



APPLICATION NOTE

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Subject

DURApulse GS30 EtherCAT XG5000 Project Creation for XMC

Purpose

This application note is intended to provide a basic project configuration for controlling a DURApulse GS30 over EtherCAT using a LS Electric XMC programmable motion controller.

Date Issued

2-27-2025

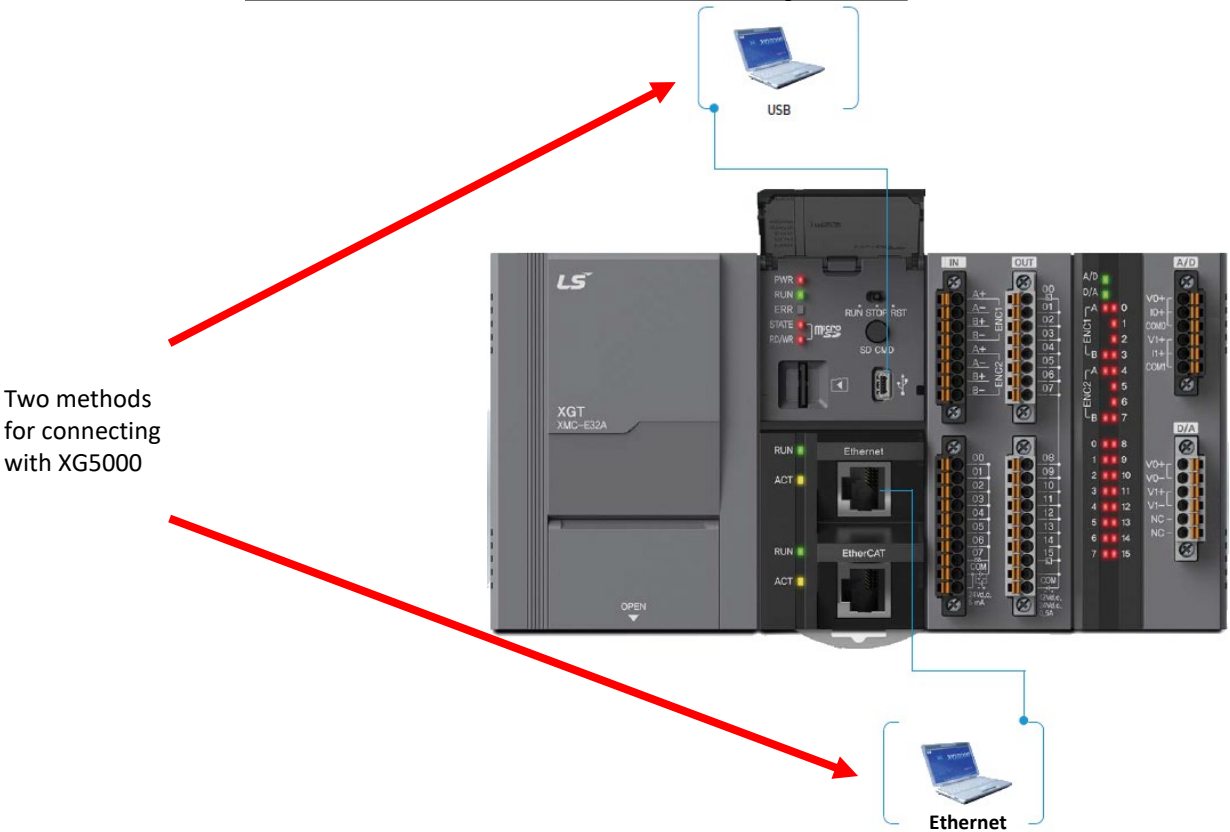
XMC03 –DURApulse GS30 EtherCAT Project Creation

- XMCs are programmed in XG5000.
- After mounting and powering it up, a user can connect to it through XG5000 for programming.
- XG5000 can connect to the XMC with a USB series Mini-B cable or an Ethernet cable.
- A USB series mini-B cable will connect to the port under the RUN/STOP Mode Switch and SD CMD button.

(Shown Below)

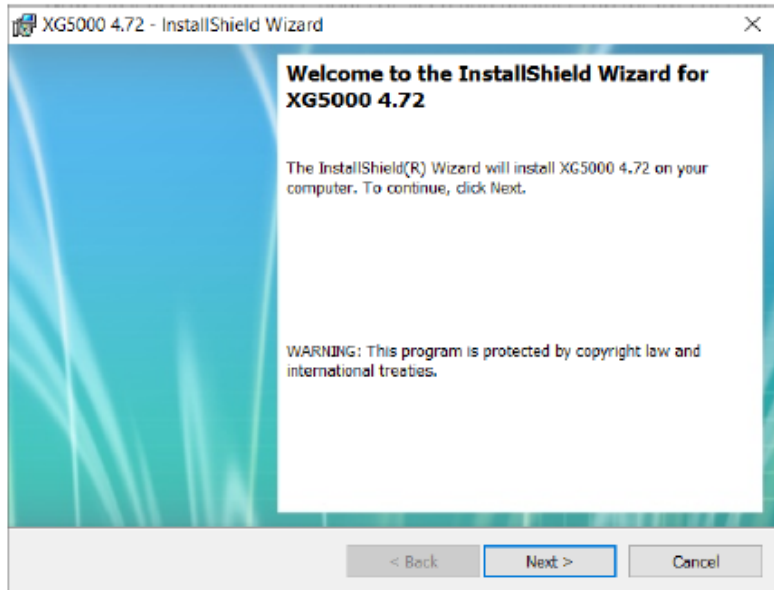
- An ethernet cable will connect to the Ethernet port on the front.
- The EtherCAT port can not be used for programming.

XG5000 XMC Connection Options



Section 1 – USB Connection to XMC

Step 1: Download and Install XG5000 software.

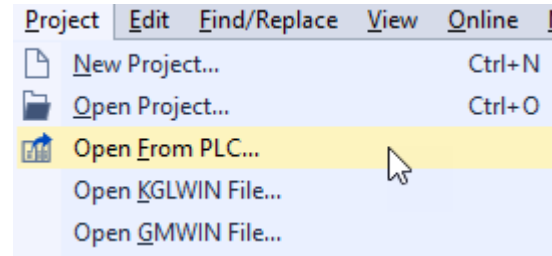
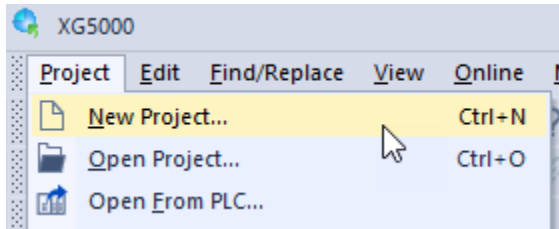


Step 2: Connect Computer with USB series Mini-B cable to the XMC.



Step 3: Open XG5000. Select Project Menu → New Project.

Alternate method is to Select Project Menu → Open From PLC... (Skip to Step 6).



Step 4: Fill in the information for a New Project.

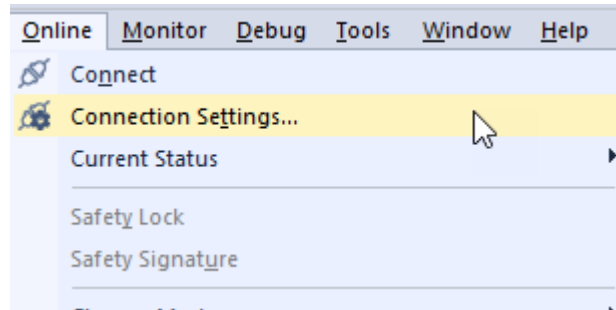
Diagram illustrating the 'New Project' dialog box with annotations:

- Add Project Name** → Project name:
- Choose XMC** → CPU Series: XMC
- Choose CPU type XMC-E16A or XMC-E08A** → CPU type: XMC-E16A
- Add Program Name** → Program name: NewProgram
- Choose Program Language** → Program Language: LD

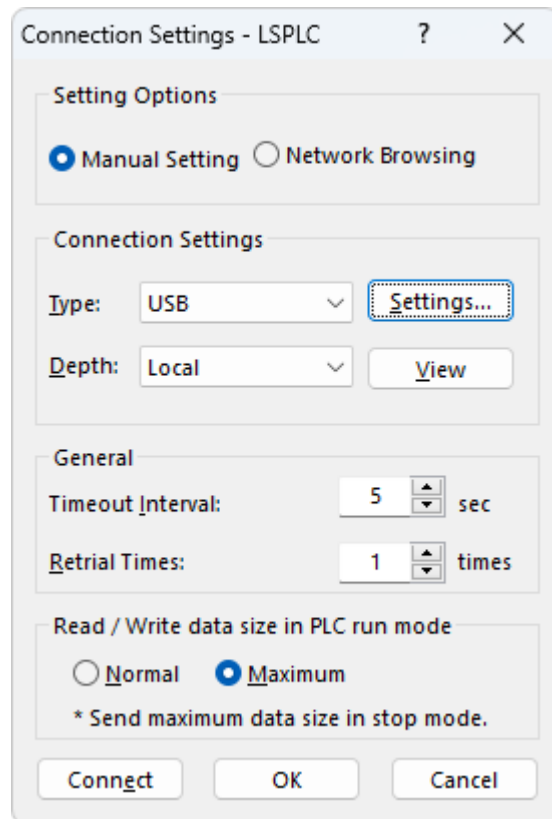
The dialog box also includes:

