



FAQ • 07/2015

Stopping an Axis with Position Accuracy after Product Identification

SIMATIC S7-1200

<https://support.industry.siemens.com/cs/ww/en/view/109477583>

This entry is from the Siemens Industry Online Support. The general terms of use (http://www.siemens.com/terms_of_use) apply.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (cell protection concept, for example) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit <http://www.siemens.com/industrialsecurity>.

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit <http://support.industry.siemens.com>.

Contents

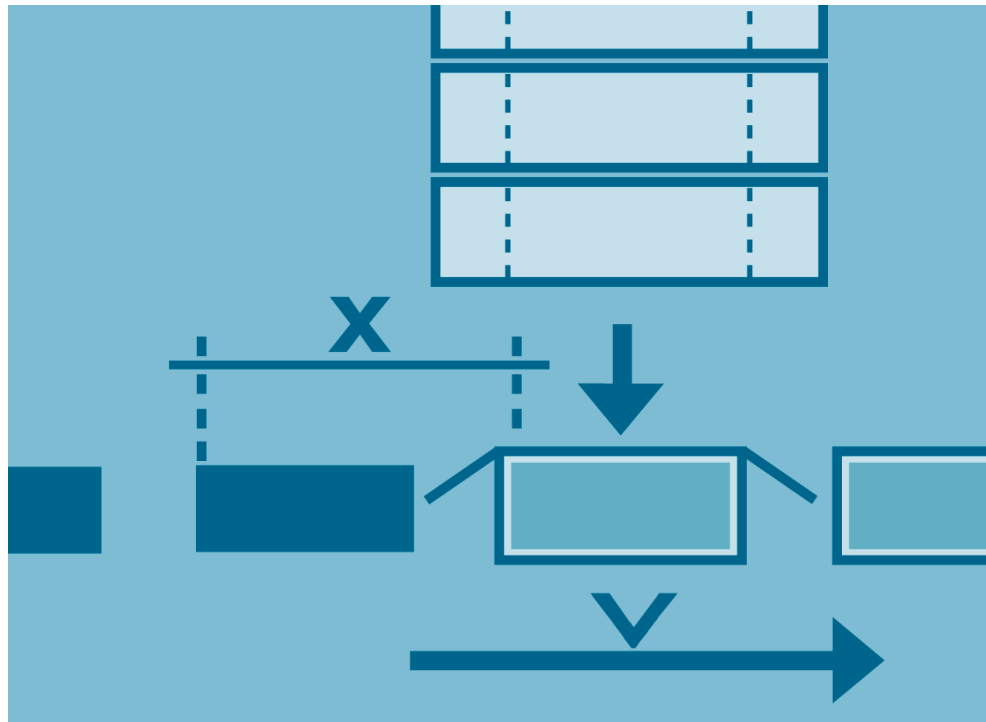
1	Task	3
	1.1 Overview	3
2	Solution	4
	2.1 Solution Overview.....	4
3	Function Mechanisms	5
	3.1 FB "MoveAfterEvent"	5
	3.2 Download	9
4	Related Literature	10

1 Task

1.1 Overview

The task is described taking the example a cartoner.

Figure 1-1



The product to be packed is conveyed via the positioning axis at velocity "v". When the product is recognized (here the back edge by a light switch) the positioning axis should stop within a distance "x" to carton the product at a standstill.

