



## KEB\_PhasingAxisControl instructions FAQ No.0014

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## Introduction

This document gives a general overview of the KEB\_PhasingAxisControl function block. General terms and behaviour will be explained.

## General description

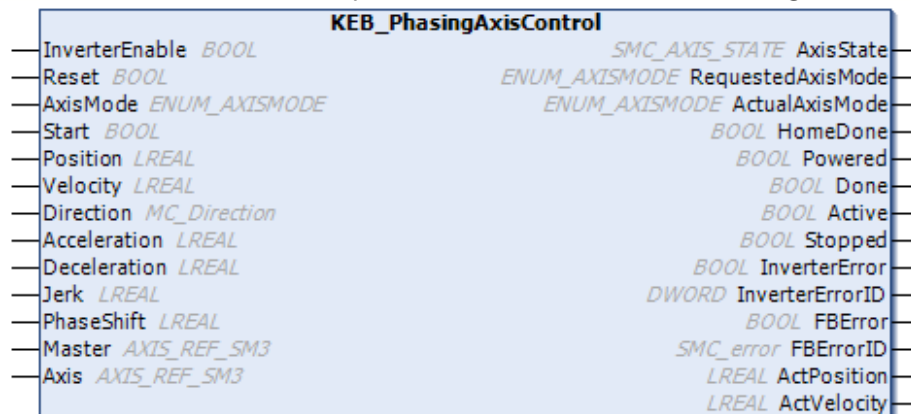
The KEB\_PhasingAxisControl function block allows the user to control a SoftMotion Drive in various modes using a single function block:

- Velocity
- Absolute Positioning
- Relative Positioning
- Set Position
- Homing
- Phasing

This function block is part of the KEB\_SMC\_Utility library.

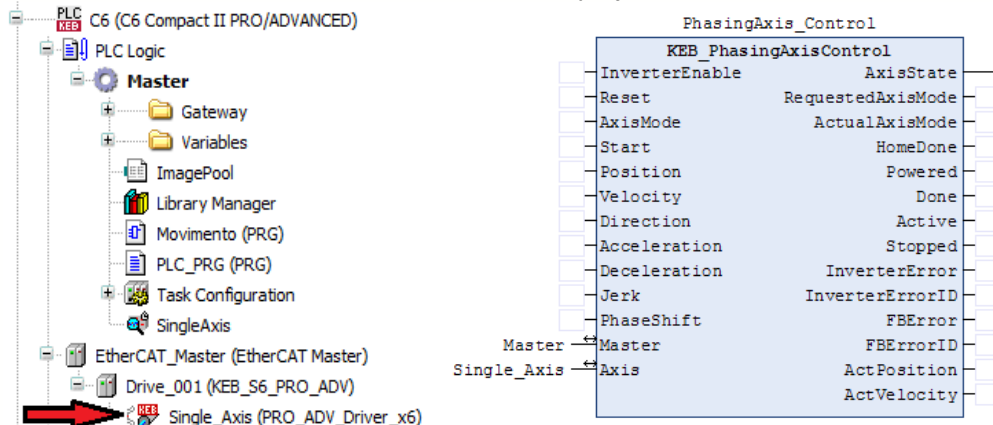
The KEB\_PhasingAxisControl function block is an extension of the KEB\_SingleAxisControl block. It contains all the features of the above-mentioned block plus the Phasing mode.

For further information about these modes please see FAQ Document KEB\_SingleAxisControl.



## Restrictions

This function block can be used with Pro/Advanced Drive only. In fact, it needs two *AXIS\_REF\_SM3* structure as input variable, **Master** and **Slave** Axis, structure that is automatically created when a SoftMotion Drive is added in the project.



## KEB\_PhasingAxisControl

### Variables

#### Input

Name	Type	Comment
<b>InverterEnable</b>	BOOL	As long as this variable is TRUE, the drive is switched on.
<b>Reset</b>	BOOL	Reset Drive or FunctionBlock errors
<b>AxisMode</b>	ENUM_AXISMODE	AM_DEFAULT = 0 AM_VELOCITY = 1 AM_POSITIONINGABSOLUTE = 2 AM_POSITIONINGRELATIVE=4 AM_SETPOSITION = 6 AM_HOMING = 7 AM_PHASING = 10
<b>Start</b>	BOOL	Run/Stop Drive in AxisMode Function
<b>Position</b>	LREAL	Target position for the motion (technical unit [units])
<b>Velocity</b>	LREAL	Value of the target velocity (not necessarily to be reached) [units/s]
<b>Direction</b>	MC_Direction	This enumeration provides the desired direction; only relevant for rotating axes (modulo-axis). Supported values depending of AxisMode: -1 = negative 0 = shortest (seen from the current position) 1 = positive 2 = current (current direction) 3 = fastest (direction, which would finish movement as fast as possible)
<b>Acceleration</b>	LREAL	Desired acceleration (increasing energy of the motor) [units/s <sup>2</sup> ]
<b>Deceleration</b>	LREAL	Desired deceleration (decreasing energy of the motor) [units/s <sup>2</sup> ]
<b>Jerk</b>	LREAL	Maximum magnitude of the jerk [units/s <sup>3</sup> ] (ignored for ramp type trapez)
<b>PhaseShift</b>	LREAL	Phase shift between Master and Slave (technical unit [units])
<b>Master</b>	AXIS_REF_SM3	Master axis
<b>Axis</b>	AXIS_REF_SM3	Controlled/Slave axis



