AN135

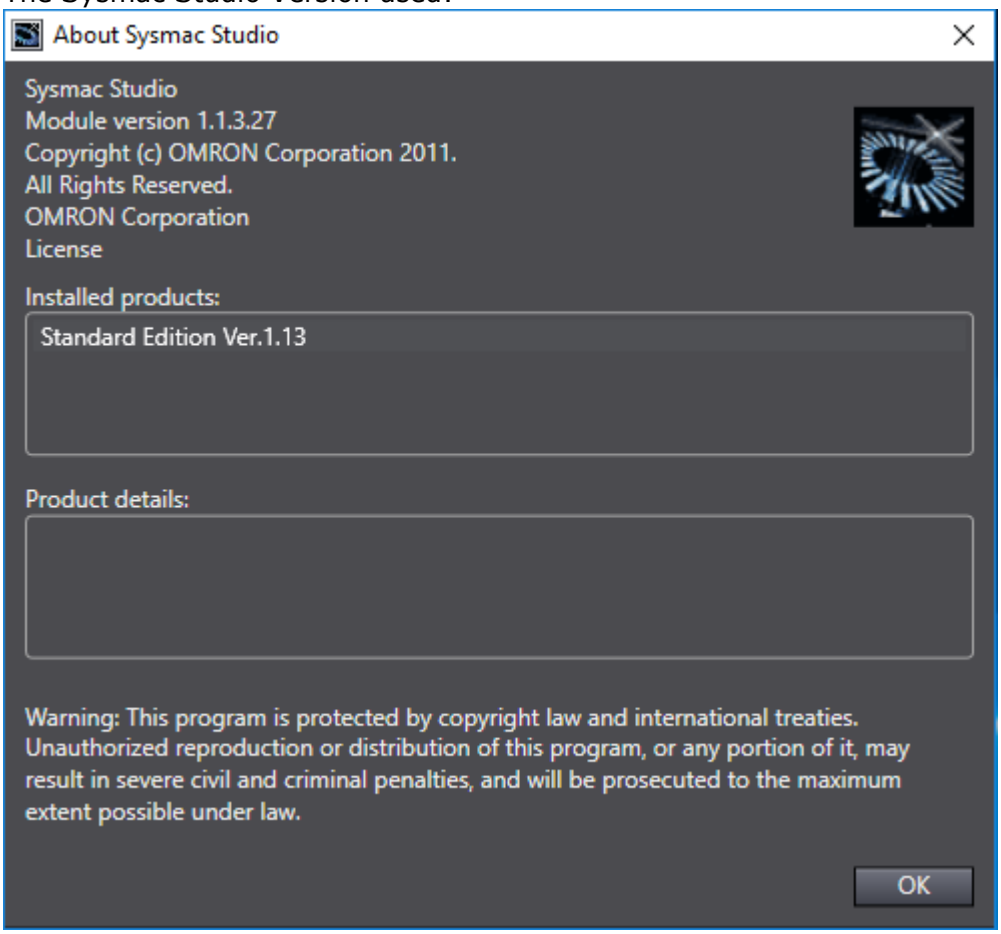
16-125548

Omron Copley Configuration Guide

Introduction

The following guide will demonstate how to use Sysmac Studio to setup and configure an Omron Ethercat Master (PLC) with a Copley Drive to edit PDO Mapping, view and edit cyclic data, and build and execute a POU Program to send an SDO.

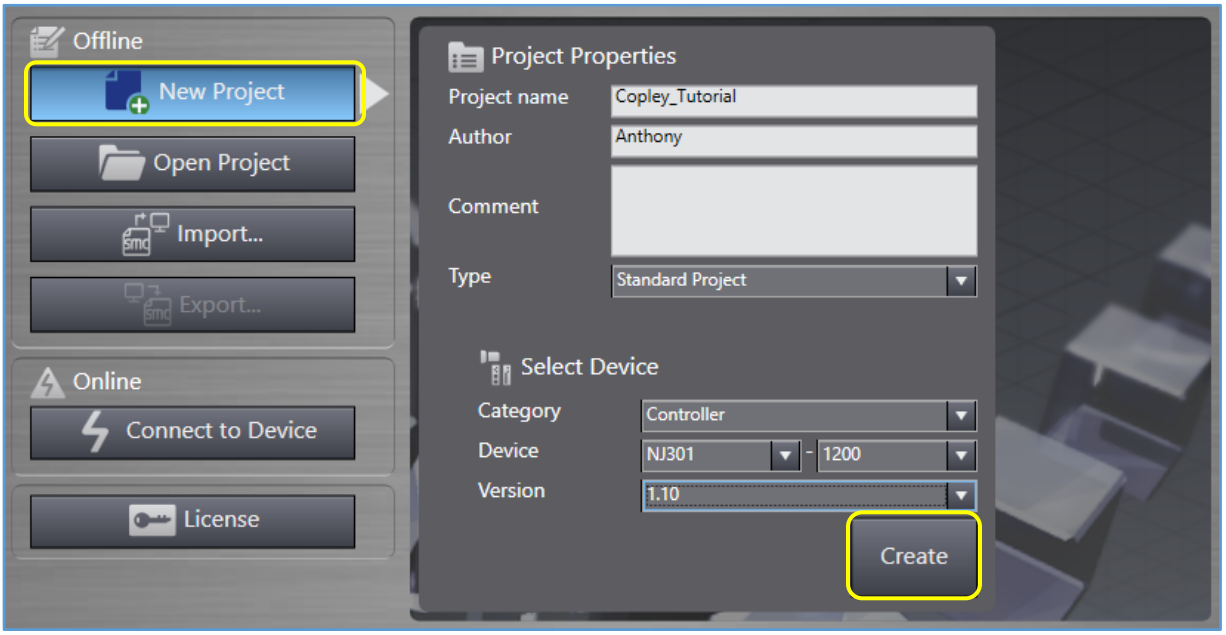
The Sysmac Studio Version used:



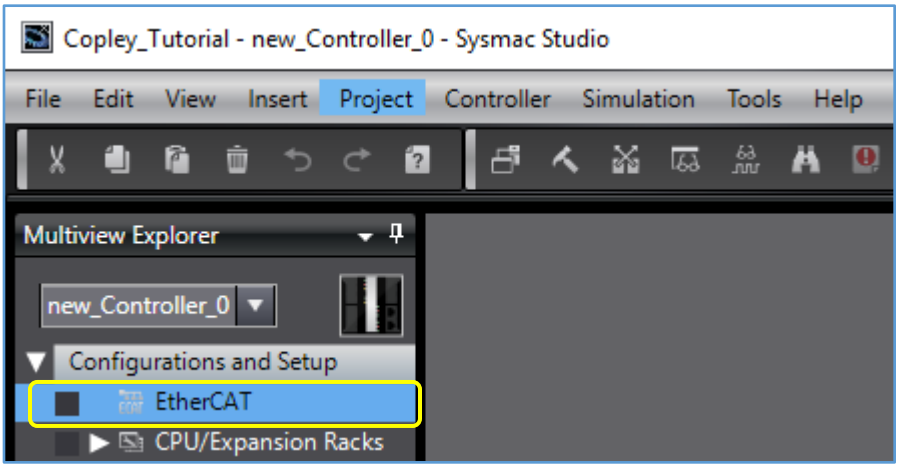
Copley Hardware used was a BEL-090-30 with firmware version 4.20, and Omron Hardware used was an Omron NJ301-1200 version 1.10. The Operating System used was a Windows 10 Enterprise.

Setup

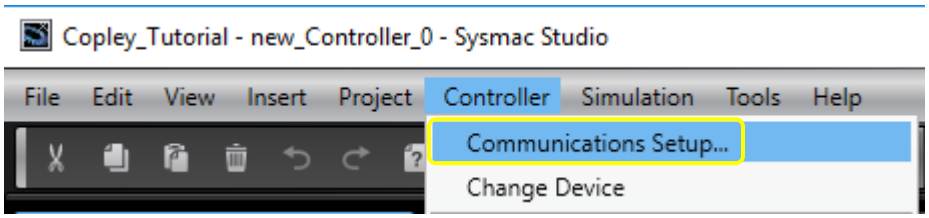
Click the "New Project" Button to create a new project in Sysmac Studio. Enter the Omron Master information and click "Create".



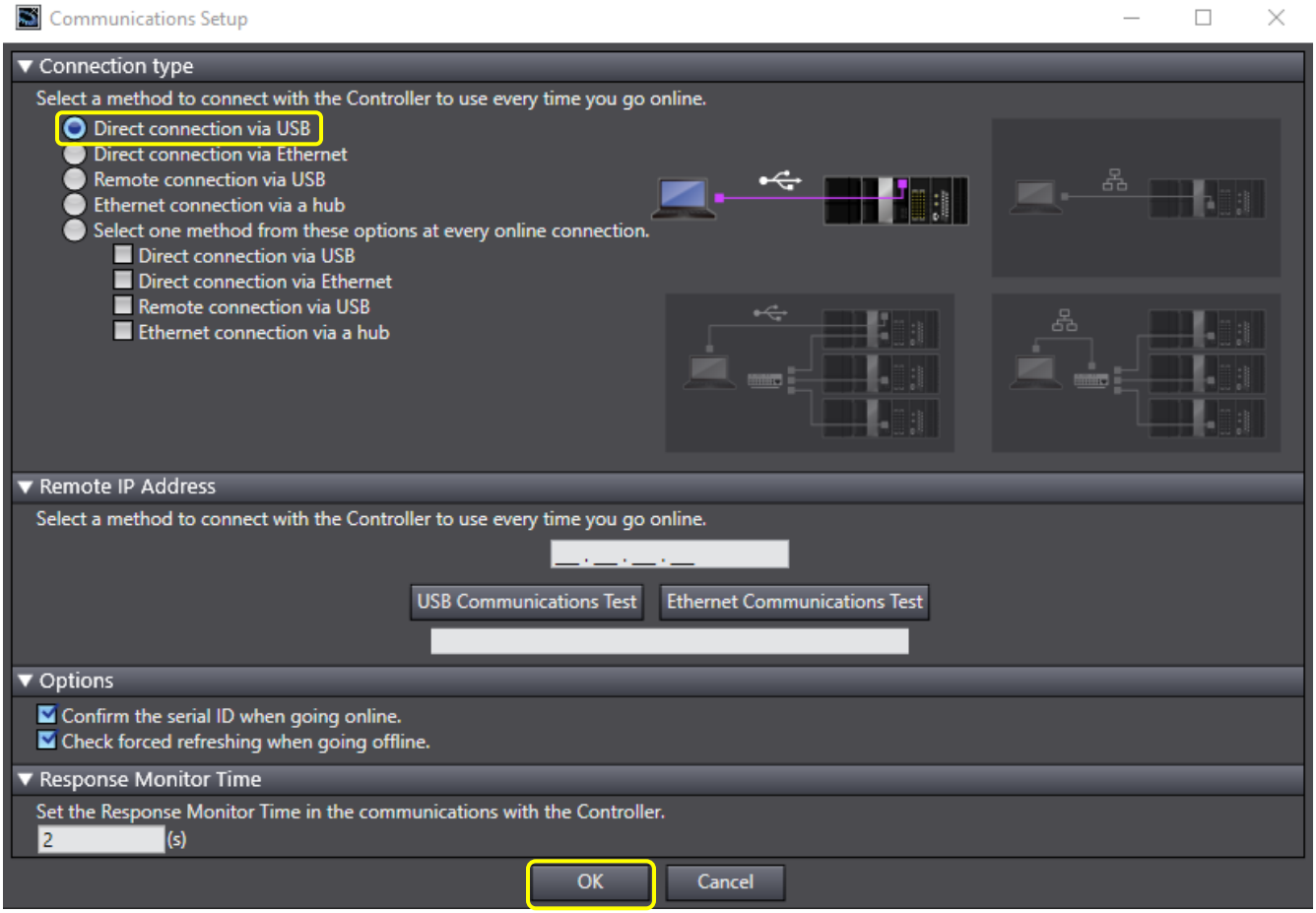
Double click on the EtherCAT Icon under the "Configuration and Setup" Tab on the left shown below.



