

# PMC Function Library (PMC axis control)

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# 1 Overview

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This document describes the specifications of PMC Function Library for PMC axis control, and how to integrate its functions.

PMC axis control is a function that controls any axis, which is independent from control of CNC, using PMC signals. A PMC axis can move independently from other axes under control of CNC, and can be used for controlling peripheral devices such as turrets, palettes, and index tables. Sample programs using functional instruction AXCTL are provided to help your programming to control PMC axis.

This library provides function blocks that can be integrated to your ladder program by FANUC LADDER-III.

## 2 Applicable PMC models

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This library can be used for the PMC models listed below:

### Applicable PMC models

Series 30i/31i/32i -MODEL B PMC
Series 35i -MODEL B PMC
Series 30i/31i/32i -MODEL A PMC
Series 32i -MODEL A PMC/L
Series 0i -MODEL F PMC
Series 0i -MODEL D PMC
Series 0i -MODEL D PMC/L
Series 0i Mate-MODEL D PMC/L
Power Motion <i>i</i> -MODEL A PMC

# 3

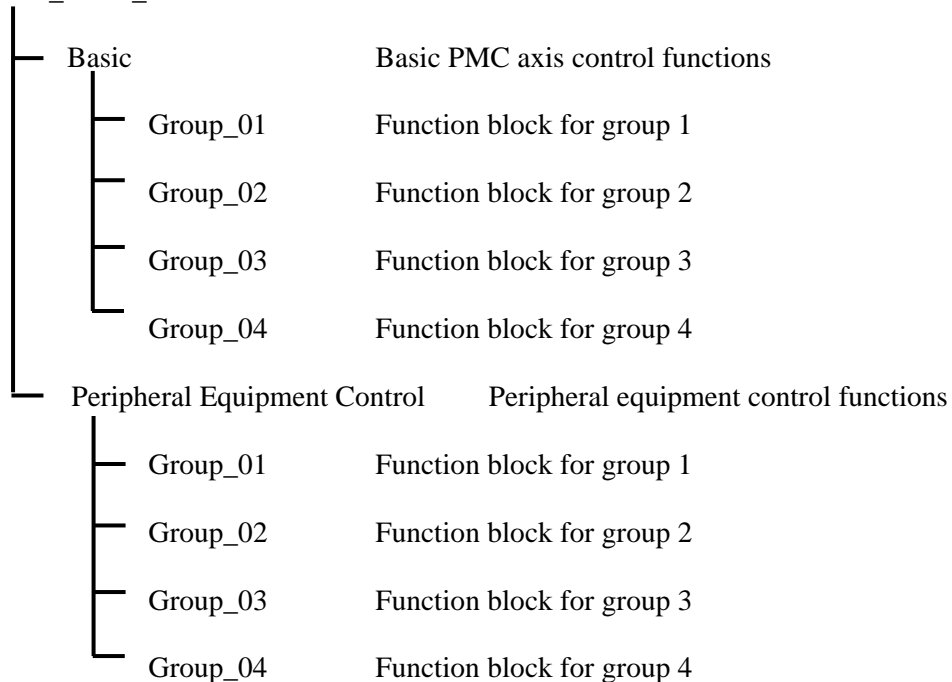
## PMC Function Library for PMC Axis Control

PMC Function Library is a function block library which provides sample programs for PMC axis control.

Library name :        PMC\_AXIS\_CONTROL.FLL

This library contains function blocks of basic PMC axis control functions for each PMC axis control command, and ones of peripheral equipment control, using each group from 1 to 4.

### PMC\_AXIS\_CONTROL.FLL



### Note

- 1 The option "Function Block function" is required to use function block function.
- 2 The option "Axis control by PMC" is required to use PMC axis control function.
- 3 For more details, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC model.

## 3.1 List of function blocks for PMC axis control

PMC\_AXIS\_CONTROL.FLL contains two types of function block:

- Function blocks of basic PMC axis control functions for each PMC axis control command
- Function blocks of peripheral equipment control

### 3.1.1 List of Function blocks of basic PMC axis control functions

The function blocks of basic PMC axis control functions for each PMC axis control command are listed below:

Table 3.1.1 List of function blocks

No.	Function block name	Size of instance	Description
1	PFL0_PMC_AXCTL_01 PFL0_PMC_AXCTL_02 PFL0_PMC_AXCTL_03 PFL0_PMC_AXCTL_04	20 byte	Executes PMC axis control by functional instruction AXCTL (SUB 53) with specified control command.
2	PFL0_RAPID_TRAVERSE_01 PFL0_RAPID_TRAVERSE_02 PFL0_RAPID_TRAVERSE_03 PFL0_RAPID_TRAVERSE_04	34 byte	Executes rapid traverse (axis control command: 00H) (the same action as "G00" of CNC)
3	PFL0_CUTTING_FEED_PER_MIN_01 PFL0_CUTTING_FEED_PER_MIN_02 PFL0_CUTTING_FEED_PER_MIN_03 PFL0_CUTTING_FEED_PER_MIN_04	34 byte	Executes cutting feed - feed per minute (axis control command: 01H) (the same action as "G94 G01" of CNC)
4	PFL0_CUTTING_FEED_PER_REV_01 PFL0_CUTTING_FEED_PER_REV_02 PFL0_CUTTING_FEED_PER_REV_03 PFL0_CUTTING_FEED_PER_REV_04	34 byte	Executes cutting feed - feed per revolution (axis control command: 02H) (the same action as "G95 G01" of CNC)
5	PFL0_SKIP_BY_FEED_PER_MIN_01 PFL0_SKIP_BY_FEED_PER_MIN_02 PFL0_SKIP_BY_FEED_PER_MIN_03 PFL0_SKIP_BY_FEED_PER_MIN_04	34 byte	Executes skip - feed per minute (axis control command: 03H) (the same action as "G31 G01" of CNC)
6	PFL0_DWELL_01 PFL0_DWELL_02 PFL0_DWELL_03 PFL0_DWELL_04	30 byte	Executes dwell (axis control command: 04H) (the same action as "G04" of CNC)
7	PFL0_REF_POS_RETURN_01 PFL0_REF_POS_RETURN_02 PFL0_REF_POS_RETURN_03 PFL0_REF_POS_RETURN_04	26 byte	Executes reference position return (axis control command: 05H)
8	PFL0_CONTINUOUS_FEED_01 PFL0_CONTINUOUS_FEED_02 PFL0_CONTINUOUS_FEED_03 PFL0_CONTINUOUS_FEED_04	30 byte	Executes continuous feed in one direction (axis control command: 06H) (the same action as continuous feed in JOG mode of CNC)
9	PFL0_1ST_REF_POS_RETURN_01 PFL0_1ST_REF_POS_RETURN_02 PFL0_1ST_REF_POS_RETURN_03 PFL0_1ST_REF_POS_RETURN_04	26 byte	Executes the first reference position return via intermediate position (axis control command: 07H) (the same action as "G28" of CNC, which execute reference position return from intermediate position)
10	PFL0_2ND_REF_POS_RETURN_01 PFL0_2ND_REF_POS_RETURN_02 PFL0_2ND_REF_POS_RETURN_03 PFL0_2ND_REF_POS_RETURN_04	26 byte	Executes the second reference position return via intermediate position (axis control command: 08H) (the same action as "G28 P2" of CNC, which execute reference position return from intermediate position)
11	PFL0_3RD_REF_POS_RETURN_01 PFL0_3RD_REF_POS_RETURN_02 PFL0_3RD_REF_POS_RETURN_03 PFL0_3RD_REF_POS_RETURN_04	26 byte	Executes the third reference position return via intermediate position (axis control command: 09H) (the same action as "G28 P3" of CNC, which execute reference position return from intermediate position)



No.	Function block name	Size of instance	Description
12	PFL0_4TH_REF_POS_RETURN_01 PFL0_4TH_REF_POS_RETURN_02 PFL0_4TH_REF_POS_RETURN_03 PFL0_4TH_REF_POS_RETURN_04	26 byte	Executes the fourth reference position return via intermediate position (axis control command: 0AH) (the same action as "G28 P4" of CNC, which execute reference position return from intermediate position)
13	PFL0_EXT_PLS_SYNC_POS_CODER_01 PFL0_EXT_PLS_SYNC_POS_CODER_02 PFL0_EXT_PLS_SYNC_POS_CODER_03 PFL0_EXT_PLS_SYNC_POS_CODER_04	32 byte	Executes synchronous operation with position coder (axis control command: 0BH)
14	PFL0_EXT_PLS_SYNC_1ST_HNDL_01 PFL0_EXT_PLS_SYNC_1ST_HNDL_02 PFL0_EXT_PLS_SYNC_1ST_HNDL_03 PFL0_EXT_PLS_SYNC_1ST_HNDL_04	26 byte	Executes synchronous operation with the first manual handle (axis control command: 0DH)
15	PFL0_EXT_PLS_SYNC_2ND_HNDL_01 PFL0_EXT_PLS_SYNC_2ND_HNDL_02 PFL0_EXT_PLS_SYNC_2ND_HNDL_03 PFL0_EXT_PLS_SYNC_2ND_HNDL_04	26 byte	Executes synchronous operation with the second manual handle (axis control command: 0EH)
16	PFL0_EXT_PLS_SYNC_3RD_HNDL_01 PFL0_EXT_PLS_SYNC_3RD_HNDL_02 PFL0_EXT_PLS_SYNC_3RD_HNDL_03 PFL0_EXT_PLS_SYNC_3RD_HNDL_04	26 byte	Executes synchronous operation with the third manual handle (axis control command: 0FH)
17	PFL0_SPEED_COMMAND_01 PFL0_SPEED_COMMAND_02 PFL0_SPEED_COMMAND_03 PFL0_SPEED_COMMAND_04	26 byte	Executes continuous feed of rotary axis by speed command (axis control command: 10H)
18	PFL0_TORQUE_CONTROL_01 PFL0_TORQUE_CONTROL_02 PFL0_TORQUE_CONTROL_03 PFL0_TORQUE_CONTROL_04	34 byte	Executes continuous feed by torque control (axis control command: 11H)
19	PFL0_AUXILIARY_FUNCTION1_01 PFL0_AUXILIARY_FUNCTION1_02 PFL0_AUXILIARY_FUNCTION1_03 PFL0_AUXILIARY_FUNCTION1_04	28 byte	Executes the same action as auxiliary function (M code function) of CNC (axis control command: 12H)
20	PFL0_AUXILIARY_FUNCTION2_01 PFL0_AUXILIARY_FUNCTION2_02 PFL0_AUXILIARY_FUNCTION2_03 PFL0_AUXILIARY_FUNCTION2_04	28 byte	Executes the same action as auxiliary function (M code function) of CNC (axis control command: 14H)
21	PFL0_AUXILIARY_FUNCTION3_01 PFL0_AUXILIARY_FUNCTION3_02 PFL0_AUXILIARY_FUNCTION3_03 PFL0_AUXILIARY_FUNCTION3_04	28 byte	Executes the same action as auxiliary function (M code function) of CNC (axis control command: 15H)
22	PFL0_MACHINE_POS_SELECT_01 PFL0_MACHINE_POS_SELECT_02 PFL0_MACHINE_POS_SELECT_03 PFL0_MACHINE_POS_SELECT_04	34 byte	Executes rapid traverse to specified absolute position in the machine coordinate system (axis control command: 20H) (the same action as "G53" of CNC)
23	PFL0_CUTTING_FEED_SEC_BLK_01 PFL0_CUTTING_FEED_SEC_BLK_02 PFL0_CUTTING_FEED_SEC_BLK_03 PFL0_CUTTING_FEED_SEC_BLK_04	34 byte	Executes cutting feed for specified period of time (axis control command: 21H)
24	PFL0_PMC_AXCTL_RESET_01 PFL0_PMC_AXCTL_RESET_02 PFL0_PMC_AXCTL_RESET_03 PFL0_PMC_AXCTL_RESET_04	2 byte	Resets PMC axis control command in action or suspended in buffer

**Note**

- 1 Function blocks for PMC axis control are provided as samples for each of the group 1 to 4. Their names have a number 01-04 at the tail, which indicates the group they use.
- 2 Function blocks of No.2 to 24 uses the function block of No.1 inside them to perform PMC axis control.
- 3 Size of instance is the data size in byte that each instance of the function block occupies.
- 4 The option “Manual handle feed 1-unit” is required to use the first manual handle device.
- 5 The option “Manual handle feed 2/3-units” is required to use the second or the third manual handle device.

### 3.1.2 List of Function blocks of peripheral equipment control

The function blocks of peripheral equipment control are listed below:

**Table 3.1.2 List of function blocks**

No.	Function block name	Size of instance	Description
1	PFL1_JOG_OPERATION_01 PFL1_JOG_OPERATION_02 PFL1_JOG_OPERATION_03 PFL1_JOG_OPERATION_04	37 byte	Jog operation Move axis in positive or negative direction at the specified speed.
2	PFL1_ATC_TURRET_CNTL_AUTO_01 PFL1_ATC_TURRET_CNTL_AUTO_02 PFL1_ATC_TURRET_CNTL_AUTO_03 PFL1_ATC_TURRET_CNTL_AUTO_04	125 byte	ATC/Turret control – Automatic operation Move axis to the position of the specified turret/magazine number in the specified direction; shorter, positive, negative.
3	PFL1_ATC_TURRET_CNTL_PITCH_01 PFL1_ATC_TURRET_CNTL_PITCH_02 PFL1_ATC_TURRET_CNTL_PITCH_03 PFL1_ATC_TURRET_CNTL_PITCH_04	131 byte	ATC/Turret control – 1-pitch rotation Move axis to the next position from the current turret/magazine number in the positive or negative direction.
4	PFL1_POINT_POSITIONING_LA_01 PFL1_POINT_POSITIONING_LA_02 PFL1_POINT_POSITIONING_LA_03 PFL1_POINT_POSITIONING_LA_04	99 byte	Point positioning (linear axis) Move to the absolute position of the specified point number in the point data table.
5	PFL1_POINT_POSITIONING_RA_01 PFL1_POINT_POSITIONING_RA_02 PFL1_POINT_POSITIONING_RA_03 PFL1_POINT_POSITIONING_RA_04	107 byte	Point positioning (rotary axis) Move to the absolute position of the specified point number in the point data table.
6	PFL1_REF_POS_RETURN_POS_NUM_01 PFL1_REF_POS_RETURN_POS_NUM_02 PFL1_REF_POS_RETURN_POS_NUM_03 PFL1_REF_POS_RETURN_POS_NUM_04	33 byte	Reference position return – reference position number Perform reference position return to the reference position of the specified number; 1 to 4.
7	PFL1_REF_POS_RETURN_SET_01 PFL1_REF_POS_RETURN_SET_02 PFL1_REF_POS_RETURN_SET_03 PFL1_REF_POS_RETURN_SET_04	31 byte	Reference position return – reference position setting Perform reference position return.
8	PFL1_POSITIONING_ABS_LA_01 PFL1_POSITIONING_ABS_LA_02 PFL1_POSITIONING_ABS_LA_03 PFL1_POSITIONING_ABS_LA_04	85 byte	Positioning – absolute specification (linear axis) Move axis to the specified absolute position.
9	PFL1_POSITIONING_ABS_RA_01 PFL1_POSITIONING_ABS_RA_02 PFL1_POSITIONING_ABS_RA_03 PFL1_POSITIONING_ABS_RA_04	93 byte	Positioning – absolute specification (rotary axis) Move axis to the specified absolute position.
10	PFL1_POSITIONING_INC_01 PFL1_POSITIONING_INC_02 PFL1_POSITIONING_INC_03 PFL1_POSITIONING_INC_04	43 byte	Positioning – incremental specification Move axis for the specified distance.
11	PFL1_SPEED_CONTROL_01 PFL1_SPEED_CONTROL_02 PFL1_SPEED_CONTROL_03 PFL1_SPEED_CONTROL_04	57 byte	Speed control Perform continuous feed of rotary axis at the specified speed. This command can also change the speed of moving axis, or can stop it.

No.	Function block name	Size of instance	Description
12	PFL1_POSITIONING_SKIP_ABS_LA_01 PFL1_POSITIONING_SKIP_ABS_LA_02 PFL1_POSITIONING_SKIP_ABS_LA_03 PFL1_POSITIONING_SKIP_ABS_LA_04	85 byte	Positioning (Skip) – absolute specification (linear axis) Move axis to the specified absolute position. If the skip signal is detected while the axis moves, the axis stops immediately.
13	PFL1_POSITIONING_SKIP_ABS_RA_01 PFL1_POSITIONING_SKIP_ABS_RA_02 PFL1_POSITIONING_SKIP_ABS_RA_03 PFL1_POSITIONING_SKIP_ABS_RA_04	93 byte	Positioning (Skip) – absolute specification (rotary axis) Move axis to the specified absolute position. If the skip signal is detected while the axis moves, the axis stops immediately.
14	PFL1_POSITIONING_SKIP_INC_01 PFL1_POSITIONING_SKIP_INC_02 PFL1_POSITIONING_SKIP_INC_03 PFL1_POSITIONING_SKIP_INC_04	43 byte	Positioning (Skip) – incremental specification Move axis for the specified distance. If the skip signal is detected while the axis moves, the axis stops immediately.
15	PFL1_DATA_SETTING_BY_TEACH_01 PFL1_DATA_SETTING_BY_TEACH_02 PFL1_DATA_SETTING_BY_TEACH_03 PFL1_DATA_SETTING_BY_TEACH_04	93 byte	Data setting by teaching Set the current absolute position as the position of the specified point in the point data table.

### Note

- 1 Function blocks for PMC axis control are provided as samples for each of the group 1 to 4. Their names have a number 01-04 at the tail, which indicates the group they use.
- 2 Size of instance is the data size in byte that each instance of each the function block occupies.

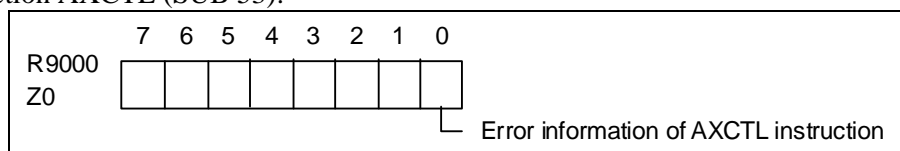
## 3.2 Definition of symbols for external variables

The function blocks for PMC axis control in the library PMC\_AXIS\_CONTROL.FLL uses the following signals as external variables. You have to define these global symbols before you use these function blocks.

- Error signal of axis control operation
- Reset signal for axis control command

### 3.2.1 Error signal of axis control operation

Each function blocks internally refers to the signal of the following address to check the error information of the functional instruction AXCTL (SUB 53):



The following global symbol needs to be defined to the error information address above:

Symbol name of error information	type	Address	
		Memory type A, B	Memory type C, D
ERR_AXIS_GRP_NO	BOOL	R9000.0	Z0.0

### 3.2.2 Reset signal for axis control command

The function blocks to reset PMC axis control, such as PFL0\_PMC\_AXCTL\_RESET\_01, enables the PMC axis control in action or suspended in buffer to be reset and cleared

The following reset signals, which these function blocks refer, shall assigned to some actual address. You have to define the following global symbols as the reset signal of the group you use.

Symbol name for reset signal	type	Address	Note
GRP_AXCTL_RST_01	BOOL	any address	for group 1
GRP_AXCTL_RST_02			for group 2
GRP_AXCTL_RST_03			for group 3
GRP_AXCTL_RST_04			for group 4

These signals are usually assigned to the address of R area, or you can use automatic address assignment function to assign their addresses.

## 3.3 CNC parameters

The function blocks in this library uses PMC axis control function, which requires the following CNC parameter to be properly set before you use the function blocks.

For the CNC parameters related to each function block, please refer to the following detailed explanations of each function.

**Table 3.3 (a) Related CNC parameters**

CNC parameter	Value	Description
No.8010	Group number	Choose the DI/DO group of PMC axis control for each axis. Valid range of the group number is 1 to 40.

### Note

- 1 For details of CNC parameter related to PMC axis control, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Setting 1 to CNC parameter EAC (No.3137#7) enables PMC axis status display screen, on which you can check the status of PMC axis control function.

## 3.4 Signals for PMC axis control function

### 3.4.1 Signals handled by function blocks for PMC axis control

The function blocks for PMC axis control use functional instruction AXCTL (SUB 53), which uses the following signals related to PMC axis control function.

Therefore, the function blocks for PMC axis control will not work properly if these signals have been disturbed. Please do not write these signals from your ladder program.

**Table 3.4.1 (a) Signals related to PMC Function Library for PMC axis control**

Signal name	Symbol	Address (group 1)	Description
Axis control command signal	EC0g~EC6g	G143.0 – G143.6	A part of axis control block data signals.
Axis control feedrate signal	EIF0g~EIF15g	G144 – G145	A part of axis control block data signals.
Axis control data signal	EID0g~EID31g	G146 – G149	A part of axis control block data signals.
Axis control command read signal	EBUFg	G142.7	Signal to direct CNC to read a command data block of PMC axis control.
Axis control command read completion signals	EBSYg	F130.7	Signal to notify that CNC has read a command data block of PMC axis control and has stored it into the input buffer.
Reset signal	ECLRg	G142.6	Signal to reset PMC axis control command.

### Note

Table above describes the address for group 1 only. For the addresses of other groups, please refer to "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 3.4.2 Signals for PMC axis control function handled by ladder program

The signals related to PMC axis control, other than introduced in “3.4.1 Signals handled by function blocks for PMC axis control”, shall be handled by ladder program.

The following table lists the main signals that shall be handled by ladder program. There are some more signals related to PMC axis control, which may be controlled by ladder program if necessary.

**Table 3.4.2 (b) Main PMC axis control signals controlled by ladder program**

Signal name	Symbol	Address (group 1)	Description
Controlled axis selection signals	EAX1~EAX8	G136.0~G136.7	Signal to enable PMC axis control (Note 1)
Axis control temporary stop signal	ESTPg	G142.5	Signal to stop the axis temporarily before completion of a block. (Note 2)
Block stop signal	ESBKg	G142.3	Signal to stop command processing after completion of current command. (Note 2)
Block stop disable signal	EMSBKg	G143.7	Signal to disable ESKBg signal. (Note 2)
Servo-off signal	ESOFg	G142.4	Signal to switch to servo-off state. (Note 2)
Buffering disable signal	EMBUFg	G142.2	Signal to disable buffering of commands. (Note 2)
Control axis selection status signal	*EAXSL	F129.7	Signal to notify if PMC axis control is active. (Note 3)
Feedrate override signals	*EFOV0g~ *EFOV7g	G151	Signals of cutting override. (Note 2)
Override cancellation signal	EOVCg	G150.5	Signal to disable override. (Note 2)
Rapid traverse override signals	EROV1, EROV2	G150.0, G150.1	Signals of rapid traverse override. (Note 3)
Dry run signal	EDRN	G150.7	Signal to apply dry run. (Note 3)
Manual rapid traverse selection signal	ERT	G150.6	Signal to select dry run or rapid traverse. (Note 3)
Skip signal	ESKIP	X4.6	Signal to apply skip. (Note 3)

### Note

- 1 Only the signals of first axis to eighth axis are described.
- 2 Only the signal of group 1 is described.
- 3 Only the signal of first path is described.
- 4 For the details of each signal, or for related signals that are not listed in the table above, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 3.5 How to use PMC Function Library

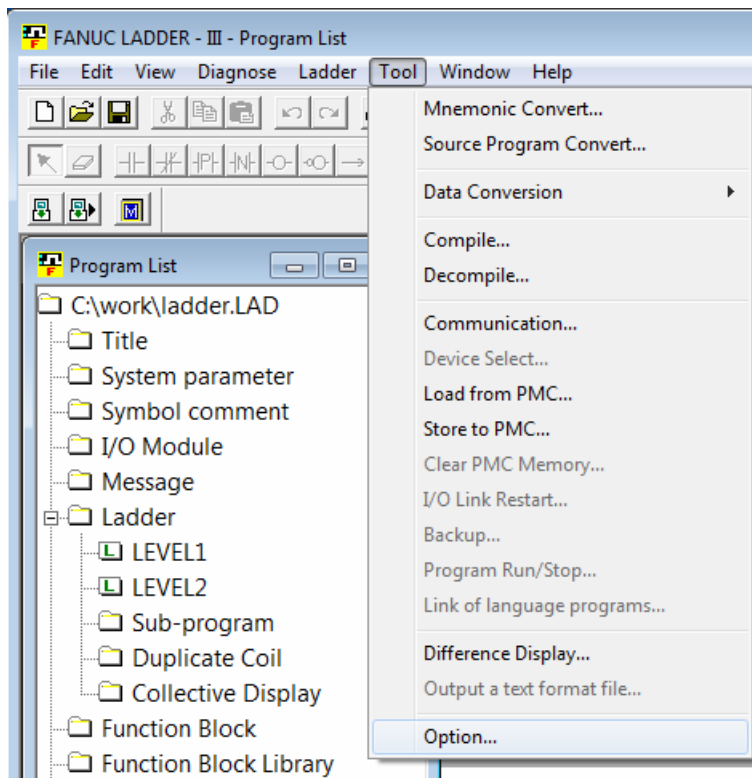
PMC Function Library for PMC axis control is provided as a function block library.

This library is contained in the installation CD of FANUC LADDER-III, with the name

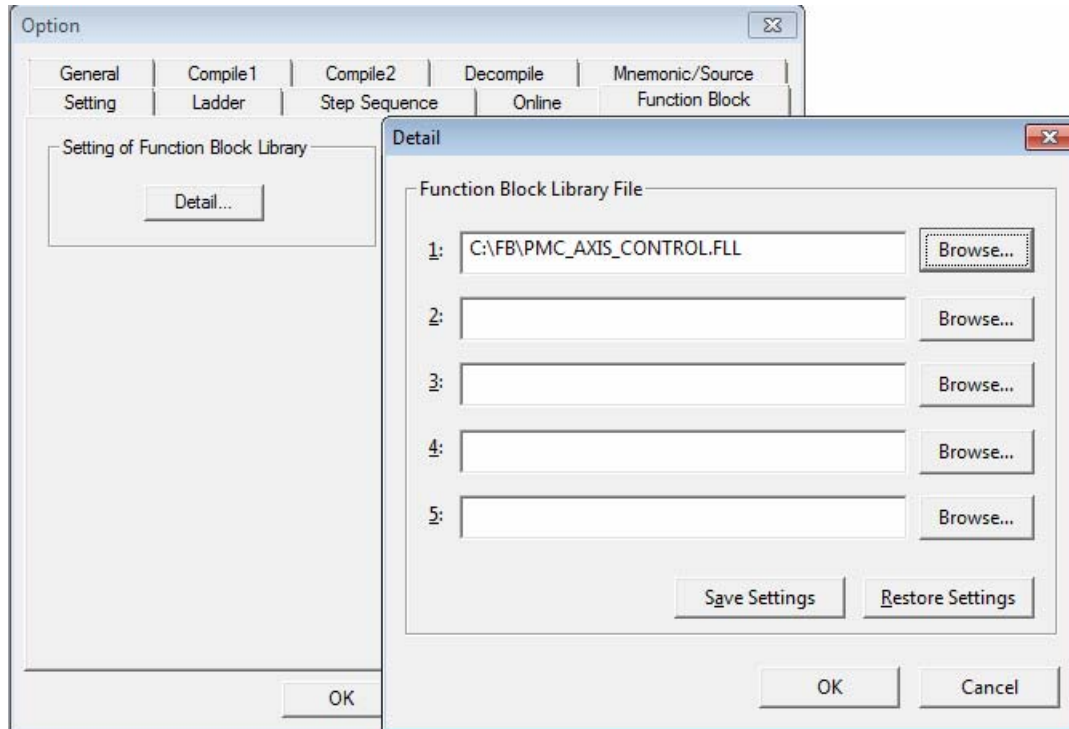
“PMC\_AXIS\_CONTROL.FLL”. You can copy the file to your hard disk drive or network drive to use it.

The function blocks in this library can be integrated to your ladder program by the following steps:

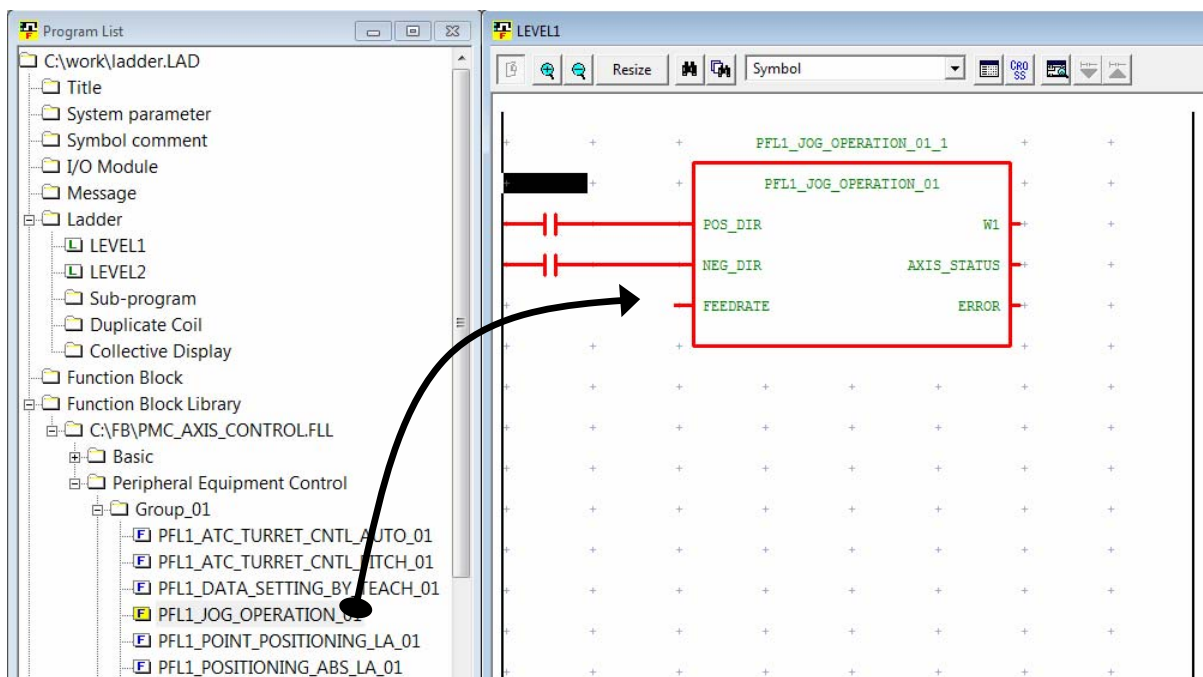
- 1) Open your ladder program, or create a new program, into which the function block will be integrated.
  - 2) Set “PMC\_AXIS\_CONTROL.FLL” as a function block library to be referred by the ladder program.
  - 3) After function blocks are displayed in the program list, drag & drop a function block you use.
  - 4) Connect proper signals and circuits to the input and output of the function block.
- 
- 1) Open or create a ladder program to use the function blocks
    - On FANUC LADDER-III, open a ladder program that support function block.
  - 2) Set “PMC\_AXIS\_CONTROL.FLL” as a function block library.
    - Select “Option” in the “Tool” menu.



- Press “Detail” button in “Function Block” tab, and enter the path of the PMC Function Library file “PMC\_AXIS\_CONTROL.FLL”.

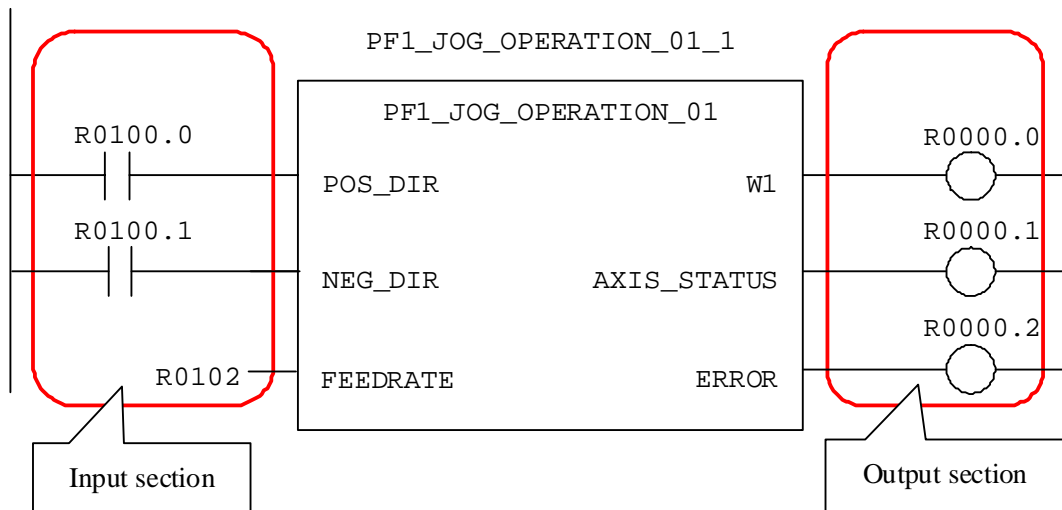


- 3) Drag & drop a function block in the program list onto the ladder edit window.
  - After the registered library is displayed under “Function Block Library” in the program list, drag & drop the function block you use at the proper place.





- 4) Connect proper signals and circuits to the input and output of the function block.
- Connect proper signals to the input and output parameters to complete as a ladder circuit.



**Figure 3.5 (a) Sample FB**

# 4

## Function blocks of basic PMC axis control

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This chapter describes the usage of the function blocks of basic PMC axis control functions provided by PMC Function Library for PMC axis control (PMC\_AXIS\_CONTROL.FLL).

### 4.1 Axis control command

---

#### 4.1.1 Function block name

---

PFL0_PMC_AXCTL_01	.....	Axis control command (group 1)
PFL0_PMC_AXCTL_02	.....	Axis control command (group 2)
PFL0_PMC_AXCTL_03	.....	Axis control command (group 3)
PFL0_PMC_AXCTL_04	.....	Axis control command (group 4)

#### 4.1.2 Function

---

This function block executes the specified axis control command of PMC axis control function by functional instruction AXCTL (SUB 53). Control command, command data 1, and command data 2 are required as input parameters.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

Control command, command data 1, and command data 2 will be passed to functional instruction AXCTL (SUB 53). For the detail of these parameters, please refer to the section "4.11.5 AXCTL (Axis Control by PMC: SUB 53)" in the chapter "4. LADDER LANGUAGE" in "PMC PROGRAMMING MANUAL" of the PMC on your CNC.

