FAQ COMBIVIS studio 6

KEB_SingleAxisControl instruction   FAQ No.0013

| Part	Version	Revision	Date	Status
en	6.3.1.0	001	2019-01-01	Released

Content

Introduction

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

General description

The KEB_SingleAxisControl function block allows the user to control a SoftMotion Drive in various modes using a single function block:
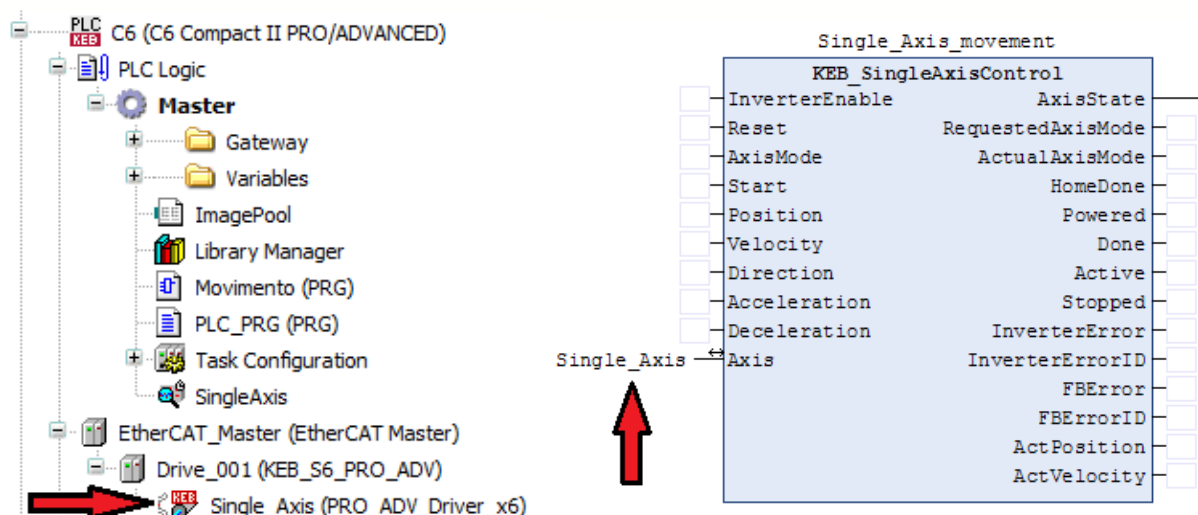
- Velocity
- Absolute Positioning
- Relative Positioning
- Set Position
- Homing

This function block is part of the KEB_SMC_Utility library.
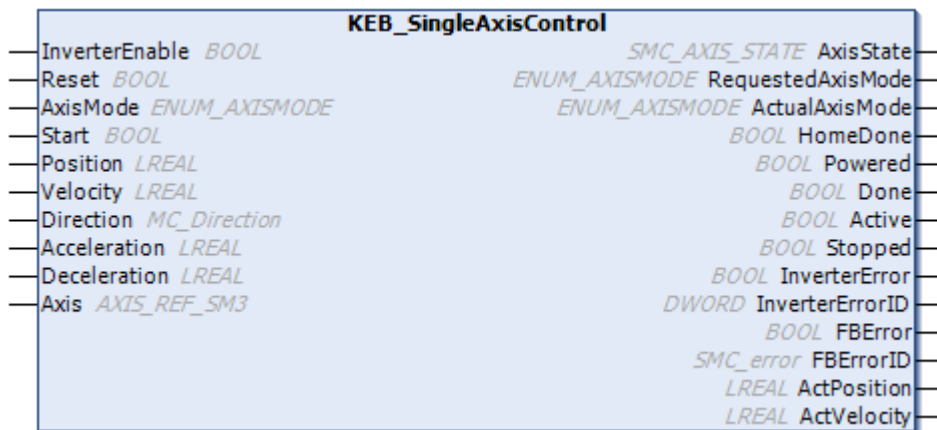
Restrictions

This function block can be used with Pro/Advance Drive only. In fact, it needs an AXIS_REF_SM3 structure as input variable, which is automatically created when a SoftMotion Drive is added in the project.

KEB_SingleAxisControl

Variables

Input

Name	Type	Comment
InverterEnable	BOOL	As long as this variable is TRUE, the drive is switched on.
Reset	BOOL	Reset Drive or FunctionBlock errors
AxisMode	ENUM_AXISMODE	AM_DEFAULT = 0 AM_VELOCITY = 1 AM_POSITIONINGABSOLUTE = 2 AM_POSITIONINGRELATIVE=4 AM_SETPOSITION = 6 AM_HOMING = 7
Start	BOOL	Run/Stop Drive in AxisMode Function
Position	LREAL	Target position for the motion (technical unit [units])
Velocity	LREAL	Value of the target velocity (not necessarily to be reached) [units/s]
Direction	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)
Acceleration	LREAL	Desired acceleration (increasing energy of the motor) [units/s²]
Deceleration	LREAL	Desired deceleration (decreasing energy of the motor) [units/s²]
Axis	AXIS_REF_SM3	Controlled axis

Output

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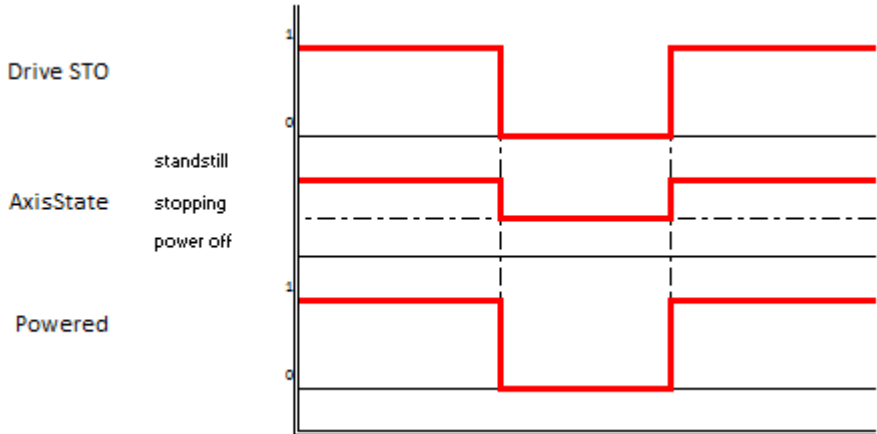**AxisState** goes to *power off*, then **Powered** is set to *FALSE.*
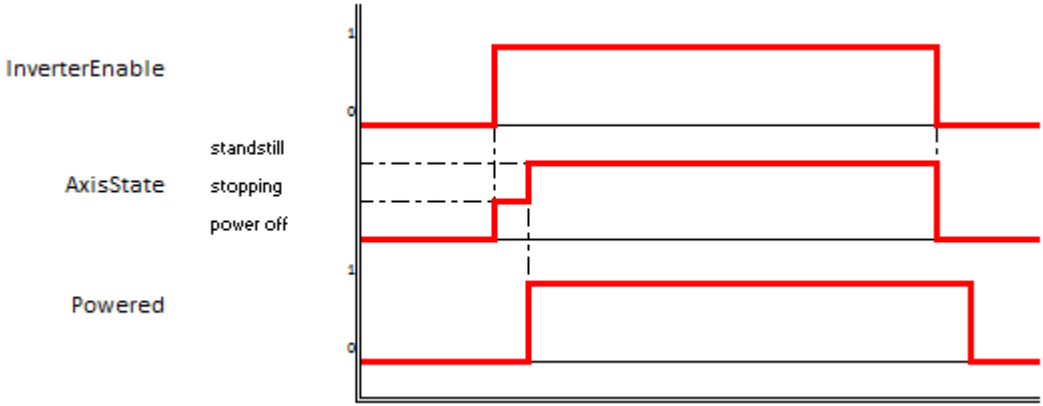
STO