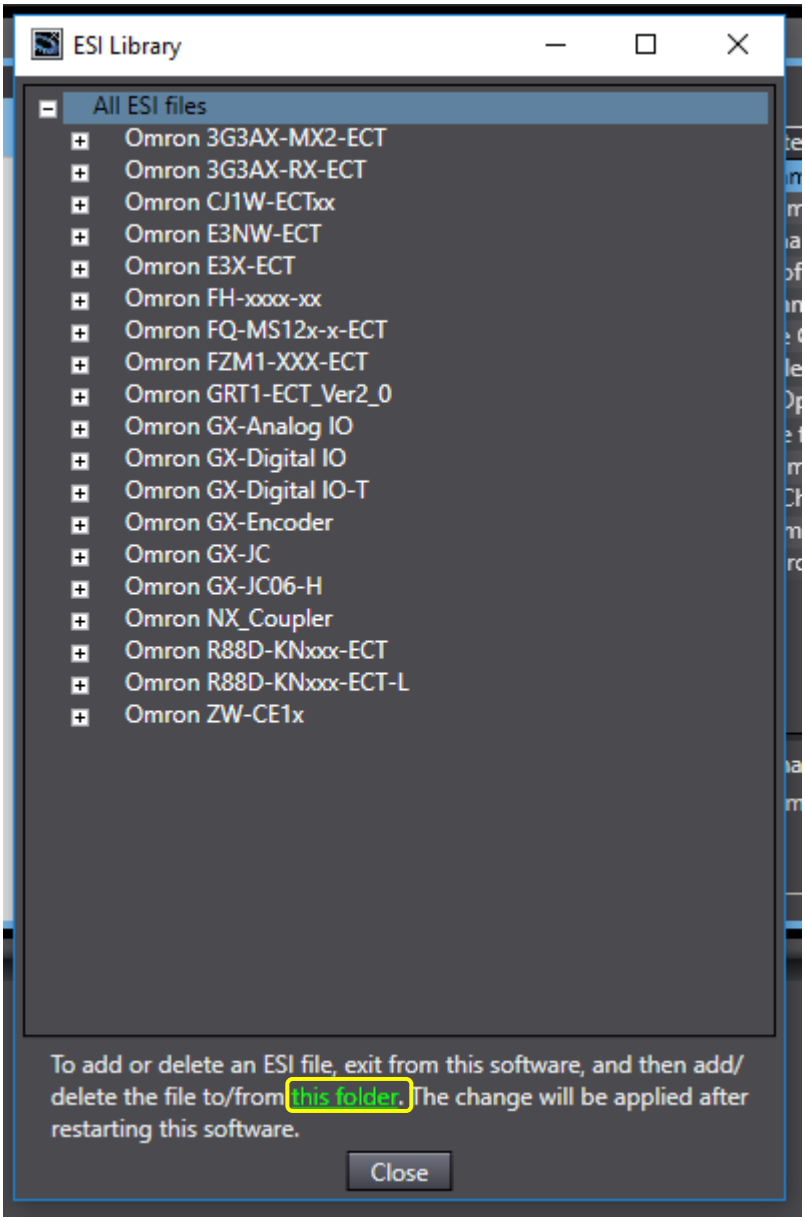
Next click on the Controller Tab in the toolbar at the top of the page and select "Communications Setup".



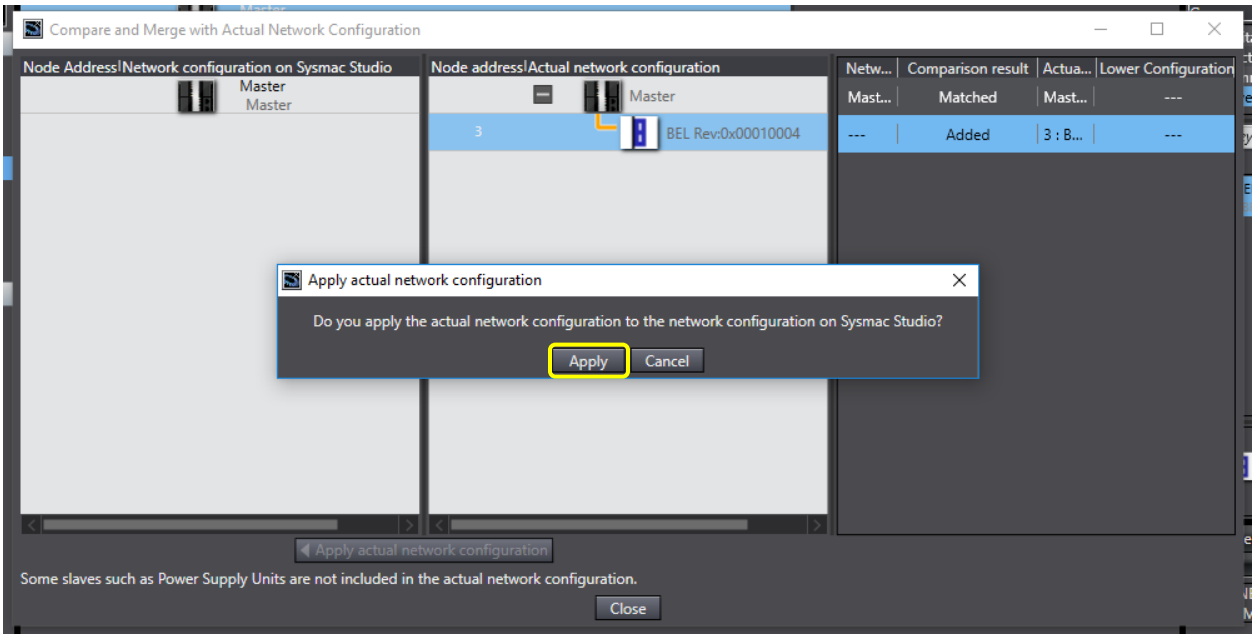
Check that the Omron Ethercat Master is powered on and connected to the PC through one of the following connection methods shown below under Connection type. The following example used "Direct connection via USB".



