

TIA_PN_DCP_cXD

Platform	TIA Portal
Controller	S7-1200/1500
Library	TIA_PN_DCP_cXD
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1. Description

The 'FB_PN_DCP_CtrlX_DRIVE' function block for TIA Portal makes position and force control of the CtrlX DRIVES possible from Siemens PLCs CPUs over PROFINET communication.

2. Configuration

This section explains the various settings required to be carried out for ctrlX DRIVE using the ctrlX DRIVE Engineering Tool and Siemens PLC using TIA Portal for the function block to work as expected.

2.1 Overview

The Siemens PLC acts as the PROFINET fieldbus master. The CtrlX Drive must be connected to the PLC over the PROFINET network. The PLC can be configured and programmed using TIA portal software over Ethernet. The drive can be configured using ctrlX DRIVE Engineering software over Ethernet. The figure below gives an overview of a possible network.

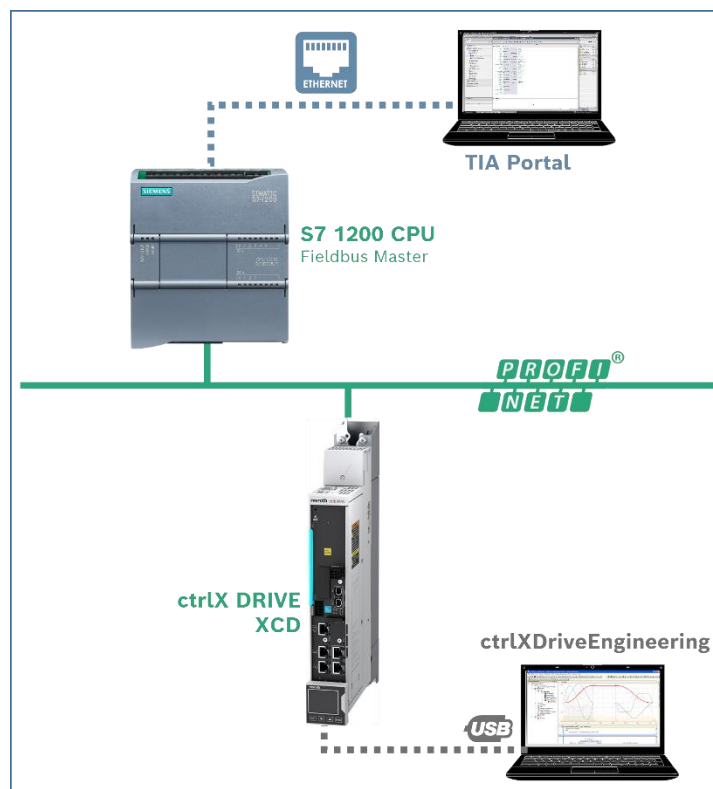


Fig 01: System connection overview

2.2 Configuration - ctrlX DRIVE Engineering

The master communication settings of CtrlX drive must be set to PROFINET as shown in the image below.

Settings IP settings axis 1 Slot 0 (Consumer) Slot 1 (Producer)

Protocol **PROFINET®**

Application profile **FSP Drive profile**

Communication status **A0005 Pre-Operational**

Change protocol and application profile ● Master communication - sub-device coupling active

Device name **ctrlx-drive-xcs**

Vendor ID **0x011F**

Device ID **0x2602** **Load slot configuration** **Save slot configuration** ⓘ

Reaction to failure of cycl. communication **As error (F4xxx) and config. error reaction of the application**

[Signal status word](#) [Signal control word](#) [GSDML files](#)

Fig 02: Master communication configuration – ctrlXDriveEngineering

In the Application Profile select the FSP Drive Profile in the Master Communication Settings. If this setting is not done the function block will not work.

From the Firmware version FWA-xxx-AXS-V-0308N-NN.00 the drive also works with the application profile “FSP Drive Profile,bit14 “Drive enable” not Evaluated”.

The AT & MDT lists, signal control word and signal status word, operation mode settings must be configured as shown in the images below. These settings are required by the function block for operation. These settings can also be loaded by using the parameter file provided in the deliverable.

Settings IP settings axis 1 Slot 0 (Consumer) Slot 1 (Producer)

Producer asynchronous

Status **prepare**

Number **0**

Producer cycle time **1000.000** us

Max. connection length **100**

Current conn. length **20**

Connection class **-1**

[Process data](#)


Data configuration

Offset	Parameter	+	-
0	S-0-0135.0.0 : Servodrive profile: Status word	+	-
2	S-0-0144.0.0 : Signal status word: Value	+	-
4	S-0-0386.0.0 : Position controller: Position actual value	+	-
8	S-0-0535.0.0 : Velocity controller: Velocity actual value	+	-
12	S-0-0390.0.0 : Diagnostic message: Manufacturer status regi...	+	-
16	S-0-1720.0.2 : Power supply control: Status word	+	-

[Add to parameter group](#)

Fig 03: AT settings– ctrlXDriveEngineering

Settings IP settings axis 1 Slot 0 (Consumer) Slot 1 (Producer)



Consumer asynch. (no watchdog)

Status:

Number:

Producer cycle time: us

Allowed data losses:

Error counter:

Max. connection length:

Current conn. length:

Connection class:

[Process data](#)

Data configuration

Offset	Parameter	+	-
0	S-0-0134.0.0 : Servodrive profile: Control word	+	-
2	S-0-0145.0.0 : Signal control word: Value	+	-
4	S-0-0282.0.0 : Drive-controlled positioning: Command value	+	-
8	S-0-0259.0.0 : Positioning profile: Profile velocity	+	-
12	S-0-0260.0.0 : Positioning profile: Acceleration	+	-
16	S-0-0359.0.0 : Positioning profile: Deceleration	+	-
20	S-0-1720.0.1 : Power supply control: Control word	+	-

[Add to parameter group](#)

PROFINET

Fig 04: MDT settings – ctrlXDriveEngineering

Status	Target parameter	Bit number
Bit 0: <input type="radio"/>	S-0-0346.0.0: Drive-controlled positioning: Control word	0
Bit 1: <input type="radio"/>	S-0-0000.0.0: <empty>	0
Bit 2: <input type="radio"/>	S-0-0148.0.0: Homing control: C0600 Command drive-controlled procedure	0
Bit 3: <input type="radio"/>	S-0-0346.0.0: Drive-controlled positioning: Control word	3
Bit 4: <input type="radio"/>	S-0-0346.0.0: Drive-controlled positioning: Control word	5
Bit 5: <input type="radio"/>	S-0-0099.0.0: Class 1 diagnostics: C0500 Reset command	0
Bit 6: <input type="radio"/>	S-0-0346.0.0: Drive-controlled positioning: Control word	1
Bit 7: <input type="radio"/>	S-0-0346.0.0: Drive-controlled positioning: Control word	2
Bit 8: <input type="radio"/>	S-0-0420.0.0: Subdevice STM: C0400 Activate configuration mode	0
Bit 9: <input type="radio"/>	S-0-0422.0.0: Subdevice STM: C0200 Activate operation mode	0
Bit 10: <input type="radio"/>	S-0-0240.0.0: DC bus supply: Control word	0
Bit 11: <input type="radio"/>	S-0-0000.0.0: <empty>	0
Bit 12: <input type="radio"/>	S-0-0000.0.0: <empty>	0
Bit 13: <input type="radio"/>	S-0-0000.0.0: <empty>	0
Bit 14: <input type="radio"/>	S-0-0000.0.0: <empty>	0
Bit 15: <input type="radio"/>	S-0-0447.0.0: Set absolute position function: C0300 Command procedure	0