2 Solution

2.1 Solution Overview

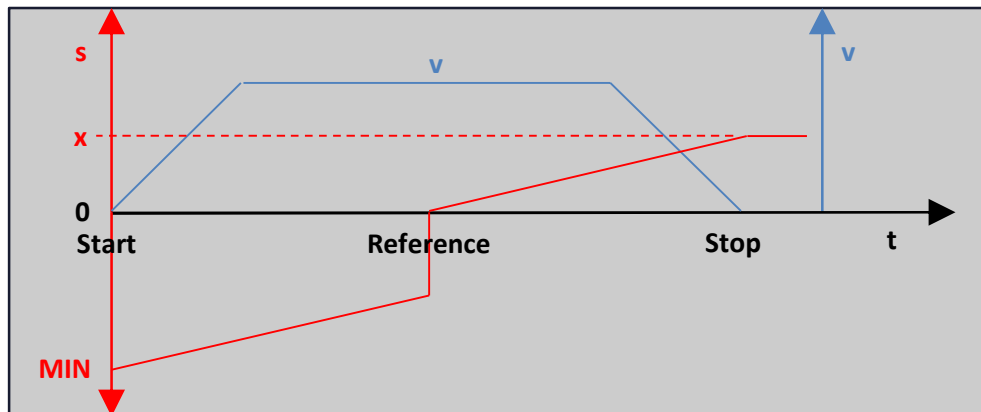
You use the call sequence of the following "Motion Control" instructions to stop the technology object "TO_PositioningAxis" with position accuracy after production recognition.

Table 2-1

No.	SCL code	Meaning
1.	<code>MC_Home (Position := MIN, Mode := 0);</code>	Direct referencing absolutely to the minimum position ($-1 \cdot 10^{12}$, for example).
2.	<code>MC_MoveAbsolute (Position := x, Velocity := v);</code>	Absolute positioning to the position x at velocity v.
3.	<code>MC_Home (Position := 0, Mode := 2);</code>	Passive referencing (when the digital input for the passive reference point switch is recognized, the axis is set to position 0). However, the travel motion of the passive referencing (here: absolute positioning) is still performed.

The time sequence is as shown below.

Figure 2-1



At the start the axis is set to the minimum position ("MIN"). This must be chosen such that the position x to be travelled to is not reached before activation of the passive reference point switch.

Then the axis does absolute positioning at velocity v to the distance value x.

Activation of the passive referencing ([Table 2-1](#) Step 3) the position of the axis jumps to 0 when the passive reference point switch is activated.

This axis travels further until the absolute position x (distance) is reached.

3 Function Mechanisms

3.1 FB "MoveAfterEvent"

This function block was developed with STEP 7 V13 SP1 Update 3 and the Technology instructions "S7-1200 Motion Control" V5.0 and tested with a CPU 1214C DC/DC/DC firmware V4.1.2.

It is called in the cyclic organization block "Main".