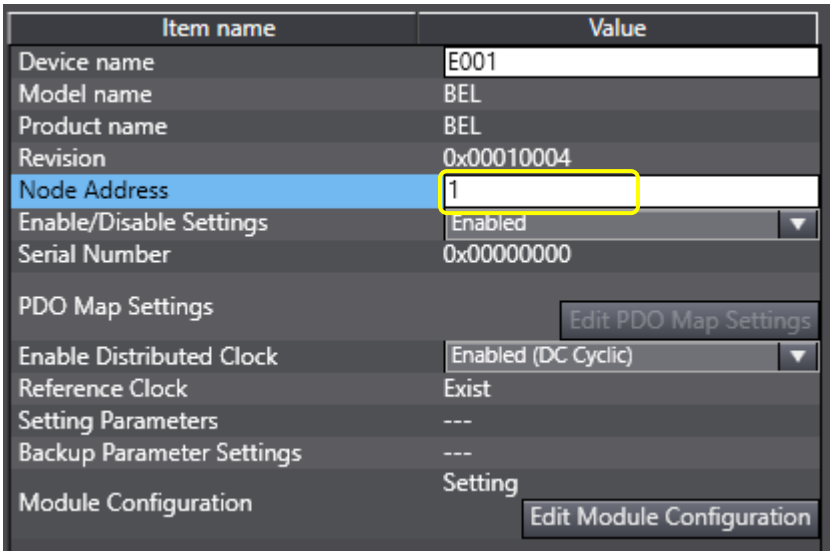
Right-click on the master icon and select “Display ESI Library”. Click on the underlined and highlighted words this folder at the bottom of the library. Paste the ESI files of any downstream devices on the network in this folder. Be sure that the ESI files support MDP Protocol (from Slots folder). Save your project and restart Sysmac for these changes to the ESI Library to take effect.



Open your saved project and right-click on the master icon. Select "Compare and Merge with Actual Network Configuration" followed by "Apply actual network configuration". Click "Apply".

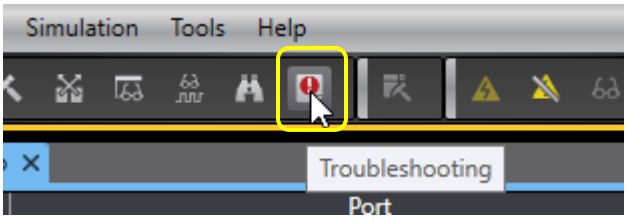


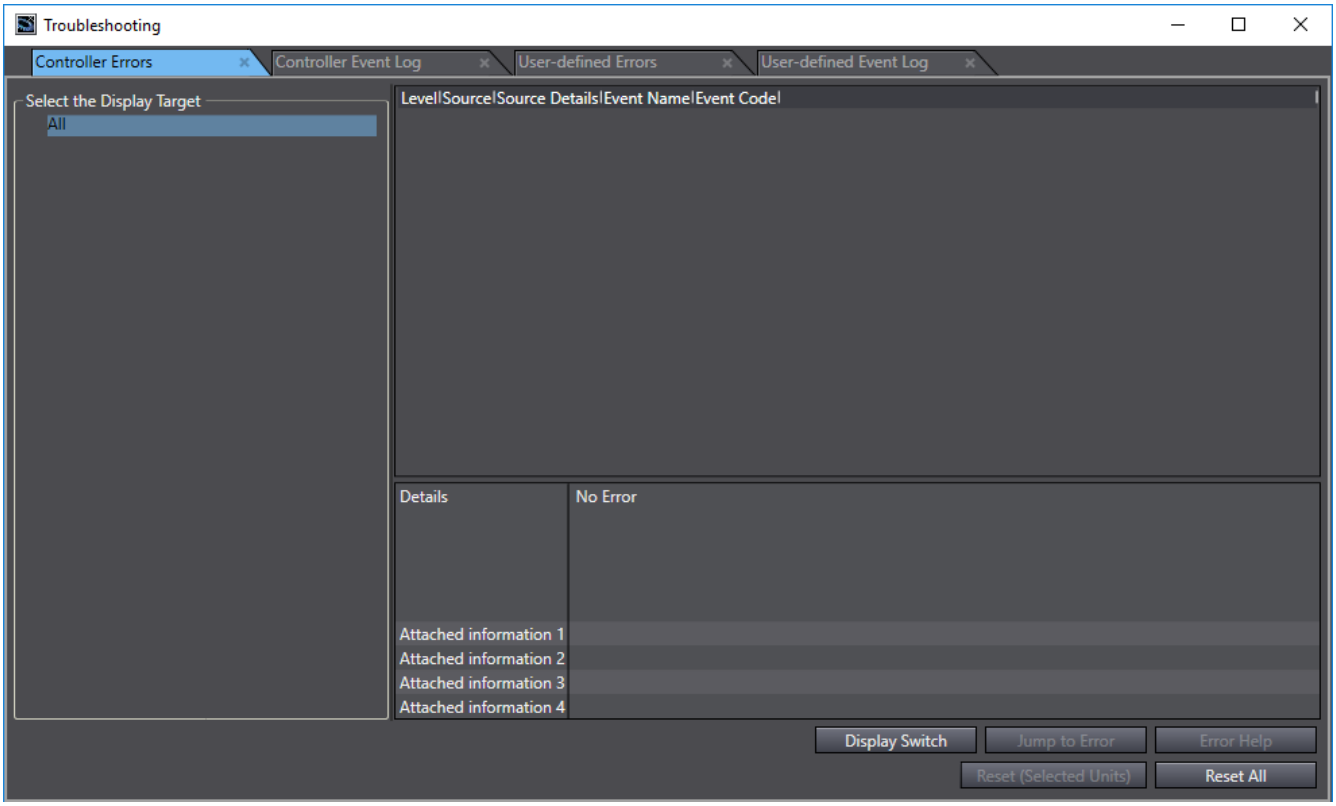
To set the Node Address, while the drive is selected in the EtherCAT Tab, edit the Node Address Textbox shown below and power-cycle the drive.