Fig 05: Signal control word settings – ctrlXDriveEngineering

Status	Source parameter	Bit number
Bit 0: <input checked="" type="radio"/>	S-0-0424.0.0: Subdevice STM: Status, parameterization mode	0
Bit 1: <input type="radio"/>	S-0-0424.0.0: Subdevice STM: Status, parameterization mode	1
Bit 2: <input type="radio"/>	S-0-0437.0.0: Positioning status: Word	2
Bit 3: <input type="radio"/>	S-0-0419.0.0: Drive-controlled positioning: Command acknowledgment	0
Bit 4: <input type="radio"/>	S-0-0331.0.0: Velocity status: Actual value = 0	0
Bit 5: <input type="radio"/>	P-0-0115.0.0: Axis state machine: Status word, axis	5
Bit 6: <input type="radio"/>	S-0-0000.0.0: <no signal>	0
Bit 7: <input type="radio"/>	S-0-0000.0.0: <no signal>	0
Bit 8: <input checked="" type="radio"/>	P-0-0110.0.0: Axis state machine: Status word 2, axis	7
Bit 9: <input type="radio"/>	S-0-0000.0.0: <no signal>	0
Bit 10: <input type="radio"/>	S-0-0000.0.0: <no signal>	0
Bit 11: <input type="radio"/>	S-0-0000.0.0: <no signal>	0
Bit 12: <input type="radio"/>	S-0-0000.0.0: <no signal>	0
Bit 13: <input type="radio"/>	S-0-0000.0.0: <no signal>	0
Bit 14: <input type="radio"/>	S-0-0000.0.0: <no signal>	0
Bit 15: <input type="radio"/>	S-0-0000.0.0: <no signal>	0

Fig 06: Signal status word settings – ctrlXDriveEngineering

<input checked="" type="radio"/> Primary op. mode	Drive-controlled positioning	
<input type="radio"/> Second. op. mode 1	Velocity control	
<input type="radio"/> Second. op. mode 2	Velocity control	
<input type="radio"/> Second. op. mode 3	Velocity control	
<input type="radio"/> Second. op. mode 4	Velocity control	
<input type="radio"/> Second. op. mode 5	Velocity control	
<input type="radio"/> Second. op. mode 6	Velocity control	
<input type="radio"/> Second. op. mode 7	Velocity control	
<input type="radio"/> Internal secondary op. mode		

Fig 07: Operation mode selection – ctrlXDriveEngineering

2.3 Configuration – Siemens TIA Portal

2.3.1 Hardware Configuration

Before we can configure ctrlX drive in the TIA portal software the device description for the drive must be installed and should be available in the TIA portal's Hardware catalog as shown in the image below. The GSDML file which contains the device description for ctrlX drive is provided in the package in case it is not installed already in TIA portal. Install the file using the 'Manage general station description files' option under the 'Options' menu or refer to TIA portal's help section for information on how to install GSDML files. Alternatively opening the provided sample program should automatically install the GSD files onto your TIA Portal software.

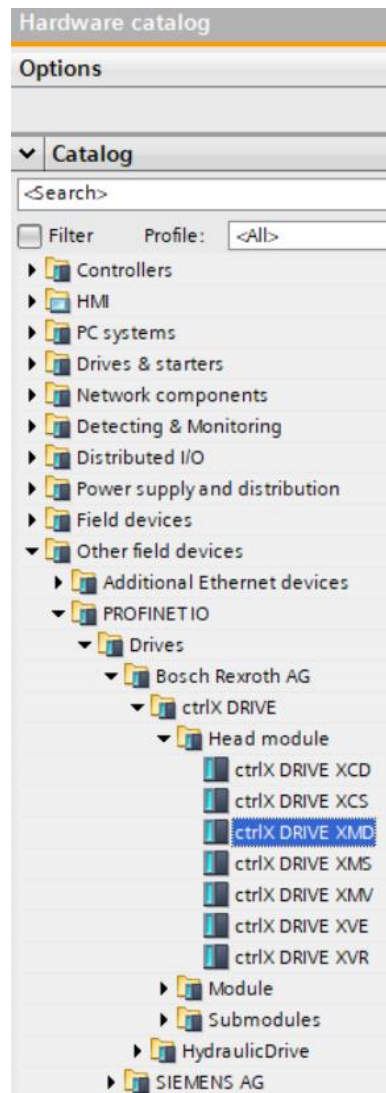


Fig 08: Hardware catalog - TIA Portal

2.3.2 Network Configuration

The ctrlX drive must be configured as an IO device in the PROFINET IO system. The number of parameters in the cyclic data channel (AT and MDT) will depend on the user application. The parameter channel data is a part of the cyclic channel data and must be enabled deliberately in the drive for this function block to work. The network connection diagram is shown below.

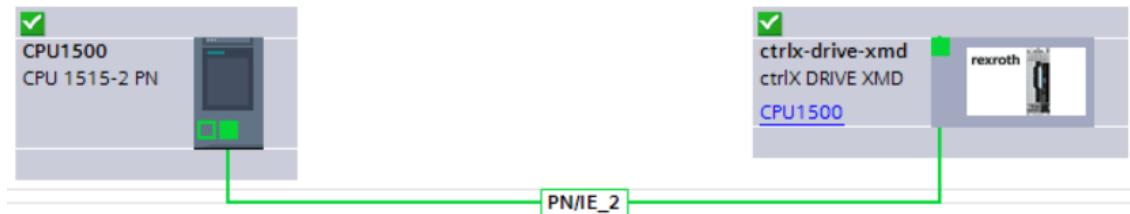


Fig 09: Devices and networks - TIA Portal

2.3.3 CtrlX Drive Configuration

The Input and output module in the hardware catalog under Module must be added to the drive configuration as shown in the image below. This enables the drive's parameter channel in EIDN format to address the drive parameters. If this setting is not done, then the function block will not work. Along with this 19 input Tags (or 26 input words) and 14 output Tags (or 11 output words) of cyclic data are required for the function block. These must be configured as shown in the image below.

