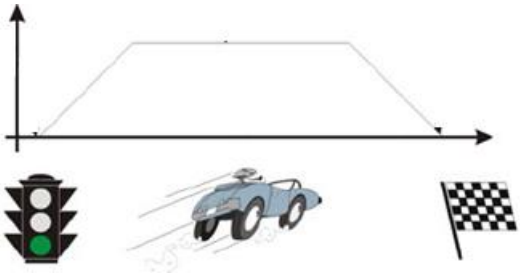


APPLICATION NOTE

« AC30 Series»: Positioning Function Block

Contents

1. Abstract

This document shows how to set up an AC30 drive using the Position Function Block to perform Positioning in Vector Control with Feedback.

2. Introduction

The aim of this application note is to demonstrate the correct way to use the Positioning Block in an AC30 application.
The example shows the basic parameter definition and the state machine to control the position commands.

Please note: The application is based on the CODESYS environment.
The AC30 is programmed with CODESYS V3.5 SP21 Patch3
The AC30 uses the PDD Package for CODESYS

Before continuing with this application note, ensure the Start-up and Commissioning section from the AC30 Hardware manual has been completed and is fully understood.
Also, the complete installation and knowledge of CODESYS is mandatory!

Using the Resolver Feedback Option board as feedback position system requires an AC30 controller board firmware >= V1.19.6 for the AC30V controller board and **>= 2.19.00F** for the AC30P/D controller board.

Note: the AC30P/D controller is recommended for PMAC control with resolver.

3. Related Documents

For more information about the AC30 Drive, see the following related documents.

Reference number	Document	Description
HA501718U001-8	AC30-manual	AC30 Product manual
HA503711U001	AC30_Hardware_Installation_Manual_Frames_D-J	AC30 Hardware manual Frames D-J
HA503711U002	AC30_Hardware_Installation_Manual_Frames_K-N	AC30 Hardware manual Frames K-N
HA503711U003	AC30_Software_Reference	AC30 Software Reference

The software example based on CODESYS with PDD is:
2026_01_22_AC30P_PDD_Resolver_Positioning_block_example

Download sample project here: AC30P_PDD_Resolver_Positioning

4. Tools

	Name	Firmware Version
Hardware	AC30P Controller Board	2.19.00F
	Resolver option Board: 7004-05	V1.3
Software	Codesys programming system	3.5.21 SP3
	PDD Package for Codesys V3.5 SP6 onwards	3.12.66.1
	Parker Drive Quicktool (PDQ)	3.12.66.1

Application: The basic functions come from the standard template: **App_0_Basic_Speed_Control**

Connections:

1. Connect AC30 to 400V AC Power Supply, Connect 24V DC Control Voltage to System Board.
2. Connect AC30 feedback option Resolver signals with Resolver.
3. Connect AC30 Motor connection U, V, W
4. Connect AC30 Ethernet to PC CODESYS PDD-Tool or PDQ tool.

5. AC30 Position Function Overview

5.1 JOG Mode in Speed Control

- JOG positive with JOG Speed (Default Speed 10% of Max speed)
- JOG negative with JOG Speed

The Ramps for JOG+ and JOG- are defined in the **Reference Ramp** function block

5.2 Move Position

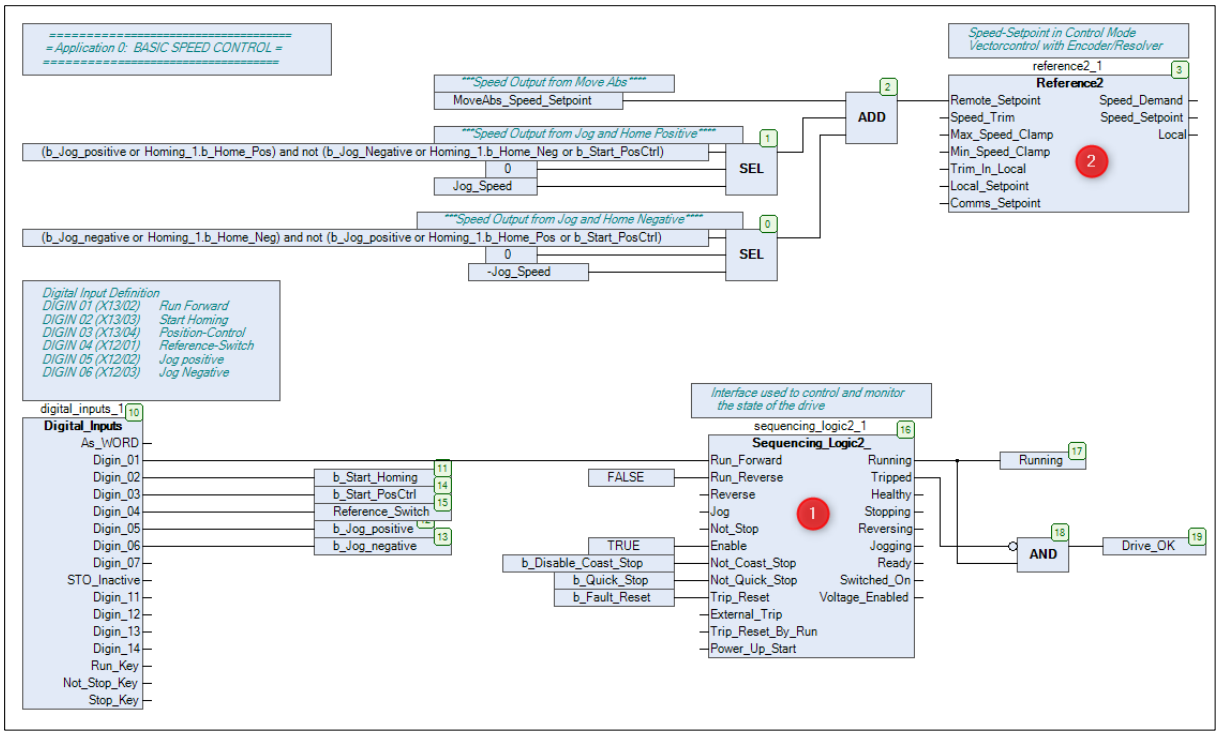
- Absolute
- Relative (with Reset to 0 Position at Start!)