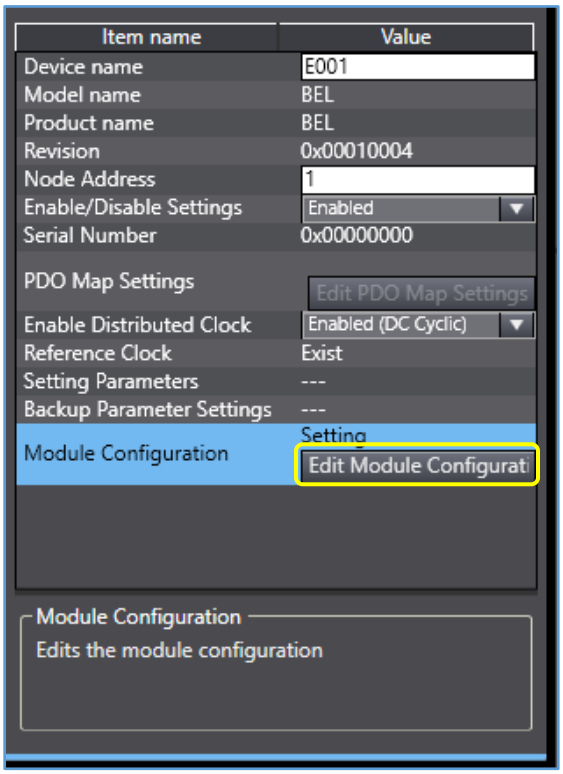
Error Log

To see any errors that may have occurred, click on the Troubleshooting Button to view the Controller Errors, Controller Event Log, User-defined Errors, or User-defined Event Log.





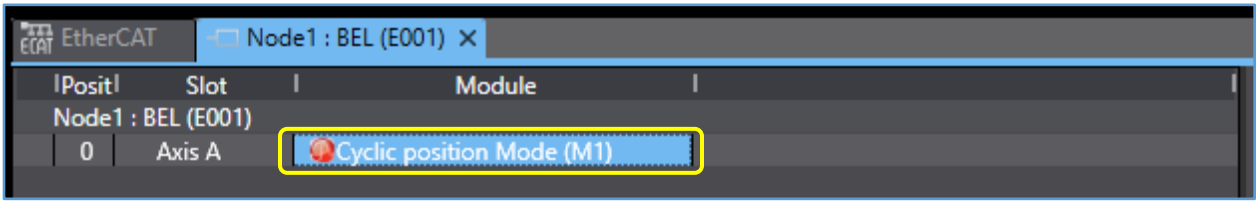
Assigning a Module to an Axis



To assign a module to each specific axis select the Copley Drive Icon under the Omron Master and then the "Edit Module Configuration" button shown in the picture on the left.

Click and drag the desired module from the Toolbox on the right to the desired axis module. Axis A of the BEL is mapped to CSP Mode shown in the Main Module Configuration Screen below.

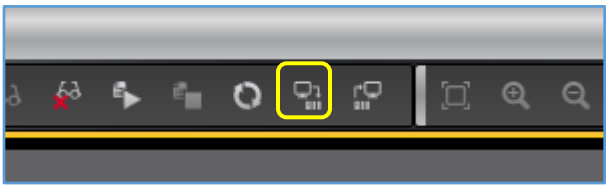
Main Module Configuration Screen



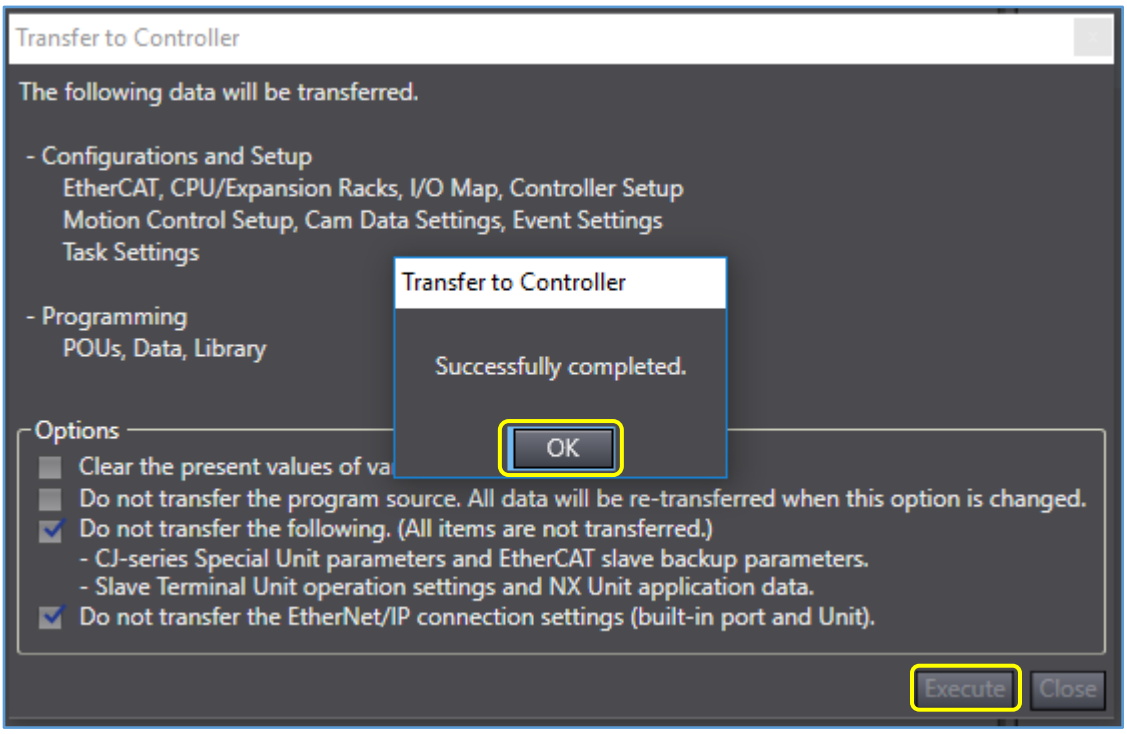
Click the Online Button followed by the Download To Controller Button both shown below.

Online Button

Download to Controller Button

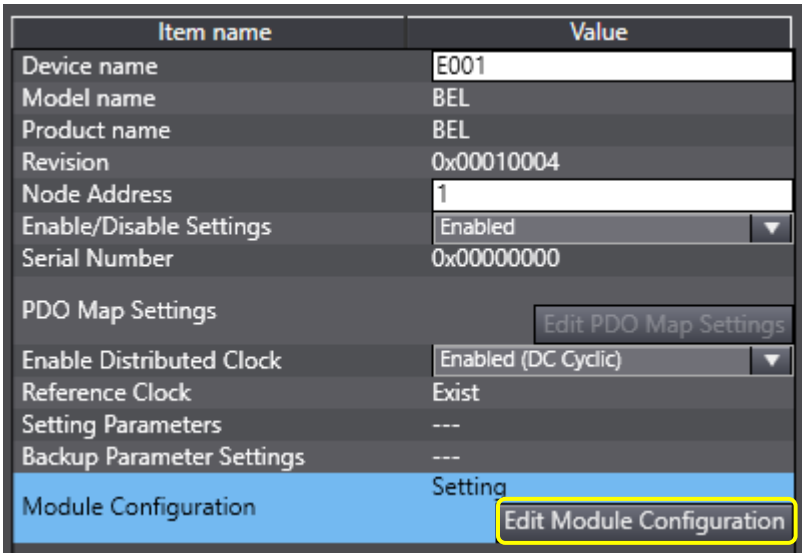


After Downloading Select Execute and OK.