### 4.1.3 Format

Graphical format of PFL0\_PMC\_AXCTL\_01 is shown below:

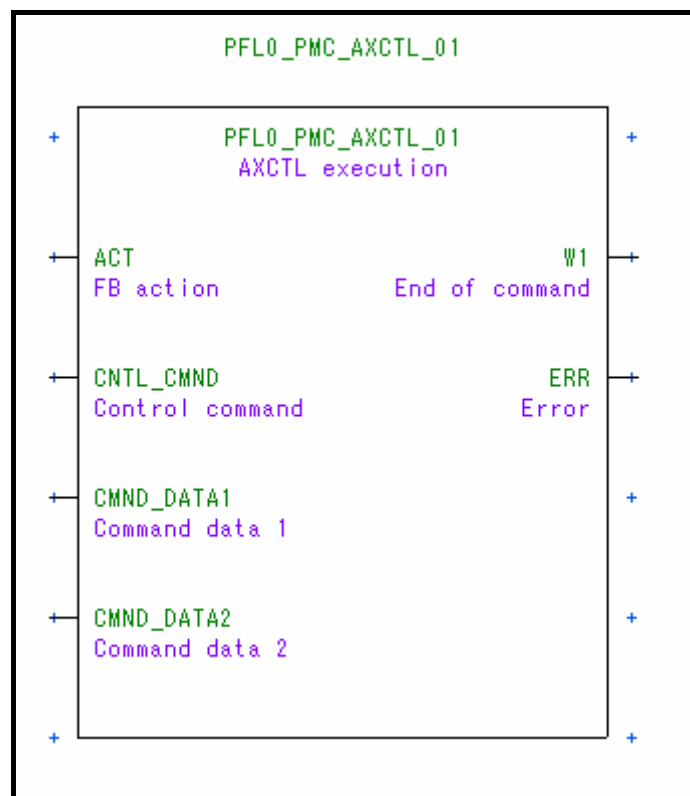


Figure 4.1.3 (a) PFL0\_PMC\_AXCTL\_01 (group 1)

## 4.1.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.1.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute PMC axis control. 1: Execute PMC axis control. (Note 1)
CNTL_CMND	Input parameter	BYTE	1	Axis control command Specify axis control command to execute. (Note 2)
CMND_DATA1	Input parameter	WORD	1	Command data 1 Specify command data 1 for axis control. Meaning of this data differs depending on the axis command; feedrate for example. (Note 2)
CMND_DATA2	Input parameter	DWORD	1	Command data 2 Specify command data 2 for axis control. Meaning of this data differs depending on the axis command; total distance for example. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 For the detail of "Control command", "Command data 1", and "Command data 2" parameters, please refer to the section "4.11.5 AXCTL (Axis Control by PMC: SUB 53)" in the chapter "4. LADDER LANGUAGE" in "PMC PROGRAMMING MANUAL" of the PMC on your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.1.5 External variables

This function block uses the following external variables:

**Table 4.1.5 (a) List of external variables**

Symbol	Data type	Count	Description
ERR_AXIS_GRP_NO	BOOL	-	Error signal of functional instruction AXCTL (SUB 53) For referring error information of functional instruction AXCTL.
GRP_AXCTL_RST_01	BOOL	-	Reset signal for PMC axis control command Signals to reset control command of the corresponding group. (Note 1)
GRP_AXCTL_RST_02			
GRP_AXCTL_RST_03			
GRP_AXCTL_RST_04			

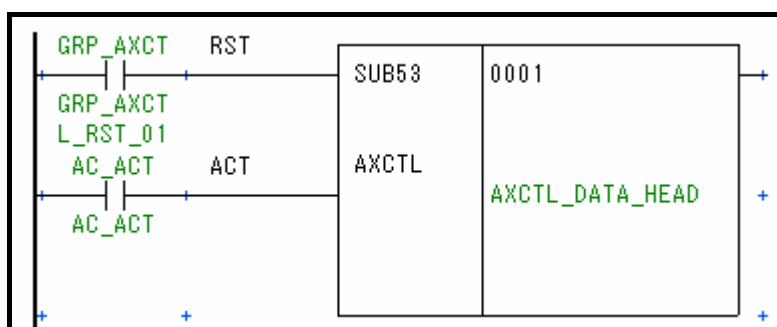
### Note

1 The symbols for group 1 to 4 are listed above. Please define the symbols you will actually use.

## 4.1.6 Creating function blocks for other groups

This function block uses functional instruction AXCTL (SUB 53) internally. The group number of the PMC axis is set to the first parameter of the functional instruction AXCTL.

To create function blocks for group 5 to 40 those are not provided by this library, the first parameter of functional instruction AXCTL inside must be changed to the number that indicates the PMC axis group. Refer to table 4.1.6 (a) for the actual value for the first parameter.



**Table 4.1.6 (a) Values and groups**

Group number	Value
1	1
2	2
3	3
4	4
5	1001
6	1002
7	1003
8	1004
...	
37	9001
38	9002
39	9003
40	9004

Values increase by 1000 for every 4 groups.

e.g.)

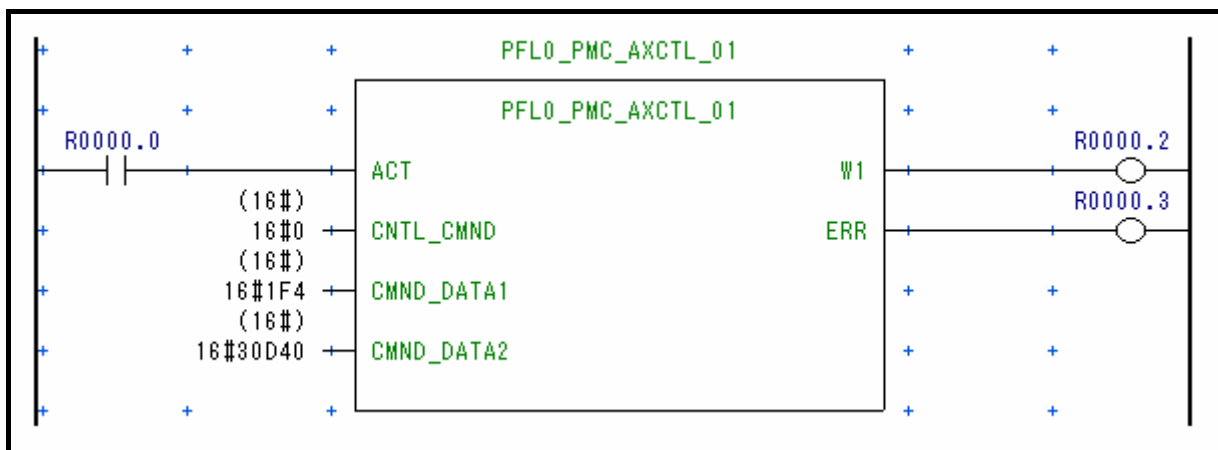
Set "1004" for group 8.

Set "7002" for group 30.

## 4.1.7 Example

The following example is to perform rapid traverse of the first axis (A-axis) of the first path controlled by group 1, at speed 500 mm/min for distance 200 mm.

Function block to use:	PFL0_PMC_AXCTL_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Axis control command (CNTL_CMND):	16#0	command code for rapid traverse; 00H
- Command data 1 (CMND_DATA1):	16#1F4 (500)	rapid traverse feedrate; 500 mm/min
- Command data 2 (CMND_DATA2):	16#30D4 (200000)	distance; 200 mm (unit: metric IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERR):	R0000.3	



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
3. Turn on ACT (R0000.0) (ACT=1) to start rapid traverse of first axis (A-axis).
4. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters; Axis control command, Command data 1, and Command data 2.
- 3 The values of input parameters, CNTL\_CMND, CMND\_DATA1, and CMND\_DATA2, are shown in hexadecimal.

## 4.2 Rapid traverse

### 4.2.1 Function block name

PFL0_RAPID_TRAVERSE_01	.....	Rapid traverse (group 1)
PFL0_RAPID_TRAVERSE_02	.....	Rapid traverse (group 2)
PFL0_RAPID_TRAVERSE_03	.....	Rapid traverse (group 3)
PFL0_RAPID_TRAVERSE_04	.....	Rapid traverse (group 4)

### 4.2.2 Function

This function block executes rapid traverse of the specified PMC axis at the feedrate and total moving distance specified by input parameters. This function block has the same functionality of “G00” of CNC.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.2.3 Format

Graphical format of PFL0\_RAPID\_TRAVERSE\_01 is shown below:

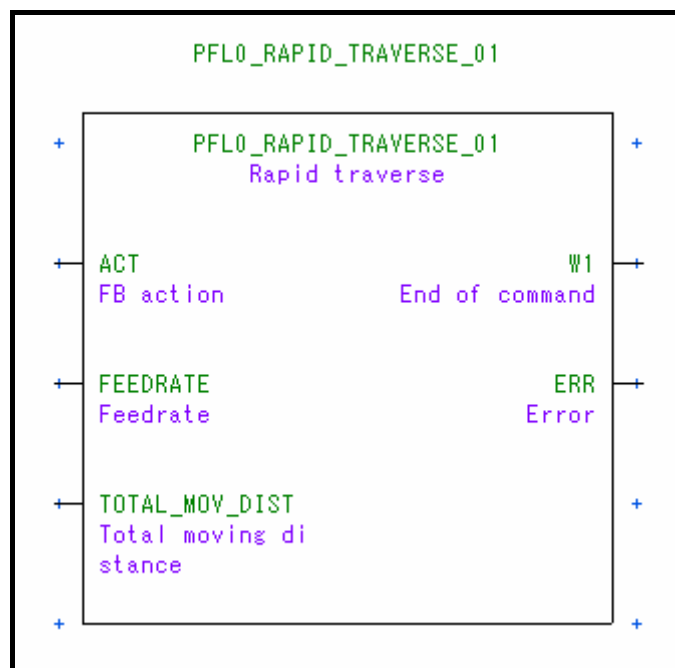


Figure 4.2.3 (a) PFL0\_RAPID\_TRAVERSE\_01 (group 1)

## 4.2.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.2.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute rapid traverse. 1: Execute rapid traverse. (Note 1)
FEEDRATE	Input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. This parameter is enabled by setting "1" to CNC parameter RPD (No.8002#0). (Note 2)
TOTAL_MOV_DIST	Input parameter	DINT	1	Total moving distance Specify the incremental travel amount in the input system unit of the axis. Valid range depends on the unit of data. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.



## 4.2.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.2.5 (a) List of related CNC parameters**

CNC parameter	Description
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
JOV (No.1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 4.2.6 Related signals

The signals related to this function block are listed below:

**Table 4.2.6 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)

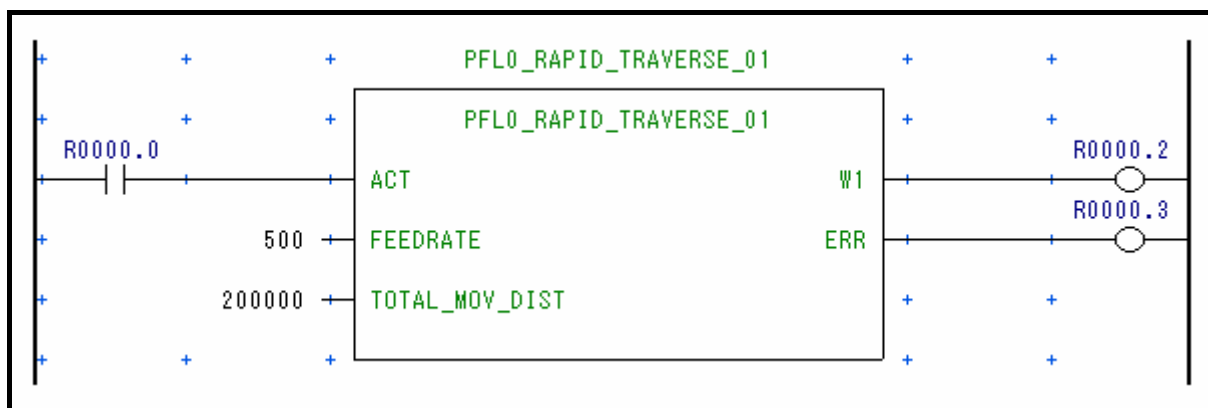
### Note

For details of the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.2.7 Example

The following example is to perform rapid traverse of the first axis (A-axis) of the first path controlled by group 1, at speed 500 mm/min for distance 200 mm.

Function block to use:	PFL0_RAPID_TRAVERSE_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Feedrate (FEEDRATE):	500	rapid traverse feedrate; 500 mm/min
- Total moving distance (TOTAL_MOV_DIST):	200000	distance; 200 mm (unit: metric IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERR):	R0000.3	



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
3. Turn on ACT (R0000.0) (ACT=1) to start rapid traverse of first axis (A-axis).
4. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- 2 Constant number or an address can be specified to the parameters; Rapid traverse feedrate and Total moving distance.

## 4.3 Cutting feed – feed per minute

### 4.3.1 Function block name

PFL0_CUTTING_FEED_PER_MIN_01	.....	Cutting feed - feed per minute (group 1)
PFL0_CUTTING_FEED_PER_MIN_02	.....	Cutting feed - feed per minute (group 2)
PFL0_CUTTING_FEED_PER_MIN_03	.....	Cutting feed - feed per minute (group 3)
PFL0_CUTTING_FEED_PER_MIN_04	.....	Cutting feed - feed per minute (group 4)

### 4.3.2 Function

This function block executes cutting feed (feed per minute) of the specified PMC axis at the feedrate and total moving distance specified by input parameters. This function block has the same functionality of “G94 G01” of CNC.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.3.3 Format

Graphical format of PFL0\_CUTTING\_FEED\_PER\_MIN\_01 is shown below:

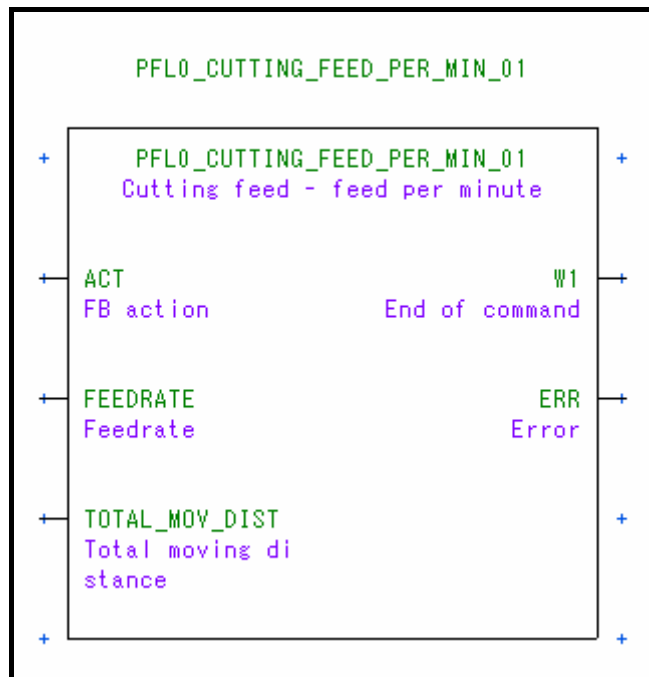


Figure 4.3.3 (a) PFL0\_CUTTING\_FEED\_PER\_MIN\_01 (group 1)

## 4.3.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.3.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute cutting feed – feed per minute. 1: Execute cutting feed – feed per minute. (Note 1)
FEEDRATE	Input parameter	UINT	1	Cutting feedrate Specify the cutting feedrate. Valid range is 1 to 65535. (Note 2)
TOTAL_MOV_DIST	Input parameter	DINT	1	Total moving distance Specify the incremental travel amount in the input system unit of the axis. Valid range depends on the unit of data. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.3.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.3.5 (a) List of related CNC parameters**

CNC parameter	Description
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
JOV (No.1402#1)	Disables jog override.
OVE (No.8001#2)	Selects signals related to dry run and override in PMC axis control.
F10 (No.8002#3)	Selects the least increment of feedrate of cutting feed – feed per minute at PMC axis control.
PF1 (No.8002#4)	Selects the unit of feedrate of cutting feed – feed per minute at PMC axis control.
PF2 (No.8002#5)	
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
EFD (No.8006#4)	Selects the specification unit of feedrate of cutting feed – feed per minute at PMC axis control.

### Note

For details of the CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 4.3.6 Related signals

The signals related to this function block are listed below:

**Table 4.3.6 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)

### Note

For details of the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

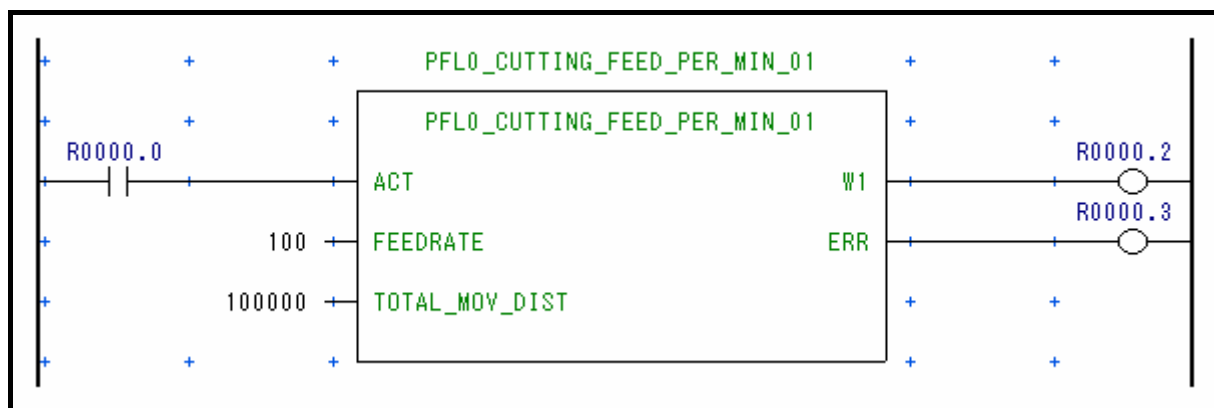
## 4.3.7 Example

The following example is to perform cutting feed of the first axis (A-axis) of the first path controlled by group 1, at speed 100 mm/min for distance 100 mm.

Function block to use: PFL0\_CUTTING\_FEED\_PER\_MIN\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Feedrate (FEEDRATE): 100 cutting feed feedrate; 100 mm/min
- Total moving distance (TOTAL\_MOV\_DIST): 100000 distance; 100 mm (unit: metric IS-B)
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Turn on ACT (R0000.0) (ACT=1) to start cutting feed – feed per minute of first axis (A-axis).
3. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters; Cutting feedrate and Total moving distance.

## 4.4 Cutting feed – feed per revolution

### 4.4.1 Function block name

PFL0_CUTTING_FEED_PER_REV_01	.....	Cutting feed - feed per revolution (group 1)
PFL0_CUTTING_FEED_PER_REV_02	.....	Cutting feed - feed per revolution (group 2)
PFL0_CUTTING_FEED_PER_REV_03	.....	Cutting feed - feed per revolution (group 3)
PFL0_CUTTING_FEED_PER_REV_04	.....	Cutting feed - feed per revolution (group 4)

### 4.4.2 Function

This function block executes cutting feed (feed per revolution) of the specified PMC axis at the feedrate and total moving distance specified by input parameters. This function block has the same functionality of “G95 G01” of CNC.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.4.3 Format

Graphical format of PFL0\_CUTTING\_FEED\_PER\_REV\_01 is shown below:

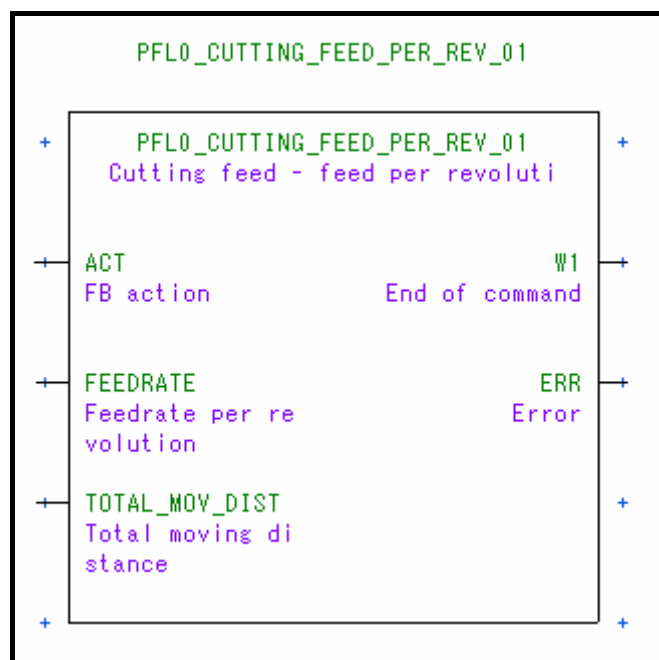


Figure 4.4.3 (a) PFL0\_CUTTING\_FEED\_PER\_REV\_01 (group 1)

## 4.4.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.4.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute cutting feed – feed per revolution. 1: Execute cutting feed – feed per revolution. (Note 1)
FEEDRATE	Input parameter	UINT	1	Feedrate per revolution Specify the feedrate per revolution. Valid range is 1 to 65535. (Note 2)
TOTAL_MOV_DIST	Input parameter	DINT	1	Total moving distance Specify the incremental travel amount in the input system unit of the axis. Valid range depends on the unit of data. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.



## 4.4.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.4.5 (a) List of related CNC parameters**

CNC parameter	Description
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
JOV (No.1402#1)	Disables jog override.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
FR1 (No.8002#6)	Selects the unit of feedrate of cutting feed – feed per revolution at PMC axis control.
FR2 (No.8002#7)	
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
DRR (No.8005#3)	Enables dry run function for cutting feed per revolution in PMC axis control.
No.8022	Upper limit feedrate of feed per revolution in PMC axis control.

### Note

For details of the CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 4.4.6 Related signals

The signals related to this function block are listed below:

**Table 4.4.6 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)

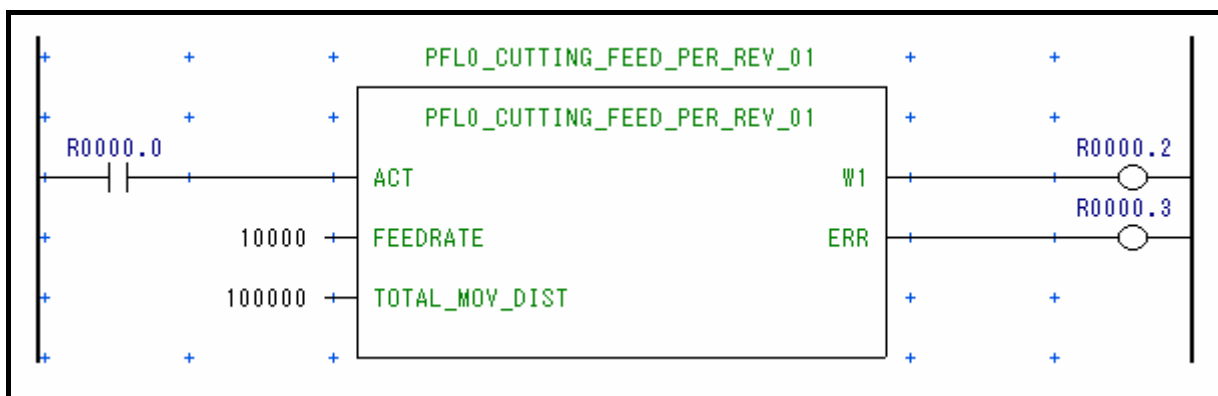
### Note

For details of the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 4.4.7 Example

The following example is to perform cutting feed of the first axis (A-axis) of the first path controlled by group 1, at speed 1 mm/rev for distance 100 mm.

Function block to use:	PFL0_CUTTING_FEED_PER_REV_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Feedrate (FEEDRATE):	100000	cutting feed feedrate per revolution; 1 mm/rev
- Total moving distance (TOTAL_MOV_DIST):	100000	distance; 100 mm (unit: metric IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERR):	R0000.3	



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Turn on ACT (R0000.0) (ACT=1) to start cutting feed – feed per revolution of first axis (A-axis).
3. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters; Feedrate per revolution and Total moving distance.

## 4.5 Skip – feed per minute

### 4.5.1 Function block name

PFL0_SKIP_BY_FEED_PER_MIN_01	.....	Skip - feed per minute (group 1)
PFL0_SKIP_BY_FEED_PER_MIN_02	.....	Skip - feed per minute (group 2)
PFL0_SKIP_BY_FEED_PER_MIN_03	.....	Skip - feed per minute (group 3)
PFL0_SKIP_BY_FEED_PER_MIN_04	.....	Skip - feed per minute (group 4)

### 4.5.2 Function

This function block executes skip function (feed per minute) of the specified PMC axis at the feedrate and total moving distance specified by input parameters. This function block has the same functionality of “G31 G01” of CNC.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 High-speed skip is not available.
- 2 Skip signals are available for PMC axes assigned to path 1 to 3.

### 4.5.3 Format

Graphical format of PFL0\_SKIP\_BY\_FEED\_PER\_MIN\_01 is shown below:

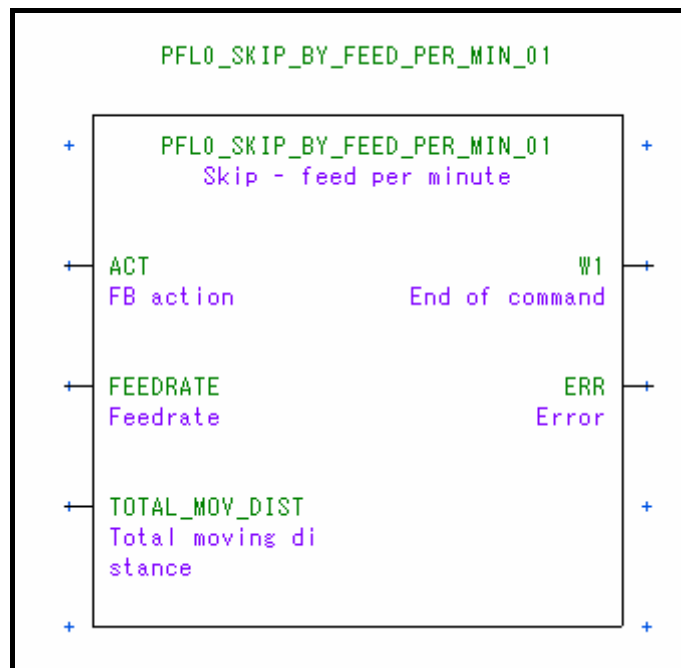


Figure 4.5.3 (a) PFL0\_SKIP\_BY\_FEED\_PER\_MIN\_01 (group 1)

## 4.5.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.5.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute skip – feed per minute. 1: Execute skip – feed per minute. (Note 1)
FEEDRATE	Input parameter	UINT	1	Cutting feedrate Specify the cutting feedrate. Valid range is 1 to 65535. (Note 2)
TOTAL_MOV_DIST	Input parameter	DINT	1	Total moving distance Specify the incremental travel amount in the input system unit of the axis. Valid range depends on the unit of data. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.5.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.5.5 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
SKE (No.8001#7)	Selects skip signal in PMC axis control.

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 4.5.6 Related signals

The signals related to this function block are listed below:

**Table 4.5.6 (a) List of related signals**

Symbol	Address	Signal name
ESKIP	X004.6	Skip signal for path 1 (PMC axis control)
ESKIP#2	X013.6	Skip signal for path 2 (PMC axis control)
ESKIP#3	X011.6	Skip signal for path 3 (PMC axis control)
SKIP	X004.7	Skip signal for path 1
SKIP#2	X013.7	Skip signal for path 2
SKIP#3	X011.7	Skip signal for path 3

### Note

For details of the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

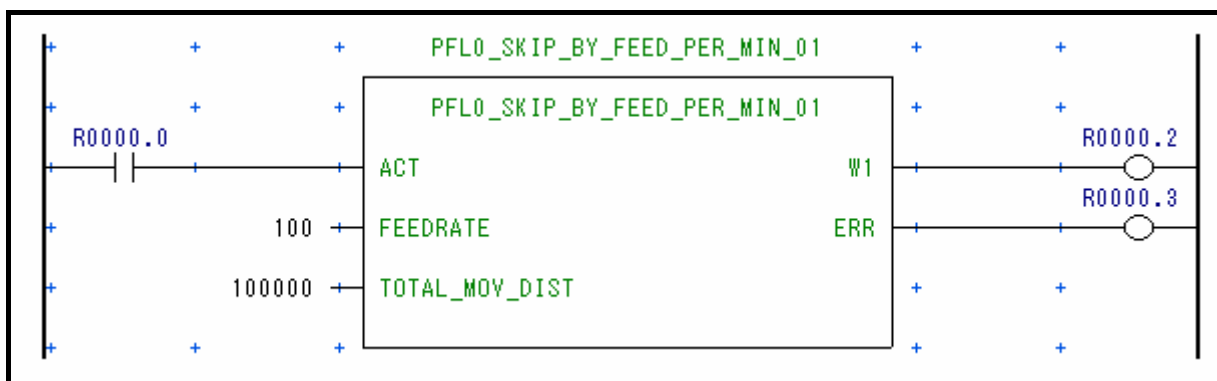
## 4.5.7 Example

The following example is to perform skip function of the first axis (A-axis) of the first path controlled by group 1, at speed 100 mm/min for distance 100 mm.

Function block to use: PFL0\_SKIP\_BY\_PER\_MIN\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Feedrate (FEEDRATE): 100 cutting feed feedrate; 100 mm/min
- Total moving distance (TOTAL\_MOV\_DIST): 100000 distance; 100 mm (unit: metric IS-B)
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Apply the following configuration to use skip signal (PMC axis control):
  - a) Set "1" to CNC parameter SKE (No.8001#7).
3. Turn on ACT (R0000.0) (ACT=1) to start skip – feed per minute of first axis (A-axis). And skip is performed when the skip signal (X004.6) turns on.
4. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters; Feedrate and Total moving distance.

## 4.6 Dwell

### 4.6.1 Function block name

PFL0_DWELL_01	.....	Dwell (group 1)
PFL0_DWELL_02	.....	Dwell (group 2)
PFL0_DWELL_03	.....	Dwell (group 3)
PFL0_DWELL_04	.....	Dwell (group 4)

### 4.6.2 Function

This function block executes dwell for the period of the dwell time specified by input parameters. This function block has the same functionality of “G04” of CNC.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.6.3 Format

Graphical format of PFL0\_DWELL\_01 is shown below:

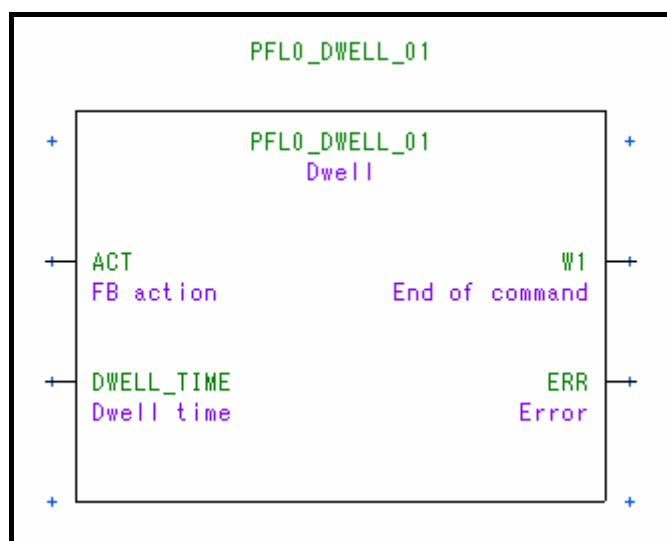


Figure 4.6.3 (a) PFL0\_DWELL\_01 (group 1)

## 4.6.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.6.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute dwell. 1: Execute dwell. (Note 1)
DWELL_TIME	Input parameter	UDINT	1	Dwell time Specify the dwell time. Valid range is 1 to 9999999. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.6.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.6.5 (a) List of related CNC parameters**

CNC parameter	Description
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
DWE (No.8002#1)	Selects the unit of dwell time in PMC axis control at increment system IS-C.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.

### Note

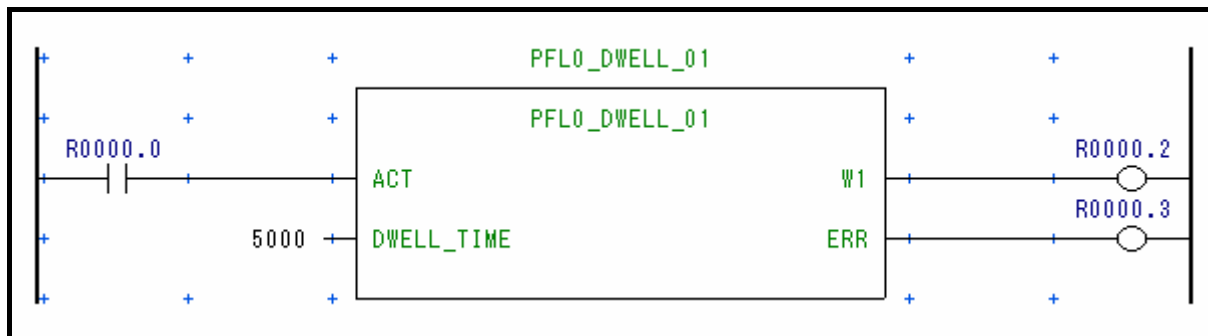
For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.



## 4.6.6 Example

The following example is to perform dwell of the first axis (A-axis) of the first path controlled by group 1, for dwell time of 5 seconds.

Function block to use:	PFL0_DWELL_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Dwell time (DWELL_TIME):	5000	dwell time; 5 seconds (unit: IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERR):	R0000.3	



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Turn on ACT (R0000.0) (ACT=1) to start dwell of 5 seconds in first axis (A-axis).
3. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- 2 Constant number or an address can be specified to the parameter Dwell time.