While **AxisState** is in standstill, if **hardware STO** is opened, AxisState goes to *stopping* and **Powered** goes *FALSE*.
If **hardware STO** is closed again, **AxisState** returns to *standstill* and **Powered** returns to *TRUE*.

During operation, while **AxisState** is in *Discrete* or *Continuous motion*, if **hardware STO** is opened, **AxisState** goes in *errorstop* and **Powered** goes *FALSE*.
The transition of **AxisState** occurs one PLC cycle after STO opening.
If **hardware STO** is closed again, **Powered** returns *TRUE* but **AxisState** remains in *errostop*. To reset the error use the **Reset** input.
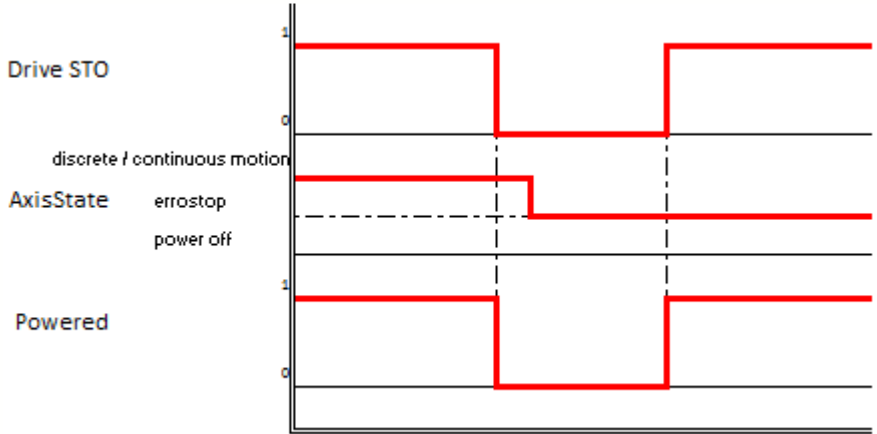
Modes

1: Velocity

By setting variable **AxisMode** to 1 the drive will be controlled in velocity mode. In this mode it is mandatory to set **Velocity**, **Direction**, **Acceleration** and **Deceleration** values.

As seen in the following diagrams, bit **Active** will set to *TRUE* when the motor is moving while bit **Done** goes *TRUE* only when **ActVelocity** reaches velocity set point.