- File directory: C:\Projects
- PLC Name: LSPLC
- Programming Format: XGI Programming
- Buttons: OK, Cancel

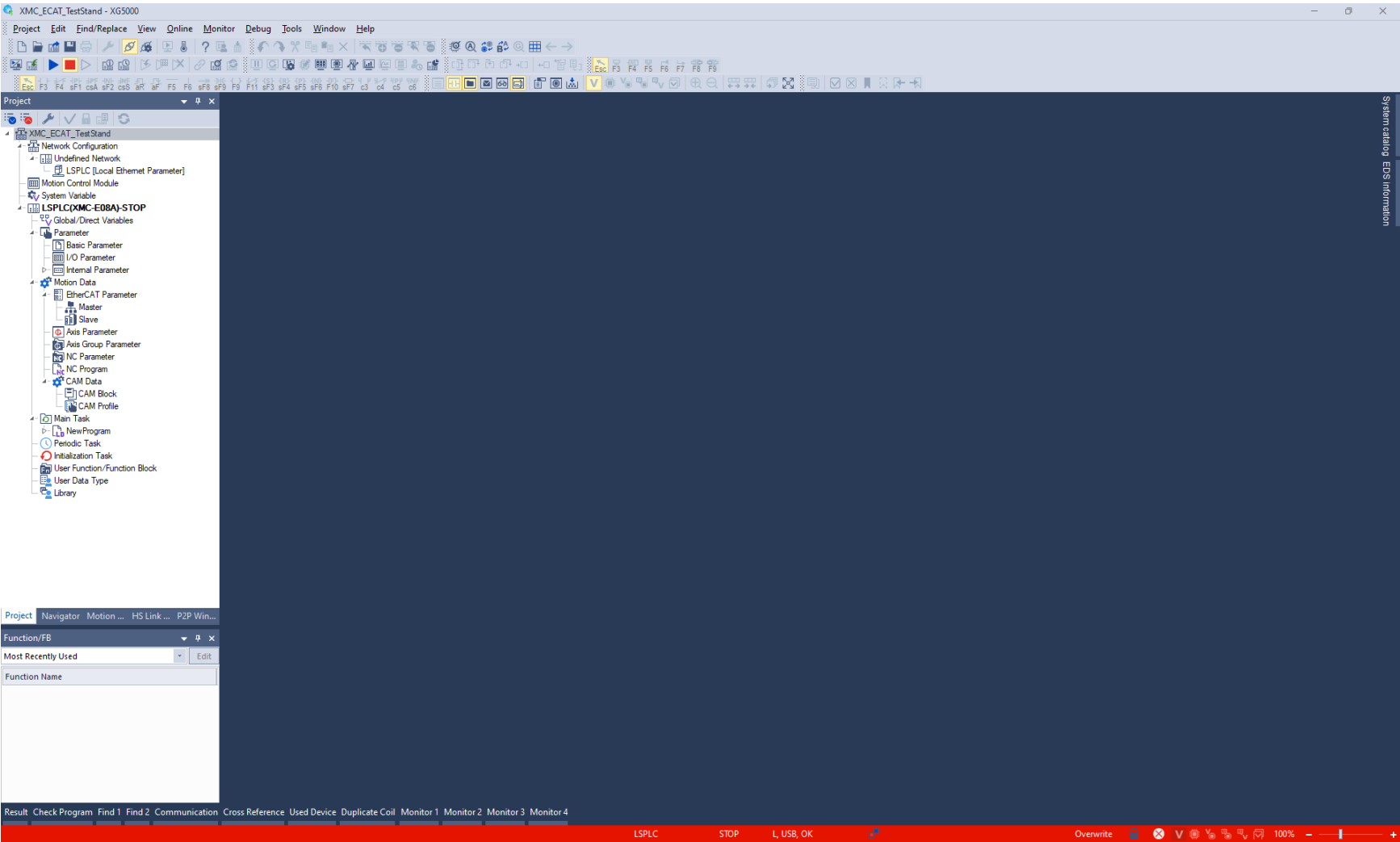
Step 5: Select Online Menu → Connection Settings...



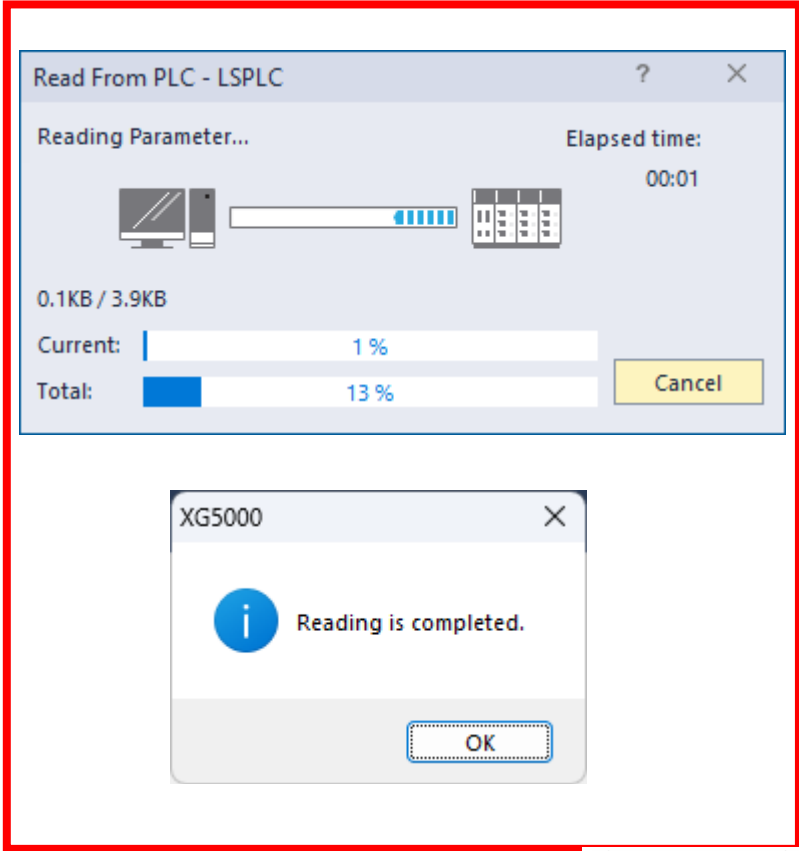
Step 6: Select USB as type. Press the Connect button when ready to connect.



Step 7: XG5000 should display connection status at the bottom part of the software. Example Below.

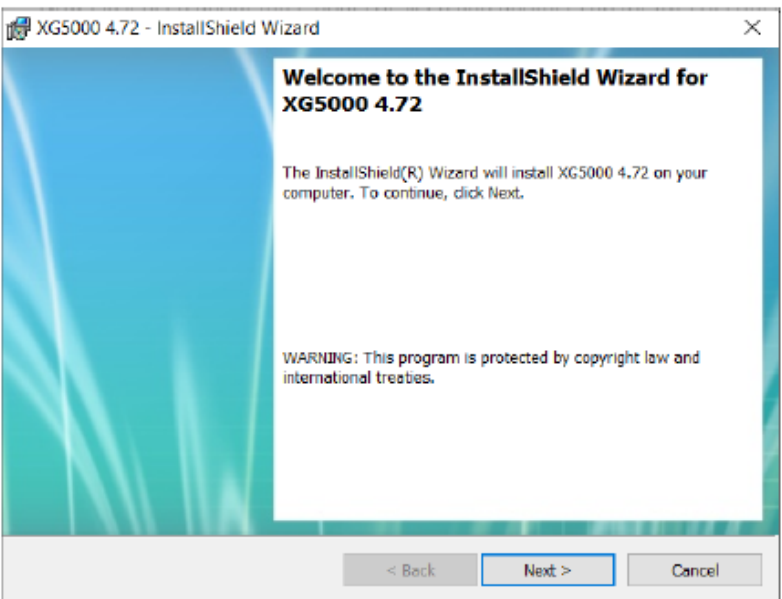


If Using Open From PLC..., These screens will appear before the project is opened and showing connection status.