## 4.7 Reference position return

### 4.7.1 Function block name

PFL0_REF_POS_RETURN_01	.....	Reference position return (group 1)
PFL0_REF_POS_RETURN_02	.....	Reference position return (group 2)
PFL0_REF_POS_RETURN_03	.....	Reference position return (group 3)
PFL0_REF_POS_RETURN_04	.....	Reference position return (group 4)

### 4.7.2 Function

This function block executes reference position return of the specified PMC axis. This function block performs rapid traverse in the direction to return reference point specified by CNC parameter ZMIx (No.1006#5), then performs the same action as manual reference position return of CNC. PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

For more details, please refer to the section “(6) Reference position return” in chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

### 4.7.3 Format

Graphical format of PFL0\_REF\_POS\_RETURN\_01 is shown below:

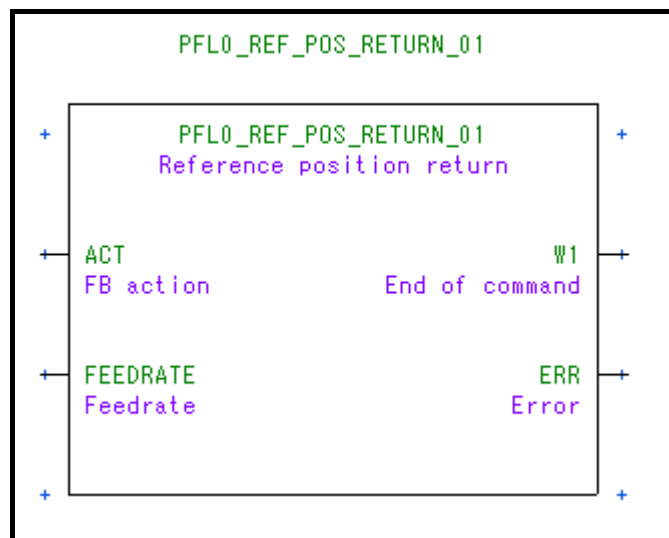


Figure 4.7.3 (a) PFL0\_REF\_POS\_RETURN\_01 (group 1)

## 4.7.4 Parameters

Details of the parameters of this function block are as shown below:

Table 4.7.4 (a) List of parameters

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute reference point return. 1: Execute reference point return. (Note 1)
FEEDRATE	Input parameter	UINT	1	Feedrate Specify the cutting feedrate. Valid range is 1 to 65535. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.7.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.7.5 (a) List of related CNC parameters**

CNC parameter	Description
DLZx (No.1005#1)	Enables function to set reference position without dogs.
ZMIx (No.1006#5)	Selects the direction of manual reference position return.
No.1420	Rapid traverse rate for each axis.
No.1424	Manual rapid traverse rate for each axis.
No.1836	Servo error amount where reference position return is possible.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

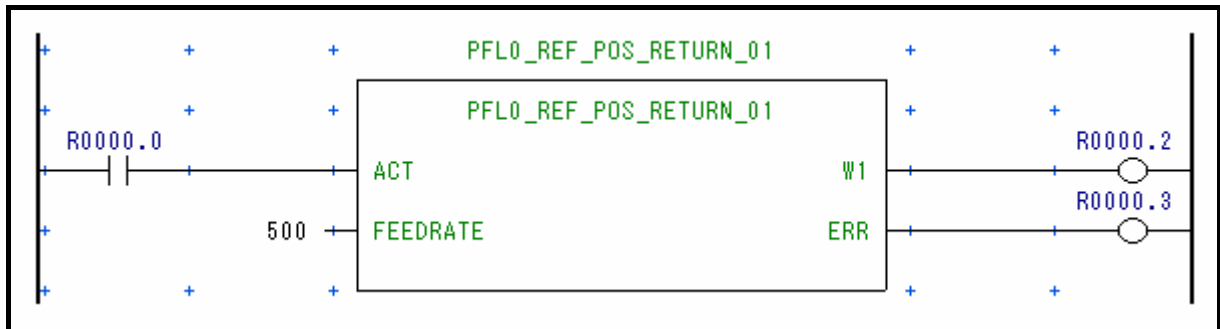
## 4.7.6 Example

The following example is to perform reference position return without dogs at the first axis (A-axis) of the first path controlled by group 1, at speed 500 mm/min.

Function block to use: PFL0\_REF\_POS\_RETURN\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Feedrate (FEEDRATE): 500 rapid traverse feedrate; 500 mm/min (unit: metric IS-B)
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
3. Apply the following configuration to enable function to set reference position without dogs:
  - a) Turn on CNC parameter DLZx (No.1005#1).
4. Turn on ACT (R0000.0) (ACT=1) to start reference position return of first axis (A-axis).
5. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameter Feedrate.

## 4.8 Continuous feed

### 4.8.1 Function block name

PFL0_CONTINUOUS_FEED_01	.....	Continuous feed (group 1)
PFL0_CONTINUOUS_FEED_02	.....	Continuous feed (group 2)
PFL0_CONTINUOUS_FEED_03	.....	Continuous feed (group 3)
PFL0_CONTINUOUS_FEED_04	.....	Continuous feed (group 4)

### 4.8.2 Function

This function block executes continuous feed of the specified PMC axis in one direction at the feedrate and direction specified by input parameters. This function block has the same functionality of continuous feed in JOG mode of CNC.

The PMC axis will move until reset. Use the function block for reset to stop the PMC axis.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.8.3 Format

Graphical format of PFL0\_CONTINUOUS\_FEED\_01 is shown below:

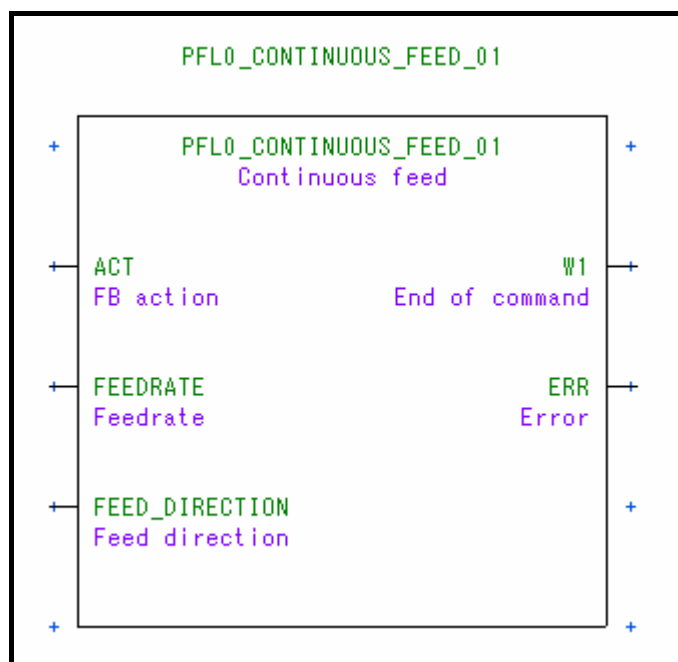


Figure 4.8.3 (a) PFL0\_CONTINUOUS\_FEED\_01 (group 1)

## 4.8.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.8.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute continuous feed. 1: Execute continuous feed. (Note 1)
FEEDRATE	Input parameter	UINT	1	Continuous feedrate Specify the continuous feedrate. You can also change the speed of PMC axis performing continuous feed already. Valid range is 1 to 65535. (Note 2)
FEED_DIRECTION	Input parameter	BOOL	-	Feed direction Specify the direction of continuous feed. 0: Positive direction. 1: Negative direction.
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 Use this function block with buffering disable signal (EMBUFg) turned off, because W1 will never turn on if the signal is turned on. For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.8.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.8.5 (a) List of related CNC parameters**

CNC parameter	Description
JOV (No.1402#1)	Disables jog override.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
F10 (No.8002#3)	Selects the least increment of feedrate of cutting feed – feed per minute at PMC axis control.
JFM (No.8004#2)	Selects the unit of feedrate of continuous feed in PMC axis control.

### Note

For details of the CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 4.8.6 Related signals

The signals related to this function block are listed below:

**Table 4.8.6 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)

### Note

For details of the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.



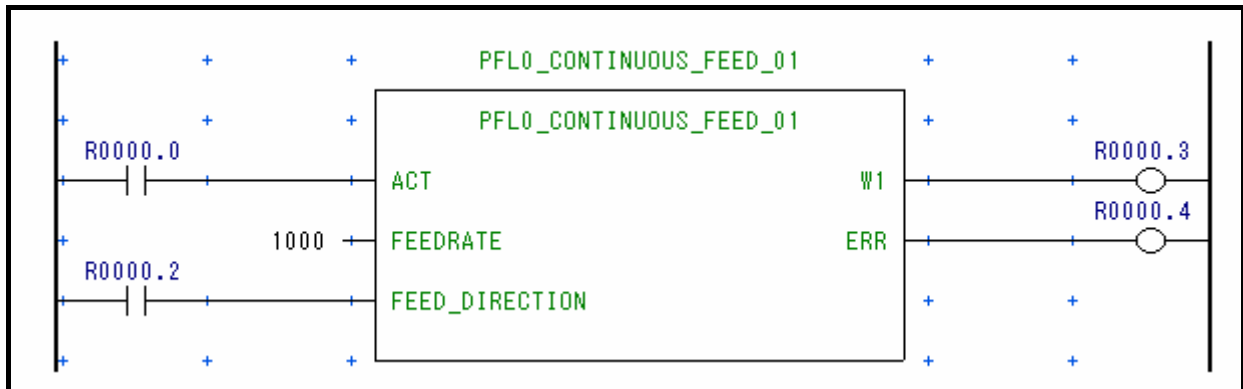
## 4.8.7 Example

The following example is to perform continuous feed of the first axis (A-axis) of the first path controlled by group 1, at speed 1000 mm/min in positive direction.

Function block to use: PFL0\_CONTINUOUS\_FEED\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Feedrate (FEEDRATE): 1000                      cutting feed feedrate; 1000 mm/min (unit: metric IS-B)
- Feed direction (FEED\_DIRECTION): R0000.2                      positive direction; 0
- Completion signal (W1): R0000.3
- Error signal (ERR): R0000.4



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Turn off buffering disable signal EMBUFg (G142.2). Use ladder program to operate this signal directly.
3. Turn off FEED\_DIRECTION (R0000.2) to make the axis move in positive direction.
4. Turn on ACT (R0000.0) (ACT=1) to start continuous feed of first axis (A-axis) in positive direction.
5. Turn off ACT (ACT=0) when W1 (R0000.3) turns on (W1=1).
6. To stop the axis, use function block PFL0\_PMC\_AXCTL\_RESET\_01 to reset PMC axis control of group 1.

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameter Continuous feedrate.

## 4.9 First to fourth reference position return

### 4.9.1 Function block name

PFL0_1ST_REF_POS_RETURN_01	.....	First reference position return (group 1)
PFL0_1ST_REF_POS_RETURN_02	.....	First reference position return (group 2)
PFL0_1ST_REF_POS_RETURN_03	.....	First reference position return (group 3)
PFL0_1ST_REF_POS_RETURN_04	.....	First reference position return (group 4)
PFL0_2ND_REF_POS_RETURN_01	...	Second reference position return (group 1)
PFL0_2ND_REF_POS_RETURN_02	...	Second reference position return (group 2)
PFL0_2ND_REF_POS_RETURN_03	...	Second reference position return (group 3)
PFL0_2ND_REF_POS_RETURN_04	...	Second reference position return (group 4)
PFL0_3RD_REF_POS_RETURN_01	...	Third reference position return (group 1)
PFL0_3RD_REF_POS_RETURN_02	...	Third reference position return (group 2)
PFL0_3RD_REF_POS_RETURN_03	...	Third reference position return (group 3)
PFL0_3RD_REF_POS_RETURN_04	...	Third reference position return (group 4)
PFL0_4TH_REF_POS_RETURN_01	....	Fourth reference position return (group 1)
PFL0_4TH_REF_POS_RETURN_02	....	Fourth reference position return (group 2)
PFL0_4TH_REF_POS_RETURN_03	....	Fourth reference position return (group 3)
PFL0_4TH_REF_POS_RETURN_04	....	Fourth reference position return (group 4)

### 4.9.2 Function

This function block executes first to fourth reference position return of the specified PMC axis at the feedrate specified by input parameter. This function block performs the same reference position return as CNC commands listed below, which are reference position return from intermediate position.

Reference position	CNC command
First reference position	G28
Second reference position	G28 P2
Third reference position	G28 P3
Fourth reference position	G28 P4

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

Each reference position is determined by CNC parameters listed below. For more details, please refer to the section “(8) First reference position return” to “(11) Fourth reference position return” in chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

Reference position	CNC parameter
First reference position	No.1240
Second reference position	No.1241
Third reference position	No.1242
Fourth reference position	No.1243

### 4.9.3 Format

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Graphical format of PFL0\_1ST\_REF\_POS\_RETURN\_01 is shown below:

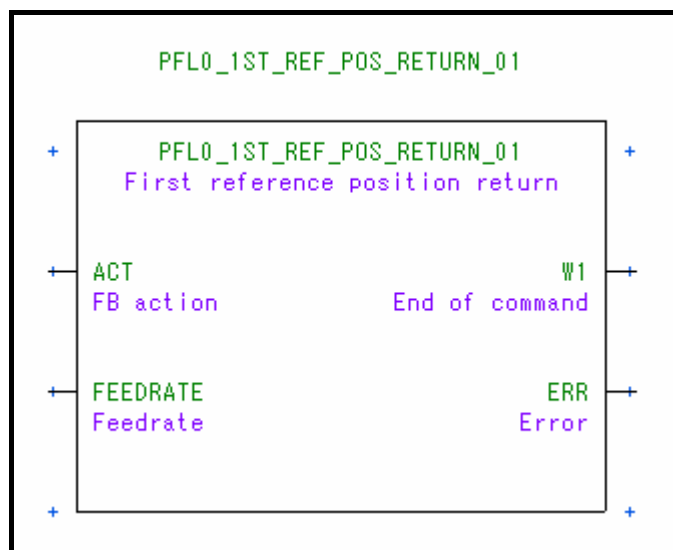


Figure 4.9.3 (a) PFL0\_1ST\_REF\_POS\_RETURN\_01 (group 1)

## 4.9.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.9.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute first to fourth reference point return. 1: Execute first to fourth reference point return. (Note 1)
FEEDRATE	Input parameter	UINT	1	Feedrate Specify the cutting feedrate. Valid range is 1 to 65535. (Note 2) This parameter is effective only when CNC parameter RPD (No.8002#0) is "1". (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.9.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.9.5 (a) List of related CNC parameters**

CNC parameter	Description
DLZx (No.1005#1)	Enables function to set reference position without dogs.
No.1240	First reference position in the machine coordinate system
No.1241	Second reference position in the machine coordinate system
No.1242	Third reference position in the machine coordinate system
No.1243	Fourth reference position in the machine coordinate system
JOV (No.1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
No.1424	Manual rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 4.9.6 Related signals

The signals related to this function block are listed below:

**Table 4.9.6 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)

### Note

For details of the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

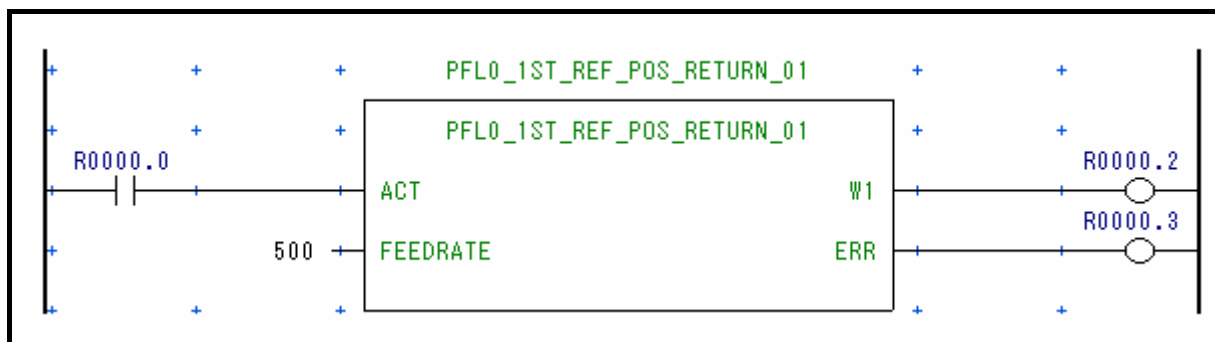
## 4.9.7 Example

The following example is to perform first reference position return at the first axis (A-axis) of the first path controlled by group 1, at speed 500 mm/min.

Function block to use: PFL0\_1ST\_REF\_POS\_RETURN\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Feedrate (FEEDRATE): 500 rapid traverse feedrate; 500 mm/min (unit: metric IS-B)
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
3. Apply the following configuration to set the first reference position to "0":
  - a) Set "0" to CNC parameter No.1240.
4. Turn on ACT (R0000.0) (ACT=1) to start first reference position return of first axis (A-axis).
5. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameter Feedrate.

## 4.10 External pulse synchronization – position coder

### 4.10.1 Function block name

PFL0\_EXT\_PLS\_SYNC\_POS\_CODER\_01 · External pulse synchronization – position coder (group 1)  
PFL0\_EXT\_PLS\_SYNC\_POS\_CODER\_02 · External pulse synchronization – position coder (group 2)  
PFL0\_EXT\_PLS\_SYNC\_POS\_CODER\_03 · External pulse synchronization – position coder (group 3)  
PFL0\_EXT\_PLS\_SYNC\_POS\_CODER\_04 · External pulse synchronization – position coder (group 4)

### 4.10.2 Function

This function block executes synchronous operation of the specified PMC axis with position coder, at the pulse weight specified by input parameter. Synchronous operation with serial spindle can be specified by This function block performs rapid traverse in the direction to return reference point specified by CNC parameter ZMIx (No.1006#5), then performs the same action as manual reference position return of CNC.

The specified PMC axis will move synchronizing with position coder at the specified pulse weight by input parameter. The spindle can be selected by the spindle number specified by input parameter, of which position coder the PMC axis synchronizes to.

Synchronization continues until reset. Use function block for reset to quit synchronization.

Position coder to synchronize can be selected by CNC parameters and input parameter as follows:

CNC parameter		Input parameter Spindle number	Position coder to synchronize
ESY (No.8007#3)	EOS (No.8019#0)		
0	0/1	Not effective	Position coder (not serial spindle)
1	0	Not effective	Position coder of the first spindle in the first path
1	1	Effective	Position coder of any spindle

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

For more details, please refer to the section “(12) External pulse synchronization – position coder” in chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

### 4.10.3 Format

Graphical format of PFL0\_EXT\_PLS\_SYNC\_POS\_CODER\_01 is shown below:

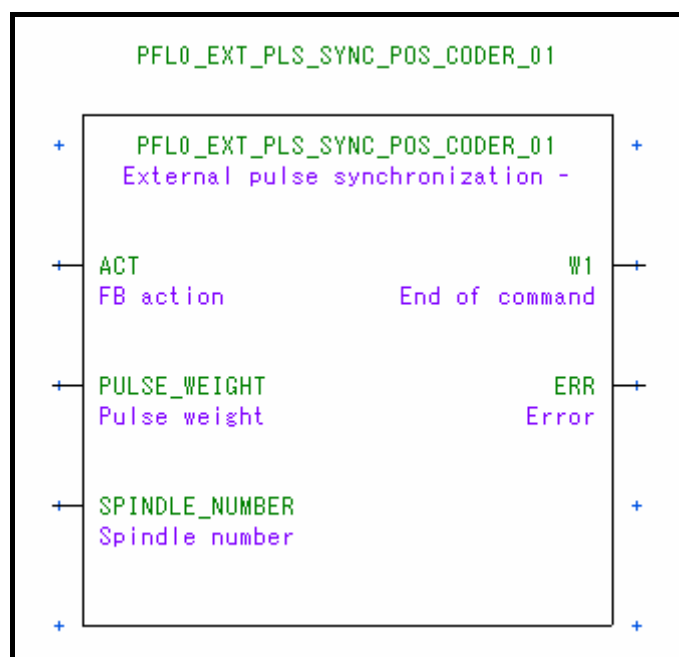


Figure 4.10.3 (a) PFL0\_EXT\_PLS\_SYNC\_POS\_CODER\_01 (group 1)



## 4.10.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.10.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute external pulse synchronization – position coder. 1: Execute external pulse synchronization – position coder. (Note 1)
PULSE_WEIGHT	Input parameter	INT	1	Pulse weight Specify the pulse weight. Valid range depends on the manual pulse magnification change signal HNDMP (Gn088.3). (Note 2)
SPNDLE_NUMBER	Input parameter	USINT	1	Spindle number of serial spindle to be synchronized Specify the spindle number, which number is common to the system. To synchronize with the position coder of a serial spindle, specify the spindle number of the serial spindle. Valid range is 1 to maximum of spindles. depends Synchronization will not work at invalid spindle number. Specify "0" to this parameter if the axis is not synchronized to the position coder of a serial spindle. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 For more details, please refer to the section "(12) External pulse synchronization – position coder" in chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 Use this function block with buffering disable signal (EMBUFg) turned off, because W1 will never turn on if the signal is turned on. For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.10.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.10.5 (a) List of related CNC parameters**

CNC parameter	Description
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
No.1424	Manual rapid traverse rate for each axis.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
ESY (No.8007#3)	Enables external pulse synchronization (serial spindle synchronization) in PMC axis control.
EOS (No.8019#0)	Enables specifying the spindle to be synchronized for serial spindle synchronization in PMC axis control.

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 4.10.6 Related signals

The signals related to this function block are listed below:

**Table 4.10.6 (a) List of related signals**

Symbol	Address	Signal name
HNDMP	G88.3	Manual pulse magnification change signal

### Note

Only address of first path is listed above. Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

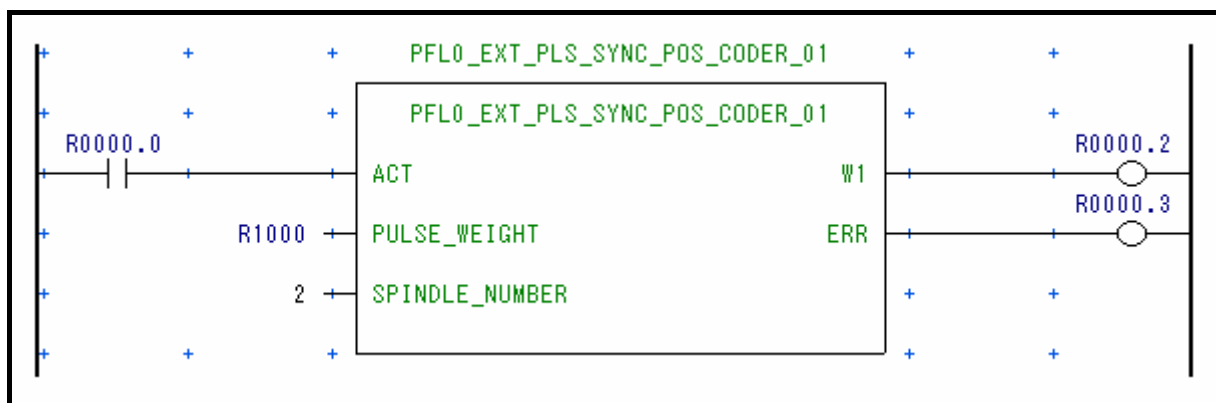
## 4.10.7 Example

The following example is to synchronize the first axis (A-axis) of the first path controlled by group 1, with position coder of the second spindle by pulse weight of 2.5.

Function block to use: PFL0\_EXT\_PLS\_SYNC\_POS\_CODER\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Pulse weight (PULSE\_WEIGHT): R1000 address of pulse weight
- Spindle number (SPINDLE\_NUMBER): 2 spindle number of serial spindle to be synchronized
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Apply the following configuration to enable spindle number of input parameter (second spindle):
  - a) Set "1" to CNC parameter ESY (No.8007#3).
  - b) Set "1" to CNC parameter EOS (No.8019#0).
3. Apply the following configuration to enable spindle number of input parameter (second spindle):
  - a) Turn off manual pulse magnification change signal HNDMP (G88.3) to choose 1/256 for the unit of pulse weight.
  - b) Set "1000" to R1000.
4. Turn on ACT (R0000.0) (ACT=1) to start synchronization of first axis (A-axis) with position coder of the second spindle.
5. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).
6. To stop synchronization, use function block PFL0\_PMC\_AXCTL\_RESET\_01 to reset PMC axis control of group 1.

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters: Pulse weight, Spindle number.

## 4.11 External pulse synchronization – manual handle

### 4.11.1 Function block name

PFL0\_EXT\_PLS\_SYNC\_1ST\_HNDL\_01 ... External pulse synchronization – first manual handle (group 1)  
PFL0\_EXT\_PLS\_SYNC\_1ST\_HNDL\_02 ... External pulse synchronization – first manual handle (group 2)  
PFL0\_EXT\_PLS\_SYNC\_1ST\_HNDL\_03 ... External pulse synchronization – first manual handle (group 3)  
PFL0\_EXT\_PLS\_SYNC\_1ST\_HNDL\_04 ... External pulse synchronization – first manual handle (group 4)

PFL0\_EXT\_PLS\_SYNC\_2ND\_HNDL\_01 ... External pulse synchronization – second manual handle (group 1)  
PFL0\_EXT\_PLS\_SYNC\_2ND\_HNDL\_02 ... External pulse synchronization – second manual handle (group 2)  
PFL0\_EXT\_PLS\_SYNC\_2ND\_HNDL\_03 ... External pulse synchronization – second manual handle (group 3)  
PFL0\_EXT\_PLS\_SYNC\_2ND\_HNDL\_04 ... External pulse synchronization – second manual handle (group 4)

PFL0\_EXT\_PLS\_SYNC\_3RD\_HNDL\_01 ... External pulse synchronization – third manual handle (group 1)  
PFL0\_EXT\_PLS\_SYNC\_3RD\_HNDL\_02 ... External pulse synchronization – third manual handle (group 2)  
PFL0\_EXT\_PLS\_SYNC\_3RD\_HNDL\_03 ... External pulse synchronization – third manual handle (group 3)  
PFL0\_EXT\_PLS\_SYNC\_3RD\_HNDL\_04 ... External pulse synchronization – third manual handle (group 4)

### 4.11.2 Function

This function block executes synchronous operation of the specified PMC axis with the corresponding manual handle, at the pulse weight specified by input parameter.

Synchronization continues until reset. Use function block for reset to quit synchronization.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.11.3 Format

Graphical format of PFL0\_EXT\_PLS\_SYNC\_1ST\_HNDL\_01 is shown below:

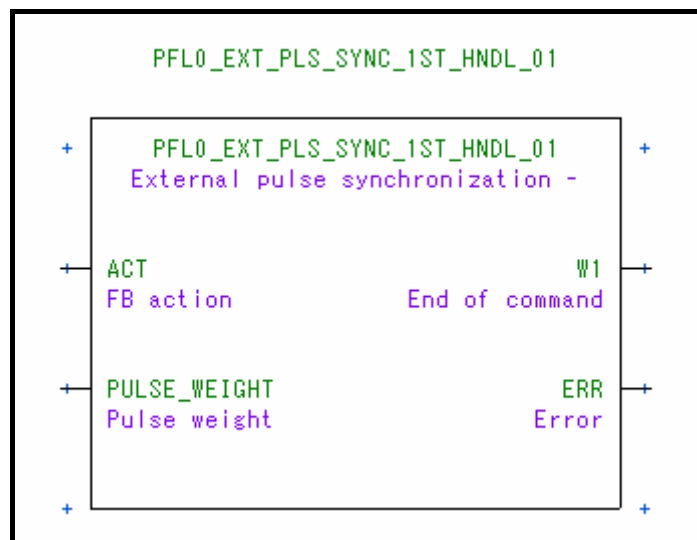


Figure 4.11.3 (a) PFL0\_EXT\_PLS\_SYNC\_1ST\_HNDL\_01 (group 1)

## 4.11.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.11.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute external pulse synchronization – manual handle. 1: Execute external pulse synchronization – manual handle. (Note 1)
PULSE_WEIGHT	Input parameter	INT	1	Pulse weight Specify the pulse weight. Valid range depends on the manual pulse magnification change signal HNDMP (Gn088.3). (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 For more details, please refer to the section “(13) External pulse synchronization - first manual handle” to “(15) External pulse synchronization - third manual handle” in chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 Use this function block with buffering disable signal (EMBUFg) turned off, because W1 will never turn on if the signal is turned on. For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 4.11.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.11.5 (a) List of related CNC parameters**

CNC parameter	Description
DIAX (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
No.1424	Manual rapid traverse rate for each axis.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.

### Note

For details of the CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 4.11.6 Related signals

The signals related to this function block are listed below:

Table 4.11.6 (a) List of related signals

Symbol	Address	Signal name
HNDMP	G88.3	Manual pulse magnification change signal

### Note

Only address of first path is listed above. Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

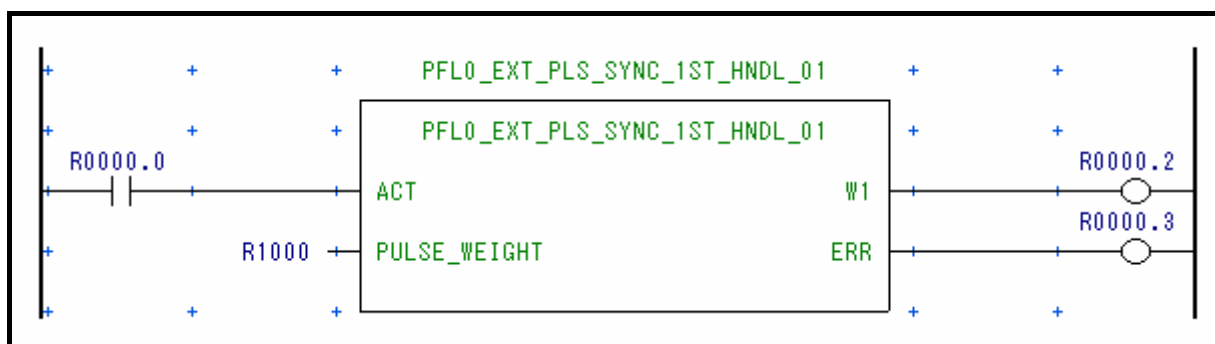
## 4.11.7 Example

The following example is to synchronize the first axis (A-axis) of the first path controlled by group 1, with the first manual handle by pulse weight of 2.5.

Function block to use: PFL0\_EXT\_PLS\_SYNC\_1ST\_HNDL\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Pulse weight (PULSE\_WEIGHT): R1000 address of pulse weight
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



- Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
- Apply the following configuration to enable spindle number of input parameter (second spindle):
  - Turn off manual pulse magnification change signal HNDMP (G88.3) to choose 1/256 for the unit of pulse weight.
  - Set "1000" to R1000.
- Turn on ACT (R0000.0) (ACT=1) to start synchronization of first axis (A-axis) with the first manual handle.
- Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).
- To stop synchronization, use function block PFL0\_PMC\_AXCTL\_RESET\_01 to reset PMC axis control of group 1.

### Note

- For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- Constant number or an address can be specified to the parameter Pulse weight.

## 4.12 Speed command

### 4.12.1 Function block name

PFL0_SPEED_COMMAND_01	.....	Speed command (group 1)
PFL0_SPEED_COMMAND_02	.....	Speed command (group 2)
PFL0_SPEED_COMMAND_03	.....	Speed command (group 3)
PFL0_SPEED_COMMAND_04	.....	Speed command (group 4)

### 4.12.2 Function

This function block executes continuous feed based on speed command in the specified PMC axis at the feedrate specified by input parameter. The PMC axis to be commanded has to be a rotary axis. (Note 1) The PMC axis will move until reset. Use the function block for reset to stop the PMC axis. PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 For more details, please refer to the section “(16) Speed command” in chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

### 4.12.3 Format

Graphical format of PFL0\_SPEED\_COMMAND\_01 is shown below:

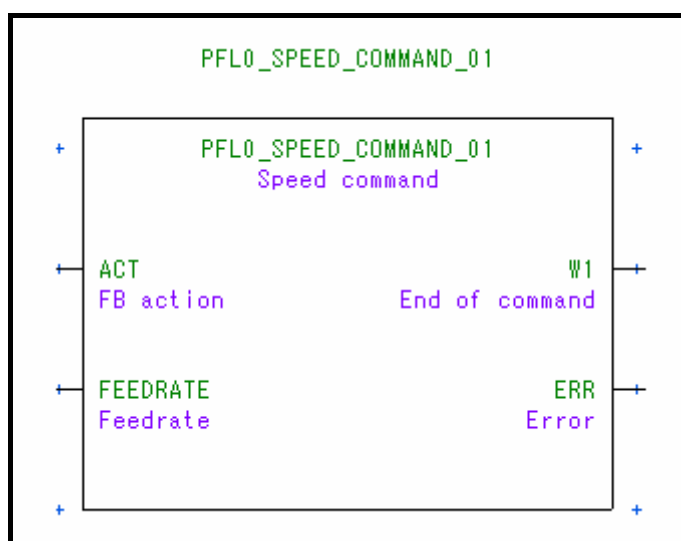


Figure 4.12.3 (a) PFL0\_SPEED\_COMMAND\_01 (group 1)

## 4.12.4 Parameters

Details of the parameters of this function block are as shown below:

Table 4.12.4 (a) List of parameters

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute speed command. 1: Execute speed command. (Note 1)
FEEDRATE	Input parameter	INT	1	Continuous feedrate Specify the speed of servo motor by binary number. You can also change the speed of PMC axis performing continuous feed already. Specify negative number (2's complement) to move backward. Valid range is -32768 to +32767, by unit $\text{min}^{-1}$ . (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.
- 4 Use this function block with buffering disable signal (EMBUFg) turned off, because W1 will never turn on if the signal is turned on. For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.



## 4.12.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.12.5 (a) List of related CNC parameters**

CNC parameter	Description
ROT <sub>x</sub> (No.1006#0)	Selects type of each axis; linear or rotary.
No.8028	Time constant for acceleration/deceleration calculation at speed command of PMC axis control.
No.8032	Feedrate for acceleration/deceleration calculation at speed command of PMC axis control.
EVP (No.8005#4)	Selects control type of speed command in PMC axis control; velocity control and position control.
VCP (No.8007#2)	Selects type of speed command in PMC axis control; FS15 type and FS16 type.
No.8040	Amount of shift per rotation of servo motor of least input increment when speed command in PMC axis control is position control
PTC (No.12730#0)	Extends linear acceleration/deceleration time constant of continuous feed operation by speed command in PMC axis control.
No.12731	Second time constant of linear acceleration/deceleration in velocity command continuous feed in PMC axis control
No.12732	Third time constant of linear acceleration/deceleration in velocity command continuous feed in PMC axis control
No.12733	Fourth time constant of linear acceleration/deceleration in velocity command continuous feed in PMC axis control
No.12734	Fifth time constant of linear acceleration/deceleration in velocity command continuous feed in PMC axis control
No.12735	First feedrate to change time constant of continuous feed operation by speed command in PMC axis control.
No.12736	Second feedrate to change time constant of continuous feed operation by speed command in PMC axis control.
No.12737	Third feedrate to change time constant of continuous feed operation by speed command in PMC axis control.
No.12738	Fourth feedrate to change time constant of continuous feed operation by speed command in PMC axis control.