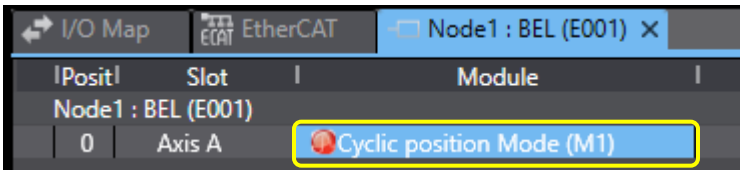


Edit PDO Mapping

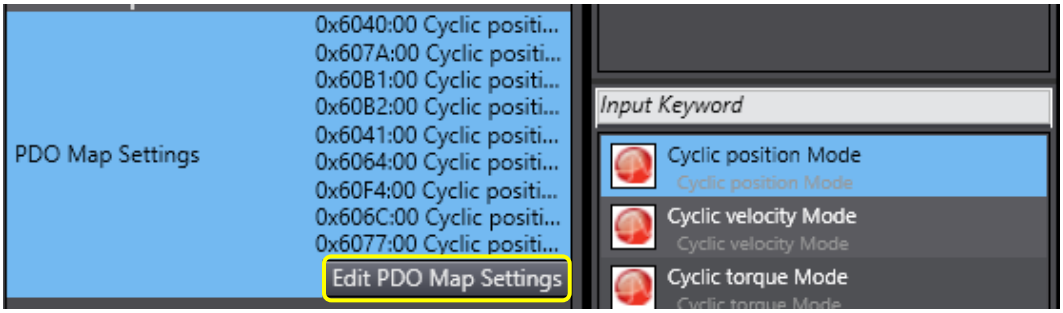
Double click on the EtherCAT tab under Configurations and Setup in the Multiview Explorer. Select the drive under the master and click the Edit Module Configuration Button.



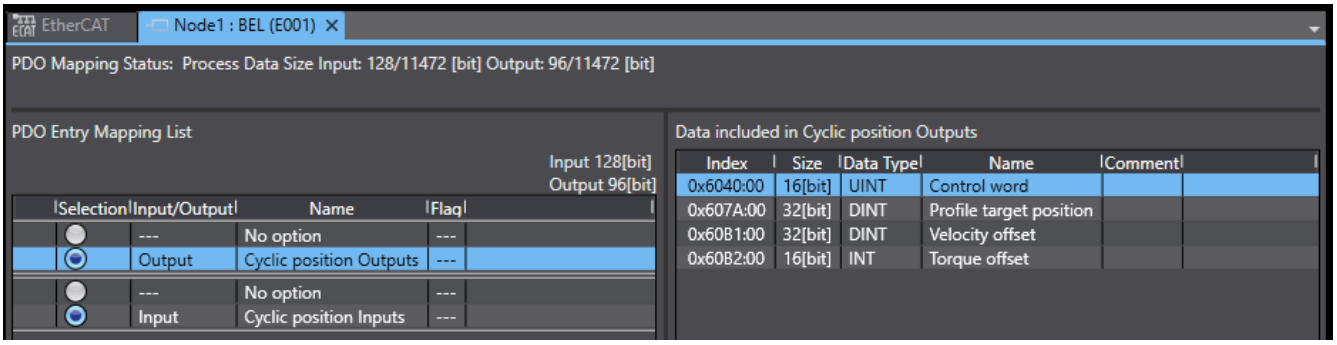
Select the Cyclic Position Mode (M1) Module.



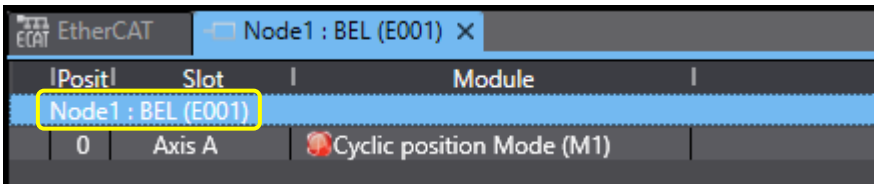
Select Edit PDO Map Settings on the right to view, enable or disable the fixed PDO's associated with this axis.



The PDO map settings here are fixed, and therefore, cannot be edited.

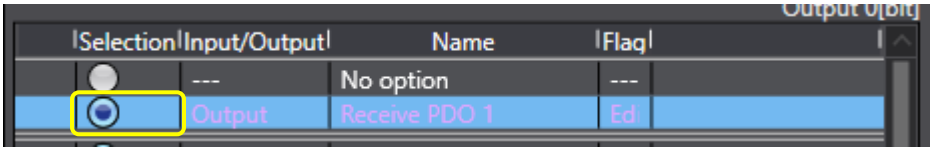


Click OK and return to the Main Module Configuration Screen. To edit the user mappable PDO's for the device, select the desired node and click the Edit PDO Map Settings Button on the right.



