



APPLICATION NOTE

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Subject

XGB EtherCAT XG5000 and XG-PM Project Creation

Purpose

This application note is intended to provide a basic project configuration for controlling an LS Electric iX7NH or PHOX EtherCAT servo drive using an XGB PLC and XBF-PN0xB module.

Date Issued

2-17-2025

XGB01 – XG5000 and XG-PM Project Creation with EtherCAT modules

- The XEM CPU is capable of controlling EtherCAT Servo drives using the XBF-PN04B or XBF-PN08B modules.
- The XEM CPU can have two of these modules connected to provide 2 EtherCAT servo networks.
- These modules must be in Slot 2 if only using one module or Slot 2 & 3 if using two modules.
- The XBF-PN04B and XBF-PN08B only provide servo control over EtherCAT and remote I/O is not supported.
- XG5000 and XG-PM are used in configuring and controlling EtherCAT servo drives with the XEM CPU.
- XG5000 is used to create a program to control the Servo drives.
- XG-PM is used to setup drive parameters and create any CAM data.

Section 1 – Creating XG5000 Project with XBF-PN04B or XBF-PN08B module

Step 1: Open XG5000 and create a new project. Fill out project information and Press OK to complete creation.

Enter Project Name →

Choose XGB(IEC) →

Choose XEM-DxxxHP or XEM-DxxxH2 →

Press OK to create project →

New Project

Project

Project name: LP600_601_ECAT_Example

File directory: C:\Projects\Example_Programs\LP600 ...

PLC

CPU Series: XGB(IEC) Product Name...

CPU type: XEM-DxxxHP

PLC Name: LSPLC

Program

Programming Format: XGI Programming

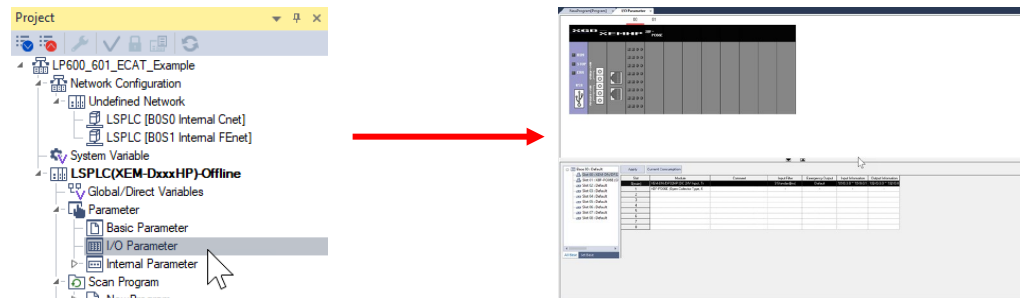
Program name: NewProgram

Program Language: LD

Project description:

this is an example project for LP600 and LP601. It uses an XBF-I

Step 2: Open I/O Parameter Screen from the Project Window.



Step 3: Add the XBF-PN04B or XBF-PN08B to Slot 2. These modules must be in Slot 2 when only 1 module is used or Slot 2 & 3 if 2 modules are being used. This example shows XBF-PN08B

The screenshot shows the 'I/O Parameter' screen with the 'Current Consumption' tab selected. The 'Slot' column shows slots 0 to 8. Slot 0 is 'XEM-DN/DP32HP (DC 24V Input, Tr)'. Slot 1 is 'XBF-PO06E (Open Collector Type, 6)'. Slot 2 is highlighted. A red arrow points from the 'Digital Module List' to the 'Apply' button.

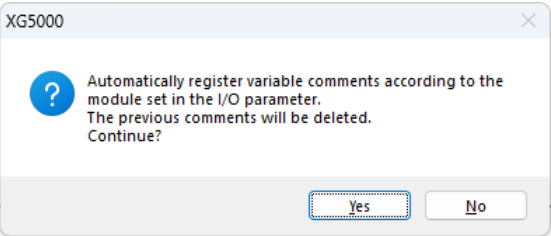
Slot	Module	Comment	Input Filter	Emergency Output	Input Information	Output Information
0(main)	XEM-DN/DP32HP (DC 24V Input, Tr)		3 Standard(ms)	Default	%I×0.0.0 ~ %I×0.0.1	%Q×0.0.0 ~ %Q×0.0.0
1	XBF-PO06E (Open Collector Type, 6)		-	-	-	-
2	XBF-PN08B (Position Control, EtherC		-	-	-	-
3						
4						
5						
6						
7						
8						

Step 4: Press the Apply Button to create the Global variables for the XBF-PN08B or XBF-PN04B module(s).

The screenshot shows the 'I/O Parameter' screen with the 'Current Consumption' tab selected. The 'Slot' column shows slots 0 to 8. Slot 0 is 'XEM-DN/DP32HP (DC 24V Input, Tr)'. Slot 1 is 'XBF-PO06E (Open Collector Type, 6)'. Slot 2 is 'XBF-PN08B (Position Control, EtherC'. A red arrow points to the 'Apply' button.

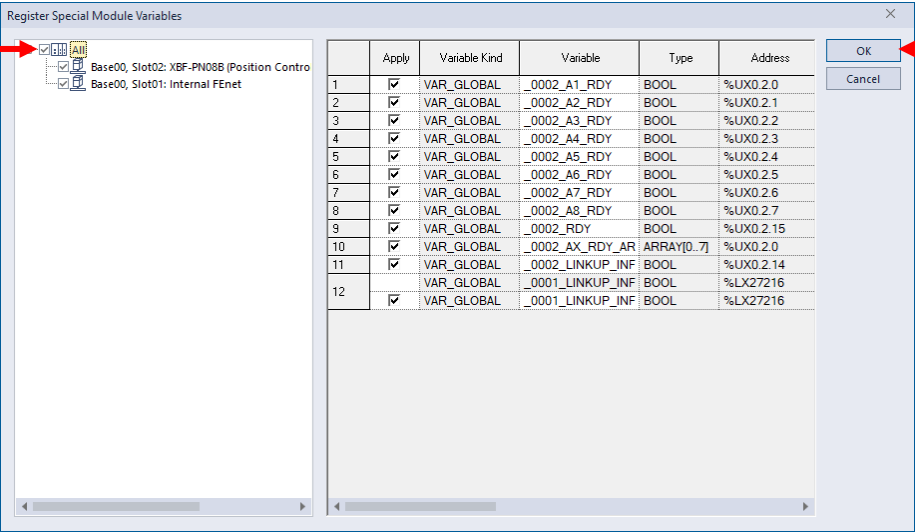
Slot	Module	Comment	Input Filter	Emergency Output	Input Information	Output Information
0(main)	XEM-DN/DP32HP (DC 24V Input, Tr)		3 Standard(ms)	Default	%I×0.0.0 ~ %I×0.0.1	%Q×0.0.0 ~ %Q×0.0.0
1	XBF-PO06E (Open Collector Type, 6)		-	-	-	-
2	XBF-PN08B (Position Control, EtherC		-	-	-	-
3						
4						
5						
6						
7						
8						

Step 5: Press Yes to register the global variables for the module(s).



Step 6: Select all the variables for creation. Press OK to create them.

Select All Check box



Press OK to create variables.

Section 1.1 – Global Variables for XBF-PN04B or XBF-PN08B

This example shows the special module variables for XBF-PN08B. These are automatically created in the previous section.

Variable Kind	Variable	Type	Address	Initial Value	Retain	Used	EIP/OPC UA	HMI	Comment
VAR_GLOBAL	_0002_A1_RDY	BOOL	%UX0.2.0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: 1-Axis Ready
VAR_GLOBAL	_0002_A2_RDY	BOOL	%UX0.2.1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: 2-Axis Ready
VAR_GLOBAL	_0002_A3_RDY	BOOL	%UX0.2.2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: 3-Axis Ready
VAR_GLOBAL	_0002_A4_RDY	BOOL	%UX0.2.3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: 4-Axis Ready
VAR_GLOBAL	_0002_A5_RDY	BOOL	%UX0.2.4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: 5-Axis Ready
VAR_GLOBAL	_0002_A6_RDY	BOOL	%UX0.2.5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: 6-Axis Ready
VAR_GLOBAL	_0002_A7_RDY	BOOL	%UX0.2.6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: 7-Axis Ready
VAR_GLOBAL	_0002_A8_RDY	BOOL	%UX0.2.7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: 8-Axis Ready
VAR_GLOBAL	_0002_AX_RDY_ARY	ARRAY[0..7]	%UX0.2.0		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: Each axis Ready
VAR_GLOBAL	_0002_LINKUP_INFO	BOOL	%UX0.2.14		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: Link up/down information
VAR_GLOBAL	_0002_RDY	BOOL	%UX0.2.15		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Positioning Module: Ready Flag

Axis Ready status. PN04B
will only have 4 of these.

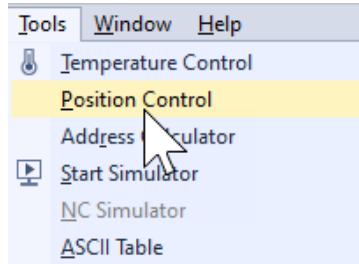
EtherCAT link active status

XBF-PN08B module status.

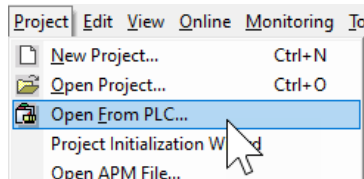
Section 2 – XG-PM Project Creation for XBF-PN04B and XBF-PN08B

- This example requires a connection to the XGB PLC Rack containing an XBF-PN04B or XBF-PN08B module.
- ADC recommends configuring drive node numbers to match the desired axis number.
- XBF-PN04B supports node numbers 1 ~ 4 for servo drives.
- XBF-PN08B supports node numbers 1 ~ 8 for servo drives.

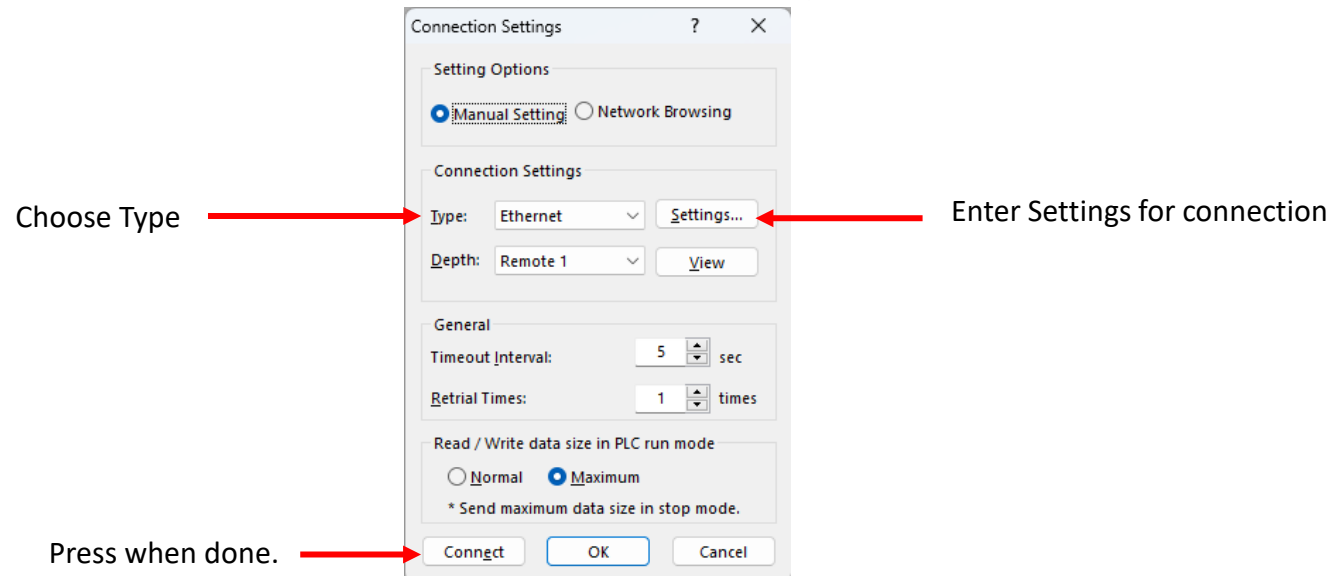
Step 1: Open XG-PM software from XG5000. Go to Tools menu -> Position Control



Step 2: From XG-PM, Select Project menu -> Open From PLC...



