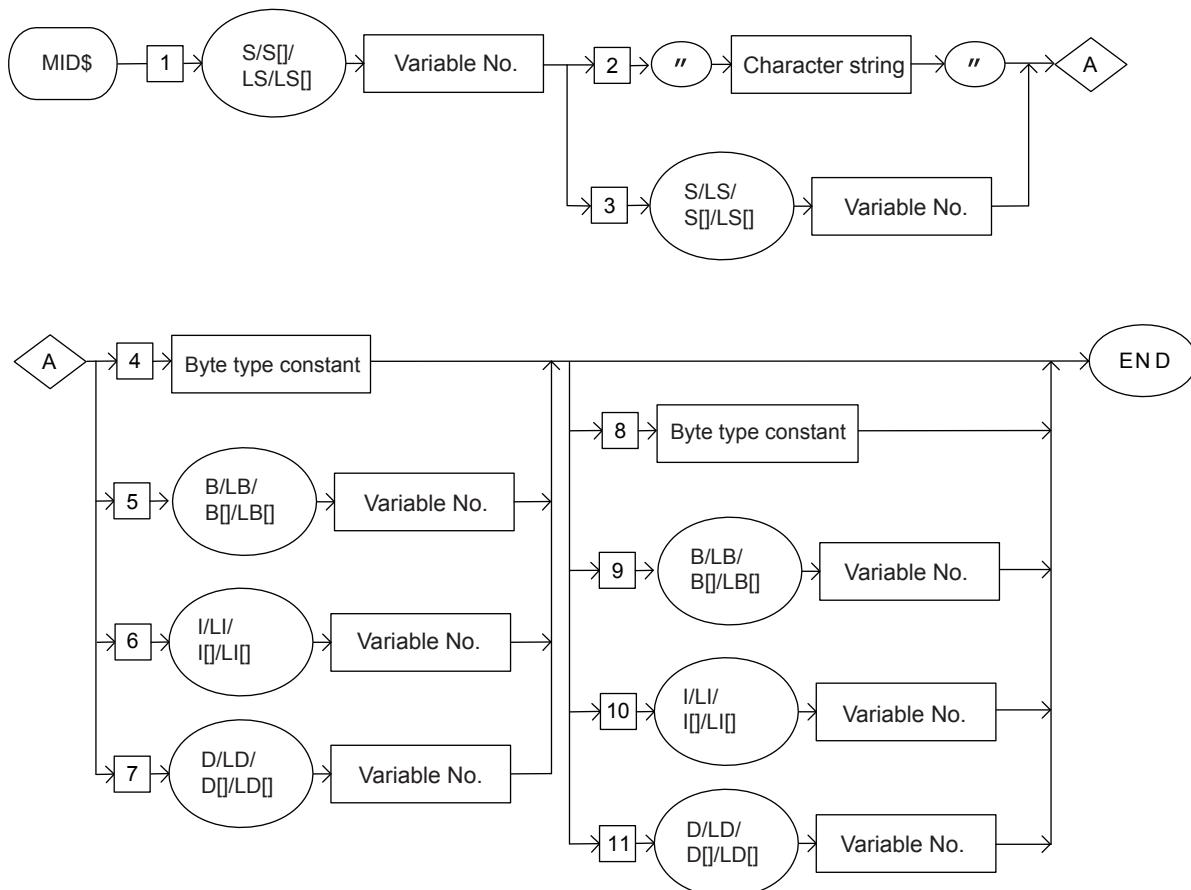
| SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Extracts the any length (data 3, 4) of the character string (ASCII) from the character strings (ASCII) in the data2, and stores the result in Data 1.

Syntax

MID$ <Data 1> <Data 2> <Data 3> <Data 4>

Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable to store the extracted character string.	<Data 1>

2. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	Character string	Specify the character string to extract.	<Data 2>
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable stored the character string to extract.	<Data 2>

3. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
4	Byte type constant	Specify the starting position to extract.	<Data 3>
5	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable stored the starting position to extract.	<Data 3>
6	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable stored the starting position to extract.	<Data 3>
7	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable stored the starting position to extract.	<Data 3>

4. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specify the length to extract.	<Data 4>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable stored the length to extract.	<Data 4>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable stored the length to extract.	<Data 4>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable stored the length to extract.	<Data 4>

Example

(1) MID$ S000 "123ABC456" 4 3

The three letters "ABC" are extracted from the fourth letter of the character string "123ABC456" and stored in S000.

LEN
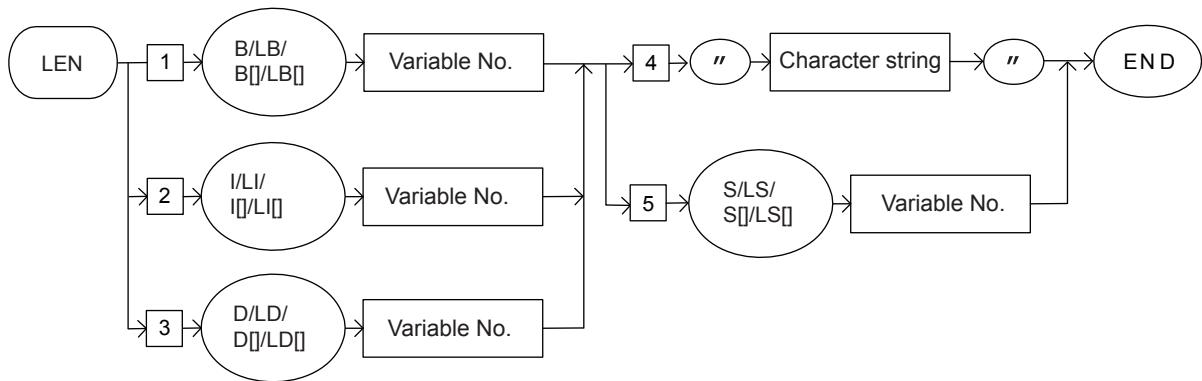
| SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Retrieves the total number of the character string (ASCII) of the data2, and stores the result in Data 1.

Syntax

LEN <Data 1> <Data 2>

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the byte type variable to store the total byte number.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to store the total byte number.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable to store the total byte number.	<Data 1>

2. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
4	Character string	Specify the character string to retrieve the total byte number.	<Data 2>
5	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable stored the character string to retrieve the total byte number.	<Data 2>

Example

(1) LEN B000 "ABCDEF"

The total byte number 6 of the character string "ABCDEF" is stored in B000.

CAT$
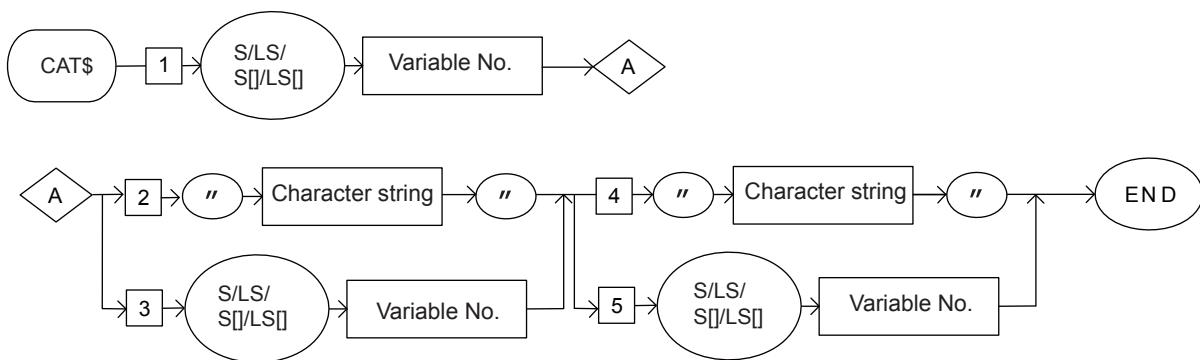
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Combines the character strings (ASCII) from the data2 and the data3, and stores the result in Data1.

Syntax

CAT$ <Data 1> <Data 2> <Data 3>

Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable to store the combined character.	<Data 1>

2. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	Character string	Specify the character strings to combine.	<Data 2>
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable stored the characters to combine.	<Data 2>

3. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
4	Character string	Specify the character strings to combine.	<Data 3>
5	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable stored the characters to combine.	<Data 3>

Example

(1) CAT$ S000 "ABC" "DEF"

The combined character string "ABCDEF" from the character string "ABC" and "DEF" is stored in S000.

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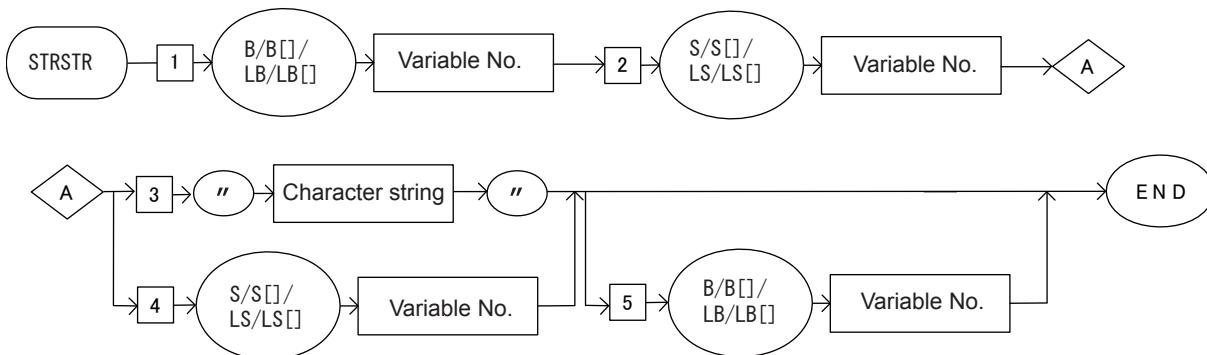
STRSTR

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

The first position where the same character string as the data2 appears in the data3 is stored into the data1.

Syntax

STRSTR <Data 1> <Data 2> <Data 3>

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the character type variable to store the appearance position.	<Data 1>

2. S Variable number/LS Variable number/S [Array number]/LS [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
2	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable where the character string to search the character string.	<Data 2>

3. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
3	Character string	Specify the character strings to search.	<Data 3>
4	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable stored the character string to search.	<Data 3>

4. B Variable number/LB Variable number/B [Array number]/LB [Array number]

The following tag can be added or omitted.

No.	Tag	Explanation	Note
5	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the number of the character type variable to store the search start position data of the search character string <data2> .	

> **Example**

(1) STRSTR B000 S000 "DEF"

Stores "4" into B000 when "ABCDEFGHI" is stored in S000.

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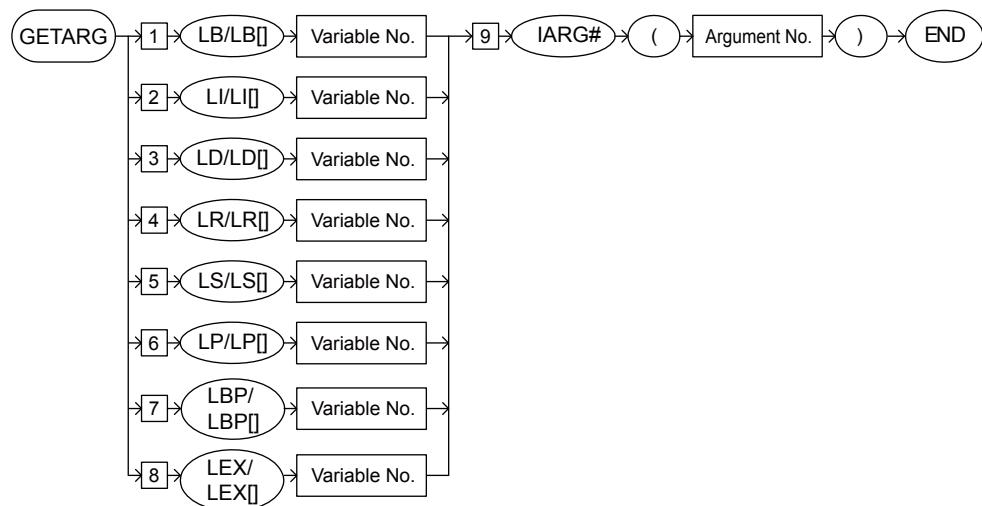
GETARG

SUBSET	STANDARD	EXPANDED
Not available	Not available	Available

Function

This is the instruction to receive arguments for the CALL instruction and macro instruction. When the instruction is executed, the argument data added to the CALL instruction or macro instruction is retrieved, then stored in the local variable specified to be used in the CALL job or macro job.

Syntax

Explanation

1. LB Variable number/LB [Array number]/ LI Variable number/LI [Array number]/ LD Variable number/LD [Array number]/ LR Variable number/LR [Array number]/ LS Variable number/LS [Array number]/LP Variable number/LP [Array number]/LBP Variable number/LBP [Array number]/ LEX Variable number/ LEX [Array number]/

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	LB Variable number LB [Array number]	Specify the local byte type variable which stores the argument.	
2	LI Variable number LI [Array number]	Specify the local integer type variable which stores the argument.	
3	LD Variable number LD [Array number]	Specify the local double precision type variable which stores the argument.	
4	LR Variable number LR [Array number]	Specify the local real type variable which stores the argument.	
5	LS Variable number LS [Array number]	Specify the local character type variable which stores the argument.	
6	LP Variable number LP [Array number]	Specify the local robot axis position type variable which stores the argument.	
7	LBP Variable number LBP [Array number]	Specify the local base axis position type variable which stores the argument.	
8	LEX Variable number LEX [Array number]	Specify the local station axis position type variable which stores the argument.	
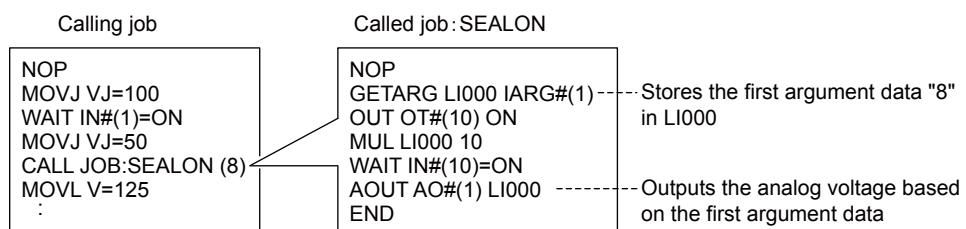
2. IARG# (Argument No.)

The following tag must be added.

No.	Tag	Explanation	Note
9	IARG# (Argument No.)	Specify the argument number to be stored in the local variable.	Variable B/I/D/LB/LI/LD can be used.

Example

(1) An example is shown below.

Calling job

```
NOP
MOVJ VJ=100
WAIT IN#(1)=ON
MOVJ VJ=50
CALL JOB:SEALON (8)
MOVL V=125
   :
```

Called job：SEALON

```
NOP
GETARG LI000 IARG#(1) ----- Stores the first argument data "8"
OUT OT#(10) ON                  in LI000
MUL LI000 10
WAIT IN#(10)=ON
AOUT AO#(1) LI000  ------- Outputs the analog voltage based
END                              on the first argument data
```
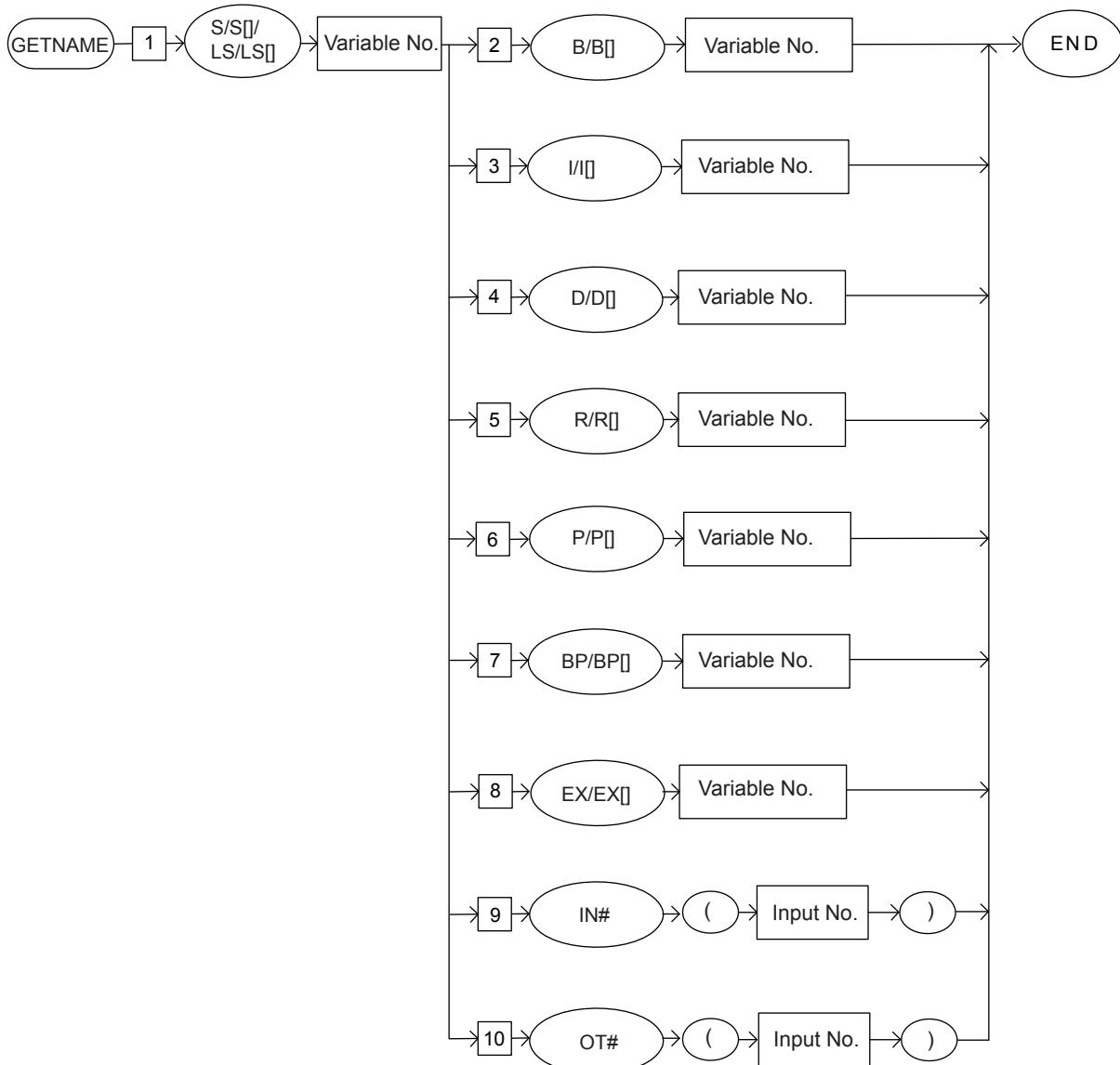
GETNAME

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the name data of the data2 into data1.

Syntax

GETNAME <Data 1> <Data 2>

Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the number of the character type variable to store the data.	<Data 1>

1. B Variable number/B [Array number]/I Variable number/I [Array number]/D Variable number/D [Array number]/R Variable number/R [Array number]/P Variable number/P [Array number]/BP Variable number/BP [Array number]/EX Variable number/EX [Array number]/IN# (input number)/OT# (output number)

One of the tags must be selected from the following table.

| No.	Tag	Explanation	Note
2	B Variable number/ B [Array number]/	Specify the number of the byte type variable to obtain the name.	<Data 2>
3	I Variable number/ I [Array number]/	Specify the number of the integer type variable to obtain the name.	<Data 2>
4	D Variable number/ D [Array number]/	Specify the number of the double precision type variable to obtain the name.	<Data 2>
5	R Variable number/ R [Array number]/	Specify the number of the real type variable to obtain the name.	<Data 2>
6	P Variable number/ P [Array number]/	Specify the number of the robot axis position type variable to obtain the name.	<Data 2>
7	BP Variable number/ BP [Array number]/	Specify the number of the base axis position type variable to obtain the name.	<Data 2>
8	EX Variable number/ EX [Array number]/	Specify the number of the station axis position type variable to obtain the name.	<Data 2>
9	IN(#) input number	Specify the user input number to obtain the name.	<Data 2> No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.
10	OT(#) output number	Specify the user output number to obtain the name.	<Data 2> No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.

Example

(1)   GETNAME S000 B000

If the "COUNT" in stored by a name of B000, "COUNT" is stored in S000.
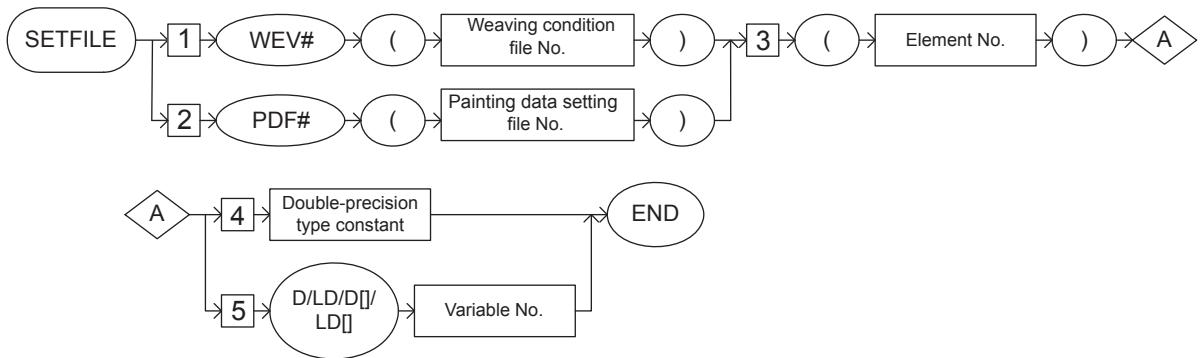
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SETFILE

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Changes the specified data of the specified condition file to the numeric data of Data 1.
Specify the data of the condition file to be changed by its element number.

Syntax

SETFILE   Condition file specification   (Element number)   <Data 1>

Explanation

1. WEV# (Weaving condition file number)/PDF# (Painting data setting file number)

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	WEV# (Weaving condition file number)	Specify the number of the weaving condition file.	No.: 1 to 255 Variable B/I/D/LB/LI/LD can be used.
2	PDF# (Painting data setting file number)	Specify the painting data setting file number.	No.: 1 Variable B/I/D/LB/LI/LD can be used.

2. (Element number)

The following tag must be added..

No.	Tag	Explanation	Note
3	(Element number)	Specify the element number of the condition file data to be changed.	Element No.: 1 to 255 Variable B/LB can be used.

3. Double-precision type constant/D Variable number/ LD Variable number/D [Array number]/LD [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
4	Double-precision type constant	Specify the double-precision type data to be changed.	<Data 1>
5	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable of the data to be changed.	<Data 1>

SUPPLE-MENT

Element number of each condition file

The element number of each item in the condition file is shown below.

<Weaving condition file>

Element No.	Item	Units	Remarks
1	MODE		
2	SMOOTHING		
3	SPEED		
4	FREQUENCY	0.1 Hz	
5	AMPLITUDE (ACTIVE IN	0.001	
6	PATTERN VERTICAL	0.001	
7	PATTERN HORIZONTAL	0.001	
8	PATTERN ANGLE	0.01 deg.	
9	ANGLE	0.01 deg.	
10	TIMER MODE (SECT 1 to 4)		Stop positions 1 to 4 (SECT 1 to 4) designated by bit data
11 to14	MOVING TIME	0.1 sec.	Sections 1 to 4
15 to18	TIMER (timer count)	0.1 sec.	Duration of a pause
19	HOVER WEAVING SET		Optional
20	HOVER WEAVING TIME	0.01 sec.	Optional
21	HOVER WEAVING INPUT		Optional

For details of the weaving condition file, refer to "Weaving Condition File" YRC1000micro OPERATOR'S MANUAL(RE-CSO-A058).