Figure 3-1

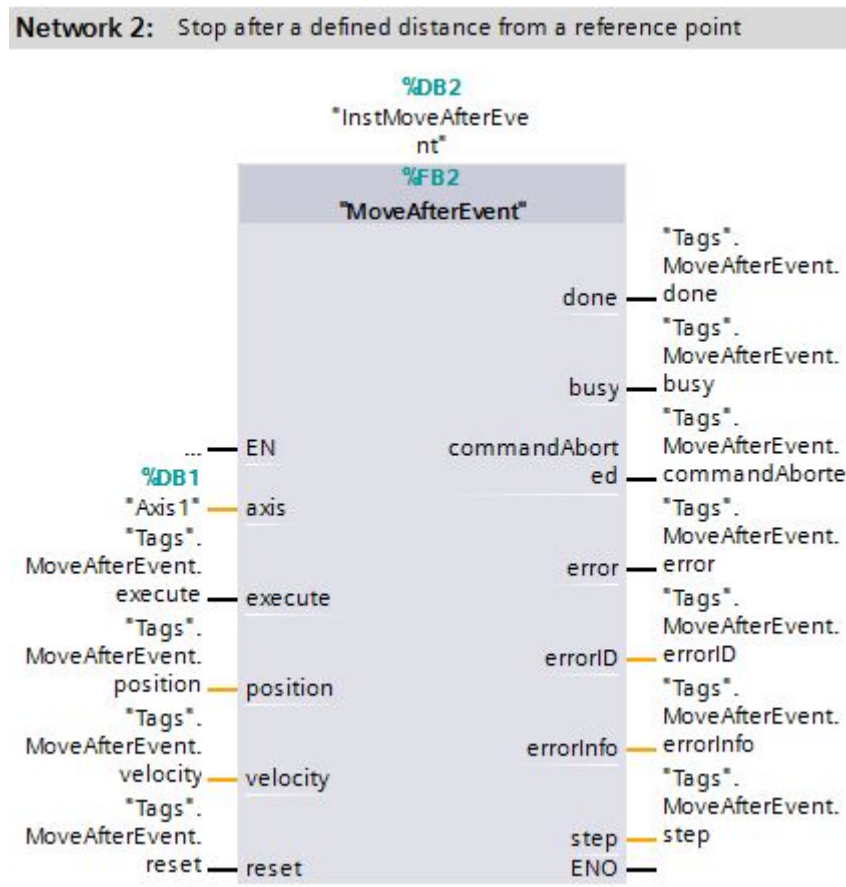


Table 3-1

	Name	Data type	Description
Input	axis	TO_PositioningAxis	Technology object of the axis.
	position	Real	Absolute target position (distance from the passive reference point switch).
	velocity	Real	Velocity of the axis.
Output	done	Bool	Absolute target position reached.
	busy	Bool	Job is being processed.
	commandAborted	Bool	The job was interrupted by another job during processing.
	error	Bool	An error has occurred during processing of the job. You can find out the cause of error from the parameters "ErrorID" and

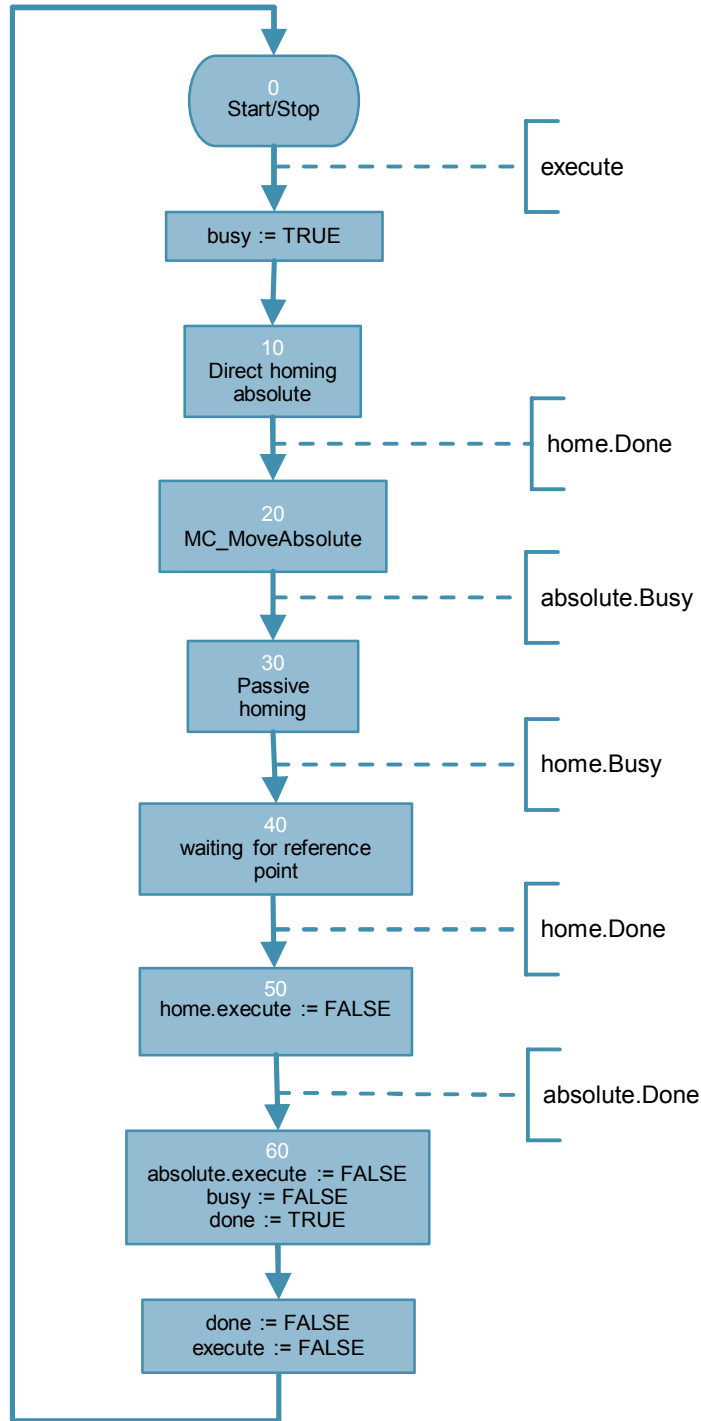
	Name	Data type	Description
			"ErrorInfo".
	errorID	Word	Error identification for the "Error" parameter.
	errorInfo	Word	Error information identification for the "ErrorID" parameter.
	step	USInt	Step counter (for checking)
InOut	execute	Bool	Start of job (automatically reset after error-free run of the block).
	reset	Bool	Stopping of the axis, resetting of the sequencer (automatically reset after execution).
Constant	MIN_POSITION	Real	Absolute minimum position for the direct referencing (Table 2-1 Step 1).