Step 3: Enter the Connection Settings. This example is using Ethernet. Press Connect when done.

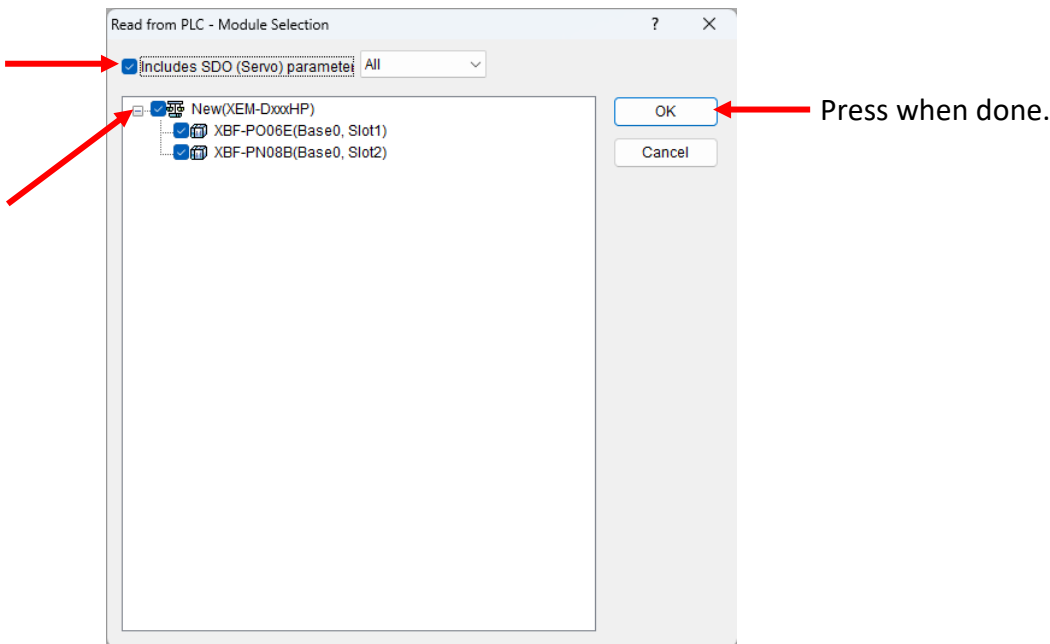


Step 4: Select all available slots. This will add the built-in PTO and EtherCAT module(s) to the project. Select the “Includes SDO (Servo) parameter” check box.

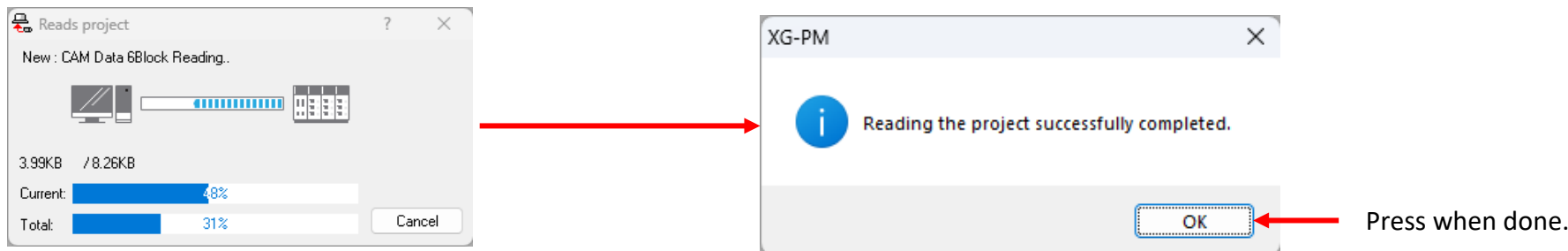
Note: Drive node numbers must be set to Axis number before opening from PLC. This will make the drive node number match the projects axis number when selecting “Includes SDO (Servo) parameter”.

Select “Includes SDO (Servo) parameter” to read current drive parameters into the project.

Select to Check all Slots.



Step 5: Status screen will show project being read from XEM CPU. Press OK on success pop up screen.



Step 6: Save project and Proceed to XGB02 topic.

Built-in PTO module

EtherCAT module

Item

OnlineHelp_XGPM_example(XEM-DioxHP)

New(XBF-PO06E,Base0,Slot1)-Online

System View

CAM Data

Common Parameter

1Axis Data

2Axis Data

3Axis Data

4Axis Data

5Axis Data

6Axis Data

New1(XBF-PN08B,Base0,Slot2)-Online

System View

CAM Data

Common Parameter

EtherCAT parameter

Master

Slave

1Axis Data

2Axis Data

3Axis Data

4Axis Data

Project

Command Tool

Error Reset	Item	Rst. Axis Error	Run
Indirect Start	Step	0	Run
Direct Start	Pos.	0 pls	Run
	Spd.	0 pls/s	
	Dwell	0 ms	
	M Code	0	
	Accel.	No.1	
	Decel.	No.1	
	Coord.	ABS	
	Type	0: POS	
Decel.	Time	0 ms	Run
Restart			Run
Inching Opr.	Pos.	0 pls	Run
Start JOG	<<	<	>
Stop JOG			

Basic Command Extension Command Modif

2023-07-19 09:01:15:824 New1: Parameter 7Axis Reading.

2023-07-19 09:01:15:869 New1: Parameter 7Axis Read completed.

2023-07-19 09:01:15:873 New1: Parameter 8Axis Reading.

2023-07-19 09:01:15:919 New1: Parameter 8Axis Read completed.

State Screen External Input Signal Monitor 1 Monitor 2

Ready

New1 R1, Ethernet XBF-PN08B Online

Library

Vendor: All vendors

Group: Servo drive

Kollmorgen

AKD EtherCAT Drive (CoE)

Danaher Motion GmbH

AKD EtherCAT Drive (CoE)

S300/S400/S600/S700 EtherCAT Drive (CoE)

Beckhoff Automation GmbH

AX2000-B110 EtherCAT Drive (CoE)

HIGEN Motor Co., Ltd.

EDA7000 CoE Servo Drive

H1-EC CoE Servo Drive

LS ELECTRIC

PEGASUS - Integrated EtherCAT drive(CoE,t

L7NH - Standard EtherCAT drive(CoE,EoE,F

PHOX - AIO DC drive(CoE,EoE,FoE)

L7NHF - EtherCAT Full Closed drive(CoE,Eo

Detail info.

Name: N/A

Vendor: N/A

Group: N/A

Version: N/A

URL(U): N/A

ESI Library

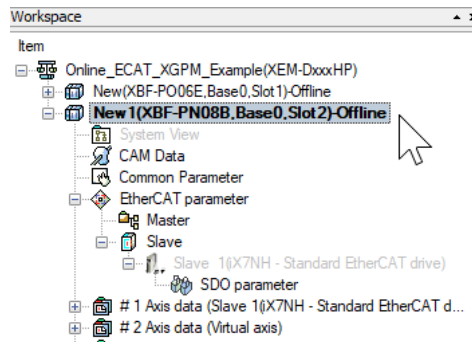
XGB02 – XG-PM EtherCAT Axis Configuration

- XG-PM is used to configure the axes on an EtherCAT network.

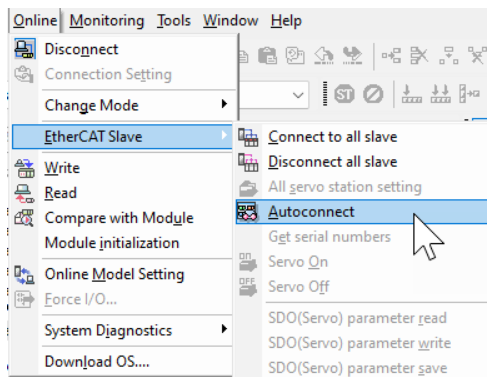
Section 1 – Reading SDO parameters for Open From PLC project

- Using the “Open From PLC” option to read the XG-PM project will include all servos connected to the XBF-PN04B or XBF-PN08B module.
- XG-PM can use the Online menu -> EtherCAT Slave -> Autoconnect procedure to read the node numbers from the servo drives and automatically associate those node numbers with the Axis number.
- Axis number will be assigned to the order the drives are connected.
- XBF-PN04B supports node numbers 1 ~ 4 for servo drives.
- XBF-PN08B supports node numbers 1 ~ 8 for servo drives.

Step 1: Connect the XG-PM project to the XEM CPU. Click on the XBF-PN0xB Module to Highlight it. This example shows XBF-PN08B.

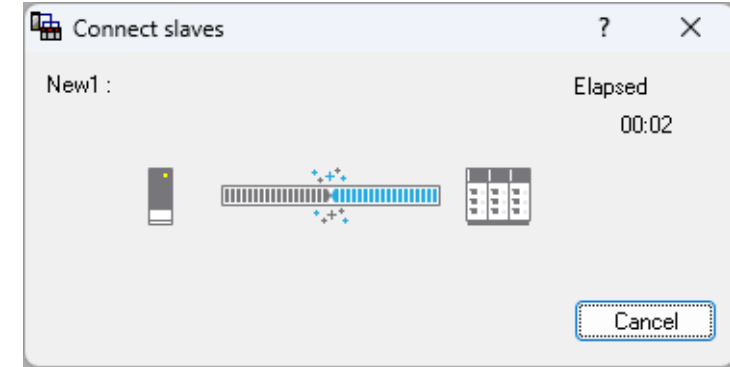
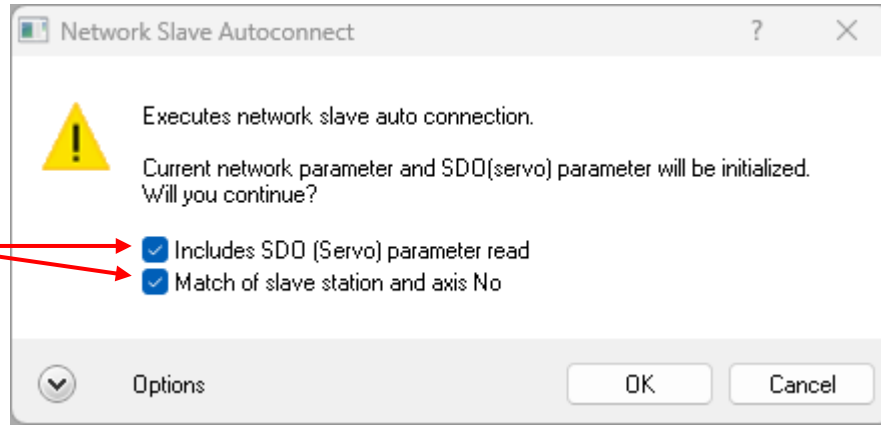


Step 2: Select Online menu -> EtherCAT Slave -> Autoconnect.

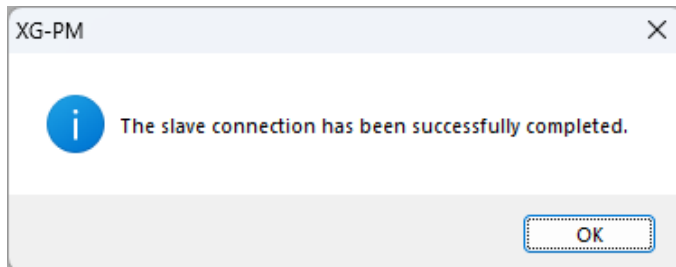


Step 3: Select the Check box next to Includes SDO (Servo) parameter read. This will read the servo drive parameters including the drive's node number. Press OK when done.

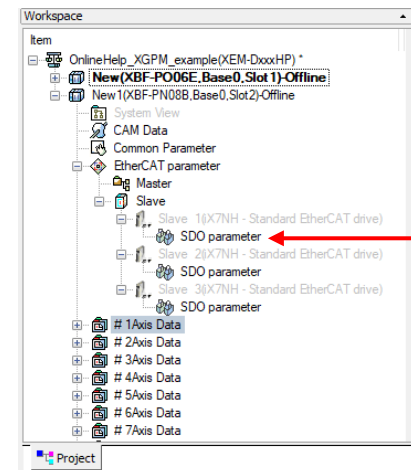
Enable these check boxes



Step 4: Press OK on message showing successful connection.