Case 1: set point reached
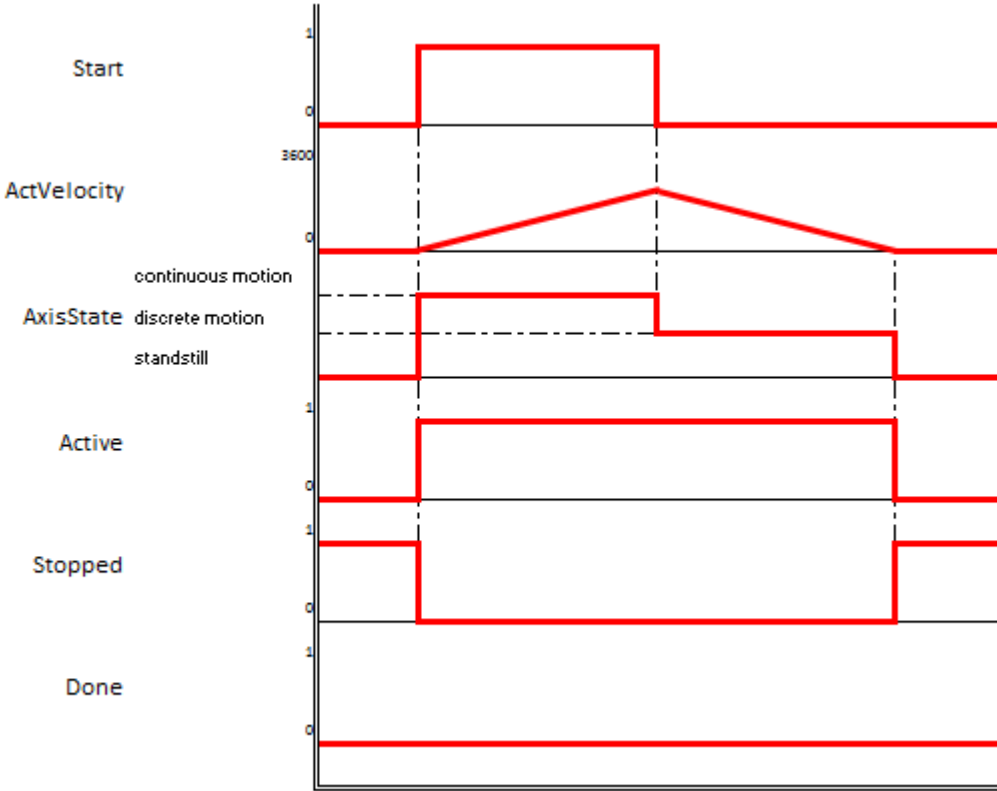
- Velocity set point: 3600 units/s
- Set point reached
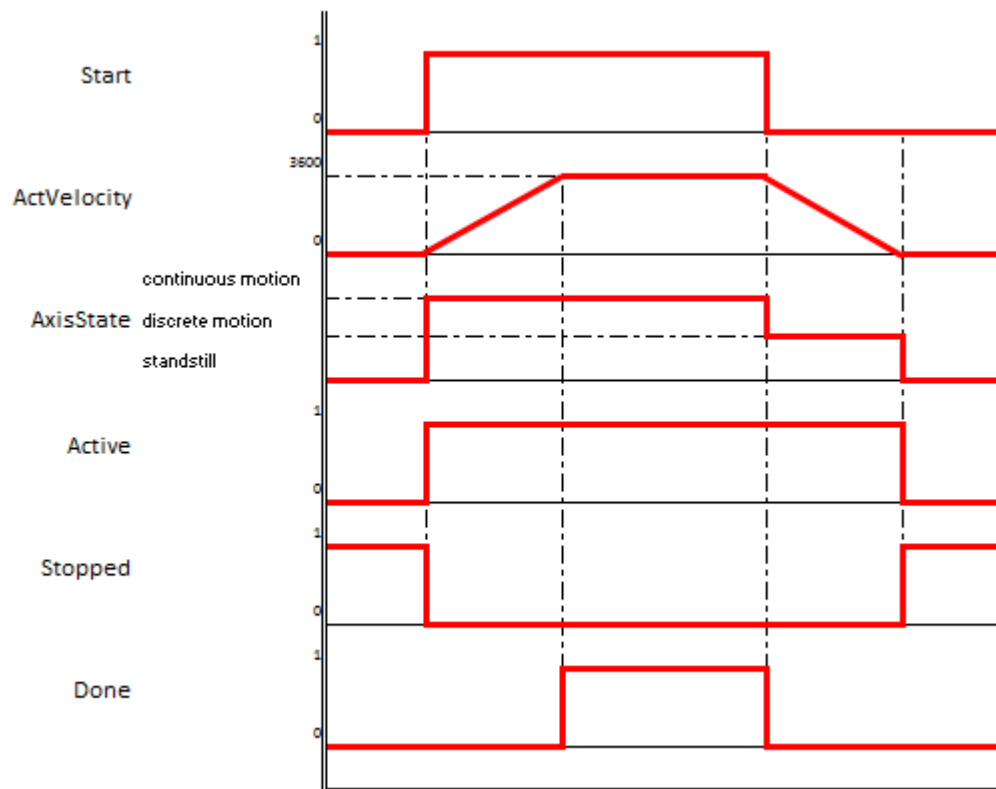
Case 2: set point not reached
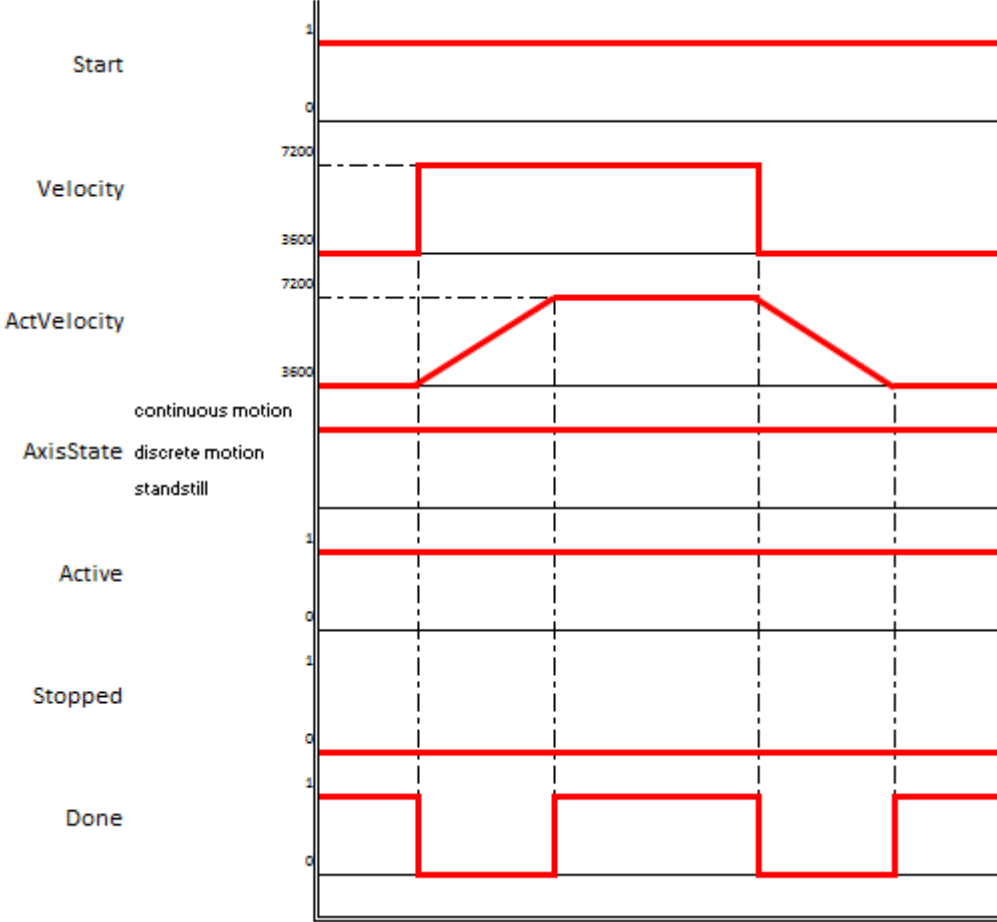
- Velocity set point: 3600 units/s
- Set point not reached