NOTE A [List of ErrorIDs and ErrorInfos \(technology objects V4 and higher\)](#) is available in the manual STEP 7 Basic V13 SP1 ([\7](#)) or in the STEP 7 V13 SP1 Online Help.

Program flow chart

The FB "MoveAfterEvent" is programmed as a sequencer.
The program flow chart is as shown below.

Figure 3-2



When the InOut variable "execute" is set the "Stopping with Position Accuracy after Product Identification" in Step 0 is started.

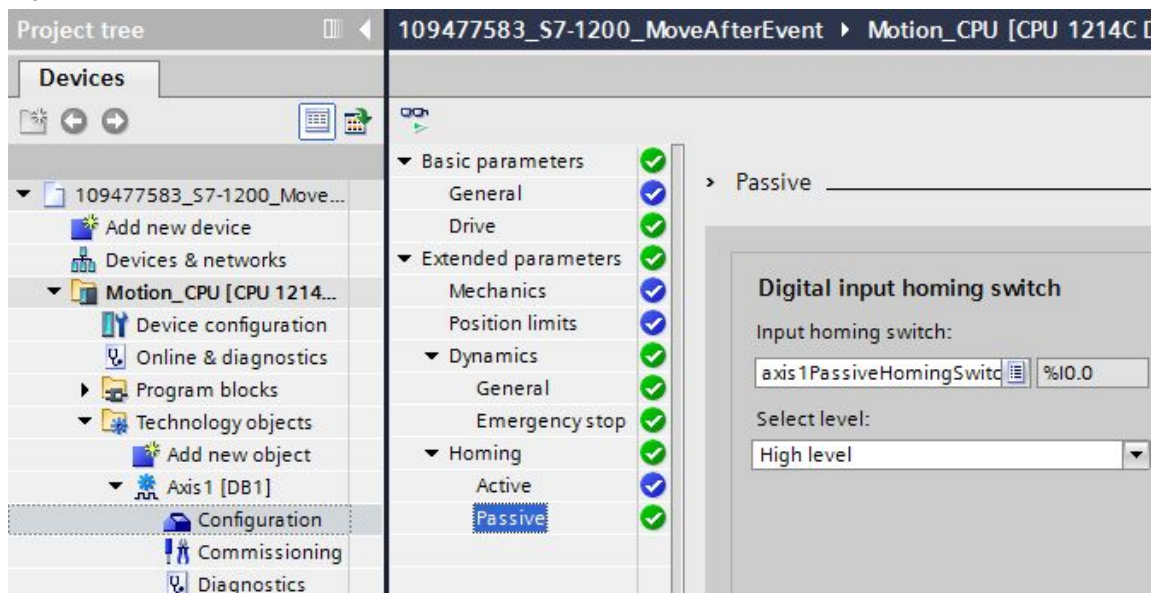
The output bit is set to "busy" during processing of the sequencer.

