

<b>NCF090A</b>	<b>Linear Interpolation (REAL) _NCF090A_MoveLinear_REAL</b>
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<b>Basic function</b>	Executes a Linear interpolation operation with up to 4 axes. (Busy attachment)																																																							
<b>Symbol</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td style="width: 40%; text-align: center;">_NCF090A_MoveLinear_REAL</td> <td style="width: 30%;"></td> </tr> <tr> <td style="text-align: center;">Always ON (P_On)</td> <td>(BOOL) EN</td> <td>(BOOL) ENO</td> </tr> <tr> <td style="text-align: center;">Unit No.</td> <td>(INT) UnitNo</td> <td>(BOOL) Done</td> </tr> <tr> <td style="text-align: center;">Axis No.</td> <td>(INT) Axis</td> <td>(BOOL) Busy</td> </tr> <tr> <td style="text-align: center;">Start</td> <td>(BOOL) Execute</td> <td>(BOOL) CommandAborted</td> </tr> <tr> <td style="text-align: center;">Interpolation axis designation</td> <td>(WORD) AxisDesignation</td> <td>(BOOL) Error</td> </tr> <tr> <td style="text-align: center;">Interpolation position designation</td> <td>(WORD) PositionDesignation</td> <td>(WORD) ErrorID</td> </tr> <tr> <td style="text-align: center;">Position command 1</td> <td>(REAL) Position1</td> <td></td> </tr> <tr> <td style="text-align: center;">Speed command 1</td> <td>(REAL) Velocity1</td> <td></td> </tr> <tr> <td style="text-align: center;">Position command 2</td> <td>(REAL) Position2</td> <td></td> </tr> <tr> <td style="text-align: center;">Speed command 2</td> <td>(REAL) Velocity2</td> <td></td> </tr> <tr> <td style="text-align: center;">Position command 3</td> <td>(REAL) Position3</td> <td></td> </tr> <tr> <td style="text-align: center;">Speed command 3</td> <td>(REAL) Velocity3</td> <td></td> </tr> <tr> <td style="text-align: center;">Position command 4</td> <td>(REAL) Position4</td> <td></td> </tr> <tr> <td style="text-align: center;">Speed command 4</td> <td>(REAL) Velocity4</td> <td></td> </tr> <tr> <td style="text-align: center;">Interpolation speed</td> <td>(REAL) InterpolationVelocity</td> <td></td> </tr> <tr> <td style="text-align: center;">Interpolation acceleration time</td> <td>(DINT) AccelerationTime</td> <td></td> </tr> <tr> <td style="text-align: center;">Interpolation deceleration time</td> <td>(DINT) DecelerationTime</td> <td></td> </tr> </table>			_NCF090A_MoveLinear_REAL		Always ON (P_On)	(BOOL) EN	(BOOL) ENO	Unit No.	(INT) UnitNo	(BOOL) Done	Axis No.	(INT) Axis	(BOOL) Busy	Start	(BOOL) Execute	(BOOL) CommandAborted	Interpolation axis designation	(WORD) AxisDesignation	(BOOL) Error	Interpolation position designation	(WORD) PositionDesignation	(WORD) ErrorID	Position command 1	(REAL) Position1		Speed command 1	(REAL) Velocity1		Position command 2	(REAL) Position2		Speed command 2	(REAL) Velocity2		Position command 3	(REAL) Position3		Speed command 3	(REAL) Velocity3		Position command 4	(REAL) Position4		Speed command 4	(REAL) Velocity4		Interpolation speed	(REAL) InterpolationVelocity		Interpolation acceleration time	(DINT) AccelerationTime		Interpolation deceleration time	(DINT) DecelerationTime	
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<b>File name</b>	Lib\FBL\omronlib\PositionController\NCF\_NCF090A_MoveLinear_REAL12.cxf																																																							
<b>Applicable models</b>	Position Unit	CJ1W-NCF71, CS1W-NCF71																																																						
	CPU Unit	CS1*-CPU**H Unit Version 3.0 or later CJ1*-CPU**H Unit Version 3.0 or later CJ1M-CPU** Unit Version 3.0 or later CP1H																																																						
	CX-Programmer	Version 5.0 or later																																																						
<b>Languages in function block definitions</b>	Ladder programming																																																							