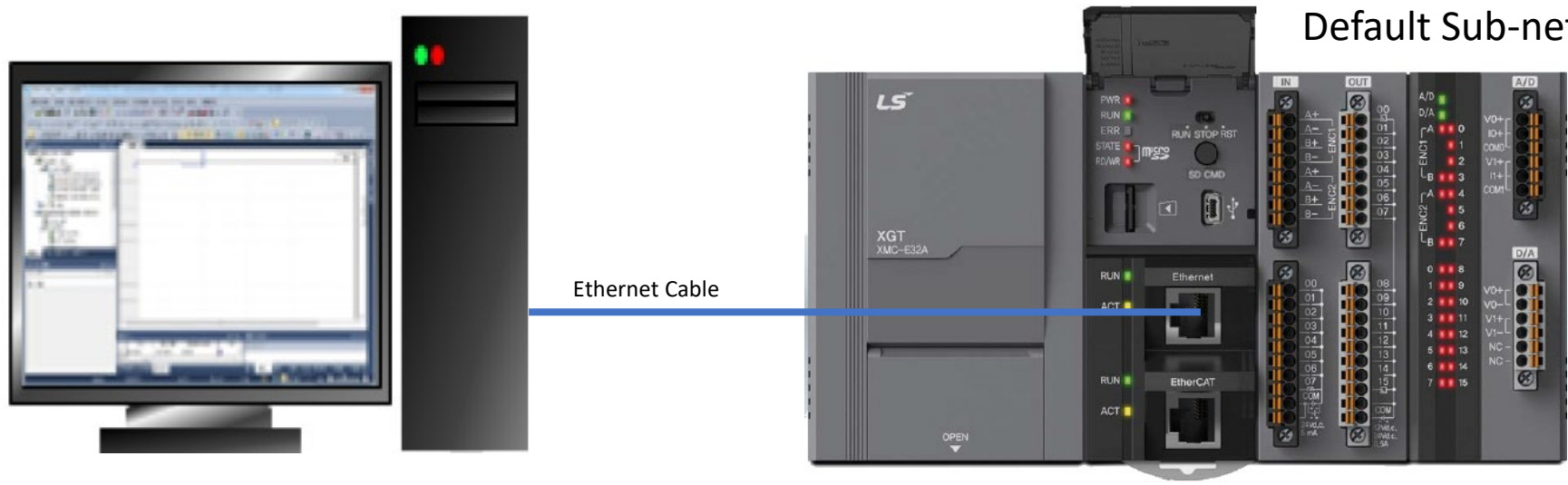


Section 2 – Ethernet Connection to the XMC

Step 1: Download and Install XG5000 software.



Step 2: Connect Computer with Ethernet cable to the XMC.



Note: Default IP address of CPU is 192.168.250.110
Default Sub-net: 255.255.255.0

Step 3: Change Computer network settings to be on the same sub-net range as the XMC.

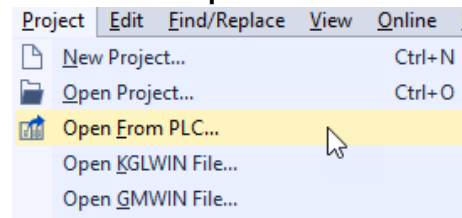
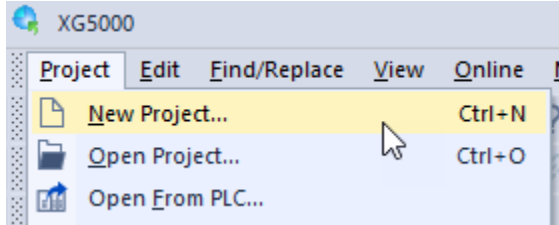
Note: If you can not change the IP address setup on your PC, try the USB connection.

Example: Set PC IP Address to 192.168.250.101

Set PC Sub-net to 255.255.255.0

Step 4: Open XG5000. Select Project Menu→ New Project.

Alternate method is to Select Project Menu → Open From PLC... (Skip to Step 7).



Step 5: Fill in the information for a New Project.

A screenshot of the 'New Project' dialog box in XG5000. The dialog box is divided into three sections: 'Project', 'PLC', and 'Program'. Red arrows point from text labels to specific fields in the dialog box. The 'Project' section has 'Project name:' and 'File directory:'. The 'PLC' section has 'CPU Series:', 'CPU type:', and 'PLC Name:'. The 'Program' section has 'Programming Format:', 'Program name:', and 'Program Language:'. The 'CPU type:' is set to 'XMC-E16A' and 'Program Language:' is set to 'LD'.

Add Project Name →

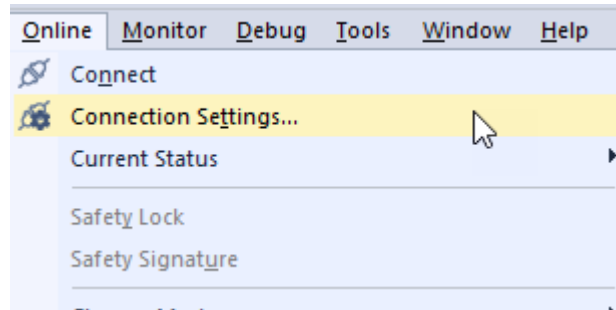
Choose XMC →

Choose CPU type XMC-E16A or XMC-E08A →

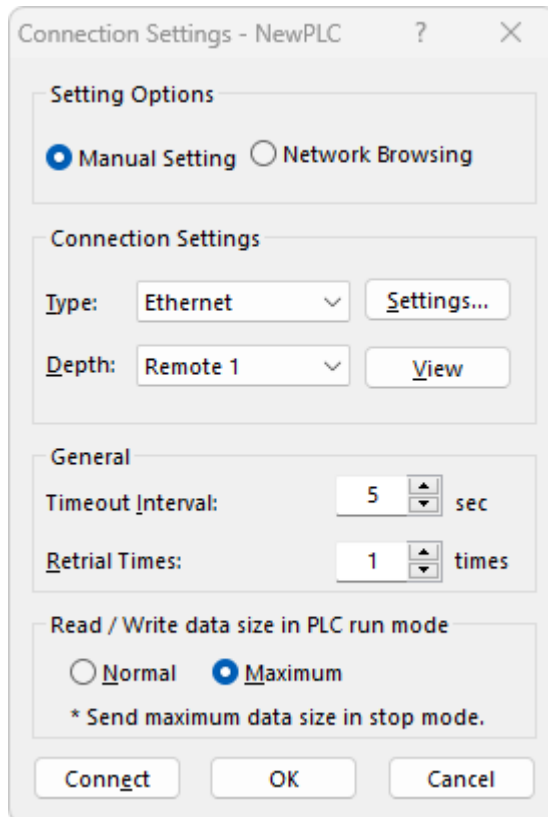
Add Program Name →

Choose Program Language →

Step 6: Select Online Menu → Connection Settings...



Step 7: Select Ethernet as type. Press the Settings... Button to enter IP address information.



Step 8: Enter the default IP address of 192.168.250.110 in the IP address field. Press OK when done.

The 'Details' dialog box is shown with the 'Ethernet' tab selected. Under the 'Set IP address' section, the 'IP address' radio button is selected, and the text field contains '192 . 168 . 250 . 110'. The 'Host name' radio button is unselected. Below this, the 'User custom port' checkbox is unselected, and the 'Port Setting' text field contains '2002'. A warning message states: 'Warning: Change the port number only in case of port forwarding using the router.' At the bottom, there is a 'Use TLS' checkbox which is unselected. The 'Scan IP', 'OK', and 'Cancel' buttons are at the bottom of the dialog.

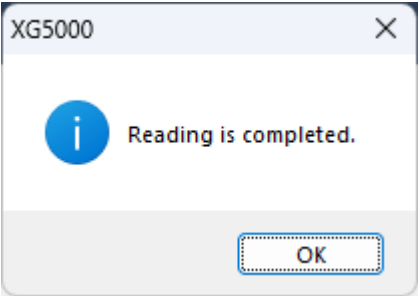
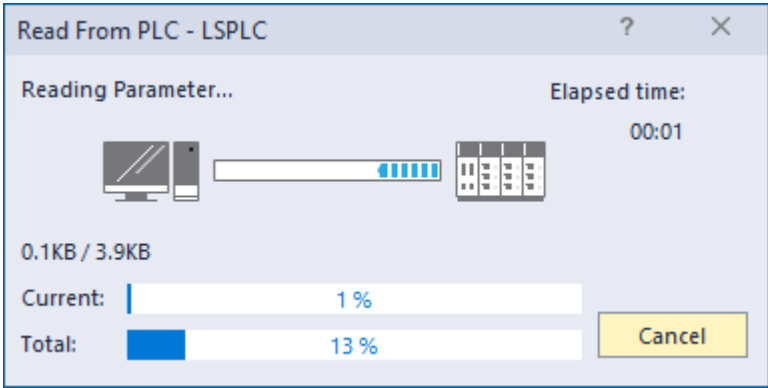
Step 9: Press Connect button to connect to XMC CPU.

The 'Connection Settings - NewPLC' dialog box is shown. In the 'Setting Options' section, the 'Manual Setting' radio button is selected. The 'Connection Settings' section has 'Type' set to 'Ethernet' and 'Depth' set to 'Remote 1'. Below this, the 'General' section shows 'Timeout Interval' set to '5' seconds and 'Retrial Times' set to '1' times. The 'Read / Write data size in PLC run mode' section has the 'Maximum' radio button selected. A note at the bottom states: '* Send maximum data size in stop mode.' The 'Connect', 'OK', and 'Cancel' buttons are at the bottom of the dialog.



Step 10: XG5000 should display connection status at the bottom part of the software. Example Below.