When enabled, the positioning axis (selected via the "axis" input) in Step 10 is referenced directly absolutely to the minimum position (constant "MIN_POSITION").

When the instruction "MC_Home" (home.Done) returns a positive feedback, in Step 20 the job of absolute travel (MC_MoveAbsolute) to the distance position "position" at the speed "velocity" is executed.

With feedback of the TO object "axis" about the processing of the positioning job ("absolute.Busy") the passive referencing (passive homing) is triggered in Step 30. Here it is specified that when the selected digital input "Reference point switch" for the passive referencing (from the configuration of the TO object "axis" -> [Figure 3-3](#)) is activated, the absolute position is set to 0 and the necessary travel movements are triggered by the user program (here: the absolute travel to the distance position -> Step 20).

Figure 3-3



After feedback of the processing of the referencing job (home.busy), the TO object waits in Step 40 for activation of the digital reference point switch input for the passive referencing.

When this has been done, the "MC_Home" instruction returns a positive feedback (home.done) and execution of the instruction is reset in Step 50 ("home.execute := FALSE").

When the target position has been reached, the "MC_Absolute" instruction returns a positive feedback (absolute.done) and execution of the instruction is reset in Step 60 ("absolute.execute := FALSE"). The output bit "busy" is reset and the "done" bit signals the successful processing of the "MoveAfterEvent" block for one cycle. Finally the InOut variable "execute" is reset ("execute := FALSE").

When instances of the output information "commandAborted", "error", "errorID" and "errorInfo" occur, they are transferred and retained by the instructions "MC_MoveAbsolute" and "MC_Home", because the sequencer remains in the step concerned ("step").

When the InOut variable "reset" is activated the "MC_Halt" instruction for stopping the positioning axis is executed and the sequencer is reset. After execution the InOut variable "reset" is reset.

3.2 Download

The download includes a STEP 7 Basic V13 SP1 project. An S7-1200 CPU firmware V4.1 with a positioning axis V5.0 is configured in the project. The drive control is the controlled positioning via pulse train frequency (PTO). This version can also be simulated without a real drive. The block can however also be used for controlled positioning with feedback via incremental encoder. The function of the FB "MoveAfterEvent" can be checked with the "WatchTable" monitoring table.