**Conditions for usage**

The following conditions for usage should be the Position Control Unit version 1.2 or earlier. (It will not be required in the Position Control Unit version 1.3 or later)

■CX-Programmer Setting

The function blocks related to the Position Control Units will not operate if the area H512 or higher (default setting) is specified as the Non Retain Area through the Function block memory allocation. Make sure to change the memory area to unused area (DM or EM, for example) from the CX-Programmer. To change this value, click **PLC/Function Block Memory/Function Block Memory Allocation** from the Menu Bar.

Specify unused area.  
The required size varies depending on the used FB and the number of FBs. If an area being used in the ladder program is specified or sufficient free space cannot be found, the CX-Programmer will display a compile error.

For example, to use the memory area from D32020 to D32767 (748 words), specify the addresses as shown in the left.

**Function description**

The Busy Output is added to the \_NCF090\_MoveLinear\_REAL in this FB.

When the Start (Execute) turns ON, the Linear Interpolation operation for the axis of the specified Unit No. (UnitNo) and Axis No. (Axis) is started.

Linear interpolation completed (Done) is set when the Linear Interpolation of this FB has been completed. This flag will not be turned ON if the operation is canceled because another operation has been started from a different instance, for a deceleration stop, or because an error has occurred.

The Busy flag (Busy) will be set when the Start (Execute) is turned ON.

The Busy flag (Busy) will be reset when the Linear interpolation completed (Done), Abort (CommandAborted), or Error flag (Error) is turned ON.

If the error occurs when the input variables is out of the range etc., the Busy flag (Busy) will be set for at least one cycle.

The Error flag (Error) will be turned ON and the Error code (ErrorID) will be output if an error occurs for the FB. This will not occur for error in other FBs or other instances of the FB.

These statuses (Done/CommandAborted/Error/ErrorID) will be reset when the Start (Execute) turns OFF. If the Start (Execute) turns OFF before the operation has been completed, the status will be set for at least one cycle when supporting conditions have occurred.

**Kind of FB definition**

Always execution type.  
Connect the EN input to the Always ON Flag (P\_On).  
The same instance cannot be used in two or more places.

**FB precautions**

- The same Linear Interpolation command cannot be executed again using a new command during the Linear Interpolation in operation. Executing a Linear Interpolation command during axis in operation is invalid. For details, refer to the *Related Manuals*.

**EN input condition**

- Connect the EN input to the Always ON Flag (P\_On).  
If another bit is connected to EN, the FB outputs will be held when the connected bit turns OFF.

<b>Restrictions</b> <b>Other</b>	<ul style="list-style-type: none"> <li>• If a speed command value for an individual axis is set to 0, no maximum speed limit will set for that interpolation axis and the speed resolved from the interpolation speed command value will be used as is. If the interpolation speed command value is set to 0, there is no interpolation speed designation and the interpolation speed is determined by the speed command values for the individual interpolation axes. If either the interpolation speed command value or a speed command value for an individual interpolation axis is set to 0, the individual interpolation axes are operated at the same speed, at the minimum unit (1 command unit/s) for the speed command value.</li> <li>• If less than the minimum unit (1 command unit/s) for an individual axis speed command value results when the interpolation speed command value is resolved for individual interpolation axes, that axis will be operated at the minimum unit (1 command unit/s) for the speed command value.</li> <li>• The following cannot be specified for this FB: "Acceleration/deceleration curve designation", "Forward rotation current limit designation" and "Reverse rotation current limit designation". If these functions are required, specify them in advance outside the FB.</li> <li>• This FB uses Unit Error Reset, Write Data, Read Data and Save Data Bits of the Position Control Unit (see Note). Therefore, do not turn these bits ON or OFF between the period from the rising edge of EN to the rising edge of ENO. For the same reason, do not use these bits for coil outputs (OUT commands).</li> <li>• The output variable of FB may not change even if EN is turned ON. In that case, check if any of Unit Error Reset, Write Data, Read Data and Save Data Bit is left ON.</li> <li>• This FB uses the Linear Interpolation Setting/ Linear Interpolation Start Bit in the Axis Operating Output Memory Areas. Therefore, do not turn these bits ON or OFF until the operation is completed. For the same reason, do not use these bits for coil outputs (OUT commands).</li> <li>• The Linear Interpolation operation does not start while the Servo Parameter bit in the Axis Operating Output Memory Areas is ON. Keep this bit OFF until the axis operation starts.</li> </ul> <p>Note:  For calculation of bit addresses, these bits are referenced in this FB in the first execution of each instance, and when changing "Unit No. (UnitNo)", "Axis No. (Axis)" of the input variable and set "Start (Execute)".</p>
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**Application example**