Example

(1) SETFILE WEV#(1) (5) 3500

Changes the amplitude setting in the weaving condition file number 1 to 3.500 mm.

GETFILE
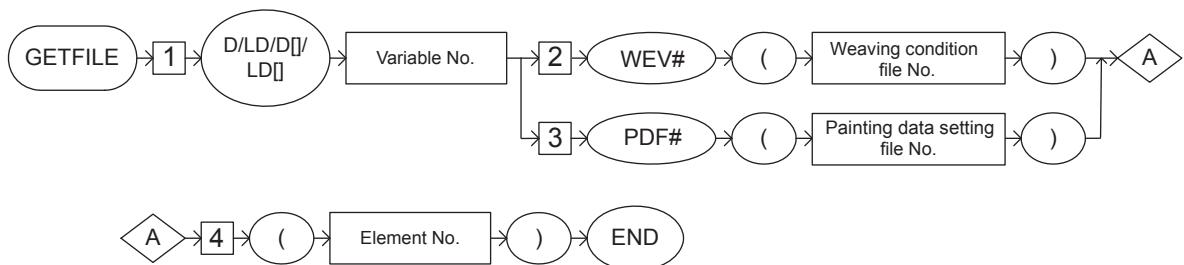
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the data of the specified condition file in Data 1.
Specify the data of the condition file to be obtained by its element number.

Syntax

GETFILE <Data 1> Condition file designation (Element number)

Explanation

1. D Variable number/LD Variable number/D [Array number]/LD [Array number]

The following tag must be added..

No.	Tag	Explanation	Note
1	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double-precision type variable to store the data.	<Data 1>

2. WEV# (Weaving condition file number)/PDF# (Painting data setting file number)

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	WEV# (Weaving condition file number)	Specify the number of the weaving condition file.	No.: 1 to 255 Variable B/I/D/LB/LI/LD can be used.
3	PDF# (Painting data setting file number)	Specify the number of the painting data setting file.	No.: 1 Variable B/I/D/LB/LI/LD can be used.

3. (Element number)

The following tag must be added.

No.	Tag	Explanation	Note
4	(Element number)	Specify the element number of the condition file to obtain the data.	Element No.: 1 to 255 Variable B/LB can be used.

Example

(1) GETFILE D000 WEV#(1) (6)

Stores the vertical distance (PATTERN VERTICAL) in the weaving condition file number 1 in D000.
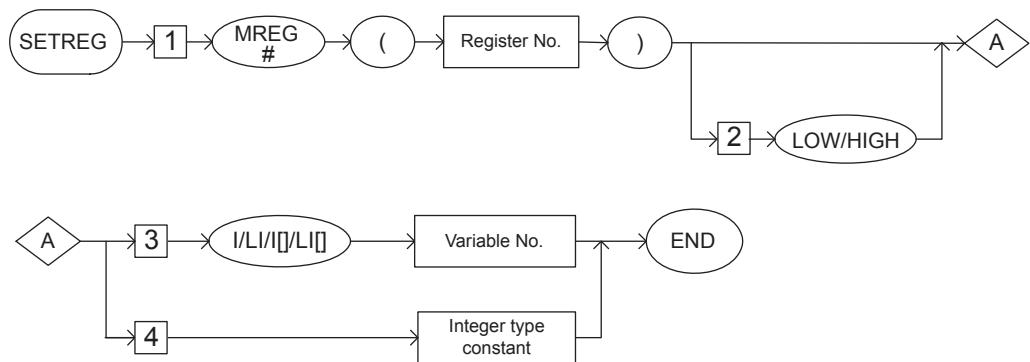
SETREG

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Copies the specified integer type variable data into the register.

Syntax

Explanation

1. MREG# (Register number)

The following tag must be added.

No.	Tag	Explanation	Note
1	MREG# (Register number)	Specify the register number to save the data.	No.: 0 to 599 Variable B/I/D/LB/LI/LD can be used.

2. LOW/HIGH

The following tag can be added or omitted.

No.	Tag	Explanation	Note
2	LOW/HIGH	Specify when copying the data into the lower/higher 8 bits of the register.	

3. I Variable number/LI Variable number/I [Array number]/LI [Array number]

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
3	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the data number to be saved in the register.	
4	Integer type variable	Input the data to be saved in the register.	
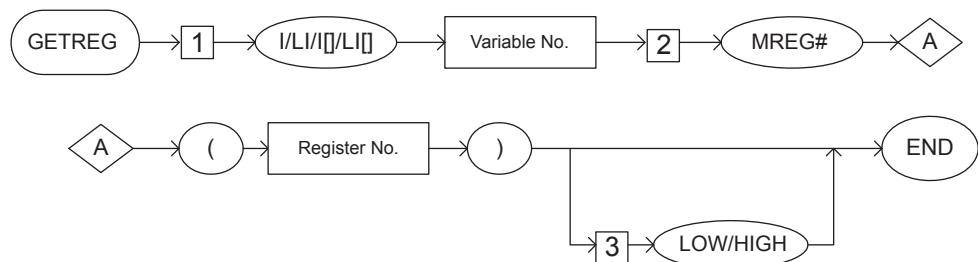
GETREG

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Copies the specified register data into the integer type variable.

Syntax

Explanation

1. I Variable number/LI Variable number/I [Array number]/LI [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
1	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the number of the integer type variable to save the register data.	

2. MREG# (Register number).

The following tag must be added.

No.	Tag	Explanation	Note
2	MREG# (Register number)	Specify the desired register number to be saved into the integer type variable.	No.: 0 to 999 Variable B/I/D/LB/LI/LD can be used.

3. LOW/HIGH

The following tag can be added or omitted.

No.	Tag	Explanation	Note
3	LOW/HIGH	Specify when saving the lower/higher 8 bits out of 16 bits register.	

GETPRM
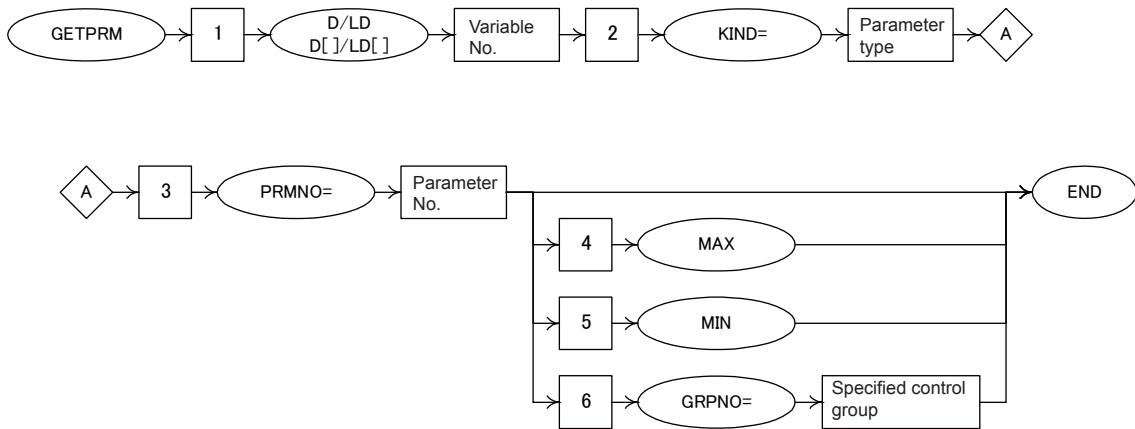
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the specified parameter into the specified variable.
It can be only used at the macro job when the macro command (optional) is valid.

Syntax

GETPRM <Data1> <Data2> <Data3> <Data4>

Explanation

1. D Variable number /LD Variable number /D [Array number] /LD [Array number]
The following tag must be added.

No.	Tag	Explanation	Note
1	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable to store the data.	<Data1>

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2. KIND=Parameter type

The following tag must be added.

No.	Tag	Explanation	Note
2	KIND=parameter type	Specify the parameter type. 4: S1CxG 5: S2C 6: S3C 7: S4C	<Data2> No.: 4 to 7 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

3. PRMNO=Parameter No.

The following tag must be added.

No.	Tag	Explanation	Note
3	PRMNO=parameter No.	Specify the parameter No.	<Data3> Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. MAX (Specifying the maximum value)
MIN (Specifying the minimum value)
GRPNO=Specifying the control group

The following tag can be added or omitted. However, one of the following tags must be selected when KIND=4(S1CxG) is specified.

No.	Tag	Explanation	Note
4	MAX	Specify the largest specified parameter value in the control group which is included the job to operate the GETPRM command. The job without control group which operates the GETPRM command cannot retrieve the parameter value.	<Data4>
5	MIN	Specify the smallest specified parameter value in the control group which is included the job to operate the GETPRM command. The job without control group which operates the GETPRM command cannot retrieve the parameter value.	<Data4>
6	GRPNP=Specify control group	Specify the control group	<Data4> Control group: 1 to 16 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

Example

GETPRM D000 KIND=4 PRMNO=800 GRPNO=1

Stores the soft limit values (+) of the Robot 1to D000.

SETPRM
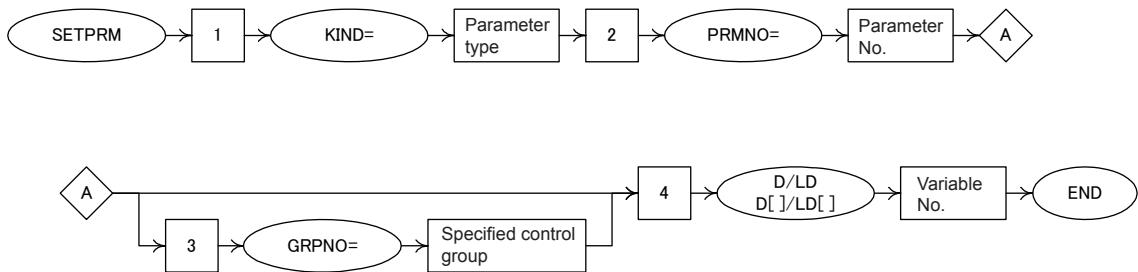
| SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Changes the specified parameter into the specified variable.
It can be only used at the macro job when the macro command (optional) is valid.

Syntax

SETPRM <Data1> <Data2> <Data3> <Data4>

Explanation

1. KIND=Parameter type
The following tag must be added.

No.	Tag	Explanation	Note
1	KIND=parameter type	Specify the parameter type. 5: S2C 6: S3C	<Data1> Type: 5 to 6 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

2. PRMNO=Parameter No.

The following tag must be added.

No.	Tag	Explanation	Note
2	PRMNO=Parameter No.	Specify the parameter number. The parameter range varies by specifying KIND=parameter type. KIND=5(S2C) : 3 to 194 KIND=6(S3C) : 64 to 1087	<Data2> Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

3. GRPNO=Specify control group

The following tag can be added or omitted.

No.	Tag	Explanation	Note
3	GRPNO=Specify control group	Specify the control group No. Tag is not used at this time for future use.	<Data3> Control group: 1 to 16 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. D Variable number/ LD Variable number /D [Array number]/ LD [Array number]

The following tag must be added.

No.	Tag	Explanation	Note
4	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the number of the double precision type variable to store the data.	<Data4>

Example

In case of executing SETPRM KIND=5 PRMNO=67 D000 when D000 is 2, the signal method can be switched to the robot coordinate from cubic/ axis interference.

2.4   Move Instruction

MOVJ
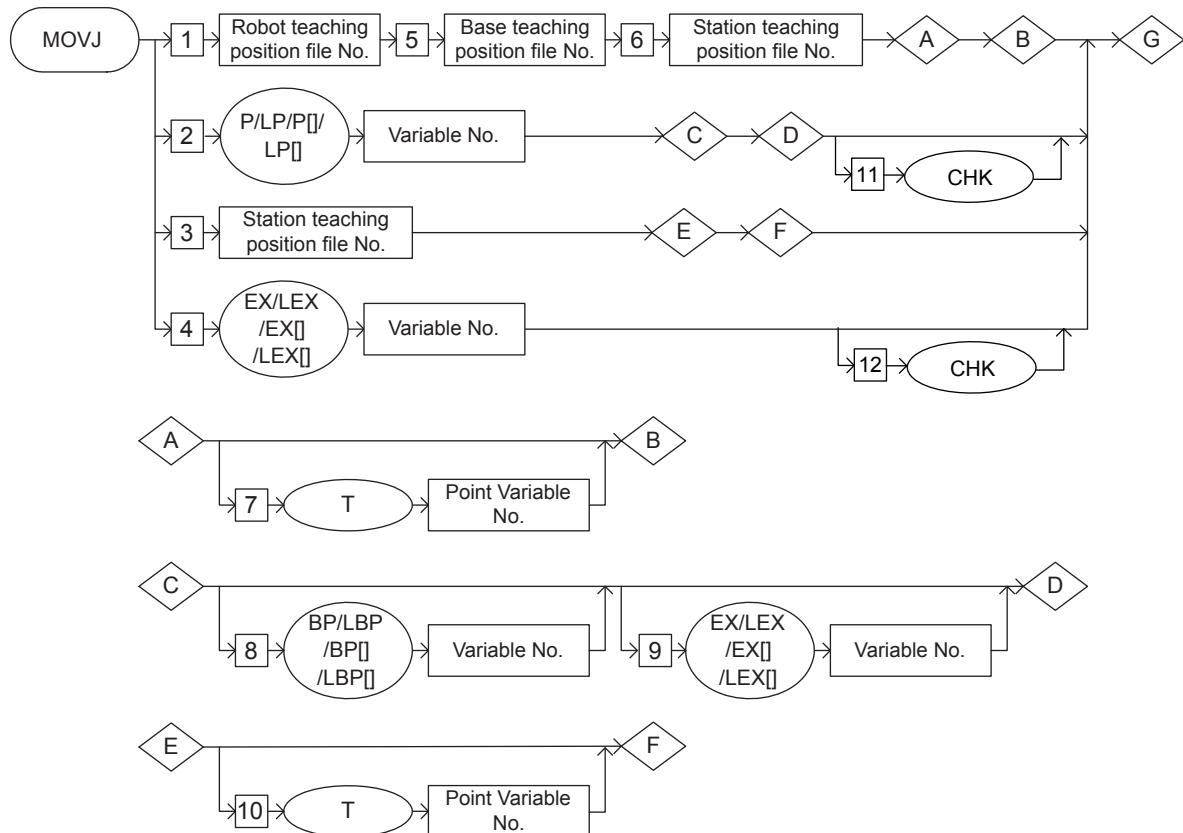
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves to the teaching position by joint interpolation.

Syntax

The tag which can be used is limited by the type of the job.

Table 2-1: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Single	Station axis only	
6	Coordinated	Two manipulators	Optional
7	Coordinated	Two manipulators with base axis	Optional

Table 2-2: Availability of Each Tag

No	Tag	Control Group 1	2	3	4	5	6	7	Note
1	Robot teaching position file number	●	●	●	●	×	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	×	●	●	
3	Station teaching position file number	×	×	×	×	●	×	×	
4	EX/LEX/EX[]/LEX[]	×	×	×	×	●	×	×	
5	Base axis teaching position file number	×	●	×	●	×	×	×	
6	Station teaching position file number	×	×	●	●	×	×	×	
7	T	○	○	○	○	×	○	○	Optional
8	BP/LBP/BP[]/LBP[]	×	●	×	●	×	×	●	
9	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	×	
10	T	×	×	×	×	○	×	×	Optional
11	CHK	●	●	●	●	×	●	●	
12	CHK	×	×	×	×	●	×	×	
13	VJ=	●	●	●	●	●	●	●	
14	PL=	●	●	●	●	●	●	●	
15	SPDL=	○	○	○	○	×	○	○	Optional
16	MT=	○	○	○	○	×	×	×	Optional
17	MTE=	×	×	○	○	○	×	×	Optional
18	NWAIT	●	●	●	●	●	●	●	
19	ENWAIT	○	○	○	○	○	○	○	Optional
20	UNTIL	●	●	●	●	●	●	●	
21	NSRCH	○	○	○	○	○	○	○	Optional
22	ACC=	●	●	●	●	●	●	●	
23	DEC=	●	●	●	●	●	●	●	
24	TRAP	●	●	●	●	●	●	●	
25	+MOVJ	×	×	×	×	×	○	○	Optional
26	+MOVL	×	×	×	×	×	○	○	Optional
27	+MOVC	×	×	×	×	×	○	○	Optional
28	+MOVS	×	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

Explanation

1. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number] /Station teaching position file number /EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	Robot teaching position file number	The robot axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the position variable number of the robot axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127
3	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
4	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

SUPPLE-MENT

Position Variables

There are the following three kinds of position variables.

Robot axis   : P000-P127

Base axis   : BP000-BP127

Station axis   : EX000-EX127

A position variable can store the position data as pulse type or XYZ type.

SUPPLE-MENT

Local Variables and Arrangement Variables

Local variables and arrangement variables are available only for the expanded instruction set.

P000 and P[0] show the same one.

2. Base Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
5	Base teaching position file number	The base axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

3. Station Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
6	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

4. T Point Variable number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
7	T Point Variable number	Specify the number of the point variable. The point variable manages the teaching positions registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

5. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LBP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
8	BP Variable number/ LBP Variable number/ BP [Array number] / LBP [Array number]	Specify the position variable number of the base axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

6. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
9	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

7. T Point Variable number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
10	T Point Variable number	Specify the number of the point variable. The point variable manages the teaching positions registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

8. CHK

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
11	CHK	Specify the CHK instruction. CHK evaluates if the manipulator can move to the target position which is specified by the position variable number. The results are stored in the system variables($B050).	

9. CHK

When a EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
12	CHK	Specify the CHK instruction. CHK evaluates if the station can move to the target position which is specified by the position variable number. The results are stored in the system variables($B050).	

SUPPLE -MENT

For details of the system variables, refer to *GETS* in *chapter 2.3 "Operating Instruction"*

10. VJ=Joint speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
13	VJ=Joint speed	Specify the joint speed. The joint speed is shown in the ratio to the highest speed. When the joint speed is omitted, the operation is performed at the speed decided beforehand.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.01%)

11. PL=Position level /SPDL=Speed level
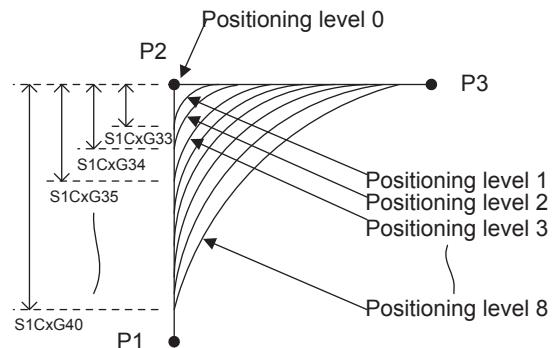
One of the tags must be selected from the following table.

No	Tag	Explanation	Note
14	PL=Position level	Specify the position level. The approach level when the manipulator passes the position where the teaching procedure was performed is called a positioning level.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.
15	SPDL=Speed level	Specify the speed level. The speed level is the tag for the robot to end the execution of the move instruction in the state of servo float control, and to confirm the state which has stopped. The operation ends when the speed feedback pulse of all axes goes below a constant value, and the manipulator is considered to have stopped.	Level: Only 0 Available only with the optional servo-float function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR SERVOFLOAT FUNCTION(HW1484512)

Position level

SUPPLE
-MENT

The approach level when the manipulator passes the position where the teaching procedure was performed is called a position level.

The approach level is set by the following parameters. (position zone)

Position level 1: S1CxG33(μm)

Position level 2: S1CxG34(μm)

Position level 3: S1CxG35(μm)

Position level 4: S1CxG36(μm)

Position level 5: SICxG37 (μm)

Position level 6: SICxG38 (μm)

Position level 7: SICxG39 (μm)

Position level 8: SICxG40 (μm)

12. MT=Amount of the T axis rotation

The following tag can be added or omitted.

No	Tag	Explanation	Note
16	MT=Amount of the T axis rotation	Specify the amount of the T axis rotation. The amount of the T axis rotation specifies the amount of movement of T axis by the number of rotations.	Amount of rotation: -32768 to 32767 Available only with the optional axis endless function. Refer to the axis endless function for details.

13. MTE= Amount of the station axis rotation

The following tag can be added or omitted.

No	Tag	Explanation	Note
17	MTE= Amount of the station axis rotation	Specify the amount of the station axis rotation. The operation of the station axis can be specified by the number of rotations.	Amount of rotation: -32768 to 32767 Available only with the optional axis endless function.

14. NWAIT/ENWAIT

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
18	NWAIT	Specify the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same time as the manipulator is carrying out that step.	
19	ENWAIT	Specify the ENWAIT instruction. The ENWAIT instruction carries out the instructions excluding the move instructions from that step on, before reaching the next step.	Available only with the conditional NWAIT function (option: S2C714) Refer to *ENWAIT* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

15. UNTIL/NSRCH

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
20	UNTIL	Specify the UNTIL instruction. The UNTIL instruction is a tag instruction by which the condition of the input signal is evaluated during operation. When the condition of the input signal is full, the robot executes the next instruction.	Refer to *UNTIL* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
21	NSRCH	Specify the NSRCH instruction. The NSRCH instruction carries out the position detection without stopping the manipulator's motion.	Available only with the optional search-in-motion function.

16. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
22	ACC=Acceleration adjustment ratio	Specify the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

17. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.
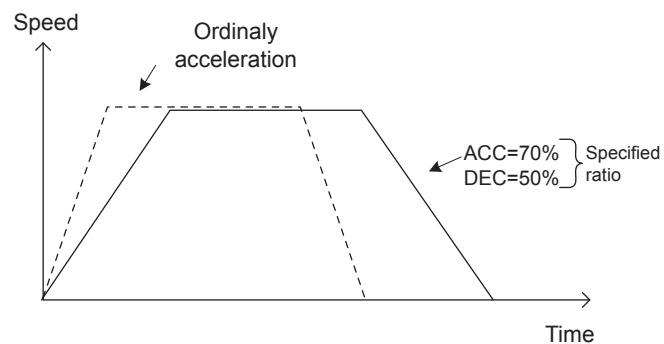
No	Tag	Explanation	Note
23	DEC=Deceleration adjustment ratio	Specify the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

Acceleration adjustment ratio

SUPPLE
-MENT

The acceleration adjustment ratio (ACC) reduces the amount of acceleration in the specified ratio.

Using this function can reduce the load inertia on the tool and the workpiece.

18. TRAP

The following tag can be added or omitted

No	Tag	Explanation	Note
24	TRAP	Specify the TRAP instruction. When a limit is exceeded during the execution of the MOVJ instruction, the TRAP instruction interrupts the execution of the MOVJ instruction and executes a jump to the label which is set as the TRAP instruction.	Refer to *TRAP* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

19. +MOVJ/+MOVL/+MOVC/+MOVS

One of the tags must be selected from the following table.
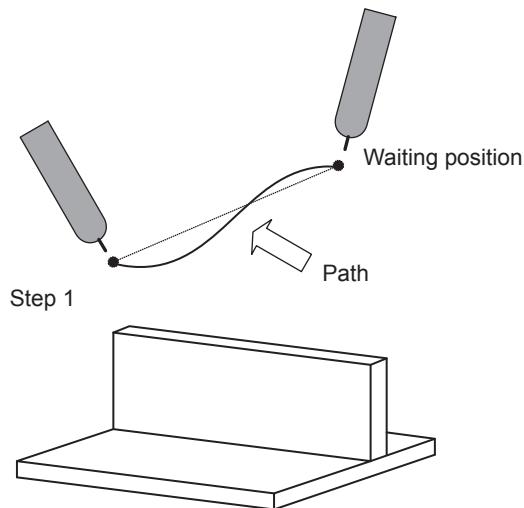
No	Tag	Explanation	Note
25	+MOVJ	Specify the joint interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
26	+MOVL	Specify the linear interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION ((HW1484482).
27	+MOVC	Specify the circular interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
28	+MOVS	Specify the spline interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).