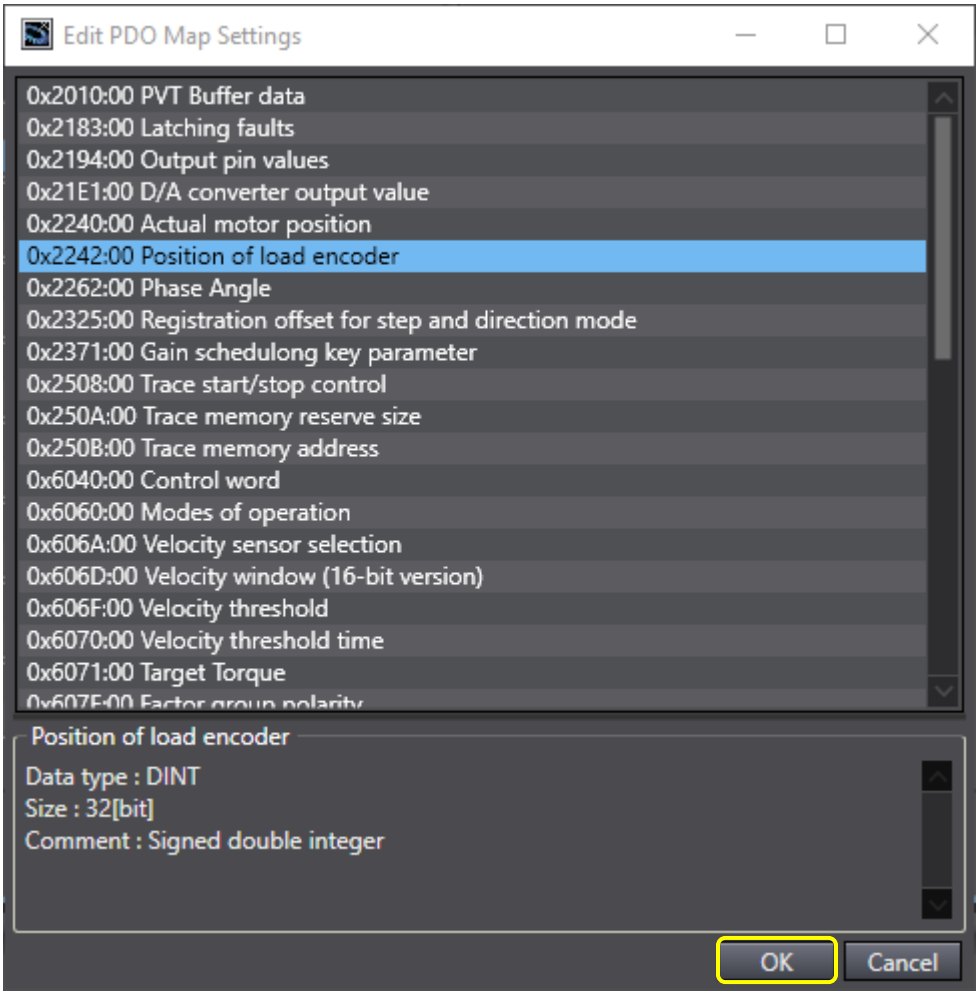
The full list of editable RxPDO's and TxPDO's is displayed.

Select Receive PDO 1.



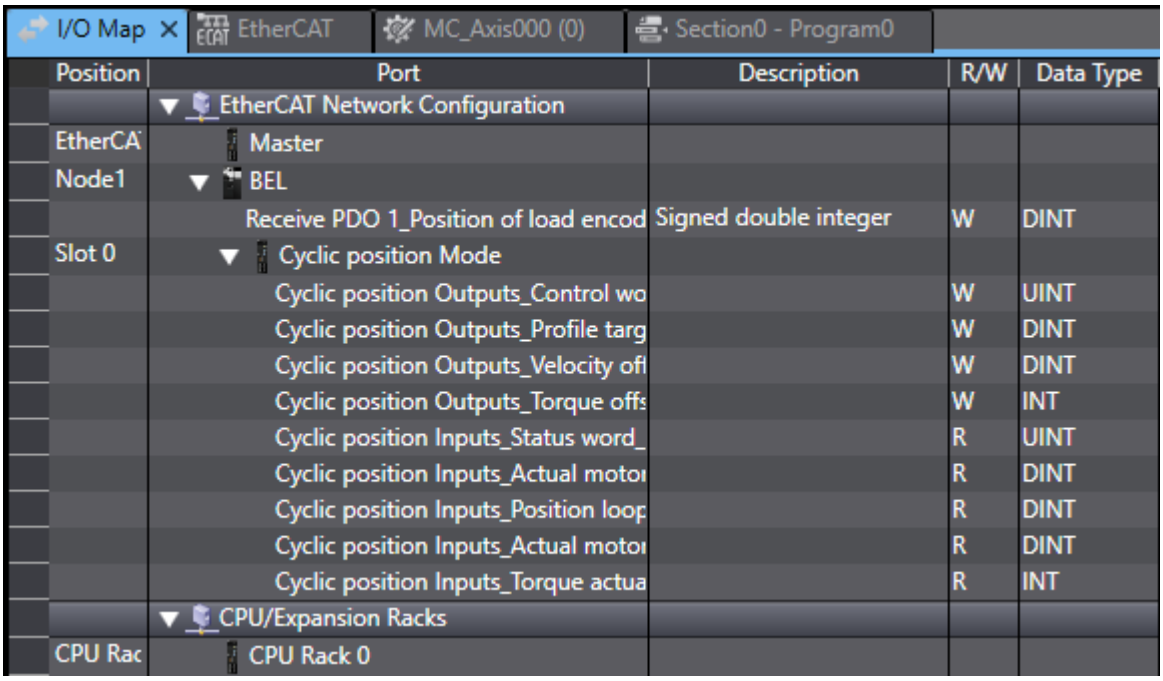
Select the Add PDO Entry Button on the bottom right.

Select objects to map to the RxPDO and click OK.



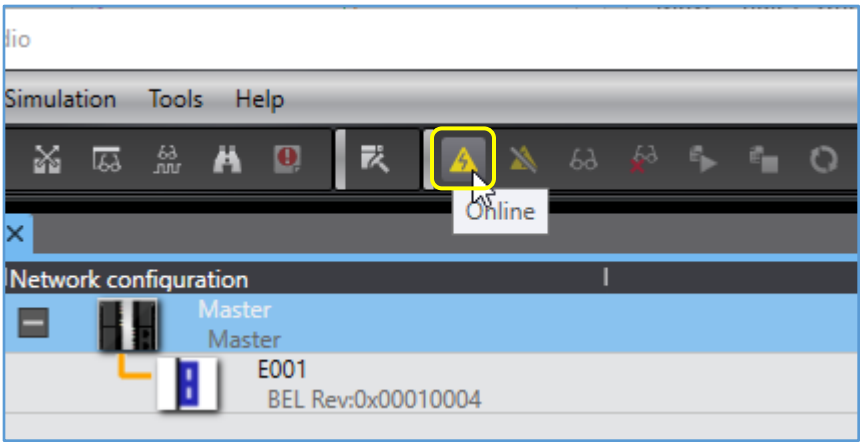
Click the Apply Button on the bottom right to apply the changes to the PDO Map Settings then click OK.