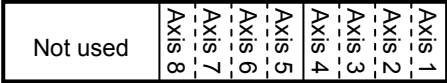
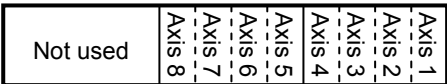
Turning the Start Trigger ON from OFF will operate the Servomotor (axis1, axis2, axis3 and, axis4) connected to the Position Control Unit with a unit number 0 using the Linear Interpolation.

Sample		_NCF090A_MoveLinear_REAL	
Always ON (P_On)	(BOOL) EN	(BOOL) ENO	
Unit No. &0	(INT) UnitNo	(BOOL) Done	Linear interpolation completed Bit B
Axis No. &1	(INT) Axis	(BOOL) Busy	Busy flag Bit C
Start Bit A	(BOOL) Execute	(BOOL) CommandAborted	Abort Bit D
Interpolation axis designation #0F	(WORD) AxisDesignation	(BOOL) Error	Error flag Bit E
Interpolation position designation #00	(WORD) PositionDesignation	(WORD) ErrorID	Error code D0
Position command 1 +5000.0	(REAL) Position1		
Speed command 1 +3000.0	(REAL) Velocity1		
Position command 2 +5000.0	(REAL) Position2		
Speed command 2 +3000.0	(REAL) Velocity2		
Position command 3 +5000.0	(REAL) Position3		
Speed command 3 +3000.0	(REAL) Velocity3		
Position command 4 +5000.0	(REAL) Position4		
Speed command 4 +3000.0	(REAL) Velocity4		
Interpolation speed +3000.0	(REAL) InterpolationVelocity		
Interpolation acceleration time +300	(DINT) AccelerationTime		
Interpolation deceleration time +300	(DINT) DecelerationTime		

**Related manuals**

Position Control Units OPERATION MANUAL (W426-E1)  
 9-7 Linear Interpolation  
 12-4 Error Codes

■Variable Tables  
Input Variables

Name	Variable name	Data type	Default	Range	Description
EN	EN	BOOL			1(ON): FB started 0(OFF): FB not started
Unit No.	UnitNo	INT	&0	&0~&15	Specify the unit number.
Axis No.	Axis	INT	&1	&1, &5	&1: Specifies combination of Axes 1 to 4 &5: Specifies combination of axes 5 to 8.
Start	Execute	BOOL	0(OFF)		↑ : Starts linear interpolation.
Interpolation axis designation	Axis Designation	WORD	#00	(When selecting Axis 1) #0001 to #00FF (An error occurs if all of Bit 00 to 03 are 0)  (When selecting Axis 5) #0010 to #00FF	Specifies interpolation axes by turning ON the bit corresponding to each axis specified in "Axis No. (Axis)". 0: Not used as interpolation axis 1: Used as interpolation axis  Bit 15      08 07      00  Ex.: Set &1 to "Axis No. (Axis)" and #0003 to "Interpolation axis designation (AxisDesignation)".
Interpolation position designation	Position Designation	WORD	#00	#0000 to #00FF	Specifies whether linear interpolation is performed with either absolute or relative position by turning ON or OFF the bit corresponding to each axis. 0: Interpolation with absolute position 1: Interpolation with relative position  Bit 15      08 07      00 
Position command 1 to 4	Position1 to 4	REAL	+0.0	-2.147483e+009 to +2.147483e+009	Specifies target positions. Unit: Command units
Speed command 1 to 4	Velocity1 to 4	REAL	+0.0	+0.0 to +2.147483e+009	Specifies maximum speed of each axis Unit: Command units/s
Interpolation speed	Interpolation Velocity	REAL	+0.0	+0.0 to +2.147483e+009	Specifies interpolation speed. Unit: Command units/s
Interpolation acceleration time	Acceleration Time	DINT	+0	+0 to +65,535	Specifies interpolation acceleration time. Unit: ms
Interpolation deceleration time	Deceleration Time	DINT	+0	+0 to +65,535	Specifies interpolation deceleration time. Unit: ms