Case 3: changing velocity during operation

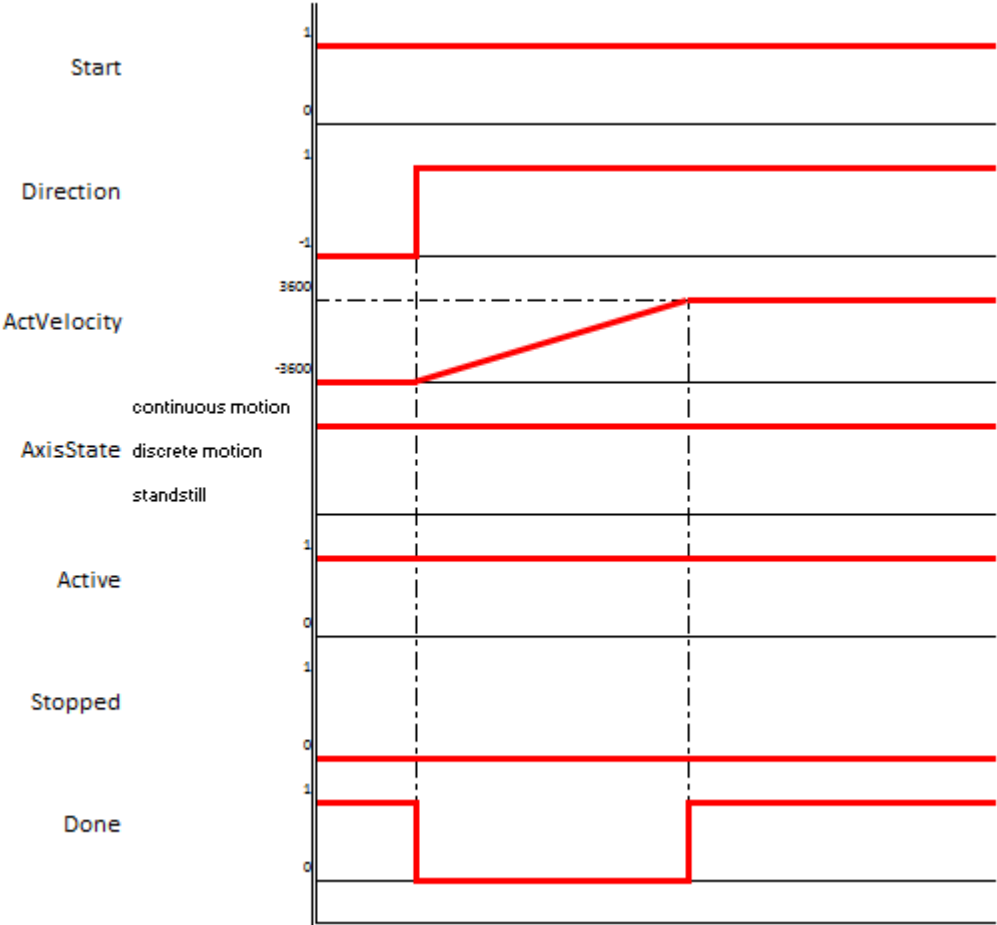- Velocity set point changes from 3600 to 7200 and back again to 3600 units/s

Case 4: changing direction during operation

- Velocity set point: 3600 units/s
- Direction changed from -1 to 1

2: Positioning Absolute

By setting variable **AxisMode** to 2 the drive will be controlled in absolute positioning mode. In this mode it is mandatory to set **Velocity**, **Acceleration** and **Deceleration** values.

As seen in the following diagrams, bit **Active** will set to *TRUE* when the motor is moving while bit **Done** goes *TRUE* only when **ActPosition** reaches position set point.

Case 1: set point reached

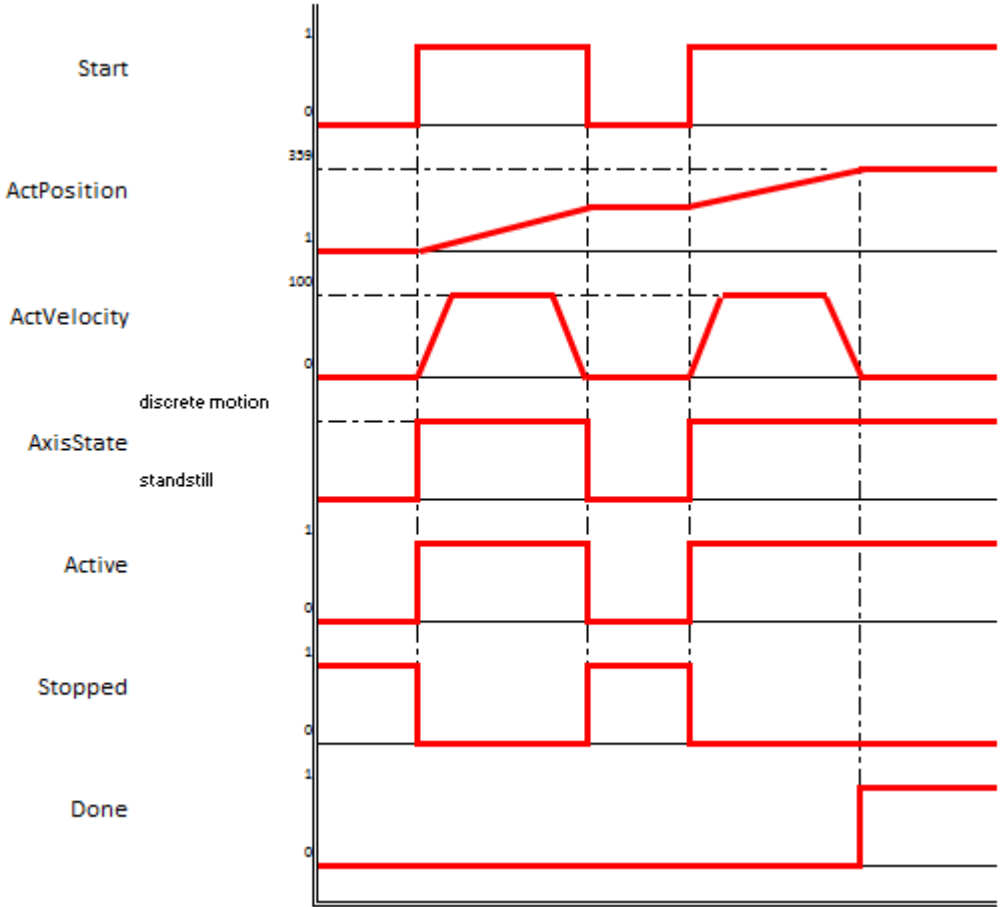- Velocity: 100 units/s
- Position set point: 359
- Set point reached
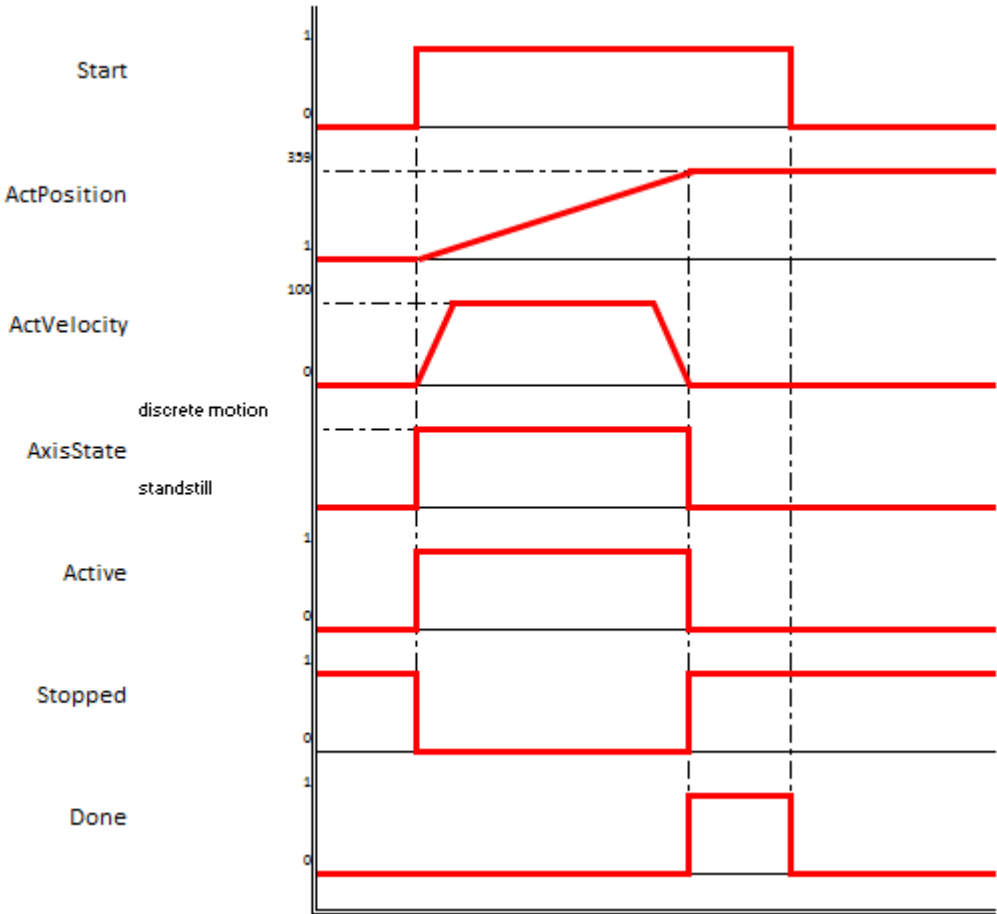
Case 2: set point not reached