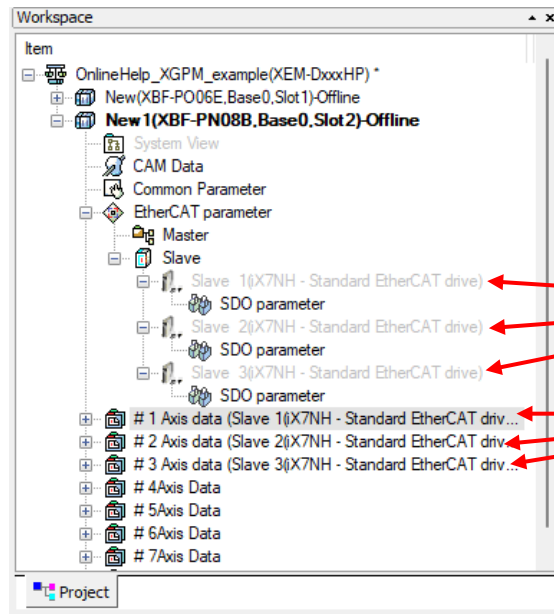
Step 5: Open the SDO parameter files to check Node ID.



Step 6: Index 2003:00 for the iX7NH servo drive will be node number. This example shows Node 1 being read in the SDO parameter file.

Parameter type		Parameter change during operation			
All		<input type="checkbox"/> Param. change during Op. Note) *Apply after power cycle			
<input checked="" type="checkbox"/>	Index	Name	Unit	Current Value	Initial Value
<input checked="" type="checkbox"/>	2000:00	Motor ID*	-	715	13
<input checked="" type="checkbox"/>	2001:00	Encoder Type*	-	4	2
<input checked="" type="checkbox"/>	2002:00	Encoder Pulse per Revolution*	pulse	524288	524288
<input checked="" type="checkbox"/>	2003:00	Node ID*	-	1	1
<input checked="" type="checkbox"/>	2004:00	Rotation Direction Select*	-	0	0
<input checked="" type="checkbox"/>	2005:00	Absolute Encoder Configuration*	-	1	1
					Access
					rw
					rw
					rw
					rw
					rw
					rw

Step 7: Make sure Slave Number matches the Axis number for your application.



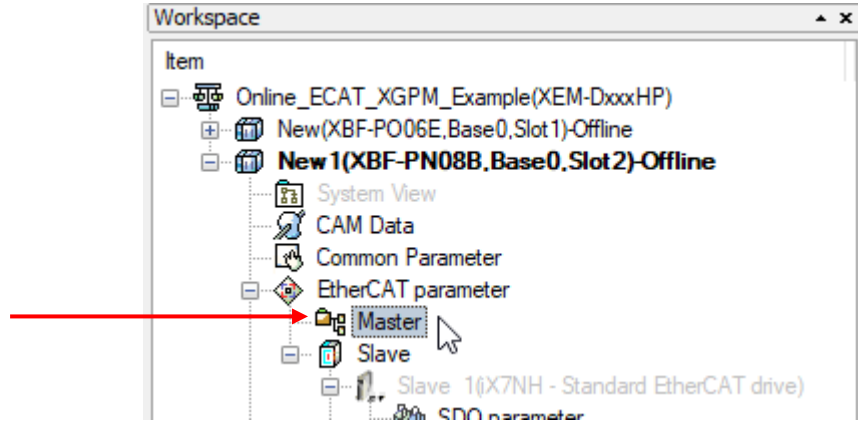
The Slave number will automatically be associated with the Axis number based on the Node ID in the Slave's SDO parameter file.

Step 8: Save the project.

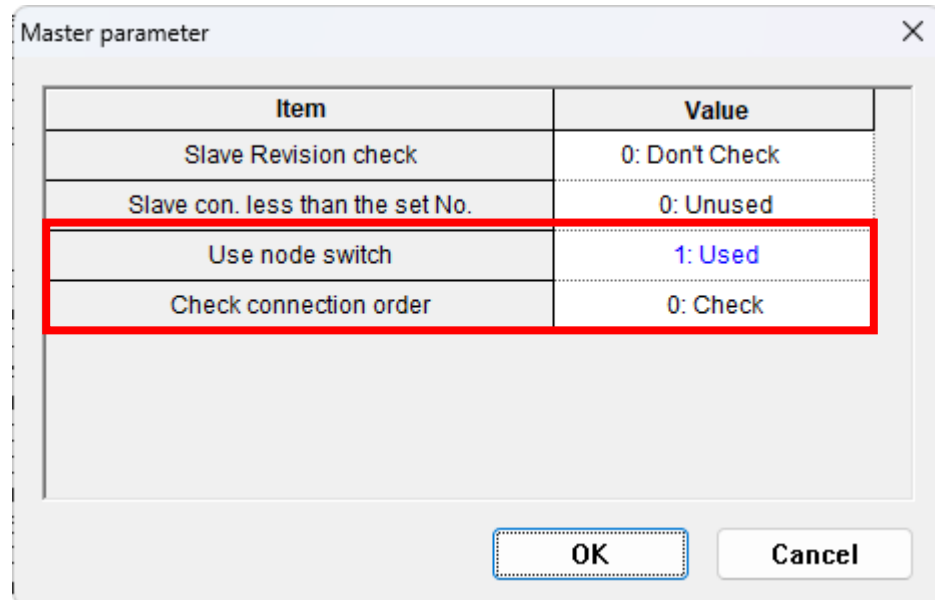
Section 2 – Setup Node Number Enforcement

- XG-PM needs to be configured to enforce node number to axis number assignment and EtherCAT connection order.
- Automationdirect highly recommends enabling this setting to make sure your system behaves as configured.

Step 1: Open EtherCAT Parameter -> Master settings in the Workspace window.

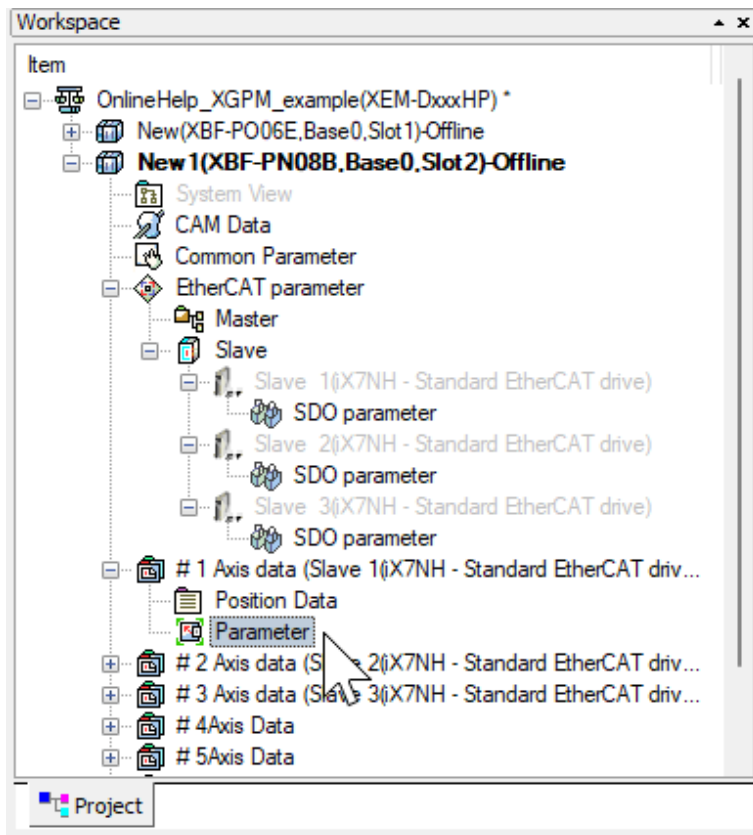


Step 2: Set Use node switch to '1: Used' and Check connection order to '0:Check'.



Section 3 – Setting up Axis Parameters

- Double click the “Parameter” file under an axis to open the Axis parameters.
- The parameter window will have the configuration for all axes available to the XEM CPU.



	Item	1 Axis	2 Axis	3 Axis	4 Axis	5 Axis	6 Axis
Basic Parameter	Unit	0: pulse	0: pulse	0: pulse	0: pulse	0: pulse	0: pulse
	Pulses per rotation	524288 pls	524288 pls	524288 pls	524288 pls	524288 pls	524288 pls
	Travel per rotation	20000 pls	20000 pls	20000 pls	20000 pls	20000 pls	20000 pls
	Unit multiplier	0: x1	0: x1	0: x1	0: x1	0: x1	0: x1
	Speed command unit	0: Unit/Time	0: Unit/Time	0: Unit/Time	0: Unit/Time	0: Unit/Time	0: Unit/Time
	Speed limit	20000000 pls/s	20000000 pls/s	20000000 pls/s	20000000 pls/s	20000000 pls/s	20000000 pls/s
	Acc. time1	500 ms	500 ms	500 ms	500 ms	500 ms	500 ms
	Acc. time2	1000 ms	1000 ms	1000 ms	1000 ms	1000 ms	1000 ms
	Acc. time3	1500 ms	1500 ms	1500 ms	1500 ms	1500 ms	1500 ms
	Acc. time4	2000 ms	2000 ms	2000 ms	2000 ms	2000 ms	2000 ms
	Dec. time 1	500 ms	500 ms	500 ms	500 ms	500 ms	500 ms
	Dec. time 2	1000 ms	1000 ms	1000 ms	1000 ms	1000 ms	1000 ms
	Dec. time 3	1500 ms	1500 ms	1500 ms	1500 ms	1500 ms	1500 ms
	Dec. time 4	2000 ms	2000 ms	2000 ms	2000 ms	2000 ms	2000 ms
	Dec. time for emg. stop	0 ms	0 ms	0 ms	0 ms	0 ms	0 ms
	Encoder select	0: Incremental Encoder	0: Incremental Encoder	0: Incremental Encoder	0: Incremental Encoder	0: Incremental Encoder	0: Incremental Encoder
	Cur. pos. compensation amount	0 pls	0 pls	0 pls	0 pls	0 pls	0 pls
	multiplier of pos. compensation amount	0: x1	0: x1	0: x1	0: x1	0: x1	0: x1
	Current speed filter time constant	0 ms	0 ms	0 ms	0 ms	0 ms	0 ms
	User defined position display magnification	0	0	0	0	0	0
	User defined speed display magnification	0	0	0	0	0	0
	Torque command unit	0: 1%	0: 1%	0: 1%	0: 1%	0: 1%	0: 1%
	Velocity sync. operation mode	0: CSP - Command Pos. Ref.	0: CSP - Command Pos. Ref.	0: CSP - Command Pos. Ref.	0: CSP - Command Pos. Ref.	0: CSP - Command Pos. Ref.	0: CSP - Command Pos. Ref.
Extended Parameter	SAW upper limit	2147483647 pls	2147483647 pls	2147483647 pls	2147483647 pls	2147483647 pls	2147483647 pls
	SAW lower limit	-2147483648 pls	-2147483648 pls	-2147483648 pls	-2147483648 pls	-2147483648 pls	-2147483648 pls
	Infinite running repeat. pos.	36000000 pls	36000000 pls	36000000 pls	36000000 pls	36000000 pls	36000000 pls
	Infinite running repeat.	0: Disable	0: Disable	0: Disable	0: Disable	0: Disable	0: Disable
	Backlash compensation	0 pls	0 pls	0 pls	0 pls	0 pls	0 pls
	Position completion time	1000 ms	1000 ms	1000 ms	1000 ms	1000 ms	1000 ms
	S-Curve ratio	50 %	50 %	50 %	50 %	50 %	50 %
	In-Position width	0 pls	0 pls	0 pls	0 pls	0 pls	0 pls
	Acc./Dec. pattern	0: Trapezoid	0: Trapezoid	0: Trapezoid	0: Trapezoid	0: Trapezoid	0: Trapezoid
	M code mode	0: None	0: None	0: None	0: None	0: None	0: None
	Software limit detect	0: Don't detect	0: Don't detect	0: Don't detect	0: Don't detect	0: Don't detect	0: Don't detect
	Ext. command selection	0: External VTP	0: External VTP	0: External VTP	0: External VTP	0: External VTP	0: External VTP
	Ext. command	0: Disable	0: Disable	0: Disable	0: Disable	0: Disable	0: Disable
	Position complete condition	0: Dwell	0: Dwell	0: Dwell	0: Dwell	0: Dwell	0: Dwell
	Int. continuous opr. type	0: Pass target pos.	0: Pass target pos.	0: Pass target pos.	0: Pass target pos.	0: Pass target pos.	0: Pass target pos.
	Int. speed selection	0: Main Ax.Spd.	0: Main Ax.Spd.	0: Main Ax.Spd.	0: Main Ax.Spd.	0: Main Ax.Spd.	0: Main Ax.Spd.
	Arc insertion position	0 pls	0 pls	0 pls	0 pls	0 pls	0 pls
	Arc insertion	0: Don't insert	0: Don't insert	0: Don't insert	0: Don't insert	0: Don't insert	0: Don't insert
	Speed override coordinate	0: ABS	0: ABS	0: ABS	0: ABS	0: ABS	0: ABS
	VTP coordinate	0: INC	0: INC	0: INC	0: INC	0: INC	0: INC
	Cam restart	0: Disable	0: Disable	0: Disable	0: Disable	0: Disable	0: Disable
	Detect abs. pos. abnormal. in the drive	0: Don't detect	0: Don't detect	0: Don't detect	0: Don't detect	0: Don't detect	0: Don't detect
	Handling of main ax. err. occurs during sync. control	0: Keep sync. control	0: Keep sync. control	0: Keep sync. control	0: Keep sync. control	0: Keep sync. control	0: Keep sync. control
	JOG high speed	5000 pls/s	5000 pls/s	5000 pls/s	5000 pls/s	5000 pls/s	5000 pls/s
	JOG low speed	1000 pls/s	1000 pls/s	1000 pls/s	1000 pls/s	1000 pls/s	1000 pls/s