**Output Variables**

Name	Variable name	Data type	Range	Description
ENO	ENO	BOOL		1 (ON): FB operating normally 0 (OFF): FB not operating normally <ul style="list-style-type: none"> <li>• FB not started</li> <li>• Input variable out of the range</li> <li>• FB ended with error</li> <li>• Common Parameters could not be read</li> </ul>
Linear interpolation completed	Done	BOOL		1 (ON) indicates that linear interpolation operation is completed.
Busy flag	Busy	BOOL		1 (ON) indicates that the FB is in progress.
Abort	CommandAborted	BOOL		1 (ON): Aborted It will be aborted when any of the following conditions is met during operation <ul style="list-style-type: none"> <li>• Turns ON when the other Move command done (Duplicate Move).</li> <li>• Stopped with Declaration Stop or Emergency Stop.</li> <li>• Executed Servo Unlock, Deviation Counter Reset on an operating axis.</li> <li>• Attempted to execute FB while Servo Unlock, Deceleration Stop, Emergency Stop or Deviation Counter Reset Bit is ON.</li> <li>• Detected the Stop Execution Flag is ON.</li> <li>• The Linear Interpolation Setting or Linear Interpolation Start Bit is changed by the other FB during Linear Interpolation in operation.</li> </ul>
Error flag	Error	BOOL		Turns ON when an error has occurred in the FB.
Error code	ErrorID	WORD		Returns the error code when an error has occurred in the FB. Refer to the <i>Related Manuals</i> for details on errors. A code of #0000 will be returned if any of the following conditions is satisfied. <ul style="list-style-type: none"> <li>• Input variable is out of range.</li> <li>• The common parameters of the Position Control Units are out of range.</li> <li>• Not established communications with a specified axis.</li> </ul> An error code with a smaller axis number output when an error occurs in more than one axis has priority.

**■Version History**

Version	Date	Contents
1.13	2006.01.	Original production
1.20	2006.08.	This FB has been improved.

**■The detailed contents of the upgrading**

Version	Detailed Contents
1.20	The following 3 items have been improved. <ul style="list-style-type: none"> <li>• In the version 1.20 or earlier, using the axis that has not been specified as an interpolation axis in "Interpolation axis designation (AxisDesignation)" caused Abort. In the version 1.20, it has been improved that using any axis not specified as an interpolation axis does not cause Abort.</li> <li>• In the version 1.20 or earlier, starting this FB while the Linear Interpolation Bit is ON caused Abort. In the version 1.20, it has been improved that starting this FB does not cause Abort even while the Linear Interpolation Bit is ON.</li> <li>• In the version 1.20 or earlier, starting this FB while either of Absolute Movement, Relative Movement, Speed Control or Torque Control Bit is ON caused Abort. In the version 1.20, it has been improved that starting this FB does not cause Abort even while any of the above bits is ON.</li> </ul>

**■Note**

This document explains the function of the function block.

It does not provide information of restrictions on the use of Units and Components or combination of them. For actual applications, make sure to read the operation manuals of the applicable products.