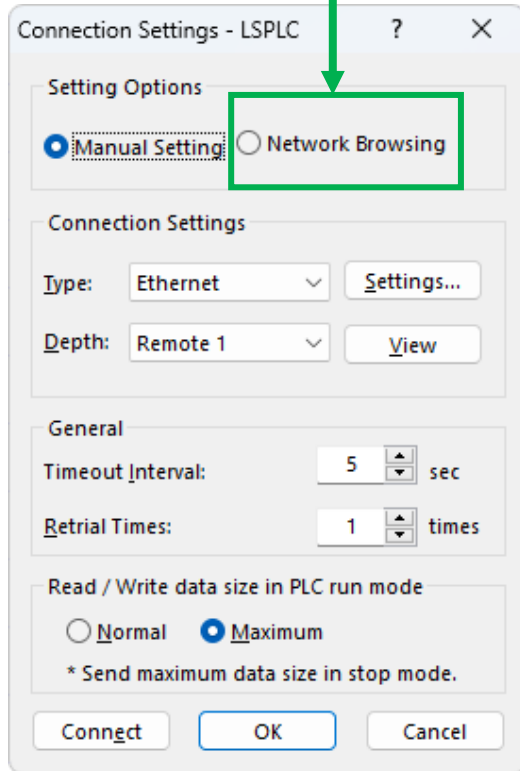
If Using Open From PLC..., These screens will appear before the project is opened and showing connection status.



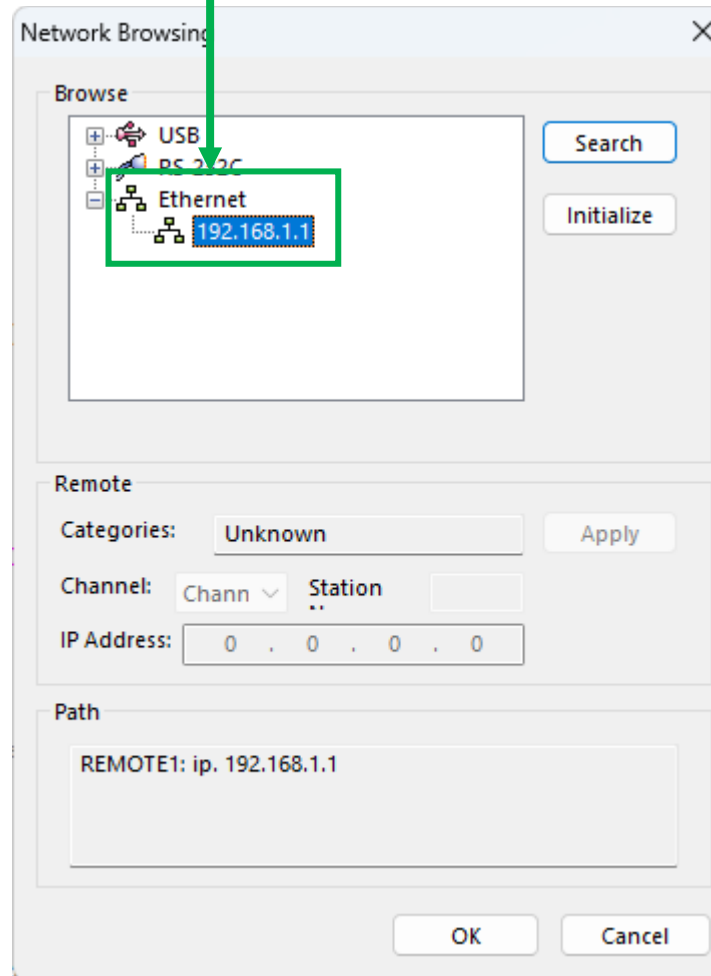
Section 2.1 – Using Network Browsing to find IP Address of XMC CPU

Network Browsing can be used to find the IP address of an XMC. Connection settings can be found in Online Menu -> Connection Settings.

Select Network Browsing to open a new window.



Expand Ethernet Section to see the IP address of any XMC that is found.



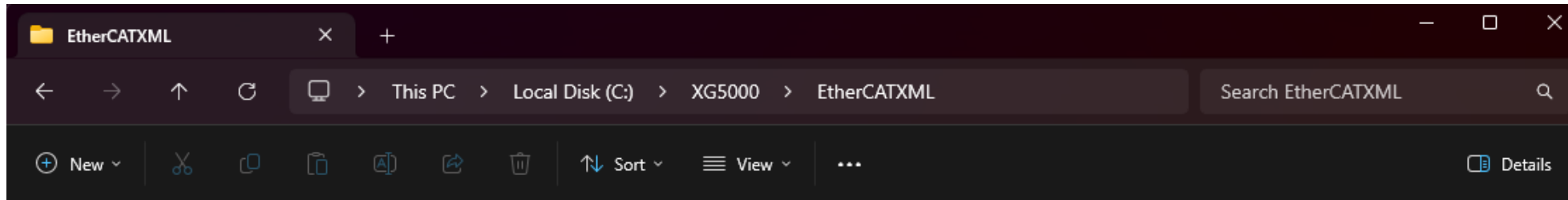
Adding DURApulse GS30 ESI File to XG5000

- The information for an EtherCAT slave is defined in the EtherCAT Slave Information (ESI) file.
- This file can be downloaded at [https://www.automationdirect.com/adc/shopping/catalog/drives_-a-soft_starters/ac_variable_frequency_drives_\(vfd\)/vfd_communication_-a-i-z-o_modules/gs30a-cm-ecat](https://www.automationdirect.com/adc/shopping/catalog/drives_-a-soft_starters/ac_variable_frequency_drives_(vfd)/vfd_communication_-a-i-z-o_modules/gs30a-cm-ecat)
- XG5000 can read the ESI file to configure communication settings for the XMC to connect with the GS30.

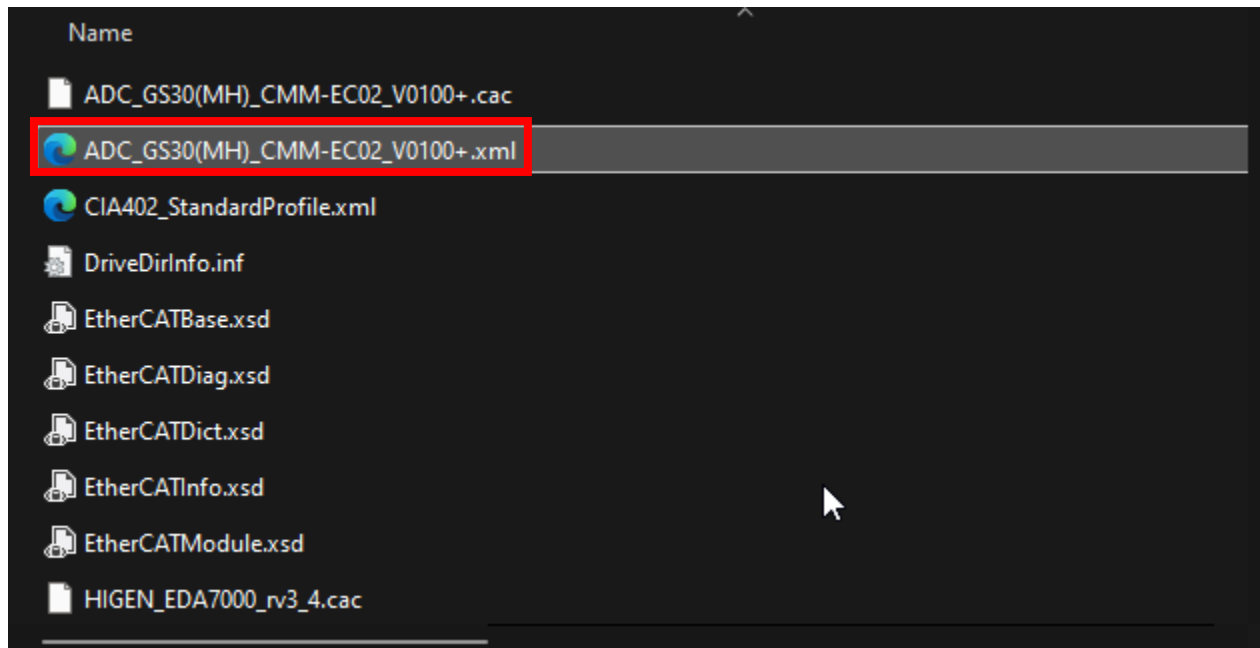
Section 1 – Adding ESI file to XG5000

Step 1: Close all Instances of XG5000 and download the ESI file for your device.

Step 2: Open a Windows Explorer and navigate to C:\XG5000\EtherCATXML.

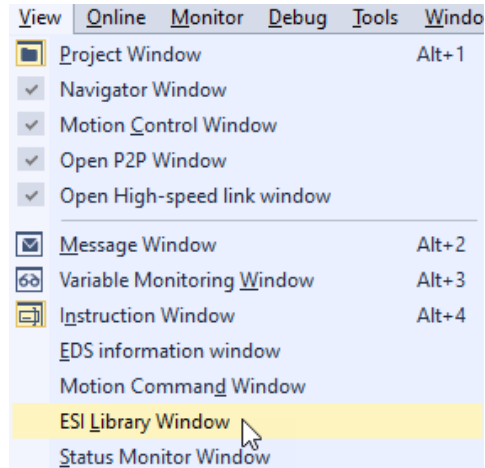


Step 3: Copy the GS30 ESI file to C:\XG5000\EtherCATXML.