Section 3.1 – Basic Parameters

Item	1 Axis	Axis Number for parameters in the column.
Unit	0: pulse	Unit can be set to pulse, mm, inch, or degree.
Pulses per rotation	524288 pls	Set the number of motor pulses for 1 revolution.
Travel per rotation	20000 pls	If unit is mm, inch or degree, set the amount of distance traveled per 1 revolution of the motor.
Unit multiplier	0: x1	Unit Multiplier set to 1,10,100 or 1000.
Speed command unit	0: Unit/Time	Set speed command to unit/time or rpm.
Speed limit	20000000 pls/s	Set max speed of the Axis.
Acc. time1	500 ms	Set Acceleration and Deceleration values for the axis.
Acc. time2	1000 ms	
Acc. time3	1500 ms	
Acc. time4	2000 ms	
Dec. time 1	500 ms	
Dec. time 2	1000 ms	
Dec. time 3	1500 ms	
Dec. time 4	2000 ms	
Dec. time for emg. stop	0 ms	Choose if Encoder on the motor is incremental or absolute.
Encoder select	0: Incremental Encoder	
Cur. pos. compenstion amount	0 pls	
multiplier of pos. compensation amount	0: x1	
Current speed filter time constant	0 ms	
User defined position display magnification	0	
User defined speed display magnification	0	
Torque command unit	0: 1%	
Velocity sync. operation mode	0: CSP - Command Pos. Ref.	

Section 3.2 – Extended Parameters

S/W upper limit	2147483647 pls	←	Set Software upper position limit.
S/W lower limit	-2147483648 pls	←	Set Software position limit.
Infinite running repeat. pos.	36000000 pls	←	Repeating position mode position value.
Infinite running repeat.	0: Disable	←	Enable repeating position mode position on the axis.
Backlash compensation	0 pls	←	Set backlash compensation distance if needed.
Position completion time	1000 ms	←	Amount of time positioning complete signal stays TRUE after completing a move.
S-Curve ratio	50 %	←	Choose the S-Curve percentage applied to velocity curve. (Can be left default)
In-Position width	0 pls	←	Set tolerance for In-position status. (Can be left default)
Acc./Dec. pattern	0: Trapezoid	←	Set Acceleration/Deceleration pattern.
M code mode	0: None		
Software limit detect	0: Don't detect	←	Enable/Disable software limit detection.
Ext. command selection	0: External VTP		
Ext. command	0: Disable		
Position complete condition	0: Dwell	←	Set the mode for positioning complete condition
Int. continuous opr. type	0: Pass target pos.		
Int. speed selection	0: Main Ax. Spd.		
Arc insertion position	0 pls		
Arc insertion	0: Don't insert		
Speed override coordinate	0: ABS		
VTP coordinate	0: INC		
Cam restart	0: Disable		
Detect abs. pos. abnormal. in the drive	0: Don't detect		
Handling of main ax. err. occurs during sync. control	0: Keep sync. control		

Section 3.3 – Manual Operation Parameters

JOG high speed	5000 pls/s
JOG low speed	1000 pls/s
JOG acceleration time	1000 ms
JOG deceleration time	1000 ms
Inching speed	100 pls/s

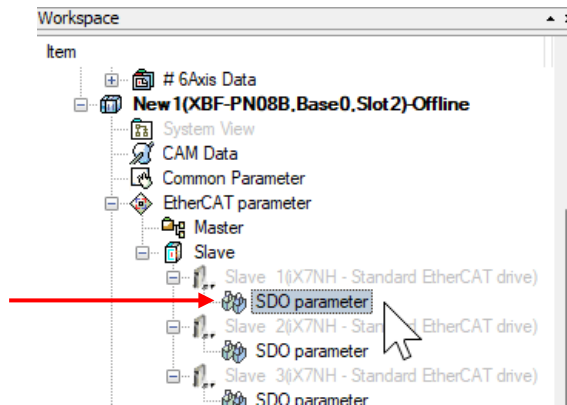


Set values for Jogging and Inching.

Section 4 – Servo Parameters

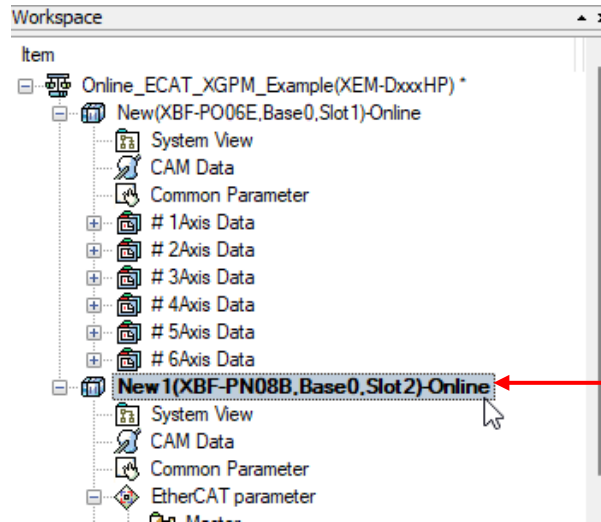
- XG-PM has the capability to adjust the parameters of the EtherCAT servo Drive .
- These value will be different depending on the servo drive and motor being used. Check the user manual of the servo drive and motor.
- For the LS iX7NH and AMPC motors, the default values should be sufficient.

Step 1: Double Click SDO parameter under the servo drive.

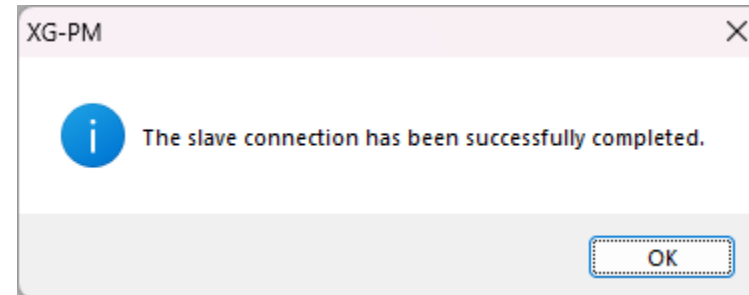
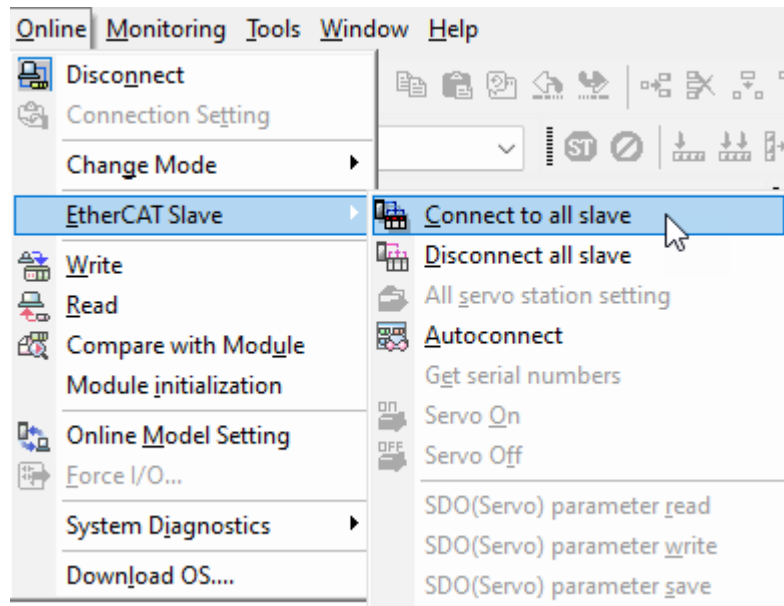


Parameter type		Parameter change during operation				
All		<input type="checkbox"/> Param. change during Op. Note) *Apply after power cycle				
<input checked="" type="checkbox"/>	Index	Name	Unit	Current Value	Initial Value	Access
<input checked="" type="checkbox"/>	2000:00	Motor ID*	-	13	13	rw
<input checked="" type="checkbox"/>	2001:00	Encoder Type*	-	2	2	rw
<input checked="" type="checkbox"/>	2002:00	Encoder Pulse per Revolution*	pulse	524288	524288	rw
<input checked="" type="checkbox"/>	2003:00	Node ID*	-	-	-	ro
<input checked="" type="checkbox"/>	2004:00	Rotation Direction Select*	-	0	0	rw
<input checked="" type="checkbox"/>	2005:00	Absolute Encoder Configuration*	-	1	1	rw
<input checked="" type="checkbox"/>	2006:00	Main Power Fail Check Mode	-	0	0	rw
<input checked="" type="checkbox"/>	2007:00	Main Power Fail Check Time	ms	40	40	rw
<input checked="" type="checkbox"/>	2008:00	7SEG Display Selection	-	0	0	rw
<input checked="" type="checkbox"/>	2009:00	Regen. Brake Resistor Configuration	-	0	0	rw
<input checked="" type="checkbox"/>	200A:00	Regen. Brake Resistor Derating Factor	%	100	100	rw
<input checked="" type="checkbox"/>	200B:00	Regen. Brake Resistor Value	ohm	0	0	rw
<input checked="" type="checkbox"/>	200C:00	Regen. Brake Resistor Power	watt	0	0	rw
<input checked="" type="checkbox"/>	200D:00	Peak Power of Regen. Brake Resistor	watt	100	100	rw
<input checked="" type="checkbox"/>	200E:00	Duration Time @ Peak Power of Regen. Brak...	ms	5000	5000	rw
<input checked="" type="checkbox"/>	200F:00	Overload Check Base	%	100	100	rw
<input checked="" type="checkbox"/>	2010:00	Overload Warning Level	%	50	50	rw
<input checked="" type="checkbox"/>	2011:00	PWM Off Delay Time	ms	10	10	rw
<input checked="" type="checkbox"/>	2012:00	Dynamic Brake Control Mode	-	0	0	rw
<input checked="" type="checkbox"/>	2013:00	Emergency Stop Configuration	-	1	1	rw
<input checked="" type="checkbox"/>	2014:00	Warning Mask Configuration	-	0	0	rw
<input checked="" type="checkbox"/>	2015:00	U Phase Current Offset	0.1%	0	0	rw
<input checked="" type="checkbox"/>	2016:00	V Phase Current Offset	0.1%	0	0	rw
<input checked="" type="checkbox"/>	2017:00	W Phase Current Offset	0.1%	0	0	rw
<input checked="" type="checkbox"/>	2018:00	Magnetic Pole Pitch*	0.01mm	2400	2400	rw
<input checked="" type="checkbox"/>	2019:00	Linear Scale Resolution*	nm	1000	1000	rw
<input checked="" type="checkbox"/>	201A:00	Commutation Method*	-	0	0	rw
<input checked="" type="checkbox"/>	201B:00	Commutation Current	0.1%	500	500	rw
<input checked="" type="checkbox"/>	201C:00	Commutation Time	ms	1000	1000	rw
<input checked="" type="checkbox"/>	201D:00	Grating Period of Sinusoidal Encoder*	um	40	40	rw
<input checked="" type="checkbox"/>	201E:00	Homing Done Behaviour	-	0	0	rw
<input checked="" type="checkbox"/>	201F:00	Velocity Function Select	-	0	0	rw
<input checked="" type="checkbox"/>	2020:00	Motor and Hall Phase Correction*	-	0	0	rw
<input checked="" type="checkbox"/>	202A:00	Motor Encoder Configuration	-	0	0	rw
<input checked="" type="checkbox"/>	202C:00	Lines per Revolution of Sinusoidal Encoder*	lines/rev.	1000	1000	rw
<input checked="" type="checkbox"/>	202D:00	FIR Filter Window of Speed Feedback	-	0	0	rw