5.3 Homing

- Homing on actual Position - Reset Position/Counter
- Homing positive to positive Edge of the Home switch, Leaving the switch in inverse direction
- Homing negative to positive Edge of the Home switch, Leaving the switch in inverse direction)

6. AC30 Basic Sequencing function

6.1 Sequencing and Reference



The application is based on the **BASIC SPEED CONTROL** Macro.

The **Sequencing_logic2** block allows you to control and monitor the operational state of the drive, the input **Run_Forward** connected to digital Inputs 1 is used to switch the drive-in running state. The **Digital_Inputs** block manages the signal flow to test Positioning Control, Homing and Jogging.

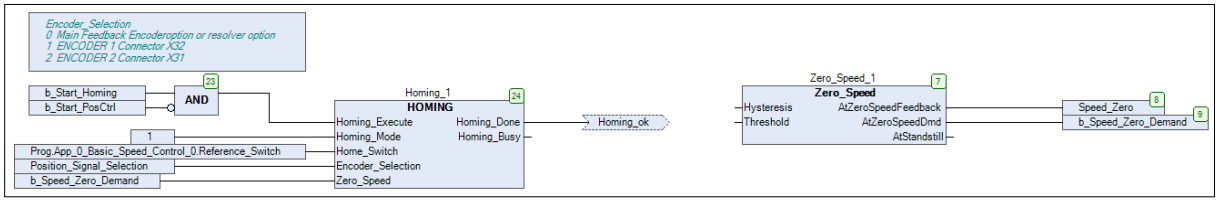
The **Reference2** block allows the Speed control of the drive, the **Remote_Setpoint** input is the signal used for the Speed Control. The **Remote_Setpoint** input received his signals from 3 sources:

- The **Move_Abs** block output signal **Speed_Output "MoveAbs_Speed_Setpoint"**.
- The **Homing** block
- The **Jog** operation "**Jog_Speed".**

Both sources are supervised against another to avoid a parallel setting.

6.2 Positioning and Homing

- Homing block

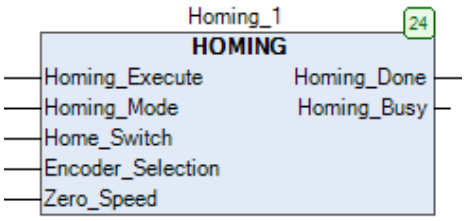


The **Homing** block is used to establish the reference point or origin for absolute movement, it is important to select the right Encoder in the **Position_Signal_Selection** input of the block corresponding to the motor, The Homing Block has 3 modes to clear the Position and Counter (see the table below for the description of each mode).

The **Homing** block also make a supervision that the Position control is disabled when the **Homing_Execute** flag is triggered. The homing end with the output signal **Homing_Done** TRUE.

If Homing is required before the Move Absolute, you must connect the **Homing_ok** in the **AND** block for the Execute signal of the **Mov_Abs_1** block

The **Zero_speed** block output is used as input in the Homing block to reset the counter.



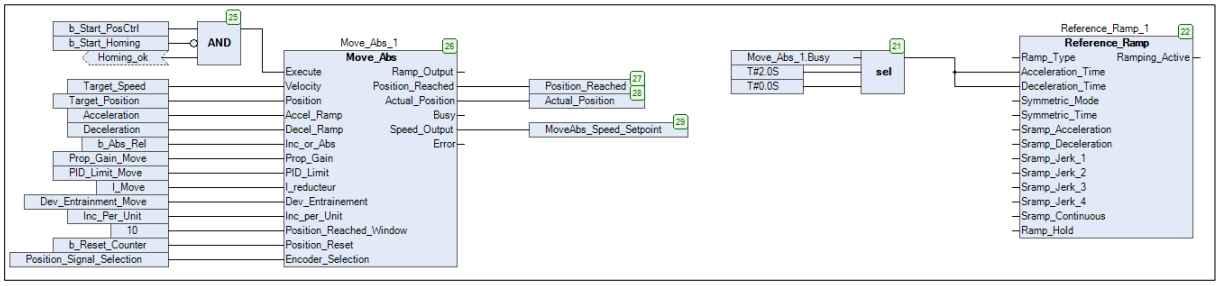
- "HOMING" Block Inputs

Parameter Name	Default Value	Type	Description
Homing_Execute	FALSE	BOOL	Start the homing operation when TRUE and **Move_Abs** Position Control block is not running!
Homing_Mode	0	REAL	Three homing modes possible: 0 = **Reset Counter** 1 = **Move Positive until Switch is high** 2 = **Move Negative until Switch is high**
Home_Switch	FALSE	BOOL	During homing mode 1 and 2, the rising edge of this signal switch ON the homing done
Encoder_Selection	0	INT	Encoder selection: **0 = Main Feedback Encoder or Resolver option board** **1 = ENCODER 1 Connector X32** **2 = ENCODER 2 Connector X31**
Zero_Speed	FALSE	BOOL	TRUE when at zero speed demand

- "HOMING" Block Outputs

Parameter Name	Default Value	Type	Description
Homing_Done	FALSE	BOOL	TRUE: Homing successful finished, a new Homing_Execute set the flag to FALSE
Homing_Busy	FALSE	BOOL	TRUE if Homing block is running

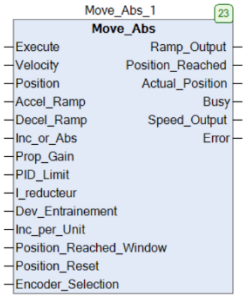
- Positioning block



The Positioning block **Move_Abs1** is triggered by the flag **b_Start_PosCTRL** combined with the supervision of the Homing running **b_Start_Homing** and **Homing _ok** flag.