- Velocity: 100 units/s
- Position set point: 359
- Manually stopped during operation and then re-started

Case 3: new set point during operation

- Velocity: 100 units/s
- Direction: +1
- Position set point: 359
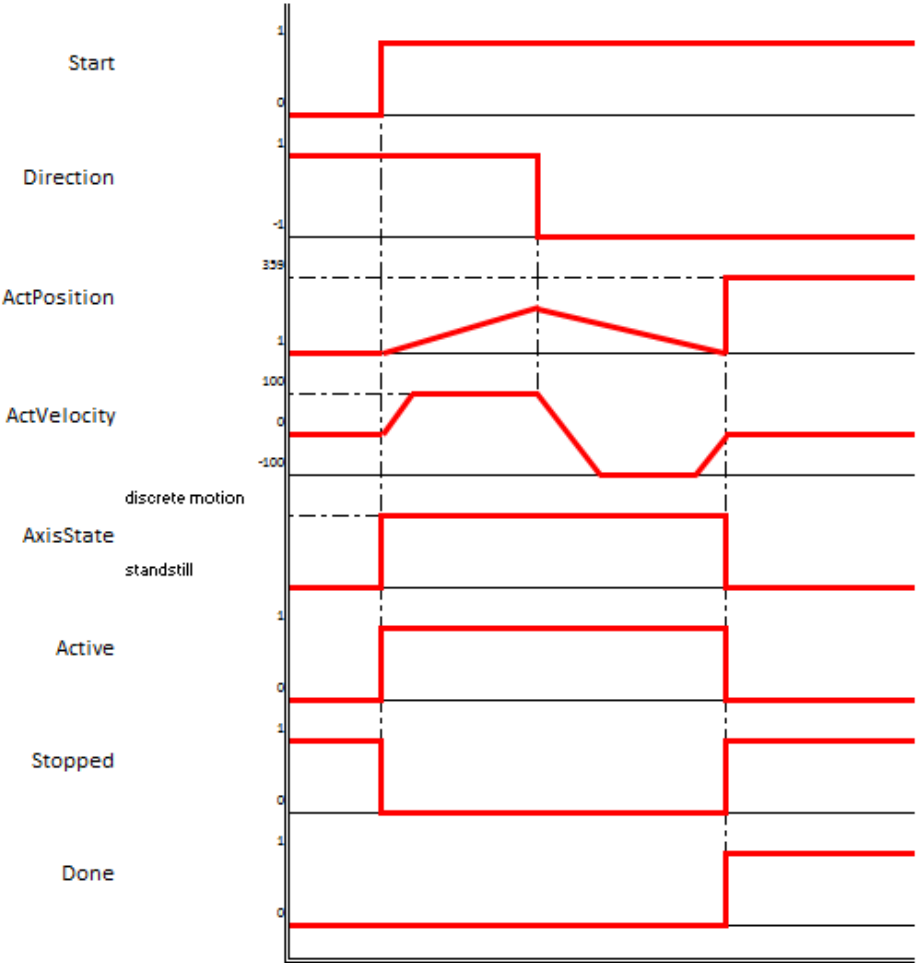- During operation, when ActPosition pass 180, new Position set point is set to 180

Case 4: changing Direction during operation

- Velocity: 100 units/s
- Position set point: 359
- During operation, Direction is changed from +1 to -1

Note that **Direction** is considered only if **Axis type** is in *Modulo*.

4: Positioning Relative

By setting variable **AxisMode** to 4 the drive will be controlled in relative positioning mode. In this mode it is mandatory to set **Velocity**, **Acceleration** and **Deceleration** values.

As seen in the following diagrams, bit **Active** will set to *TRUE* when the motor is moving while bit **Done** goes *TRUE* only when **ActPosition** reaches position set point.

If during operation (**Active** *TRUE* and **Done** *FALSE*) a new Velocity set point is set, the FB sees it as a new start, meaning that the (internal) position will restart from zero.