Example

(1) MOVJ P000 VJ=50.00
Move from the manipulator's waiting position to step 1. Move by
joint interpolation at a speed of 50%.
The position in Step 1 is registered to the P variable no. 0.
The path during movement is not specified. Be careful of interfer-
ence.

MOVL
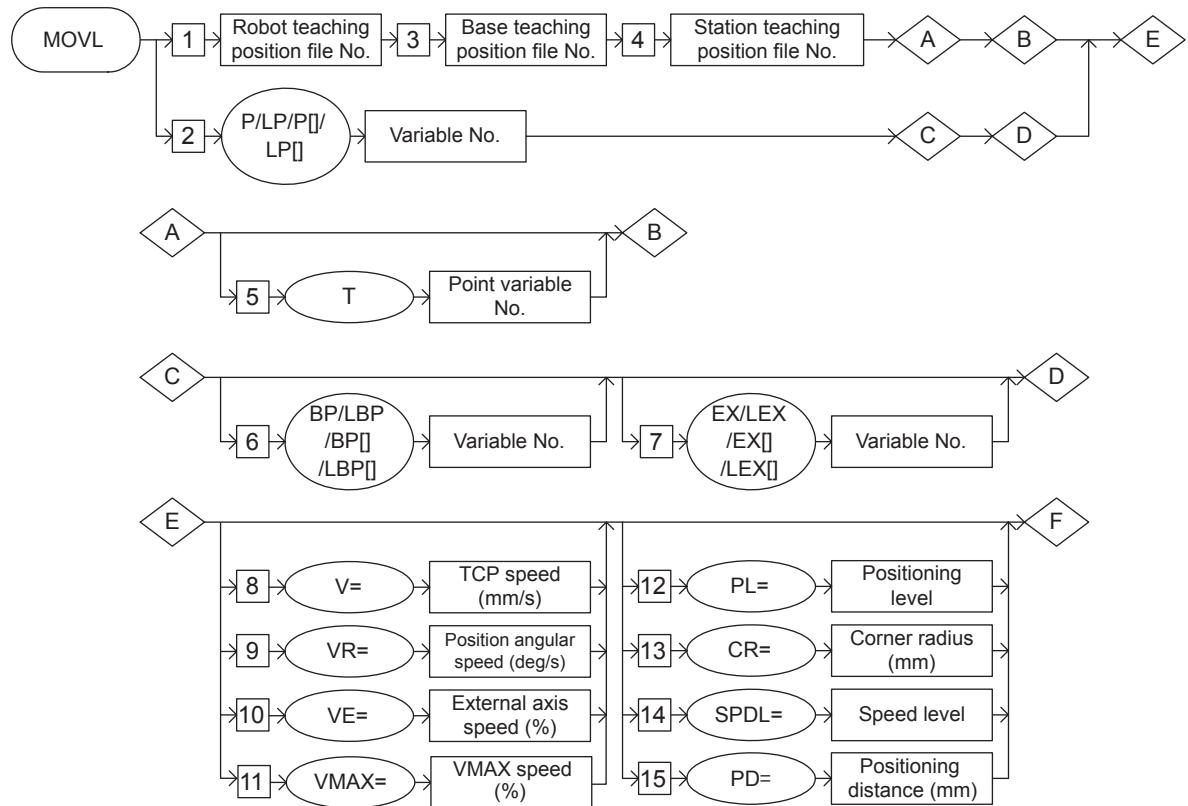
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves to the teaching position by linear interpolation.

Syntax

The tag which can be used is limited by the type of the job.

MOVL →

1 → Robot teaching position file No. → 3 → Base teaching position file No. → 4 → Station teaching position file No. → A → B → E

2 → P/LP/P[]/LP[] → Variable No. → C → D

A → 5 → T → Point variable No. → B

C → 6 → BP/LBP/BP[]/LBP[] → Variable No. → 7 → EX/LEX/EX[]/LEX[] → Variable No. → D

E →
8 → V= → TCP speed (mm/s)
9 → VR= → Position angular speed (deg/s)
10 → VE= → External axis speed (%)
11 → VMAX= → VMAX speed (%)
12 → PL= → Positioning level
13 → CR= → Corner radius (mm)
14 → SPDL= → Speed level
15 → PD= → Positioning distance (mm)
→ F

```
F ──────────────────────────────────────────────────── G
    ┌16├→ MTE= →  Amount of           ┌17├→ NWAIT ─────
                  station axis
                  rotation            ┌18├→ ENWAIT
```

```
G ──────────────────────────────────────────────────── H
    ┌19├→ UNTIL      ┌24├→ ACC= →  Acceleration
                                    adjustment
                                    ratio (%)
    ┌20├→ SRCH

    ┌21├→ ASRCH

    ┌22├→ HPSRCH

    ┌23├→ NSRCH
```

```
H ──────────────────────────────────────────── ┌27├→ +MOVJ → END
    ┌25├→ DEC= →  Deceleration    ┌26├→ TRAP
                  adjustment                    ┌28├→ +MOVL
                  ratio (%)
                                                ┌29├→ +MOVC

                                                ┌30├→ +MOVS
```

Table 2-3: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Coordinated	Two manipulators	Optional
6	Coordinated	Two manipulators with base axis	Optional

Table 2-4: Availability of Each Tag

No	Tag	Control Group						Note
		1	**2**	**3**	**4**	**5**	**6**	
1	Robot teaching position file number	●	●	●	●	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	●	●	
3	Base axis teaching position file number	×	●	×	●	×	●	
4	Station teaching position file number	×	×	●	●	×	×	
5	T	○	○	○	○	○	○	Optional
6	BP/LBP/BP[]/LBP[]	×	●	×	●	×	●	
7	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	
8	V=	●	●	●	●	●	●	
9	VR=	●	●	●	●	●	●	
10	VE=	×	×	●	●	×	×	
11	VMAX=	●	●	●	●	●	●	
12	PL=	●	●	●	●	●	●	
13	CR=	●	●	●	●	●	●	
14	SPDL=	○	○	○	○	○	○	Optional
15	PD=	●	●	●	●	●	●	
16	MTE=	×	×	○	○	×	×	Optional
17	NWAIT	●	●	●	●	●	●	
18	ENWAIT	○	○	○	○	○	○	Optional
19	UNTIL	●	●	●	●	●	●	
20	SRCH	○	○	○	○	○	○	Optional
21	ASRCH	○	○	○	○	○	○	Optional
22	HPSRCH	○	○	○	○	○	○	Optional
23	NSRCH	○	○	○	○	○	○	Optional
24	ACC=	●	●	●	●	●	●	
25	DEC=	●	●	●	●	●	●	
26	TRAP	●	●	●	●	●	●	
27	+MOVJ	×	×	×	×	○	○	Optional
28	+MOVL	×	×	×	×	○	○	Optional
29	+MOVC	×	×	×	×	○	○	Optional
30	+MOVS	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

Explanation

1. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	Robot teaching position file number	The robot axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the position variable number of the robot axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

2. Base Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
3	Base teaching position file number	The base axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

3. Station Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
4	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

4. T Point Variable number

When the robot teaching position file number is selected from the table in part 1 of this Explanation, the following can be added or omitted.

No	Tag	Explanation	Note
5	T Point Variable number	Specify the point variable number. The point variable manages the teaching position registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

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5. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the position variable number of the base axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

6. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

7. V=Tool center point speed /VR=Position angular speed /VE=External axis speed/VMAX=VMAX speed

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
8	V=Tool center point speed	Specify the tool center point speed. Specify the unit of rate using the operation condition setting screen.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)
9	VR=Position angular speed	Specify the position angular speed.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg./s)
10	VE=External axis speed	Specify the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.01 %)
11	VMAX=VMAX speed	Specify VMAX speed. VMAX speed is expressed as the rate with respect to the maximum speeds of each axes.	Speed: 50% to 100% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: %)

SUPPLE
-MENT

VMAX speed

By using this tag, the speed is specified as the rate with respect to the maximum speed of each axes.
This tag can be added to MOVL (linear interpolation).
For example, if VMAX=100 is set, the linear interpolation motion is performed at the TCP speed without exceeding the maximum speed of each axes.
If VMAX=50 is set, the motion is performed at the half speed of TCP speed when VMAX=100 is set.
Since the speed of each axes is controlled not to exceed the maximum speed, the TCP speed may not be stable.
Thus, VMAX speed must be used in the case where the motion with the stable speed is not required for the operation. If the motion with stable speed is required, use the play speed V.

8. PL=Position level /CR=Corner radius /SPDL=Speed level /PD=Position distance
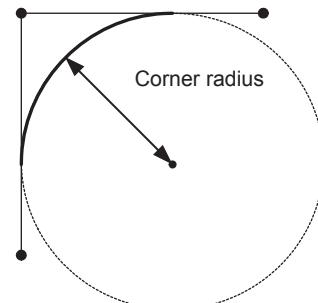
One of the tags must be selected from the following table.

No	Tag	Explanation	Note
12	PL=Position level	Specify the position level. The position level is a level of the approach when the manipulator passes the position where the teaching procedure was performed.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.
13	CR=Corner radius	Specify the corner radius. The manipulator operates by circular interpolation in which the corner radius is specified.	Radius: 0.1mm to 6553.5 mm Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm)
14	SPDL=Speed level	Specify the speed level. The speed level is the tag for the robot to end the execution of the move instruction in the state of the servo float control, and to confirm the state which has stopped. The operation ends when the speed feedback pulse of all axes goes below a constant value, and the manipulator is considered to have been stopped.	Level: Only 0 Available only with the optional servo-float function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR SERVOFLOAT FUNCTION(HW1484512)
15	PD=Position distance	Specify the position distance. If the position distance is specified, the manipulator (at the feedback position) starts inward turning operation from the specified point.	Distance: 0.1mm to 6553.5 mm Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm)
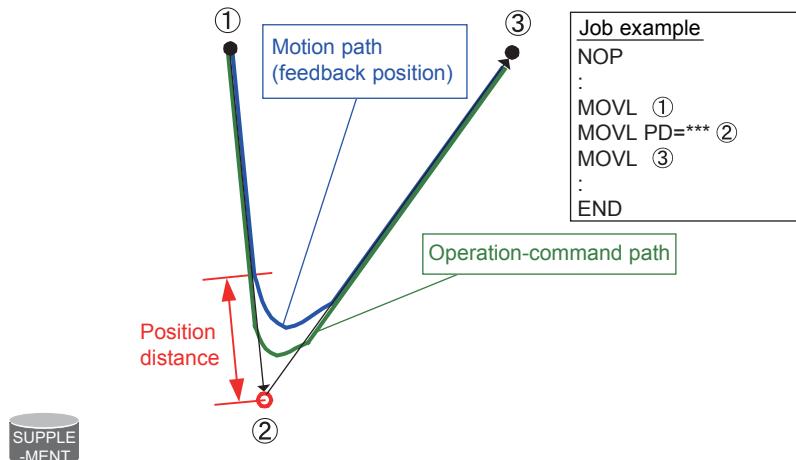
SUPPLE-MENT

Corner radius

The manipulator operates by circular interpolation in which the corner radius is specified.

Corner radius

NOTE
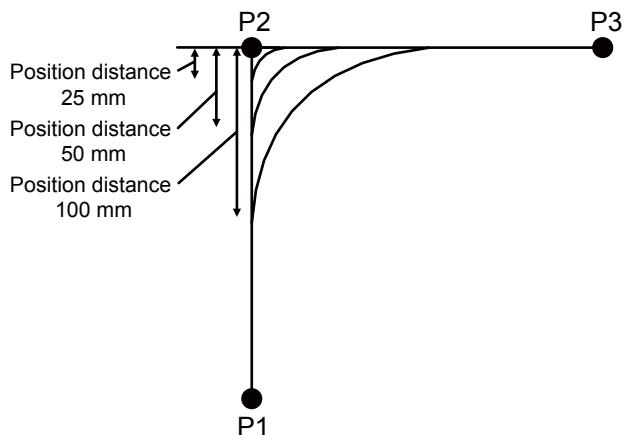
If the move instruction with the CR is registered in a job, the next move instruction must be registered in the same job. If the next move instruction is not registered in the same job, the move instruction is executed ignoring "CR=Corner radius".

Position distance

When the position distance is specified, the manipulator (at the feedback position) starts inward turning operation from the specified point.

SUPPLE-MENT

① Motion path (feedback position)

③

```
Job example
NOP
:
MOVL  ①
MOVL PD=***  ②
MOVL  ③
:
END
```

Operation-command path

Position distance

②

The relation between the manipulator's path and the teaching position when the position distance is specified is shown below.

P2   P3

Position distance
25 mm

Position distance
50 mm

Position distance
100 mm

P1

NOTE

If a large value is specified for the position distance in a short-distance step, the accuracy of the position distance may be deteriorated.

The manipulator starts its inward-turning operation in the latter half of the step's distance.

9. MTE= Amount of station axis rotation

The following tag can be added or omitted.

No	Tag	Explanation	Note
16	MTE=Amount of station axis rotation	Specify the amount of station axis rotation. The operation of the station axis can be specified by the number of rotations.	Amount of rotation: -32768 to 32767 Available only with the optional axis endless function. Refer to the axis endless function for details.

10. NWAIT/ENWAIT

The following tag can be added or omitted.

No	Tag	Explanation	Note
17	NWAIT	Specify the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same as time the manipulator is carrying out that step.	
18	ENWAIT	Specify the ENWAIT instruction. The ENWAIT instruction carries out the instructions excluding the move instructions from that step on, before reaching the next step.	Available only with the conditional NWAIT function. (option: S2C714) Refer to *ENWAIT* of *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

11. UNTIL/SRCH/ASRCH/HPSRCH/NSRCH

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
19	UNTIL	Specify the UNTIL instruction. The UNTIL instruction is a tag by which the conditions of the input signal are evaluated during operation. When the condition of the input signal is full, the robot executes the next instruction.	Refer to *UNTIL* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
20	SRCH	Specify the SRCH instruction. The SRCH instruction is a tag which detects the start point.	Available only with the optional searching function. Refer to the searching function.
21	ASRCH	Specify the ASRCH instruction. The ASRCH instruction detects input signal's voltage.	Available only with the optional general-purpose sensor function. For details, refer to general-purpose sensor function.
22	HPSRCH	Specify the HPSRCH instruction. The HPSRCH instruction detects the position of the zero-point.	
23	NSRCH	Specify the NSRCH instruction. The NSRCH instruction detects a position without stopping the motion.	Available only with the optional search-in-motion function. For details, refer to search-in-motion function.

12. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
24	ACC=Acceleration adjustment ratio	Specify the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

13. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
25	DEC=Deceleration adjustment ratio	Specify the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

14. TRAP

The following tag can be added or omitted.

| No	Tag	Explanation	Note
26	TRAP	Specify the TRAP instruction. When a limit is exceeded during the execution of the MOVL instruction, the TRAP instruction interrupts the execution of the MOVL instruction and executes a jump to the label which is set as the TRAP instruction.	Refer to *TRAP* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

15. +MOVJ/+MOVL/+MOVC/+MOVS
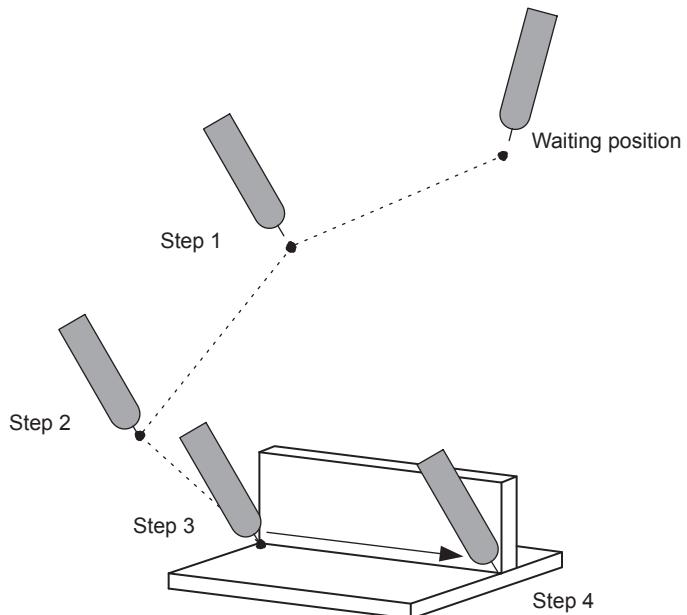
One of the tags must be selected from the following table.

No	Tag	Explanation	Note
27	+MOVJ	Specify the joint interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).

No	Tag	Explanation	Note
28	+MOVL	Specify the linear interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
29	+MOVC	Specify the circular interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
30	+MOVS	Specify the spline interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).

Example

(1) NOP
     MOVJ VJ=50.00
     MOVJ VJ=25.00
     MOVJ VJ=12.50   ••• Step 3
     MOVL V=138   ••• Step 4
     Moves from Step 3 to Step 4 by the linear interpolation at a rate of 138cm/min.

MOVC
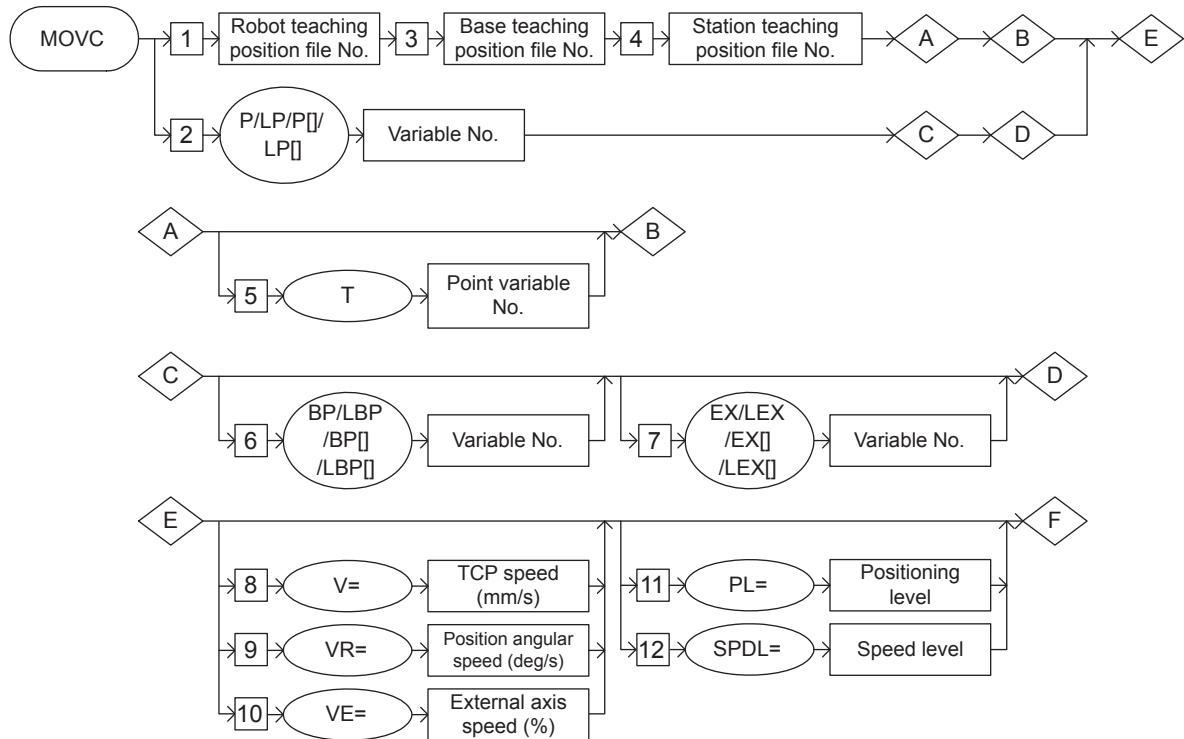
| SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves to the teaching position by circular interpolation.

Syntax

The tag which can be used is limited by the type of the job.
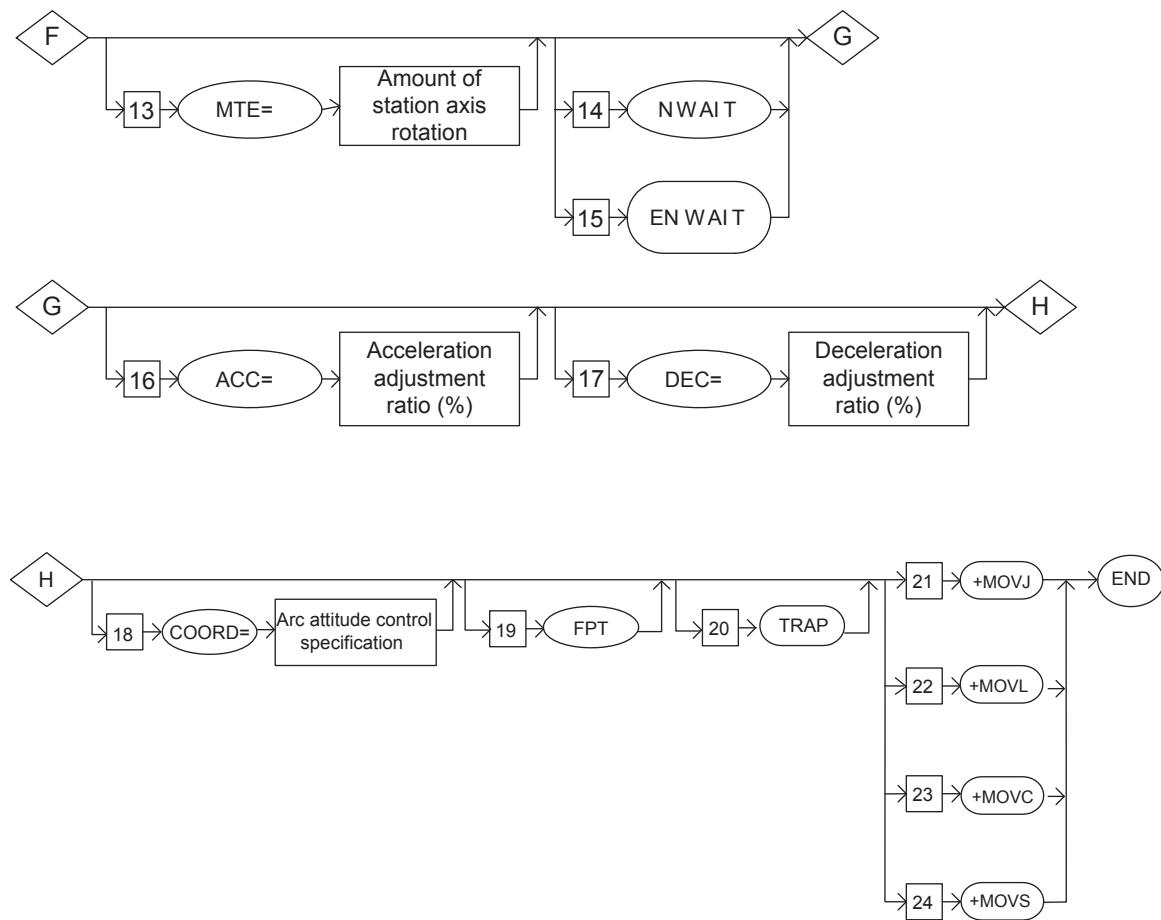
Table 2-5: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Coordinated	Two manipulators	Optional
6	Coordinated	Two manipulators with base axis	Optional

Table 2-6: Availability of Each Tag

No	Tag	Control Group						Note
		1	2	3	4	5	6	
1	Robot teaching position file number	●	●	●	●	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	●	●	
3	Base teaching position file number	×	●	×	●	×	●	
4	Station teaching position file number	×	×	●	●	×	×	
5	T	○	○	○	○	○	○	Optional
6	BP/LBP/BP[]/LBP[]	×	●	×	●	×	●	
7	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	
8	V=	●	●	●	●	●	●	
9	VR=	●	●	●	●	●	●	
10	VE=	×	×	●	●	×	×	
11	PL=	●	●	●	●	●	●	
12	SPDL=	○	○	○	○	○	○	Optional
13	MTE=	×	×	○	○	×	×	Optional
14	NWAIT	●	●	●	●	●	●	
15	ENWAIT	○	○	○	○	○	○	Optional
16	ACC=	●	●	●	●	●	●	
17	DEC=	●	●	●	●	●	●	
18	COORD=	●	●	●	●	●	●	
19	FPT	●	●	●	●	●	●	
20	TRAP	●	●	●	●	●	●	
21	+MOVJ	×	×	×	×	○	○	Optional
22	+MOVL	×	×	×	×	○	○	Optional
23	+MOVC	×	×	×	×	○	○	Optional
24	+MOVS	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

> **NOTE**
>
> The three MOVC instructions for the three points which define a circular arc must be registered in the same job. If all of the three MOVC instructions are not registered in the same job due to the JUMP/CALL instruction, the manipulator cannot perform the circular interpolation motion which passes the three points.