## Output

Name	Type	Comment
<b>AxisState</b>	SMC_AXIS_STATE	0: power_off 1: errorstop 2: stopping 3: standstill 4: discrete_motion 5: continuous_motion 6: synchronized_motion 7: homing
<b>RequestedAxisMode</b>	ENUM_AXISMODE	Shows requested axis mode
<b>ActualAxisMode</b>	ENUM_AXISMODE	Shows actual axis mode
<b>HomeDone</b>	BOOL	TRUE indicates that if homing is done
<b>Powered</b>	BOOL	As long as this variable is TRUE, the drive is switched on
<b>Done</b>	BOOL	TRUE indicates that the movement is on
<b>Active</b>	BOOL	TRUE indicates that the drive is moving
<b>Stopped</b>	BOOL	TRUE indicates that the drive is not moving
<b>InverterError</b>	BOOL	TRUE indicates drive error
<b>InverterErrorID</b>	DWORD	Use GetInvStateD function to get a STRING errormessage
<b>FBError</b>	BOOL	TRUE indicates FunctionBlock error
<b>FBErrorID</b>	SMC_error	Use SMC_ErrorString function to get a STRING errormessage
<b>ActPosition</b>	LREAL	Actual position [units]
<b>ActVelocity</b>	LREAL	Actual velocity [units/s]

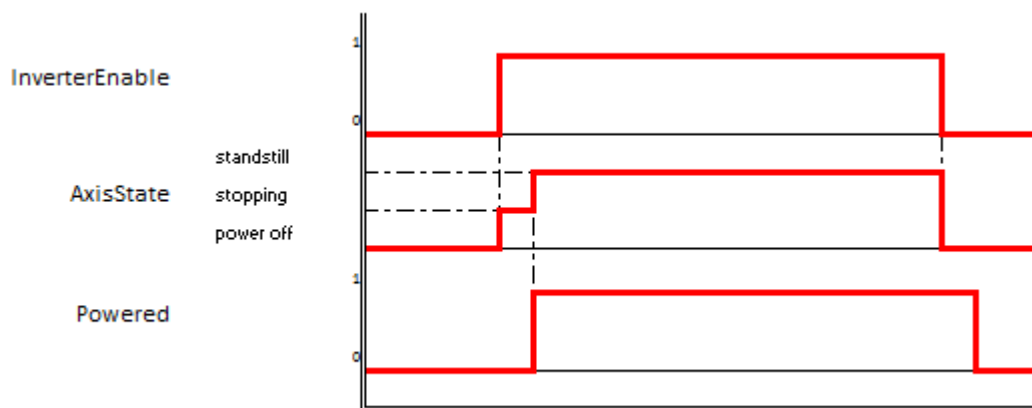
## InverterEnable

To switch ON the drive, **InverterEnable** must be set to *TRUE*. Once *TRUE*, **AxisState** goes to *standstill* (after a brief moment in *stopping*), then **Powered** is set to *TRUE*. Now the drive is ready.

Once **Powered** is *TRUE* one can select an operational mode, insert the inputs and start the FB.

At the end of every operation, to switch OFF the drive, **InverterEnable** must be set to *FALSE*.

**AxisState** goes to *power off*, then **Powered** is set to *FALSE*.



## Modes

### 10: Phasing

By setting variable **AxisMode** to 10 the drive will be controlled in phasing mode. In this mode it is mandatory to set **Velocity**, **Acceleration** and **Deceleration** values (although **Velocity** will not affect the phasing behaviour).

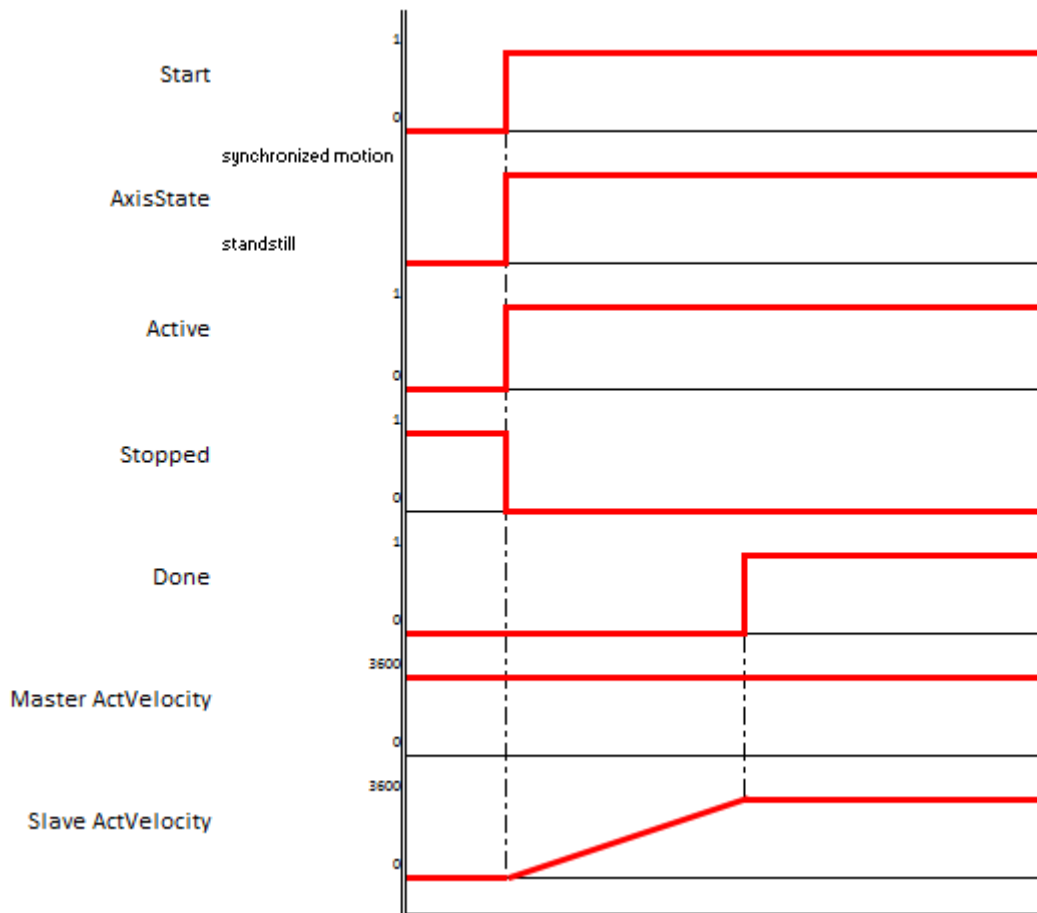
**Acceleration** and **Deceleration** values will affect the behaviour of Slave Axis when it tries to reduce the gap with the Master.