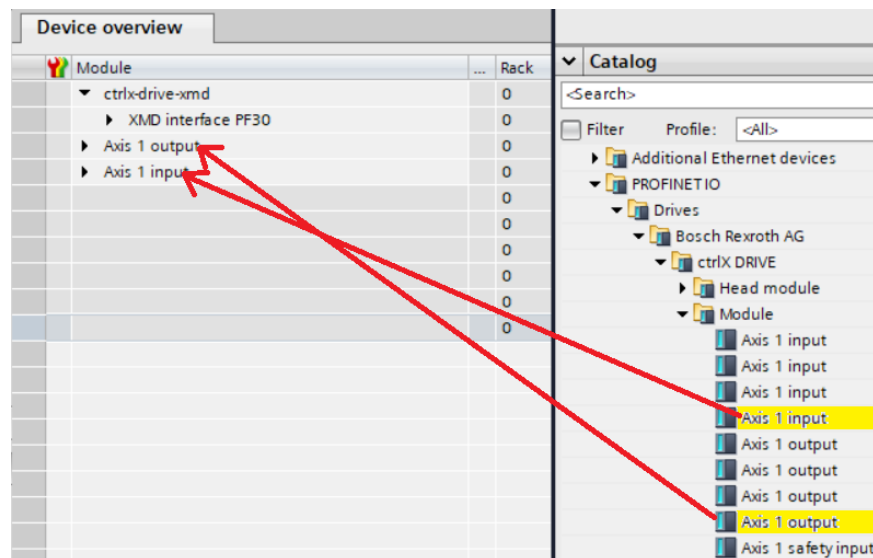


Fig 10: Drive configuration - TIA Portal

2.3.4 Address Configuration

The process image addresses need to be given as inputs to the function block when calling it in the user program. These addresses are used to exchange data between the PROFINET memory area and the function block memory. The same addresses that are set in the ctrlX drive configuration window must be given as inputs to the function block as shown in the image below. The color coding between the left and right sides of the image shows how the addresses are mapped.

As shown in the image below the I_address and Q_address values set in the ctrlX drive configuration must be set to the function block inputs DriveData_Input, and DriveData_Output in the user program which are linked to the user defined data structures st_DCP_StatusWord_cxD and st_DCP_ControlWord_cxD which will be explained in the chapter 3.5. The configuration in S7-1200/1500 CPUs is shown in the Image.

Default tag table				Device overview			
	Name	Data type	Address	Module	Rack	Slot	I address / Q address
25	oNewValuePossible	Bool	%M27.5	ctrlX-drive-xcs	0	0	
26	oSetPosAck	Bool	%M27.6	XCS interface PF30	0	0 X1	
27	oHardwareLock	Bool	%M27.7	output_1	0	output	
28	oCommandChanged	Bool	%M28.0	S-0-0134.0.0: Master co...	0	output...	22...23
29	oDriveWarning	Bool	%M28.1	S-0-0145.0.0: Signal con...	0	output...	24...25
30	oDriveError	Bool	%M28.2	S-0-0282.0.0: Positionin...	0	output...	26...29
31	oInStandstill	Bool	%M28.3	S-0-0259.0.0: Positionin...	0	output...	30...33
32	oDriveDiagnosis	DInt	%MD29	S-0-0260.0.0: Positionin...	0	output...	34...37
33	oPosAct	Real	%MD34	S-0-0359.0.0: Positionin...	0	output...	38...41
34	oVelAct	Real	%MD38	S-0-1720.0.1: Power sup...	0	output...	42...43
35	DriveData_Output	"st_DCP_ControlWord_cxD"	%Q22.0		0	1 8	
36	Enable_DCP_FB	Bool	%M65.7		0	1 9	
37	DriveData_Input	"st_DCP_StatusWord_cxD"	%I18.0		0	1 10	
38	srAccDecScalingFactor	Real	%MD43		0	1 11	
39	In_Enable	Bool	%M47.0		0	1 12	
40	In_TargetMode	Int	%MW48		0	1 13	
41	In_OperationModeSelection	Int	%MW50		0	1 14	
42	In_ErrorMode	Int	%MW52		0	1 15	
43	In_Timeout	Time	%MD54	input_1	0	input	
44	In_InLADDR	"st_PS_StatusWord_cxD"	%I34.0	S-0-0135.0.0: Drive statu...	0	input 1	18...19
45	In_OutLADDR	"st_PS_ControlWord_cxD"	%Q42.0	S-0-0144.0.0: Signal stat...	0	input 2	20...21
46	Out_InOperation	Bool	%M58.1	S-0-0386.0.0: Active pos...	0	input 3	22...25
47	Out_Error	Bool	%M58.2	S-0-0535.0.0: Active vel...	0	input 4	26...29
48	Out_ErrorID	Int	%MW59	S-0-0390.0.0: Diagnostic...	0	input 5	30...33
49	Out_ActualMode	Int	%MW61	S-0-1720.0.2: Power sup...	0	input 6	34...35

Fig 11: Address mapping S7-1500/1200 - TIA Portal

3. Function Block - FB_PN_DCP_cxD

3.1 Short Description

The 'FB_PN_DCP_cxD' function block for TIA Portal makes position and force control of the Rexroth ctrlX drives possible from Siemens PLCs CPUs over PROFINET communication. The control mode for position control can be set from this function block. The Drive performs the Position Control only when the MainMode is active. The parameters required by this function block are exchanged as cyclic data (AT and MDT). The function block scales the command and actual values based on the scaling Factors provided on the respective input(PosScalingFactor,VelScalingFactor). The function block can be used with ctrlX DRIVE from the version V0308.