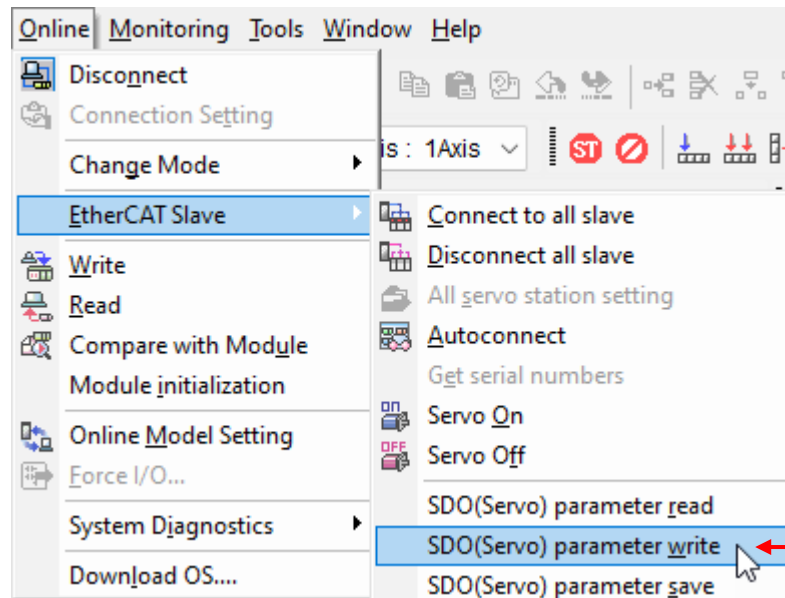
Step 2: Select the XBF-PN0xB module in the project Workspace window. This example shows XBF-PN08B.



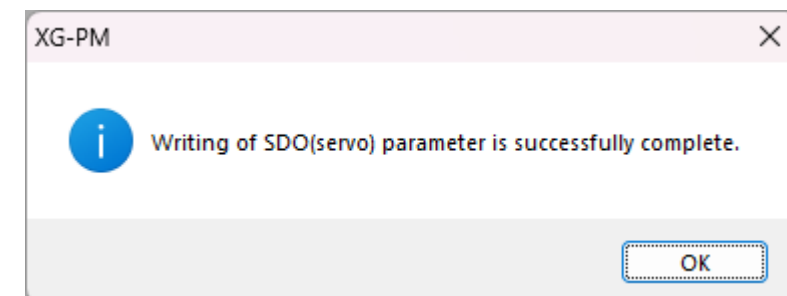
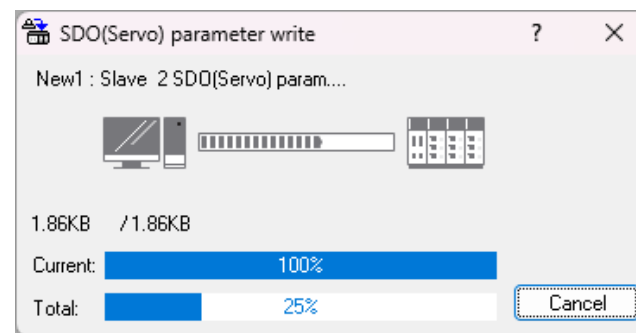
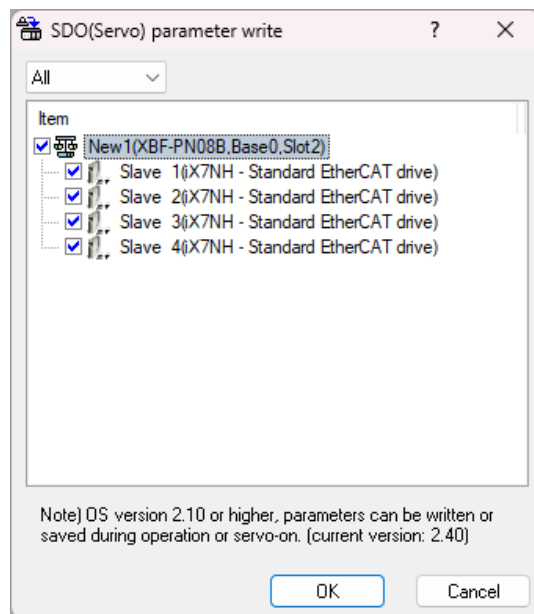
Step 3: Go to Online -> EtherCAT Slave -> Connect to all slave. This will connect the EtherCAT network if it has not previously been connected



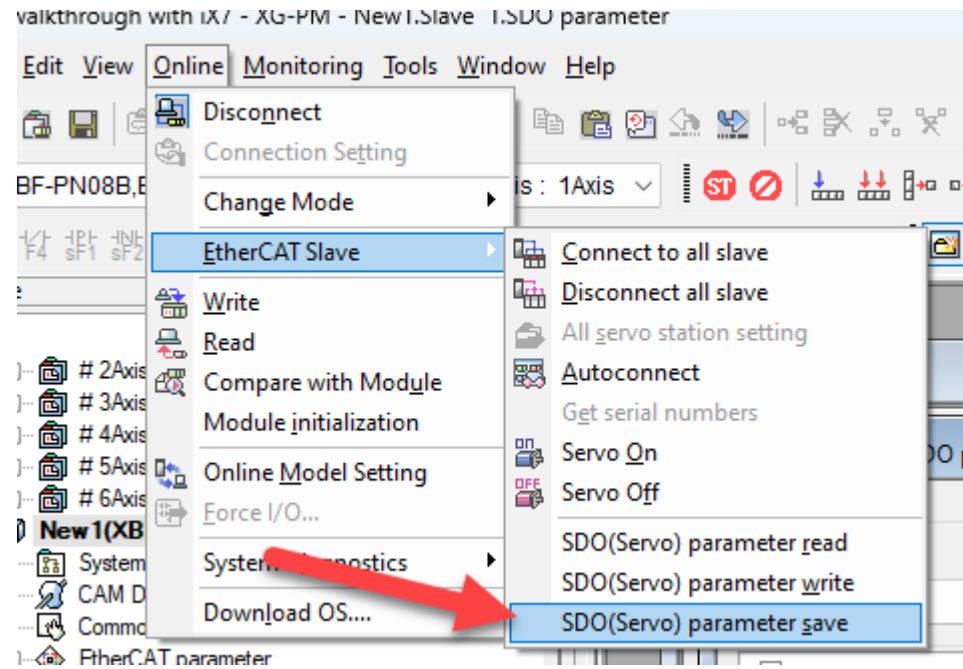
Step 4: Go to Online -> EtherCAT Slave -> SDO(Servo) parameter write



Step 5: Select the slaves to write the SDO parameters to. Press OK.

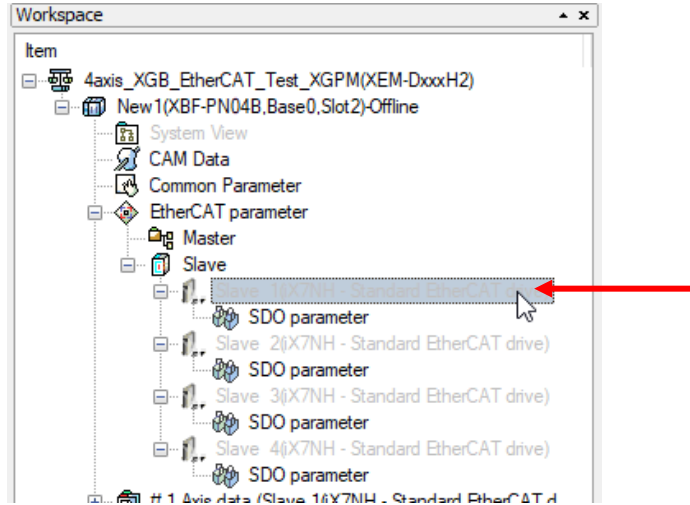


Step 6: Go to Online -> EtherCAT Slave -> SDO(Servo) parameter save to save the changed SDO parameters to the drive.

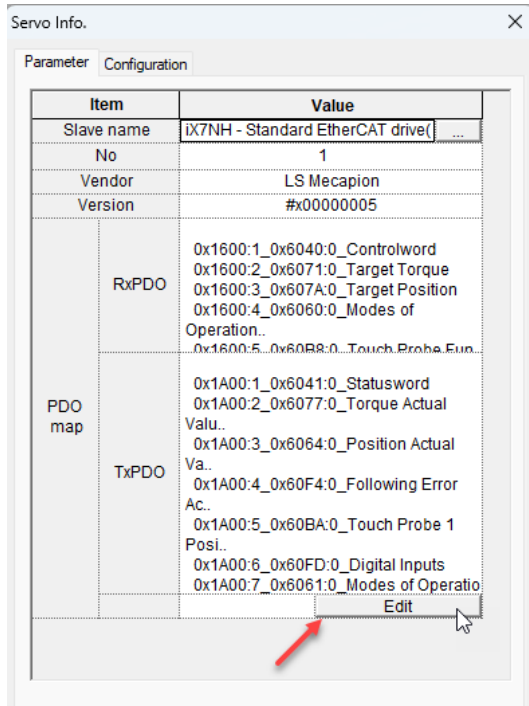


Section 5 – Modify PDO data of an EtherCAT Slave

Step 1: Navigate to the Workspace window -> EtherCAT parameter -> Slave. Double Click on the slave to access the Servo Info screen.



Step 2: Press the Edit button in the Servo Info Screen.



Step 3: The PDO Item Edit Screen will allow modification of the slave's PDO data. Select PDO type filter of TxPDO for input data and RxPDO for output data.

PDO Item Edit

PDO Assignment(A):

address	SM	flags
<input checked="" type="checkbox"/> 0x1A00	3	
<input type="checkbox"/> 0x1A01		
<input type="checkbox"/> 0x1A02		
<input type="checkbox"/> 0x1A03		

Download PDO

☒ PDO Assignment

☒ PDO Setting

PDO type filter(P): TxPDO

Mappable objects:

Index	Name	Data type	Size(Bytes)
0x2121:0	Drive Status Output 1	UINT	2
0x2122:0	Drive Status Output 2	UINT	2
0x2600:0	Feedback Speed	INT	2
0x2601:0	Command Speed	INT	2
0x2602:0	Following Error	DINT	4
0x2604:0	Instantaneous Maximum Operation	INT	2
0x2605:0	DC-Link Voltage	UINT	2
0x2607:0	SingleTurn Data	UDINT	4
0x2608:0	Mechanical Angle	UINT	2
0x2609:0	Electrical Angle	INT	2
0x260A:0	MultiTurn Data	DINT	4
0x2614:0	Warning Code	UINT	2
0x2615:0	Analog Input 1 Value	INT	2
0x261D:0	Motor Temperature	UINT	2

Select PDO: 0:0x1A00

Mapping objects:

Index	Name	Data type	Size(Bytes)	CPU n
0x6041:0	Statusword	UINT	2	<input type="checkbox"/>
0x6077:0	Torque Actual Value	INT	2	<input type="checkbox"/>
0x6064:0	Position Actual Value	DINT	4	<input type="checkbox"/>
0x60F4:0	Following Error Actual Value	DINT	4	<input type="checkbox"/>
0x60BA:0	Touch Probe 1 Positive Edge Positi	DINT	4	<input type="checkbox"/>
0x60FD:0	Digital Inputs	UDINT	4	<input type="checkbox"/>
0x6061:0	Modes of Operation Display	SINT	1	<input type="checkbox"/>
0x2601:0	Command Speed	INT	2	<input type="checkbox"/>
0x2600:0	Feedback Speed	INT	2	<input type="checkbox"/>
0x60B9:0	Touch Probe Status	UINT	2	<input type="checkbox"/>

Note) The CPU w/r func. of PDO item operates in OS version 2.1 or higher.