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

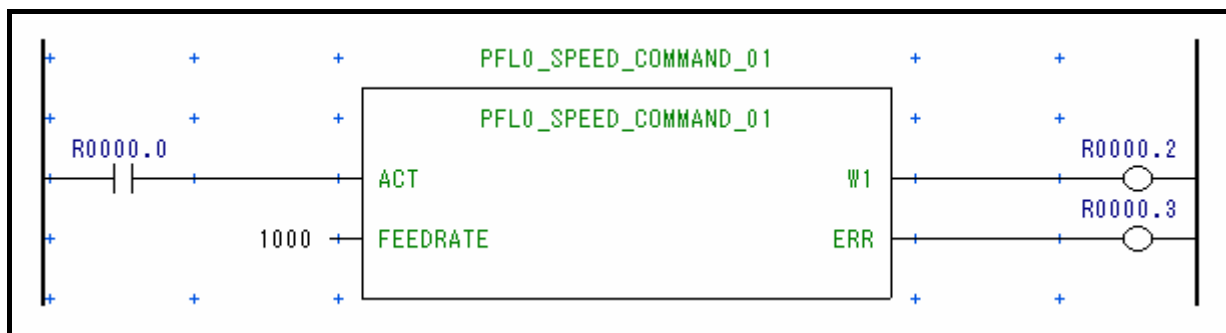
## 4.12.6 Example

The following example is to perform continuous feed of the first axis (A-axis) of the first path controlled by group 1, at speed 1000 mm/min in positive direction.

Function block to use: PFL0\_SPEED\_COMMAND\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Feedrate (FEEDRATE): 1000 continuous feed speed; 1000 mm/min (positive direction)
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Apply the following configuration to configure first axis (A-axis) as a rotary axis:
  - a) Set “1” to CNC parameter ROTx (No.1006#0) of first axis (A-axis).
3. Turn on ACT (R0000.0) (ACT=1) to start continuous feed of first axis (A-axis) in positive direction.
4. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).
5. To stop the axis, use function block PFL0\_PMC\_AXCTL\_RESET\_01 to reset PMC axis control of group 1.

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- 2 Constant number or an address can be specified to the parameter Continuous feedrate.

## 4.13 Torque control

### 4.13.1 Function block name

PFL0_TORQUE_CONTROL_01	.....	Torque control (group 1)
PFL0_TORQUE_CONTROL_02	.....	Torque control (group 2)
PFL0_TORQUE_CONTROL_03	.....	Torque control (group 3)
PFL0_TORQUE_CONTROL_04	.....	Torque control (group 4)

### 4.13.2 Function

This function block executes continuous feed by torque control at the maximum feedrate and torque data specified by input parameters.

The PMC axis will move until reset. Use the function block for reset to stop the PMC axis.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.13.3 Format

Graphical format of PFL0\_TORQUE\_CONTROL\_01 is shown below:

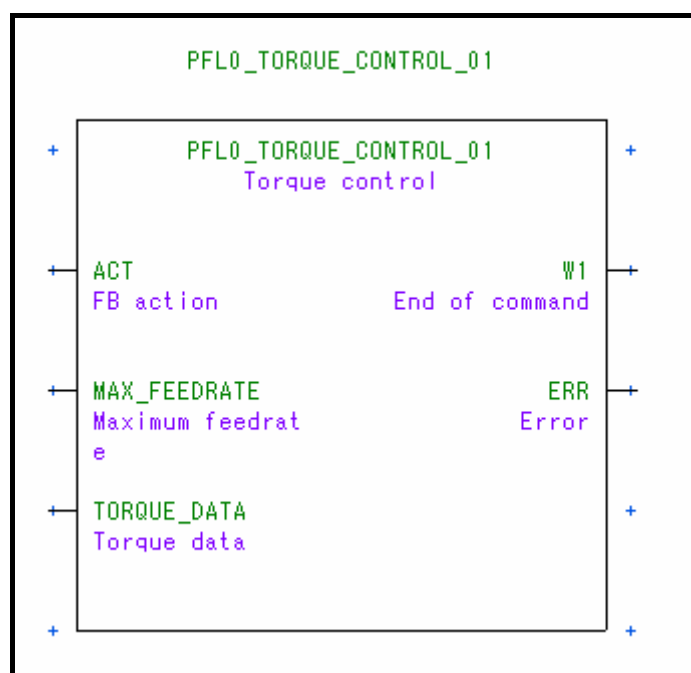


Figure 4.13.3 (a) PFL0\_TORQUE\_CONTROL\_01 (group 1)

## 4.13.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.13.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute torque control. 1: Execute torque control. (Note 1)
MAX_FEEDRATE	Input parameter	UINT	1	Maximum feedrate Specify the maximum feedrate by unit of $\text{min}^{-1}$ at torque control. You can also change the speed of PMC axis performing torque control already. Valid range is 1 to 32767. (Note 2) If there is no object to generate torque, or the speed exceeds the maximum feedrate, alarm (SV0422) will be raised.
TORQUE_DATA	Input parameter	DINT	1	Torque data Specify the torque of torque control. You can also change the torque of PMC axis performing torque control already. Valid range is -99999999 to +99999999 by unit of 0.00001Nm. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 For an axis of linear motor, the units of Maximum feedrate and Torque data changes to the followings:  
Maximum feedrate: cm/min  
Torque data: 0.001N  
For the details of each parameter, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
3. Resetting axis control will change the output W1=1 to W1=0.  
For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.13.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.13.5 (a) List of related CNC parameters**

CNC parameter	Description
TQF (No.1803#4)	Enables follow-up operation at torque control of PMC axis control.
TRE (No.1805#1)	Suppresses counter update when the NC parameter TQF (No.1803#4) is turned off, which means no follow-up operation is done in torque control of PMC axis control.
No.1885	Maximum allowable value for total travel during torque control.
No.1886	Positional deviation when torque control is canceled.

### Note

- 1 For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.
- 2 In addition to the CNC parameters above, you have to make proper configuration of other parameters related to torque control function of servo function. For the details of these parameters, please refer to the section "(17) Torque control" in chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.13.6 Related signals

The signals related to this function block are listed below:

**Table 4.13.6 (a) List of related signals**

Symbol	Address	Signal name
DTCHx	G124	Controlled axes detach signals

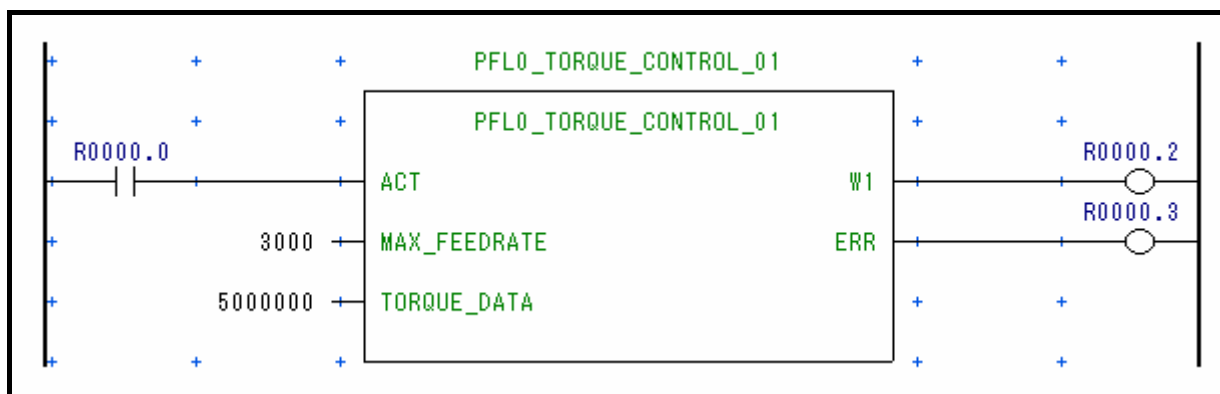
### Note

Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.13.7 Example

The following example is to perform torque control of the first axis (A-axis) of the first path controlled by group 1, by continuous feed at the maximum feedrate 3000 rev/min and torque data of 50 Nm in positive direction.

Function block to use:	PFL0_TORQUE_CONTROL_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Maximum feedrate (MAX_FEEDRATE):	3000	maximum feedrate; 3000 rev/min
- Torque data (TORQUE_DATA):	5000000	torque data; 50 Nm (positive direction)
- Completion signal (W1):	R0000.2	
- Error signal (ERR):	R0000.3	



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Apply the following configuration to enable follow-up operation at torque control:
  - a) Set "1" to CNC parameter TQF (No.1803#4).
3. Turn on ACT (R0000.0) (ACT=1) to start continuous feed of first axis (A-axis) in positive direction.
4. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).
5. To stop the axis, use function block PFL0\_PMC\_AXCTL\_RESET\_01 to reset PMC axis control of group 1.

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters; Maximum feedrate and Torque data.

## 4.14 Auxiliary function

### 4.14.1 Function block name

PFL0_AUXILIARY_FUNCTION1_01	.....	Auxiliary function 1 (group 1)
PFL0_AUXILIARY_FUNCTION1_02	.....	Auxiliary function 1 (group 2)
PFL0_AUXILIARY_FUNCTION1_03	.....	Auxiliary function 1 (group 3)
PFL0_AUXILIARY_FUNCTION1_04	.....	Auxiliary function 1 (group 4)
PFL0_AUXILIARY_FUNCTION2_01	.....	Auxiliary function 2 (group 1)
PFL0_AUXILIARY_FUNCTION2_02	.....	Auxiliary function 2 (group 2)
PFL0_AUXILIARY_FUNCTION2_03	.....	Auxiliary function 2 (group 3)
PFL0_AUXILIARY_FUNCTION2_04	.....	Auxiliary function 2 (group 4)
PFL0_AUXILIARY_FUNCTION3_01	.....	Auxiliary function 3 (group 1)
PFL0_AUXILIARY_FUNCTION3_02	.....	Auxiliary function 3 (group 2)
PFL0_AUXILIARY_FUNCTION3_03	.....	Auxiliary function 3 (group 3)
PFL0_AUXILIARY_FUNCTION3_04	.....	Auxiliary function 3 (group 4)

### 4.14.2 Function

This function block executes the same functionality of auxiliary function of CNC for the function code specified by input parameter.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 The same auxiliary function cannot be commanded from more than one group at a time. Command different auxiliary function from different group, or command them one by one
- 2 For the details of auxiliary function of CNC, please refer to the chapter of "AUXILIARY FUNCTION" in "CONNECTION MANUAL (FUNCTION)" of your CNC.

### 4.14.3 Format

Graphical format of PFL0\_AUXILIARY\_FUNCTION1\_01 is shown below:

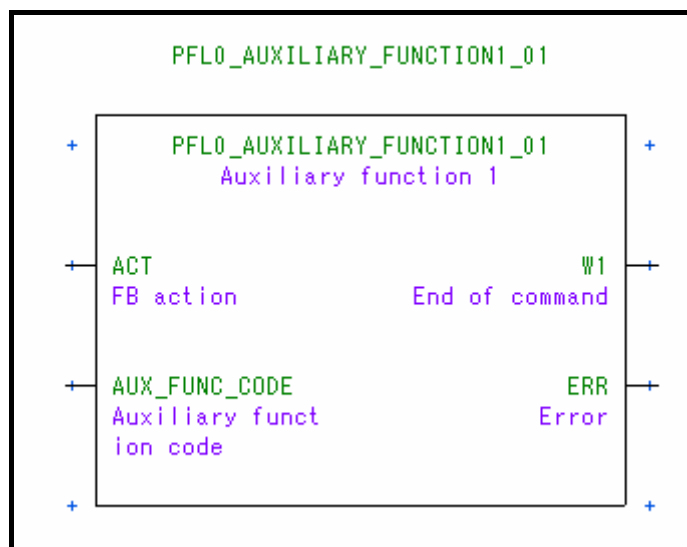


Figure 4.14.3 (a) PFL0\_AUXILIARY\_FUNCTION1\_01 (group 1)

## 4.14.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.14.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute auxiliary function. 1: Execute auxiliary function. (Note 1)
AUX_FUNC_CODE	Input parameter	UINT	1	Auxiliary function code Specify the auxiliary function code to be sent to PMC. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the auxiliary function, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Set auxiliary code of 1-byte or 2-byte binary data according to the CNC parameter AUX (No.8001#6)  
Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.  
For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.14.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.14.5 (a) List of related CNC parameters**

CNC parameter	Description
AUX (No.8001#6)	Selects data size of auxiliary function code.

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.



## 4.14.6 Related signals

The signals related to this function block are listed below:

**Table 4.14.6 (a) List of related signals**

Symbol	Address	Signal name
EFINg	G142.0	Auxiliary function completion signal (PMC axis control)
EMFg	F131.0	Auxiliary function strobe signal (PMC axis control)
EMF2g	F131.2	Auxiliary function 2 strobe signal (PMC axis control)
EMF3g	F131.3	Auxiliary function 3 strobe signal (PMC axis control)
EM11g – EM48g	F132、F142	Auxiliary function code signals (PMC axis control)
EDENg	F130.3	Auxiliary function executing signal (PMC axis control)

### Note

For details of the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

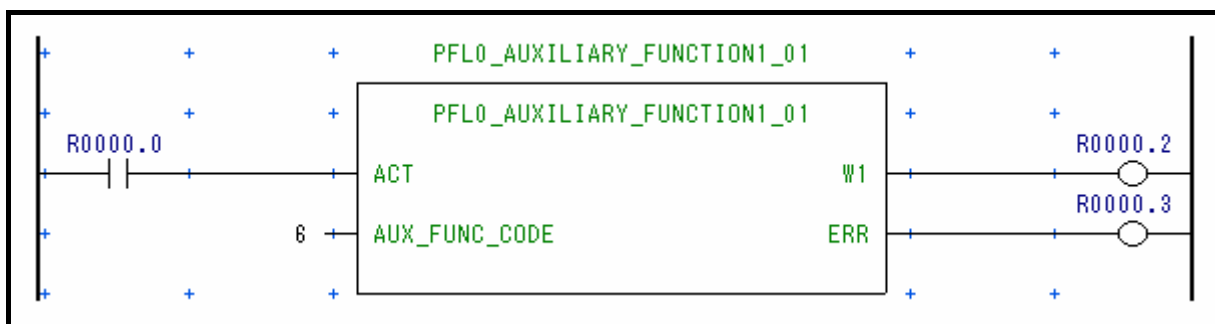
## 4.14.7 Example

The following example is to perform auxiliary function with auxiliary function code 06 at group 1 controlling the first axis (A-axis) of the first path.

Function block to use: PFL0\_AUXILIARY\_FUNCTION\_01 for group 1

Parameters:

- Activation (ACT): R0000.0
- Auxiliary function code (AUX\_FUNC\_CODE): 6 auxiliary function code; 6
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



- Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
- Turn on ACT (R0000.0) (ACT=1) to command auxiliary function code 6 at group 1.  
The procedure of ladder program to handle the following signals of group 1 is the same as the auxiliary function of CNC:
  - Auxiliary function strobe signal EMFg (F131.0)
  - Auxiliary function code signals EM11g – EM28g (F132)
  - Auxiliary function completion signal EFINg (G142.0)
- Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- Constant number or an address can be specified to the parameter Auxiliary function code.

## 4.15 Machine coordinate system selection

### 4.15.1 Function block name

PFL0_MACHINE_POS_SELECT_01	.....	Machine coordinate system selection (group 1)
PFL0_MACHINE_POS_SELECT_02	.....	Machine coordinate system selection (group 2)
PFL0_MACHINE_POS_SELECT_03	.....	Machine coordinate system selection (group 3)
PFL0_MACHINE_POS_SELECT_04	.....	Machine coordinate system selection (group 4)

### 4.15.2 Function

This function block executes absolute rapid traverse of the specified PMC axis to the machine coordinate position at the feedrate, specified by input parameters. This function block has the same functionality of “G53” of CNC.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

For more details, please refer to the section “(21) Machine coordinate system selection” in chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

### 4.15.3 Format

Graphical format of PFL0\_MACHINE\_POS\_SELECT\_01 is shown below:

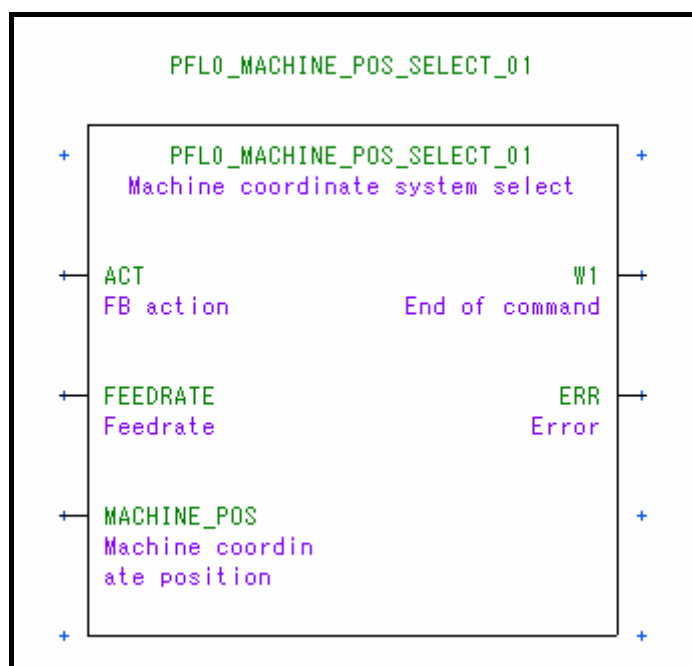


Figure 4.15.3 (a) PFL0\_MACHINE\_POS\_SELECT\_01 (group 1)

## 4.15.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.15.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute machine coordinate system selection. 1: Execute machine coordinate system selection. (Note 1)
FEEDRATE	Input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. This parameter is enabled by setting "1" to CNC parameter RPD (No.8002#0). (Note 2)
MACHNE_POS	Input parameter	DINT	1	Machine coordinate position Specify the machine coordinate by the input unit as an absolute value. Valid range depends on unit of data. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.  
For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.15.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.15.5 (a) List of related CNC parameters**

CNC parameter	Description
ROT <sub>x</sub> (No.1006#0)	Selects type of each axis; linear or rotary.
ROA <sub>x</sub> (No.1008#0)	Enables roll-over of rotary axis.
RAB <sub>x</sub> (No.1008#1)	Selects the direction of rotation in absolute programming.
No.1260	Shift amount per rotation of rotary axis.

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 4.15.6 Example

The following example is to perform rapid traverse of the first axis (A-axis) of the first path controlled by group 1, at speed 200 mm/min to the position 1000 mm.

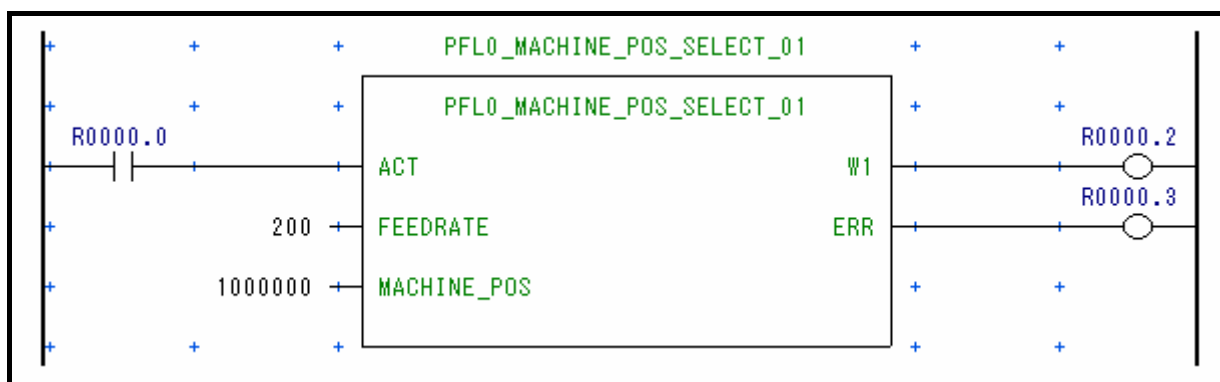
Function block to use:

PFL0\_MACHINE\_POS\_SELECT\_01

for group 1

Parameters:

- Activation (ACT): R0000.0
- Feedrate (FEEDRATE): 200 rapid traverse feedrate; 200 mm/min
- Machine coordinate position (MACHINE\_POS): 100000 machine coordinate position; 1000 mm (unit: metric IS-B)
- Completion signal (W1): R0000.2
- Error signal (ERR): R0000.3



- Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
- Apply the following configuration to enable rapid traverse speed of input parameter:
  - Turn on CNC parameter RPD (No.8002#0).
- Turn on ACT (R0000.0) (ACT=1) to start rapid traverse of first axis (A-axis) to the specified machine coordinate position.
- Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- Constant number or an address can be specified to the parameters; Rapid traverse feedrate and Machine coordinate position.

## 4.16 Cutting feed – sec/block specification

### 4.16.1 Function block name

PFL0_CUTTING_FEED_SEC_BLK_01	.....	Cutting feed – sec/block specification (group 1)
PFL0_CUTTING_FEED_SEC_BLK_02	.....	Cutting feed – sec/block specification (group 2)
PFL0_CUTTING_FEED_SEC_BLK_03	.....	Cutting feed – sec/block specification (group 3)
PFL0_CUTTING_FEED_SEC_BLK_04	.....	Cutting feed – sec/block specification (group 4)

### 4.16.2 Function

This function block executes cutting feed of the specified PMC axis for a specified period of time at the feedrate and total moving distance specified by input parameters. This function block has the same functionality of “G95 G01” of CNC. In sec/block specification, the time to finish the block is specified.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.16.3 Format

Graphical format of PFL0\_CUTTING\_FEED\_SEC\_BLK\_01 is shown below:

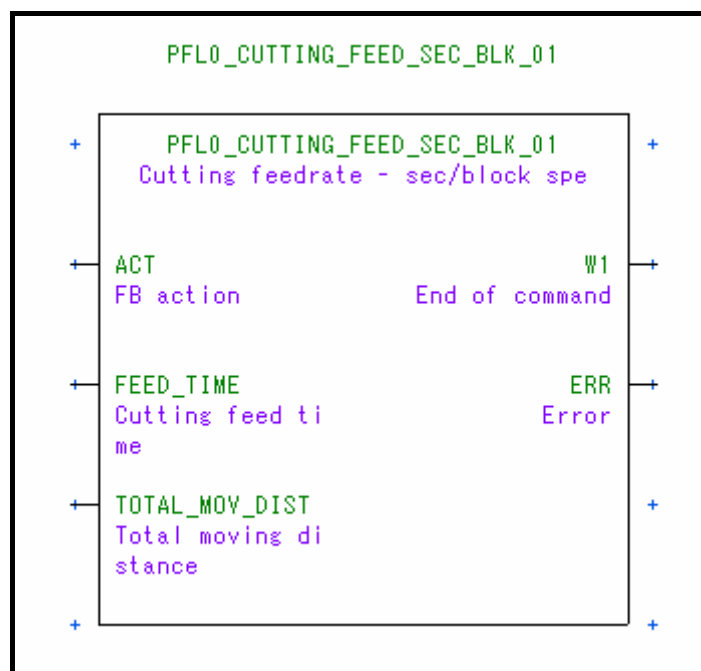


Figure 4.16.3 (a) PFL0\_CUTTING\_FEED\_SEC\_BLK\_01 (group 1)

## 4.16.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 4.16.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	Input parameter	BOOL	-	Activation 0: Do not execute cutting feed – sec/block specification. 1: Execute cutting feed – sec/block specification. (Note 1)
FEED_TIME	Input parameter	UINT	1	Cutting feed time Specify the period of time to finish the block. Valid range is 1 to 327867 by unit 0.1 sec. (Note 2)
TOTAL_MOV_DIST	Input parameter	DINT	1	Total moving distance Specify the incremental travel amount in the input system unit of the axis. Valid range depends on the unit of data. (Note 2)
W1	Output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 1, 3, 4) 0: Normally W1=0. 1: Turns on at completion of transmission of the PMC axis command to NC, in case of buffering disable signal (EMBUFg) = 0. Turns on at completion of the activity of the PMC axis command, in case of buffering disable signal (EMBUFg) = 1. Also turns on at error.
ERR	Output parameter	BOOL	-	Error signal Indicates error status at execution of functional instruction AXCTL (SUB 53). (Note 1) This signal corresponds to the external variable ERR_AXIS_GRP_NO. 0: Axis control command finishes successfully. 1: Axis control command finishes with an error.

### Note

- 1 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1 and ERR are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).  
If RESET parameter of the function block for resetting PMC axis control is turned on (RESET=1), the function block of the same group does not work even if ACT=1.
- 2 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 3 Resetting axis control will change the output W1=1 to W1=0.  
For the details of buffering disable signal (EMBUFg), please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 4.16.5 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 4.16.5 (a) List of related CNC parameters**

CNC parameter	Description
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
JOV (No.1402#1)	Disables jog override.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
F10 (No.8002#3)	Selects the least increment of feedrate of cutting feed – feed per minute at PMC axis control.
PF1 (No.8002#4)	Selects the unit of feedrate of cutting feed – feed per minute at PMC axis control.
PF2 (No.8002#5)	
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
EFD (No.8006#4)	Selects the specification unit of feedrate of cutting feed – feed per minute at PMC axis control.

### Note

For details of the CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 4.16.6 Related signals

The signals related to this function block are listed below:

**Table 4.16.6 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)

### Note

For details of the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

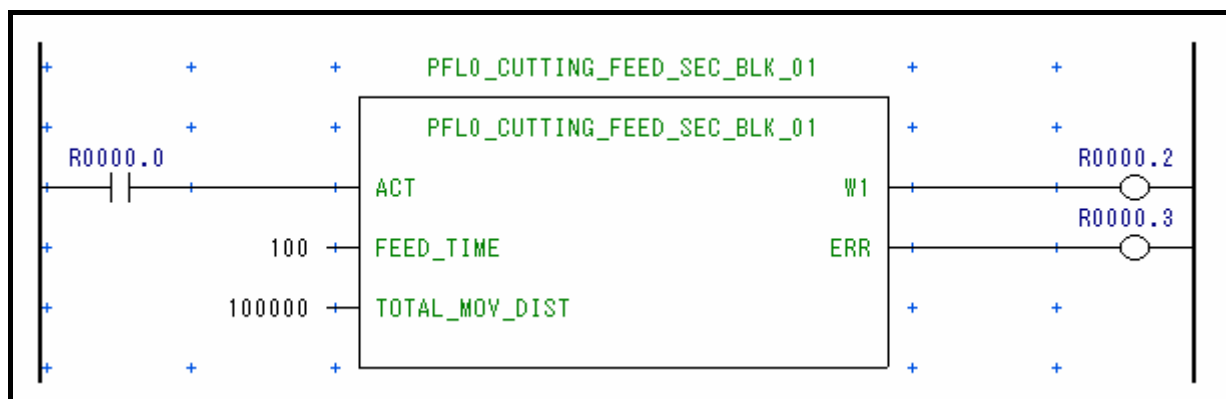
## 4.16.7 Example

The following example is to perform cutting feed of the first axis (A-axis) of the first path controlled by group 1, for 10 seconds to move distance 100 mm.

Function block to use: PFL0\_CUTTING\_FEED\_SEC\_BLK\_01 for group 1

Parameters:

- Activation (ACT):	R0000.0	
- Cutting feed time (FEEDTIME):	100	cutting feed time; 10 sec
- Total moving distance (TOTAL_MOV_DIST):	100000	distance; 100 mm (unit: metric IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERR):	R0000.3	



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Turn on ACT (R0000.0) (ACT=1) to start cutting feed of first axis (A-axis) for 10 seconds for 100 mm.
3. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- 2 Constant number or an address can be specified to the parameters; Cutting feed time and Total moving distance.



## 4.17 Reset PMC axis control

### 4.17.1 Function block name

PFL0\_PMC\_AXCTL\_RESET\_01 ... Reset PMC axis control (group 1)  
PFL0\_PMC\_AXCTL\_RESET\_02 ... Reset PMC axis control (group 2)  
PFL0\_PMC\_AXCTL\_RESET\_03 ... Reset PMC axis control (group 3)  
PFL0\_PMC\_AXCTL\_RESET\_04 ... Reset PMC axis control (group 4)

### 4.17.2 Function

This function block resets the PMC axis control command that is currently working or is stored in command buffer.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 4.17.3 Format

Graphical format of PFL0\_PMC\_AXCTL\_RESET\_01 is shown below:

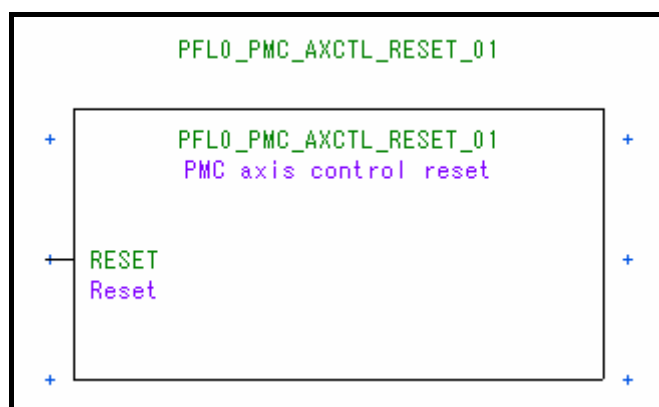


Figure 4.17.3 (a) PFL0\_PMC\_AXCTL\_RESET\_01 (group 1)

### 4.17.4 Parameters

Details of the parameters of this function block are as shown below:

Table 4.17.4 (a) List of parameters

Symbol	Parameter type	Data type	Count	Description
RESET	Input parameter	BOOL	-	Reset signal 0: Do not reset PMC axis control command. 1: Reset PMC axis control command. (Note 1)

#### Note

- 1 Turn on input RESET to reset PMC axis control, and then the PMC control command of the group that is currently executed or is stored in command buffer is reset. This also turns off W1 of the function blocks of the group.
- 2 When ACTs of a function blocks for PMC axis control, and RESET of this function block of the same group, turn on at once, RESET of this function block defeats ACTs.

## 4.17.5 External variables

This function block uses the following external variables:

Table 4.17.5 (a) List of external variables

Symbol	Data type	Count	Description
GRP_AXCTL_RST_01	BOOL	-	Reset signal for PMC axis control command Signals to reset control command of the corresponding group. (Note 1)
GRP_AXCTL_RST_02			
GRP_AXCTL_RST_03			
GRP_AXCTL_RST_04			

### Note

1 Different symbols are used for each group. Please define the symbols you will actually use.

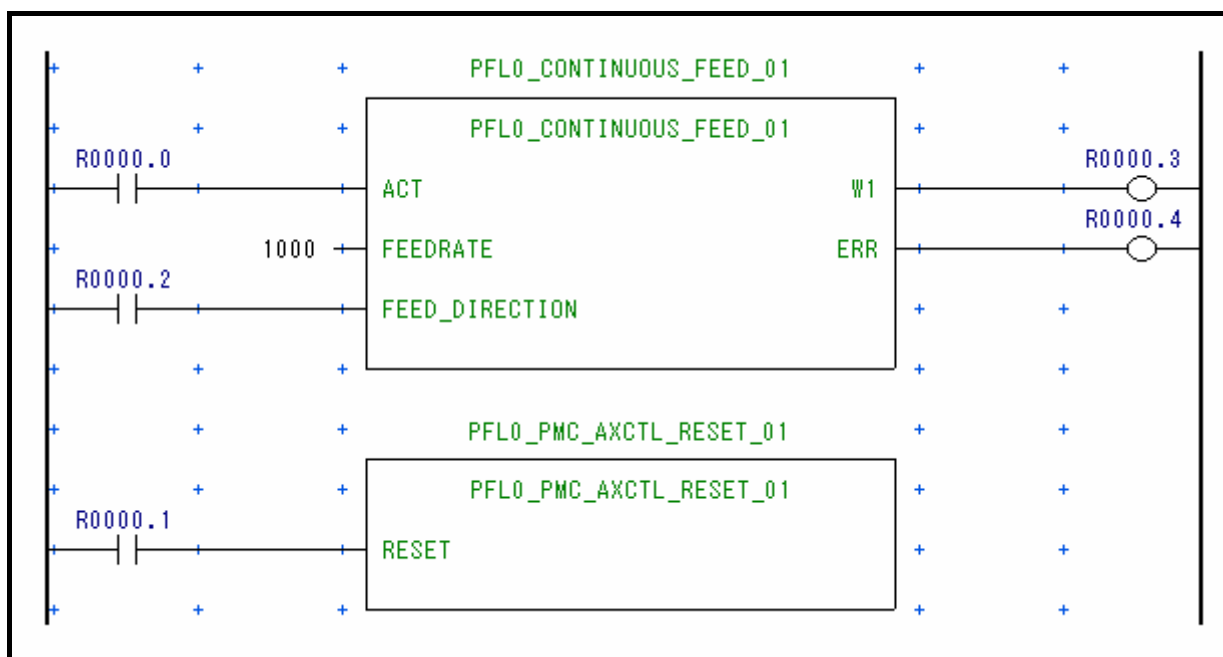
## 4.17.6 Example

The following example is to reset the PMC axis control command of continuous feed of the first axis (A-axis) of the first path controlled by group 1, at speed 1000 mm/min in positive direction.

Function block to use: PFL0\_PMC\_AXCTL\_RESET\_01 for group 1

Parameters:

- Reset signal (RESET): R0000.1



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
2. Turn on ACT (R0000.0) (ACT=1) to start continuous feed of first axis (A-axis).
3. When W1=1, turn off ACT (ACT=0).
4. Turn on RESET (R0000.1) while the axis performs continuous feed, to stop the PMC control command of continuous feed of the axis.
5. Turn off RESET.

# 5

## Function blocks of peripheral equipment control

This chapter describes the usage of the function blocks of peripheral equipment control functions provided by PMC Function Library for PMC axis control (PMC\_AXIS\_CONTROL.FLL).