3.2 Interface Description

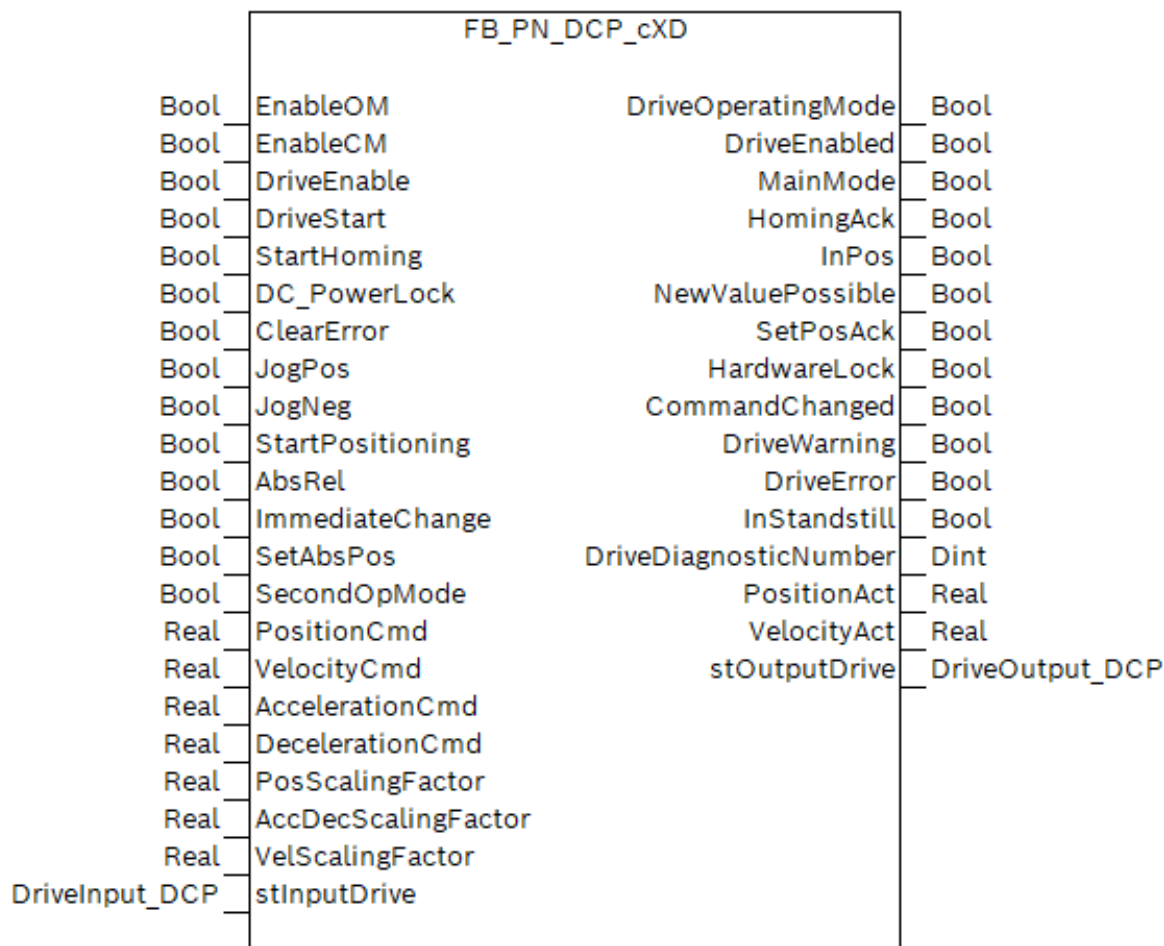


Fig 12: Interface diagram – FB_PN_DCP_cxD

3.3 Input and Output Description

I/O Type	Name	Type	Comment
VAR_INPUT	EnableOM	Bool	Enable drive to move to OM, PM -> OM
	EnableCM	Bool	Enable drive to move to CM, OM -> CM
	DriveEnable	Bool	Command to power ON the drive. Drive switches to “AH” mode
	DriveStart	Bool	Drive in operation. Drive switches to “AF” mode
	StartHoming	Bool	Drive controlled homing procedure starts at rising edge
	DC_PowerLock	Bool	DC Bus Power Control S-0-0240.bit0, 1→DC bus is ready for power output, 0→ DC bus is not ready for power supply.

	ClearError	Bool	Drive error acknowledgement command start at rising edge
	JogPos	Bool	Endless Jog motion in the positive direction
	JogNeg	Bool	Endless Jog motion in the negative direction
	StartPositioning	Bool	New command values are accepted by drive at the rising edge of this input.
	AbsRel	Bool	Position Command value type; 0 – Absolute Command; 1 – Relative Command
	ImmediateChange	Bool	New command values are accepted immediately if this input is TRUE.
	SetAbsPos	Bool	Set absolute position command
	SecondOpMode	Bool	Switch to second operation mode
	PositionCmd	Real	Position Command value (S-0-0282.0.0)
	VelocityCmd	Real	Velocity Command value (S-0-0259.0.0)
	AccelerationCmd	Real	Acceleration S260
	DecelerationCmd	Real	Deceleration S359
	PosScalingFactor	Real	resolution for position
	AccDecScalingFactor	Real	resolution for acceleration and deceleration
	VelScalingFactor	Real	resolution for velocity
	stInputDrive	HW_IO	Input word address from hardware configuration when drive is added
VAR_OUTPUT	DriveOperatingMode	Bool	Drive is ready for operation.,0 - PM; 1 - OM
	DriveEnabled	Bool	Drive Powered ON (with torque)
	MainMode	Bool	Primary Operating mode active and drive follows the command value.
	HomingAck	Bool	Drive is referenced
	InPos	Bool	Last position command has been reached. Drive In Position.
	NewValuePossible	Bool	Drive is ready for new command value. Command values can be accepted with rising edge of StartPositioning input.
	SetPosAck	Bool	Position set point is taken by the drive
	HardwareLock	Bool	P110 Bit 7, internal hardware lock
	CommandChanged	Bool	P115 Bit 5, Drive Command changed
	DriveWarning	Bool	Class 2 diagnostics warning (cf. S 0-0012) at ctrlXDrive
	DriveError	Bool	Class 1 diagnostics drive error (cf. S 0-0011) The bit is set if a class 1 diagnostics error is present (drive lock-out).
	InStandstill	Bool	Drive is in Standstill; Actual Velocity < Velocity Window
	DriveDiagnosticNumber	Dint	Drive diagnostic message number from the parameter S-0-0390. This is a 4byte Hexadecimal data. More information is available in ctrlX Drive Engineering help.

	PositionAct	Real	Actual position feedback, S-0-0386
	VelocityAct	Real	Actual velocity feedback, S-0-0040
	stOutputDrive	HW_IO	Output word address from hardware configuration when drive is added

Table 1: Interface description – FB_PN_DCP_cXD

3.4 Min-/Max-Default-Values and Takeover of Inputs

The following table shows the min max and default values for the function block inputs.