As seen in the following diagrams, bit **Done** goes *TRUE* when **ActPosition** of Slave Axis reaches **ActPosition** of Master Axis. After that, Slave behaviour depends only by the Master.

#### Case 1a: Start Master first, then start Slave

[velocity mode]

- Master Velocity set point: 3600 units/s
- Master Set point reached
- PhaseShift: 0



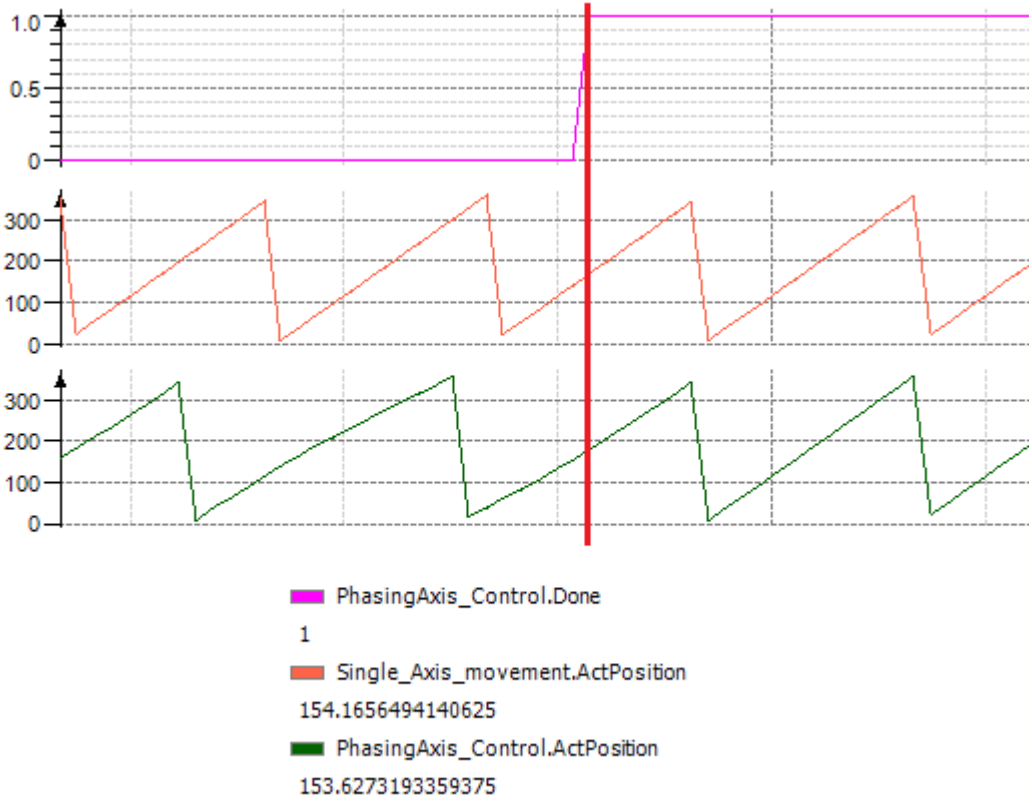
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## Zoom on synch time

Bit **Done** goes *TRUE* when **ActPosition** of Slave Axis *PhasingAxis\_Control* reaches **ActPosition** of Master Axis *Single\_Axis\_movement*.

Tolerance between positions depends on drive settings.