Example

1. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	Robot teaching position file number	The robot axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the position variable number of the robot axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

2. Base Teaching Position File Number

When a base teaching position file number is selected from the table in part 1 of this Explanation, added the following tag.

No	Tag	Explanation	Note
3	Base teaching position file number	The base axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

3. Station Teaching Position File Number

When a base teaching position file number is selected from the table in part 1 of this Explanation, added the following tag.

No	Tag	Explanation	Note
4	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

4. T Point Variable number

When the robot teaching position file number is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
5	T Point Variable number	Specify the point variable number. The point variable manages the teaching position registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

5. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the position variable number of the base axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

6. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

7. V=Tool center point speed /VR=Position angular speed /VE=External axis speed

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
8	V=Tool center point speed	Specify the tool center point speed. Specify the unit of rate using the operation condition setting screen.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)
9	VR=Position angular speed	Specify the position angular speed.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg/s)
10	VE=External axis speed	Specify the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.(Units: 0.01 %)

8. PL=Position level /SPDL=Speed level

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
11	PL=Position level	Specify the position level. The position level is a level of the approach when the manipulator passes the position where the teaching procedure was performed.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.
12	SPDL=Speed level	Specify the speed level. The speed level is a tag for the robot to end the execution of the move instruction in the state of servo float control, and to confirm the state which has stopped. The operation ends when the speed feedback pulse of all axes goes below a constant value, and the manipulator is considered to have been stopped.	Level: Only 0 Available only with the optional servo-float function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR SERVOFLOAT FUNCTION(HW1484512)

9. MTE=Amount of station axis rotation

The following tag can be added or omitted.

No	Tag	Explanation	Note
13	MTE=Amount of station axis rotation	Specify the amount of station axis rotation. The operation of the station axis can be specified by the number of rotations.	Amount of rotation: -100 to 100 Available only with the optional axis endless function.

10. NWAIT/ENWAIT

The following tag can be added or omitted.

No	Tag	Explanation	Note
14	NWAIT	Specify the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same time as the manipulator is carrying out that step.	
15	ENWAIT	Specify the ENWAIT instruction. The ENWAIT instruction carries out the instructions excluding the move instructions from that step on, before reaching the next step.	Available only with the conditional NWAIT function. (option: S2C714) Refer to *ENWAIT* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

11. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
16	ACC=Acceleration adjustment ratio	Specify the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

12. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
17	DEC=Deceleration adjustment ratio	Specify the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

13. COORD=Arc attitude control specification

The following tag can be added or omitted.

| No	Tag	Explanation	Note
18	COORD=Arc attitude control specification	Specify the attitude control of arc. This is not usually needed, but depending on teaching, the intended circular motion may not be performed. In this case, specify as follows. When the circular surface is parallel with the robot installation surface, specify as COORD = 0. When the circular surface is not parallel with the robot installation surface, specify as COORD = 1.	Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used to specify the attitude control.

Example
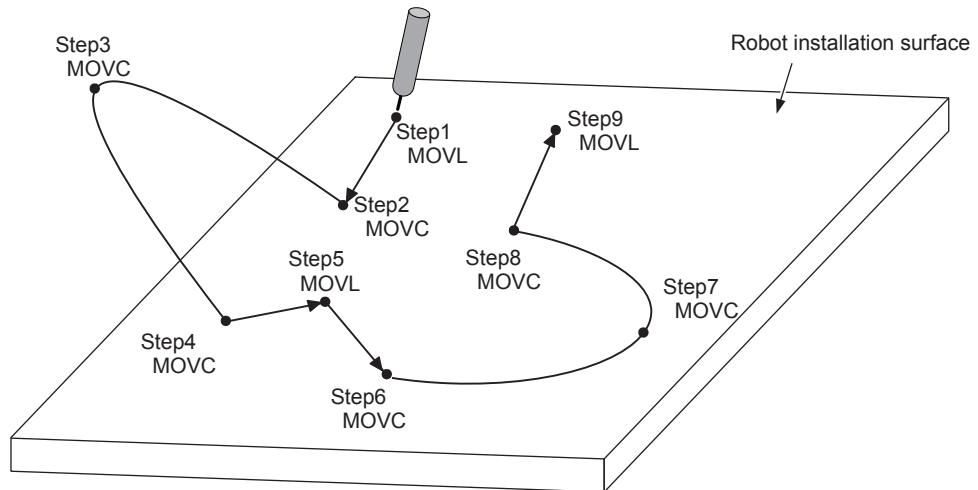
```
NOP
MOVL V=138
MOVC V=138  COORD=1        •••Step 2
MOVC V=138  COORD=1        •••Step 3
MOVC V=138  COORD=1        •••Step 4
MOVL V=138
MOVC V=138  COORD=0        •••Step 6
MOVC V=138  COORD=0        •••Step 7
MOVC V=138  COORD=0        •••Step 8
MOVL V=138
END
```

Step 2 to 4 performs the attitude control based on the circular surface.

Step 6 to 7 performs the attitude control based on the robot installation surface.

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14. FPT Arc end-point setting

The following tag can be added or omitted.

No	Tag	Explanation	Note
19	FPT	Specify the end-point of the arc (the point at which the curvature of the arc is to be changed).	

Example

(1) NOP
     MOVL V=138
     MOVC V=138   ♦♦♦Step 2
     MOVC V=138   ♦♦♦Step 3
     MOVC V=138   ♦♦♦Step 4
     MOVC FPT V=138   ♦♦♦Step 5
     MOVC V=138   ♦♦♦Step 6
     MOVC V=138   ♦♦♦Step 7
     MOVL V=138
     END

Moves from Step 2 to Step 7 by circular interpolation at a rate of 138 cm/min.
Moves to Step 3 in a circular arc formed with the teaching points in Steps 2, 3, and 4.
Moves to Step 4 in a circular arc formed with the teaching points in Steps 3, 4, and 5.
Moves to Step 5 in a circular arc formed with the teaching points in Steps 3, 4, and 5.
Moves to Step 6 in a circular arc formed with the teaching points in Steps 5, 6, and 7.
Moves to Step 7 in a circular arc formed with the teaching points in Steps 5, 6, and 7.
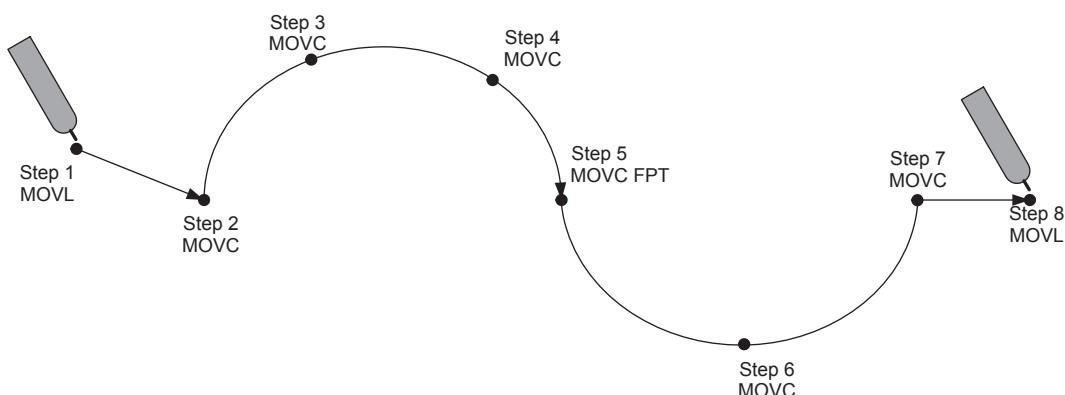
15. TRAP

The following tag can be added or omitted.

No	Tag	Explanation	Note
20	TRAP	Specify the TRAP instruction. When a limit is exceeded during the execution of the MOVC instruction, the TRAP instruction interrupts the execution of the MOVC instruction and executes a jump to the label which is set as the TRAP instruction.	Refer to *TRAP* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

16. +MOVJ/+MOVL/+MOVC/+MOVS

One of the tags must be selected from the following table.

| No	Tag	Explanation	Note
21	+MOVJ	Specify the joint interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
22	+MOVL	Specify the linear interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
23	+MOVC	Specify the circular interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
24	+MOVS	Specify the spline interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).

MOVS
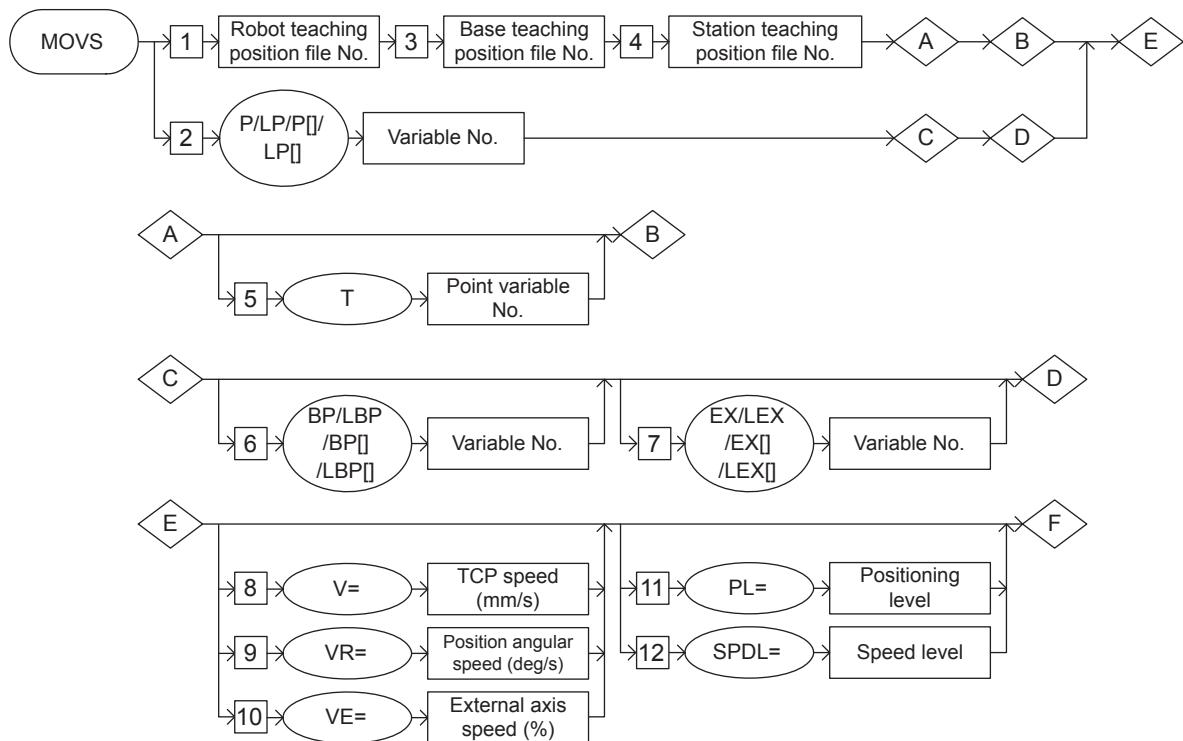
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves to the teaching position by spline interpolation.

Syntax

The tag which can be used is limited by the type of the job.
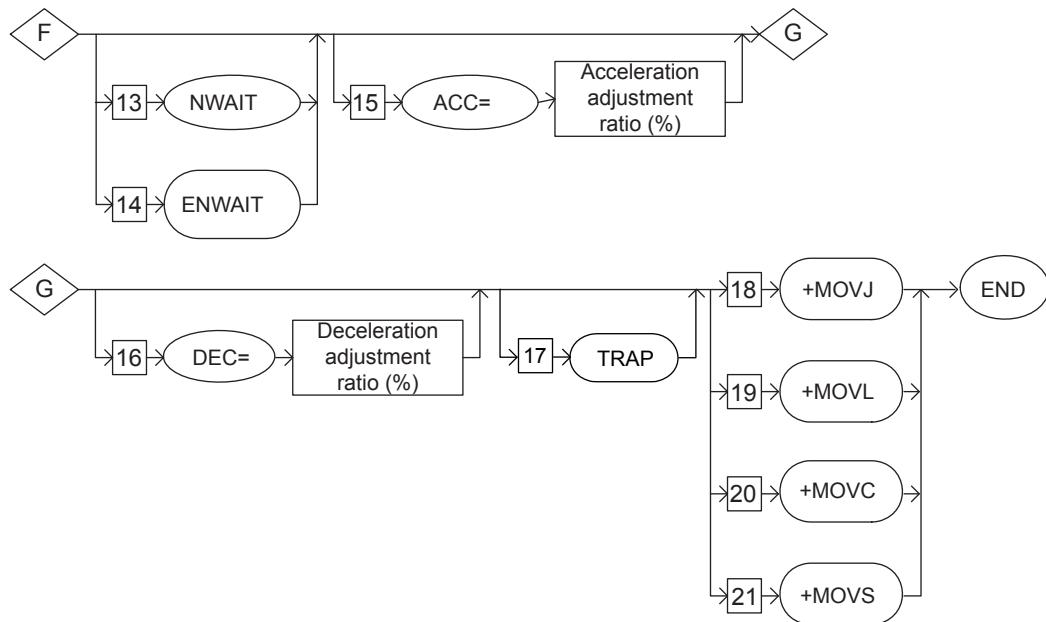
Table 2-7: Job Type and Control Group

No.	Job type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Coordinated	Two manipulators	Optional
6	Coordinated	Two manipulators with base axis	Optional

Table 2-8: Availability of Each Tag

No	Tag	Control Group						Note
		1	2	3	4	5	6	
1	Robot teaching position file number	●	●	●	●	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	●	●	
3	Base teaching position file number	×	●	×	●	×	●	
4	Station teaching position file number	×	×	●	●	×	×	
5	T	○	○	○	○	○	○	Optional
6	BP/LBP/BP[]/LBP[]	×	●	×	●	×	●	
7	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	
8	V=	●	●	●	●	●	●	
9	VR=	●	●	●	●	●	●	
10	VE=	×	×	●	●	×	×	
11	PL=	●	●	●	●	●	●	
12	SPDL=	○	○	○	○	○	○	Optional
13	NWAIT	●	●	●	●	●	●	
14	ENWAIT	○	○	○	○	○	○	Optional
15	ACC=	●	●	●	●	●	●	
16	DEC=	●	●	●	●	●	●	
17	TRAP	●	●	●	●	●	●	
18	+MOVJ	×	×	×	×	○	○	Optional
19	+MOVL	×	×	×	×	○	○	Optional
20	+MOVC	×	×	×	×	○	○	Optional
21	+MOVS	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

Explanation

1. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	Robot teaching position file number	The robot axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
2	P Variable number / LP Variable number / P [Array number]/ LP [Array number]	Specify the position variable number of the robot axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

2. Base Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
3	Base teaching position file number	The base axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

3. Station Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
4	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

4. T Point Variable number

When the robot teaching position file number is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
5	T Point Variable number	Specify the point variable number. The point variable manages the teaching position registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

5. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
6	BP Variable number / LBP Variable number / BP [Array number]/ LBP [Array number]	Specify the position variable number of the base axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

6. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
7	EX Variable number / LEX Variable number / EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

7. V=Tool center point speed /VR=Position angular speed /VE=External axis speed

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
8	V=Tool center point speed	Specify the tool center point speed. Specify the unit of rate using the operation condition setting screen.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)
9	VR=Position angular speed	Specify the position angular speed.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg/s)
10	VE=External axis speed	Specify the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.(Units: 0.01 %)

8. PL=Position level /SPDL=Speed level

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
11	PL=Position level	Specify the position level. The position level is a level of the approach when the manipulator passes the position where the teaching procedure was done.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.
12	SPDL=Speed level	Specify the speed level. The speed level is a tag for the robot to end the execution of the move instruction in the state of servo float control, and to confirm the state which has stopped. The operation ends when the speed feedback pulse of all axes goes below a constant value, and the manipulator is considered to have been stopped.	Level: Only 0 Available only with the optional servo-float function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR SERVOFLOAT FUNCTION (HW1484512).

9. NWAIT/ENWAIT

The following tag can be added or omitted.

No	Tag	Explanation	Note
13	NWAIT	Specify the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same time as the manipulator is carrying out that step.	
14	ENWAIT	Specify the ENWAIT instruction. The ENWAIT instruction carries out the instructions excluding the move instructions from that step on, before reaching the next step.	Available only with the conditional NWAIT function. (option: S2C714) Refer to *ENWAIT* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

10. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
15	ACC=Acceleration adjustment ratio	Specify the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

11. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
16	DEC=Deceleration adjustment ratio	Specify the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

12. TRAP

The following tag can be added or omitted

No	Tag	Explanation	Note
17	TRAP	Specify the TRAP instruction. When a limit is exceeded during the execution of the MOVS instruction, the TRAP instruction interrupts the execution of the MOVS instruction and executes a jump to the label which is set as the TRAP instruction.	Refer to *TRAP* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

13. +MOVJ/+MOVL/+MOVC/+MOVS

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
18	+MOVJ	Specify the joint interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to the YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
19	+MOVL	Specify the linear interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to the YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
20	+MOVC	Specify the circular interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to the YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).
21	+MOVS	Specify the spline interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. For details, refer to the YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482)

Example

(1) NOP
        MOVL V=138
        MOVS V=138   ••• Step 2
        MOVS V=138   ••• Step 3
        MOVS V=138   ••• Step 4
        MOVS V=138   ••• Step 5
        MOVS V=138   ••• Step 6
   MOVL V=138
        END
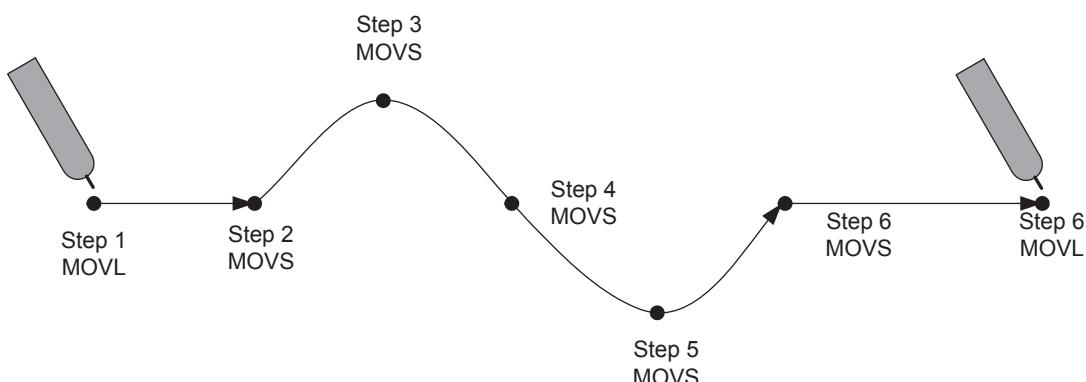
Moves from Step 2 to Step 6 by spline interpolation at a rate of 138cm/min.
Moves to Step 3 by spline interpolation defined by the teaching points in Steps 2, 3, and 4.
Moves to Step 4 by synchronized spline interpolation defined by the teaching points in Steps 2, 3, 4 and by the synchronized spline interpolation defined by the teaching points in Steps 3, 4, and 5.
Moves to Step 5 by synchronized spline interpolation defined by the teaching points in Steps 3, 4,5 and by synchronized spline interpolation defined by the teaching points in Steps 4, 5, and 6.
Moves to Step 6 by spline interpolation defined by the teaching points in Steps 4, 5, and 6.

Step 3
MOVS

Step 4
MOVS

Step 1
MOVL

Step 2
MOVS

Step 6
MOVS

Step 6
MOVL

Step 5
MOVS

IMOV
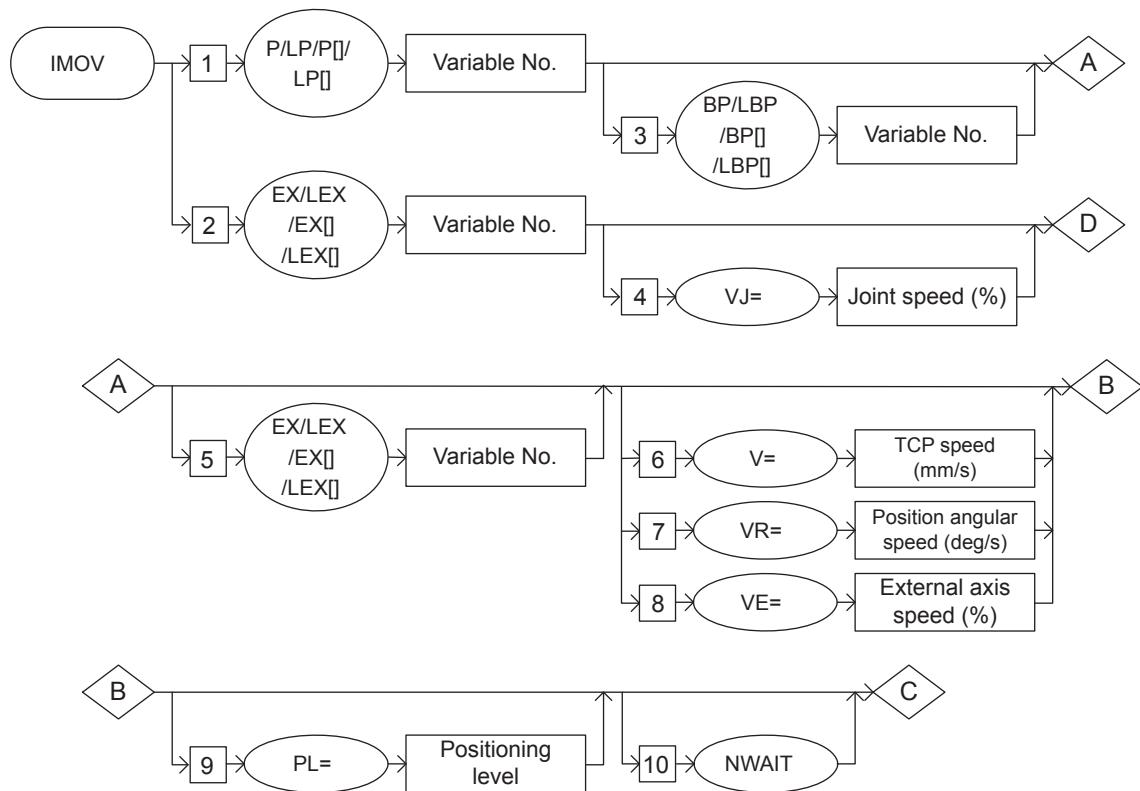
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves by linear interpolation from the current position for the specified incremental value.