Case 1: set point reached

- Velocity: 100 units/s
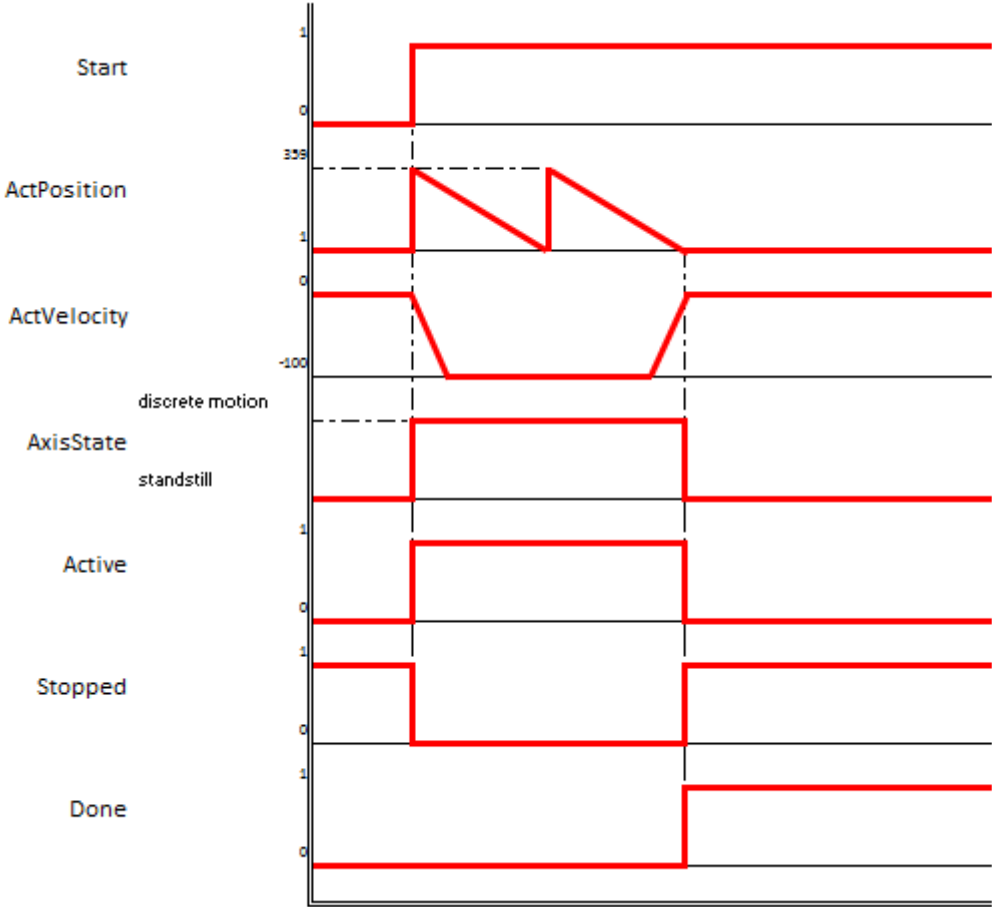- Position set point: +719
- Set point reached
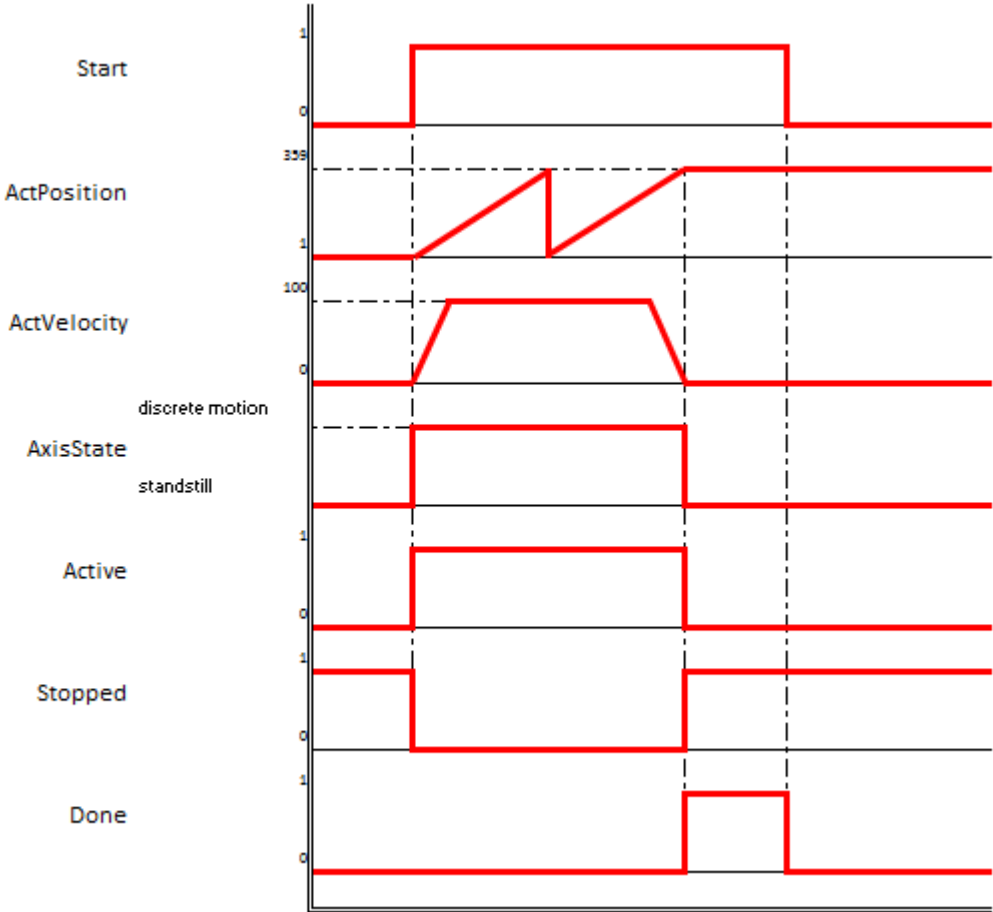
Case 2: negative position