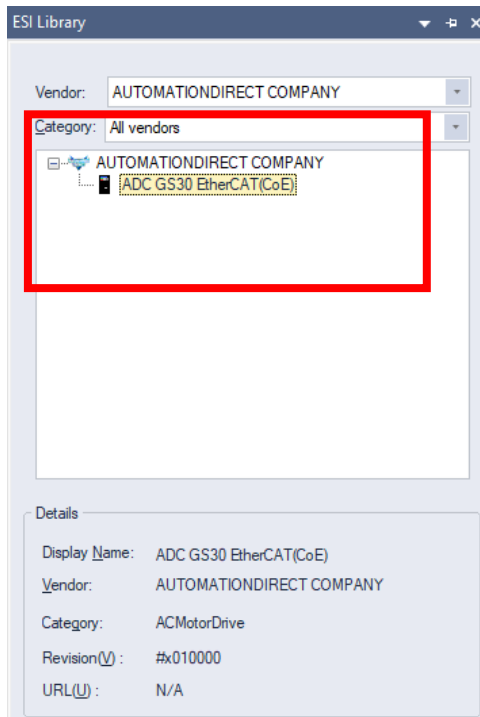


Step 4: Open your XMC project in XG5000.

Step 5: Select View Menu -> ESI Library Window



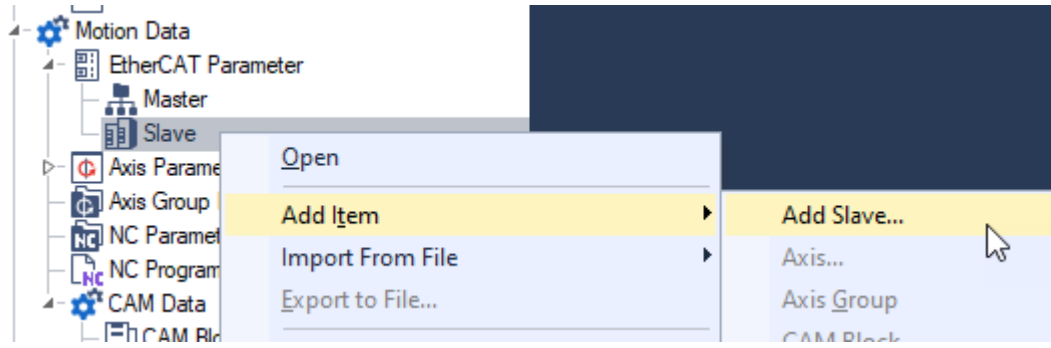
Step 6: The GS30 should appear in the ESI Library window. This device can now be added to the XMC project.



Adding GS30 to an XMC Project

- The GS30 ESI file must be loaded into XG5000 before it can be used in a project.

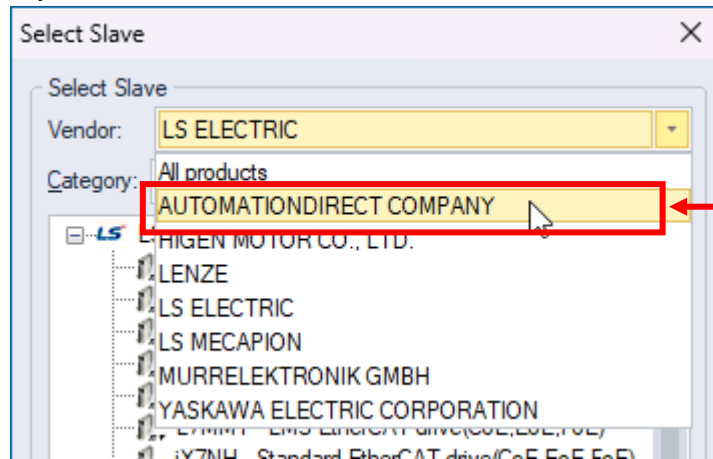
Step 1: In the Project Window, Right click on Slave under EtherCAT Parameter Section. Select Add item -> Add Slave...



Step 2: Press the '...' button next to the Slave Name property.

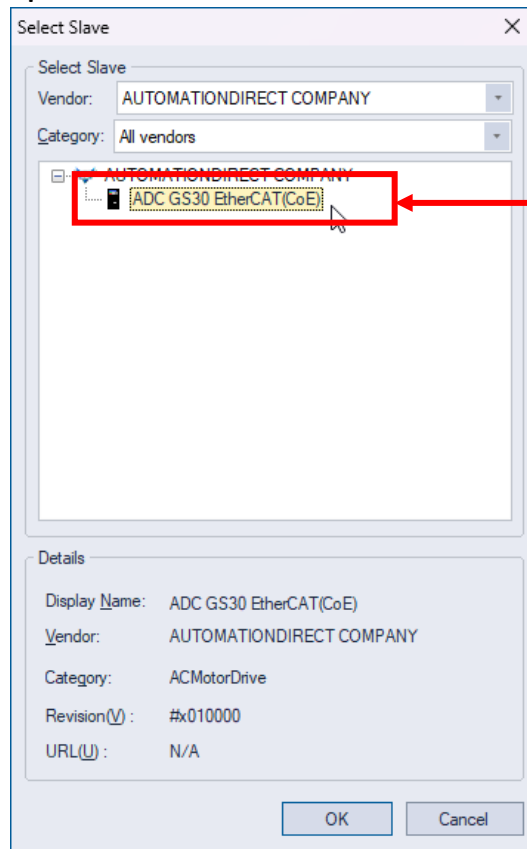


Step 3: Select AUTOMATIONDIRECT COMPANY from the Vendor List.



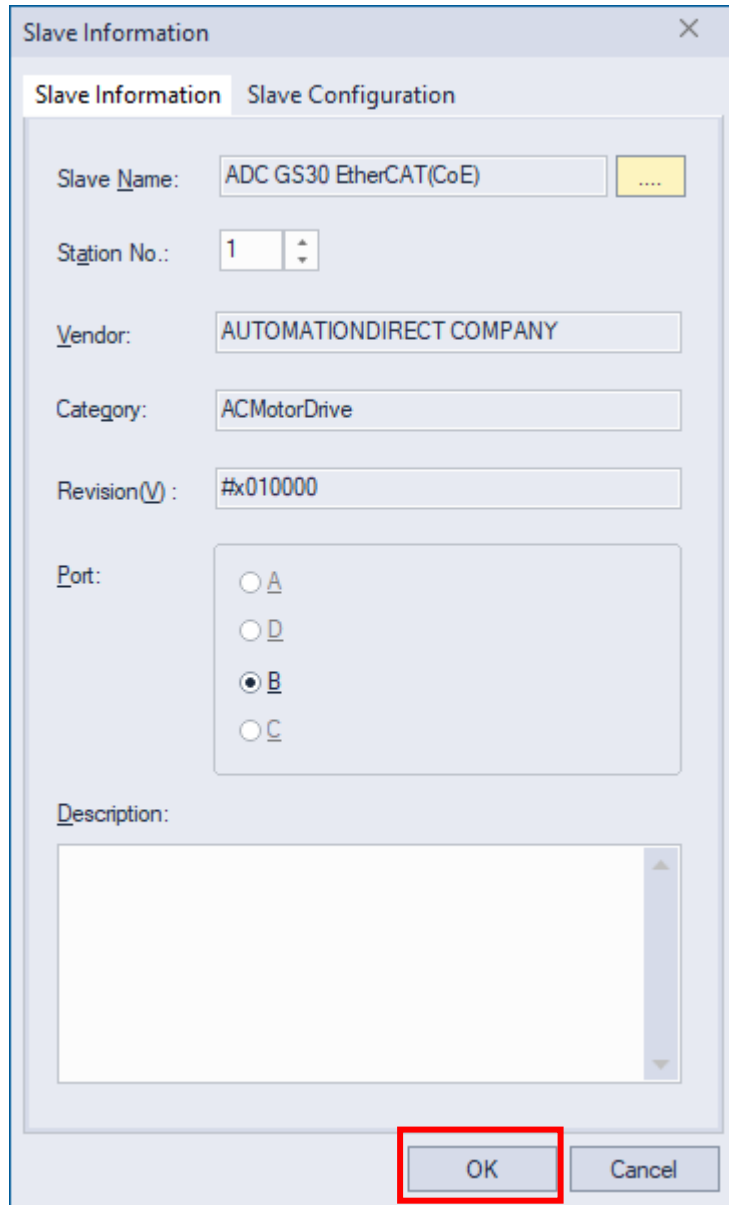
Select AUTOMATIONDIRECT COMPANY

Step 4: Select ADC GS30 EtherCAT (CoE) from the list. Press OK button



Select ADC GS30 EtherCAT (CoE)

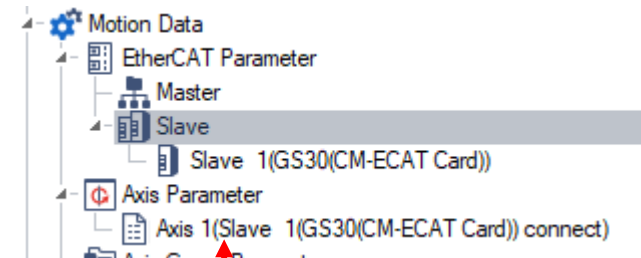
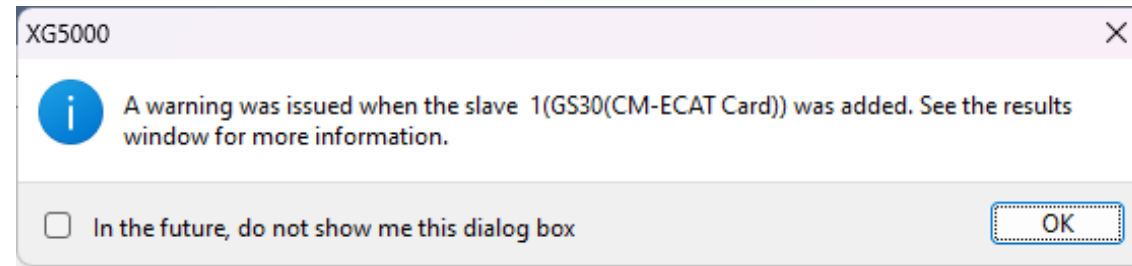
Step 5: Press OK on the Slave information screen to add the GS30 to the project. Press OK on the pop up screen.