When the Position Control is activated= **Busy**, there is a signal to the Speed Loop **Reference_Ramp** block to disable the speed loop ramps in this case.

Resetting the Position and Counter to 0 is possible in the **Move_Abs** Block with the Position Reset Input signal.



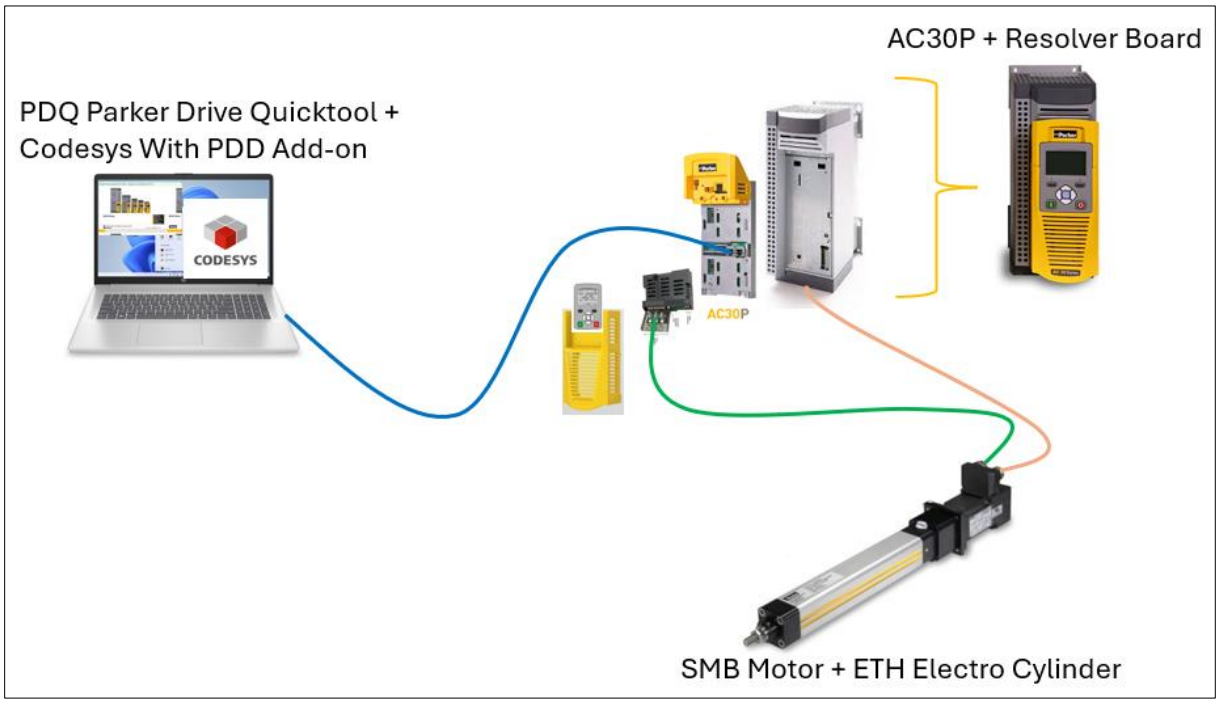
➢ "Move_Abs" Block Inputs

Parameter Name	Default Value	Type	Description
Execute	FALSE	BOOL	Execute the movement
Velocity	20	REAL	Target speed: % of the max speed
Position	0	REAL	Target Position in Unit
Accel_Ramp	1.0	REAL	Time in s to reach 100% from 0%
Decel_Ramp	1.0	REAL	Time in s to reach 0% from 100%
Inc_or_Abs	TRUE	BOOL	**FALSE** for Incremental with clear Position Counter! / **TRUE** for Absolute movement
Prop_Gain	0.5	REAL	Position Loop Proportional Gain during deceleration phase
PID_Limit	2.0	REAL	Position Loop PID Output Limit during deceleration phase
I_reducteur	1.0	REAL	Reducer Ratio
Dev_Entrainement	1.0	REAL	Driving factor
Inc_per_Unit	1.0	REAL	Number of encoders increment per unit
Position_Reached_window	10	REAL	Position Reached window in unit
Position_Reset	FALSE	BOOL	Reset the encoder and actual position
Position_Signal_Selection	0	INT	Encoder, who measures the motor shaft position 0= Mainspeed Feedback 1= Encoder 1 Connector X32 2= Encoder 2 Connector X31

- "Move_Abs" Block Outputs

Parameter Name	Default Value	Type	Description
Ramp_Output	0.0	REAL	Generated ramp value
Position_Reached	FALSE	BOOL	TRUE, if Position is in between Target position +/- Position reached Window
Actual_Position	0.0	REAL	Actual Position in Unit
Busy	FALSE	BOOL	Movement launch and dest. not reached
Speed_Output	0.0	REAL	Speed reference in % to be linked to the **Remote_Setpoint** in the Reference Block
Error	FALSE	BOOL	TRUE: if Velocity < 0; Decel, Accel Ramp <=0; Inc_per_Unit <=0;