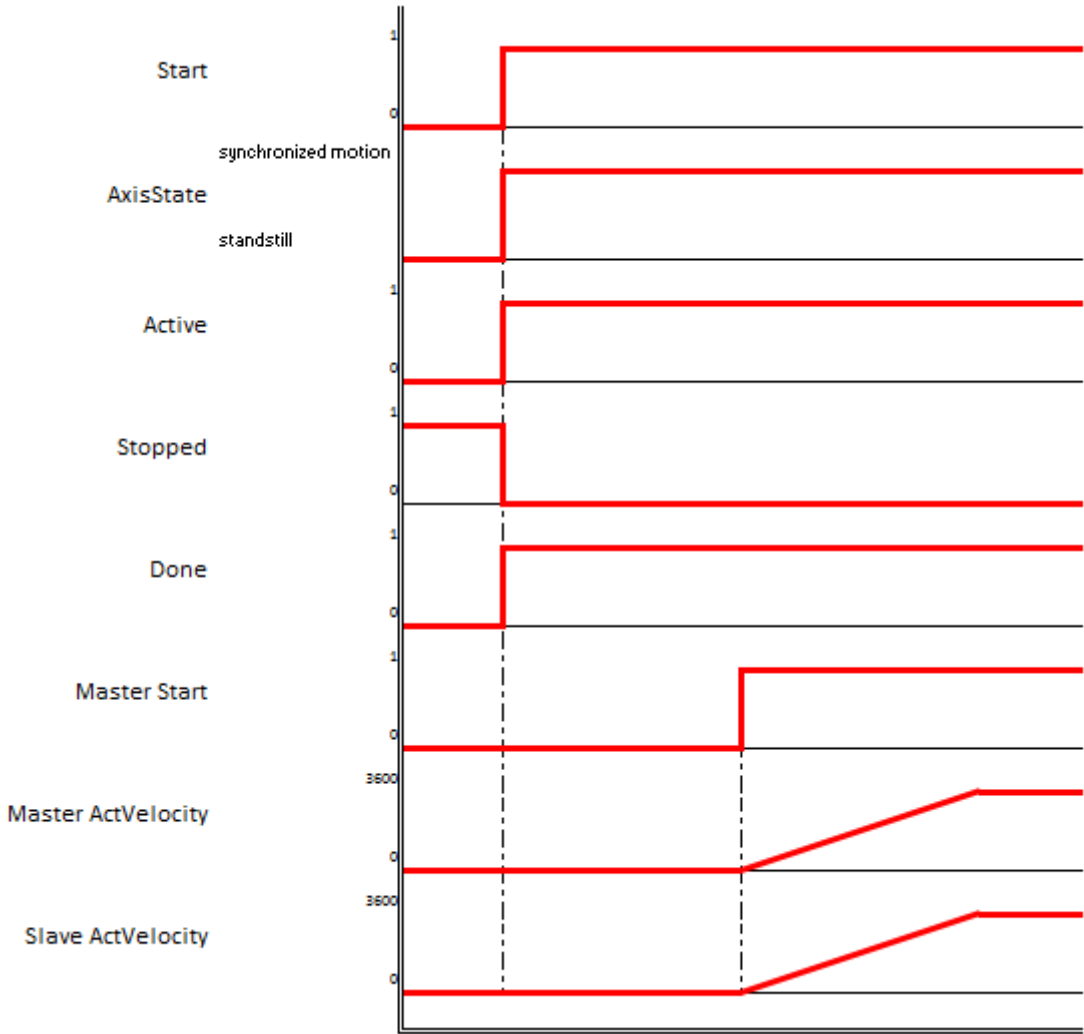


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**Case 1b: Start Slave first, then start Master** [velocity mode]

- Master Velocity set point: 3600 units/s
- Master Set point reached
- PhaseShift: 0
- Bit **Done** goes *TRUE* when Slave Axis recovers Position of Master Axis