Top Up Down Bottom

OK Cancel

Choose TxPDO to modify input data.
Choose RxPDO to modify output data.

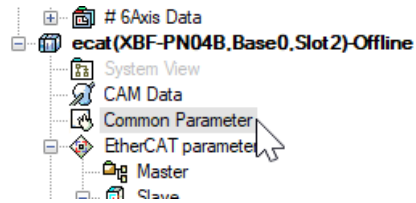
This section shows PDO data that can be added to the currently mapped section.

These buttons are used to add or remove mapped PDO data.

This section shows currently mapped PDO data.

Section 6 – Changing EtherCAT Cycle Time

Step 1: Double Click Common Parameter under the XBF-PN0xB module.



Step 2: Select the Control period. Auto will let the XBF-PN0xB module determine the cycle time based on the number of slaves.

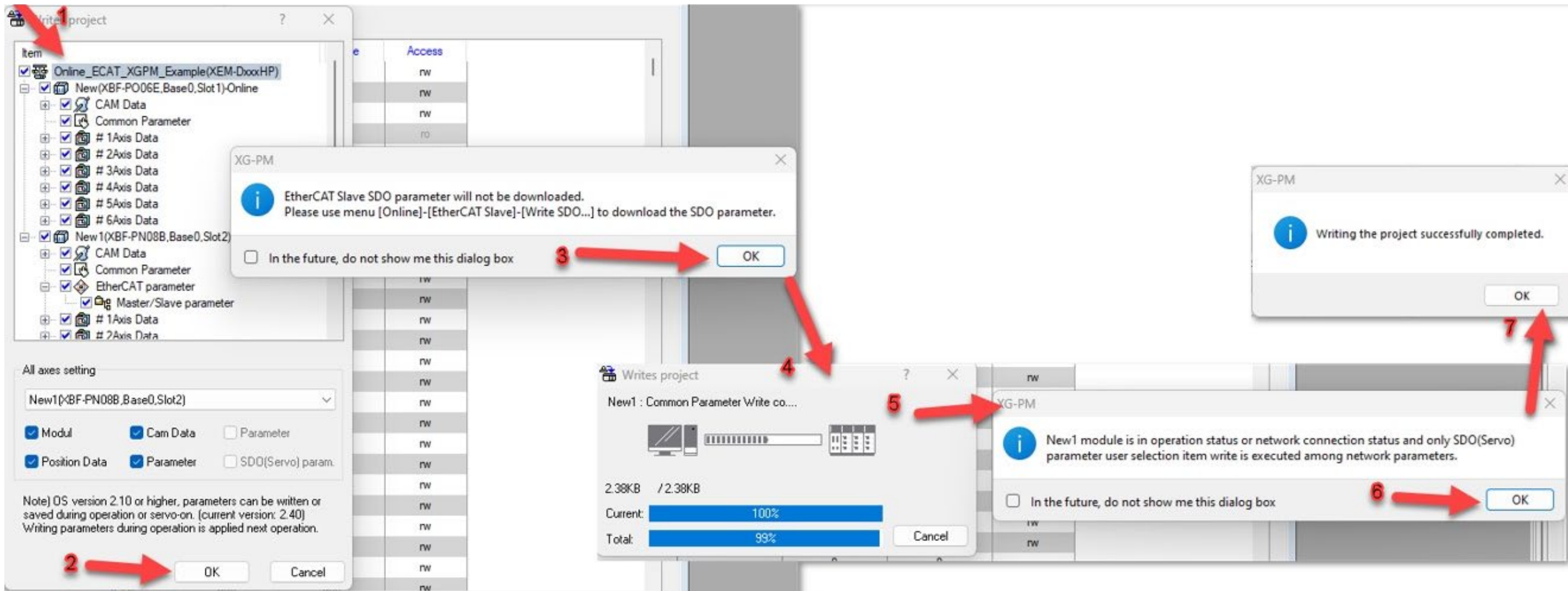
	Item	Settings
Common Parameter	Enc1 pulse input	3:PHASE A/B (x1)
	Enc1 z-phase clear	0: Disable
	Enc1 max. value	2147483647
	Enc1 min. value	-2147483648
	Speed override	0: Specify %
	SSP Position	0: INC
	Enc1 avr. count	0: None
	External input function selection	0: Encoder signal A,B,Z phase
	External input filter	0: Disable
	Torque sync. control mode	0: Torque Actual Value
	Error reset mode	0: Module
	Control period	0: Auto 1: 1 ms 2: 2 ms 3: 3 ms 4: 4 ms

Section 7 – Write Project to XEM CPU

Step 1: Connect to XEM CPU and Click “Write” to write the configuration to the PLC’s motion CPU -> XBF-PN08B or XBF-PN04B



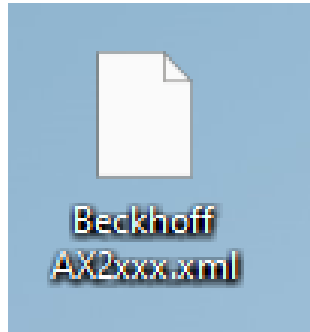
Step 2: Check the “Project Name” check box to write everything to the CPU and click OK.



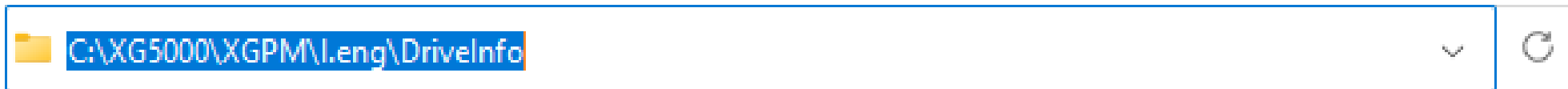
XGB03– Importing EtherCAT Servo Drive Information files into XG-PM

- The EtherCAT Servo Drive Information files contain servo parameters for the drive being controlled over EtherCAT.
- The iX7NH servo drive's file is included with the XG-PM software.
- Third party EtherCAT drives can be added to the XG-PM software.
- All drive information files should be xml files.

Step 1: Download the EtherCAT Drive information file from the vendor's website. Close the XG-PM software. This example uses the xml file for a Beckhoff AX2 servo drive.



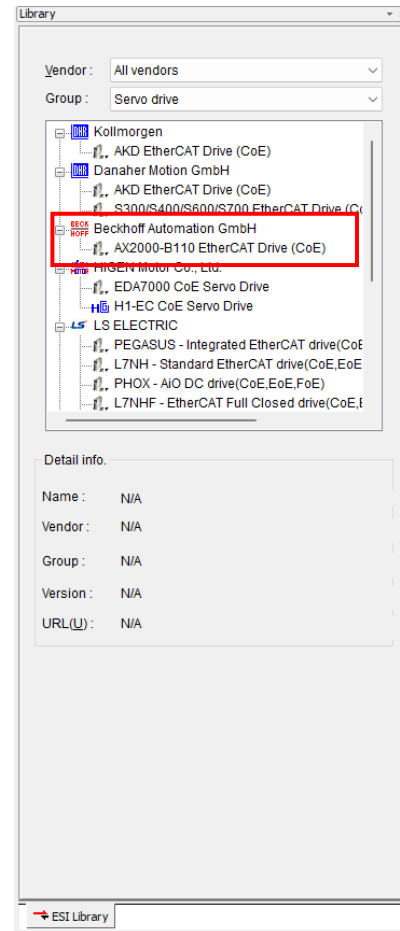
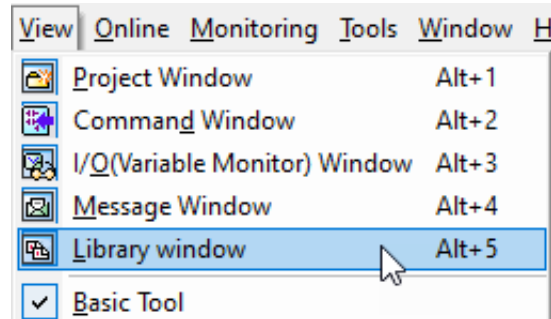
Step 2: Navigate to the DriveInfo folder for XG5000 directory. The default location is 'C:\XG5000\XGPM\l.eng\DriveInfo'



Step 3: Copy and Paste the EtherCAT drive information file in to the 'DriveInfo' folder.

Name	Date modif
LS_Mecapion_EtherCAT_IO_Ver.0.0/.xml	5/22/2023 4
XEL-BSSCT EtherCAT Slave(MDP).cac	4/12/2023 9
XEL-BSSCT EtherCAT Slave(MDP).xml	5/22/2023 4
XEL-BSSCT EtherCAT Slave(MDP)_Modules.xml	5/22/2023 4
XMC_E32A_ENI.xml	5/22/2023 4
Beckhoff AX2xxx.xml	6/29/2023 2

Step 4: Start up the XG-PM program from XG5000 to see if the file is imported correctly. Go to View menu-> Library Window to make sure it is visible.



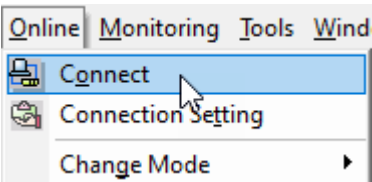
XGB04 – XGB EtherCAT Troubleshooting

Section 1 – XG-PM System View for EtherCAT Status

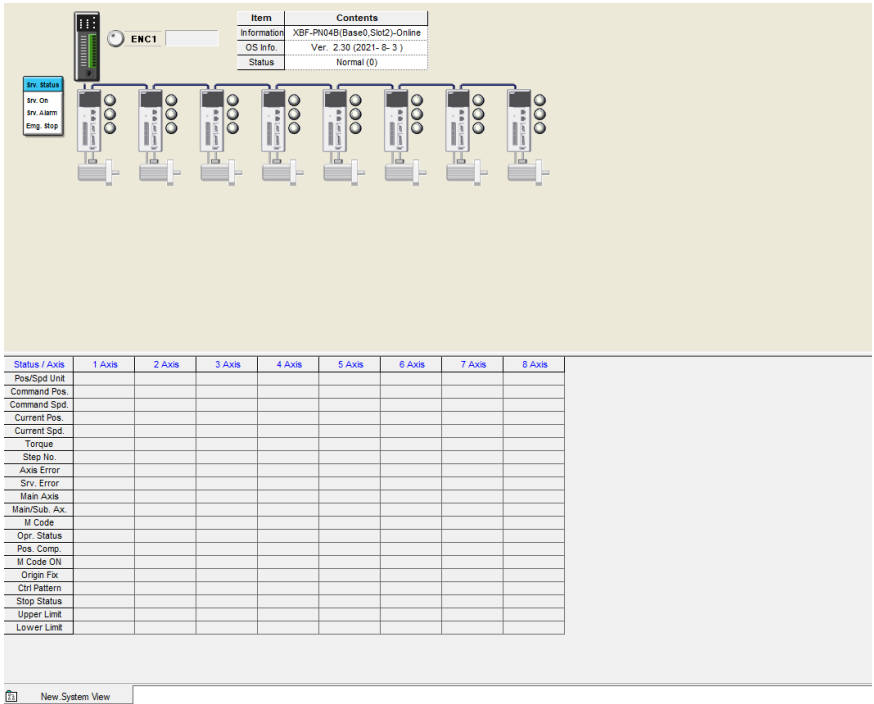
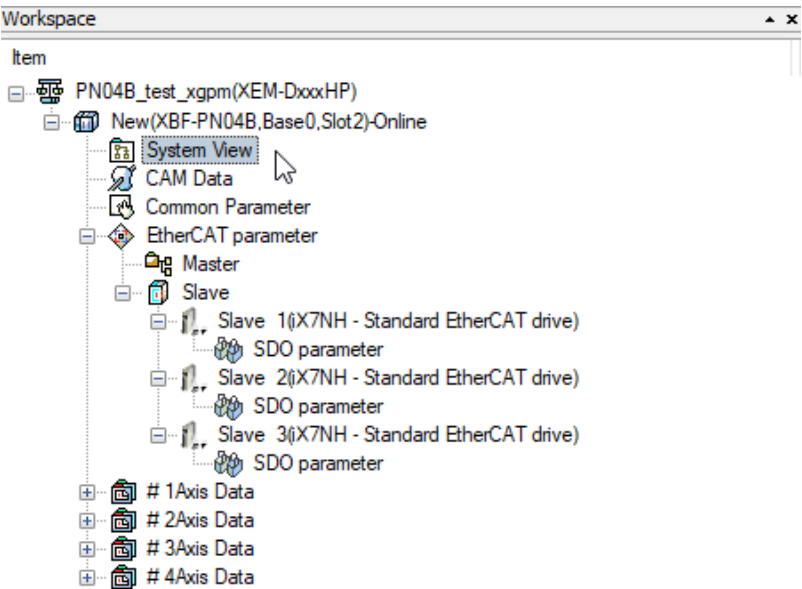
- XG-PM System View is only available when connected online to the XEM CPU.
- It can be used to see which of the Axes are active on the EtherCAT network.
- It also shows drive status and error status.