Syntax

The tag which can be used is limited by the type of the job.
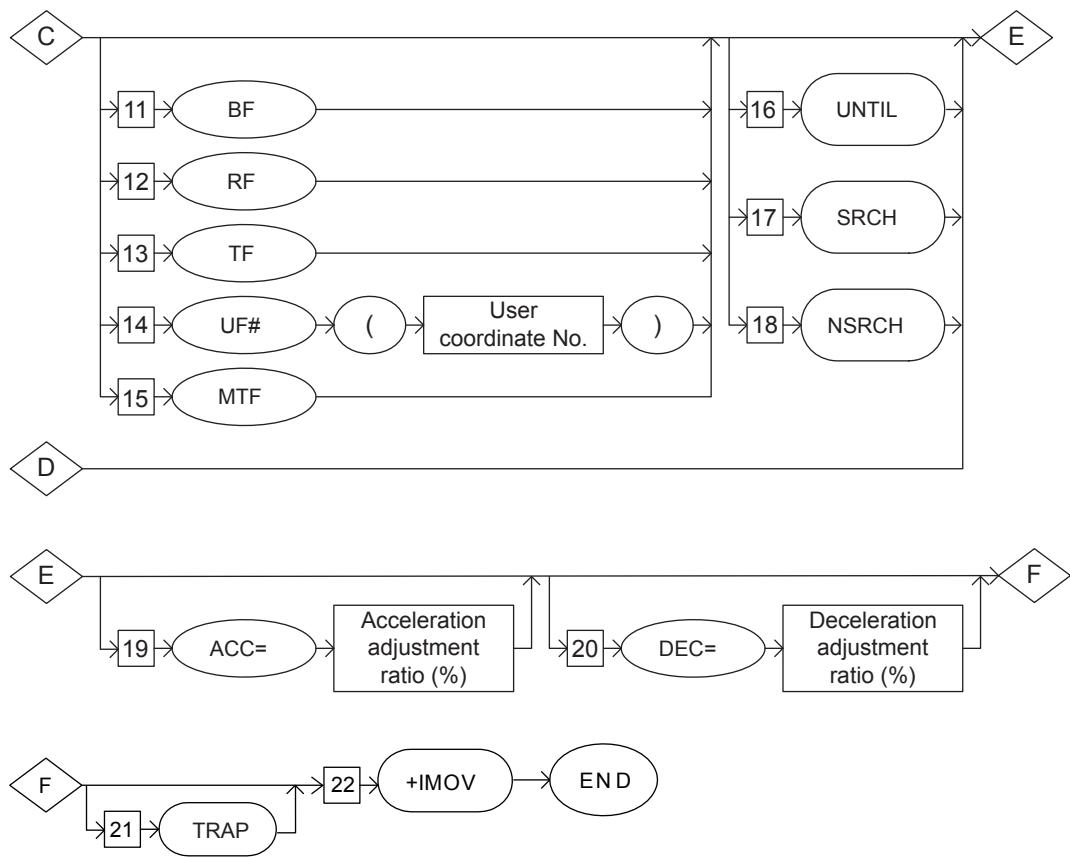
Table 2-9: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Single	Only station axis	
6	Coordinated	Two manipulators	Optional
7	Coordinated	Two manipulators with base axis	Optional

Table 2-10: Availability of Each Tag

No	Tag	Control Group							Note
		1	2	3	4	5	6	7	
1	P/LP/P[]/LP[]	●	●	●	●	×	●	●	
2	EX/LEX/EX[]/LEX[]	×	×	×	×	●	×	×	
3	BP/LBP/BP[]/LBP[]	×	●	×	●	×	●	×	
4	VJ=	×	×	×	×	●	×	×	
5	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	×	
6	V=	●	●	●	●	×	●	●	
7	VR=	●	●	●	●	×	●	●	
8	VE=	×	×	●	●	×	×	×	
9	PL=	●	●	●	●	×	●	●	
10	NWAIT	●	●	●	●	×	●	●	
11	BF	●	●	●	●	×	●	●	
12	RF	●	●	●	●	×	●	●	
13	TF	●	●	●	●	×	●	●	
14	UF#()	●	●	●	●	×	●	●	
15	MTF	×	×	×	×	×	●	●	
16	UNTIL	●	●	●	●	×	●	●	
17	SRCH	○	○	○	○	×	○	○	Optional
18	NSRCH	○	○	○	○	×	○	○	Optional
19	ACC=	●	●	●	●	●	●	●	
20	DEC=	●	●	●	●	●	●	●	
21	TRAP	●	●	●	●	●	●	●	
22	+IMOV	×	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

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Explanation

1. P Variable number /LP Variable number /P [Array number] /LP [Array number] /EX Variable number / LEX Variable number /EX [Array number] /LEX [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	P Variable number / LP Variable number / P [Array number]/ LP [Array number]	Specify the position variable number of the manipulator axis. Moves the axis according to the position data set in the specified variable number.	Variable number: 000 to 127
2	EX Variable number / LEX Variable number / EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. Moves the axis according to the position data set in the specified variable number.	Variable number: 000 to 127

2. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
3	BP Variable number / LBP Variable number / BP [Array number]/ LBP [Array number]	Specify the position variable number of the base axis. Moves the axis according to the position data set in the specified variable number.	Variable number: 000 to 127

3. VJ=Joint speed

The following tag can be added or omitted only when a EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation.

No	Tag	Explanation	Note
4	VJ=Joint speed	Specify the joint speed. The joint speed in a ratio to the highest speed. Operates at the speed decided beforehand when the joint speed is omitted.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.01 %)

4. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
5	EX Variable number / LEX Variable number / EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. Moves the axis according to the position data set in the specified variable number.	Variable number: 000 to 127

5. V=Tool center point speed /VR=Position angular speed /VE=External axis speed

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
6	V=Tool center point speed	Specify the tool center point speed. Specify the unit of rate using the operation condition setting screen.	Speed: 0.1 mm to 1500.0 mm/s The units can be changed by setting the parameter S2C173. Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)
7	VR=Position angular speed	Specify the position angular speed.	Speed: 0.1 degrees to 180.0 degrees/s Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg/s)
8	VE=External axis speed	Specify the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.(Units: 0.01 %)

6. PL=Position level

The following tag can be added or omitted.

No	Tag	Explanation	Note
9	PL=Position level	Specify the position level. The positioning level is a level of the approach when the manipulator passes the position where the teaching procedure was done.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

7. NWAIT

The following tag can be added or omitted.

No	Tag	Explanation	Note
10	NWAIT	Specify the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same as time the manipulator is carrying out that step.	

8. BF/RF/TF/UF# (User coordinate number)

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
11	BF	Specify the increment value in the base coordinate system.	
12	RF	Specify the increment value in the robot coordinate system.	
13	TF	Specify the increment value in the tool coordinate system.	
14	UF#(User coordinate number)	Specify the increment value in the user coordinate system.	No: 1 to 24 Variable B/I/D/LB/LI/LD can be used.
15	MTF	Specify the incremental value in the master tool coordinate system. In the master tool coordinate system, position data is converted to positions relative to the master manipulator.	Available only with the optional independent/coordinated function.

9. UNTIL/SRCH/NSRCH

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
16	UNTIL	Specify the UNTIL instruction. The UNTIL instruction is a tag by which the conditions of the input signal are evaluated during operation. When the condition of the input signal is full, the robot executes the next instruction.	Refer to *UNTIL* in *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
17	SRCH	Specify the SRCH instruction. The SRCH instruction is a tag which detects the start point.	Available only with the optional searching function. For details, refer to searching function.
18	NSRCH	Specify the NSRCH instruction. The NSRCH instruction detects a position without stopping the motion.	Available only with the optional search-in-motion function. For details, refer to search-in-motion function.

10. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
19	ACC=Acceleration adjustment ratio	Specify the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

11. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
20	DEC=Deceleration adjustment ratio	Specify the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

12. TRAP

The following tag can be added or omitted

No	Tag	Explanation	Note
21	TRAP	Specify the TRAP instruction. When a limit is exceeded during the execution of the IMOV instruction, the TRAP instruction interrupts the execution of the IMOV instruction and executes a jump to the label which is set as the TRAP instruction.	Refer to *TRAP* in *chapter 2.6 "Instruction Which Adheres to an Instruction"*

13. +IMOV

Add the following tag.

No	Tag	Explanation	Note
22	+IMOV	Specify the move instruction for an incremental value of the master manipulator.	Available only with the optional coordinate function. For details, refer to YRC1000micro OPTIONS INSTRUCTIONS FOR INDEPENDENT/COORDINATED CONTROL FUNCTION (HW1484482).

Example

(1) IMOV P000 V=138 RF
     Moves from the current position at a rate of 138cm/min for the incremental value specified in P000 in the robot coordinate system.

SPEED

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Sets the playback speed. The manipulator operates at the speed specified in the SPEED instruction when the speed is not specified in the move instruction.

Syntax

The tag which can be used is limited by the type of the job.
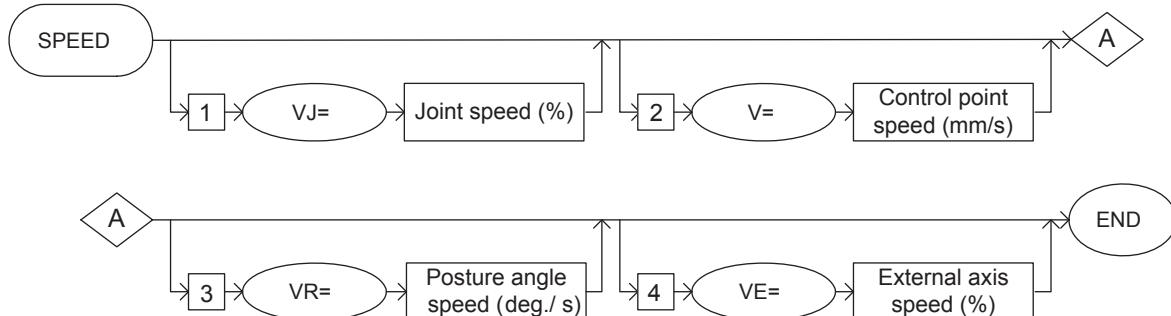
Table 2-11: Job Type and Control Group

No.	Job Type	Control group	Remarks
1	-	One manipulator (standard)	
2	-	One manipulator with station axis	
3	-	Station axis only	

Table 2-12: Availability of Each Tag

No	Tag	Control Group			Note
		1	2	3	
1	VJ=	●	●	●	
2	V=	●	●	×	
3	VR=	●	●	×	
4	VE=	×	●	×	

●: Available
×: Not available

Explanation

1. VJ=Joint speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
1	VJ=Joint speed	Specify the joint speed. The joint speed is shown in the ratio to the highest speed. Operates at the speed decided beforehand when the joint speed is omitted.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.01 %)

2. V=Tool center point speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
2	V=Tool center point speed	Specify the tool center point speed. Specify the unit of rate using the operation condition setting screen.	Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)

3. VR=Position angular speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
3	VR=Position angular speed	Specify the position angular speed.	Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg/s)

4. VE=External axis speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
4	VE=External axis speed	Specify the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.(Units: 0.01 %)

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Example

(1) NOP
    MOVJ VJ=100.00   Moves at the joint speed
    MOVL V=138   100.00%.
                                                ♦♦♦Moves at the control point
    SPEED VJ=50.00 V=276 VR=30.0   speed 138cm/min.
    MOVJ   ♦♦♦Moves at the joint speed
    MOVL   50.00%.
                                                ♦♦♦Moves at the control point
     MOVL VR=60.0   speed 276 cm/min.
                                                ♦♦♦Moves at the position angular
    END   speed 60.0 degree/s.

REFP
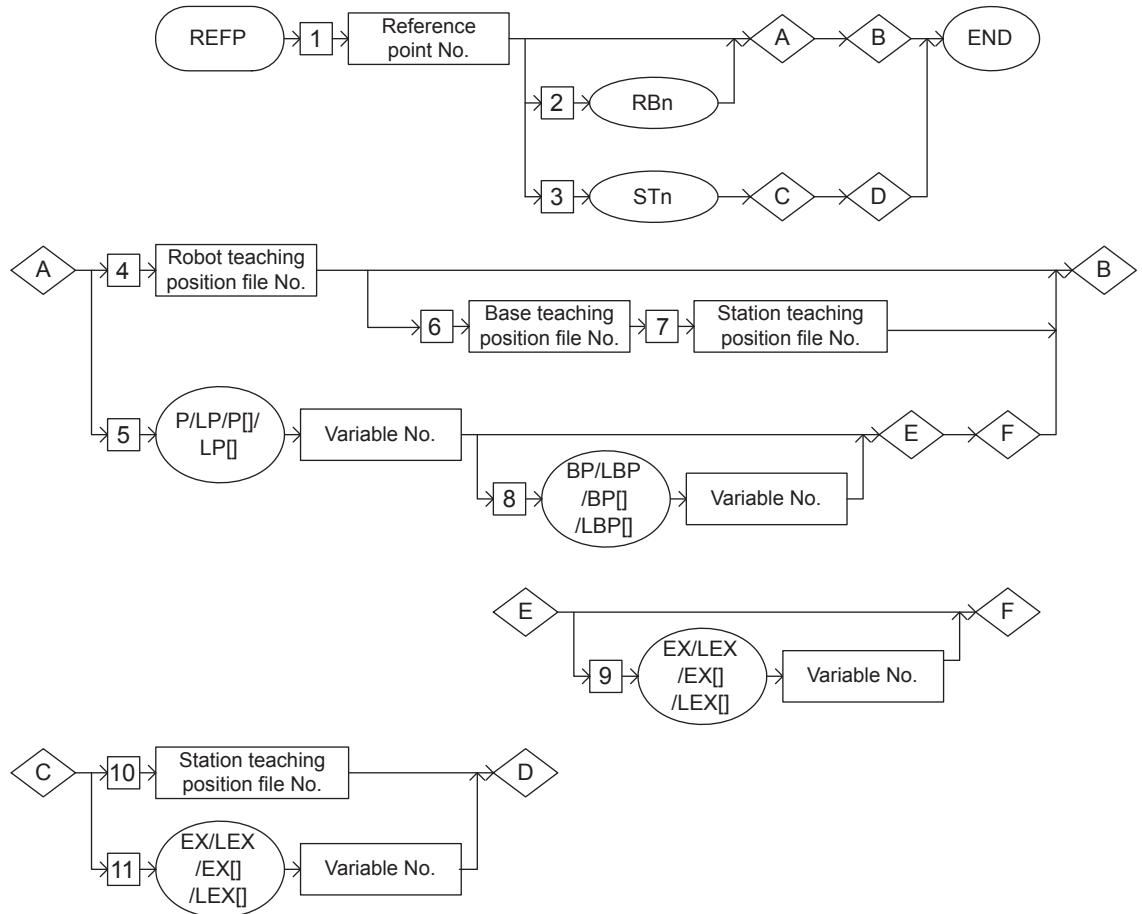
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

It is an instruction which has the position data by which a supplementary point of the wall point, etc. for weaving is set.

Syntax

The tag which can be used is limited by the type of the job.

Table 2-13: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Single	Station axis only	
6	Coordinated	Two manipulators	Optional
7	Coordinated	Two manipulators with base axis	Optional
8	Coordinated	Coordinated job with one manipulator and the station axis (designated as master)	Optional
9	Coordinated	Coordinated job with one manipulator (with base axis) and the station axis (designated as master)	Optional

Table 2-14: Availability of Each Tag

No	Tag	Control Group									Note
		1	2	3	4	5	6	7	8	9	
1	Reference point number	●	●	●	●	●	●	●	●	●	
2	RBn	×	×	×	×	×	●	●	●	●	
3	STn	×	×	×	×	×	×	×	●	●	
4	Robot teaching position file number	●	●	●	●	×	●	●	●	●	
5	P/LP/P[]/LP[]	●	●	●	●	×	●	●	●	●	
6	Base-axis teaching position file number	×	●	×	●	×	×	●	×	●	
7	Station teaching position file number	×	×	●	●	×	×	×	×	×	
8	BP/LBP/BP[]/LBP[]	×	●	×	●	×	×	●	×	●	
9	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	×	×	×	
10	Station teaching position file number	×	×	×	×	●	×	×	●	●	
11	EX/LEX/EX[]/LEX[]	×	×	×	×	●	×	×	●	●	

●: Available
×: Not available

Explanation

1. Reference Point Number

Add the following tag.
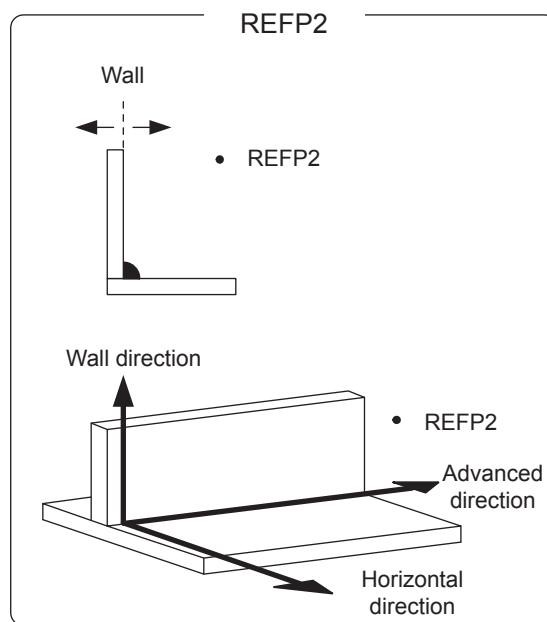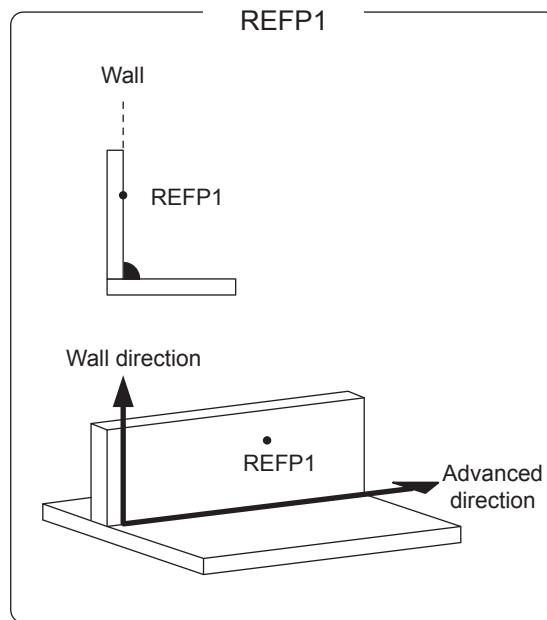
No	Tag	Explanation	Note
1	Reference point number	Specify the reference point (REFP) number.	Reference points: 1 to 8

SUPPLE -MENT

Reference points during weaving

Usually it is not necessary to register reference points during the weaving. However, there are cases when it must be registered according to the situation of the workpiece, etc.

In this case, the wall direction is defined as REFP1 and the horizontal wall direction is defined as REFP2.

REFP1

Wall

REFP1

Wall direction

REFP1

Advanced direction

REFP2

Wall

REFP2

Wall direction

REFP2

Advanced direction

Horizontal direction

2. RBn/STn

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
2	RBn	Specify the robot to which the reference point is to be input.	n: 1 to 2 RB1: Robot 1
3	STn	Specify the station to which the reference point is to be input.	n: 1 to 3 ST1: Station 1

3. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number]

One of the tags must be selected from the following table.

| No	Tag	Explanation	Note
4	Robot teaching position file number	The position in the reference point where the robot axis is taught is unconditionally written in this file. This teaching position cannot be edited.	On the job display, this tag is not displayed.
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the position variable number of the robot axis. The position data set in the variable of the specified number becomes a reference point.	Variable number: 000 to 127

4. Base Teaching Position File Number

When the robot teaching position file number is selected from the table in part 3 of this Explanation, add the following tag.

No	Tag	Explanation	Note
6	Base teaching position file number	The position in the reference point where the base axis is taught is unconditionally written in this file. This teaching position cannot be edited.	On the job display, this tag is not displayed.

5. Station Teaching Position File Number

When the robot teaching position file number is selected from the table in part 3 of this Explanation, add the following tag.

No	Tag	Explanation	Note
7	Station teaching position file number	The position in the reference point where the station axis is taught is unconditionally written in this file. This teaching position cannot be edited.	On the job display, this tag is not displayed.

6. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 3 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
8	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the position variable number of the base axis. The position data set in the variable of the specified number becomes a reference point.	Variable number: 000 to 127

7. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 3 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
9	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. The position data set in the variable of the specified number becomes a reference point.	Variable number: 000 to 127

8. Station teaching position file number/EX Variable number /LEX Variable number /EX [Array number] / LEX [Array number]
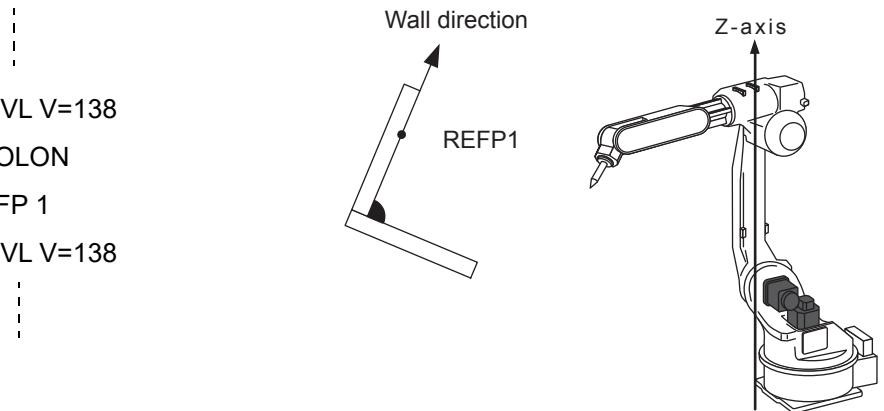
One of the tags must be selected from the following table.

No	Tag	Explanation	Note
10	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
11	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis. The position data set in the variable of a specified number becomes a reference point.	Variable number: 000 to 127

Example
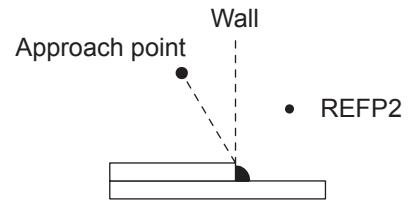
Register REFP1 when the wall direction and the Z direction of the robot axis are different.


```
    ┊
MOVL V=138
TOOLON
REFP 1
MOVL V=138
    ┊
```

(2)   Register REFP2 when the approach point is on the other side of the wall.


```
    ┊
MOVJ VJ=25.00◆◆◆Approach point
MOVL V=138
TOOLON
REFP 2
MOVL V=138
    ┊
```

2.5   Shift Instruction

SFTON

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Begins the parallel shift operation. The amount of the parallel shift is set in a positional variable by the increment value of X, Y, and Z in each coordinate system.