### 5.1 Jog operation

#### 5.1.1 Function block name

PFL1_JOG_OPERATION_01	.....	Jog operation (group 1)
PFL1_JOG_OPERATION_02	.....	Jog operation (group 2)
PFL1_JOG_OPERATION_03	.....	Jog operation (group 3)
PFL1_JOG_OPERATION_04	.....	Jog operation (group 4)

#### 5.1.2 Function

This function block performs jog operation at the feedrate specified by input parameters. While the input parameter of positive direction is turned on, the axis moves continuously in positive direction, and also negative direction.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

If both of input parameters of positive and negative direction are turned on, this function block does not work

#### 5.1.3 Format

Graphical format of PFL1\_JOG\_OPERATION\_01 is shown below:

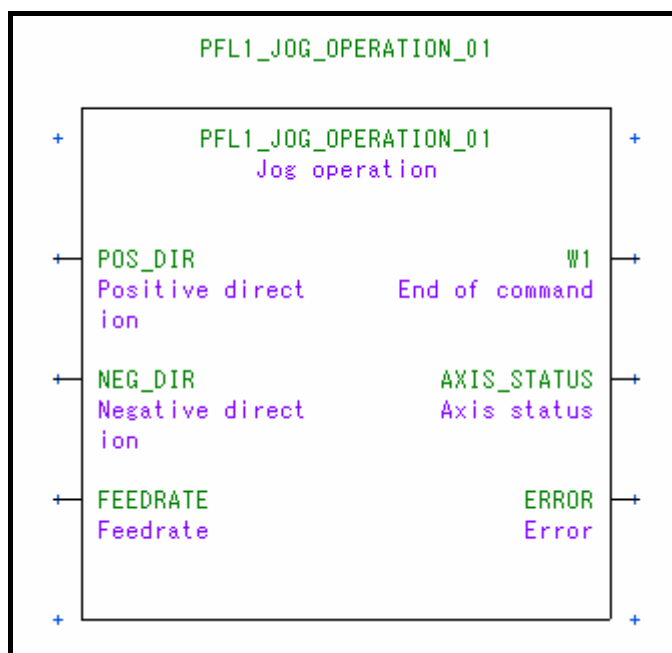


Figure 5.1.3 (a) PFL1\_JOG\_OPERATION\_01 (group 1)

## 5.1.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.1.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
POS_DIR	input parameter	BOOL	-	Positive direction (Note 2) 0: Do not move axis. 1: Move axis in positive direction.
NEG_DIR	input parameter	BOOL	-	Negative direction (Note 2) 0: Do not move axis. 1: Move axis in negative direction.
FEEDRATE	input parameter	UINT	1	Continuous feedrate Specify the continuous feedrate. Valid range is 1 to 65535. (Note 3)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 5, 6) 0: Normally W1=0. 1: Turns on for one cycle just after axis stops. Also turns on at error.
AXIS_STATUS	output parameter	BOOL	-	Axis status Indicates the status of the axis (Note 4) 0: Axis is not moving. 1: Axis is moving.
ERROR	output parameter	BOOL	-	Error signal Indicates error status at execution. 0: Finished successfully. 1: Finished with an error.

### Note

- 1 This function block turns off the buffering disable signal (EMBUFg) while it is working.
- 2 If both of POS\_DIR and NEG\_DIR are turned on, axis will not move either way.
- 3 This function block internally uses function block for continuous feed. For more details, please refer to the section "(7) Continuous feed" in chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 4 AXIS\_STATUS signal is generated from axis moving signal (EGENg) and in-position signal (EINPg). To issue the next command after the axis stops, check if both of AXIS\_STATUS and control axis selection status signal (\*EAXSL) are turned off.
- 5 W1 turns on just after the axis stops, and turns off one scan after.
- 6 Because reset is used to stop the axis, any other PMC axis control command of the same group will also be reset.

## 5.1.5 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

**Table 5.1.5 (a) Signals to modify**

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

**Table 5.1.5 (b) Signals to refer**

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)
EGENg	F130.4	Axis moving signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.1.6 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.1.6 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
JOV (1402#1)	Disables jog override.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
F10 (8002#3)	Selects the least increment of feedrate of cutting feed – feed per minute at PMC axis control.
JFM (8004#2)	Selects the unit of feedrate of continuous feed in PMC axis control.
No.8010	DI/DO group of PMC axis control for each axis.

### Note

For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.1.7 Related signals

The signals related to this function block are listed below:

**Table 5.1.7 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
*EAXSL	F129.7	Control axis selection status signal (PMC axis control)

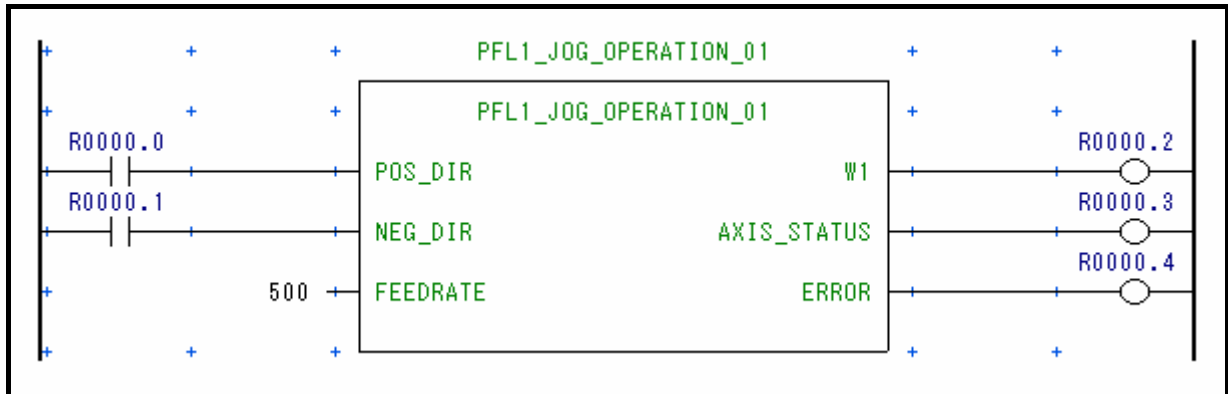
### Note

For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.1.8 Example

The following example is to perform jog operation of the first axis (A-axis) of the first path controlled by group 1, at speed 500 mm/min in positive direction.

Function block to use:	PFL1_JOG_OPERATION_01	for group 1
Parameters:		
- Positive direction (POS_DIR):	R0000.0	
- Negative direction (NEG_DIR):	R0000.1	
- Continuous feedrate (FEEDRATE):	500	continuous feedrate; 500 mm/min (unit: metric IS-B)
- Completion signal (W1):	R0000.2	
- Axis status (AXIS_STATUS):	R0000.3	
- Error signal (ERR):	R0000.4	



1. Apply the following configuration to assign first axis (A-axis) to first path:
  - a) Set “1” to CNC parameter No.981 of first axis (A-axis).
2. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program.
3. Turn on POS\_DIR (R0000.0) and off NEG\_DIR (R0000.1) to start the first axis (A-axis) to move in positive direction, and then AXIS\_STATUS (R0000.3) turns on.
4. Turn off both of POS\_DIR (R0000.0) and NEG\_DIR (R0000.1) to stop the axis. AXIS\_STATUS (R0000.3) turns off, and W1 turns on for one cycle.

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- 2 Constant number or an address can be specified to the parameter Continuous feedrate.

## 5.2 ATC/Turret control – Automatic operation

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### 5.2.1 Function block name

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PFL1_ATC_TURRET_CNTL_AUTO_01	.....	ATC/Turret control – Automatic operation (group 1)
PFL1_ATC_TURRET_CNTL_AUTO_02	.....	ATC/Turret control – Automatic operation (group 2)
PFL1_ATC_TURRET_CNTL_AUTO_03	.....	ATC/Turret control – Automatic operation (group 3)
PFL1_ATC_TURRET_CNTL_AUTO_04	.....	ATC/Turret control – Automatic operation (group 4)

### 5.2.2 Function

---

This function block moves ATC/turret to the position, in the rotation direction (shortcut, positive, or negative), at the feedrate, specified by input parameters. The position of turret/magazine begins with “1”.

Specify the amount of travel per ATC rotation and the number of turrets/magazines to the input parameters.

The axis must be a rotary axis, and the amount of travel per rotation should be the value of CNC parameter No.1260 (shift amount per one rotation of a rotary axis).

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 The axis controlled by this function block should be setup as rotary axis type A by CNC parameter.
- 2 This function block reads the current position (absolute) of the axis internally. Specify the path and axis number of the axis to the input parameters.
- 3 For details of the CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

### 5.2.3 Format

Graphical format of PFL1\_ATC\_TURRET\_CNTL\_AUTO\_01 is shown below:

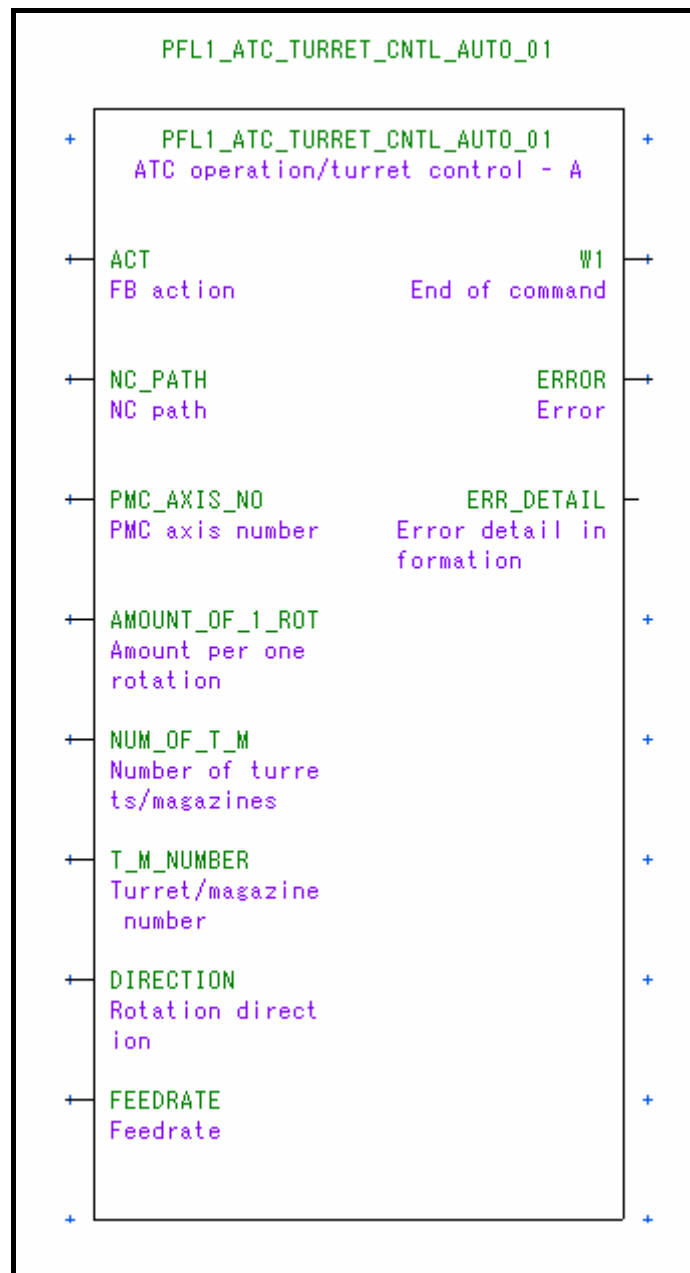


Figure 5.2.3 (a) PFL1\_ATC\_TURRET\_CNTL\_AUTO\_01 (group 1)



## 5.2.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.2.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute ATC/turret control. 1: Execute ATC/turret control. (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
AMOUNT_OF_1_ROT	input parameter	DINT	1	Amount of travel per rotation Specify the amount of travel per rotation of the rotary axis. Set the value of CNC parameter No.1260. (Note 3)
NUM_OF_T_M	input parameter	UINT	1	Number of turrets/magazines Specify the number of turrets/magazines. Valid range is 1 to 65535.
T_M_NUMBER	input parameter	UINT	1	Turret/magazine number Specify the turret/magazine number to go to. Turret/magazine number begins with "1".
DIRECTION	input parameter	USINT	1	Rotation direction Specify the direction of the axis rotation. 1: shortcut rotation 2: positive direction 3:negative direction
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 4)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 5) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.2.5 Error information".

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 For the details of CNC parameter No.1260, please refer to "CONNECTION MANUAL (FUNCTION)" of your CNC. The input parameter AMOUNT\_OF\_1\_ROT (amount of travel per rotation) should be "Value of CNC parameter No.1260"  $\times 10^{\text{decimal point position}}$ . Valid range is as followings:

IS-A	IS-B to IS-E
0 – 99999999 (8 digits)	0 – 999999999 (9 digits)

- 4 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.2.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

Table 5.2.5 (a) List of error codes

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
2	Axis configuration error (CNC parameter error) - The PMC-controlled axis is not a rotary axis (A type). Check the value of CNC parameter No.1006.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
13	Number of turrets/magazines error (input parameter error) - Specified number of turrets/magazines is out of valid range.
14	Turret/magazine number error (input parameter error) - Specified turret/magazine number of destination is out of valid range.
15	Rotation direction error (input parameter error) - Rotation direction out of range 1 to 3 is specified.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.2.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

Table 5.2.6 (a) Signals to modify

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

Table 5.2.6 (b) Signals to refer

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.2.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

Table 5.2.7 (a) List of related CNC parameters

CNC parameter	Description
No.981	Path number that each axis belong to.
ROT <sub>x</sub> (No.1006#0)	Selects type of each axis; linear or rotary. (Note 1)
ROS <sub>x</sub> (No.1006#1)	Selects type of rotary axis. (Note 1)
DIA <sub>x</sub> (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
ROA <sub>x</sub> (No.1008#0)	Enables roll-over of rotary axis. (Note 1)
No.1013	Selects increment system of each axis.
No.1260	Shift amount per rotation of rotary axis.
JOV (1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".
No.8010	DI/DO group of PMC axis control for each axis. (Note 2)

### Note

- 1 To use this function block, the axis to be controlled has to be a rotary axis (A type), and the roll-over function has to be enabled. An error will be issued if the axis is not rotary axis (A type).
- 2 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 3 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.2.8 Related signals

The signals related to this function block are listed below:

Table 5.2.8 (a) List of related signals

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
MV1~MV8	F102	Axis moving signals

### Note

For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.2.9 Example

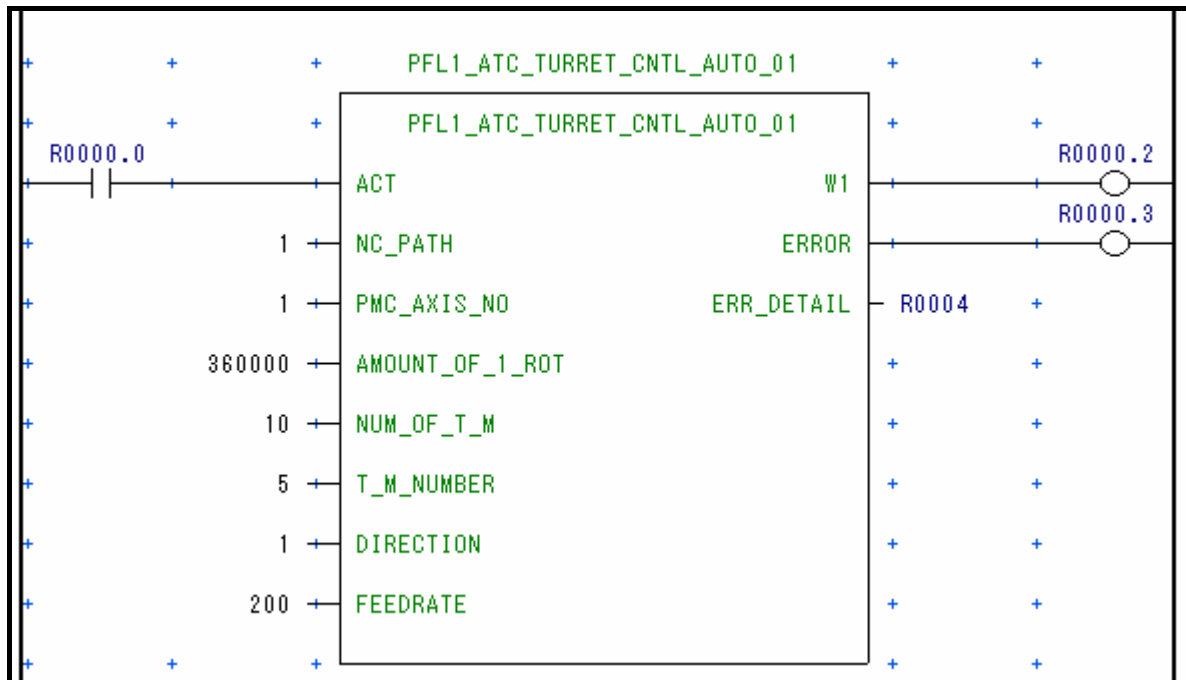
The following example is to move the first axis (A-axis) of the first path controlled by group 1, to the turret/magazine #5 of ATC/turret of 10 turrets/magazines, whose amount of travel per rotation is 360.000, at the feedrate 200 deg/min in direction of shortcut rotation.

Function block to use:

PFL1\_ATC\_TURRET\_CNTL\_AUTO\_01 for group 1

Parameters:

- Activation (ACT):	R0000.0	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Amount of travel per rotation (AMOUNT_OF_1_ROT):	360000	amount of travel per rotation; 360.000 (unit: IS-B)
- Number of turrets/magazines (NUM_OF_T_M):	10	number of turret/magazines; 10
- Turret/magazine number (T_M_NUMBER):	5	target turret/magazine number; 5
- Rotation direction (DIRECTION):	1	shortcut rotation
- Rapid traverse feedrate (FEEDRATE):	200	rapid traverse feedrate; 200 deg/min (unit: IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



- Apply the following configuration to setup a rotary axis:
  - Set "1" to CNC parameter ROTx (No.1006#0), and "0" to ROSx (No.1006#1), to select rotary axis (A type).
  - Set "1" to CNC parameter ROAx (No.1008#0) to enable roll-over function of the rotary axis.
- Apply the following configuration to assign first axis (A-axis) to first path:
  - Set "1" to CNC parameter No.981 of first axis (A-axis).
- Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
- Apply the following configuration to enable rapid traverse speed of input parameter:
  - Turn on CNC parameter RPD (No.8002#0).
- Turn on ACT (R0000.0) to start moving to the turret/magazine #5 in the direction of shortcut rotation.
- Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

**Note**

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Rapid traverse feedrate.

## 5.3 ATC/Turret control – 1-pitch rotation

---

### 5.3.1 Function block name

---

PFL1_ATC_TURRET_CNTL_PITCH_01	.....	ATC/Turret control – 1-pitch operation (group 1)
PFL1_ATC_TURRET_CNTL_PITCH_02	.....	ATC/Turret control – 1-pitch operation (group 2)
PFL1_ATC_TURRET_CNTL_PITCH_03	.....	ATC/Turret control – 1-pitch operation (group 3)
PFL1_ATC_TURRET_CNTL_PITCH_04	.....	ATC/Turret control – 1-pitch operation (group 4)

### 5.3.2 Function

---

This function block moves to the next ATC/turret, in the direction (positive or negative), at the feedrate, specified by input parameters.

Specify the amount of travel per ATC rotation and the number of turrets/magazines to the input parameters. The axis must be a rotary axis, and the amount of travel per rotation should be the value of CNC parameter No.1260 (shift amount per one rotation of a rotary axis).

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 The axis controlled by this function block should be setup as rotary axis type A by CNC parameter.
- 2 This function block reads the current position (absolute) of the axis internally. Specify the path and axis number of the axis to the input parameters.
- 3 For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

### 5.3.3 Format

Graphical format of PFL1\_ATC\_TURRET\_CNTL\_PITCH\_01 is shown below:

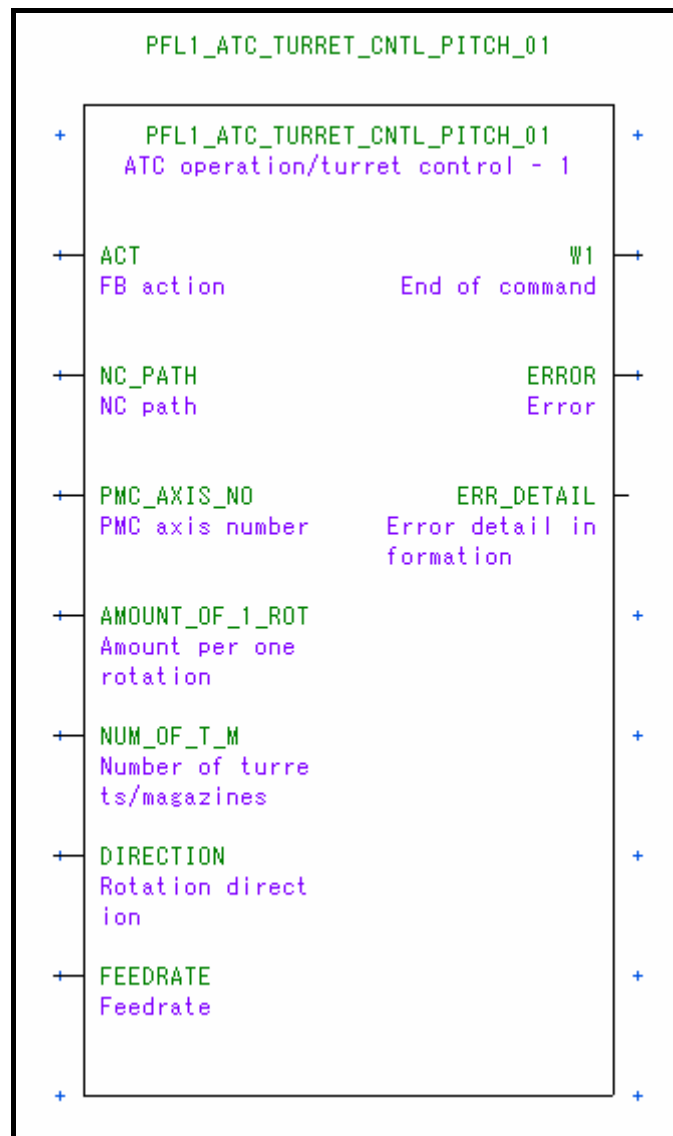


Figure 5.3.3 (a) PFL1\_ATC\_TURRET\_CNTL\_PITCH\_01 (group 1)

## 5.3.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.3.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute ATC/turret control. 1: Execute ATC/turret control. (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
AMOUNT_OF_1_ROT	input parameter	DINT	1	Amount of travel per rotation Specify the amount of travel per rotation of the rotary axis. Set the value of CNC parameter No.1260. (Note 3)
NUM_OF_T_M	input parameter	UINT	1	Number of turrets/magazines Specify the number of turrets/magazines. Valid range is 1 to 65535.
DIRECTION	input parameter	BOOL	-	Rotation direction Specify the direction of the axis rotation. 0: positive direction 1: negative direction
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 4)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 5) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.3.5 Error information".



### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 For the details of CNC parameter No.1260, please refer to "CONNECTION MANUAL (FUNCTION)" of your CNC. The input parameter AMOUNT\_OF\_1\_ROT (amount of travel per rotation) should be "Value of CNC parameter No1260"  $\times 10^{\text{decimal point position}}$ . Valid range is as followings:

IS-A	IS-B to IS-E
0 – 99999999 (8 digits)	0 – 999999999 (9 digits)

- 4 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.3.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

**Table 5.3.5 (a) List of error codes**

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
2	Axis configuration error (CNC parameter error) - The PMC-controlled axis is not a rotary axis (A type). Check the value of CNC parameter No.1006.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
13	Number of turrets/magazines error (input parameter error) - Specified number of turrets/magazines is out of valid range.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.3.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

**Table 5.3.6 (a) Signals to modify**

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

**Table 5.3.6 (b) Signals to refer**

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.3.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.3.7 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
ROTx (No.1006#0)	Selects type of each axis; linear or rotary. (Note 1)
ROSx (No.1006#1)	Selects type of rotary axis. (Note 1)
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
ROAx (No.1008#0)	Enables roll-over of rotary axis. (Note 1)
No.1013	Selects increment system of each axis.
No.1260	Shift amount per rotation of rotary axis.
JOV (1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".
No.8010	DI/DO group of PMC axis control for each axis. (Note 2)

### Note

- 1 To use this function block, the axis to be controlled has to be a rotary axis (A type), and the roll-over function has to be enabled. An error will be issued if the axis is not rotary axis (A type).
- 2 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 3 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.3.8 Related signals

The signals related to this function block are listed below:

**Table 5.3.8 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
MV1~MV8	F102	Axis moving signals

### Note

For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.3.9 Example

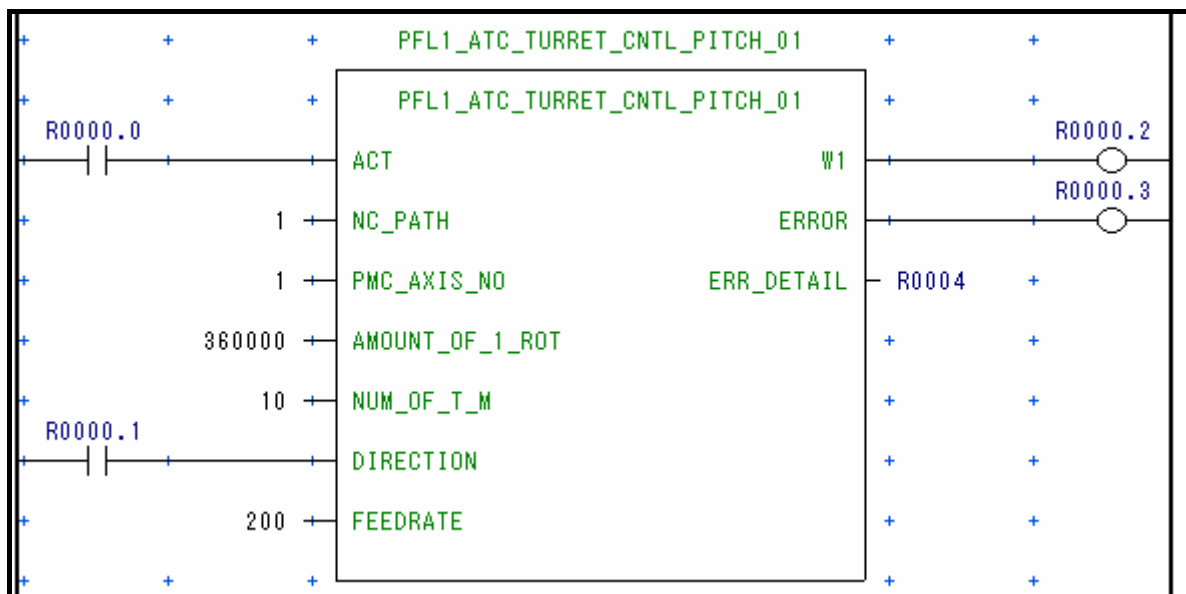
The following example is to move the first axis (A-axis) of the first path controlled by group 1, to the next turret/magazine of ATC/turret of 10 turrets/magazines, whose amount of travel per rotation is 360.000, at the feedrate 200 deg/min in positive direction.

Function block to use:

PFL1\_ATC\_TURRET\_CNTL\_PITCH\_01 for group 1

Parameters:

- Activation (ACT):	R0000.0	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Amount of travel per rotation (AMOUNT_OF_1_ROT):	360000	amount of travel per rotation; 360.000 (unit: IS-B)
- Number of turrets/magazines (NUM_OF_T_M):	10	number of turret/magazines; 10
- Rotation direction (DIRECTION):	R0000.1	0: positive direction
- Rapid traverse feedrate (FEEDRATE):	200	rapid traverse feedrate; 200 deg/min (unit: IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



1. Apply the following configuration to setup a rotary axis:
  - a) Set "1" to CNC parameter ROTx (No.1006#0), and "0" to ROSx (No.1006#1), to select rotary axis (A type).
  - b) Set "1" to CNC parameter ROAx (No.1008#0) to enable roll-over function of the rotary axis.
2. Apply the following configuration to assign first axis (A-axis) to first path:
  - a) Set "1" to CNC parameter No.981 of first axis (A-axis).
3. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
4. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
5. Turn on ACT (R0000.0) to start moving to the next turret/magazine in the positive direction.
6. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Rapid traverse feedrate.

## 5.4 Point positioning (linear axis)

---

### 5.4.1 Function block name

---

PFL1_POINT_POSITIONING_LA_01	.....	Point positioning (linear axis) (group 1)
PFL1_POINT_POSITIONING_LA_02	.....	Point positioning (linear axis) (group 2)
PFL1_POINT_POSITIONING_LA_03	.....	Point positioning (linear axis) (group 3)
PFL1_POINT_POSITIONING_LA_04	.....	Point positioning (linear axis) (group 4)

### 5.4.2 Function

---

Prepare a point data table in PMC address (D-address typically) in which the set of coordinates (absolute) are registered. This function block moves the axis to the coordinate (absolute) of the specified point number, which points the target position in the point data table, and at the feedrate, specified by the input parameters. Also specify the top address of the prepared point data table and the total of points in the table to each input parameter.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 This function block is designed for a linear axis.
- 2 This function block reads the current position (absolute) of the axis internally. Specify the path and axis number of the axis to the input parameters.
- 3 For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

### 5.4.3 Format

Graphical format of PFL1\_POINT\_POSITIONING\_LA\_01 is shown below:

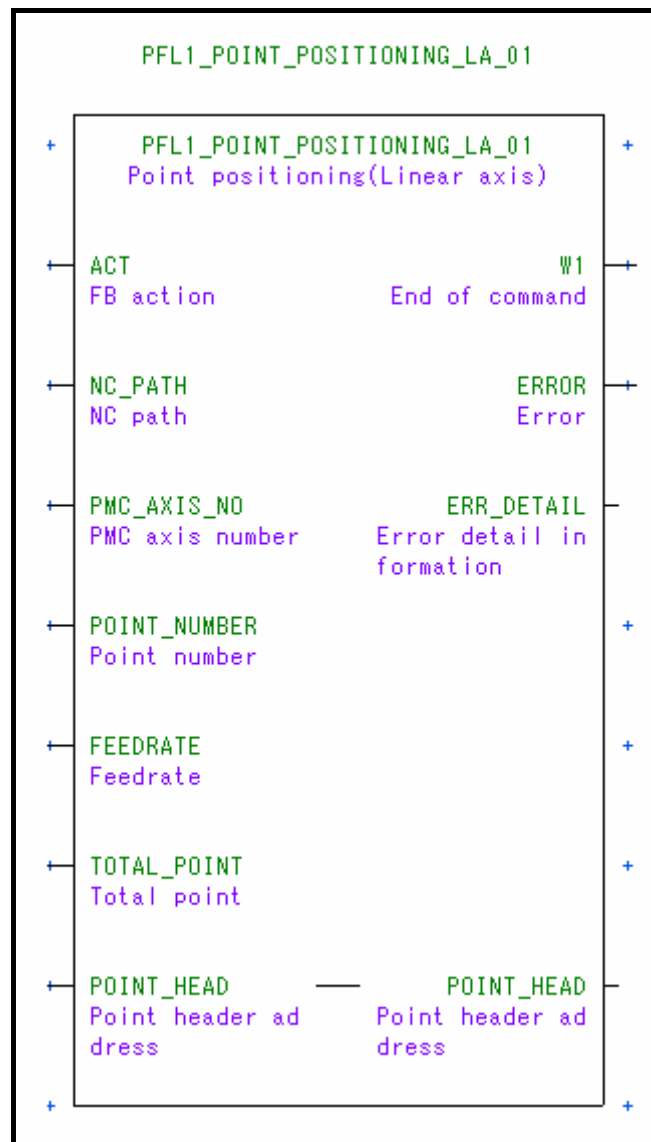


Figure 5.4.3 (a) PFL1\_POINT\_POSITIONING\_LA\_01 (group 1)

## 5.4.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.4.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute point positioning. 1: Execute point positioning. (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
POINT_NUMBER	input parameter	UINT	1	Point number Specify the point number which points the target coordinate (absolute) in the point data table. Valid range is 1 to total points.
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 4)
TOTAL_POINT	input parameter	UINT	1	Total points Specify the total points of the point data table. Valid range is 1 to 16384. (Note 3)
POINT_HEAD	input/output parameter	DINT	1	Top address of point data table Specify the top address of the point data table containing the set of coordinates (absolute). Typically, point data table is located in PMC address such as D-address.
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 5) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.4.5 Error information".

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 Valid range is 1 to 16384; however, the size of table cannot exceed the end of the address area.
- 4 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.4.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

**Table 5.4.5 (a) List of error codes**

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
16	Total points error (input parameter error) - Specified total points is out of valid range.
17	Point number error (input parameter error) - Specified point number is out of valid range.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.4.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

**Table 5.4.6 (a) Signals to modify**

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

**Table 5.4.6 (b) Signals to refer**

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.4.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

Table 5.4.7 (a) List of related CNC parameters

CNC parameter	Description
No.981	Path number that each axis belong to.
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
JOV (No.1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".
No.8010	DI/DO group of PMC axis control for each axis. (Note 1)

### Note

- 1 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 2 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.4.8 Related signals

The signals related to this function block are listed below:

Table 5.4.8 (a) List of related signals

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
MV1~MV8	F102	Axis moving signals

### Note

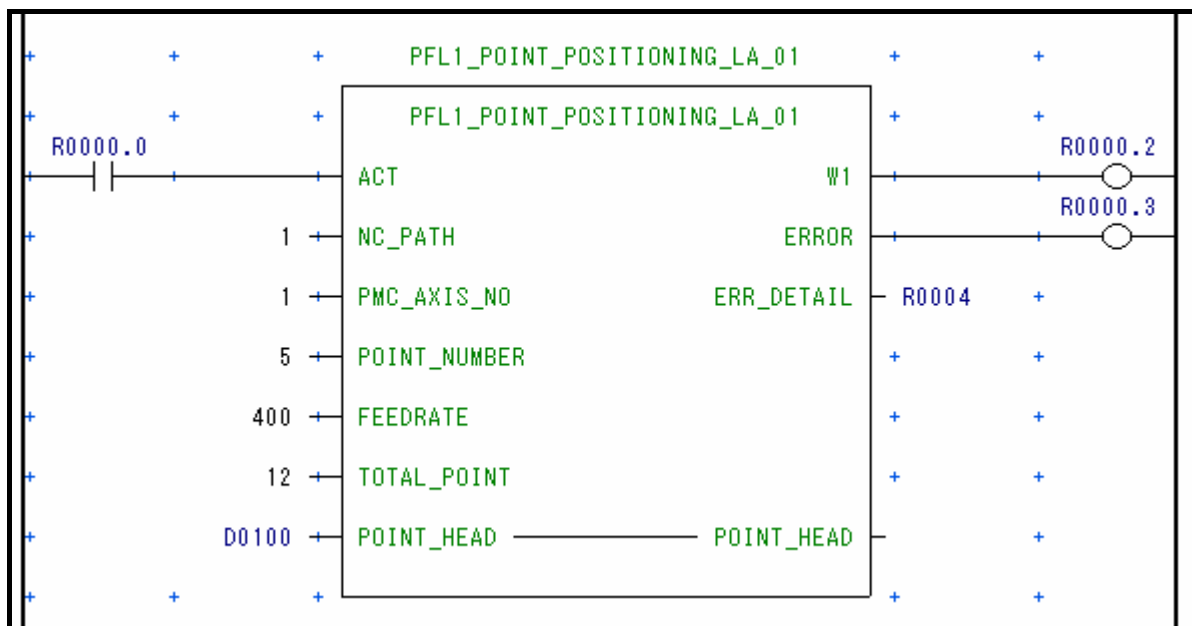
For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.