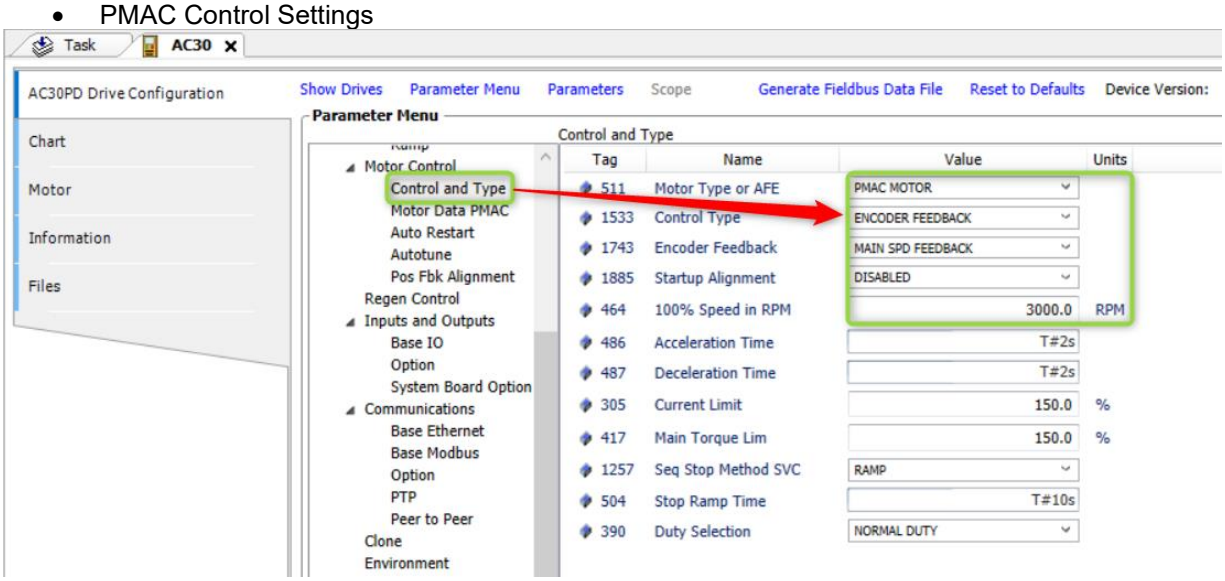
7 Example Using Positioning blocks for ETH Cylinder Running



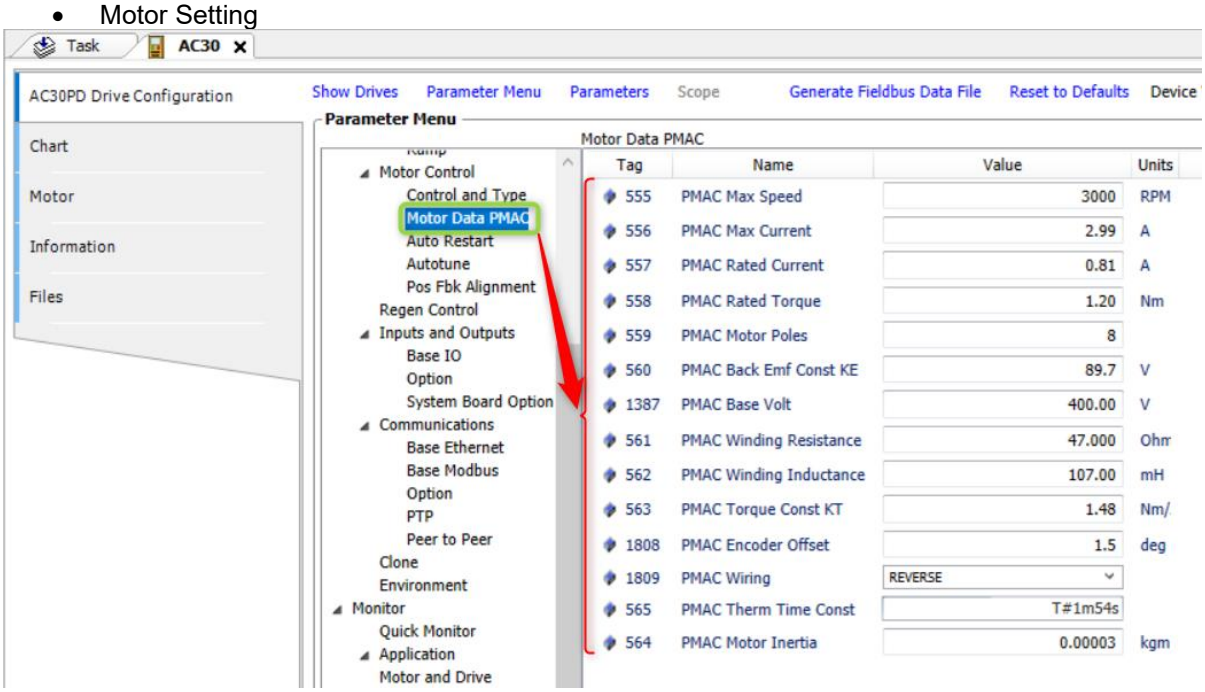
Name	Reference
Motor	SMB60301.45112ID64
ETH Electro Cylinder	ETH032M05A1K1BGMN0100A