- Velocity: 100 units/s
- Position set point: -719
- Set point reached
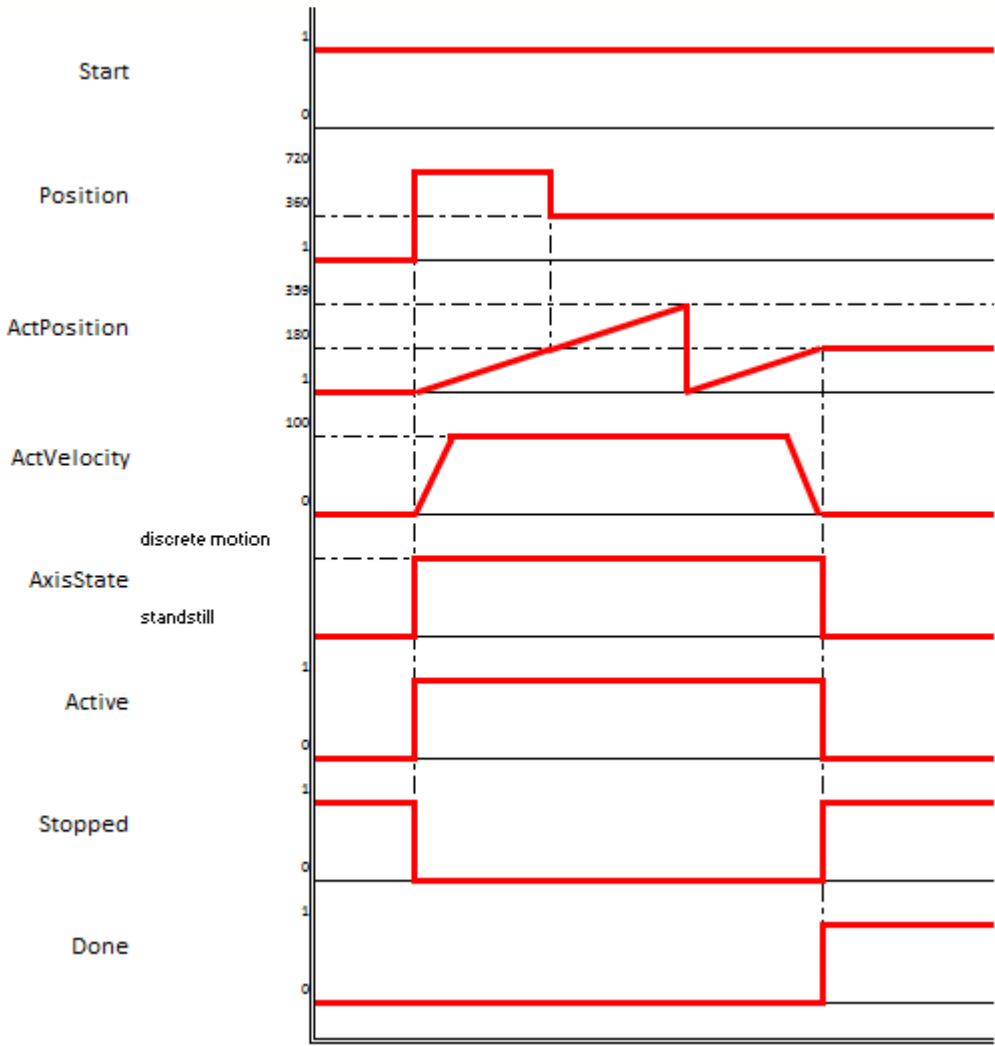
Case 3: new set point during operation

- Velocity: 100 units/s
- Position set point: +720
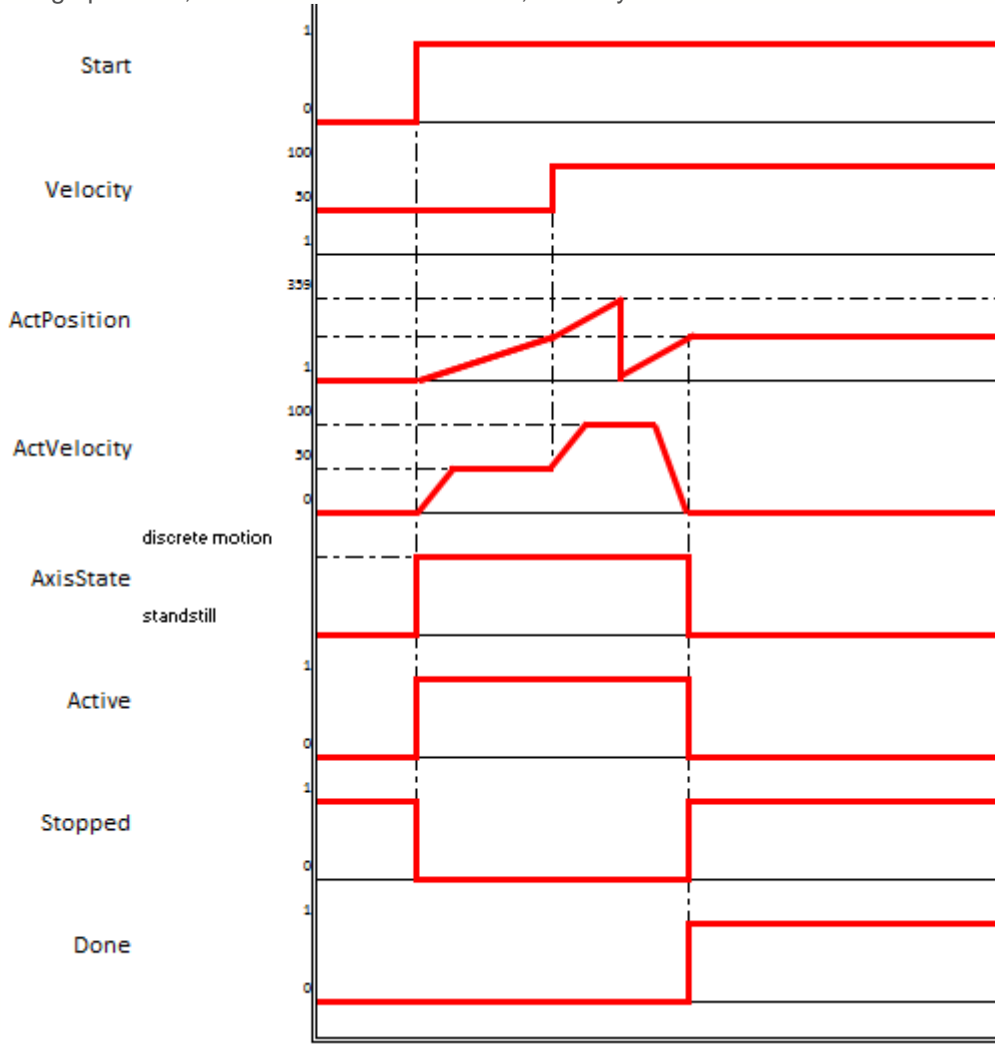- During operation, when position reached 180, new Position set point is +360

Case 4: changing velocity during operation

- Velocity: 50 units/s
- Position set point: +360
- During operation, when Position reached 180, Velocity is set to 100 units/s

6: Set Position

By setting variable **AxisMode** to 6 the drive will be controlled in set position mode. In this mode no input values are mandatory and the motor will remain standstill.
As seen in the following diagram, bit **Done** will set to *TRUE* immediately after **Start** goes *TRUE*.