The 'Slave Information' dialog box is shown with the 'Slave Information' tab selected. The fields are filled with the following information:

- Slave Name: ADC GS30 EtherCAT(CoE)
- Station No.: 1
- Vendor: AUTOMATIONDIRECT COMPANY
- Category: ACMotorDrive
- Revision(V): #x010000
- Port: B (selected)
- Description: (empty text area)

The 'OK' button at the bottom is highlighted with a red rectangle.



XG5000 will assign an axis to the GS30. This is done to use the LS Electric AC drive function blocks.

GS30 Parameter Configuration for EtherCAT

Configure these minimum drive parameters via the Keypad or Drive Configuration Software:

- a. Set P00.20 to 8: Communication card
- b. Set P00.21 to 5: Communication card
- c. Set P09.30 to 1: Decoding method 2 (60xx)
- d. Set P09.40 to 1 (default value)

Note: Your application may need other parameters set. This example shows the minimum requirements to get EtherCAT control working.



Help Site for LS AC Drive Function blocks

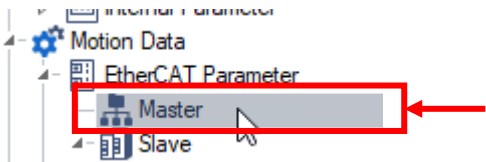
- https://cdn.automationdirect.com/static/helpfiles/ls_xmc/Content/C_ProcedureTopics/AC%20Drive%20Function%20Blocks.htm?to_cpath=Procedures%7CAC%20Drive%20Function%20Blocks%7C_0
- This help site contains information on the LS AC drive function blocks.
- LS_InverterControl is used to write the control word to the GS30.
- LS_InverterStatus1 and LS_InverterStatus2 are used to read the status word from the GS30.
- LS_InverterWriteVel is used to start a velocity movement on the GS30.
- LS_InverterReadVel is used to read the current velocity of the GS30.

Note: The next section shows how to manually use the Control Word and Status word to control the GS30.



Accessing GS30 PDO Data Directly

- Accessing the GS30 PDO data directly allows control without using the LS AC drive function blocks.
 - **Note:** The next section has an Automationdirect function block for easy speed control of the GS30.
- Step 1: In the Project Window, Double click on Motion Data->Master. This opens up the Master window.



Step 2: Choose PDO Variable.

Master x

General Information

PDO Variable

Diagnostics

Format: HEX Variable setting

Send PDO initiator device: %IW64

Receive PDO initiator device: %QW64 ☐ %MX0 => %MW0.0 Displayed In Format

Used Frame: [Usage: 2 %, Frames: 1 / 4]

	Station No.	Rx/Tx	Object index	Object Name	Variable	Type	Device	Monitor value
1	1	Rx	0x1600	1. Rx PDO parameter				
2					_EC001_RxPDO_1600_0_Control_Word	UINT	%QW64	
3					_EC001_RxPDO_1600_1_vl_target_velocity	INT	%QW65	
4					_EC001_RxPDO_1600_2_Mode_Of_Operation	SINT	%QB132	
5					_EC001_RxPDO_1600_3_Padding	USINT	%QB133	
6		Tx	0x1A00	1. Tx PDO parameter				
7					_EC001_TxPDO_1A00_0_Status_Word	UINT	%IW64	
8					_EC001_TxPDO_1A00_1_vl_velocity_demand	INT	%IW65	
9					_EC001_TxPDO_1A00_2_Mode_Of_Operation_Display	SINT	%IB132	
10					_EC001_TxPDO_1A00_3_Padding	USINT	%IB133	

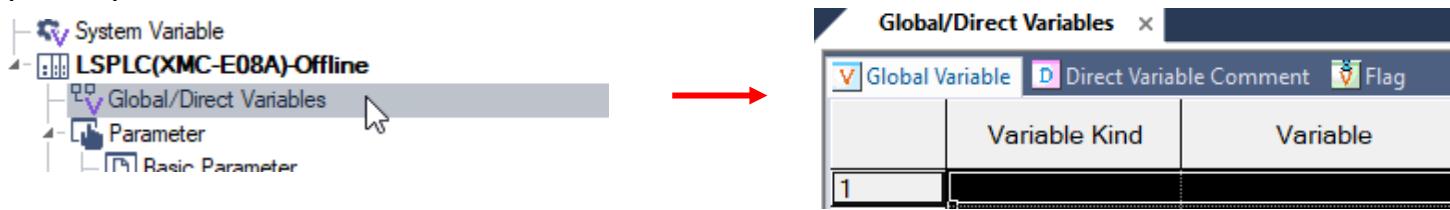
EC001 will be Slave 1 data.

TxPDO will be input data.
RxPDO is output data.

These are the address devices for the Input and Output Data.



Step 3: Open Global/Direct Variables. Select Global Variable tab.



Step 4: Create some global variables to access the drive data. Below example is for reference and your variables could be named differently.

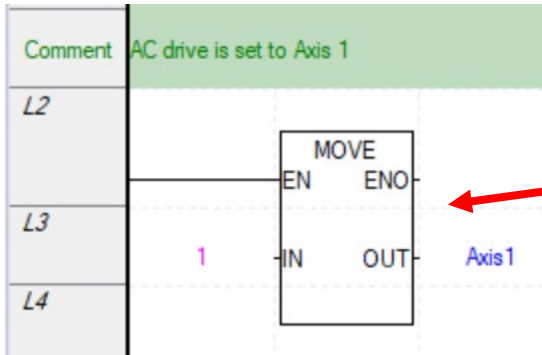
Variable Kind	Variable	Type	Address	Initial Value	Retain	Used	EIP/OPC UA	HMI	Comment
VAR_GLOBAL	GS30_ControlWord	UINT	%QW64		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GS30 EtherCAT Control Word
VAR_GLOBAL	GS30_CurrentOperationM	SINT	%IB132		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GS30 Current mode of operation
VAR_GLOBAL	GS30_CurrentVelocity	INT	%IW65		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GS30 current velocity in RPM
VAR_GLOBAL	GS30_ModeOfOperation	SINT	%QB132		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GS30 Mode Of Operation
VAR_GLOBAL	GS30_StatusWord	UINT	%IW64		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GS30 EtherCAT Status word
VAR_GLOBAL	GS30_TargetVelocity	INT	%QW65		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GS30 Velocity target in RPM

Data type shown in the Master PDO window.

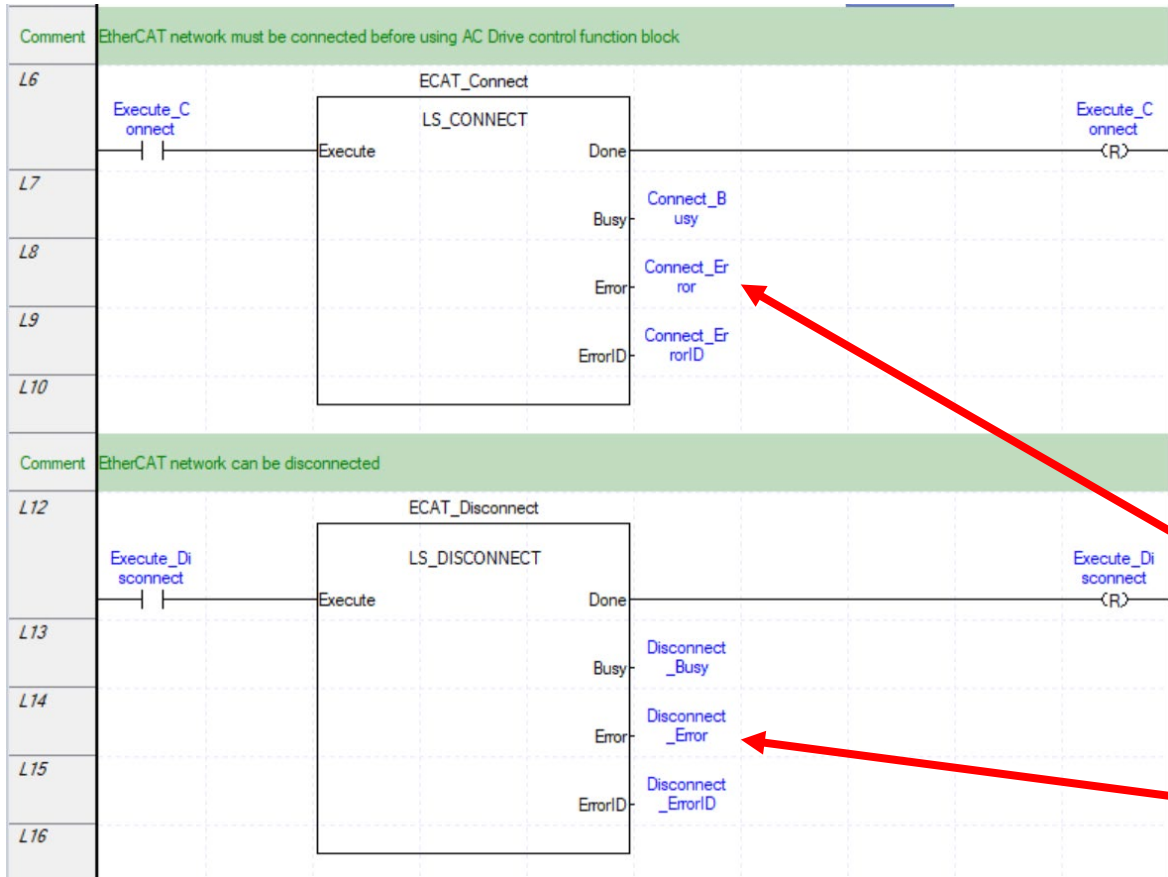
PDO Addresses from Master Window.