Syntax

The tag which can be used is limited by the type of the job.
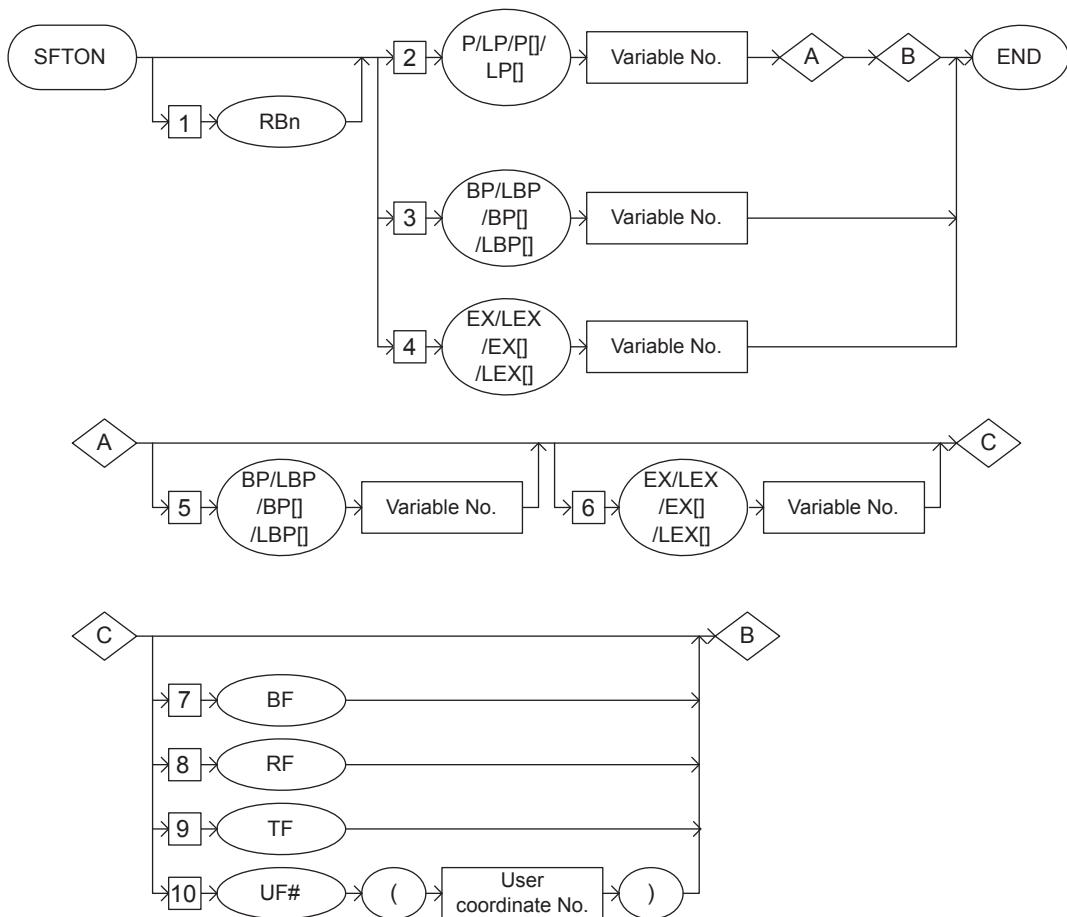
Table 2-15: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Single	Station axis only	
6	Coordinated	Two manipulators	Optional
7	Coordinated	Two manipulators with base axis	Optional
8	Coordinated	Coordinated job with one manipulator and the station axis (designated as master)	Optional
9	Coordinated	Coordinated job with one manipulator (with base axis) and the station axis (designated as master)	Optional

Table 2-16: Availability of Each Tag

No	Tag	Control Group									Note
		1	2	3	4	5	6	7	8	9	
1	RBn	×	×	×	×	×	●	●	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	×	●	●	●	●	
3	BP/LBP/BP[]/LBP[]	×	●	×	●	×	×	●	×	●	
4	EX/LEX/EX[]/LEX[]	×	×	●	●	●	×	×	●	●	
5	BP/LBP/BP[]/LBP[]	×	●	×	●	×	×	●	×	●	
6	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	×	●	●	
7	BF	●	●	●	●	×	●	●	●	●	
8	RF	●	●	●	●	×	●	●	●	●	
9	TF	●	●	●	●	×	●	●	●	●	
10	UF#()	●	●	●	●	×	●	●	●	●	

●: Available
×: Not available

Explanation

1. RBn

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
1	RBn	Specify the robot that is to execute a shift operation.	n: 1 to 2 RB1: Robot 1

2. P Variable number /LP Variable number /P [Array number] /LP [Array number] /BP Variable number / LBP Variable number /BP [Array number] /LBP [Array number] /EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

One of the tags must be selected from the following table.

No	Tag	Explanation	Note
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specify the position variable number of the robot axis by which the shift value is set. The shift is performed by the only increment value which is set in the variable of the specified number.	Variable number: 000 to 127
3	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the position variable number of the base axis by which the shift value is set. The shift is performed by the only increment value which is set in the variable of the specified number.	Variable number: 000 to 127
4	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis by which the shift value is set. The shift is performed by the only increment value which is set in the variable of the specified number.	Variable number: 000 to 127

3. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 2 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
5	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specify the position variable number of the base axis by which the shift value is set. The shift is performed by the only increment value which is set in the variable of the specified number.	Variable number: 000 to 127

4. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 2 of this Explanation, the following tag can be added.

| No	Tag	Explanation	Note
6	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specify the position variable number of the station axis by which the shift value is set. The shift is performed by the only increment value which is set in the variable of the specified number.	Variable number: 000 to 127

5. BF/RF/TF/UF# (User coordinate number)

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 2 of this Explanation, one of the tags must be selected from the following table.

No	Tag	Explanation	Note
7	BF	Specify the shift operation in the base coordinate system.	
8	RF	Specify the shift operation in the robot coordinate system.	
9	TF	Specify the shift operation in the tool coordinate system.	
10	UF#(User coordinate number)	Specify the shift operation in the user coordinate system.	No.1 to 63 Variable B/I/D/LB/LI/LD can be used.

Example

(1)　NOP
　　　MOVJ VJ=50.0
　　　MOVL V=138
　　　SFTON P000 UF#(1)
　　　MOVL V=138
　　　MOVL V=138
　　　MOVL V=138
　　　SFTOF
　　　MOVL V=138

Shifted section

Step 1　　　Step 2　　　Step 3　　　Step 4　　　Step 5　　　Step 6

The shift is performed between Step 3 and Step 5 in the user coordinate system by the amount of the shift which is set in P000.

SFTOF

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Ends the parallel shift operation.

Syntax

The tags to be added are decided according to the type of the job.
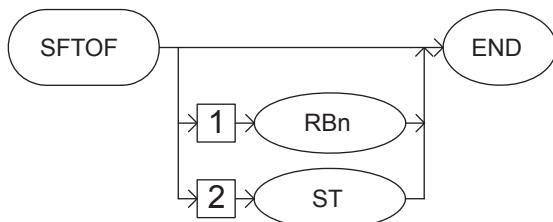
Table 2-17: Job Type and Control Group

No.	Job Type	Control group	Remarks
1	Single	One manipulator (standard)	
2	Coordinated	Two manipulators (without station axis)	Optional
3	Coordinated	Two manipulators (with station axis)	Optional

Table 2-18: Availability of Each Tag

No	Tag	Control group 1	2	3	Note
1	RBn	×	●	●	
2	ST	×	×	●	

●: Available
×: Not available

Explanation

1. RBn/ST
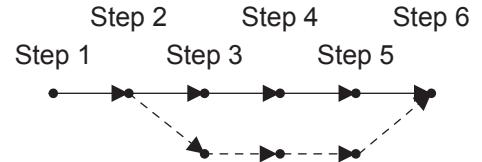
One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
1	RBn	Specify the robot that is to end the shift operation.	n: 1 to 2 RB1: Robot 1
2	ST	Ends the station axis shift operation.	

Example

(1) NOP
     MOVJ VJ=50.0
     MOVL V=138
     SFTON P000 UF#(1)
     MOVL V=138
     MOVL V=138
     MOVL V=138
     SFTOF
     MOVL V=138
     ⋮

Shifted section

Step 1   Step 2   Step 3   Step 4   Step 5   Step 6

The shift is performed between Step 3 and Step 5 in the user coordinate system by the amount of the shift which is set in P000.

MSHIFT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available
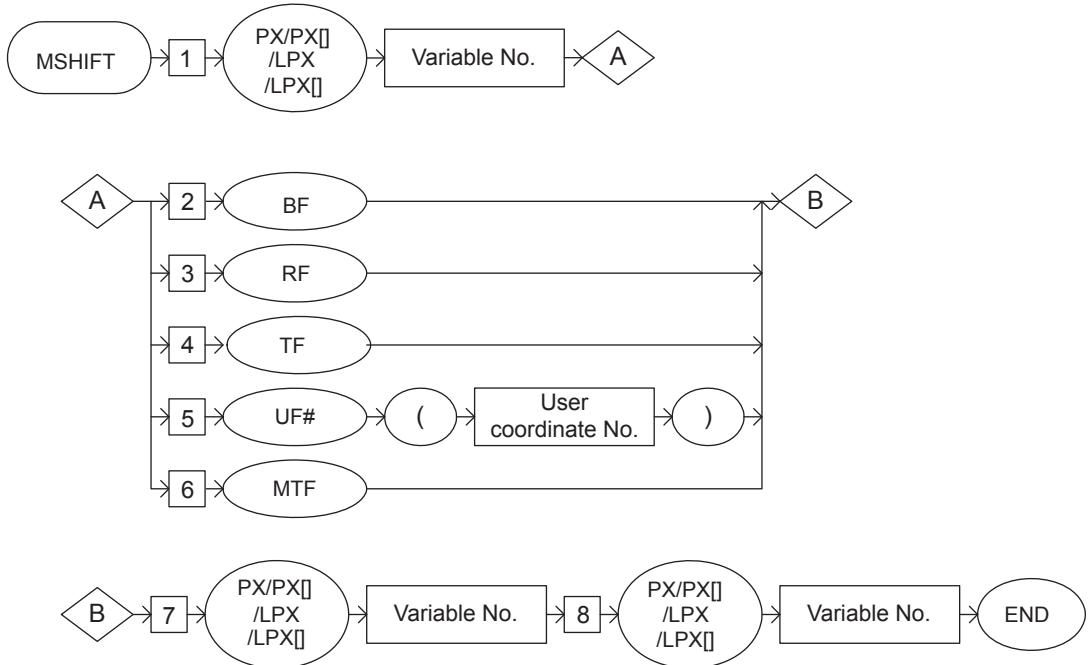
Function

Calculates the amount of the shift in the specified coordinate system according to Data 2 and Data 3 and stores the result in Data 1.

Data 2 indicates the reference position to carry out the parallel shift, and Data 3 is the target position (shifted position).

Syntax

MSHIFT <Data 1> Coordinate system designation <Data 2> <Data 3>

Explanation

1. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the number of the expanded position variable to store the calculated shift.	<Data 1>

2. BF/RF/TF/UF# (User coordinate number)/MTF

One of the tags must be selected from the following table.

No.	Tag	Explanation	Note
2	BF	Specify the calculation of the shift amount in the base coordinate system.	
3	RF	Specify the calculation of the shift amount in the robot coordinate system.	
4	TF	Specify the calculation of the shift amount in the tool coordinate system.	
5	UF# (User coordinate number)	Specify the calculation of the shift amount in the user coordinate system.	No.: 1 to 63 Variable B/I/D/LB/LI/LD can be used.
6	MTF	Specify the calculation of the shift amount in the master tool coordinate system.	Available only with the optional independent/ coordinated function.

3. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
7	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the expanded position type variable number of the reference position to calculate the amount of the shift.	<Data 2>

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4. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
8	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specify the expanded position type variable number of the target position to calculate the amount of the shift.	<Data 3>

Example

(1) NOP   : Moves to the reference position.
     MOVJ VJ=20.00   : Sets the current position (the reference
     GETS PX000 $PX000   position) in the position variable P000.
     MOVJ VJ=20.00   : Moves to the target position.
     GETS PX001 $PX000   : Sets the current position (the target
     MSHIFT PX010 BF PX000 PX001   position) in the position variable P001.
     END   : Calculates the shift amount and stores it in
                                                              the position variable P010.

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2.6   Instruction Which Adheres to an Instruction

IF
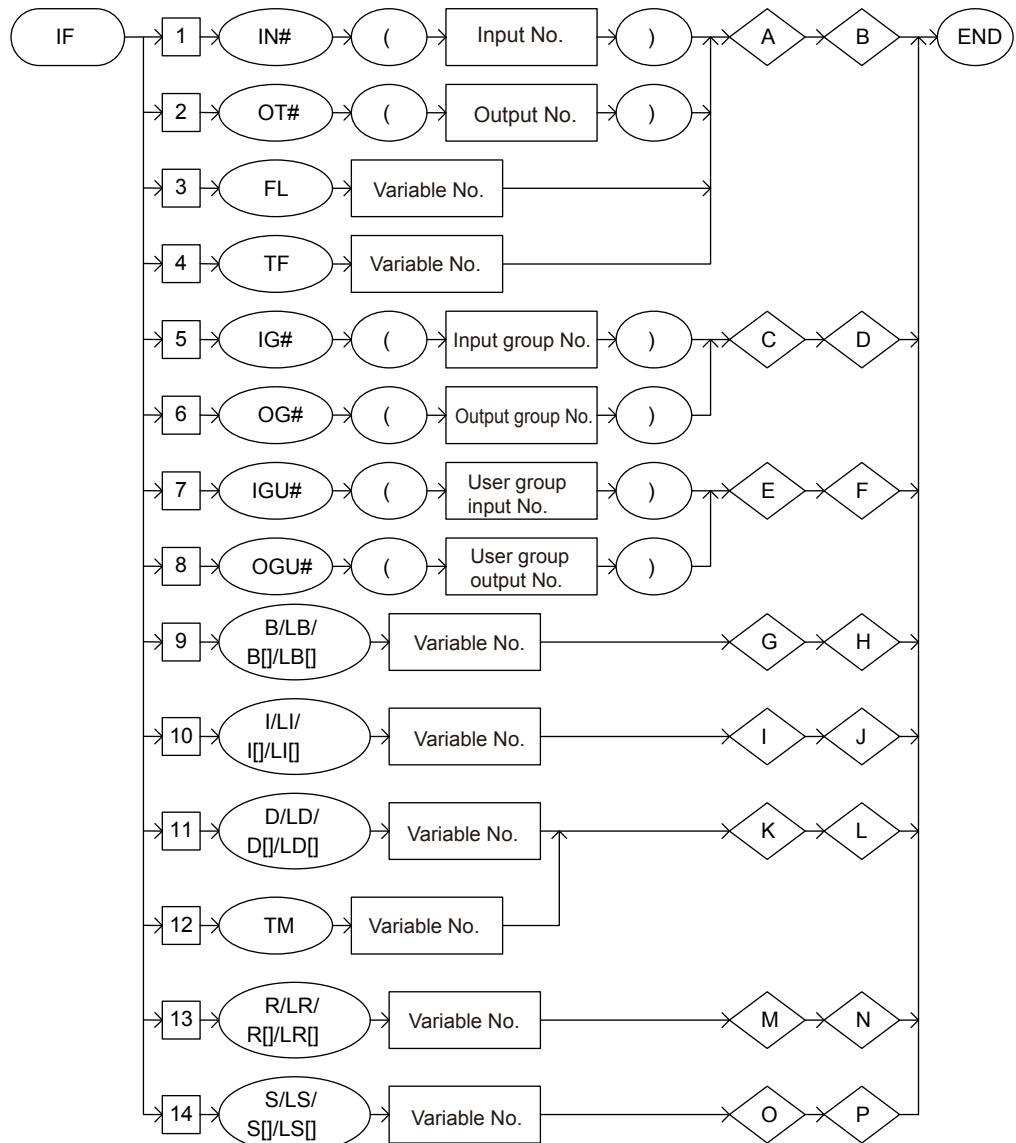
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function
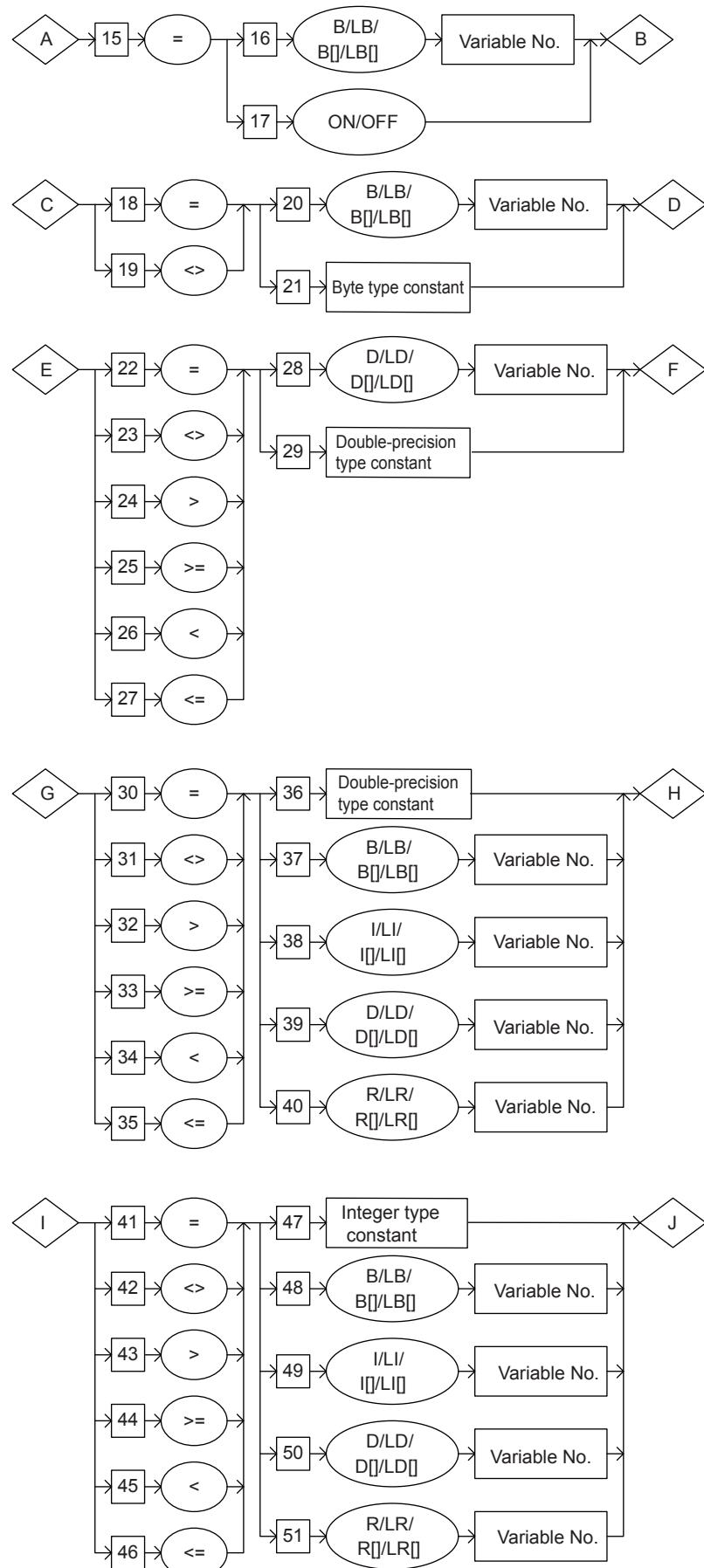
Evaluates the various conditions during operation. This instruction is added after other instructions for processing.

Syntax

IF <Comparison element 1> =, <>, <=, >=, <, > <Comparison element 2>

Explanation

1. IN# (Input number) /OT# (Output number) /FL Variable number /TF Variable number/IG# (Input group number)/OG# (Output group number)/IGU# (User group input number)/OGU# (User group output number)/B Variable number/LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /TM Variable number/R Variable number /LR Variable number /R [Array number] /LR [Array number] /S Variable number /LS Variable number /S [Array number] /LS [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	IN# (Input number)	Specify the number of the GP input signal to be compared.	<Comparison element 1> No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.
2	OT# (Output number)	Specify the number of the GP output signal to be compared.	<Comparison element 1> No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.
3	FL Variable number	Specify the flag variable number to be compared.	<Comparison element 1>
4	TF Variable number	Specify the timer flag variable number to be compared.	<Comparison element 1>
5	IG# (Input group number)	Specify the number of the GP input group signal (1 group 8points) to be compared.	<Comparison element 1> No.: 1 to 512 Variable B/I/D/LB/LI/LD can be used.
6	OG# (Output group number)	Specify the number of the GP output group signal (1 group 8points) to be compared.	<Comparison element 1> No.: 1 to 512 Variable B/I/D/LB/LI/LD can be used.
7	IGU# (User group Input number)	Specify the number of the user group input signal to be compared.	<Comparison element 1> No.: 1 to 64 Variable B/I/D/LB/LI/LD can be used.
8	OGU# (User group output number)	Specify the number of the user group output signal to be compared.	<Comparison element 1> No.: 1 to 64 Variable B/I/D/LB/LI/LD can be used.

No	Tag	Explanation	Note
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number to be compared.	<Comparison element 1>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number to be compared.	<Comparison element 1>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double-precision type variable number to be compared.	<Comparison element 1>
12	TM Variable number	Specify the timer variable number to be compared.	<Comparison element 1>
13	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number to be compared.	<Comparison element 1>
14	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the character type variable number to be compared.	<Comparison element 1>

2. =

When an IN# (Input number), OT# (Output number), FL Variable or TF Variable is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
15	=	It is equal.	

3. B Variable number /LB Variable number /B [Array number] /LB [Array number] /ON /OFF

When an IN# (Input number), OT# (Output number), FL Variable or TF Variable is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after the equal sign (=) which is added from the table in part 2 of this Explanation.

No	Tag	Explanation	Note
16	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable which becomes a comparison condition.	<Comparison element 2> Least significant bit: 0: OFF 1: ON
17	ON/OFF	The comparison condition is specified as ON or OFF.	<Comparison element 2>

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4. =/<>

When an IG# (Input group number) or OG# (Output group number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
18	=	It is equal.	
19	<>	It is not equal.	

5. B Variable number /LB Variable number /B [Array number] /LB [Array number] /Bite type constant

When an IG# (Input group number) or OG# (Output group number) is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=" or "<>" which is added from the table in part 4 of this Explanation.

No	Tag	Explanation	Note
20	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable which becomes a comparison condition.	<Comparison element 2>
21	Byte type constant	The comparison condition is specified by byte type constant.	<Comparison element 2>

6. =/<>/>/>=/</<=

When an IGU# (User group input number) or OGU# (User group output number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
22	=	It is equal.	
23	<>	It is not equal.	
24	>	It is greater than.	
25	>=	It is greater than or equal.	
26	<	It is less than.	
27	<=	It is less than or equal.	

7. D Variable number /LD Variable number /D [Array number] /LD [Array number] /Double-precision type constant

When an IGU# (User group input number) or OGU# (User group output number) is selected from the table in part 1 of this Explanation, one of the tags in the following table is selected after "=", "<>", ">", ">=", "<"or "<=" which is added from the table in part 6 of this Explanation.