Figure 3-4

	Name	Addr...	Display format	Monitor value	Modify value		Comment
1	enable					<input type="checkbox"/>	
2	*Tags*.power.enable		Bool	TRUE	TRUE	<input checked="" type="checkbox"/>	
3	*Tags*.power.stopMode		DEC+/-	0		<input type="checkbox"/>	
4	*Tags*.power.status		Bool	TRUE		<input type="checkbox"/>	
5	*Tags*.power.busy		Bool	TRUE		<input type="checkbox"/>	
6	*Tags*.power.error		Bool	FALSE		<input type="checkbox"/>	
7	*Tags*.power.errorID		Hex	16#0000		<input type="checkbox"/>	
8	*Tags*.power.errorInfo		Hex	16#0000		<input type="checkbox"/>	
9	*MoveAfterEvent*					<input type="checkbox"/>	
10	*Tags*.MoveAfterEvent.execute		Bool	FALSE	TRUE	<input checked="" type="checkbox"/>	
11	*Tags*.MoveAfterEvent.position		Floating-poi...	10.0	10.0	<input checked="" type="checkbox"/>	
12	*Tags*.MoveAfterEvent.velocity		Floating-poi...	250.0	250.0	<input checked="" type="checkbox"/>	
13	*Tags*.MoveAfterEvent.reset		Bool	FALSE		<input type="checkbox"/>	
14	*Tags*.MoveAfterEvent.step		DEC	0		<input type="checkbox"/>	
15	*Tags*.MoveAfterEvent.done		Bool	FALSE		<input type="checkbox"/>	
16	*Tags*.MoveAfterEvent.busy		Bool	FALSE		<input type="checkbox"/>	
17	*Tags*.MoveAfterEvent.commandAborted		Bool	FALSE		<input type="checkbox"/>	
18	*Tags*.MoveAfterEvent.error		Bool	FALSE		<input type="checkbox"/>	
19	*Tags*.MoveAfterEvent.errorID		Hex	16#0000		<input type="checkbox"/>	
20	*Tags*.MoveAfterEvent.errorInfo		Hex	16#0000		<input type="checkbox"/>	
21	*Tags*.doneCounter		DEC	6		<input type="checkbox"/>	
22	*axis feedback*					<input type="checkbox"/>	
23	*Axis1*.ActualPosition		Floating-poi...	10.0		<input type="checkbox"/>	
24	*Axis1*.ActualVelocity		Floating-poi...	0.0		<input type="checkbox"/>	
25	*Axis1*.StatusBits.Enable		Bool	TRUE		<input type="checkbox"/>	
26	*Axis1*.StatusBits.HomingDone		Bool	TRUE		<input type="checkbox"/>	
27	*Axis1*.StatusBits.Error		Bool	FALSE		<input type="checkbox"/>	
28	*Axis1*.StatusBits.Standstill		Bool	TRUE		<input type="checkbox"/>	
29	*Axis1*.StatusBits.PositioningCommand		Bool	FALSE		<input type="checkbox"/>	
30	*Axis1*.StatusBits.HomingCommand		Bool	FALSE		<input type="checkbox"/>	
31	*Axis1*.StatusBits.ConstantVelocity		Bool	FALSE		<input type="checkbox"/>	
32	*Axis1*.StatusBits.Accelerating		Bool	FALSE		<input type="checkbox"/>	
33	*Axis1*.StatusBits.Decelerating		Bool	FALSE		<input type="checkbox"/>	
34	*axis hardware interface*					<input type="checkbox"/>	
35	*axis1PassiveHomingSwitch*	%I0.0	Bool	FALSE		<input type="checkbox"/>	
36	*axis1Pulse*	%Q0.0	Bool	FALSE		<input type="checkbox"/>	
37	*axis1Dir*	%Q0.1	Bool	FALSE		<input type="checkbox"/>	
38	*axis1Enable*	%Q0.2	Bool	TRUE		<input type="checkbox"/>	

4 Related Literature

Table 4-1

	Subject area	Title
\1\	Siemens Industry Online Support	http://support.industry.siemens.com
\2\	Download page of this entry	https://support.industry.siemens.com/cs/ww/en/view/109477583
\3\	Manual: SIMATIC S7 S7-1200 Programmable Controller	https://support.industry.siemens.com/cs/ww/en/view/107623221
\4\	Service Pack 1 for SIMATIC STEP 7 V13 incl. PLCSIM (TIA Portal)	https://support.industry.siemens.com/cs/ww/en/view/105825934
\5\	Updates for STEP 7 V13 SP1 and WinCC V13 SP1	https://support.industry.siemens.com/cs/ww/en/view/109311724
\6\	Firmware update for SIMATIC S7-1200 CPUs	https://support.industry.siemens.com/cs/products?dtp=Download&pnid=13685&lc=en-WW
\7\	Manual: STEP 7 Basic V13 SP1	https://support.industry.siemens.com/cs/ww/en/view/109054417
\8\	Manual: SIMATIC STEP 7 S7-1200 Motion Control V13 SP1	https://support.industry.siemens.com/cs/ww/en/view/108577079
\9\	Sample application "SINAMICS V: Controlled Positioning of a V90 with S7-1200 via the Pulse/Direction Interface with HMI"	https://support.industry.siemens.com/cs/ww/en/view/77467940
\10\	Sample application "SINAMICS V: Positioning of a V60 using S7-1200 (TIA-Portal) with pulse/direction interface and HMI (Set 7)"	https://support.industry.siemens.com/cs/ww/en/view/38391227