Section 1.1 – Using System View

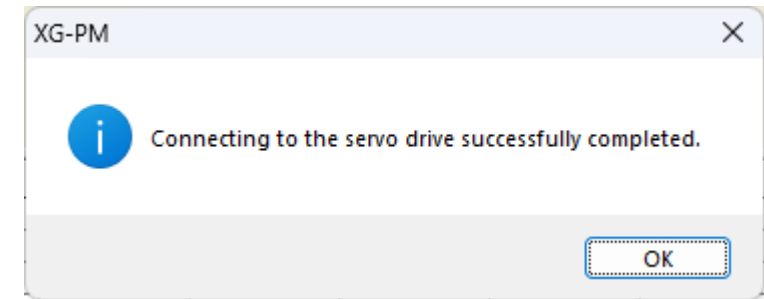
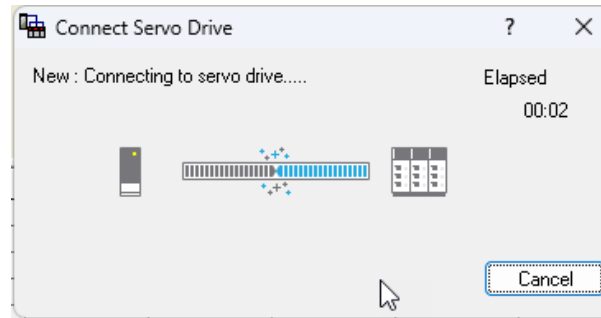
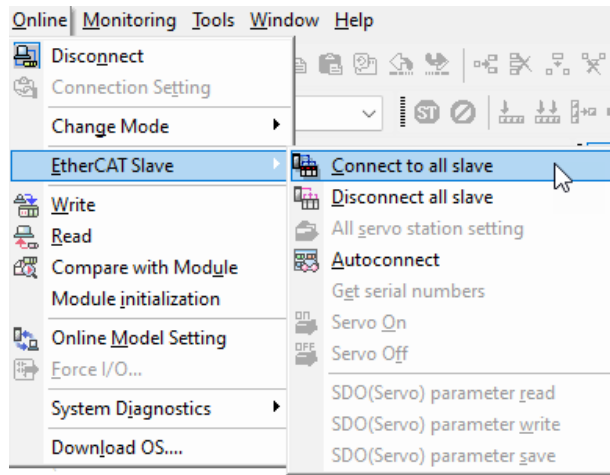
Step 1: Connect to the XEM CPU in XG-PM. Go to Online Menu -> Connect.



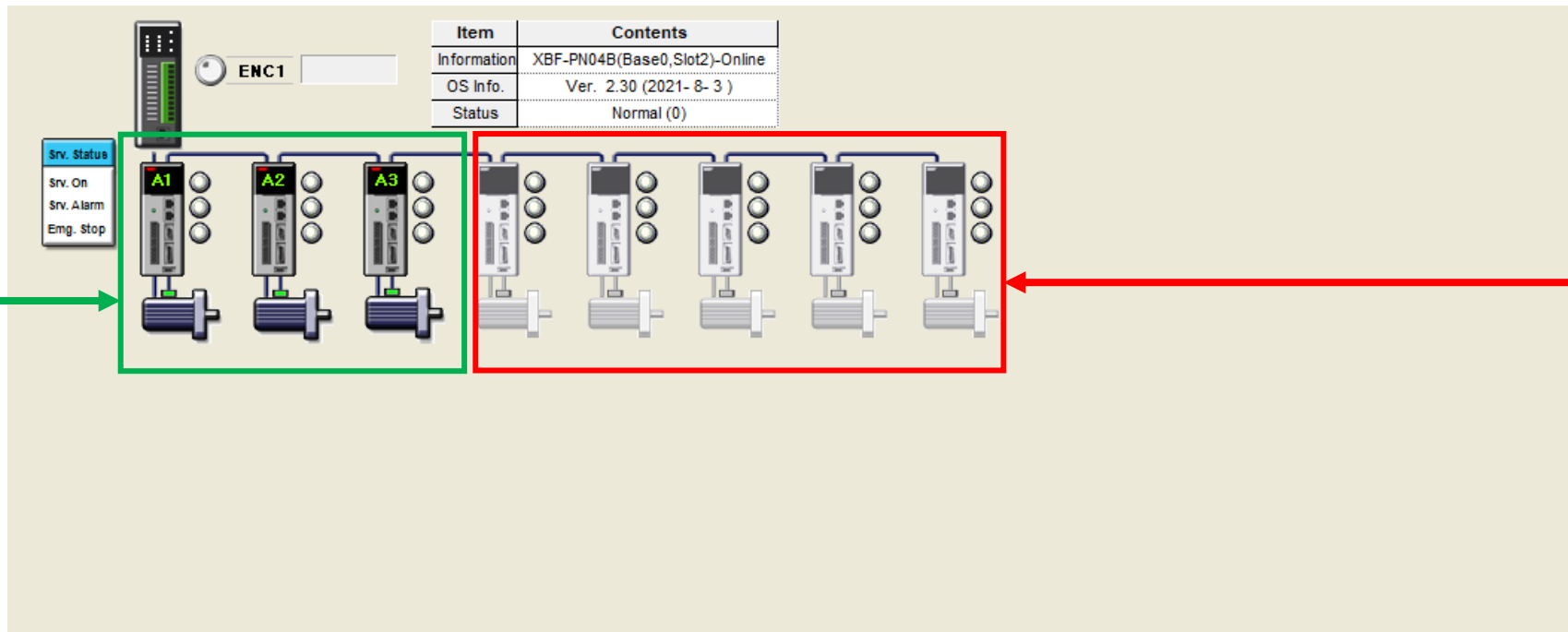
Step 2: Open the System View window by double clicking on it in the Workspace window.



Step 3: Go to Online Menu -> EtherCAT Slave -> Connect to all slave. This will connect XG-PM to the EtherCAT Servos



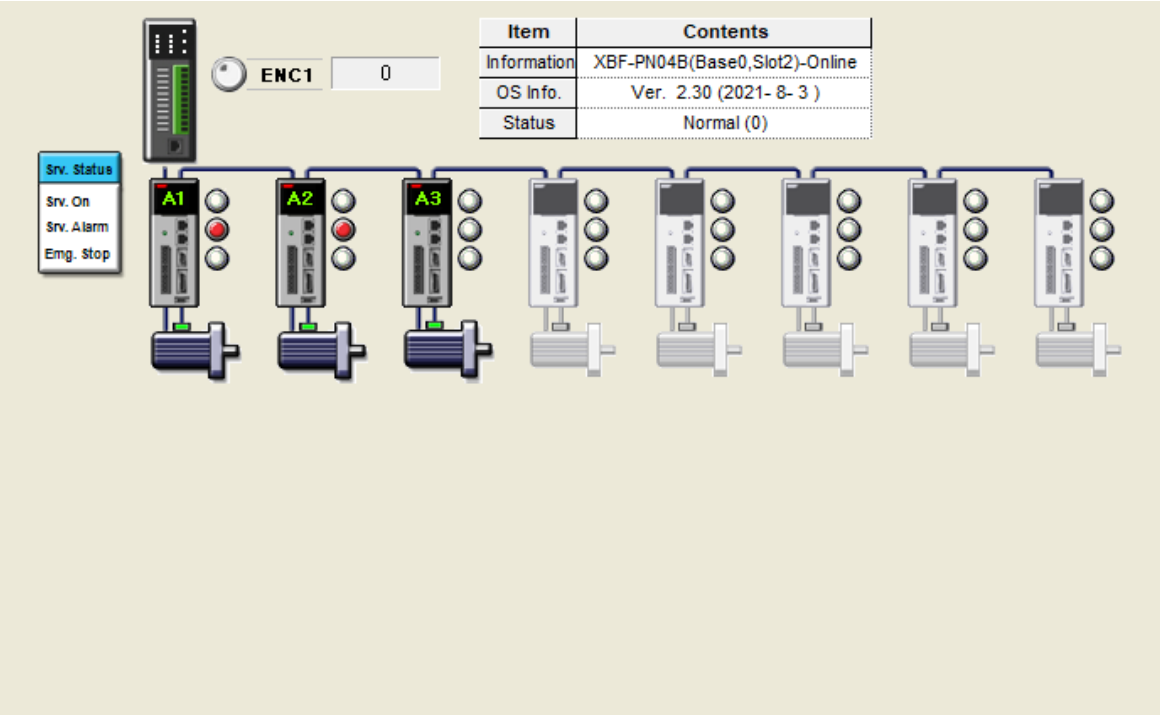
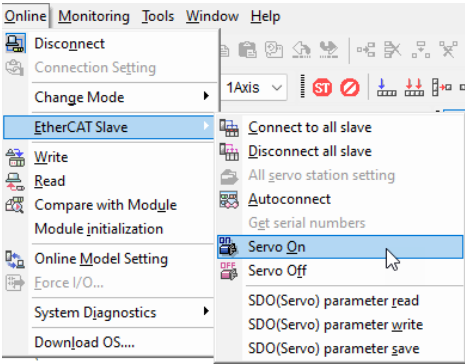
Drives Online
over EtherCAT



Drives Offline or
not configured

Section 1.2 – Using System View after Servo On Command

Step 1: Go to Online Menu -> EtherCAT Slave -> Servo On.



Item	Contents
Information	XBF-PN04B(Base0,Slot2)-Online
OS Info.	Ver. 2.30 (2021- 8- 3)
Status	Normal (0)

After Servo On command, the Status / Axis data is populated by servo status.

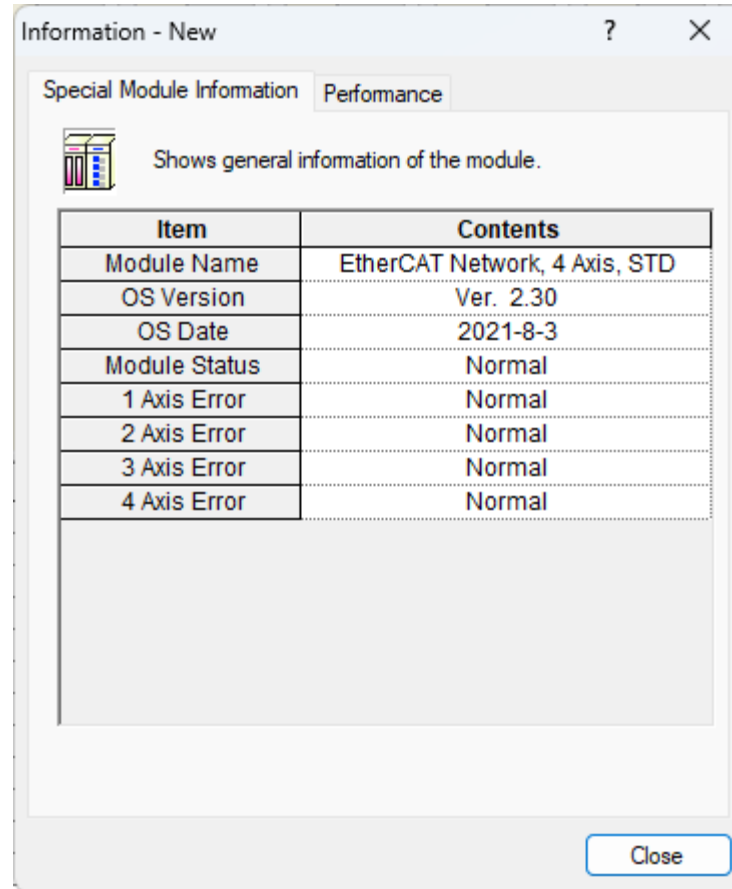
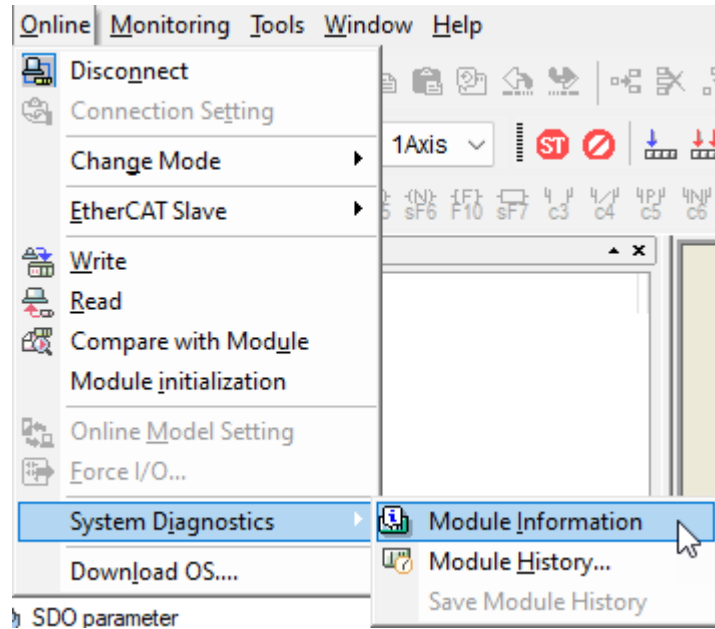