No	Tag	Explanation	Note
28	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
29	Double-precision type constant	Specify the double precision type constant which becomes a comparison condition.	<Comparison element 2>

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8. =/<>/>/>=/</<=

When an B Variable number, LB Variable number, B [Array number] or LB [Array number] is selected the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
30	=	It is equal.	
31	<>	It is not equal.	
32	>	It is greater than.	
33	>=	It is greater than or equal.	
34	<	It is less than.	
35	<=	It is less than or equal.	

9. Byte type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] / LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When an B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<" or "<=" which is added from the table in part 8 of this Explanation.

No	Tag	Explanation	Note
36	Byte type constant	The comparison condition is specified by the byte type constant.	<Comparison element 2>
37	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number which becomes a comparison condition.	<Comparison element 2>
38	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number which becomes a comparison condition.	<Comparison element 2>
39	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
40	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number which becomes a comparison condition.	<Comparison element 2>

10. =/<>/>/>=/</<=

When a I Variable number, LI Variable number, I [Array number] or LI [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
41	=	It is equal.	
42	<>	It is not equal.	
43	>	It is greater than.	
44	>=	It is greater than or equal.	
45	<	It is less than.	
46	<=	It is less than or equal.	

11. Integer type constant/ B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] / R Variable number /LR Variable number /R [Array number] /LR [Array number]

When a I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<"or "<=" which is added from the table in part 10 of this Explanation.

No	Tag	Explanation	Note
47	Integer type constant	The comparison condition is specified by the integer type constant.	<Comparison element 2>
48	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number which becomes a comparison condition.	<Comparison element 2>
49	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number which becomes a comparison condition.	<Comparison element 2>
50	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
51	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number which becomes a comparison condition.	<Comparison element 2>

12. =/<>/>/>=/</<=

When an D Variable number, LD Variable number, D [Array number] or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
52	=	It is equal.	
53	<>	It is not equal.	
54	>	It is greater than.	
55	>=	It is greater than or equal.	
56	<	It is less than.	
57	<=	It is less than or equal.	

13. Double precision type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When an D Variable number, LD Variable number, D [Array number], LD [Array number] or TM Variable number is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<" or "<=" which is added from the table in part 12 of this Explanation.

No	Tag	Explanation	Note
58	Double precision type constant	The comparison condition is specified by the double precision type constant.	<Comparison element 2>
59	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number which becomes a comparison condition.	<Comparison element 2>
60	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number which becomes a comparison condition.	<Comparison element 2>
61	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
62	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number which becomes a comparison condition.	<Comparison element 2>

14. =/<>/>/>=/</<=

When an R Variable number, LR Variable number, R [Array number] or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
63	=	It is equal.	
64	<>	It is not equal.	
65	>	It is greater than.	
66	>=	It is greater than or equal.	
67	<	It is less than.	
68	<=	It is less than or equal.	

15. Real type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number]/ I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<" or "<=" which is added from the table in part 14 of this Explanation.

No	Tag	Explanation	Note
69	Double precision type constant	The comparison condition is specified by the double precision type constant.	<Comparison element 2>
70	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number which becomes a comparison condition.	<Comparison element 2>
71	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number which becomes a comparison condition.	<Comparison element 2>
72	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
73	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number which becomes a comparison condition.	<Comparison element 2>

16. =/<>/>/>=/</<=

When an S Variable number, LS Variable number, S [Array number] or LS [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
74	=	It is equal.	
75	<>	It is not equal.	
76	>	It is greater than.	
77	>=	It is greater than or equal.	
78	<	It is less than.	
79	<=	It is less than or equal.	

17. Character type constant/S Variable number /LS Variable number /S [Array number] /LS [Array number]

When an S Variable number, LS Variable number, S [Array number] or LS [Array number] is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<" or "<=" which is added from the table in part 16 of this Explanation.

No	Tag	Explanation	Note
80	Character type constant	The comparison condition is specified by the character type constant.	<Comparison element 2>
81	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the character type variable number which becomes a comparison condition.	<Comparison element 2>

Example

(1) SET B000 1
     JUMP B000 IF IN#(14)=ON
     It jumps to Job 1 if input signal No.14 is turned ON.

(2) JUMP *2 IF D005<=D006
     Jumps to *2 if D005 is below D006.
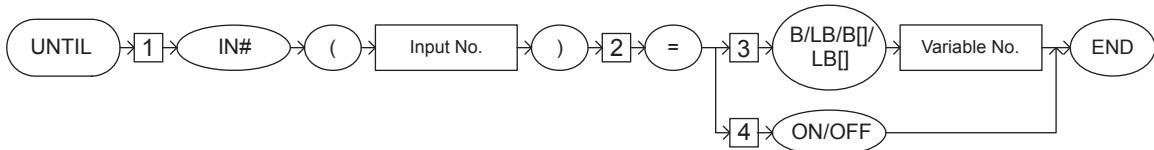
UNTIL

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

During the execution of move instruction to which UNTIL instruction is added, the specified condition is evaluated. If the condition is satisfied, the ongoing move instruction is forcibly completed and the next instruction is executed. This instruction is added after other instructions for processing.

Syntax

Explanation

1. IN# (Input number)

Add the following tag.

No.	Tag	Explanation	Note
1	IN# (Input number)	Specify the number of the general-purpose input signal which becomes a input condition.	No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.

2. =

Add the following tag.

No.	Tag	Explanation	Note
2	=	It is equal.	

3. B Variable number/LB Variable number/B [Array number]/LB [Array number]/ON/OFF.

Choose one of the tags from the following table after "=" is selected from the table in part 2 of this Explanation.
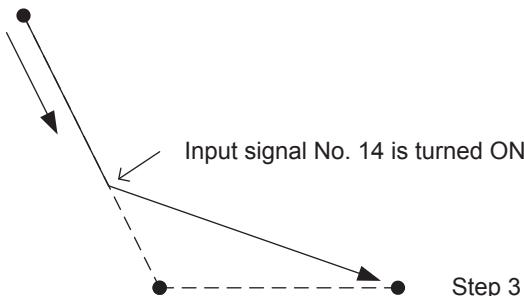
No.	Tag	Explanation	Note
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable to be the condition of execution.	Least significant bit: 0: OFF 1: ON
4	ON/OFF	Specify the condition as ON or OFF.	

Example

(1)   Step 1 MOVJ VJ=100.00
      Step 2 MOVJ VJ=50.00 UNTIL IN#(14)=ON
      Step 3 MOVJ VJ=25.00

The axis moves toward Step 2 until input signal No. 14 is turned ON. When input signal No. 14 is turned ON, the axis moves toward Step 3.

Step 1 MOVJ VJ=100.00

Input signal No. 14 is turned ON.

Step 3

Step 2
MOVJ VJ=50.00 UNTIL
IN#(14)=ON
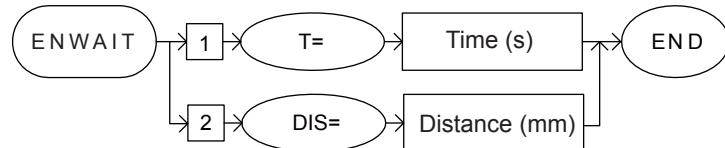
ENWAIT

SUBSET	STANDARD	EXPANDED	Parameter
Available	Available	Available	S2C714

Function

Carries out, in advance for the specified time or distance, an instruction other than a move instruction on the instruction line next to the move instruction that was added with ENWAIT.

Syntax


Explanation

1. T=Time/DIS= Distance

Choose one of the tags from the following table.
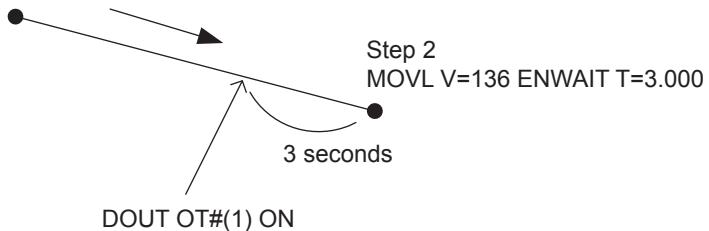
No.	Tag	Explanation	Note
1	T=Time	Specify the time in which the next instruction excluding a move instruction is carried out.	Time: 0.001 to 65.535 seconds Variable I/LI/I []/LI [] can be used. (Units: 0.001 seconds)
2	DIS= Distance	Specify the distance in which the next instruction excluding a move instruction is carried out.	Distance: 0.0 to 6553.5 mm Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used. (Units: 0.1 mm)

Example

(1) Step 1 MOVL V=136
     Step 2 MOVL V=136 ENWAIT T=3.000
             DOUT OT#(1) ON

     DOUT on the next instruction line is carried out 3 seconds before
   reaching Step 2.

Step 1 MOVL V=136

                                        Step 2
                                        MOVL V=136 ENWAIT T=3.000

                        3 seconds

DOUT OT#(1) ON

DIALSB
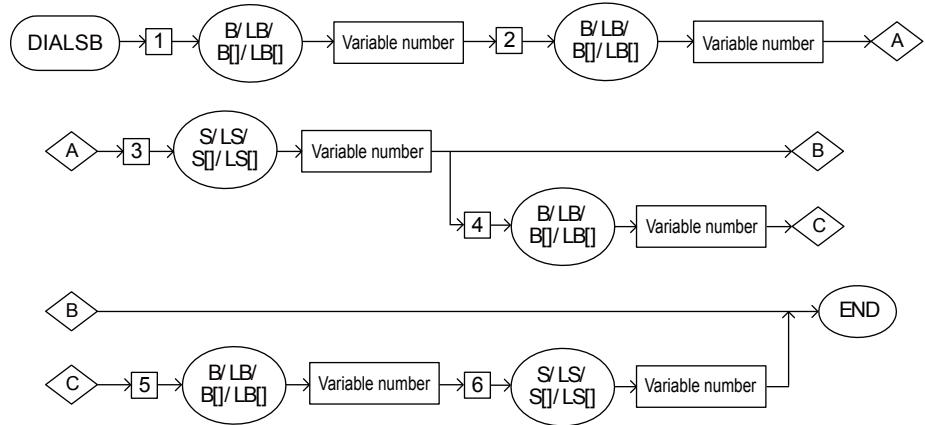
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Specifies the structure of the dialog (the display position of the message and button) shown by the DIALOG instruction.

* Can be selected only in the DIALOG instruction.

Syntax

Explanation

1. B Variable number / LB Variable number / B [Array number] / LB [Array number]: Message X coordinates

Add the following tag.

No	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number.	

2. B Variable number / LB Variable number / B [Array number] / LB [Array number]: Message Y coordinates

Add the following tag.

No	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number.	

3. S Variable number / LS Variable number / S [Array number] / LS [Array number]: Message character string

Add the following tag.

No	Tag	Explanation	Note
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the character string type variable number.	

### 4. B Variable number / LB Variable number / B [Array number] / LB [Array number]: Button X coordinates

Make sure to add the following tag for the first DIALSB in the DIALOG instruction.

For the second and after, the following tag can be added or omitted.

No	Tag	Explanation	Note
4	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number.	

5. B Variable number / LB Variable number / B [Array number] / LB [Array number]: Button Y coordinates

For the second and after, the following tag can be added or omitted.

No	Tag	Explanation	Note
5	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number.	

6. S Variable number / LS Variable number / S [Array number] / LS [Array number]: Button character string

Make sure to add the following tag for the first DIALSB in the DIALOG instruction.

For the second and after, the following tag can be added or omitted.

No	Tag	Explanation	Note
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the character string type variable number.	

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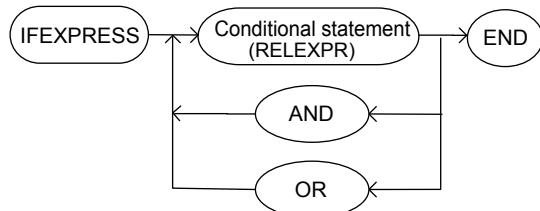
IFEXPRESS

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Evaluates the conditions in which a instruction with this instruction is executed.

Syntax

Explanation

1. Conditional statement

The following tag must be added.

No	Tag	Explanation	Note
-	Conditional statement	Specify the conditional statement	For details of the setting of conditional statement, refer to *chapter 1.5 "Registration of Conditional Statement"*

2. AND/OR

One of the following tags is selected.

No	Tag	Explanation	Note
-	AND	Take a logical product of two or more conditional statements.	
-	OR	Take a logical sum of two or more conditional statements.	

Example

(1)   JUMP *1 IF(IN#(1)=ON AND IN#(2)=ON)
When both the GP input no.1 and 2 are ON, a jump to the label "*1" is performed.

(2)   CALL B000 IF(B000=0 OR B000=1)
When the content of B000 is 0 or 1, the job "0" or "1" is called.
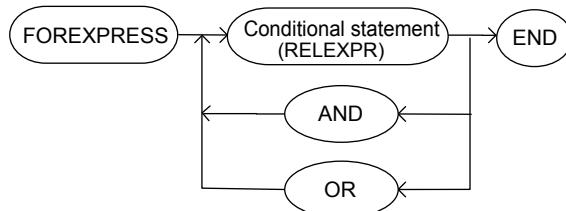
FOREXPRESS

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Evaluates the conditions in which a instruction with this instruction is executed.

Syntax

Explanation

1. Conditional statement

The following tag must be added.

No	Tag	Explanation	Note
-	Conditional statement	Specify the conditional statement	For details of the setting of conditional statement, refer to *chapter 1.5 "Registration of Conditional Statement"*

2. AND/OR

One of the following tags is selected.

No	Tag	Explanation	Note
-	AND	Take a logical product of two or more conditional statements.	
-	OR	Take a logical sum of two or more conditional statements.	

Example

(1) WAIT FOR(IN#(1)=ON AND IN#(2)=ON)
     Wait until both the GP input no.1 and 2 become ON.

(2) WAIT FOR(B000=1 OR I000=1)
   Wait until the content of B000 becomes 1 or the content of I000 becomes 1.
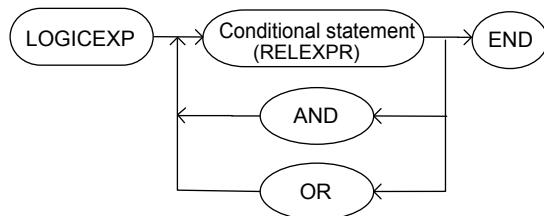
LOGICEXP

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Determines whether a conditional statement is true of false.

Syntax

Explanation

1. Conditional statement

The following tag must be added.

No	Tag	Explanation	Note
-	Conditional statement	Specify the conditional statement	For details of the setting of conditional statement, refer to *chapter 1.5 "Registration of Conditional Statement"*

2. AND/OR

One of the following tags is selected.

No	Tag	Explanation	Note
-	AND	Take a logical product of two or more conditional statements.	
-	OR	Take a logical sum of two or more conditional statements.	

Example

(1)   SET FL0000 LOGICEXP(IN#(1)=ON AND IN#(2)=ON)
      When both the GP input no.1 and 2 are ON, FL0000 becomes ON.
      Otherwise, FL0000 is OFF.

(2)   SET FL0010 LOGICEXP(B000=1 OR I000=1)
      When the content of B000 is 1 or the content of I000 is 1, FL0010
   becomes ON. Otherwise, FL0010 is OFF.
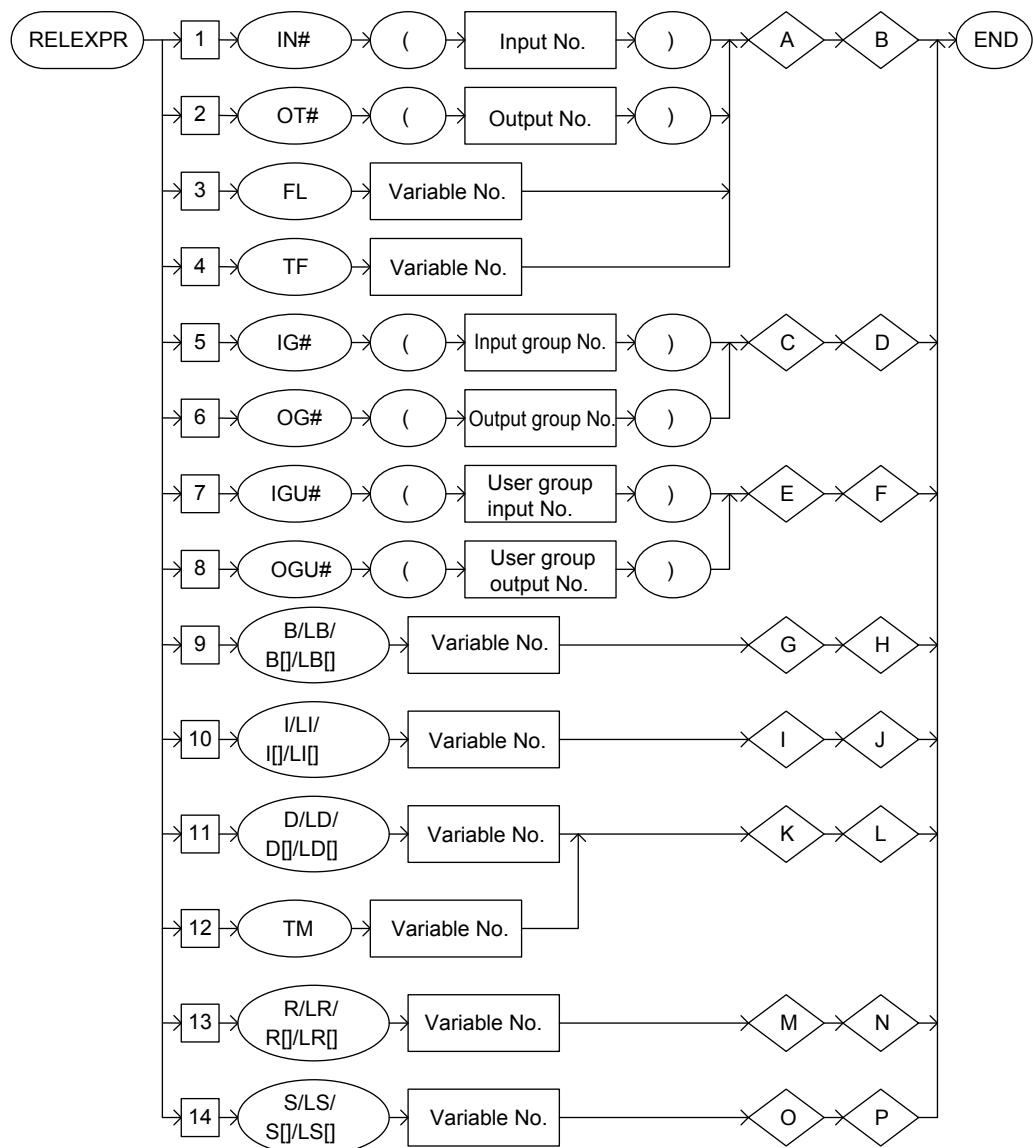
RELEXPR

SUBSET	STANDARD	EXPANDED
Available	Available	Available
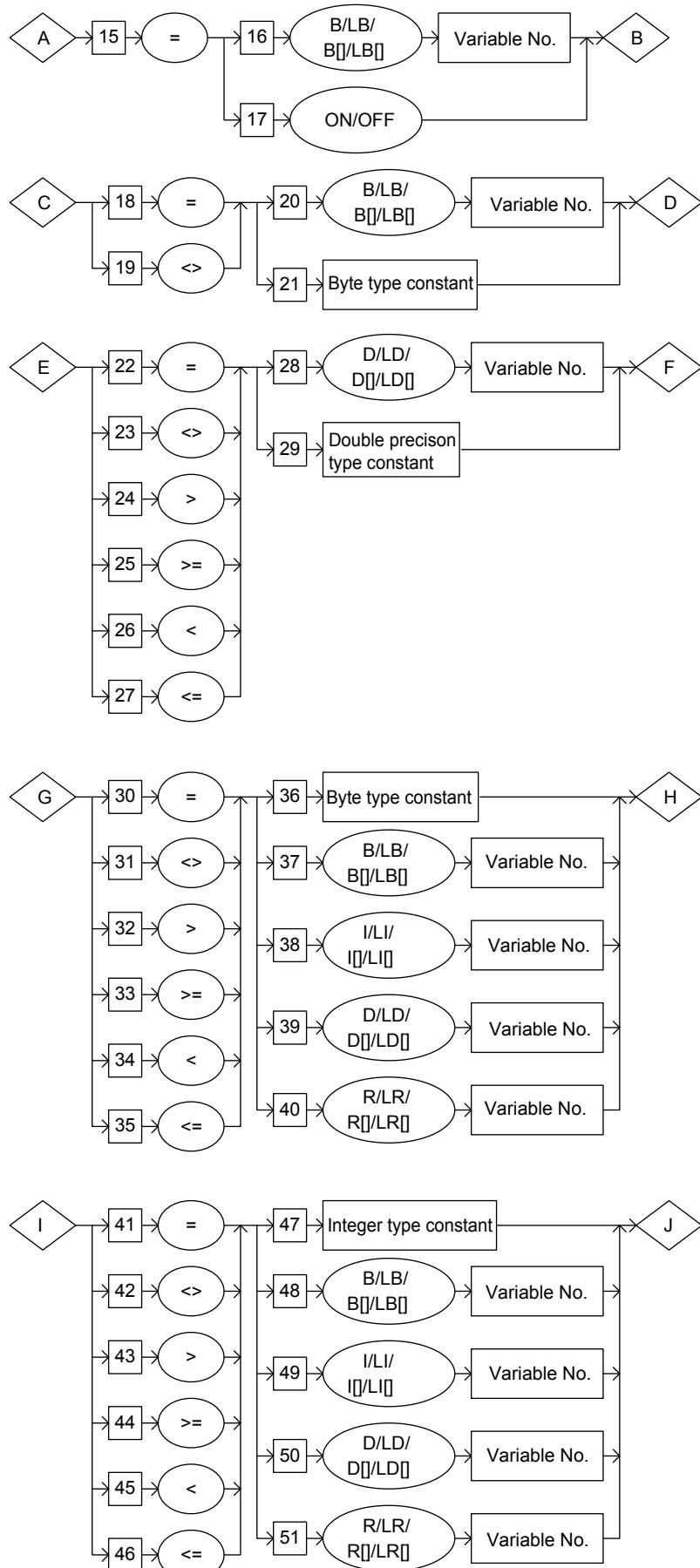
Function

Specifies the conditional statement.