7.1 Hardware Configuration

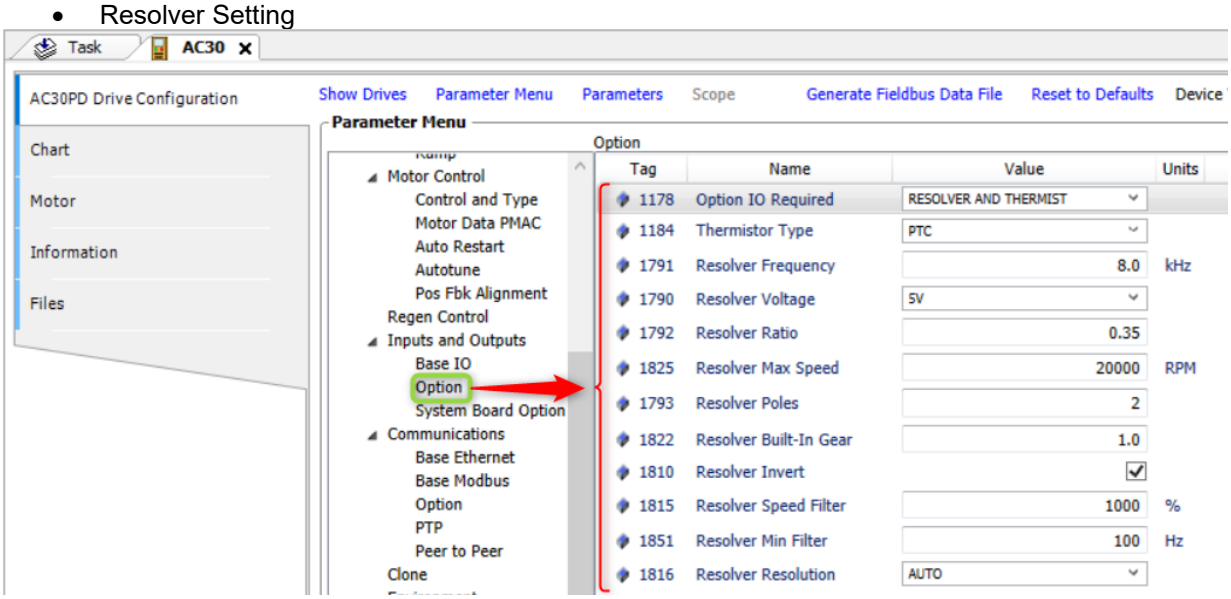
- PMAC Control Settings



- Motor Setting



- Resolver Setting



- Measuring Unit

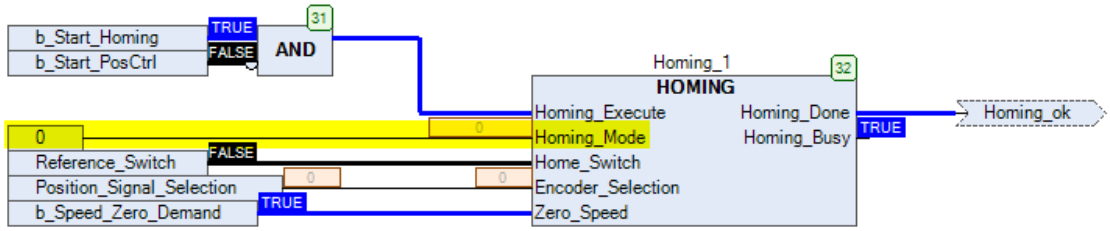
Unit per motor revolutions	65536 count per turn
ETH Length mm per motor revolutions	Around 5 mm per turn

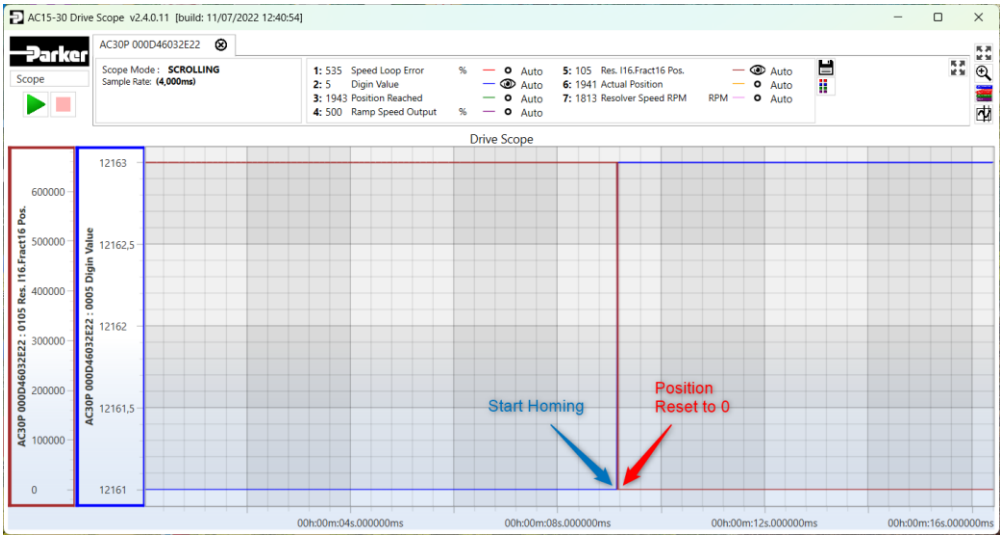
7.2 Digital Input Definition

DIGIN 01 (X13/02) Running
DIGIN 02 (X13/03) Start Homing
DIGIN 03 (X13/04) Position-Control
DIGIN 04 (X12/01) Reference-Switch
DIGIN 05 (X12/02) Jog positive
DIGIN 06 (X12/03) Jog Negative
DIGIN 07 (X12/04) Not used