Name	Data type	Min. value	Max. Value	Default Value	Takeover
EnableOM	BOOL	NA	NA	FALSE	Continuous
EnableCM	BOOL	NA	NA	FALSE	Continuous
DriveEnable	BOOL	NA	NA	FALSE	Continuous
DriveStart	BOOL	NA	NA	FALSE	Continuous
DriveHoming	BOOL	NA	NA	FALSE	Continuous
DC_PowerLock	BOOL	NA	NA	TRUE	Contineous
ClearError	BOOL	NA	NA	FALSE	Continuous
JogPos	BOOL	NA	NA	FALSE	Continuous
JogNeg	BOOL	NA	NA	FALSE	Continuous
NewValue	BOOL	NA	NA	FALSE	Raising Edge
Abs_Rel	BOOL	NA	NA	FALSE	Continuous
ImmediateChange	BOOL	NA	NA	FALSE	Continuous
SetAbsPos	BOOL	NA	NA	FALSE	Continuous
SecondOperationMode	BOOL	NA	NA	FALSE	Continuous
PositionCmd	REAL	-2147483.0	2147483.0	0.0	Continuous
VelocityCmd	REAL	-2147483.0	-2147483.0	0.0	Continuous
AccCmd	REAL	-2147483.0	2147483.0	0.0	Continuous

DecCmd	REAL	-2147483.0	2147483.0	0.0	Continuous
PosScalingFactor	REAL	-2147483.0	2147483.0	100.0	Continuous
AccDecScalingFactor	REAL	-2147483.0	2147483.0	100.0	Continuous
VelScalingFactor	REAL	-2147483.0	2147483.0	100.0	Continuous
stInputDrive	DWord	NA	NA	FALSE	Continuous

Table 2: Min-/max-/default values and takeover of inputs – FB_PN_DCP_cXD

3.5 Data types

3.5.1 st_DCP_ControlWord_cXD

SI.NO	Name	Data Type	Description
1	MasterControlWord_134	st_DCP_MstControlWord_134_cXD	Master Control Word S-0-0134
2	SignalControlWord_145	st_DCP_SigControlWord145_cXD	Signal Control Word S-0-0144
3	Pos_Cmd	Dint	Positioning command S-0-0282
4	Vel_Cmd	Dint	Positioning Velocity S-0-0259
5	Acc_CMD	Dint	Positioning Acceleration S-0-0260
6	Dec_CMD	Dint	Positioning Deceleration S-0-0359

Table 3: Control Word Structure – FB_PN_DCP_cXD

3.5.2 st_DCP_StatusWord_cXD

SI.NO	Name	Data Type	Description
1	DriveStatusWord_135	st_DCP_MstStatusWord_135_cXD	Drive Status Word S-0-0135
2	SignalStatusWord_144	st_DCP_SigStatusWord_144_cXD	Signal Status Word S-0-0144
3	Pos_Sct	Dint	Active position feedback S-0-0386
4	Vel_Act	Dint	Velocity feedback S-0-0040
5	Diagnostic_message	UDint	Diagnostic message number S-0-0390

Table 4: Status Word Structure – FB_PN_DCP_cXD

3.6 Functional Description

The 'FB_PN_DCP_cXD' function block allows the execution of position control in the ctrlX drive from Siemens PLCs CPUs over PROFINET communication. The control mode for position control and the Velocity control can be set from this function block. The actual values and status word data received from drive is displayed at the various function block outputs.

3.6.1 Position Control

The primary operation mode for this function block is the position control mode, i.e., executing a positioning operation with a position command value and a velocity command value. To execute this Position/Velocity Control mode make sure that the scaling factor parameters are provided (PosScalingFactor, VelScalingFactor), the Acceleration and deceleration values (Accelerationcmd, DecelerationCmd) should be provided.

Use the StartPositioning(0→1) tag for position control, once the raising edge of startpositioning is detected and the JogPos and JogNeg is reset then the Drive will move to the position set by the positionCmd with a velocity of VelocityCmd with an acceleration of Accelerationcmd/DecelerationCmd

All the parameters for the command values and the actual values must be configured in the cyclic data parameters (AT and MDT) as specified in the configuration section earlier in this document. The scaling for these parameters depends on the scaling factor inputs (PosScalingFactor, VelScalingFactor) handled by the function block by reading their respective parameter data values and their attributes as required.

3.6.2 Position Control Mode Jogging

When the function block is enabled and the drive is in operation mode, it is possible to jog the axis in both the directions. *JogPos* and *JogNeg* inputs are used to jog the axis in the positive and negative directions respectively, with the velocity value of VelocityCmd.

4. Sample Program

The sample program included in the package contains two PLCs – CPU 1215C DC/DC/DC, CPU 1515-2 PN. The main program OB1 contains an instance of the Drive Control and Positioning function block("Instance_FB_PN_DCP_cXD") in the PLC projects and respective Tags are configured and mapped with the IO's from the ctrlX DRIVE.

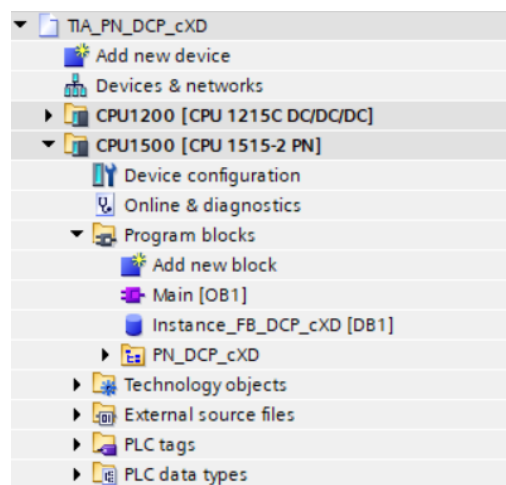


Fig 13: Sample program

Default tag table								
	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	St
	sJogPos	Bool	%M0.6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sJogNeg	Bool	%M0.7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sNewValue	Bool	%M1.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sAbs_Rel	Bool	%M1.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sImmediateChange	Bool	%M1.2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sSetAbsPos	Bool	%M1.3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sSecondOperationMode	Bool	%M1.4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sPosCmd	Real	%MD2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sVelCmd	Real	%MD6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sAccCmd	Real	%MD10	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	sDecCmd	Real	%MD14	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	srPosScalingFactor	Real	%MD18	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	srVelScalingFactor	Real	%MD22	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oDriveOperatingMode	Bool	%M27.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oDriveEnabled	Bool	%M27.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oMainMode	Bool	%M27.2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oHomingAck	Bool	%M27.3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oInPos	Bool	%M27.4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oNewValuePossible	Bool	%M27.5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oSetPosAck	Bool	%M27.6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oHardwareLock	Bool	%M27.7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oCommandChanged	Bool	%M28.0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oDriveWarning	Bool	%M28.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oDriveError	Bool	%M28.2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oInStandstill	Bool	%M28.3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oDriveDiagnosis	DInt	%MD29	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oPosAct	Real	%MD34	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	oVelAct	Real	%MD38	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	▶ DriveData_Output	*stControlWord_cxD*	%Q0.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	▶ DriveData_Input	*stStatusWord_cxD*	%I0.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

Fig 14: Configuration of Tags and Mapping

Till now we have seen the configuration of DCP Function Block instance in TIA Portal, now let see the controlling of drive via function block operation.

4.1 Operation Example of DCP (Drive Control Position) Function Block

The 'FB_PN_DCP_cxD' function block allows the execution of position control in the ctrlX drive from Siemens PLCs CPUs over PROFINET communication. The control mode for position control and the Velocity control can be set from this function block. The actual values and status word data received from drive is displayed at the various function block outputs.