Case 1: new set point

- Position set point: +180
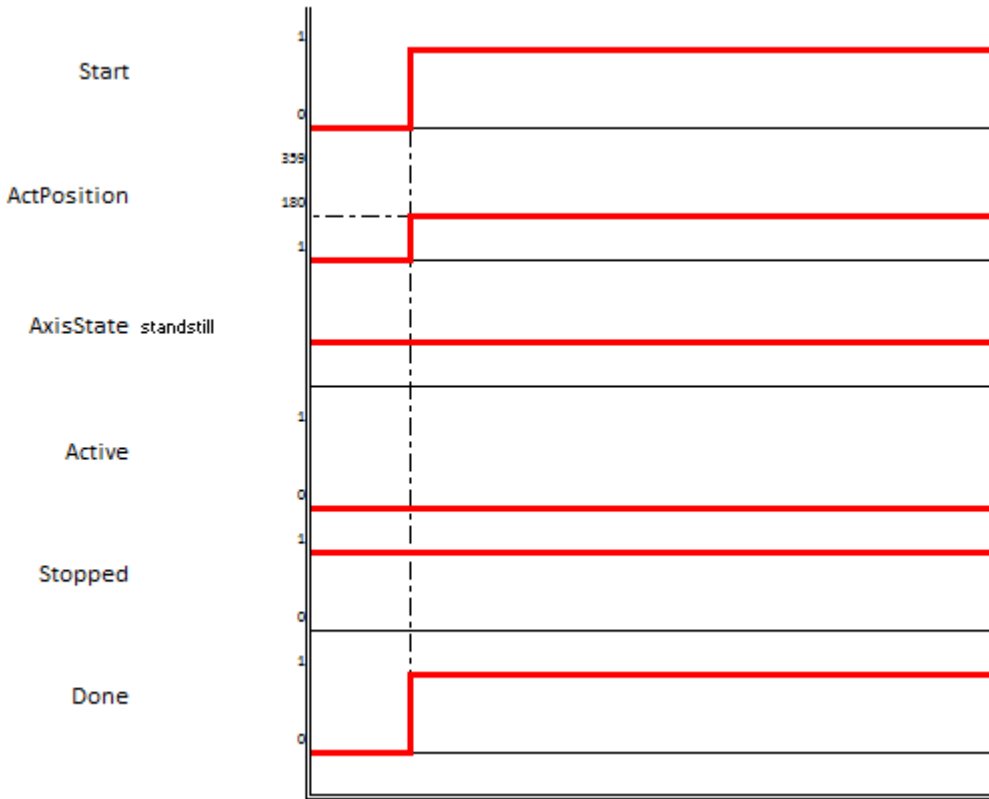
7: Homing

By setting variable **AxisMode** to 7 the drive will be controlled in homing mode. In this mode it is mandatory to set **Acceleration** and **Deceleration** values.

Homing method, like for other homing parameter as homing offset or speed search, is controlled directly via inverter parameter and not using the function block.

Position input can assume any value. The FB will make an homing with desired method and then change the **ActPosition** value to **Position** value.

Case 1: Homing on current position 35

- Homing method: 35
- Actual Position: 180
- Position Set point: 0
- Bit **Done** goes *TRUE* many plc cycles after **ActPosition** is set to 0.
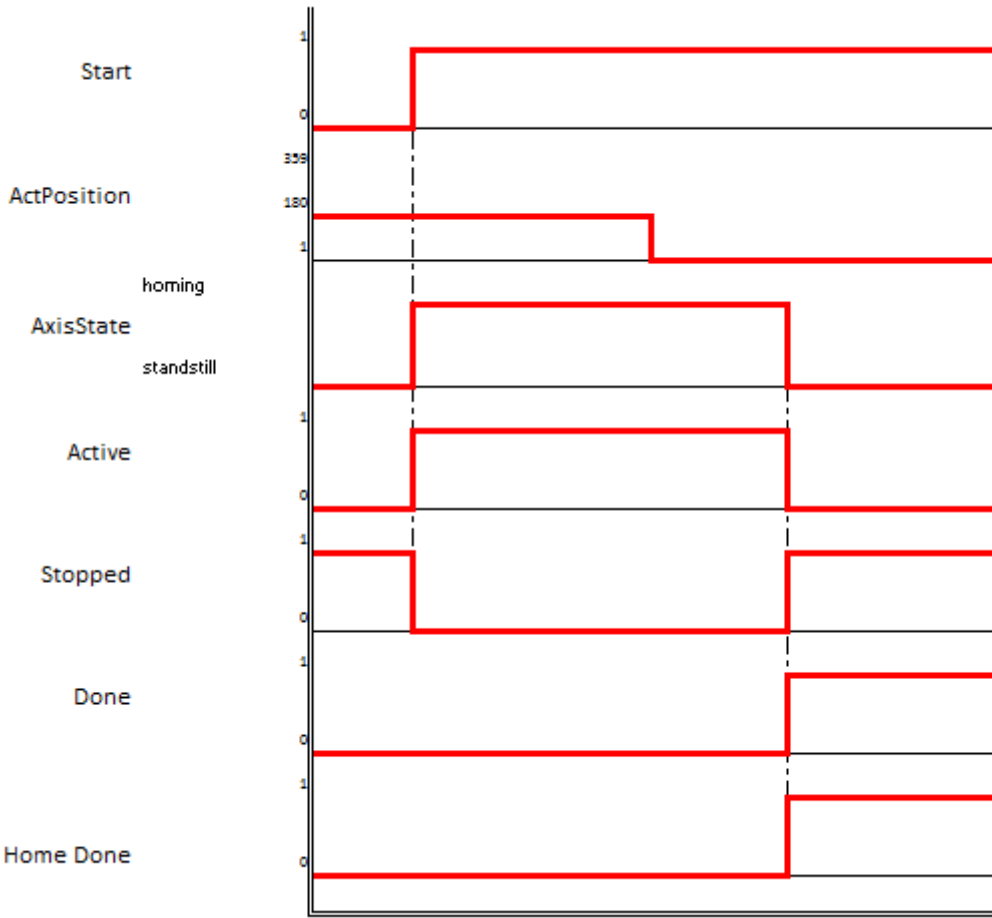
0: AM_Default
By setting variable **AxisMode** to 0 the drive will be controlled by other SMC function blocks, e.g. in CNC mode.
In this mode no profile is generated by the function block so all inputs as **Position**, **Velocity**, **Acceleration** and **Decelerations** are not used.
The block can still be used to enable/disable the axis and for diagnostic outputs.

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