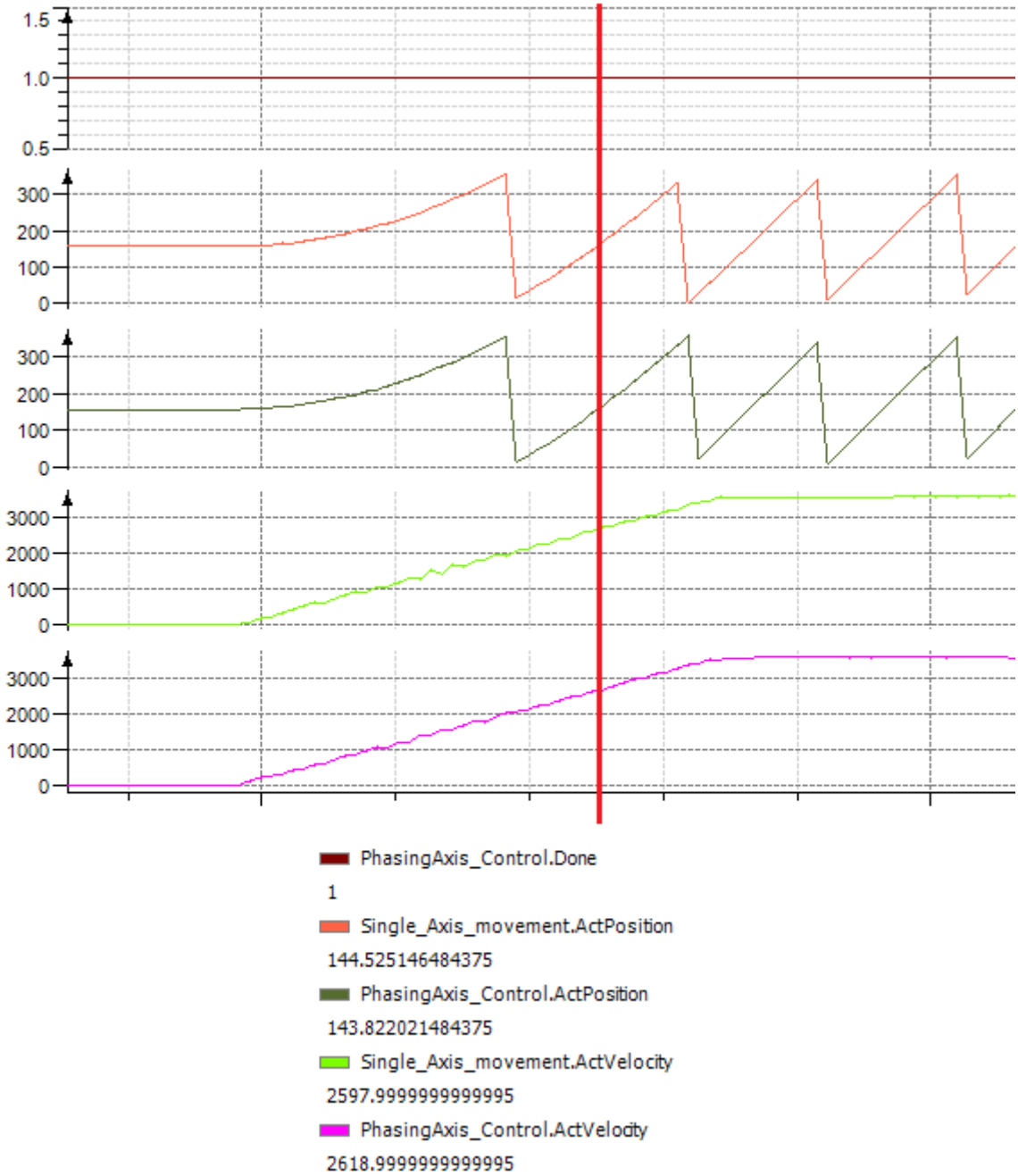


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## Zoom on synch time

Bit **Done** goes *TRUE* immediately because Master and Slave start from the same position. When Master Axis starts, both Axis react in the same way. Tolerance between positions depends on drive settings.

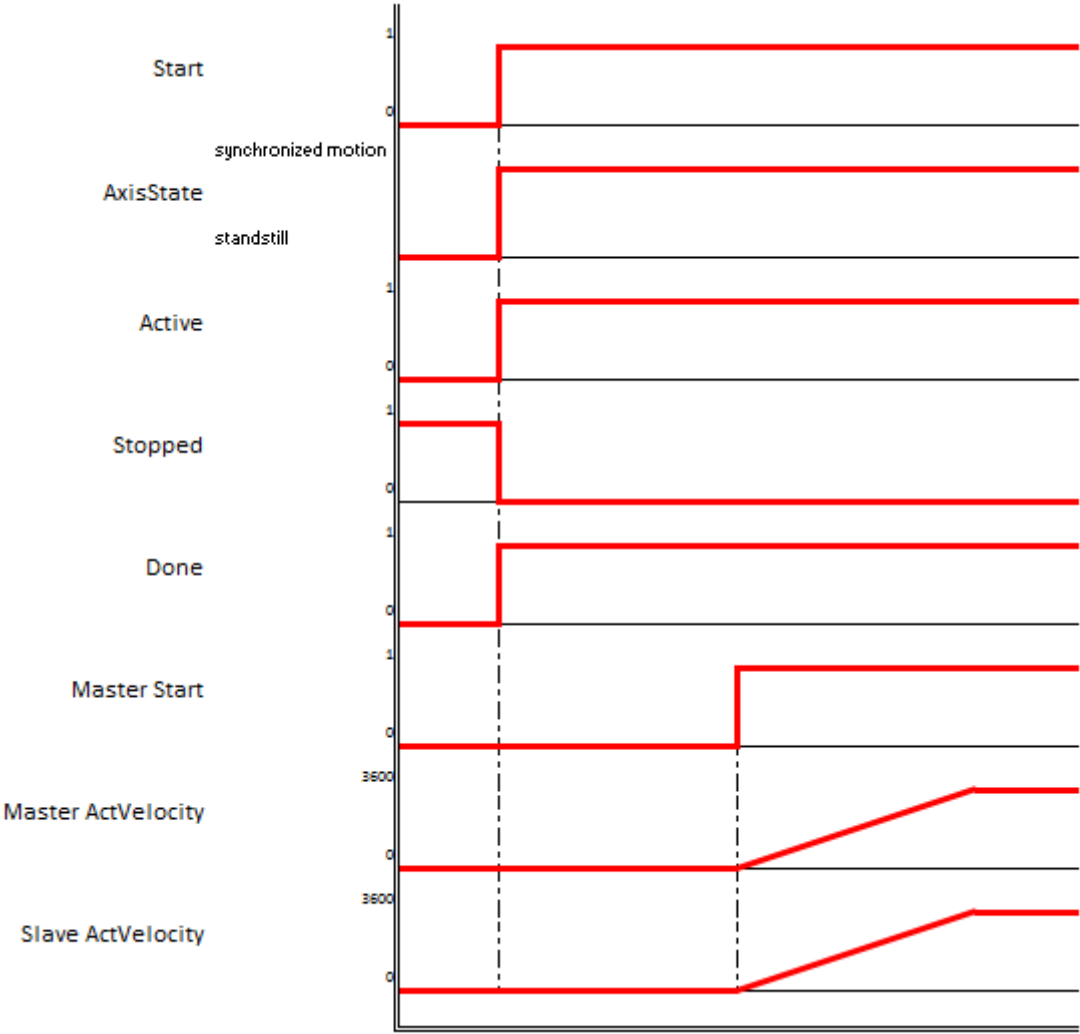


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**Case 1c: Shift ≠ 0 [velocity mode]**

- Master Velocity set point: 3600 units/s
- Master Set point reached
- PhaseShift: 90