## 5.4.9 Example

The following example is to execute rapid traverse of the first axis (A-axis) of the first path controlled by group 1, to the coordinate (absolute) that point number 5 points in the point data table of D0100 – D0147 which contains 12 points total, at the feedrate 400 mm/min.

Function block to use:	PFL1_POINT_POSITIONING_LA_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Point number (POINT_NUMBER):	5	point number of destination; 5
- Rapid traverse feedrate (FEEDRATE):	400	rapid traverse feedrate; 400 mm/min (unit: metric, IS-B)
- Total points (TOTAL_POINT):	12	total of points in the point data table; 12
- Top address of point data table (POINT_HEAD):	D0100	
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



1. Prepare a point data table of 12 points at D0100 – D0147, containing coordinates (absolute) of each point. (4 bytes × 12)
2. Apply the following configuration to assign first axis (A-axis) to first path:
  - a) Set “1” to CNC parameter No.981 of first axis (A-axis).
3. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
4. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
5. Turn on ACT (R0000.0) to start moving first axis (A-axis) to the coordinate stored as point #5 at D0116.
6. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Rapid traverse feedrate.

## 5.5 Point positioning (rotary axis)

---

### 5.5.1 Function block name

---

PFL1_POINT_POSITIONING_RA_01	.....	Point positioning (rotary axis) (group 1)
PFL1_POINT_POSITIONING_RA_02	.....	Point positioning (rotary axis) (group 2)
PFL1_POINT_POSITIONING_RA_03	.....	Point positioning (rotary axis) (group 3)
PFL1_POINT_POSITIONING_RA_04	.....	Point positioning (rotary axis) (group 4)

### 5.5.2 Function

---

Prepare a point data table in PMC address (D-address typically) in which the set of coordinates (absolute) are registered. This function block moves the axis to the coordinate (absolute) of the specified point number, which points the target position in the point data table, in the rotation direction (shortcut, positive, or negative), and at the feedrate, specified by the input parameters.

Also specify the top address of the prepared point data table and the total of points in the table to each input parameter. The axis must be a rotary axis, and the amount of travel per rotation should be equal to the value of CNC parameter No.1260 (shift amount per one rotation of a rotary axis).

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 The axis controlled by this function block should be setup as rotary axis type A by CNC parameter.
- 2 This function block reads the current position (absolute) of the axis internally. Specify the path and axis number of the axis to the input parameters.
- 3 For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

### 5.5.3 Format

Graphical format of PFL1\_POINT\_POSITIONING\_RA\_01 is shown below:

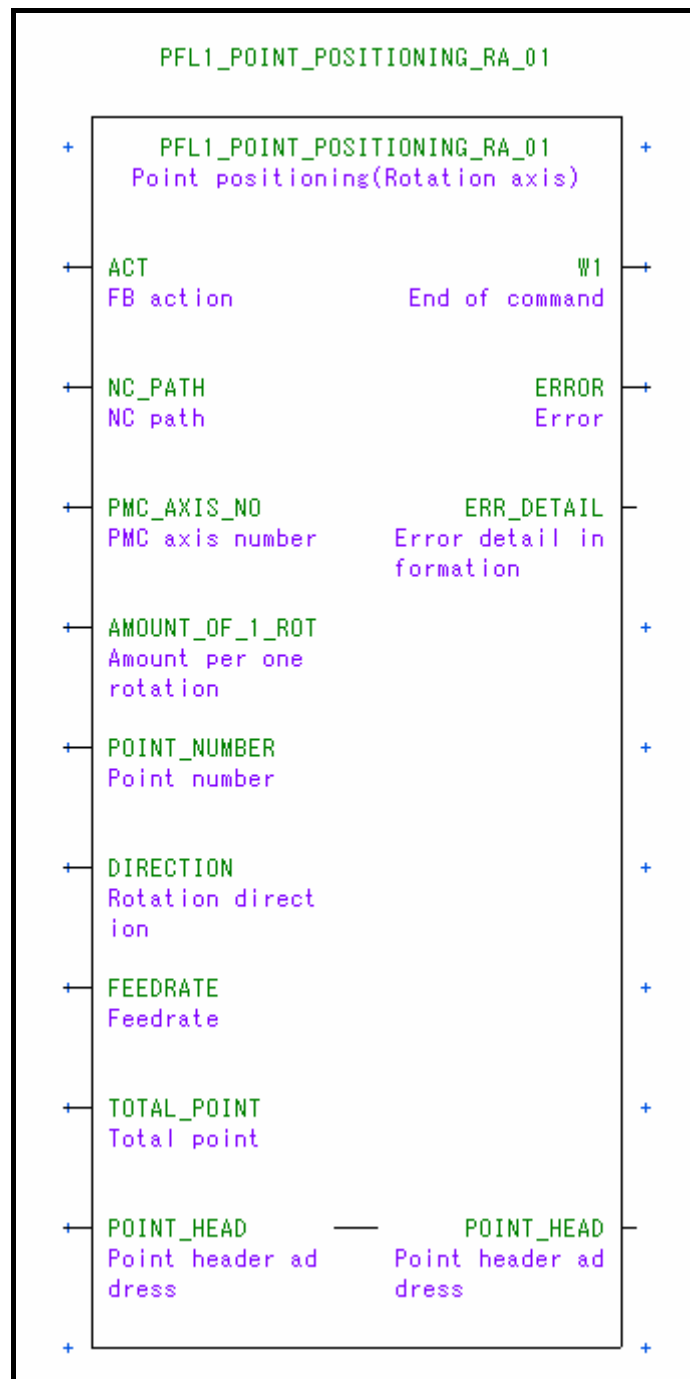


Figure 5.5.3 (a) PFL1\_POINT\_POSITIONING\_RA\_01 (group 1)

## 5.5.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.5.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute point positioning. 1: Execute point positioning. (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
AMOUNT_OF_1_ROT	input parameter	DINT	1	Amount of travel per rotation Specify the amount of travel per rotation of the rotary axis. Set the value of CNC parameter No.1260. (Note 3)
POINT_NUMBER	input parameter	UINT	1	Point number Specify the point number which points the target coordinate (absolute) in the point data table. Valid range is 1 to total points.
DIRECTION	input parameter	USINT	1	Rotation direction Specify the direction of the axis rotation. 1: shortcut rotation 2: positive direction 3: negative direction
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 5)
TOTAL_POINT	input parameter	UINT	1	Total points Specify the total points of the point data table. Valid range is 1 to 16384. (Note 4)
POINT_HEAD	input/output parameter	DINT	1	Top address of point data table Specify the top address of the point data table containing the set of coordinates (absolute). Typically, point data table is located in PMC address such as D-address.
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 6) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.4.5 Error information".

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 For the details of CNC parameter No.1260, please refer to "CONNECTION MANUAL (FUNCTION)" of your CNC. The input parameter AMOUNT\_OF\_1\_ROT (amount of travel per rotation) should be "Value of CNC parameter No.1260"  $\times 10^{\text{decimal point position}}$ . Valid range is as followings:

IS-A	IS-B to IS-E
0 – 99999999 (8 digits)	0 – 999999999 (9 digits)

- 4 Valid range is 1 to 16384; however, the size of table cannot exceed the end of the address area.
- 5 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 6 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.5.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

**Table 5.5.5 (a) List of error codes**

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
2	Axis configuration error (CNC parameter error) - The PMC-controlled axis is not a rotary axis (A type). Check the value of CNC parameter No.1006.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
15	Rotation direction error (input parameter error) - Rotation direction out of range 1 to 3 is specified.
16	Total points error (input parameter error) - Specified total points is out of valid range.
17	Point number error (input parameter error) - Specified point number is out of valid range.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.5.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

**Table 5.5.6 (a) Signals to modify**

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

**Table 5.5.6 (b) Signals to refer**

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.5.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.5.7 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
ROT <sub>x</sub> (No.1006#0)	Selects type of each axis; linear or rotary. (Note 1)
ROS <sub>x</sub> (No.1006#1)	Selects type of rotary axis. (Note 1)
DIA <sub>x</sub> (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
ROA <sub>x</sub> (No.1008#0)	Enables roll-over of rotary axis. (Note 1)
No.1013	Selects increment system of each axis.
No.1260	Shift amount per rotation of rotary axis.
JOV (No.1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".
No.8010	DI/DO group of PMC axis control for each axis. (Note 2)

### Note

- 1 To use this function block, the axis to be controlled has to be a rotary axis (A type), and the roll-over function has to be enabled. An error will be issued if the axis is not rotary axis (A type).  
Please use the function block of "Point positioning (linear axis)" when using the rotary axis (B type).
- 2 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 3 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.5.8 Related signals

The signals related to this function block are listed below:

**Table 5.5.8 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
MV1~MV8	F102	Axis moving signals

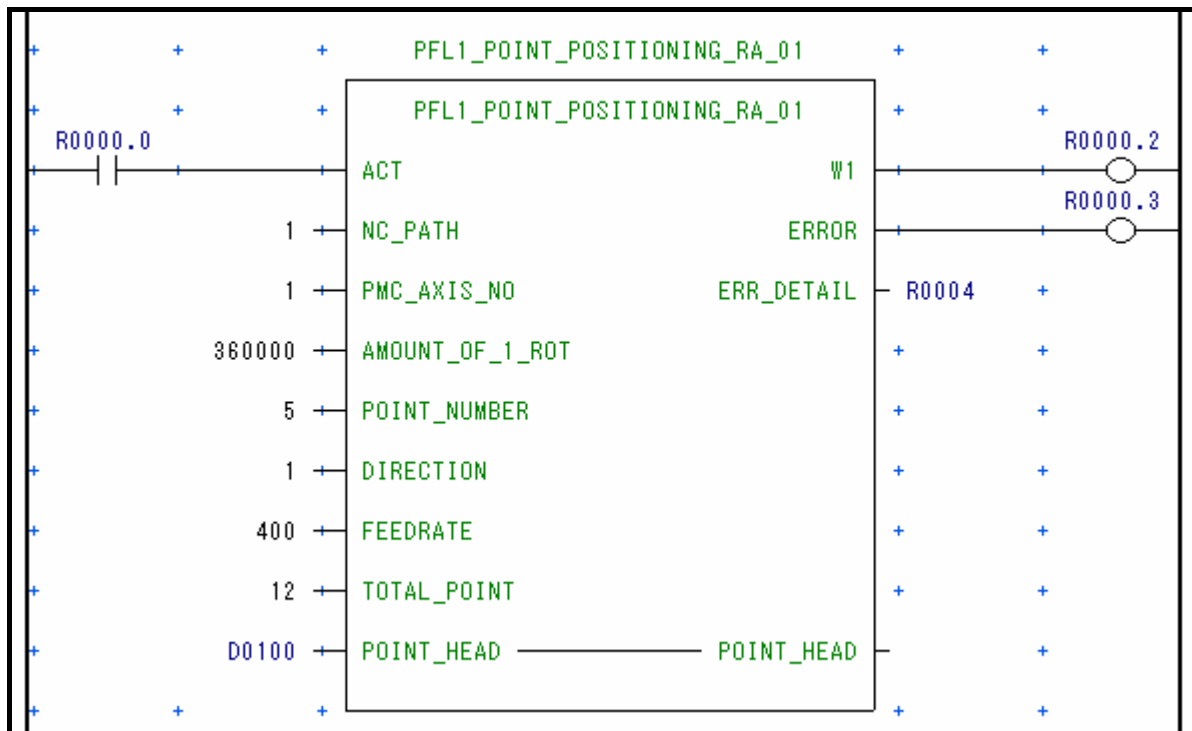
### Note

For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.5.9 Example

The following example is to execute rapid traverse of the first axis (A-axis) of the first path controlled by group 1, to the coordinate (absolute) that point number 5 points in the point data table of D0100 – D0147 which contains 12 points total, whose amount of travel per rotation is 360.000, at the feedrate 400 deg/min in direction of shortcut rotation.

Function block to use:	PFL1_POINT_POSITIONING_RA_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Amount of travel per rotation (AMOUNT_OF_1_ROT):	360000	amount of travel per rotation; 360.000 (unit: IS-B)
- Point number (POINT_NUMBER):	5	point number of destination; 5
- Rotation direction (DIRECTION):	1	shortcut rotation
- Rapid traverse feedrate (FEEDRATE):	400	rapid traverse feedrate; 400 deg/min (unit: metric, IS-B)
- Total points (TOTAL_POINT):	12	total of points in the point data table; 12
- Top address of point data table (POINT_HEAD):	D0100	
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



1. Prepare a point data table of 12 points at D0100 – D0147, containing coordinates (absolute) of each point. (4 bytes × 12)
2. Apply the following configuration to setup a rotary axis:
  - a) Set “1” to CNC parameter ROTx (No.1006#0), and “0” to ROSx (No.1006#1), to select rotary axis (A type).
  - b) Set “1” to CNC parameter ROAx (No.1008#0) to enable roll-over function of the rotary axis.
3. Apply the following configuration to assign first axis (A-axis) to first path:
  - a) Set “1” to CNC parameter No.981 of first axis (A-axis).
4. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis. Control axis selection signal can be directly processed by ladder program. (Note 1)
5. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).

6. Turn on ACT (R0000.0) to start moving first axis (A-axis) to the coordinate stored as point #5 at D0116 in the direction of shortcut rotation.
7. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

**Note**

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Rapid traverse feedrate.



## 5.6 Reference position return – reference position number

### 5.6.1 Function block name

PFL1_REF_POS_RETURN_NUM_01	.....	Reference position return – reference position number (group 1)
PFL1_REF_POS_RETURN_NUM_02	.....	Reference position return – reference position number (group 2)
PFL1_REF_POS_RETURN_NUM_03	.....	Reference position return – reference position number (group 3)
PFL1_REF_POS_RETURN_NUM_04	.....	Reference position return – reference position number (group 4)

### 5.6.2 Function

This function block executes reference position return of the specified PMC axis to the position of the specified reference position number (1 – 4).

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

For more details, please refer to the section “(6) Reference position return” in chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

### 5.6.3 Format

Graphical format of PFL1\_REF\_POS\_RETURN\_NUM\_01 is shown below:

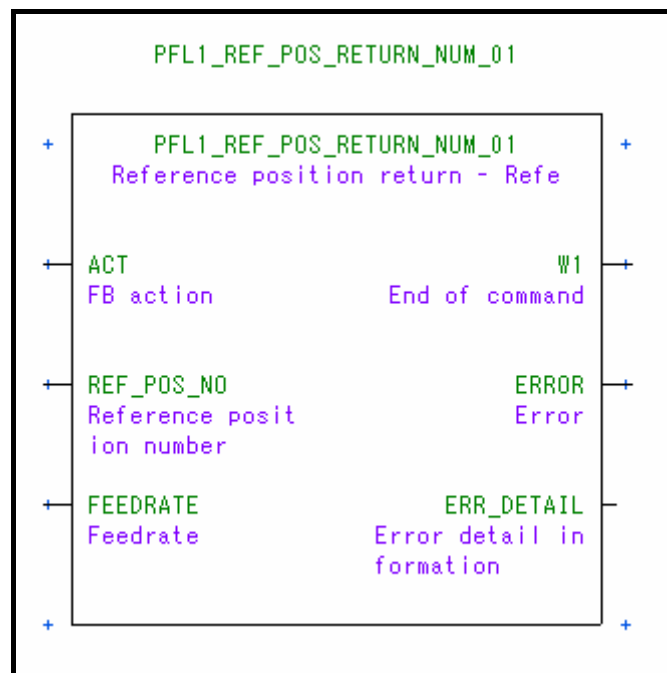


Figure 5.6.3 (a) PFL1\_REF\_POS\_RETURN\_NUM\_01 (group 1)

## 5.6.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.6.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute reference position return. 1: Execute reference position return. (Note 2)
REF_POS_NO	input parameter	USINT	1	Reference position number Specify reference position number. Valid range is 1 to 4, which correspond the reference position of first to fourth.
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 3)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 4) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.6.5 Error information".

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 4 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the following signals also if necessary.
  - First reference position return end signals (ZP1 – ZP8)
  - Second reference position return end signals (ZP21 – ZP28)
  - Third reference position return end signals (ZP31 – ZP38)
  - Fourth reference position return end signals (ZP41 – ZP48)

## 5.6.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

**Table 5.6.5 (a) List of error codes**

Error code	Meaning
18	Reference position number error (PMC axis control function block error) - Reference position number is out of range (1 – 4).
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.6.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

**Table 5.6.6 (a) Signals to modify**

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

**Table 5.6.6 (b) Signals to refer**

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 5.6.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.6.7 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
DLZx (No.1005#1)	Enables function to set reference position without dogs.
No.1013	Selects increment system of each axis.
No.1240	First reference position in the machine coordinate system
No.1241	Second reference position in the machine coordinate system
No.1242	Third reference position in the machine coordinate system
No.1243	Fourth reference position in the machine coordinate system
JOV (No.1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
No.1424	Manual rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
No.8010	DI/DO group of PMC axis control for each axis. (Note 2)

### Note

- 1 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 2 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.6.8 Related signals

The signals related to this function block are listed below:

**Table 5.6.8 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
ZP1~ZP8	F94	First reference position return end signals
ZP21~ZP28	F96	Second reference position return end signals
ZP31~ZP38	F98	Third reference position return end signals
ZP41~ZP48	F100	Fourth reference position return end signals

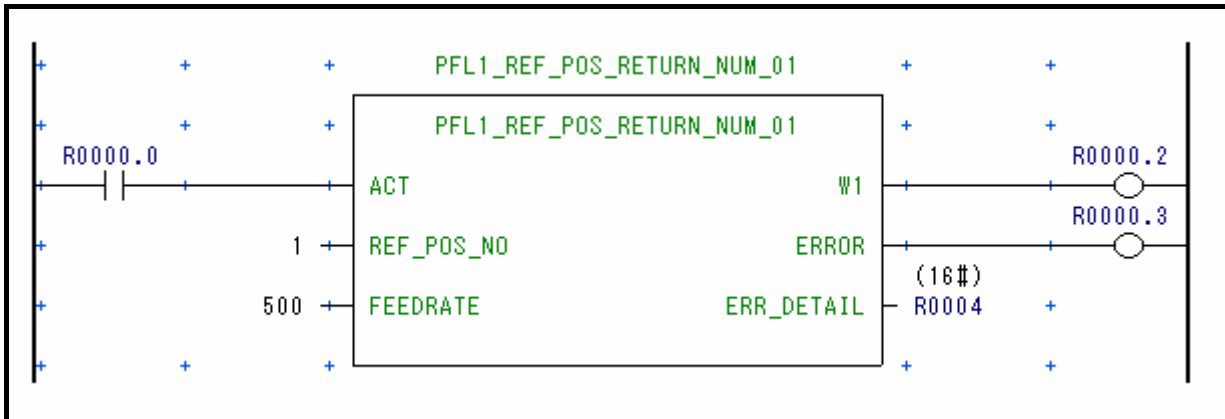
### Note

For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.6.9 Example

The following example is to execute first reference position return of the first axis (A-axis) of the first path controlled by group 1, at the feedrate 500 mm/min.

Function block to use:	PFL1_REF_POS_RETURN_NUM_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Reference position number (REF_POS_NO):	1	reference position number; 1
- Rapid traverse feedrate (FEEDRATE):	500	rapid traverse feedrate; 500 mm/min (unit: metric, IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
2. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
3. Apply the following configuration to set the first reference position to "0":
  - a) Set "0" to CNC parameter No.1240.
4. Turn on ACT (R0000.0) to perform first reference position return of first axis (A-axis).
5. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Rapid traverse feedrate.

## 5.7 Reference position return – reference position setting

### 5.7.1 Function block name

PFL1_REF_POS_RETURN_SET_01	.....	Reference position return – reference position setting (group 1)
PFL1_REF_POS_RETURN_SET_02	.....	Reference position return – reference position setting (group 2)
PFL1_REF_POS_RETURN_SET_03	.....	Reference position return – reference position setting (group 3)
PFL1_REF_POS_RETURN_SET_04	.....	Reference position return – reference position setting (group 4)

### 5.7.2 Function

This function block executes reference position setting of the specified PMC axis, performing the same action of manual reference position return of CNC, after rapid traverse to the direction of manual reference position return specified by CNC parameter ZMIx (No.1006#5).

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

For more details, please refer to the section “(6) Reference position return” in chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

### 5.7.3 Format

Graphical format of PFL1\_REF\_POS\_RETURN\_SET\_01 is shown below:

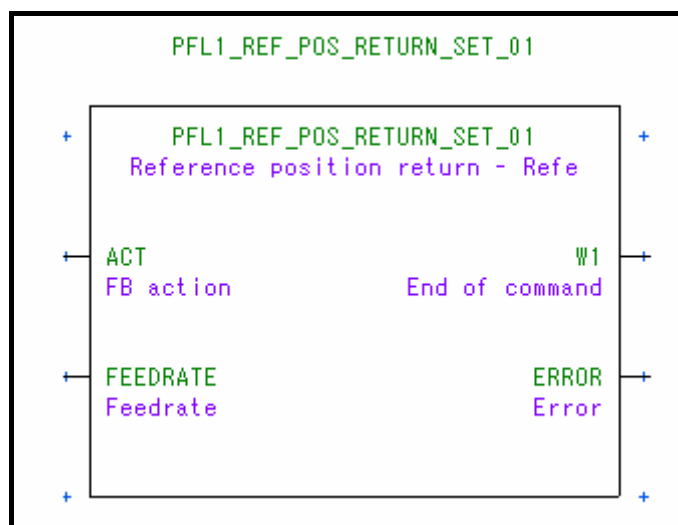


Figure 5.7.3 (a) PFL1\_REF\_POS\_RETURN\_SET\_01 (group 1)

## 5.7.4 Parameters

Details of the parameters of this function block are as shown below:

Table 5.7.4 (a) List of parameters

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute reference position return. 1: Execute reference position return. (Note 2)
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 3)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 4) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 1) 0: Finished successfully. 1: Finished with DI/DO group number error.

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 4 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the reference position return end signals (ZP1 – ZP8) also if necessary.

## 5.7.5 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

Table 5.7.5 (a) Signals to modify

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

Table 5.7.5 (b) Signals to refer

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.7.6 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

Table 5.7.6 (a) List of related CNC parameters

CNC parameter	Description
No.981	Path number that each axis belong to.
DLZx (No.1005#1)	Enables function to set reference position without dogs.
ZMlx (No.1006#5)	Selects the direction of manual reference position return.
No.1240	First reference position in the machine coordinate system
No.1420	Rapid traverse rate for each axis.
No.1424	Manual rapid traverse rate for each axis.
No.1836	Servo error amount to enable reference position return.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".
No.8010	DI/DO group of PMC axis control for each axis.

### Note

- 1 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 2 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.7.7 Related signals

The signals related to this function block are listed below:

Table 5.7.7 (a) List of related signals

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
ZP1~ZP8	F94	First reference position return end signals

### Note

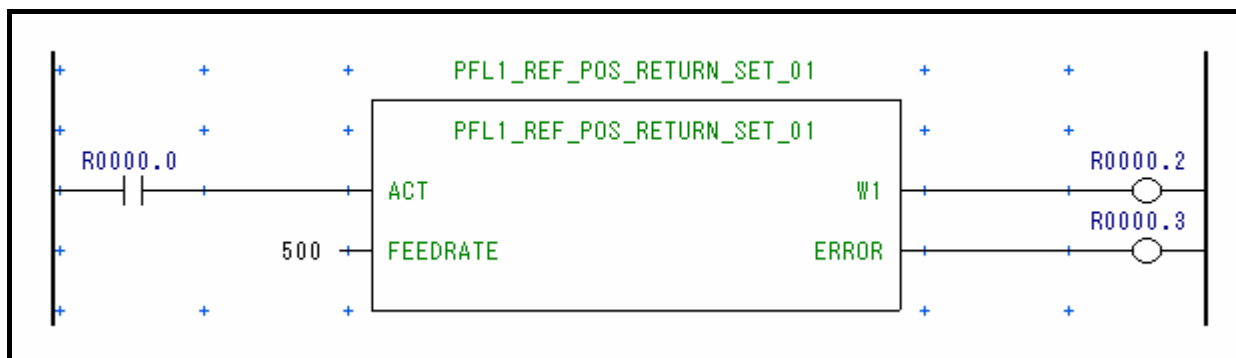
For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.



## 5.7.8 Example

The following example is to execute reference position setting without dogs of the first axis (A-axis) of the first path controlled by group 1, at the feedrate 500 mm/min.

Function block to use:	PFL1_REF_POS_RETURN_SET_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Rapid traverse feedrate (FEEDRATE):	500	rapid traverse feedrate; 500 mm/min (unit: metric, IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	



1. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
2. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
3. Apply the following configuration to enable the function for setting reference position without dogs:
  - a) Set "1" to CNC parameter DLZx (No.1005#1).
4. Turn on ACT (R0000.0) to perform reference position setting of first axis (A-axis).
5. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameter Rapid traverse feedrate.

## 5.8 Positioning – absolute specification (linear axis)

### 5.8.1 Function block name

PFL1_POSITIONING_ABS_LA_01	.....	Positioning – absolute specification (linear axis) (group 1)
PFL1_POSITIONING_ABS_LA_02	.....	Positioning – absolute specification (linear axis) (group 2)
PFL1_POSITIONING_ABS_LA_03	.....	Positioning – absolute specification (linear axis) (group 3)
PFL1_POSITIONING_ABS_LA_04	.....	Positioning – absolute specification (linear axis) (group 4)

### 5.8.2 Function

This function block executes rapid traverse of the axis to the coordinate (absolute) at the feedrate, specified by the input parameters.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

This function block is designed for a linear axis.

### 5.8.3 Format

Graphical format of PFL1\_POSITIONING\_ABS\_LA\_01 is shown below:

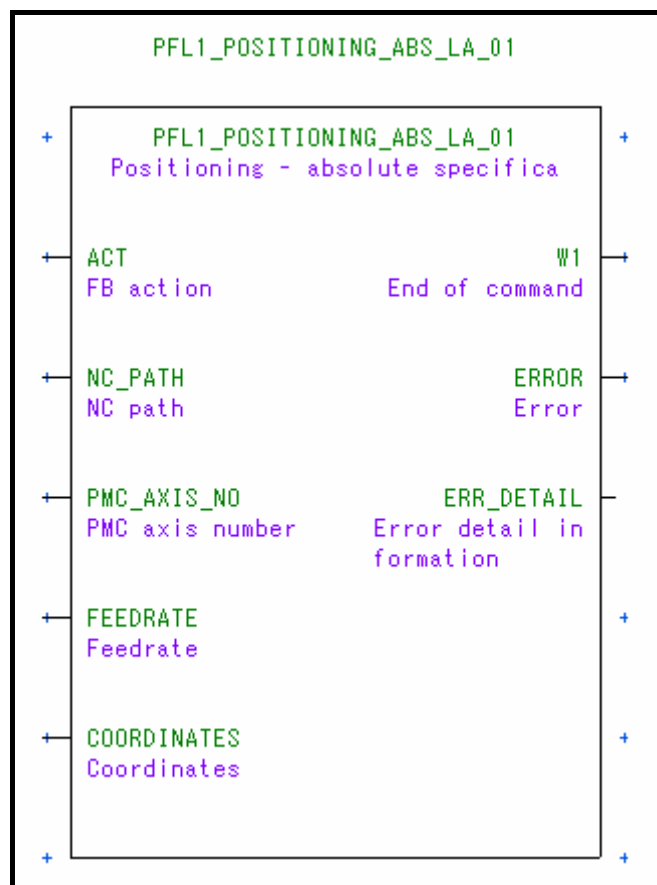


Figure 5.8.3 (a) PFL1\_POSITIONING\_ABS\_LA\_01 (group 1)

## 5.8.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.8.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute positioning. 1: Execute positioning. (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 4)
COORDINATES	input parameter	DINT	1	Coordinate of destination Specify the coordinate (absolute) of destination. (Note 3)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 5) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.8.5 Error information".

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 The unit of data is the least input increment of the axis. For more details, please refer to "Standard parameter setting tables (A)" in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 4 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.8.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

**Table 5.8.5 (a) List of error codes**

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.8.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

**Table 5.8.6 (a) Signals to modify**

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

**Table 5.8.6 (b) Signals to refer**

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.8.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

Table 5.8.7 (a) List of related CNC parameters

CNC parameter	Description
No.981	Path number that each axis belong to.
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
JOV (No.1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".
No.8010	DI/DO group of PMC axis control for each axis. (Note 1)

### Note

- 1 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 2 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.8.8 Related signals

The signals related to this function block are listed below:

Table 5.8.8 (a) List of related signals

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
MV1~MV8	F102	Axis moving signals

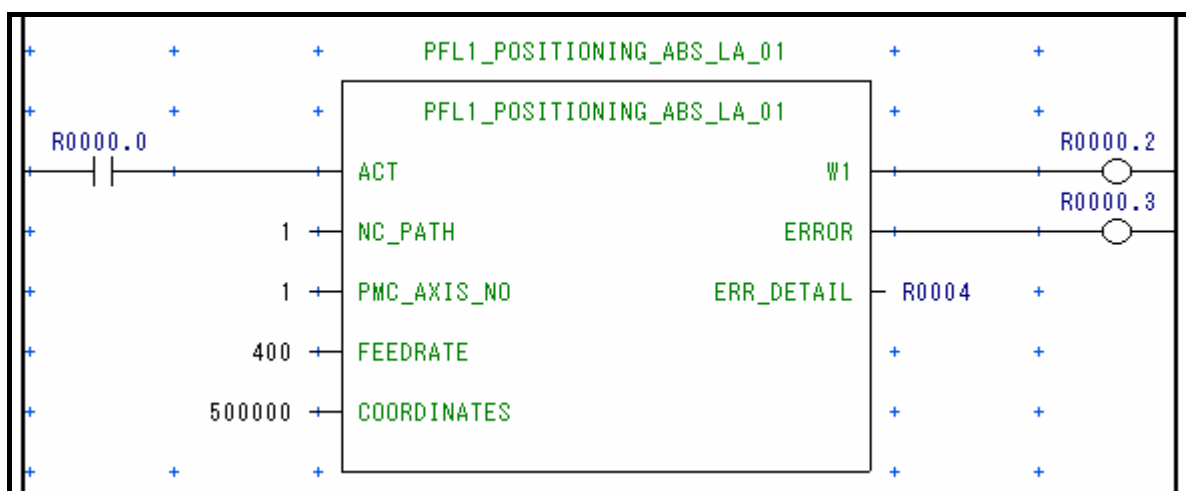
### Note

For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.8.9 Example

The following example is to move the first axis (A-axis) of the first path controlled by group 1, to the absolute coordinate 500 mm at the feedrate 400 mm/min.

Function block to use:	PFL1_POSITIONING_ABS_LA_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Rapid traverse feedrate (FEEDRATE):	400	rapid traverse feedrate; 400 mm/min (unit: metric, IS-B)
- Destination coordinate (COORDINATES):	500000	absolute coordinate; 500.000 mm (unit: metric, IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



1. Apply the following configuration to assign first axis (A-axis) to first path:
  - a) Set "1" to CNC parameter No.981 of first axis (A-axis).
2. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
3. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
4. Turn on ACT (R0000.0) to start moving first axis (A-axis) to the absolute coordinate 500 mm.
5. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Rapid traverse feedrate.

## 5.9 Positioning – absolute specification (rotary axis)

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### 5.9.1 Function block name

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PFL1_POSITIONING_ABS_RA_01	.....	Positioning – absolute specification (rotary axis) (group 1)
PFL1_POSITIONING_ABS_RA_02	.....	Positioning – absolute specification (rotary axis) (group 2)
PFL1_POSITIONING_ABS_RA_03	.....	Positioning – absolute specification (rotary axis) (group 3)
PFL1_POSITIONING_ABS_RA_04	.....	Positioning – absolute specification (rotary axis) (group 4)

### 5.9.2 Function

---

This function block executes rapid traverse of the axis to the coordinate (absolute), in the rotation direction (shortcut, positive, or negative), at the feedrate, specified by the input parameters.

The axis must be a rotary axis, and the amount of travel per rotation should be equal to the value of CNC parameter No.1260 (shift amount per one rotation of a rotary axis).

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 The axis controlled by this function block should be setup as rotary axis type A by CNC parameter.
- 2 This function block reads the current position (absolute) of the axis internally. Specify the path and axis number of the axis to the input parameters.
- 3 Do not specify the value that exceeds the amount of travel per rotation to the coordinate (absolute).
- 4 For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

### 5.9.3 Format

Graphical format of PFL1\_POSITIONING\_ABS\_RA\_01 is shown below:

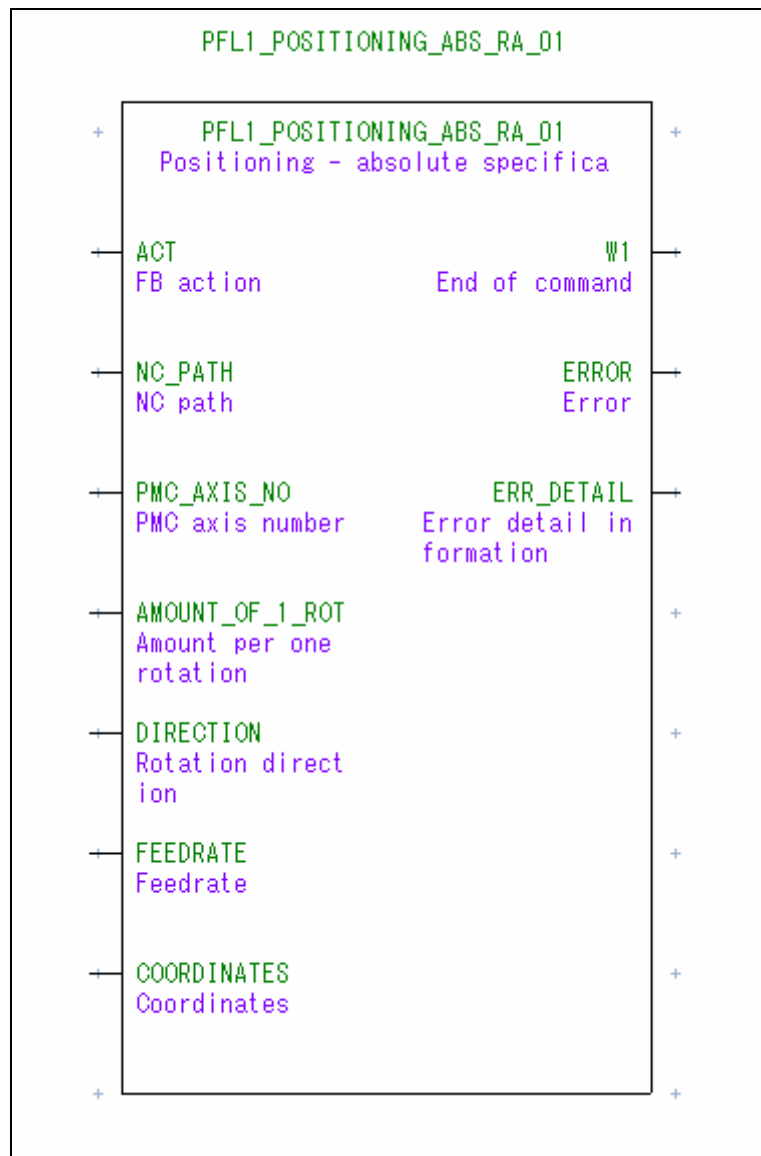


Figure 5.9.3 (a) PFL1\_POSITIONING\_ABS\_RA\_01 (group 1)



## 5.9.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.9.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute positioning. 1: Execute positioning. (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
AMOUNT_OF_1_ROT	input parameter	DINT	1	Amount of travel per rotation Specify the amount of travel per rotation of the rotary axis. Set the value of CNC parameter No.1260. (Note 3)
DIRECTION	input parameter	USINT	1	Rotation direction Specify the direction of the axis rotation. 1: shortcut rotation 2: positive direction 3: negative direction
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 5)
COORDINATES	input parameter	DINT	1	Coordinate of destination Specify the coordinate (absolute) of destination. (Note 4)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 6) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.8.5 Error information".