Syntax

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Explanation

1. IN# (Input number) /OT# (Output number) /FL Variable number /TF Variable number/IG# (Input group number)/OG# (Output group number)/IGU# (User group input number)/OGU# (User group output number)/B Variable number/LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /TM Variable number/R Variable number /LR Variable number /R [Array number] /LR [Array number] /S Variable number /LS Variable number /S [Array number] /LS [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	IN# (Input number)	Specify the number of the GP input signal to be compared.	<Comparison element 1> No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.
2	OT# (Output number)	Specify the number of the GP output signal to be compared.	<Comparison element 1> No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.
3	FL Variable number	Specify the flag variable number to be compared.	<Comparison element 1>
4	TF Variable number	Specify the timer flag variable number to be compared.	<Comparison element 1>
5	IG# (Input group number)	Specify the number of the GP input group signal (1 group 8points) to be compared.	<Comparison element 1> No.: 1 to 512 Variable B/I/D/LB/LI/LD can be used.
6	OG# (Output group number)	Specify the number of the GP output group signal (1 group 8points) to be compared.	<Comparison element 1> No.: 1 to 512 Variable B/I/D/LB/LI/LD can be used.
7	IGU# (User group Input number)	Specify the number of the user group input signal to be compared.	<Comparison element 1> No.: 1 to 64 Variable B/I/D/LB/LI/LD can be used.
8	OGU# (User group output number)	Specify the number of the user group output signal to be compared.	<Comparison element 1> No.: 1 to 64 Variable B/I/D/LB/LI/LD can be used.
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number to be compared.	<Comparison element 1>

No	Tag	Explanation	Note
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number to be compared.	<Comparison element 1>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double-precision type variable number to be compared.	<Comparison element 1>
12	TM Variable number	Specify the timer variable number to be compared.	<Comparison element 1>
13	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number to be compared.	<Comparison element 1>
14	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the character type variable number to be compared.	<Comparison element 1>

2. =

When an IN# (Input number), OT# (Output number), FL Variable or TF Variable is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
15	=	It is equal.	

3. B Variable number /LB Variable number /B [Array number] /LB [Array number] /ON /OFF

When an IN# (Input number), OT# (Output number), FL Variable or TF Variable is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after the equal sign (=) which is added from the table in part 2 of this Explanation.

No	Tag	Explanation	Note
16	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable which becomes a comparison condition.	<Comparison element 2> Least significant bit: 0: OFF 1: ON
17	ON/OFF	The comparison condition is specified as ON or OFF.	<Comparison element 2>

4. =/<>

When an IG# (Input group number) or OG# (Output group number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
18	=	It is equal.	
19	<>	It is not equal.	

5. B Variable number /LB Variable number /B [Array number] /LB [Array number] /Byte type constant

When an IG# (Input group number) or OG# (Output group number) is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=" or "<>" which is added from the table in part 4 of this Explanation.

No	Tag	Explanation	Note
20	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable which becomes a comparison condition.	<Comparison element 2>
21	Byte type constant	The comparison condition is specified by byte type constant.	<Comparison element 2>

6. =/<>/>/>=/</<=

When an IGU# (User group input number) or OGU# (User group output number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
22	=	It is equal.	
23	<>	It is not equal.	
24	>	It is greater than.	
25	>=	It is greater than or equal.	
26	<	It is less than.	
27	<=	It is less than or equal.	

7. D Variable number /LD Variable number /D [Array number] /LD [Array number] /Double-precision type constant

When an IGU# (User group input number) or OGU# (User group output number) is selected from the table in part 1 of this Explanation, one of the tags in the following table is selected after "=", "<>", ">", ">=", "<"or "<=" which is added from the table in part 6 of this Explanation.

No	Tag	Explanation	Note
28	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
29	Double-precision type constant	Specify the double precision type constant which becomes a comparison condition.	<Comparison element 2>

8. =/<>/>/>=/</<=

When an B Variable number, LB Variable number, B [Array number] or LB [Array number] is selected the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
30	=	It is equal.	
31	<>	It is not equal.	
32	>	It is greater than.	
33	>=	It is greater than or equal.	
34	<	It is less than.	
35	<=	It is less than or equal.	

9. Byte type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] / LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When an B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<" or "<=" which is added from the table in part 8 of this Explanation.

No	Tag	Explanation	Note
36	Byte type constant	The comparison condition is specified by the byte type constant.	<Comparison element 2>
37	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number which becomes a comparison condition.	<Comparison element 2>
38	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number which becomes a comparison condition.	<Comparison element 2>
39	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
40	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number which becomes a comparison condition.	<Comparison element 2>

10. =/<>/>/>=/</<=

When a I Variable number, LI Variable number, I [Array number] or LI [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
41	=	It is equal.	
42	<>	It is not equal.	
43	>	It is greater than.	
44	>=	It is greater than or equal.	
45	<	It is less than.	
46	<=	It is less than or equal.	

11. Integer type constant/ B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] / R Variable number /LR Variable number /R [Array number] /LR [Array number]

When a I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<"or "<=" which is added from the table in part 10 of this Explanation.

No	Tag	Explanation	Note
47	Integer type constant	The comparison condition is specified by the integer type constant.	<Comparison element 2>
48	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number which becomes a comparison condition.	<Comparison element 2>
49	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number which becomes a comparison condition.	<Comparison element 2>
50	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
51	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number which becomes a comparison condition.	<Comparison element 2>

12. =/<>/>/>=/</<=

When an D Variable number, LD Variable number, D [Array number] or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
52	=	It is equal.	
53	<>	It is not equal.	
54	>	It is greater than.	
55	>=	It is greater than or equal.	
56	<	It is less than.	
57	<=	It is less than or equal.	

13. Double precision type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When an D Variable number, LD Variable number, D [Array number], LD [Array number] or TM Variable number is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<"or "<=" which is added from the table in part 12 of this Explanation.

No	Tag	Explanation	Note
58	Double precision type constant	The comparison condition is specified by the double precision type constant.	<Comparison element 2>
59	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number which becomes a comparison condition.	<Comparison element 2>
60	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number which becomes a comparison condition.	<Comparison element 2>
61	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
62	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number which becomes a comparison condition.	<Comparison element 2>

14. =/<>/>/>=/</<=

When an R Variable number, LR Variable number, R [Array number] or LR
[Array number] is selected from the table in part 1 of this Explanation,
choose one of the tags from the following table.

No	Tag	Explanation	Note
63	=	It is equal.	
64	<>	It is not equal.	
65	>	It is greater than.	
66	>=	It is greater than or equal.	
67	<	It is less than.	
68	<=	It is less than or equal.	

15. Real type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number]/ I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or
LR [Array number] is selected from the table in part 1 of this Explanation,
one of the tags from the following table is selected after "=", "<>", ">", ">=",
"<" or "<=" which is added from the table in part 14 of this Explanation.

No	Tag	Explanation	Note
69	Double precision type constant	The comparison condition is specified by the double precision type constant.	<Comparison element 2>
70	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specify the byte type variable number which becomes a comparison condition.	<Comparison element 2>
71	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specify the integer type variable number which becomes a comparison condition.	<Comparison element 2>
72	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specify the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
73	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specify the real type variable number which becomes a comparison condition.	<Comparison element 2>

16. =/<>/>/>=/</<=

When an S Variable number, LS Variable number, S [Array number] or LS [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
74	=	It is equal.	
75	<>	It is not equal.	
76	>	It is greater than.	
77	>=	It is greater than or equal.	
78	<	It is less than.	
79	<=	It is less than or equal.	

17. Character type constant/S Variable number /LS Variable number /S [Array number] /LS [Array number]

When an S Variable number, LS Variable number, S [Array number] or LS [Array number] is selected from the table in part 1 of this Explanation, one of the tags from the following table is selected after "=", "<>", ">", ">=", "<" or "<=" which is added from the table in part 16 of this Explanation.

| No	Tag	Explanation	Note
80	Character type constant	The comparison condition is specified by the character type constant.	<Comparison element 2>
81	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specify the character type variable number which becomes a comparison condition.	<Comparison element 2>

TRAP

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

If a limit excess is detected during the execution of the move instruction to which TRAP instruction is added, the TRAP instruction interrupts the execution of the move instruction without the occurrence of Alarm and jumps to the label which is set as TRAP instruction.

Syntax

TRAP → 1 → * → Label character string → END

Explanation

1. * Label string

The following tag must be added.

No	Tag	Explanation	Note
1	* Label strings	Specify the label which is the trap destination.	String: 8 characters

Example
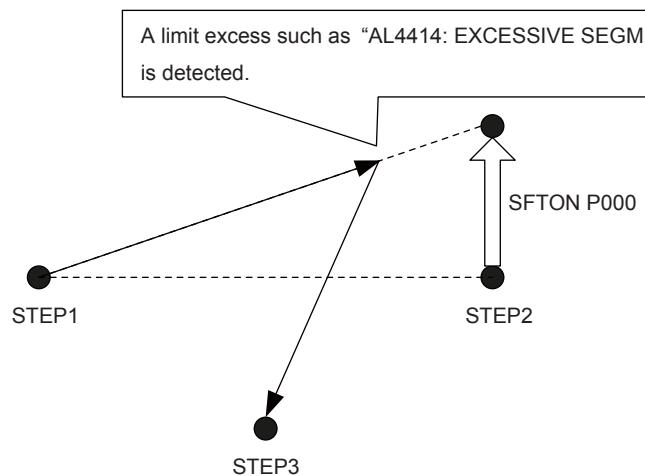
(1) STEP1 MOVL V=1500.0
              SFTON P000
     STEP2 MOVL V=1500.0 TRAP *ERR
              SFTOF
              :
              *ERR
     STEP3 MOVJ VJ=1500.0

If a limit excess is detected during the transfer to STEP2, the motion is interrupted without the occurrence of Alarm, a jump to the label "*ERR" is performed and the transfer to STEP3 starts.

A limit excess such as "AL4414: EXCESSIVE SEGMENT" is detected.

SFTON P000

STEP1

STEP2

STEP3

2.7   General-purpose Instruction

WVON

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Material handling, press tending, cutting, and other applications

Function

Starts weaving operation.

Syntax

The tags to be added differ depending on the control group in the job.
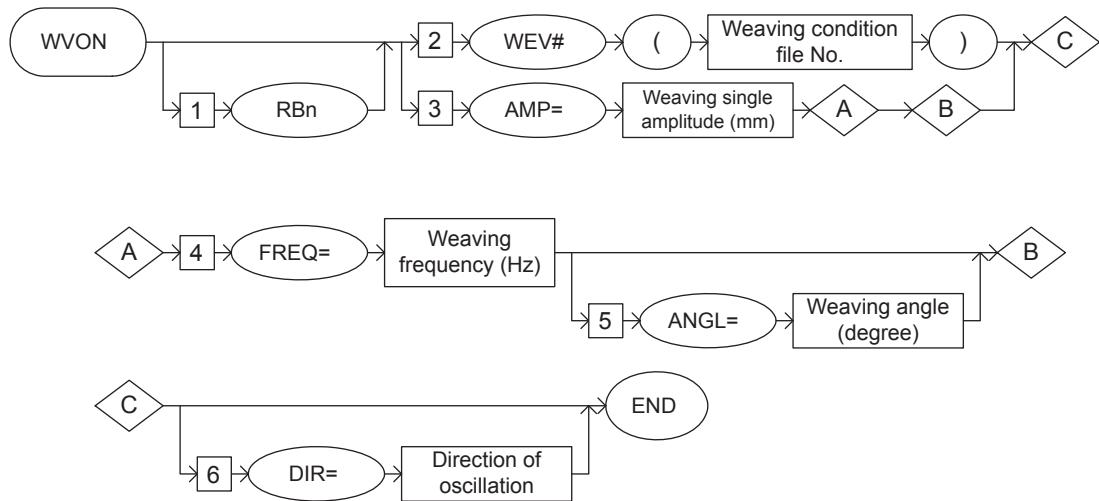
Table 2-19: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Coordinated	Two manipulators.	The coordinated operation function(option). This function can be specified only when it's effective.

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Table 2-20: Availability of Each Tag

No	Tag	Control Group (manipulator)		Note
		1	**2**	
1	RBn	×	●	
2	WEV#()	●	●	
3	AMP=	●	●	
4	FREQ=	●	●	
5	ANGL=	●	●	
6	DIR=	●	●	

●: Available
×: Not available

Explanation

1. RBn

Choose the following tag when two manipulators are used.

No	Tag	Explanation	Note
1	RBn	Specify the robot (manipulator) which executes a weaving operation.	n: 1 to 2 RB1: Robot 1

2. WEV# (Weaving condition file number)/AMP=Weaving single amplitude

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	WEV#(Weaving condition file number)	Specify the weaving condition file number. The condition when the weaving operates is registered in the weaving condition file.	No.: 1 to 255 Variable B/I/D/LB/LI/LD can be used.
3	AMP=Weaving signal amplitude	Specify the amplitude of weaving.	Single amplitude: 0.1 mm to 99.9 mm Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used. (Units: 0.1 mm)

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3. FREQ=Weaving frequency

When AMP=Weaving single amplitude is selected from the table in part 2
of this Explanation, add the following tag.

No	Tag	Explanation	Note
4	FREQ=Weaving frequency	Specify the weaving frequency.	Frequency: 1.0 Hz to 5.0 Hz Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1 Hz)

4. ANGL=Weaving angle

When AMP=Weaving single amplitude is selected from the table in part 2
of this Explanation, the following tag can be added or omitted after the tag
FREQ=Weaving frequency is selected from the table in part 3 of this
Explanation.

No	Tag	Explanation	Note
5	ANGL=Weaving angle	Specify the weaving angle.	Angle: 0.1 deg. to 180.0 deg. Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1 deg.)

5. DIR=Direction of weaving

The following tag can be added or omitted.
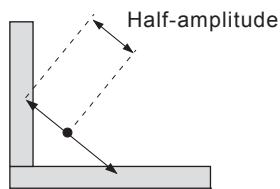
| No	Tag	Explanation	Note

6	DIR=Direction of weaving	Specify the direction of weaving. Refer to the supplement "Weaving conditions".	Direction: 0 or 1
			  0: Forward
			  1: Reversed
			Variable B/I/D/B[]/I[]/D[]/
			LB/LI/LD/LB[]/LI[]/LD[]
			can be used.

Setting conditions for weaving

SUPPLE
-MENT
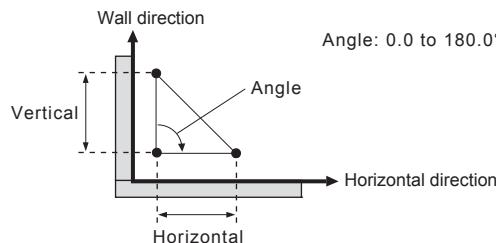
• Weaving half-amplitude
  Specify the amplitude size of weaving motion.

Half-amplitude
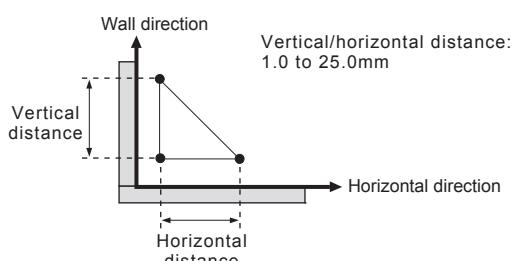
• Weaving angle
  Specify the angle of weaving motion.

Wall direction

Angle

Vertical

Angle: 0.0 to 180.0°

Horizontal direction

Horizontal

MODE: TRIANGLE, L-TYPE

Wall direction

Vertical
distance

Vertical/horizontal distance:
1.0 to 25.0mm

Horizontal direction

Horizontal
distance
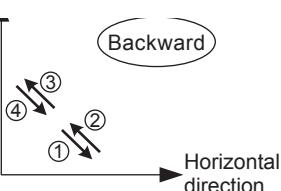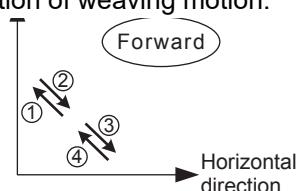
MODE: TRIANGLE, L-TYPE
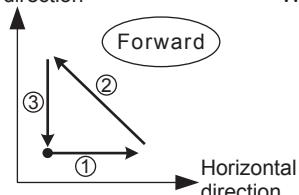
• Starting direction of weaving
  Specify the starting direction of weaving motion.

SINGLE

Forward

② ① ③ ④

Horizontal
direction

Backward

③ ④ ② ①

Horizontal
direction
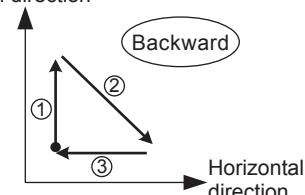
TRIANGLE

Wall direction
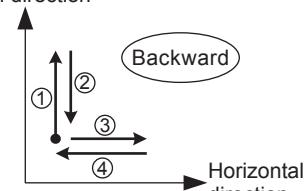
Forward

③ ② ①

Horizontal
direction

Wall direction

Backward

① ② ③

Horizontal
direction

L-TYPE

Wall direction

Forward

④ ③ ② ①

Horizontal
direction

Wall direction

Backward

① ② ③ ④

Horizontal
direction

ELLIPSE

Forward

③ ② ① ④ ⑤

Travel
direction

Horizontal
direction

Reverse

④ ⑤ ① ③ ②

Travel
direction

Horizontal
direction
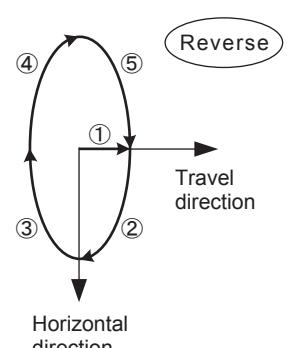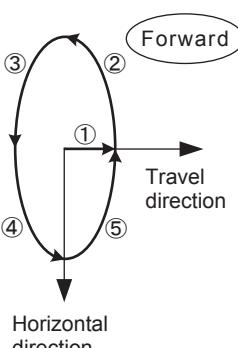
> SUPPLE-MENT
> For details of the weaving condition file number, refer to the YRC1000micro OPERATOR'S MANUAL(RE-CSO-A058).
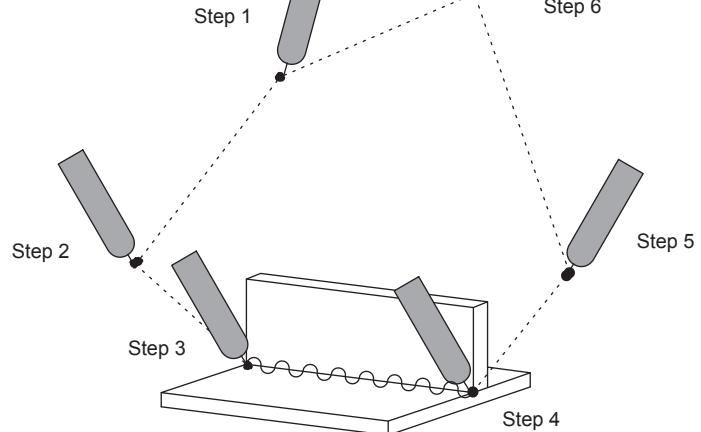
Example

(1) WVON WEV#(1) DIR=1
Weaving starts with the conditions specified in the weaving condition file.

(2) NOP
　　MOVJ VJ=50.00   ♦♦♦ Step 1
　　MOVL V=220   ♦♦♦ Step 2
　　MOVL V=200   ♦♦♦ Step 3
　　WVON AMP=5.0 FREQ=3.0 ANGL40.0   ♦♦♦ Weaving starts
　　TOOLON   ♦♦♦ Operation starts
　　MOVL V=138   ♦♦♦ Step 4
　　TOOLOF   ♦♦♦ Operation ends
　　WVOF   ♦♦♦ Weaving ends
　　MOVL V=200   ♦♦♦ Step 5
　　MOVJ VJ=50.00   ♦♦♦ Step 6
　　END

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WVOF

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Material handling, press tending, cutting, and other applications

Function

Ends weaving operation.

Syntax

The tags to be added differ depending on the control group in the job.

Table 2-21: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Coordinated	Two manipulators.	The coordinated operation function (option). This function can be specified only when it's effective.

Table 2-22: Availability of Each Tag

No	Tag	Control Group (manipulator)		Note
		1	2	
1	RBn	×	●	

●: Available
×: Not available
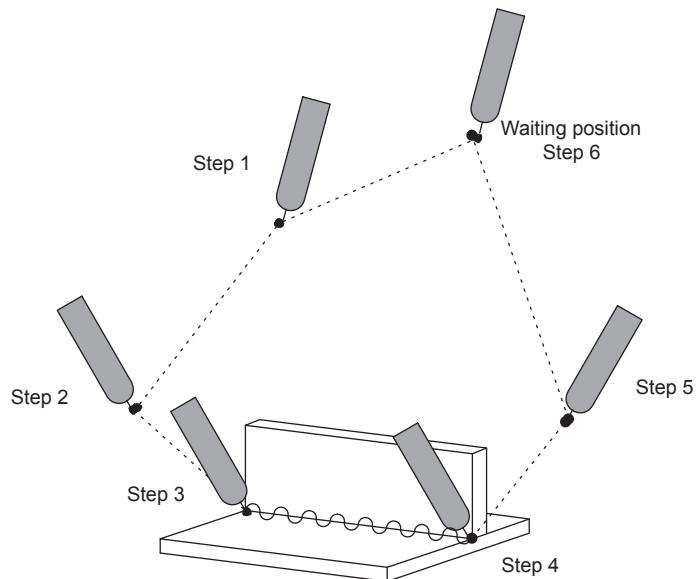
Explanation

1. RBn

Choose the following tag when two manipulators are used.

No	Tag	Explanation	Note
1	RBn	Specify the robot (manipulator) which ends the weaving operation.	n: 1 to 2 RB1: Robot 1

Example

```
(1)  NOP
     MOVJ VJ=50.00              ♦♦♦ Step 1
     MOVL V=220                 ♦♦♦ Step 2
     MOVL V=200                 ♦♦♦ Step 3
     WVON WEV#(2)               ♦♦♦ Weaving starts
     TOOLON                     ♦♦♦ Operation starts
     MOVL V=138                 ♦♦♦ Step 4
     TOOLOF                     ♦♦♦ Operation ends
     WVOF                       ♦♦♦ Weaving ends
     MOVL V=200                 ♦♦♦ Step 5
     MOVJ VJ=50.00              ♦♦♦ Step 6
     END
```
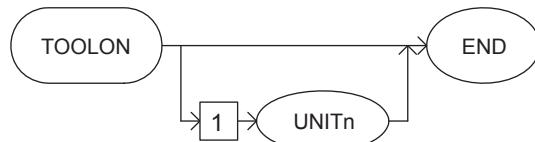
TOOLON

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Material handling, press tending, cutting, and other applications

Function

Turns ON the work instruction.

Syntax

Explanation

1. UNITn

Choose one of the units. These tags are valid for a system with multiple applications in which two applications are used for material handling, press tending, cutting, or other applications.
These tags are not shown when there is only one application.

No	Tag	Explanation	Note
1	UNITn	Specify the unit.	n: 1 to 2 UNIT1: UNIT1

Example

(1) TOOLON

Turns ON the work instruction.
Turns ON the work start instruction (dedicated output relay #51530) and waits for the work start response (dedicated input relay #41130). When the work start response is turned ON, the next instruction is carried out.
The work start response relay is designed to turn ON immediately after the output of the work start instruction.
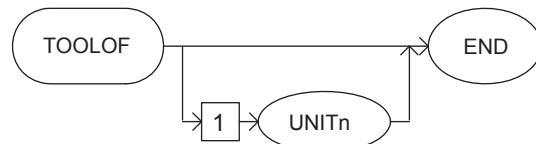
TOOLOF

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Material handling, press tending, cutting, and other applications

Function

Turns OFF the work instruction.

Syntax

Explanation

1. UNITn

Choose one of the units. These tags are valid for a system with multiple
applications in which two applications are used for material handling,
press tending, cutting, and other applications.
These tags are not shown when there is only one application.

No	Tag	Explanation	Note
1	UNITn	Specify the Unit.	n: 1 to 2 UNIT1: UNIT1

Example

(1) TOOLOF

Turns OFF the work instruction.
Turns ON the work end instruction (dedicated output relay
#51531) and waits for the work end response (dedicated input
relay #41131). When the work end response is turned ON, the
next instruction is carried out.
The work end response relay is designed to turn ON immediately
after the output of the work end instruction.

YRC1000micro OPTIONS
INSTRUCTIONS

FOR INFORM LANGUAGE

YASKAWA

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