Status / Axis	1 Axis	2 Axis	3 Axis	4 Axis	5 Axis	6 Axis	7 Axis	8 Axis
Pos/Spd Unit	pls,pls/s	pls,pls/s	pls,pls/s					
Command Pos.	0	0	0					
Command Spd.	0	0	0					
Current Pos.	0	0	0					
Current Spd.	0	0	0					
Torque	0.0 %	0.0 %	0.0 %					
Step No.	1	1	1					
Axis Error	0	0	0					
Srv. Error	49(h31)	49(h31)	0(h0)					
Main Axis	1 Axis	2 Axis	3 Axis					
Main/Sub. Ax.	Main Axis	Main Axis	Main Axis					
M Code	0	0	0					
Opr. Status								
Pos. Comp.								
M Code ON								
Origin Fix								
Ctrl Pattern								
Stop Status								
Upper Limit								
Lower Limit								

Section 2 – Getting Module Information

- The Module information will show the XBF-PN04B or XBF-PN08B module OS version and Axis status.

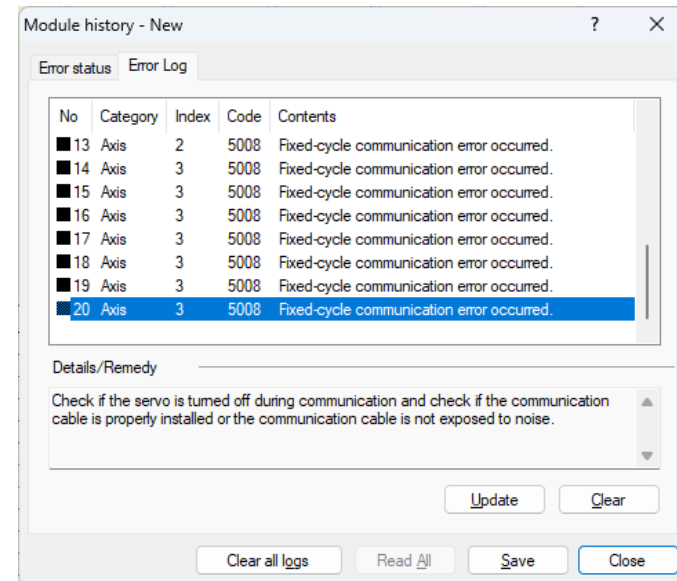
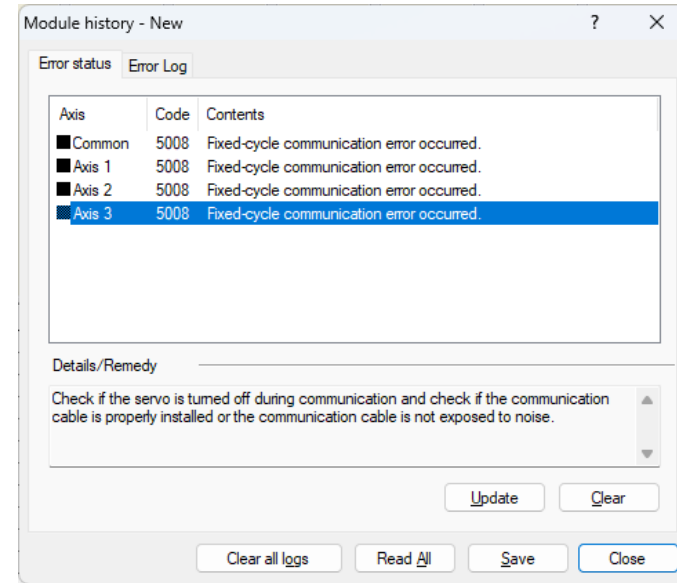
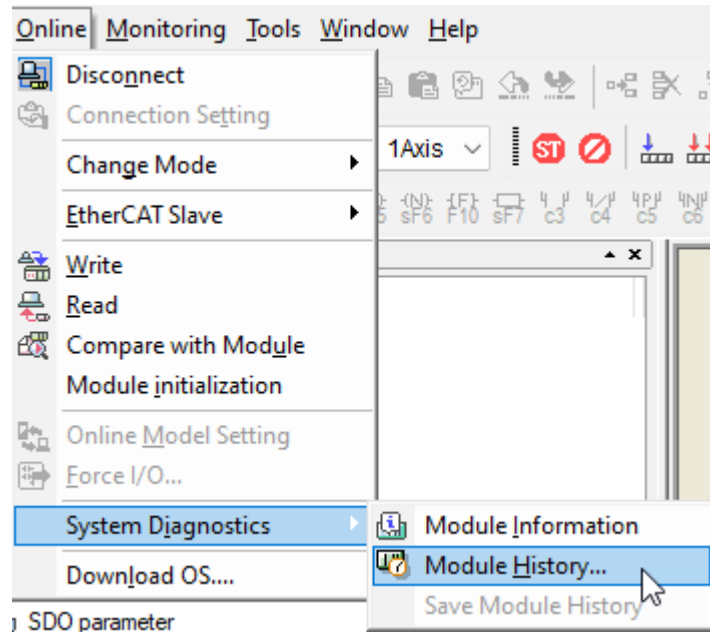
In XG-PM, Go to Online Menu -> System Diagnostics -> Module Information



Section 3 – Getting Module Error Information

- The Module Error information will show current and past errors that have occurred on the XBF-PN08B or XBF-PN04B.

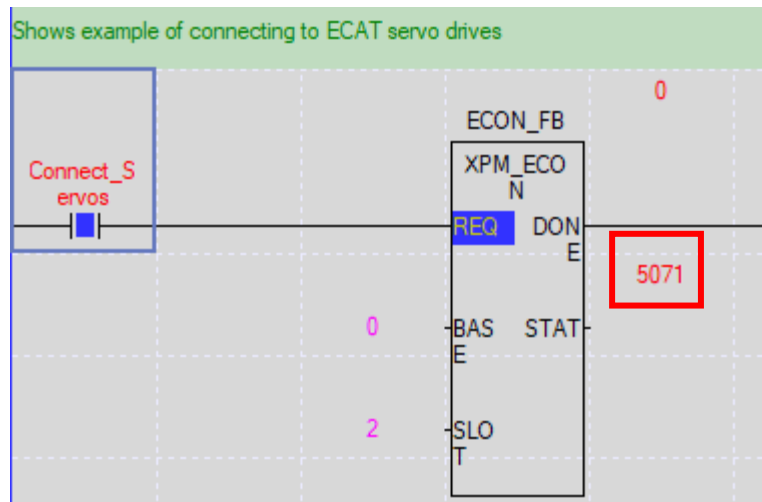
In XG-PM, Go to Online Menu -> System Diagnostics -> Module Module History



Section 4 – XEM EtherCAT Network Order Error

- The EtherCAT network must be wired up according to the order set in the XG-PM project.
- Network order should be Axis 1 -> Axis 2 -> -> Last Axis used.
- If the order doesn't match the XG-PM project and Node Number Enforcement is enabled, XPM_ECON and XG-PM will give an error when trying to connect the EtherCAT network. This error code is '5071'.
- To Fix the issue, Make sure the EtherCAT node order matches the XG-PM project.
- If performing auto-connect again, the node id to axis assignment will change and project code may need to be updated to match it.

XPM ECON Error



XG-PM Error

Module history - New1

Error status Error Log System Log Operation Log

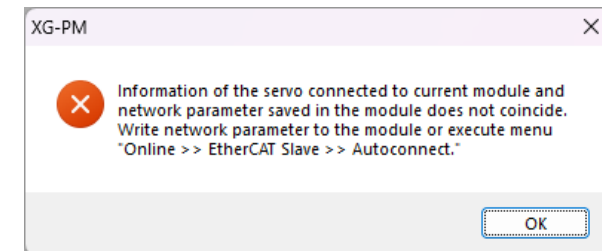
No	Category	Index	Code	Date	Time	Contents
93	Axis	5	5008	1984-01-01	05:02:32.012	Fixed-cycle communicat
94	Axis	6	5008	1984-01-01	05:02:32.012	Fixed-cycle communicat
95	Axis	7	5008	1984-01-01	05:02:32.012	Fixed-cycle communicat
96	Axis	8	5008	1984-01-01	05:02:32.012	Fixed-cycle communicat
97	Common	0	5071	1997-09-09	04:57:14.328	There is a discrepancy b
98	Common	0	5071	1997-09-09	04:57:24.502	There is a discrepancy b
99	Common	0	5071	1986-09-27	04:56:22.697	There is a discrepancy b

Details/Remedy

Please set the Node ID of the EtherCAT slave connected to the corresponding axis to match the EtherCAT parameter settings.

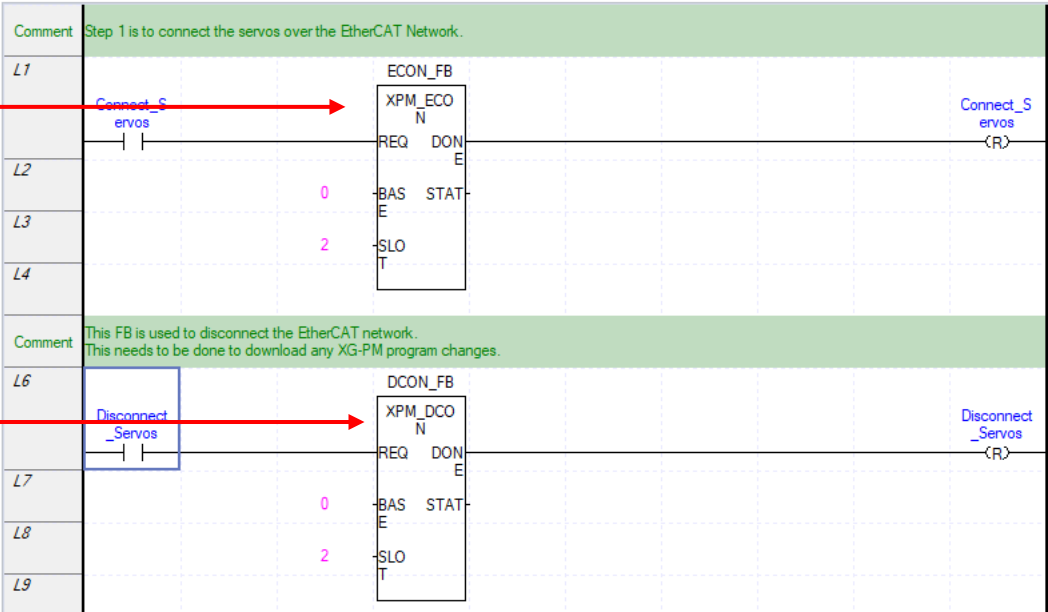
Update Clear

Clear all logs Read All Save Close



XGB05 – XGB EtherCAT Motion Code Examples

XPM_ECON must be used to connect the EtherCAT network. This should be done before calling any other motion blocks.



XPM_DCON is used to disconnect the EtherCAT network.

Base is always 0.
The slot is the physical location of the XBF-PN0xB module.
The axis is referenced with its number from the XG-PM project.