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 For the details of CNC parameter No.1260, please refer to "CONNECTION MANUAL (FUNCTION)" of your CNC. The input parameter AMOUNT\_OF\_1\_ROT (amount of travel per rotation) should be "Value of CNC parameter No1260"  $\times 10^{\text{decimal point position}}$ . Valid range is as followings:

IS-A	IS-B to IS-E
0 – 99999999 (8 digits)	0 – 999999999 (9 digits)

- 4 The unit of data is the least input increment of the axis. For more details, please refer to "Standard parameter setting tables (A)" in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 6 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.9.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

Table 5.9.5 (a) List of error codes

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
2	Axis configuration error (CNC parameter error) - The PMC-controlled axis is not a rotary axis (A type). Check the value of CNC parameter No.1006.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
15	Rotation direction error (input parameter error) - Rotation direction out of range 1 to 3 is specified.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.9.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

Table 5.9.6 (a) Signals to modify

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

Table 5.9.6 (b) Signals to refer

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.9.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.9.7 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
ROT <sub>x</sub> (No.1006#0)	Selects type of each axis; linear or rotary. (Note 1)
ROS <sub>x</sub> (No.1006#1)	Selects type of rotary axis. (Note 1)
DIA <sub>x</sub> (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
ROA <sub>x</sub> (No.1008#0)	Enables roll-over of rotary axis. (Note 1)
No.1013	Selects increment system of each axis.
No.1260	Shift amount per rotation of rotary axis.
JOV (No.1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".
No.8010	DI/DO group of PMC axis control for each axis. (Note 1)

### Note

- 1 To use this function block, the axis to be controlled has to be a rotary axis (A type), and the roll-over function has to be enabled. An error will be issued if the axis is not rotary axis (A type).  
Please use the function block of "Point positioning (linear axis)" when using the rotary axis (B type).
- 2 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 3 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.9.8 Related signals

The signals related to this function block are listed below:

**Table 5.9.8 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
MV1~MV8	F102	Axis moving signals

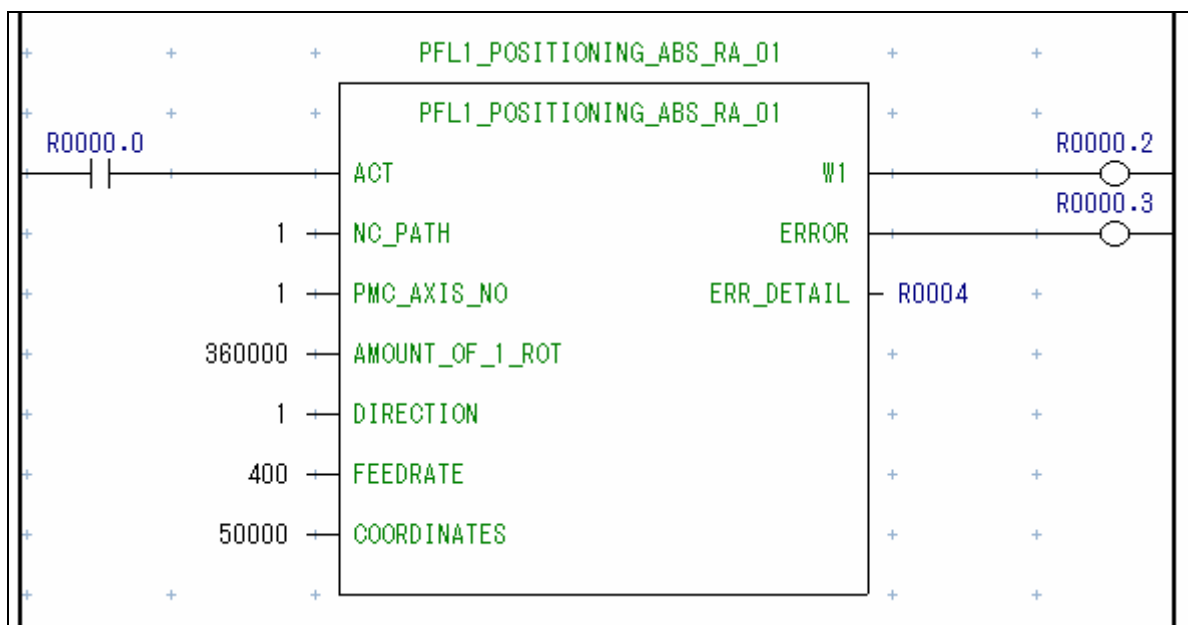
### Note

For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.9.9 Example

The following example is to move the first axis (A-axis) of the first path controlled by group 1, to the absolute coordinate 50.000, whose amount of travel per rotation is 360.000, at the feedrate 400 deg/min in direction of shortcut rotation.

Function block to use:	PFL1_POSITIONING_ABS_RA_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Amount of travel per rotation (AMOUNT_OF_1_ROT):	360000	amount of travel per rotation; 360.000 (unit: IS-B)
- Rotation direction (DIRECTION):	1	shortcut rotation
- Rapid traverse feedrate (FEEDRATE):	400	rapid traverse feedrate; 400 deg/min (unit: metric, IS-B)
- Destination coordinate (COORDINATES):	50000	absolute coordinate; 50.000 (unit: metric, IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



1. Apply the following configuration to setup a rotary axis:
  - a) Set "1" to CNC parameter ROTx (No.1006#0), and "0" to ROSx (No.1006#1), to select rotary axis (A type).
  - b) Set "1" to CNC parameter ROAx (No.1008#0) to enable roll-over function of the rotary axis.
2. Apply the following configuration to assign first axis (A-axis) to first path:
  - a) Set "1" to CNC parameter No.981 of first axis (A-axis).
3. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
4. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
5. Turn on ACT (R0000.0) to start moving first axis (A-axis) to the absolute coordinate 50.
6. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Rapid traverse feedrate.

## 5.10 Positioning – incremental specification

### 5.10.1 Function block name

PFL1_POSITIONING_INC_01	.....	Positioning – incremental specification (group 1)
PFL1_POSITIONING_INC_02	.....	Positioning – incremental specification (group 2)
PFL1_POSITIONING_INC_03	.....	Positioning – incremental specification (group 3)
PFL1_POSITIONING_INC_04	.....	Positioning – incremental specification (group 4)

### 5.10.2 Function

This function block executes rapid traverse of the axis for the distance at the feedrate, specified by the input parameters.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

### 5.10.3 Format

Graphical format of PFL1\_POSITIONING\_INC\_01 is shown below:

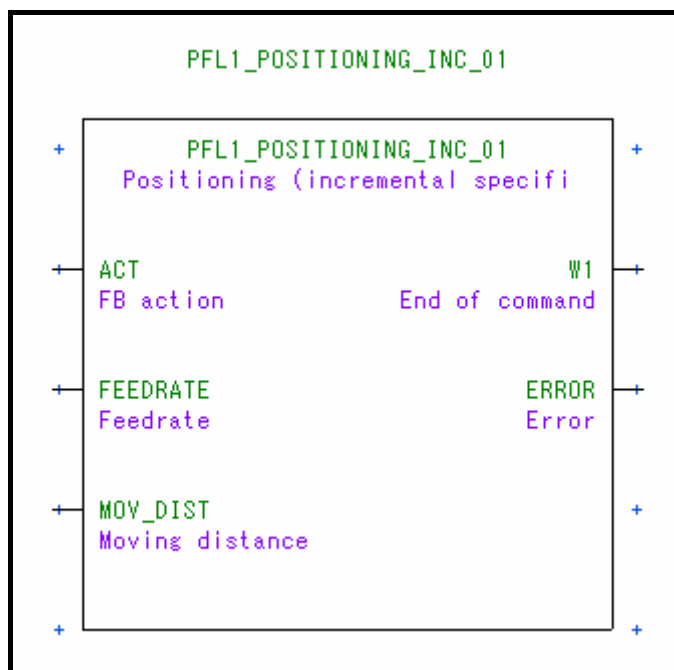


Figure 5.10.3 (a) PFL1\_POSITIONING\_INC\_01 (group 1)

## 5.10.4 Parameters

Details of the parameters of this function block are as shown below:

Table 5.10.4 (a) List of parameters

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute positioning. 1: Execute positioning. (Note 2)
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 4)
MOV_DIST	input parameter	DINT	1	Moving distance Specify the moving distance (incremental) of the axis. (Note 3)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 5) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 The unit of data is the least input increment of the axis. For more details, please refer to "Standard parameter setting tables (A)" in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 4 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.10.5 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

Table 5.10.5 (a) Signals to modify

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

Table 5.10.5 (b) Signals to refer

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.10.6 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.10.6 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
No.1013	Selects increment system of each axis.
JOV (No.1402#1)	Disables jog override.
No.1420	Rapid traverse rate for each axis.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
RDE (No.8001#3)	Enables dry run for rapid traverse in PMC axis control.
RPD (No.8002#0)	Selects source of rapid traverse feedrate in PMC axis control.
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
R10 (No.8005#2)	Selects the unit of rapid traverse feedrate of PMC axis when CNC parameter RPD (No.8002#0) is "1".
No.8010	DI/DO group of PMC axis control for each axis. (Note 1)

### Note

For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.10.7 Related signals

The signals related to this function block are listed below:

**Table 5.10.7 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
MV1~MV8	F102	Axis moving signals

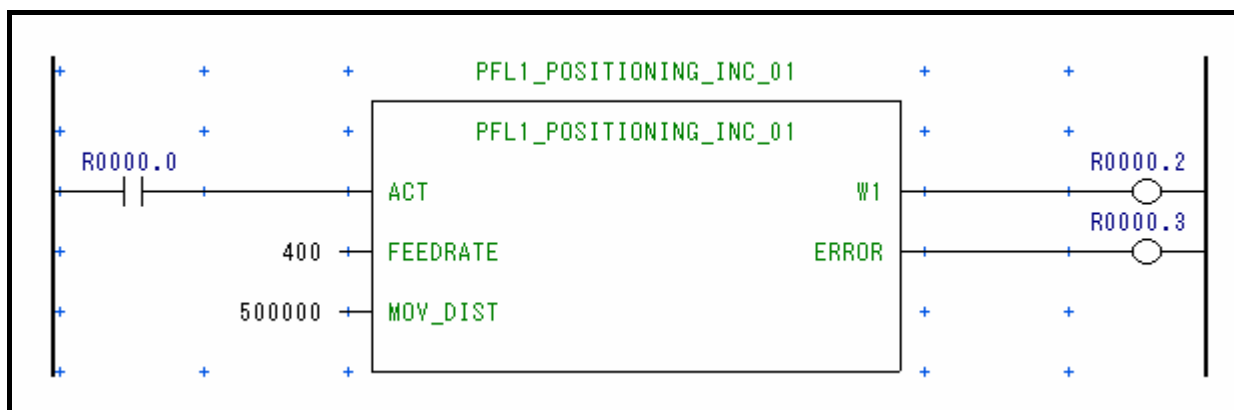
### Note

For the details of each signal, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.10.8 Example

The following example is to move the first axis (A-axis) of the first path controlled by group 1, for the distance of 500 mm at the feedrate 400 mm/min.

Function block to use:	PFL1_POSITIONING_INC_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Rapid traverse feedrate (FEEDRATE):	400	rapid traverse feedrate; 400 mm/min (unit: metric, IS-B)
- Moving distance (MOV_DIST):	500000	moving distance; 500.000 mm (unit: metric, IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	



1. Apply the following configuration to assign first axis (A-axis) to first path:
  - a) Set "1" to CNC parameter No.981 of first axis (A-axis).
2. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
3. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
4. Turn on ACT (R0000.0) to start moving first axis (A-axis) for the distance 500 mm.
5. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Rapid traverse feedrate.



## 5.11 Speed control

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### 5.11.1 Function block name

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PFL1_SPEED_CONTROL_01	.....	Speed control (group 1)
PFL1_SPEED_CONTROL_02	.....	Speed control (group 2)
PFL1_SPEED_CONTROL_03	.....	Speed control (group 3)
PFL1_SPEED_CONTROL_04	.....	Speed control (group 4)

### 5.11.2 Function

---

This function block executes continuous feed of the axis by speed control at the continuous feedrate specified by the input parameters. It can also change the continuous feedrate by turning on ACT with new continuous feedrate in input parameter while the axis is moving.

Turn on input parameter STOP to stop the axis. The PMC axis to be controlled must be a rotary axis.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 This function block uses the speed command (10H) of the PMC axis control function, and supports both of speed control and position control selected by CNC parameter. For more details, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 This function block uses a function block to reset PMC axis control command to stop the axis. Turning on the input parameter STOP will reset the command in action and ones suspended in buffer of the same group.

### 5.11.3 Format

Graphical format of PFL1\_SPEED\_CONTROL\_01 is shown below:

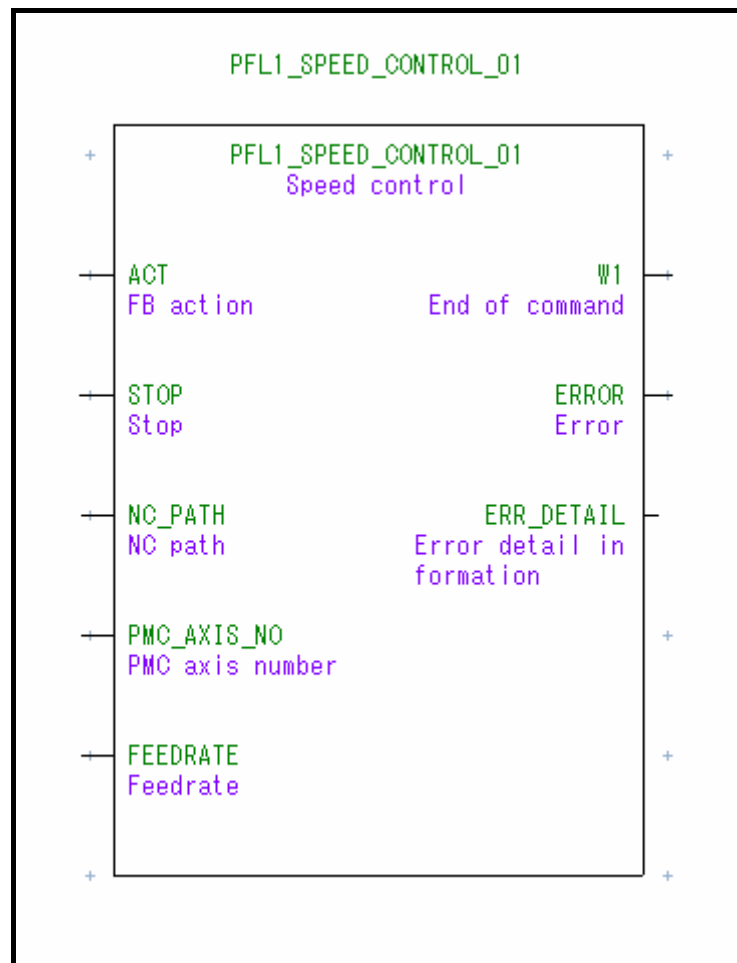


Figure 5.11.3 (a) PFL1\_SPEED\_CONTROL\_01 (group 1)

## 5.11.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.11.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute speed control. 1: Execute speed control. (Note 2, 3)
STOP	input parameter	BOOL	-	Stop axis 0: Do not stop the axis 1: Stop the axis (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
FEEDRATE	input parameter	INT	1	Continuous feedrate Specify the rotation speed of the servo motor in binary value. Specify positive value for rotation in positive direction. And negative (2's complement) value for negative. Valid range is -32768 to +32767, by unit rev/min. (Note 3)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 4) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.11.5 Error information".

### Note

- 1 This function block turns off the buffering disable signal (EMBUFg) while it is working.
- 2 From the status ACT=0 and STOP=0, turn on ACT to start execution, and turn on STOP to stop it. Turn off STOP after the axis stops. If both of ACT and STOP turn on, STOP is effective.  
While ACT=1 or STOP=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT and STOP (ACT=0, STOP=0) when W1 turns on (W1=1).
- 3 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 4 W1 is generated from axis moving signal (EGEng). To check if the axis stops, check the control axis selection status signal (\*EAXSL) also if necessary.

## 5.11.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

**Table 5.11.5 (a) List of error codes**

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
2	Axis configuration error (CNC parameter error) - The PMC-controlled axis is not a rotary axis. Check the value of CNC parameter No.1006.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.11.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

**Table 5.11.6 (a) Signals to modify**

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

**Table 5.11.6 (b) Signals to refer**

Symbol	Address	Signal name
EGENg	F130.4	Axis moving signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.11.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.11.7 (a) List of related CNC parameters**

CNC parameter	Description
981	Path number that each axis belong to.
ROT <sub>x</sub> (No.1006#0)	Selects type of each axis; linear or rotary. (Note 1)
EVP (No.8005#4)	Selects control type of speed command in PMC axis control; velocity control and position control. (Note 3)
VCP (8007#2)	Selects type of speed command in PMC axis control; FS15 type and FS16 type. (Note 3)
No.8010	DI/DO group of PMC axis control for each axis. (Note 2)
No.8028	Time for acceleration/deceleration calculation at speed control of PMC axis control.
No.8040	Amount of shift per rotation of servo motor of least input increment when speed command in PMC axis control is position control
PTC (No.12730)	Extends linear acceleration/deceleration time constant of continuous feed operation by speed command in PMC axis control.
No.12731	Second time constant of linear acceleration/deceleration in velocity command continuous feed in PMC axis control
No.12732	Third time constant of linear acceleration/deceleration in velocity command continuous feed in PMC axis control
No.12733	Fourth time constant of linear acceleration/deceleration in velocity command continuous feed in PMC axis control
No.12734	Fifth time constant of linear acceleration/deceleration in velocity command continuous feed in PMC axis control
No.12735	First feedrate to change time constant of continuous feed operation by speed command in PMC axis control.
No.12736	Second feedrate to change time constant of continuous feed operation by speed command in PMC axis control.
No.12737	Third feedrate to change time constant of continuous feed operation by speed command in PMC axis control.
No.12738	Fourth feedrate to change time constant of continuous feed operation by speed command in PMC axis control.

### Note

- 1 The PMC axis that this function block controls must be a rotary axis ROT<sub>x</sub>(No.1006#5)=1, or CNC parameter error is raised.
- 2 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 3 The coordinate will not be updated when FS16i specification and speed control are selected (VCP(No.8007#2)=1, EVP(No.8005#4)=0).  
Reference position setting will be required after execution because the position will be lost and reference position establishment signal (XRF<sub>x</sub><F120>) turns off.
- 4 For details of each CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

## 5.11.8 Related signals

---

The signals related to this function block are listed below:

**Table 5.11.8 (a) List of related signals**

Symbol	Address	Signal name
*EAXSL	F129.7	Control axis selection status signal (PMC axis control)
EINPg	F130.0	In-position signal (PMC axis control)

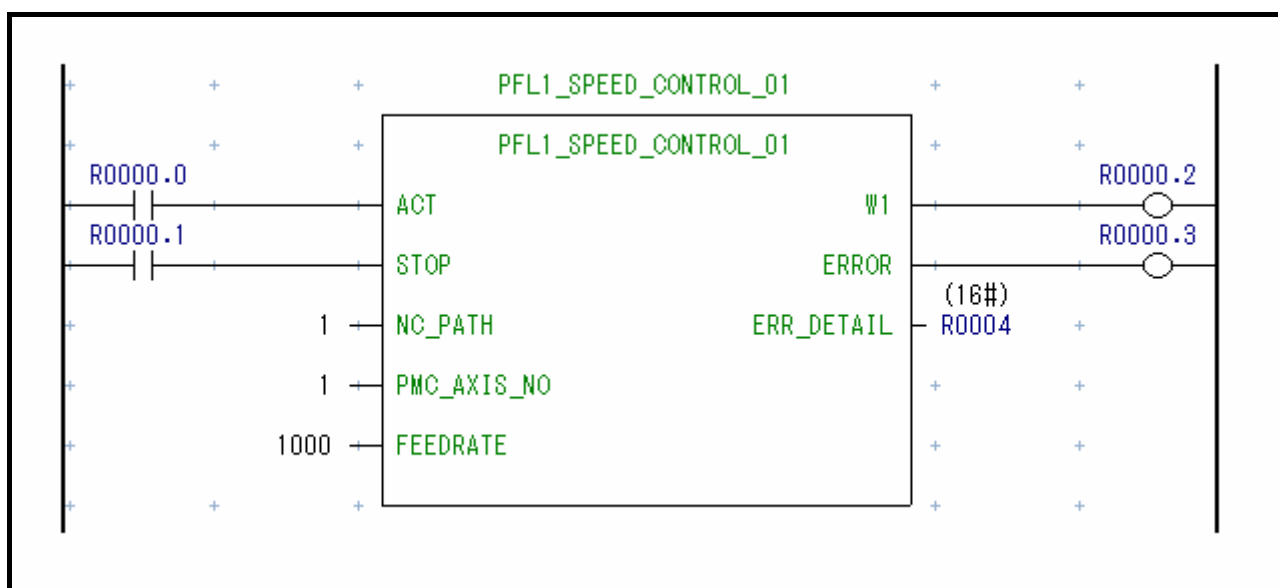
### **Note**

For the details of each signal please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 5.11.9 Example

The following example is to perform continuous feed of the first axis (A-axis) of the first path controlled by group 1, at speed 1000 rev/min in positive direction.

Function block to use:	PFL1_SPEED_CONTROL_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- Stop command (STOP):	R0000.1	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Continuous feedrate (FEEDRATE):	1000	continuous feedrate; 1000 rev/min
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



1. Apply the following configuration to assign first axis (A-axis) to first path:
  - a) Set "1" to CNC parameter No.981 of first axis (A-axis).
2. Apply the following configuration to setup first axis (A-axis) as a rotary axis:
  - a) Set "1" to CNC parameter ROTx (No.1006#0), and "0" to ROSx (No.1006#1), to select rotary axis (A type).
3. Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - b) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
4. Turn on ACT (R0000.0) and turn off STOP (R0000.1) to start moving the first axis (A-axis) at feedrate 1000 rev/min in positive direction.
5. Turn off ACT (R0000.0) and turn on STOP (R0000.1) to stop the axis.
6. When the first axis (A-axis) stops, turn off STOP (R0000.1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters such as Continuous feedrate.

## 5.12 Positioning (skip) – absolute specification (linear axis)

---

### 5.12.1 Function block name

---

PFL1\_POSITIONING\_SKIP\_ABS\_LA\_01 ... Positioning (skip) – absolute specification (linear axis) (group 1)  
PFL1\_POSITIONING\_SKIP\_ABS\_LA\_02 ... Positioning (skip) – absolute specification (linear axis) (group 2)  
PFL1\_POSITIONING\_SKIP\_ABS\_LA\_03 ... Positioning (skip) – absolute specification (linear axis) (group 3)  
PFL1\_POSITIONING\_SKIP\_ABS\_LA\_04 ... Positioning (skip) – absolute specification (linear axis) (group 4)

### 5.12.2 Function

---

This function block executes the skip function (feed per minute) of the axis to the coordinate (absolute) at the cutting feedrate, specified by the input parameters.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 This function block is designed for a linear axis.
- 2 High-speed skip is not available.
- 3 Skip signals are available for PMC axes assigned to path 1 to 3.
- 4 This function block reads the current position (absolute) of the axis internally. Specify the path and axis number of the axis to the input parameters.
- 5 For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.



## 5.12.3 Format

Graphical format of PFL1\_POSITIONING\_SKIP\_ABS\_LA\_01 is shown below:

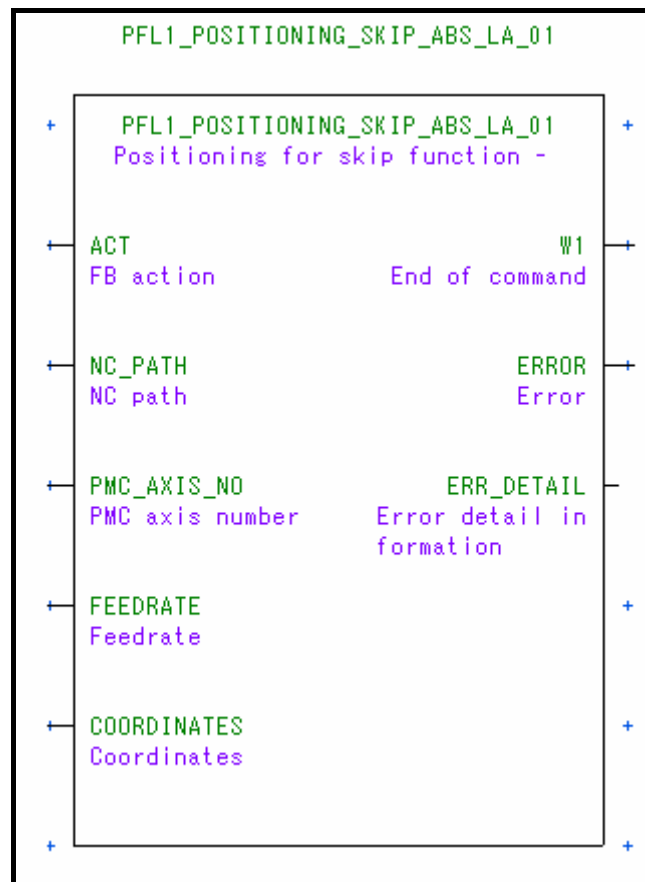


Figure 5.12.3 (a) PFL1\_POSITIONING\_SKIP\_ABS\_LA\_01 (group 1)

## 5.12.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.12.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute positioning (skip). 1: Execute positioning (skip). (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
FEEDRATE	input parameter	UINT	1	Cutting feedrate Specify the cutting feedrate. Valid range is 1 to 65535. (Note 4)
COORDINATES	input parameter	DINT	1	Coordinate of destination Specify the coordinate (absolute) of destination. (Note 3)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 5) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.12.5 Error information".

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 The unit of data is the least input increment of the axis. For more details, please refer to "Standard parameter setting tables (A)" in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 4 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.12.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

**Table 5.12.5 (a) List of error codes**

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.12.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

**Table 5.12.6 (a) Signals to modify**

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

**Table 5.12.6 (b) Signals to refer**

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.12.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.12.7 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
JOV (No.1402#1)	Disables jog override.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
SKE (No.8001#7)	Selects skip signal in PMC axis control.
F10 (No.8002#3)	Selects the least increment of feedrate of cutting feed – feed per minute at PMC axis control.
PF1 (No.8002#4)	Selects the unit of feedrate of cutting feed – feed per minute at PMC axis control.
PF2 (No.8002#5)	
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
EFD (No.8006#4)	Selects the specification unit of feedrate of cutting feed – feed per minute at PMC axis control.
No.8010	DI/DO group of PMC axis control for each axis.

### Note

- 1 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 2 For details of each CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 5.12.8 Related signals

The signals related to this function block are listed below:

**Table 5.12.8 (a) List of related signals**

Symbol	Address	Signal name
ESKIP	X004.6	Skip signal for path 1 (PMC axis control)
ESKIP#2	X013.6	Skip signal for path 2 (PMC axis control)
ESKIP#3	X011.6	Skip signal for path 3 (PMC axis control)
SKIP	X004.7	Skip signal for path 1
SKIP#2	X013.7	Skip signal for path 2
SKIP#3	X011.7	Skip signal for path 3
MV1~MV8	F102	Axis moving signals

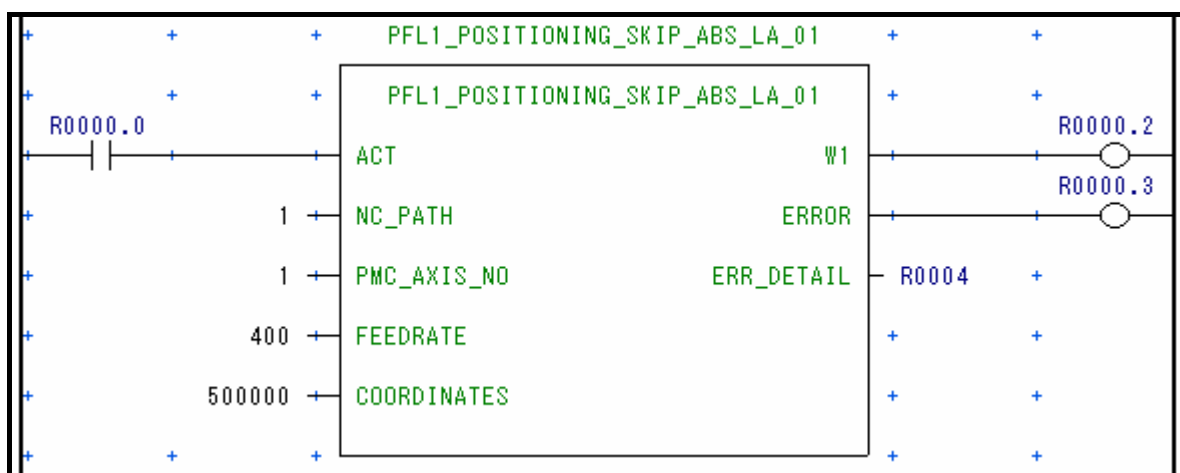
### Note

For details of the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 5.12.9 Example

The following example is to perform skip function of the first axis (A-axis) of the first path controlled by group 1, while cutting feed at speed 400 mm/min to the absolute coordinate 500 mm.

Function block to use:	PFL1_POSITIONING_SKIP_ABS_LA_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Cutting feedrate (FEEDRATE):	400	cutting feedrate; 400 mm/min (unit: metric, IS-B)
- Destination coordinate (COORDINATES):	500000	absolute coordinate; 500.000 mm (unit: metric, IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



1. Apply the following configuration to control first axis (A-axis) of first path as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.981 of first axis (A-axis).
  - b) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - c) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
2. Apply the following configuration to enable skip signal (PMC axis control):
  - a) Turn on CNC parameter SKE (No.8001#7).
3. Turn on ACT (R0000.0) to start cutting feed per minute of first axis (A-axis). While moving, turning on skip signal (X004.6) will cause skip operation.
4. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters, such as Cutting feedrate and Total moving distance.

## 5.13 Positioning (skip) – absolute specification (rotary axis)

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### 5.13.1 Function block name

---

PFL1\_POSITIONING\_SKIP\_ABS\_RA\_01 ... Positioning (skip) – absolute specification (linear axis) (group 1)  
PFL1\_POSITIONING\_SKIP\_ABS\_RA\_02 ... Positioning (skip) – absolute specification (linear axis) (group 2)  
PFL1\_POSITIONING\_SKIP\_ABS\_RA\_03 ... Positioning (skip) – absolute specification (linear axis) (group 3)  
PFL1\_POSITIONING\_SKIP\_ABS\_RA\_04 ... Positioning (skip) – absolute specification (linear axis) (group 4)

### 5.13.2 Function

---

This function block executes the skip function (feed per minute) of the axis to the coordinate (absolute), in the rotation direction (shortcut, positive, or negative), at the cutting feedrate, specified by the input parameters. The axis must be a rotary axis, and the amount of travel per rotation should be the value of CNC parameter No.1260 (shift amount per one rotation of a rotary axis).