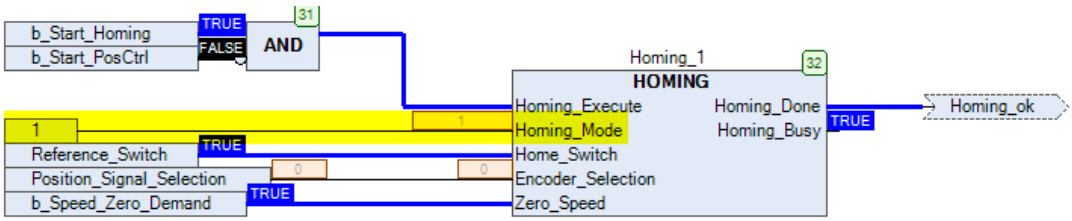
7.3 Homing operation

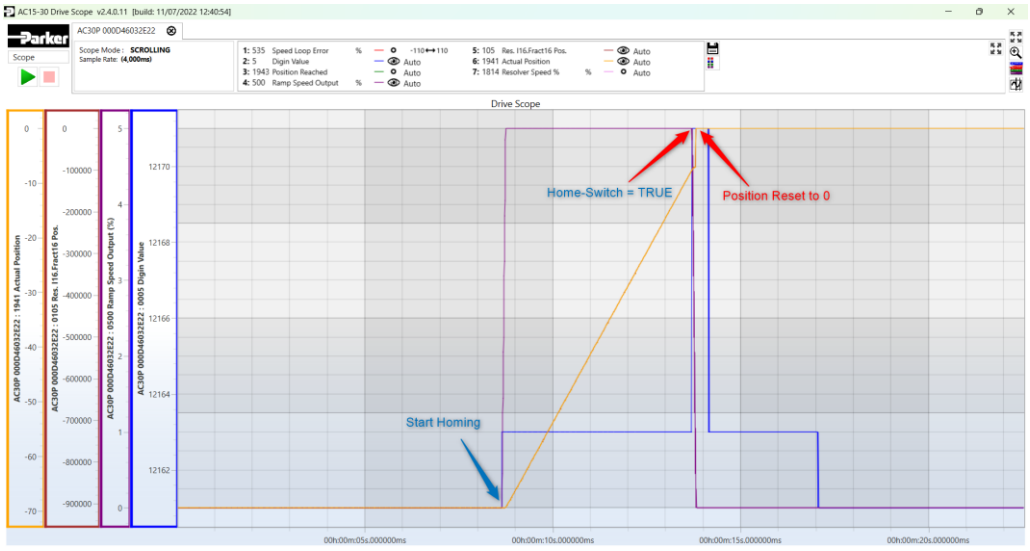
- Homing mode = 0 (Reset Counter): When execute homing (Homing_Execute) is turned ON, the counter will be cleared to 0.



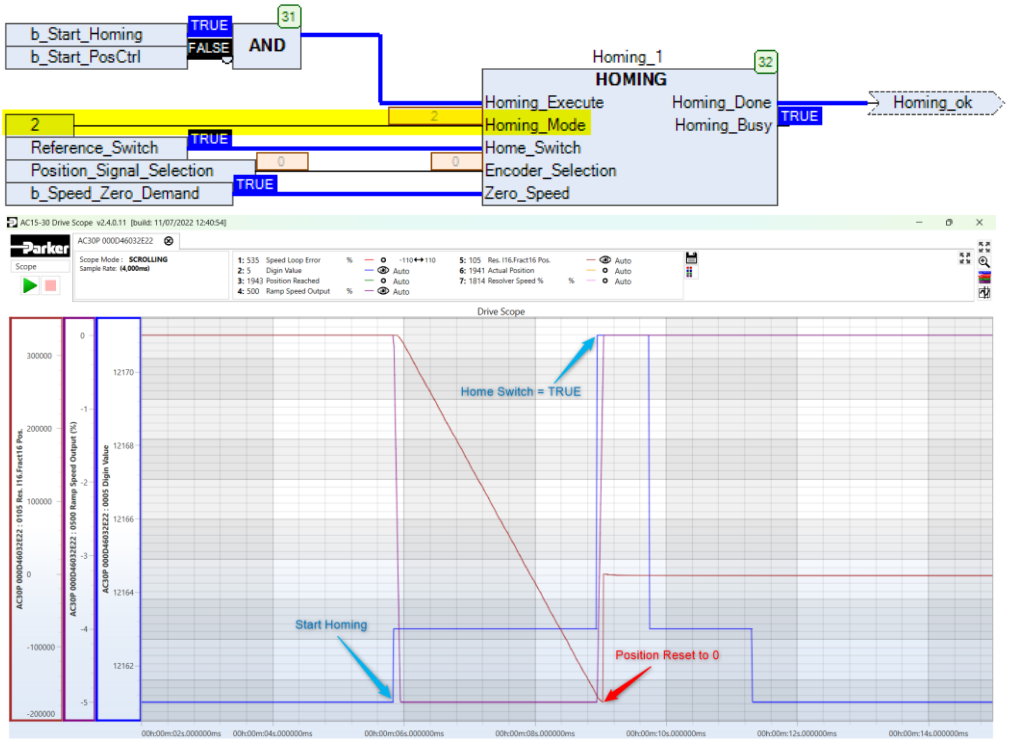


- Homing mode=1(Move Positive to Switch): When execute homing (Homing_Execute) is turned ON, the axis move positive until the home switch(Home_Switch) is ON then the counter is cleared to 0.





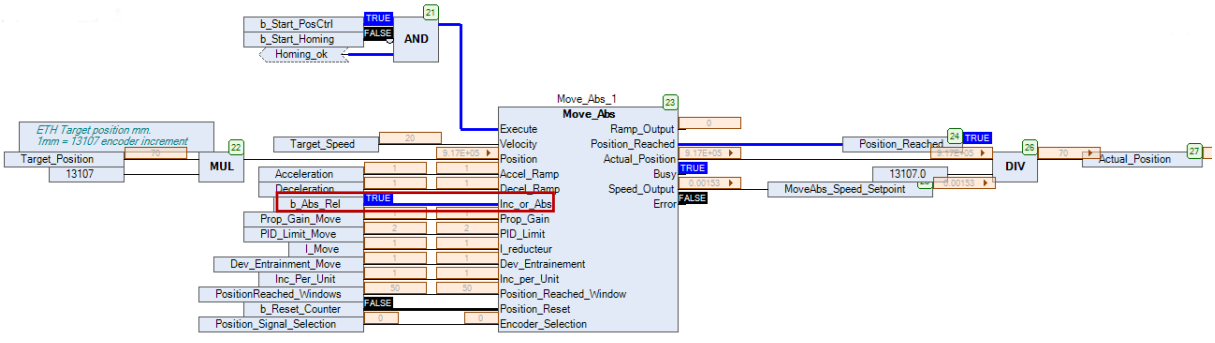
- Homing mode=2 (Move Negative to Switch): When execute homing(Homing_Execute) is turned ON, the axis move negative until the home switch(Home_Switch) is ON and the counter will is cleared to 0.