Automationdirect GS30 Speed Control Function Block Example

- Download XMC_AC_Drive_Ctrl_FB from https://cdn.automationdirect.com/static/support/sampleprg/XMC/XMC_AC_Drive_Ctrl_FB.zip
- This Automationdirect example program provides a function block for easy speed control of the GS30.



Axis 1 was assigned to our GS30 for this sample project. Set to the axis number in your project.

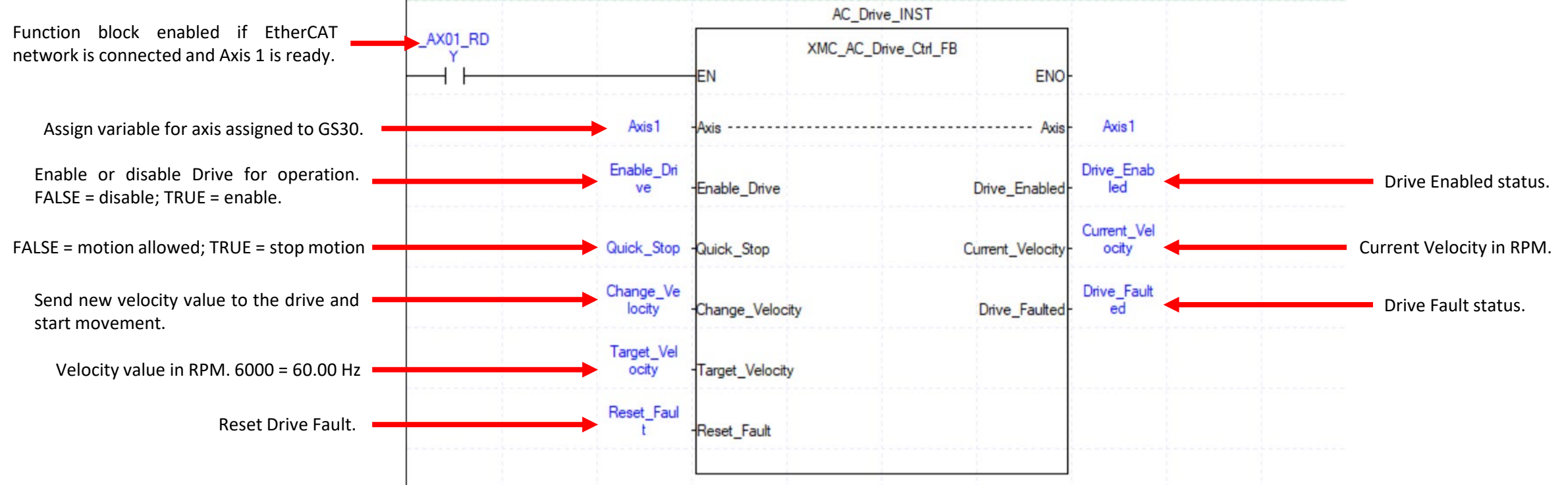


LS_Connect must be called first to connect the EtherCAT network.

LS_Disconnect is used to disconnect the EtherCAT network. Must be done before doing a project write if the network is connected.



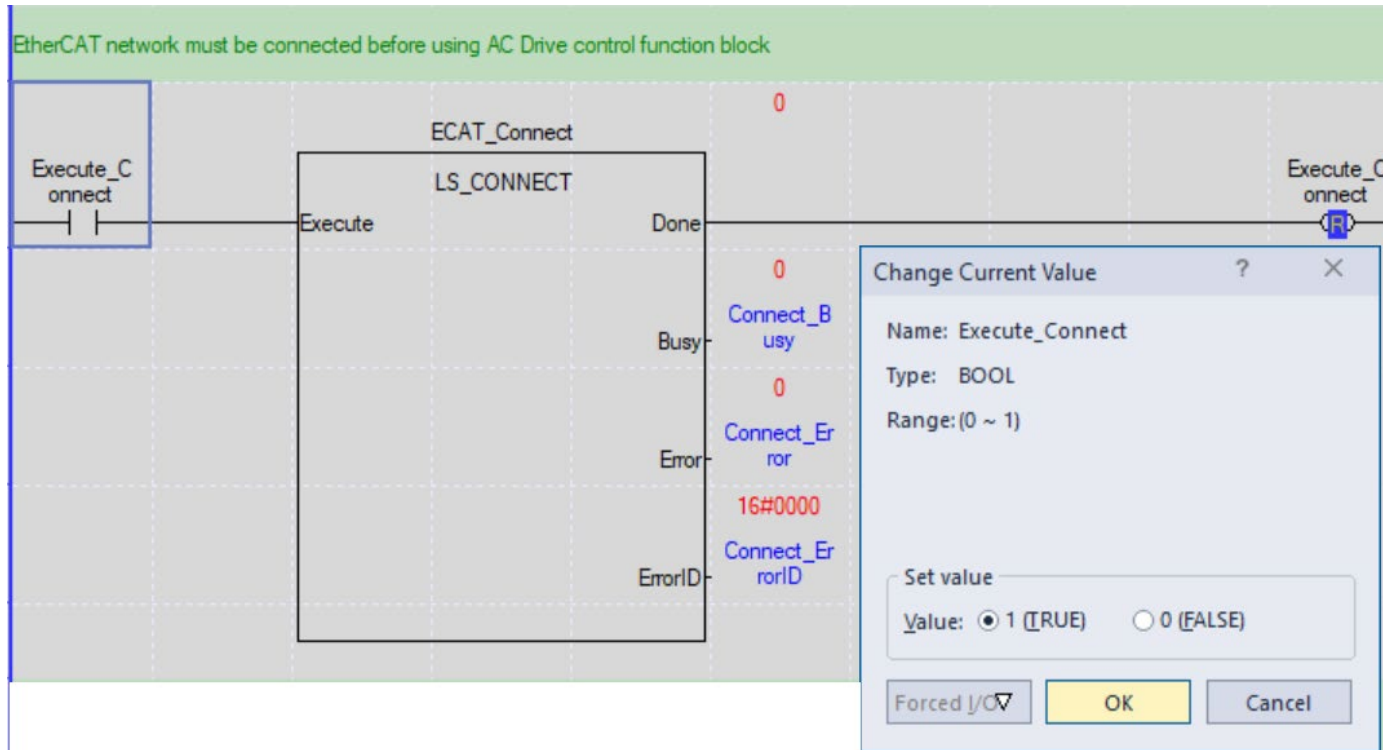
Example of XMC_AC_Drive_Ctrl_FB function block