4.2 Drive Controlling

Once the Drive configuration is done, Controlling of the Drive can be handled by the function block as well. The Drive is Enabled by clearing all the error in the Drive by Raising edge of the Clearerror Tag as shown in the Below image.

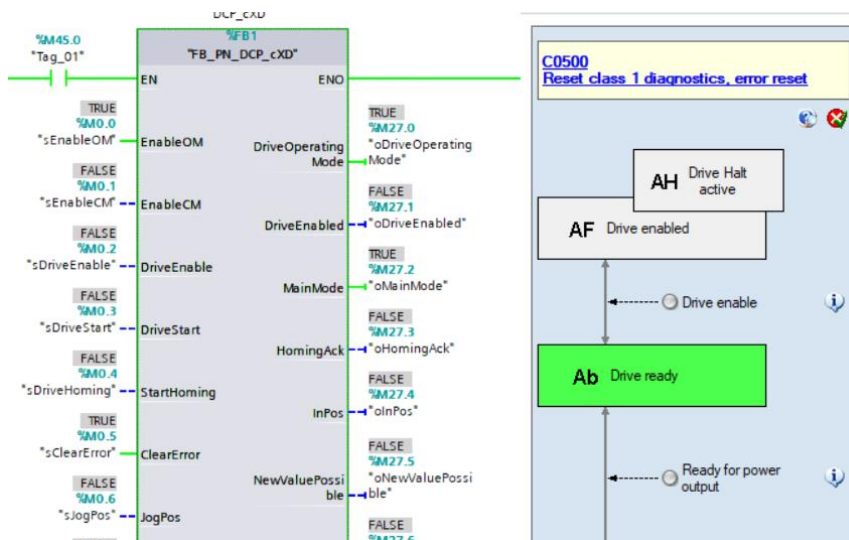


Fig 15: Drive_ClearError

The Drive can be pushed to AH DriveHalt active from the function block by configuring the tag EnableOM =1, DriveEnable =1 and DriveStart =0 as shown in the below figure.

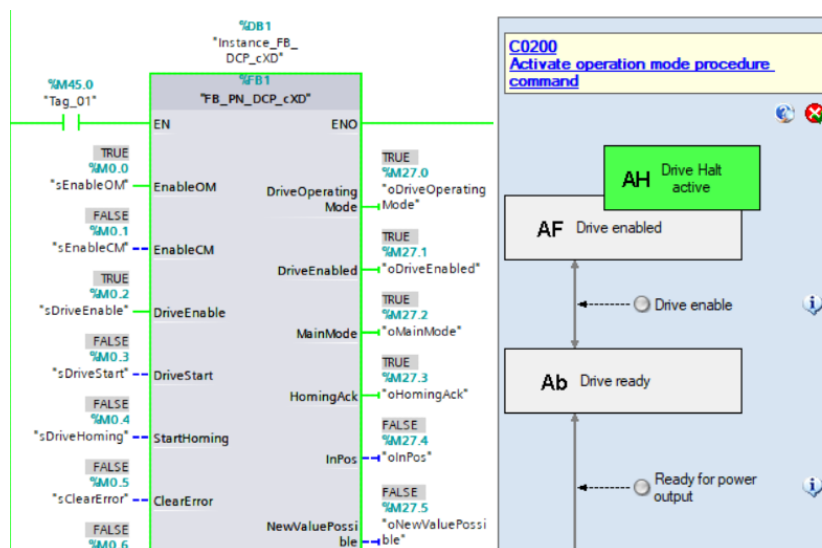


Fig 16: Drive_Halt

The Drive can be pushed to AF Drive enabled from the function block by Configuring the following tags EnableOM =1, DriveEnable =1 and DriveStart =1 and the output in the Drive can be seen in the below figure.

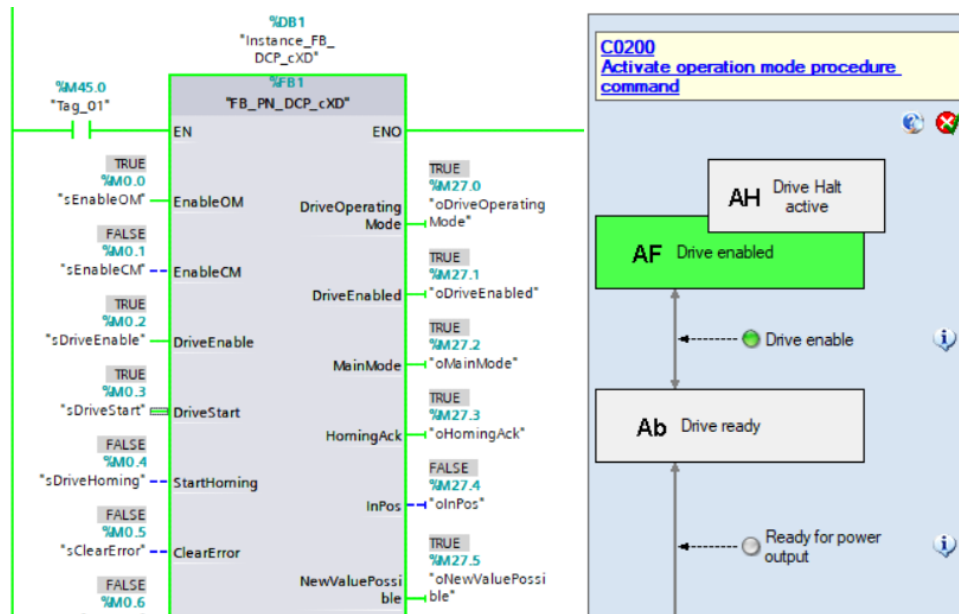


Fig 17: Drive_Enabled

4.3 Drive Positioning

Once the Drive is enabled then the positioning of the drive can be done by the function block, Drive can be freely jogged, Drive can be moved to certain position using the respective tags in the FB_PN_DCP_cxD function block.

4.3.1 Drive Jogging

Drive can be Jogged freely using the PLC but before that the scaling for the positioning and velocity command should be provided. We can adjust the following tags to match the display value in PLC with the Drive.

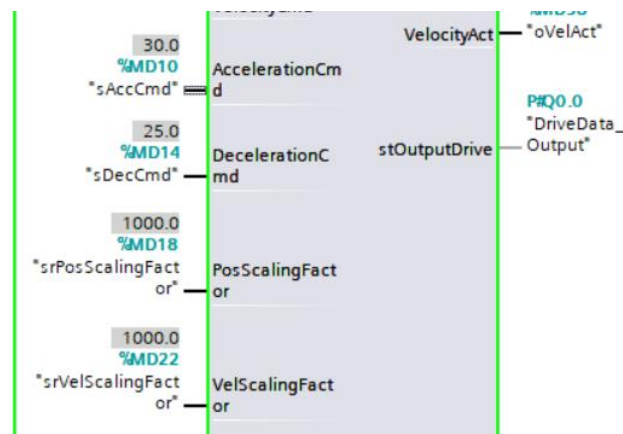


Fig 18: Drive_Scaling_Parameters

Now let's jog the drive freely in Positive direction as well as in Negative direction, to perform this the Velocity command for the drive should be provided. In our case let us take the Velocity of the drive as 30. To move the drive in Positive direction let's configure the Function block as this Velocitycmd =30, JogPos = 1.