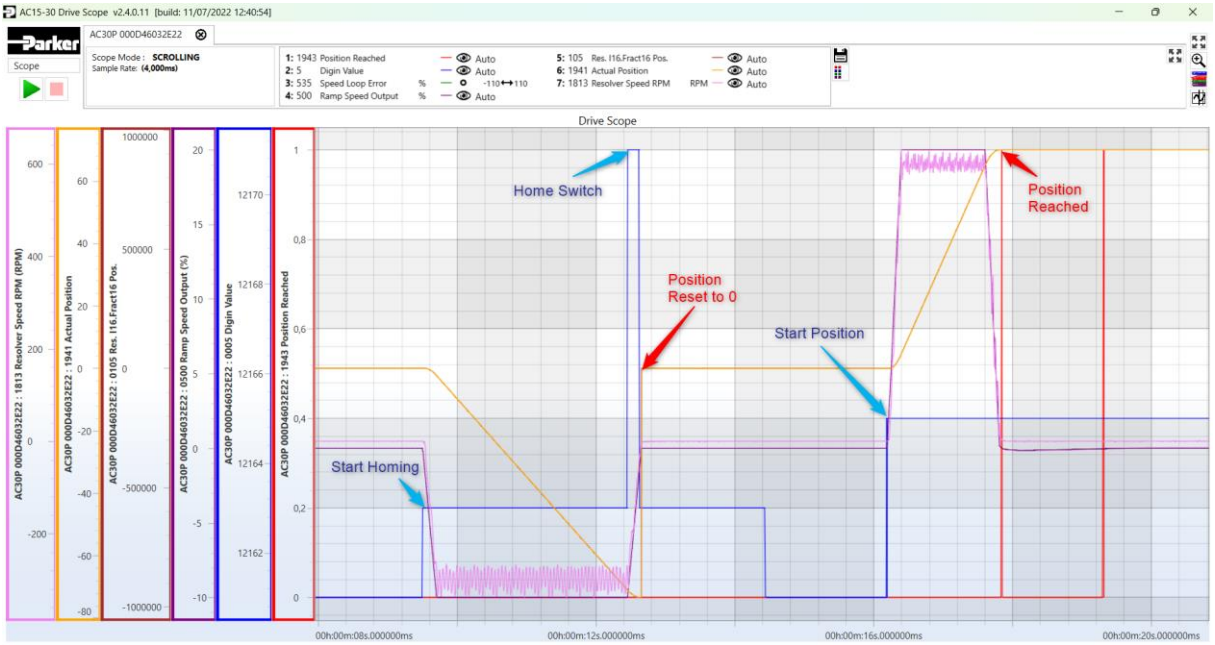


7.4 Absolute Positioning

- Position adjustment

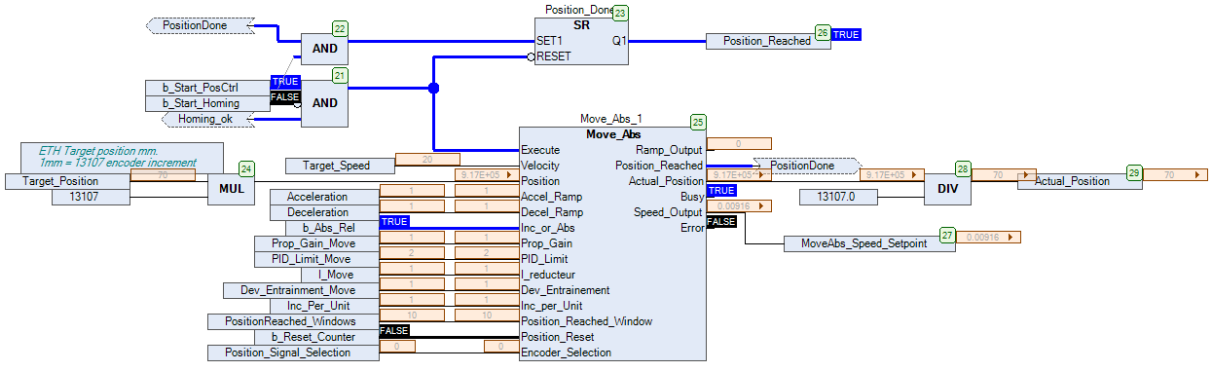
With homing done("Homing_OK") ON and execute homing(b_Start_Homing) OFF, turn ON the execute input(b_Start_PosCtrl) to start the positioning to the absolute target position. The position is reached once the output signal "Position_Reached" is ON. The position is monitored and adjusted as long as the execute signal input remains ON.