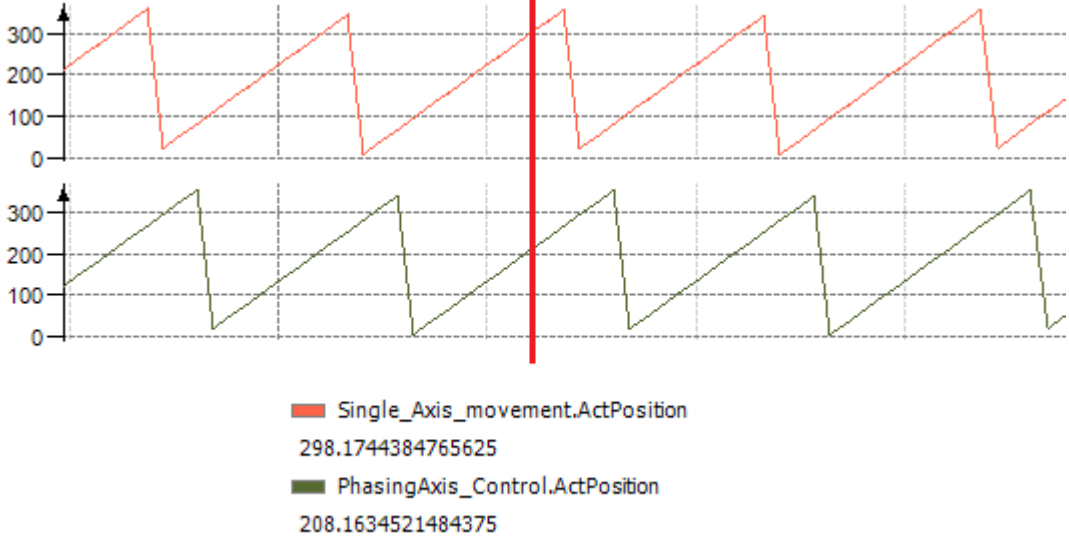


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## Zoom on synch time

Setting a Shift of 90 units means Slave Axis is late on Master Axis of 90 units.



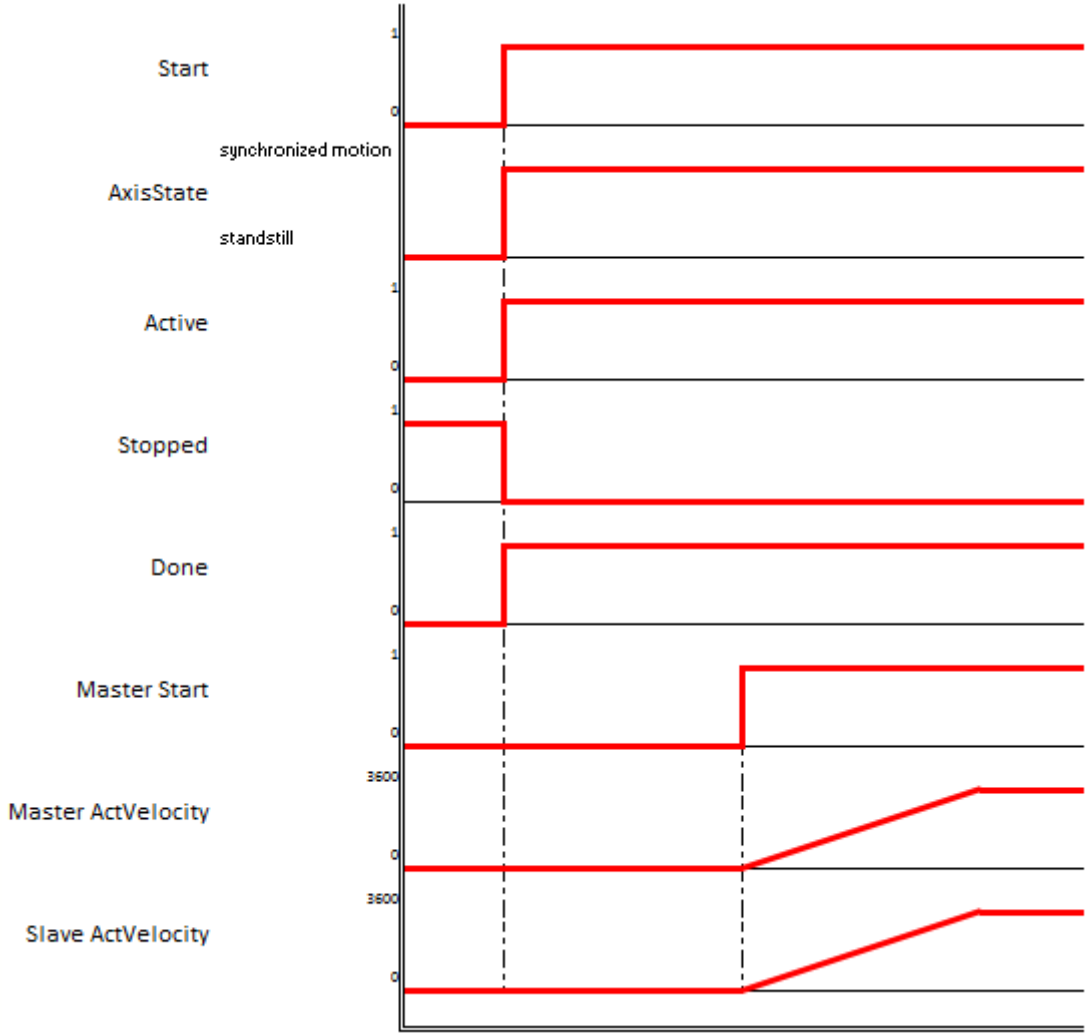
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## Case 1d: Master change during operations

[velocity mode]

- Master Velocity set point: 3600 units/s
- Master Set point reached
- Master Velocity changed to 7200 units/s