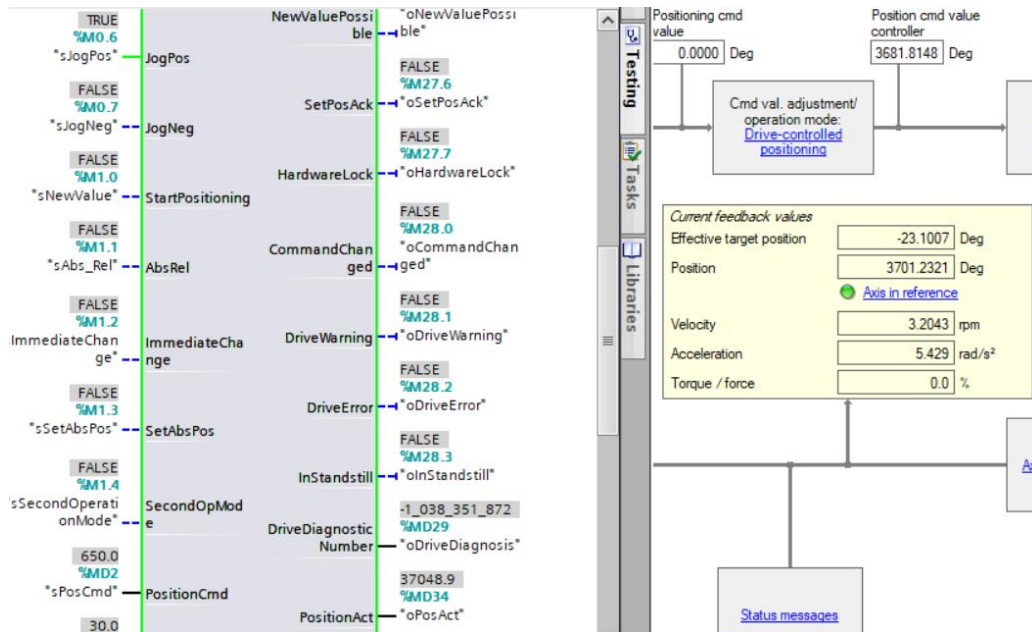


Fig 19: Drive_Jog_Pos

In our case let us take the Velocity of the drive as 30. To move the drive in Negative direction let's configure the Function block as this Velocitycmd =30, JogNeg = 1.

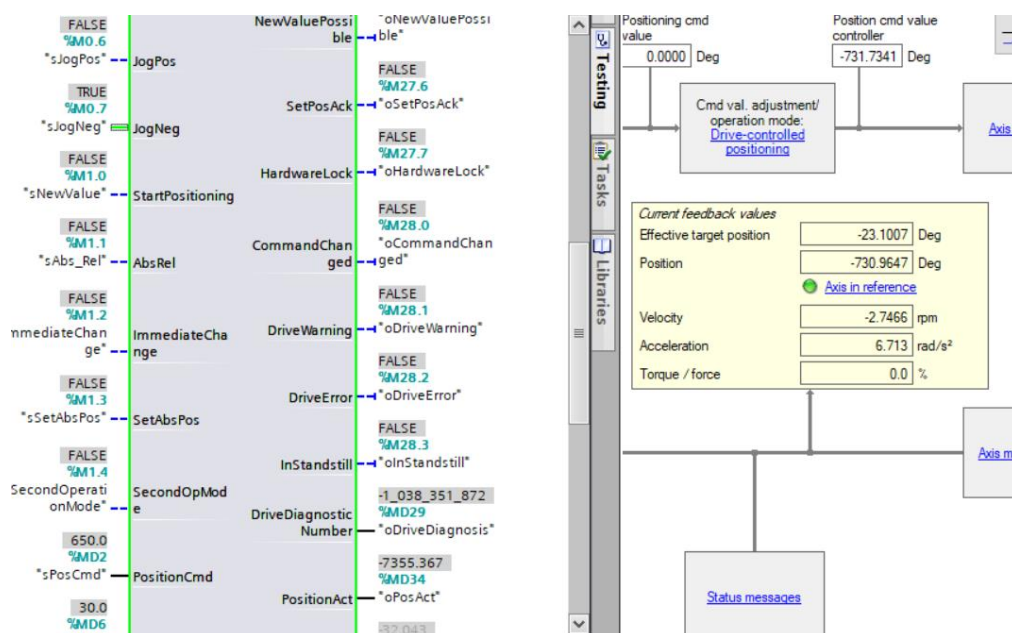


Fig 20: Drive_Jog_Neg

4.3.2 Position Controlled Jogging

A Particular position for a drive can be achieved by a function block. We can move the drive to a desired position by using the tag StartPositioning(Raising Edge). Here we will consider the position of the drive to be 550 with a velocity of 30, Let's Configure the same thing in the function block as VelocityCmd = 30, PositionCmd = 550 and StartPositioning = 1 then the Drive will start the positioning and the same can be seen in the below image.

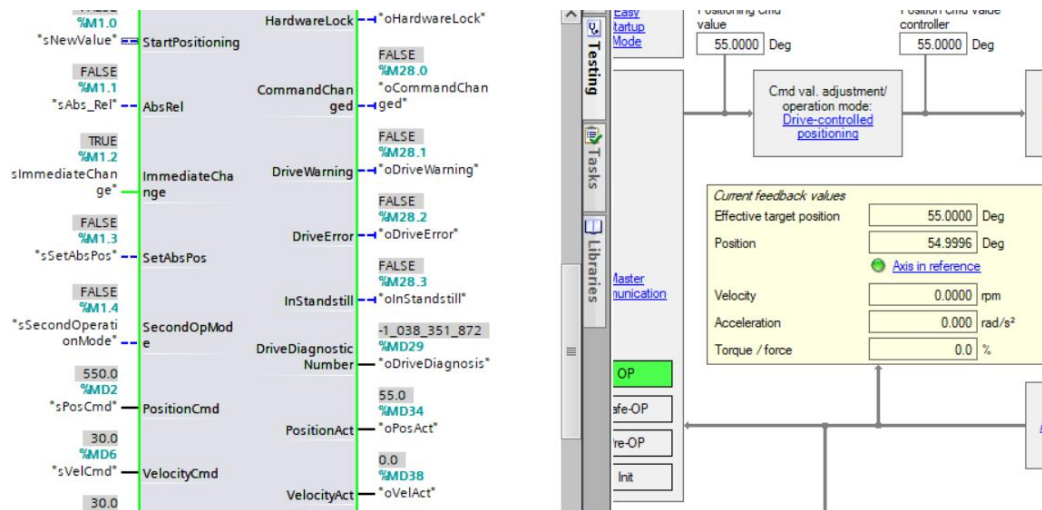


Fig 21: Drive Position Controlling

4.3.3 Homing

To work with the homing from the Function Block first clear the encoder position of the drive from the ctrlx DRIVE Engineering system and then the Homing cmd can be provided in the function block and the homing acknowledgment can be seen in the function block once the Drive Homing is done.