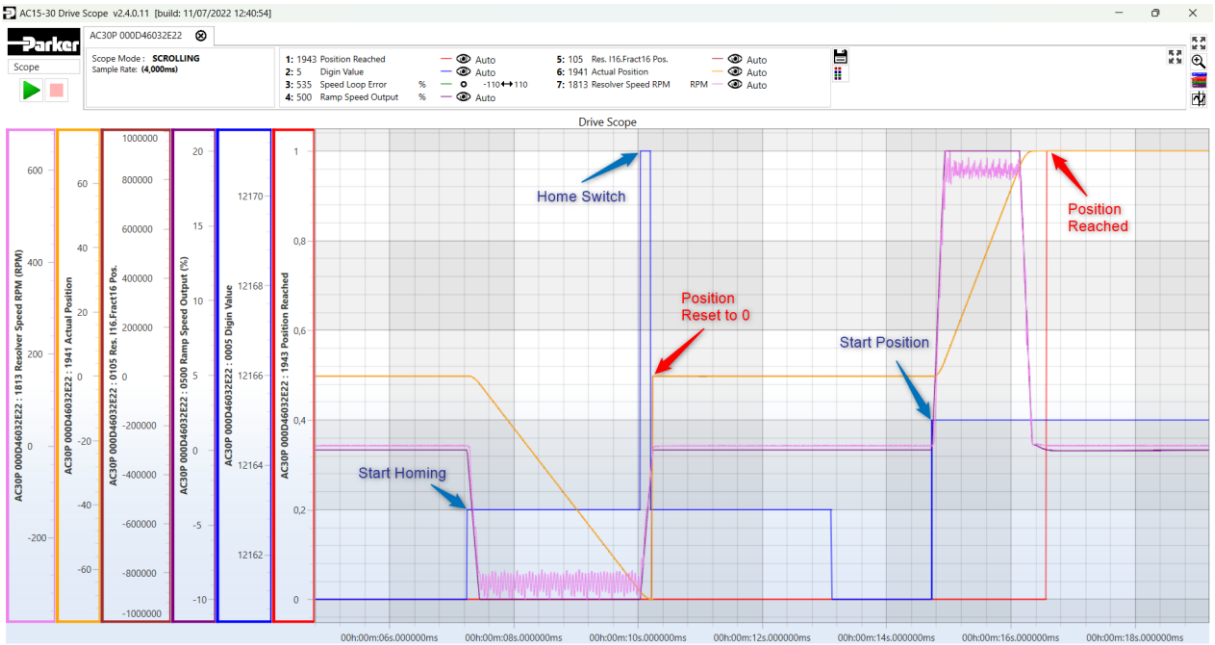




- Position Hold

With homing done(“Homing_OK”) ON and execute homing(b_Start_Homing) OFF, turn ON the execute input(b_Start_PosCtrl) to start the positioning to the absolute target position. The position is reached once the output signal “Position_Reached” is ON. The position is held as long as the execute signal input remains ON.



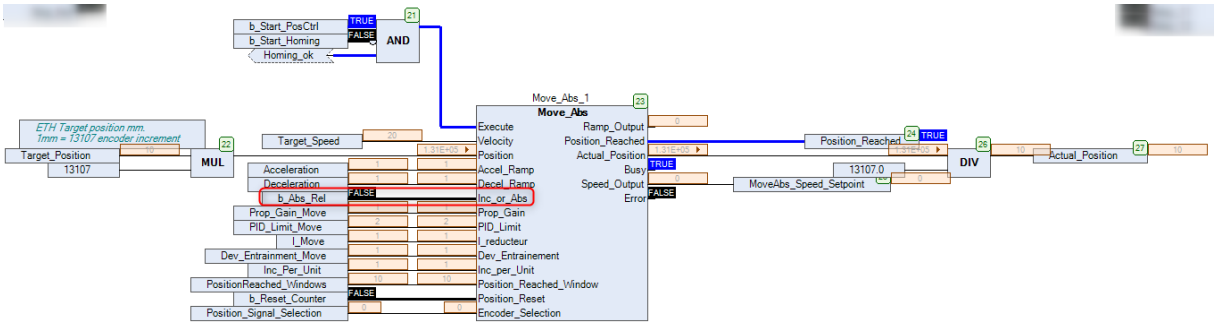


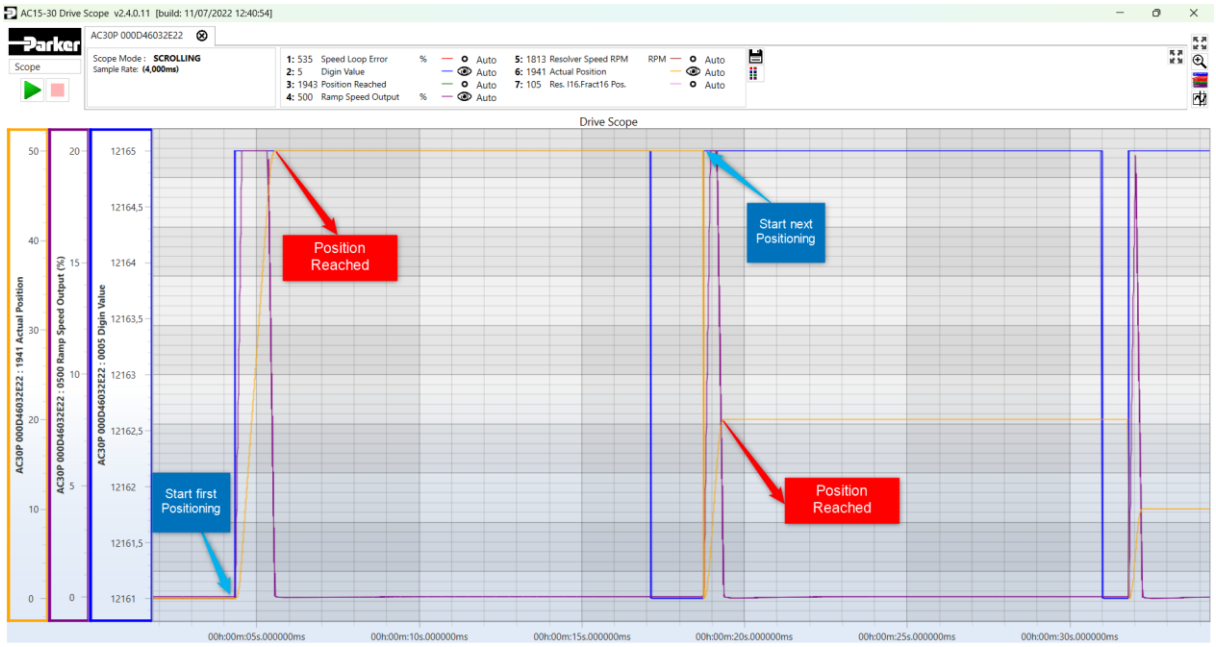
7.5 Relative Positioning

Executes positioning with the specified Position command (“Target_Position”), Speed command(“Target_Speed”) (Velocity), Acceleration rate (“Acceleration”), and Deceleration rate (“Deceleration”).

The Input signal “b_Abs_Rel” uses to specify the move type will be OFF for relative move.

Start (Execute) is turned ON, the counter is cleared, the axis move to the target position, the position is done once the position is reached, the next start will cleared the counter to 0 and the next positioning operation will start.





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