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 The axis controlled by this function block should be setup as rotary axis type A by CNC parameter.
- 2 High-speed skip is not available.
- 3 Skip signals are available for PMC axes assigned to path 1 to 3.
- 4 This function block reads the current position (absolute) of the axis internally. Specify the path and axis number of the axis to the input parameters.
- 5 Do not specify the value that exceeds the amount of travel per rotation to the coordinate (absolute).
- 6 For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

### 5.13.3 Format

Graphical format of PFL1\_POSITIONING\_SKIP\_ABS\_RA\_01 is shown below:

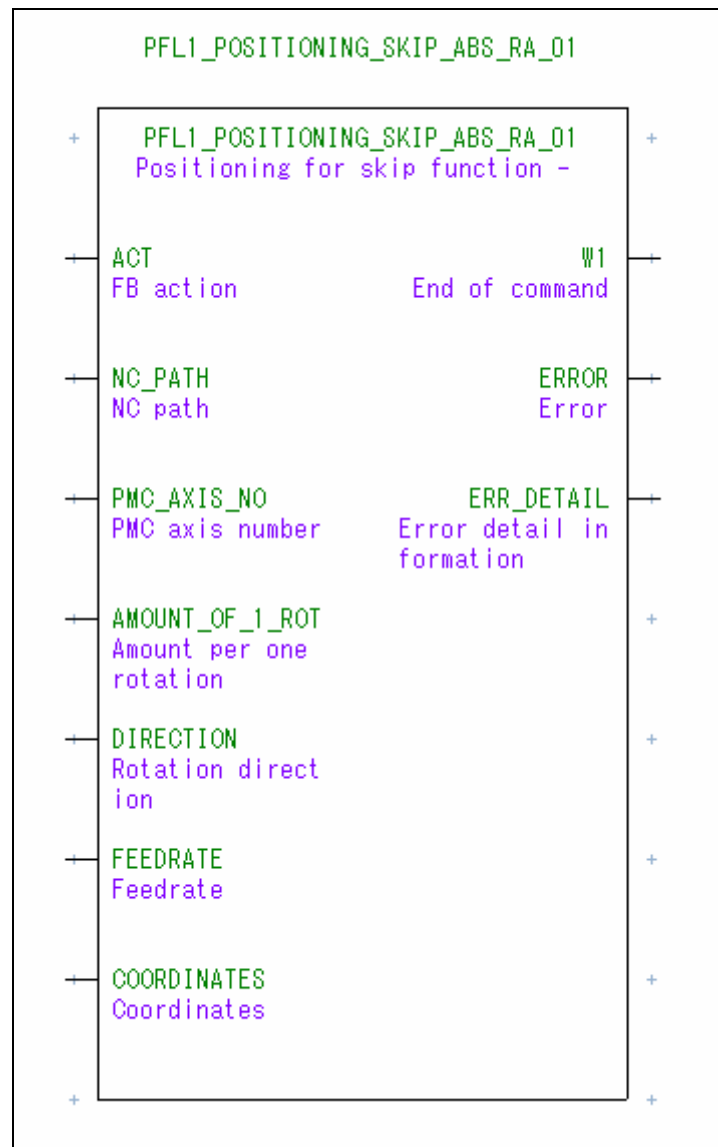


Figure 5.13.3 (a) PFL1\_POSITIONING\_SKIP\_ABS\_RA\_01 (group 1)

## 5.13.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.13.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute positioning (skip). 1: Execute positioning (skip). (Note 2)
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
AMOUNT_OF_1_ROT	input parameter	DINT	1	Amount of travel per rotation Specify the amount of travel per rotation of the rotary axis. Set the value of CNC parameter No.1260. (Note 3)
DIRECTION	input parameter	USINT	1	Rotation direction Specify the direction of the axis rotation. 1: shortcut rotation 2: positive direction 3: negative direction
FEEDRATE	input parameter	UINT	1	Cutting feedrate Specify the cutting feedrate. Valid range is 1 to 65535. (Note 5)
COORDINATES	input parameter	DINT	1	Coordinate of destination Specify the coordinate (absolute) of destination. (Note 4)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 6) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.12.5 Error information".



### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 For the details of CNC parameter No.1260, please refer to "CONNECTION MANUAL (FUNCTION)" of your CNC. The input parameter AMOUNT\_OF\_1\_ROT (amount of travel per rotation) should be "Value of CNC parameter No.1260"  $\times 10^{\text{decimal point position}}$ . Valid range is as followings:

IS-A	IS-B to IS-E
0 – 99999999 (8 digits)	0 – 999999999 (9 digits)

- 4 The unit of data is the least input increment of the axis. For more details, please refer to "Standard parameter setting tables (A)" in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 6 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.13.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

Table 5.13.5 (a) List of error codes

Error code	Meaning
1	Group number error (CNC parameter error) <ul style="list-style-type: none"><li>- DI/DO group number is not specified for PMC-controlled axis.</li></ul> Check the value of CNC parameter No.8010.
2	Axis configuration error (CNC parameter error) <ul style="list-style-type: none"><li>- The PMC-controlled axis is not a rotary axis (A type).</li></ul> Check the value of CNC parameter No.1006.
11	CNC path number error (input parameter error) <ul style="list-style-type: none"><li>- Specified CNC path number does not exist.</li></ul>
12	PMC axis number error (input parameter error) <ul style="list-style-type: none"><li>- Specified axis number does not exist.</li></ul>
15	Rotation direction error (input parameter error) <ul style="list-style-type: none"><li>- Rotation direction out of range 1 to 3 is specified.</li></ul>
21	DI/DO group number error (PMC axis control function block error) <ul style="list-style-type: none"><li>- DI/DO group number for PMC axis control function block is invalid.</li></ul>

## 5.13.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

Table 5.13.6 (a) Signals to modify

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

Table 5.13.6 (b) Signals to refer

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.13.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.13.7 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
ROT <sub>x</sub> (No.1006#0)	Selects type of each axis; linear or rotary. (Note 1)
ROS <sub>x</sub> (No.1006#1)	Selects type of rotary axis. (Note 1)
DIA <sub>x</sub> (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
ROA <sub>x</sub> (No.1008#0)	Enables roll-over of rotary axis. (Note 1)
No.1013	Selects increment system of each axis.
No.1260	Shift amount per rotation of rotary axis.
JOV (No.1402#1)	Disables jog override.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
SKE (No.8001#7)	Selects skip signal in PMC axis control.
F10 (No.8002#3)	Selects the least increment of feedrate of cutting feed – feed per minute at PMC axis control.
PF1 (No.8002#4)	Selects the unit of feedrate of cutting feed – feed per minute at PMC axis control.
PF2 (No.8002#5)	
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
EFD (No.8006#4)	Selects the specification unit of feedrate of cutting feed – feed per minute at PMC axis control.
No.8010	DI/DO group of PMC axis control for each axis.

### Note

- 1 To use this function block, the axis to be controlled has to be a rotary axis (A type), and the roll-over function has to be enabled. An error will be issued if the axis is not rotary axis (A type).  
Please use the function block of “Point positioning (linear axis)” when using the rotary axis (B type).
- 2 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 3 For details of each CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 5.13.8 Related signals

The signals related to this function block are listed below:

**Table 5.13.8 (a) List of related signals**

Symbol	Address	Signal name
ESKIP	X004.6	Skip signal for path 1 (PMC axis control)
ESKIP#2	X013.6	Skip signal for path 2 (PMC axis control)
ESKIP#3	X011.6	Skip signal for path 3 (PMC axis control)
SKIP	X004.7	Skip signal for path 1
SKIP#2	X013.7	Skip signal for path 2
SKIP#3	X011.7	Skip signal for path 3
MV1~MV8	F102	Axis moving signals

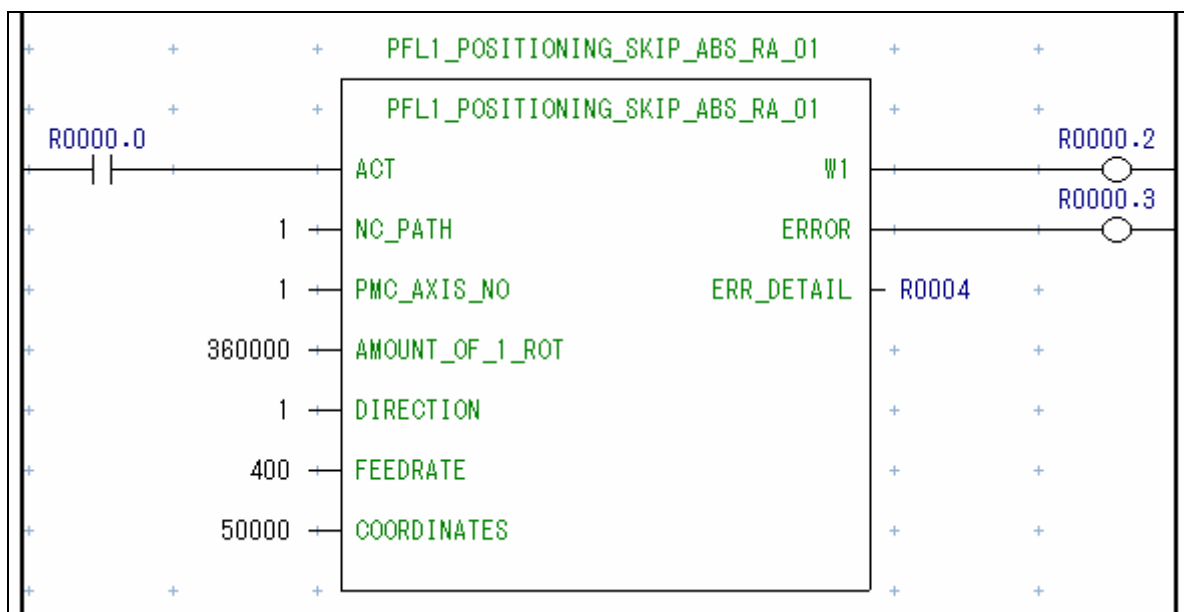
### Note

For details of the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 5.13.9 Example

The following example is to perform the skip function of the first axis (A-axis) of the first path controlled by group 1, whose amount of travel per rotation is 360.000, while cutting feed at speed 400 deg/min to the absolute coordinate 50.000 in direction of shortcut rotation.

Function block to use:	PFL1_POSITIONING_SKIP_ABS_RA_01	for group 1
Parameters:		
- Activation (ACT):	R0000.0	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Amount of travel per rotation (AMOUNT_OF_1_ROT):	360000	amount of travel per rotation; 360.000 (unit: IS-B)
- Rotation direction (DIRECTION):	1	shortcut rotation
- Cutting feedrate (FEEDRATE):	400	cutting feedrate; 400 deg/min (unit: metric, IS-B)
- Destination coordinate (COORDINATES):	50000	absolute coordinate; 50.000 (unit: metric, IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	
- Error detail (ERR_DETAIL):	R0004	



- Apply the following configuration to setup a rotary axis:
  - Set "1" to CNC parameter ROTx (No.1006#0), and "0" to ROSx (No.1006#1), to select rotary axis (A type).
  - Set "1" to CNC parameter ROAx (No.1008#0) to enable roll-over function of the rotary axis.
- Apply the following configuration to control first axis (A-axis) to first path:
  - Set "1" to CNC parameter No.981 of first axis (A-axis).
- Apply the following configuration to enable to control first axis (A-axis) as PMC axis of group 1:
  - Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis. Control axis selection signal can be directly processed by ladder program. (Note 1)
- Apply the following configuration to enable skip signal (PMC axis control):
  - Turn on CNC parameter SKE (No.8001#7).
- Turn on ACT (R0000.0) to start cutting feed per minute of first axis (A-axis). While moving, turning on skip signal (X004.6) will cause skip operation.
- Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

**Note**

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters, such as Cutting feedrate and Total moving distance.

## 5.14 Positioning (skip) – incremental specification

### 5.14.1 Function block name

PFL1_POSITIONING_SKIP_INC_01	.....	Positioning (skip) – incremental specification (group 1)
PFL1_POSITIONING_SKIP_INC_02	.....	Positioning (skip) – incremental specification (group 2)
PFL1_POSITIONING_SKIP_INC_03	.....	Positioning (skip) – incremental specification (group 3)
PFL1_POSITIONING_SKIP_INC_04	.....	Positioning (skip) – incremental specification (group 4)

### 5.14.2 Function

This function block executes the skip function (feed per minute) of the axis for the distance at the cutting feedrate, specified by the input parameters.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 This function block is designed for a linear axis.
- 2 High-speed skip is not available.
- 3 Skip signals are available for PMC axes assigned to path 1 to 3.
- 4 For details of the CNC parameters, please refer to the "PARAMETER MANUAL" of your CNC.

### 5.14.3 Format

Graphical format of PFL1\_POSITIONING\_SKIP\_INC\_01 is shown below:

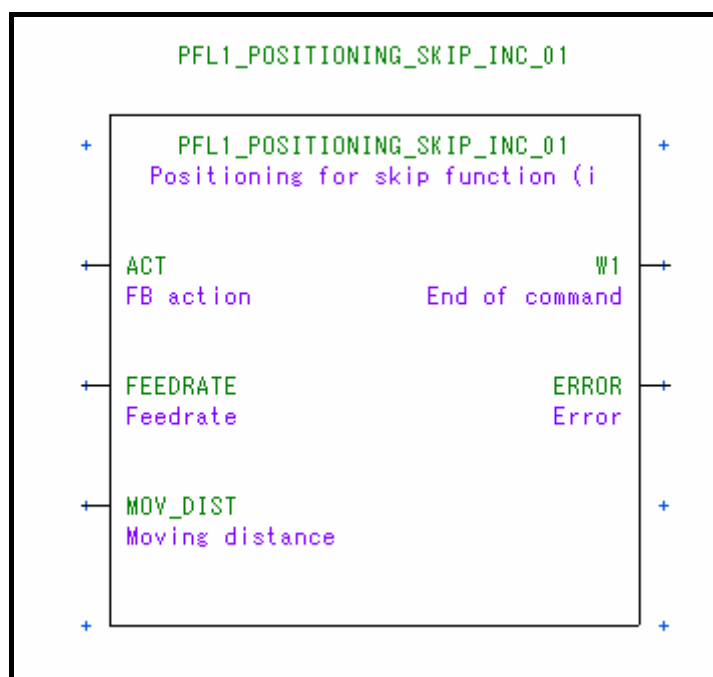


Figure 5.14.3 (a) PFL1\_POSITIONING\_SKIP\_INC\_01 (group 1)

## 5.14.4 Parameters

Details of the parameters of this function block are as shown below:

Table 5.14.4 (a) List of parameters

Symbol	Parameter type	Data type	Count	Description
ACT	input parameter	BOOL	-	Activation 0: Do not execute positioning (skip). 1: Execute positioning (skip). (Note 2)
FEEDRATE	input parameter	UINT	1	Cutting feedrate Specify the cutting feedrate. Valid range is 1 to 65535. (Note 4)
MOV_DIST	input parameter	DINT	1	Moving distance Specify the moving distance (incremental) of the axis. (Note 3)
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 2, 5) 0: Normally W1=0. Also turns off at reset of PMC axis control. 1: Turns on at completion of the axis motion. Also turns on at error (ERRR=1).
ERROR	output parameter	BOOL	-	Error signal Indicates error status. (Note 2) 0: Finished successfully. 1: Finished with an error.

### Note

- 1 This function block turns on the buffering disable signal (EMBUFg) while it is working.
- 2 ACT should be turned on (ACT=1) only when the function block should work. While ACT=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off ACT (ACT=0) when W1 turns on (W1=1).
- 3 The unit of data is the least input increment of the axis. For more details, please refer to "Standard parameter setting tables (A)" in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 4 Please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 5 W1 is generated from in-position signal (EINPg). To check if the axis stops, check the axis moving signals (MV1 – MV8) also if necessary.

## 5.14.5 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

Table 5.14.5 (a) Signals to modify

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

Table 5.14.5 (b) Signals to refer

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.14.6 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.14.6 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
DIAx (No.1006#3)	Selects radius/diameter specification of the move command for each axis.
JOV (No.1402#1)	Disables jog override.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
SKE (No.8001#7)	Selects skip signal in PMC axis control.
F10 (No.8002#3)	Selects the least increment of feedrate of cutting feed – feed per minute at PMC axis control.
PF1 (No.8002#4)	Selects the unit of feedrate of cutting feed – feed per minute at PMC axis control.
PF2 (No.8002#5)	
NCI (No.8004#6)	Selects if in-position check at deceleration is done or not for PMC axis control.
CDI (No.8005#1)	Selects how to specify the amount of travel and the feedrate of PMC axis when PMC axes are programmed by diameter.
EFD (No.8006#4)	Selects the specification unit of feedrate of cutting feed – feed per minute at PMC axis control.
No.8010	DI/DO group of PMC axis control for each axis.

### Note

- 1 This function block reads CNC parameter No.8010 to get DI/DO group number of the axis number specified by input parameter. If the DI/DO group number does not match the group of the function block, input parameter error occurs.
- 2 For details of each CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 5.14.7 Related signals

The signals related to this function block are listed below:

**Table 5.14.7 (a) List of related signals**

Symbol	Address	Signal name
ESKIP	X004.6	Skip signal for path 1 (PMC axis control)
ESKIP#2	X013.6	Skip signal for path 2 (PMC axis control)
ESKIP#3	X011.6	Skip signal for path 3 (PMC axis control)
SKIP	X004.7	Skip signal for path 1
SKIP#2	X013.7	Skip signal for path 2
SKIP#3	X011.7	Skip signal for path 3
MV1~MV8	F102	Axis moving signals

### Note

For details of the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 5.14.8 Example

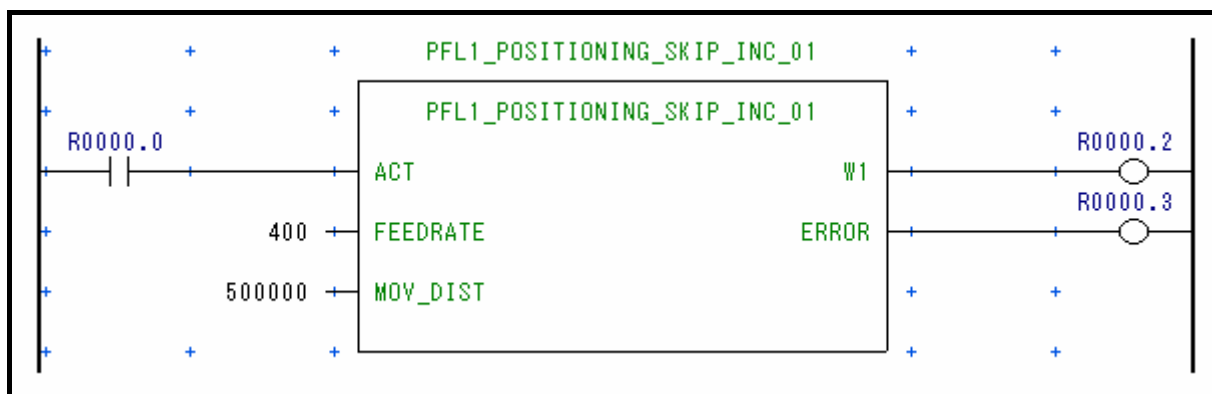
The following example is to perform skip function of the first axis (A-axis) of the first path controlled by group 1, while cutting feed at speed 400 mm/min for the distance 500 mm.

Function block to use:

PFL1\_POSITIONING\_SKIP\_INC\_01 for group 1

Parameters:

- Activation (ACT):	R0000.0	
- Cutting feedrate (FEEDRATE):	400	cutting feedrate; 400 mm/min (unit: metric, IS-B)
- Moving distance (MOV_DIST):	500000	distance 500.000 mm (unit: metric IS-B)
- Completion signal (W1):	R0000.2	
- Error signal (ERROR):	R0000.3	



1. Apply the following configuration to control first axis (A-axis) of first path as PMC axis of group 1:
  - a) Set "1" to CNC parameter No.981 of first axis (A-axis).
  - b) Set "1" to CNC parameter No.8010 of first axis (A-axis).
  - c) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
2. Apply the following configuration to enable skip signal (PMC axis control):
  - a) Turn on CNC parameter SKE (No.8001#7).
3. Turn on ACT (R0000.0) to start cutting feed per minute of first axis (A-axis). While moving, turning on skip signal (X004.6) will cause skip operation.
4. Turn off ACT (ACT=0) when W1 (R0000.2) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 2 Constant number or an address can be specified to the parameters; Cutting feedrate and Moving distance.



## 5.15 Data setting by teaching

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### 5.15.1 Function block name

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PFL1_DATA_SETTING_BY_TEACH_01	.....	Data setting by teaching (group 1)
PFL1_DATA_SETTING_BY_TEACH_02	.....	Data setting by teaching (group 2)
PFL1_DATA_SETTING_BY_TEACH_03	.....	Data setting by teaching (group 3)
PFL1_DATA_SETTING_BY_TEACH_04	.....	Data setting by teaching (group 4)

### 5.15.2 Function

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Prepare a point data table in PMC address (D-address typically) in which the set of coordinates (absolute) are registered. This function block writes the current position (absolute coordinate) to the point data table where the point number specified by the input parameter.

This function block can also perform jog operation of the axis at the feedrate, specified by the input parameters. The axis moves continuously to positive direction while the input parameter for positive direction turns on, and to negative direction while the negative one turns on.

PMC Function Library for PMC axis control provides function blocks for group 1 to 4. Choose the function block for the group that you use.

#### Note

- 1 Typically, point data table is located in PMC address such as D-address.
- 2 Writing the current position (absolute coordinate) should be done while the axis stay still.
- 3 If both of input parameter for moving positive and negative direction turn on at once, jog operation does not work.

### 5.15.3 Format

Graphical format of PFL1\_DATA\_SETTING\_BY\_TEACH\_01 is shown below:

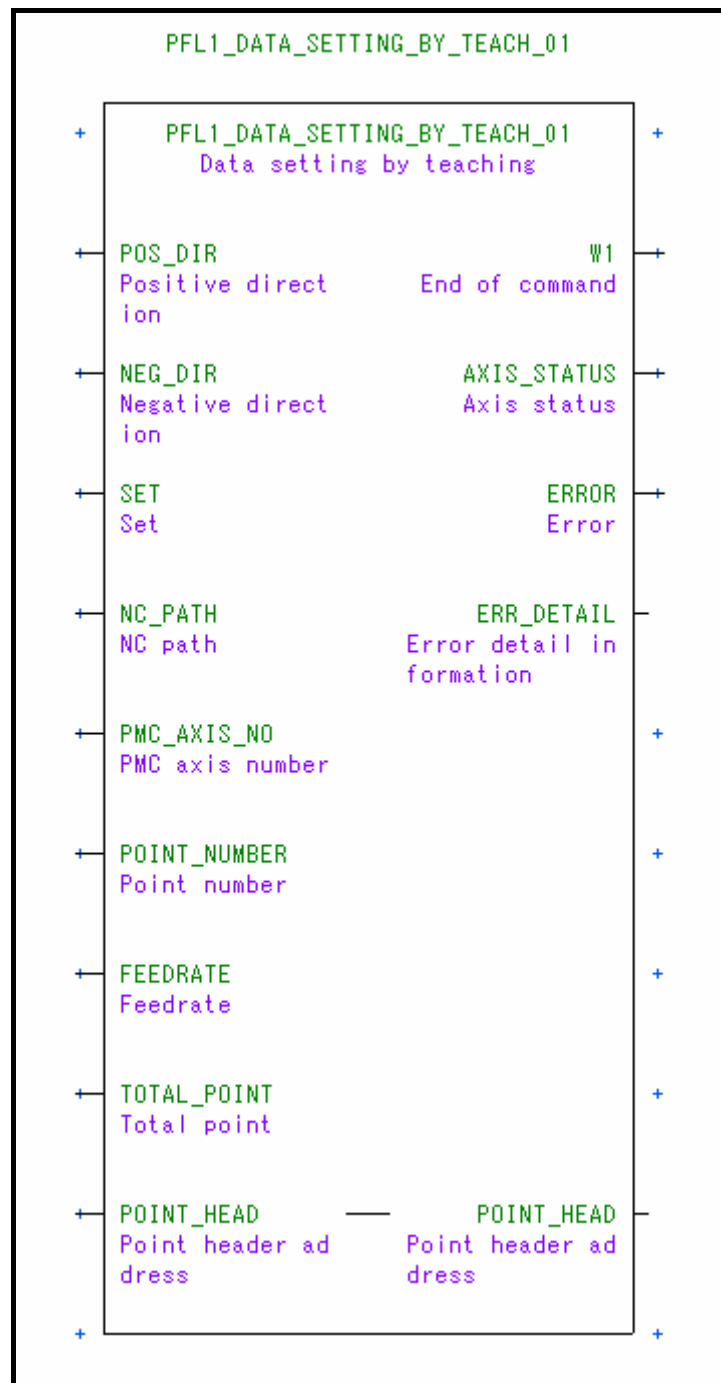


Figure 5.15.3 (a) PFL1\_DATA\_SETTING\_BY\_TEACH\_01 (group 1)

## 5.15.4 Parameters

Details of the parameters of this function block are as shown below:

**Table 5.15.4 (a) List of parameters**

Symbol	Parameter type	Data type	Count	Description
POS_DIR	input parameter	BOOL	-	Positive direction (Note 2, 3) 0: Do not move axis. 1: Move axis in positive direction.
NEG_DIR	input parameter	BOOL	-	Negative direction (Note 2, 3) 0: Do not move axis. 1: Move axis in negative direction.
SET	input parameter	BOOL	-	Data setting command (Note 2, 4) 0: Do not write current position (absolute coordinate). 1: Write current position (absolute coordinate) into point data table.
NC_PATH	input parameter	USINT	1	CNC path number Specify the CNC path number to which the axis to control belongs. Valid range is 1 to the maximum path number.
PMC_AXIS_NO	input parameter	USINT	1	PMC axis number Specify the axis number of the axis to control by PMC. Valid range is 1 to the maximum axis number.
POINT_NUMBER	input parameter	UINT	1	Point number Specify the point number which points the coordinate data in the point data table to be written to. Valid range is 1 to total points.
FEEDRATE	input parameter	UINT	1	Rapid traverse feedrate Specify the rapid traverse feedrate. Valid range is 1 to 65535. (Note 5)
TOTAL_POINT	input parameter	UINT	1	Total points Specify the total points of the point data table. Valid range is 1 to 16384. (Note 6)
POINT_HEAD	input/output parameter	DINT	1	Top address of point data table Specify the top address of the point data table whose coordinate data will be modified. Typically, point data table is located in PMC address such as D-address.
W1	output parameter	BOOL	-	Completion signal Indicates completion of the process. (Note 4) 0: Normally W1=0. 1: Turns on at completion of writing motion. Also turns on at error.
AXIS_STATUS	output parameter	BOOL	-	Axis status Indicates the status of the axis (Note 4) 0: Axis is not moving. 1: Axis is moving.
ERROR	output parameter	BOOL	-	Error signal Indicates error status at execution. 0: Finished successfully. 1: Finished with an error.
ERR_DETAIL	output parameter	INT	1	Error detail Indicates detail information of the error at ERROR=1. For more details, please refer to "5.15.5 Error information".

### Note

- 1 This function block turns off the buffering disable signal (EMBUFg) while it is working.
- 2 POS\_DIR, NEG\_DIR, and SET parameters should be "0" normally, and turn on only one of them at a time which should be executed. If both of POS\_DIR and NEG\_DIR are turned on, axis will not move either way. While the axis is moving (AXIS\_STATUS=1), SET will not work. Turn on SET after stopping the axis.
- 3 This function block uses a function block to reset PMC axis control command to stop the axis. When this function block stops the axis, the command in action and ones suspended in buffer of the same group will be also reset.
- 4 While SET=1, the outputs of W1, ERROR, and ERR\_DETAIL are sustained. Please turn off SET (SET=0) when W1 turns on (W1=1).
- 5 This function block internally uses function block for continuous feed. For more details, please refer to the section "(7) Continuous feed" in chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.
- 6 Valid range is 1 to 16384; however, the size of table cannot exceed the end of the address area.
- 7 AXIS\_STATUS signal is generated from axis moving signal (EGENg) and in-position signal (EINPg). To issue the next command after the axis stops, check if both of AXIS\_STATUS and control axis selection status signal (\*EAXSL) are turned off.

## 5.15.5 Error information

Error detail information (ERR\_DETAIL) of this function block notifies the cause of error as follows:

Table 5.15.5 (a) List of error codes

Error code	Meaning
1	Group number error (CNC parameter error) - DI/DO group number is not specified for PMC-controlled axis. Check the value of CNC parameter No.8010.
11	CNC path number error (input parameter error) - Specified CNC path number does not exist.
12	PMC axis number error (input parameter error) - Specified axis number does not exist.
16	Total points error (input parameter error) - Specified total points is out of valid range.
17	Point number error (input parameter error) - Specified point number is out of valid range.
21	DI/DO group number error (PMC axis control function block error) - DI/DO group number for PMC axis control function block is invalid.

## 5.15.6 Signals used inside function block

This function block uses the following signals for PMC axis control function, modifying and referring:

Table 5.15.6 (a) Signals to modify

Symbol	Address	Signal name
EMBUFg	G142.2	Buffering disable signal (PMC axis control)

Table 5.15.6 (b) Signals to refer

Symbol	Address	Signal name
EINPg	F130.0	In-position signal (PMC axis control)
EGENg	F130.4	Axis moving signal (PMC axis control)

### Note

Only the signal of group 1 is described. For the details of each signal please refer to the chapter of PMC axis control in "CONNECTION MANUAL (FUNCTION)" of your CNC.

## 5.15.7 Related CNC parameters

Details of the CNC parameters related to this function block are as shown below:

**Table 5.15.7 (a) List of related CNC parameters**

CNC parameter	Description
No.981	Path number that each axis belong to.
JOV (1402#1)	Disables jog override.
OVE (No.8001#2)	Select signals related to dry run and override in PMC axis control.
F10 (8002#3)	Selects the least increment of feedrate of cutting feed – feed per minute at PMC axis control.
JFM (8004#2)	Selects the unit of feedrate of continuous feed in PMC axis control.
No.8010	DI/DO group of PMC axis control for each axis.

### Note

For details of the CNC parameters, please refer to the “PARAMETER MANUAL” of your CNC.

## 5.15.8 Related signals

The signals related to this function block are listed below:

**Table 5.15.8 (a) List of related signals**

Symbol	Address	Signal name
RT	G019.7	Rapid traverse selection signal
DRN	G046.7	Dry run signal
ERT	G150.6	Rapid traverse selection signal (PMC axis control)
EDRN	G150.7	Dry run signal (PMC axis control)
*EAXSL	F129.7	Control axis selection status signal (PMC axis control)

### Note

For the details of each signal, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.

## 5.15.9 Example

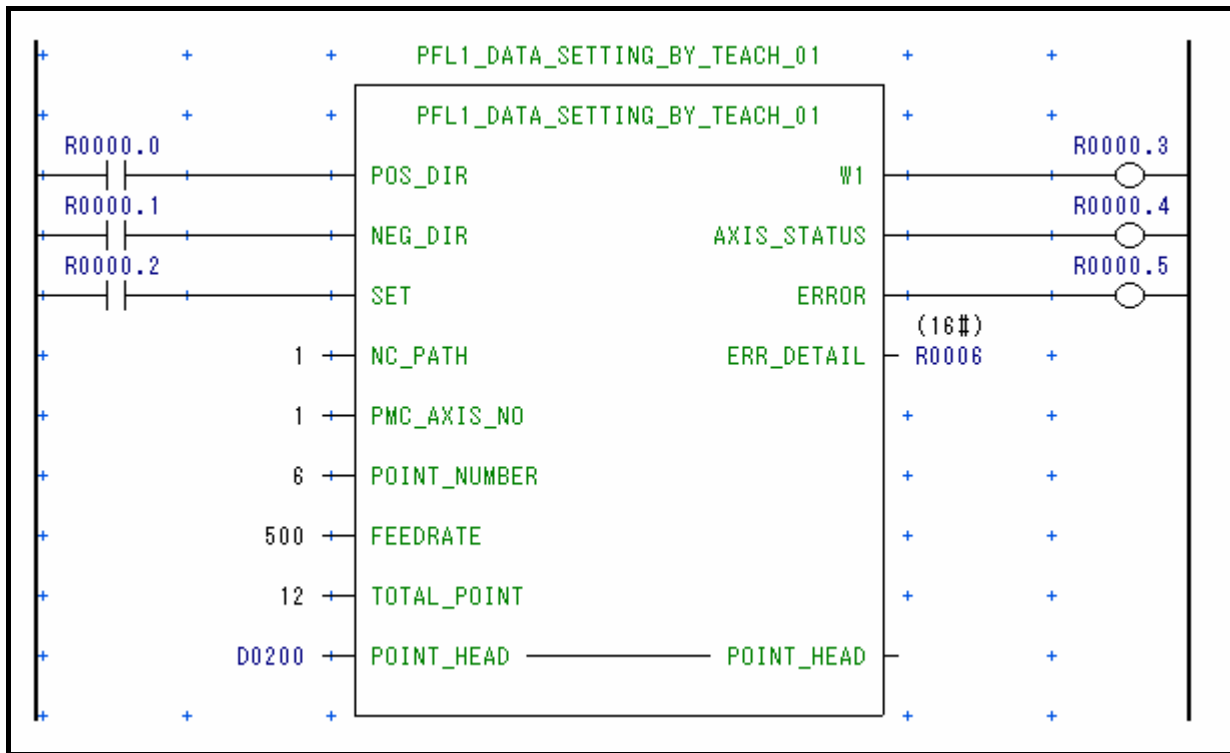
The following example is to perform jog operation of the first axis (A-axis) of the first path controlled by group 1, to the destination at speed 500 mm/min in positive direction, and after stopping the axis, then to write current absolute position into the point data table at the position of point #6.

Function block to use:

PFL1\_DATA\_SETTING\_BY\_TEACH\_01 for group 1

Parameters:

- Positive direction (POS_DIR):	R0000.0	
- Negative direction (NEG_DIR):	R0000.1	
- Data setting command (SET):	R0000.2	
- CNC path number (NC_PATH):	1	path 1
- PMC axis number (PMC_AXIS_NO):	1	PMC axis to be controlled; first axis (A-axis)
- Point number (POINT_NUMBER):	6	point number of data to be written; 6
- Rapid traverse feedrate (FEEDRATE):	500	rapid traverse feedrate; 500 mm/min (unit: metric, IS-B)
- Total points (TOTAL_POINT):	12	total of points in the point data table; 12
- Top address of point data table (POINT_HEAD):	D0100	
- Completion signal (W1):	R0000.3	
- Axis status (AXIS_STATUS):	R0000.4	
- Error signal (ERR):	R0000.5	
- Error detail (ERR_DETAIL):	R0006	



1. Prepare a point data table of 12 points at D0100 – D0147, containing coordinates (absolute) of each point. (4 bytes × 12)
2. Apply the following configuration to control first axis (A-axis) of first path as PMC axis of group 1:
  - a) Set “1” to CNC parameter No.981 of first axis (A-axis).
  - b) Set “1” to CNC parameter No.8010 of first axis (A-axis).
  - c) Turn on control axis selection signal EAX1 (G136.0) to enable PMC axis control of first axis.  
Control axis selection signal can be directly processed by ladder program. (Note 1)
3. Apply the following configuration to enable rapid traverse speed of input parameter:
  - a) Turn on CNC parameter RPD (No.8002#0).
4. Turn on POS\_DIR (R0000.0) and off NEG\_DIR (R0000.1) to start the first axis (A-axis) to move in positive direction, and then AXIS\_STATUS (R0000.4) turns on.
5. When the axis reaches the destination, turn off POS\_DIR (R0000.0) to stop the axis. And then AXIS\_STATUS (R0000.4) turns off.
6. Turn on SET (R0000.2) to write the current position (absolute coordinate) into the point data table at the pint #6 (D0220).
7. Turn off SET (SET=0) when W1 (R0000.3) turns on (W1=1).

### Note

- 1 For details of the CNC parameters and the signals, please refer to the chapter of PMC axis control in “CONNECTION MANUAL (FUNCTION)” of your CNC.
- 2 Constant number or an address can be specified to the parameters, such as Rapid traverse feedrate.