Clearing the Position of Encoder and resetting the homing acknowledgment in function block can be shown in the below image.

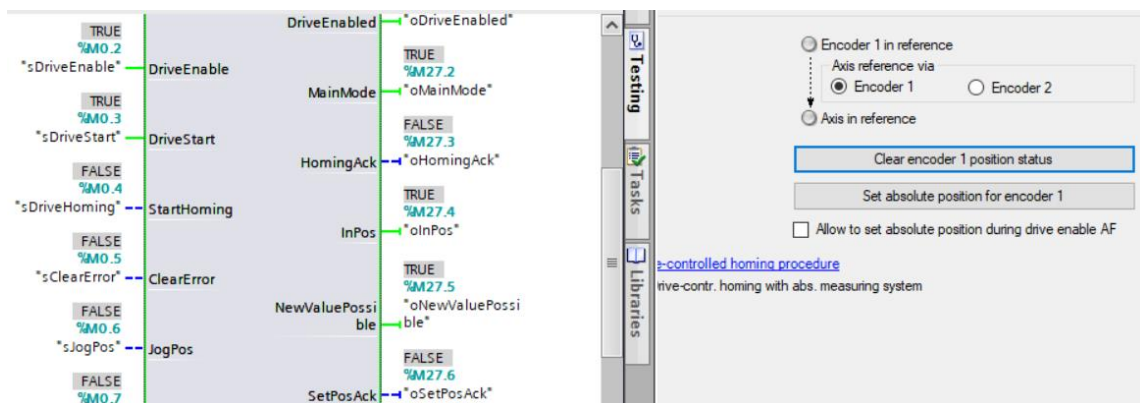


Fig 22: Drive Clear Encoder Position

To perform the homing on the Drive in the function block StartHoming should be enabled(Raising Edge) and once the Homing in the drive is completed then the Homing acknowledgment(oHomingAck) in the Function block will be set and CommandChanged output will also be set, which can be seen in the below images.

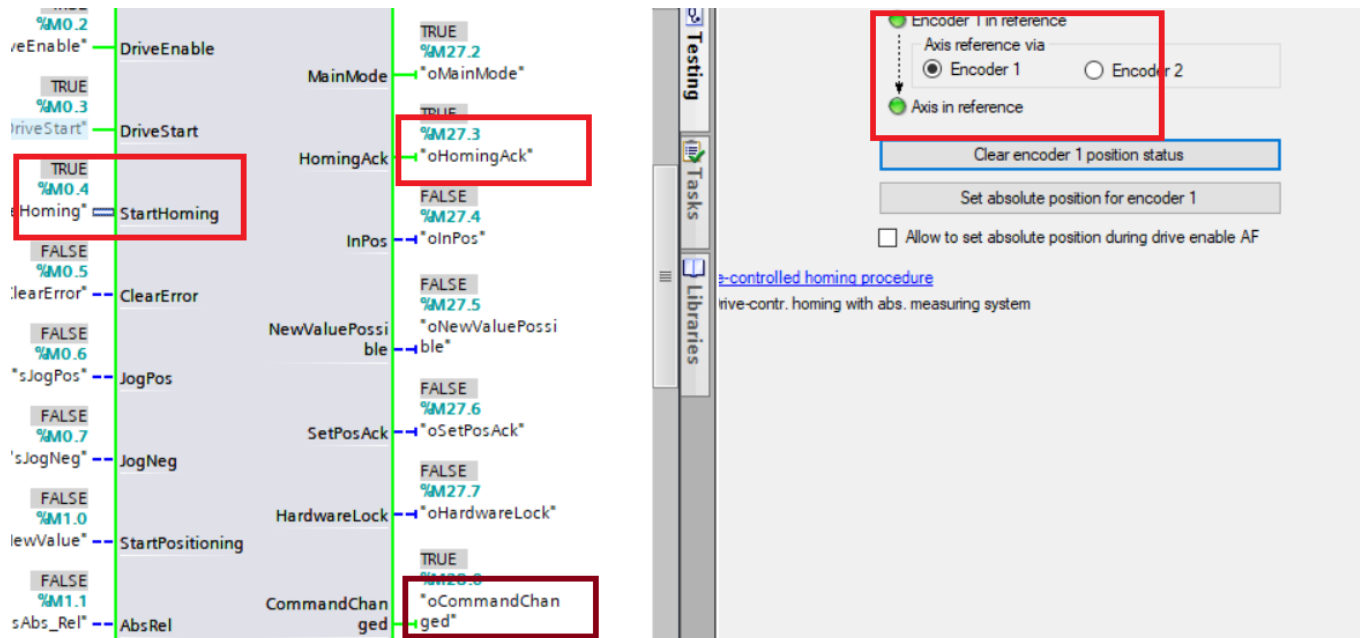


Fig 23: Drive Homing Ack and Command Changed Set

5. Document Version History

Version	Date (dd.mm.yyyy)	Editor	Remarks
1.0	18.07.2022	PFY1KOR	Initial Version
1.1	03.01.2023	PFY1KOR	CommandChanged Output Implemented
1.2	07.03.2023	PFY1KOR	Bugs for V1.0.2 612769 Bug fix TIA FB package issue with PAR and sample project. 616886 Bug fix TIA DCP a wrong Bit is used for AH_Standstill. 616895 Bug fix TIA DCP Scaling wrong.
1.3	18.04.2023	PFY1KOR	645417 Bug fix ctrlX Drive DCP Profinet Example PAR File and Watch List 645451 Bug fix ctrlX Drive Power Supply Profinet Example PAR File and Watch List
1.4	31.05.2023	PFY1KOR	657295 Bug fix FB_PN_DCP_cXD: check temp vs static variable for bNewValueFlanke. 658226 Bug fix FB_PN_DCP_cXD Structure stSignalStatusWord_cXD wrong for HardwareLock. 658838 Bug fix TIA_PN_DCP_cXD comment confuse in stStatuscXD_Bits
2.0	19.04.2024	PFY1KOR	782923 Removed the conflicts between DCP and Power Supply Function blocks working together with the same Drive.
2.1	01.04.2025	PFY1KOR	990187 ctrlXDrive Profinet function bloc S7 bug, pos Flag "start Posinioning"