Running the drive with Example Program

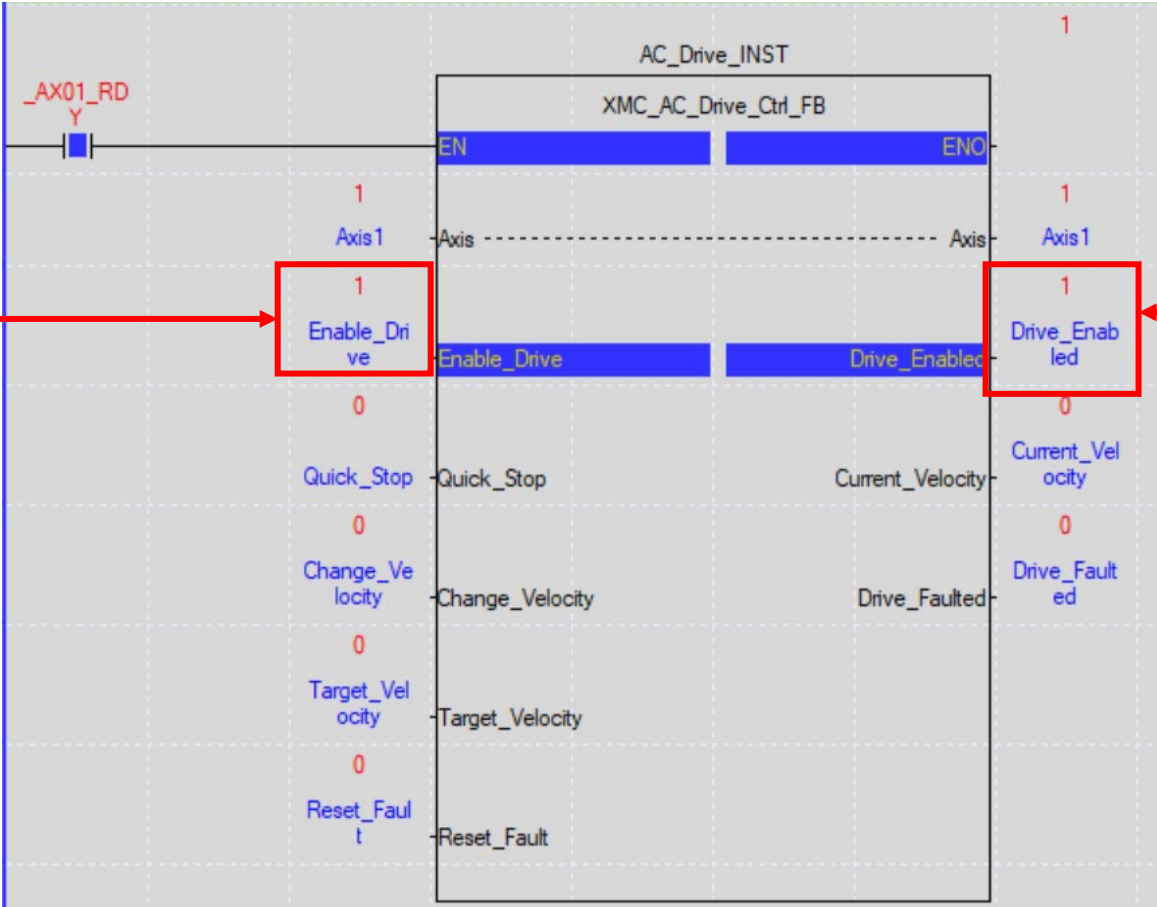
Step 1: Write program to the XMC.

Step 2: Set Execute_Connect to TRUE to run the LS_Connect function block to connect the EtherCAT network.



Step 3: Set Enable_Drive to TRUE to enable the GS30.

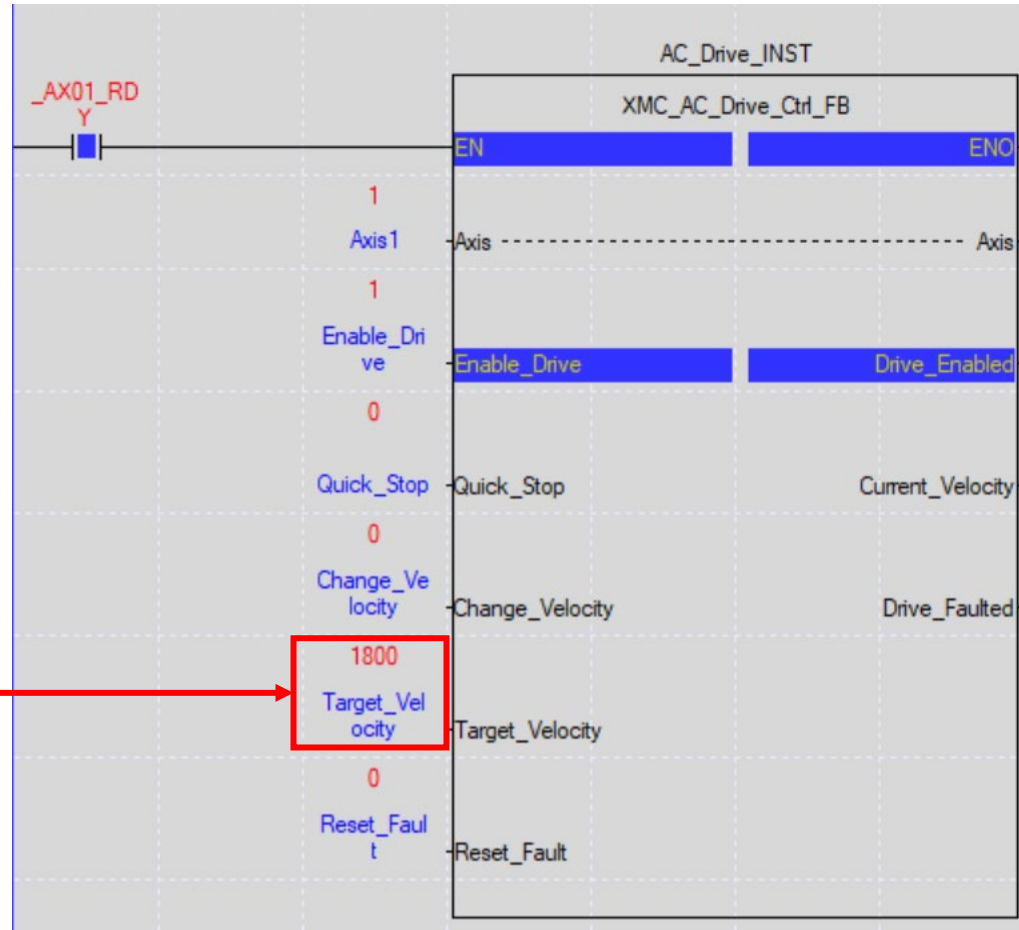
Set Enable_Drive to TRUE.



Drive Enabled should turn TRUE.

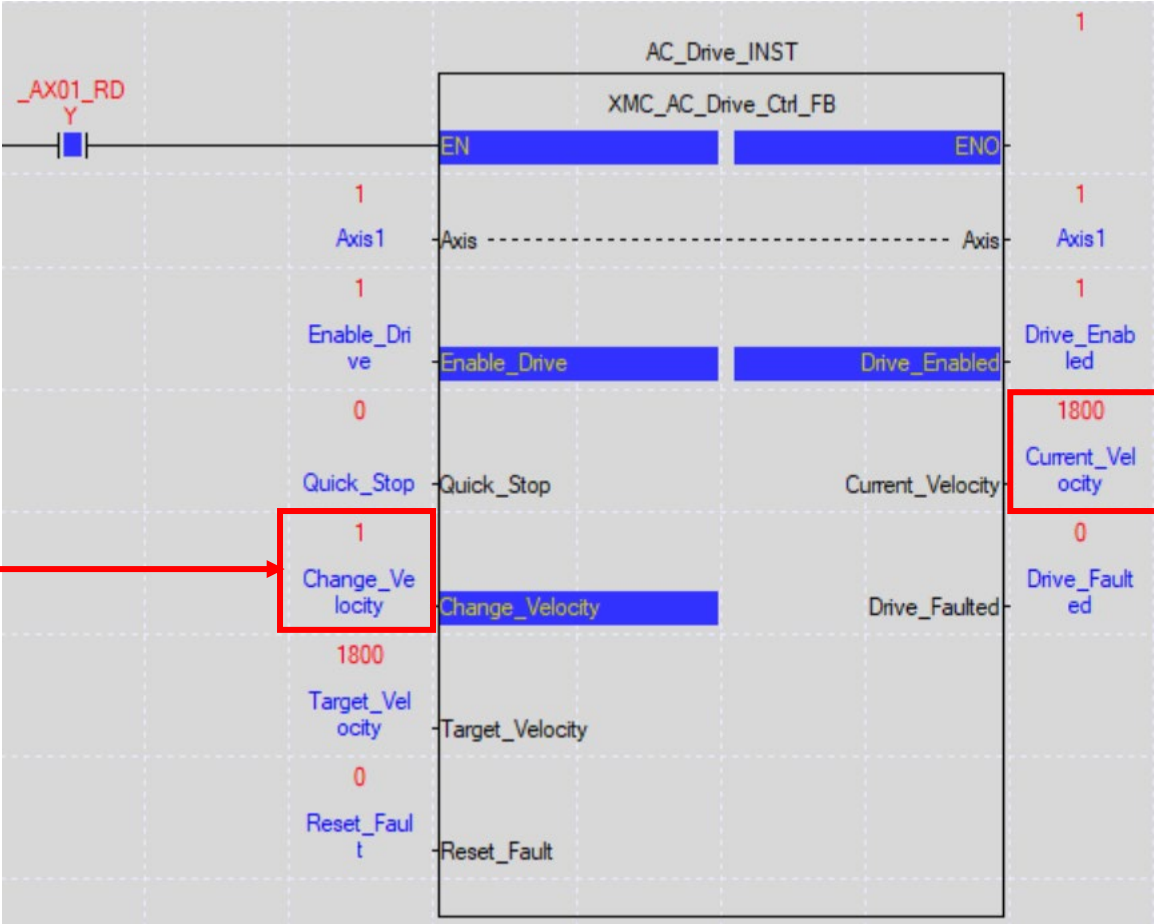
Step 4: Enter a velocity value in RPM to Target_Velocity. This example shows 1800 RPM

1800 RPM.



Step 5: Set Change_Velocity to TRUE. The drive will ramp up to speed.

Set to TRUE.



Should reach the value entered in Target_Velocity.



Stopping the drive with Example Program

- The drive can be stopped by setting the Quick_Stop input to TRUE or setting Drive_Enable to FALSE.
- The drive will start running again when Quick_Stop becomes FALSE and Drive_Enable is TRUE.
- The drive will start running again if Drive_Enable is set to TRUE and it was operational before being disabled.

Set to TRUE to stop the drive.