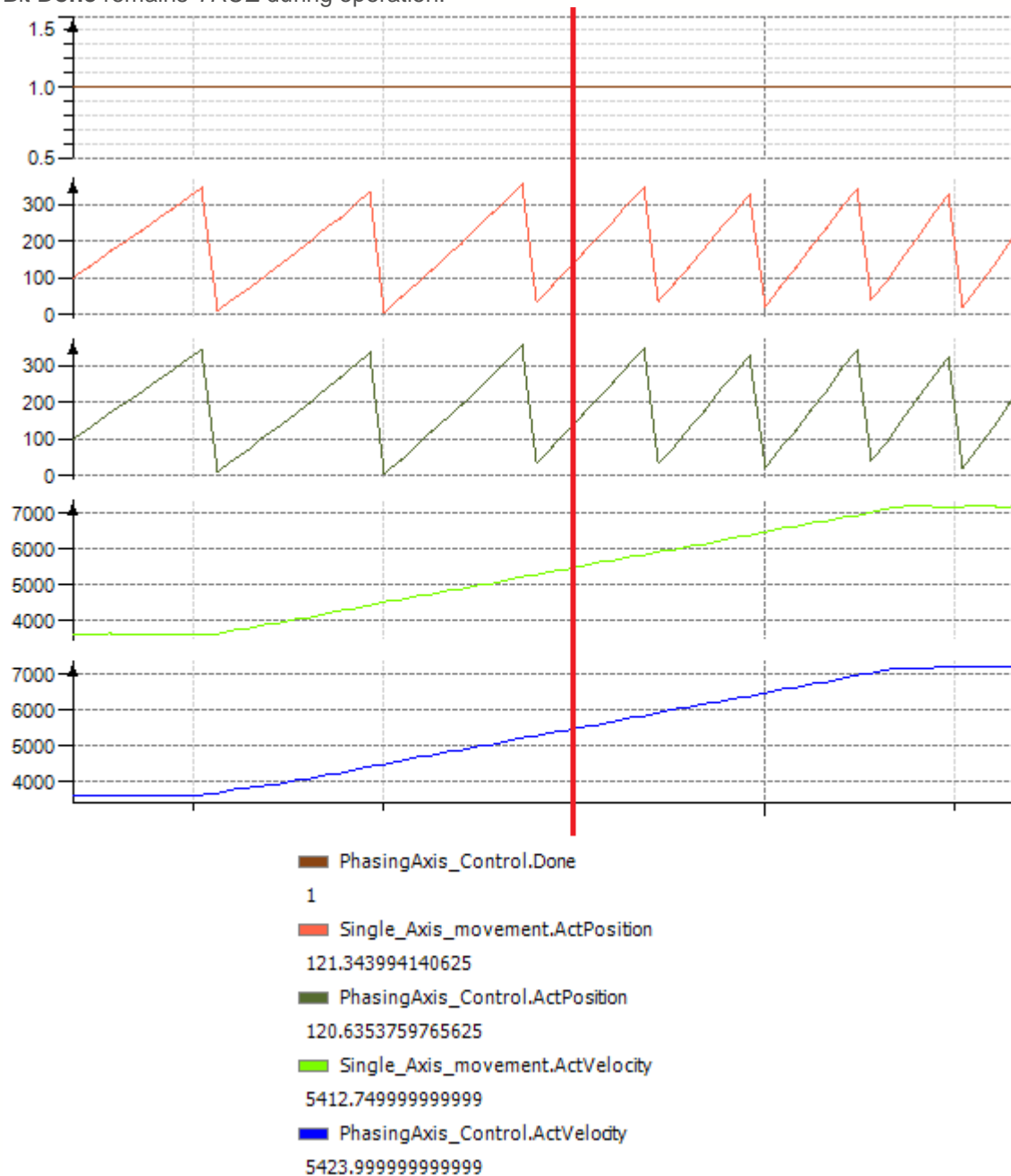


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## Zoom on synch time

Bit **Done** remains *TRUE* during operation.

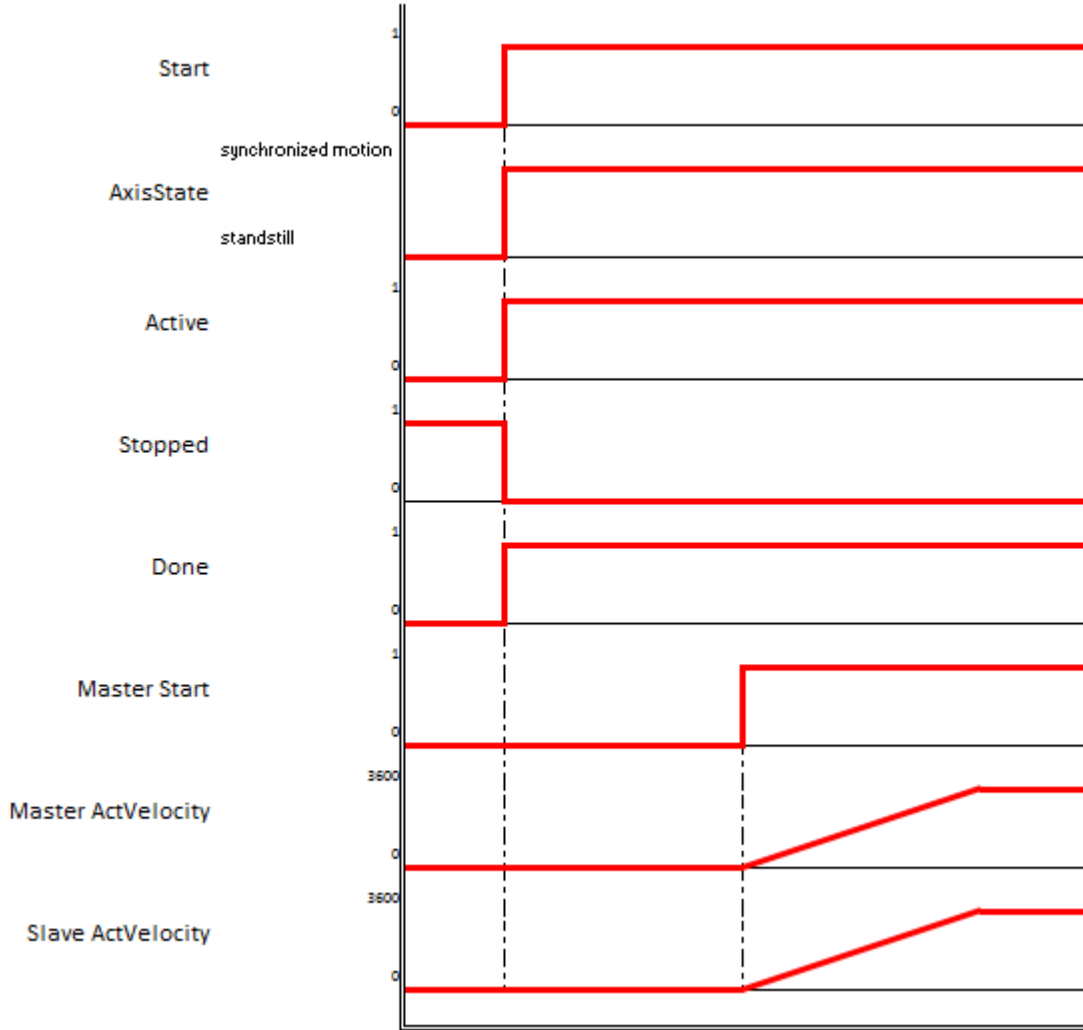


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## Case 1e: Shift change during operations [velocity mode]

- Master Velocity set point: 3600 units/s
- Master Set point reached
- Shift changed from 0 to 90 units during operations

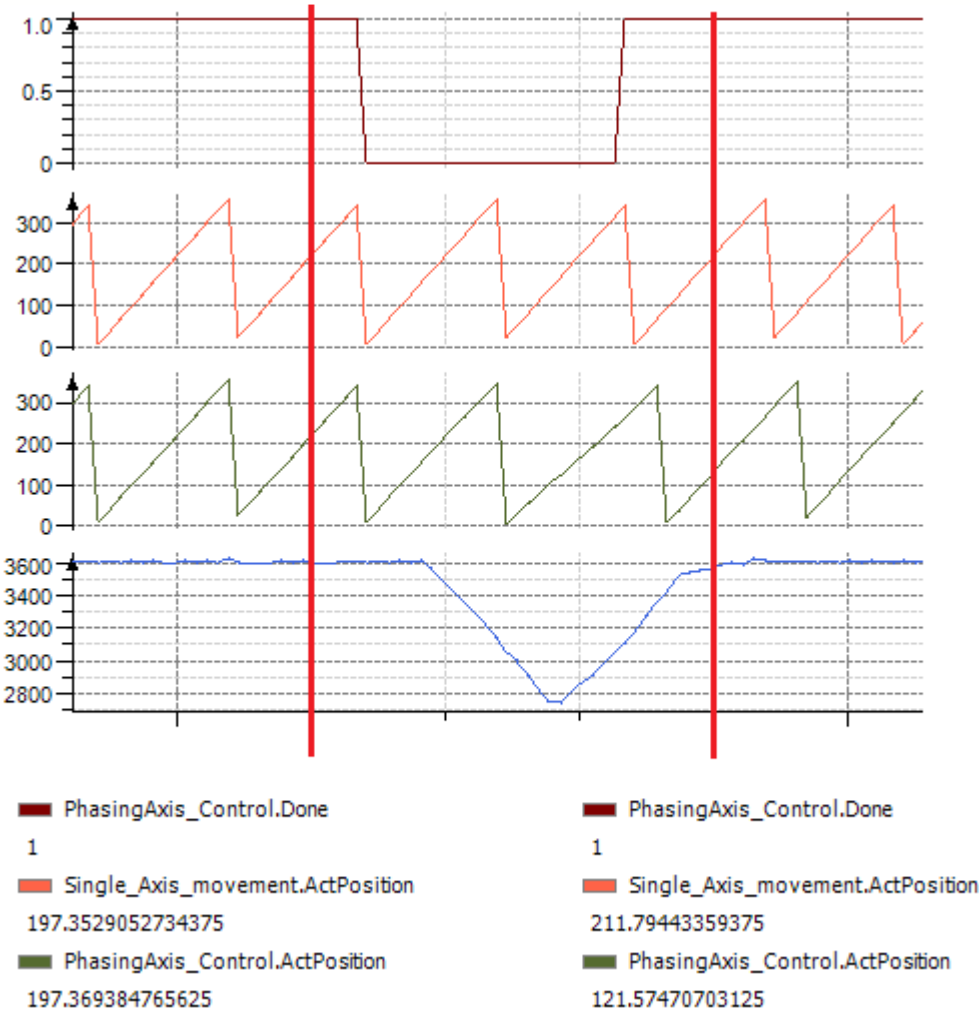


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## Zoom on synch time

Bit **Done** goes *FALSE* after Shift change. When Slave Axis recover with the shift, bit **Done** goes *TRUE*.



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