Select the I/O Map tab in the Configurations and Setup Menu to view the changes to the PDO Mapping.

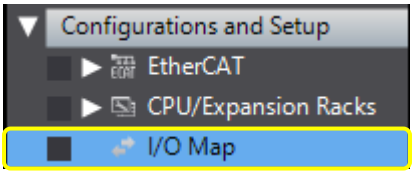


View and Edit PDO Cyclic Data

Click the Online Button shown below.

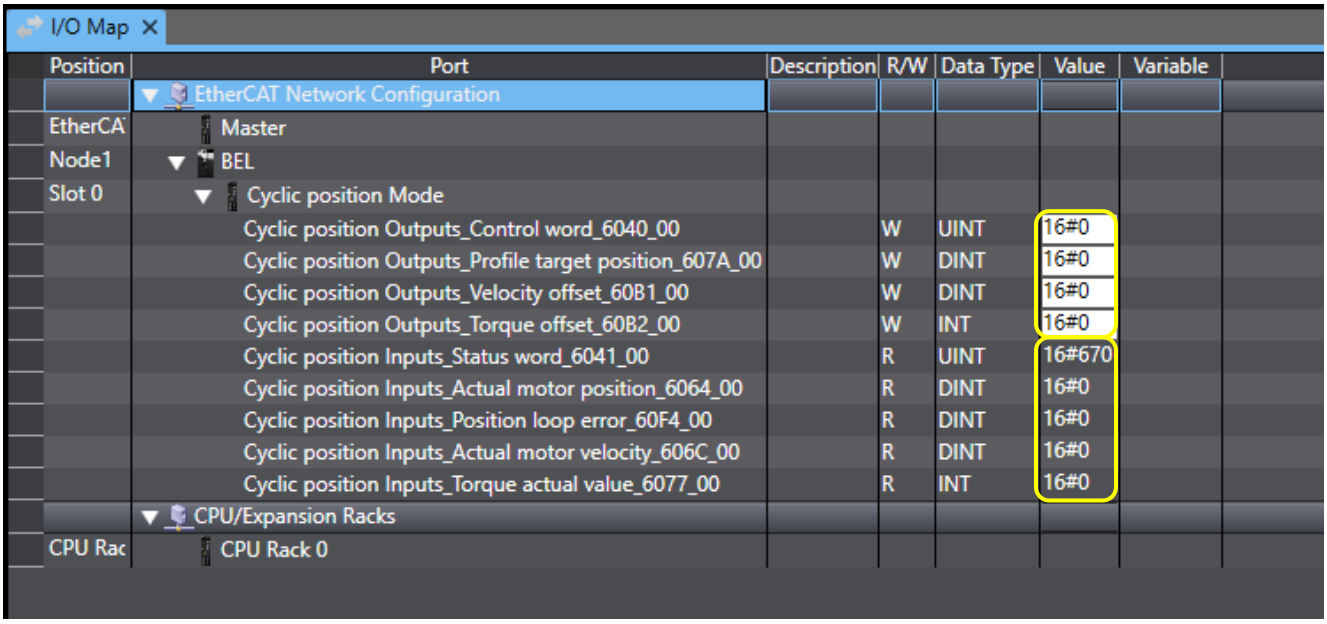


Navigate to the I/O Map under the Configurations and Setup Tab on the left.



A live feed of the cyclic data used by the selected module (CSP Mode) is displayed there. The data sent to the drive (RxPDO's) can be edited here for testing purposes. A live feed of the data sent by the drive to the master (TxPDO's) is also shown here.

Select a Monitor Type of Hex on the bottom left of the I/O Map.

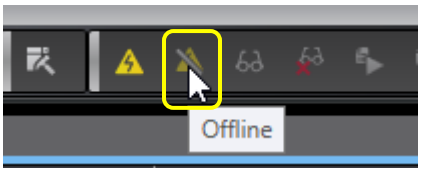


If it is safe to do so and as a test, try enabling the drive by writing "16#F" to the Control Word (CANopen Object 0x6040) and view the change in the Status Word.

If there are no faults present in the drive, the status light for the axis should be solid green (drive enabled). A change in the Status Word should also have occurred.

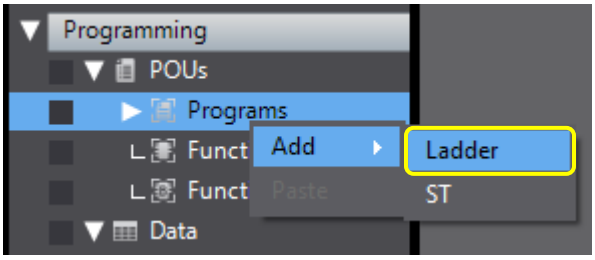
Send SDO's (Acyclic Data)

Click the "Offline" button.

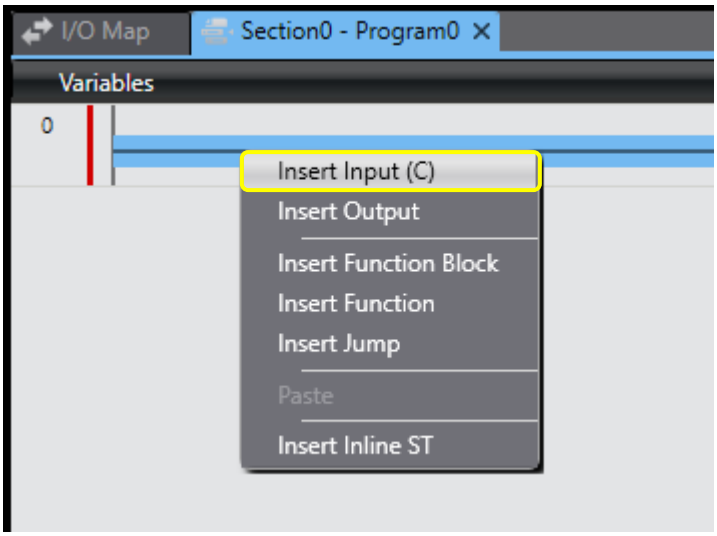


Create a POU Program to send an SDO. Navigate to Programming > POUs > Programs.

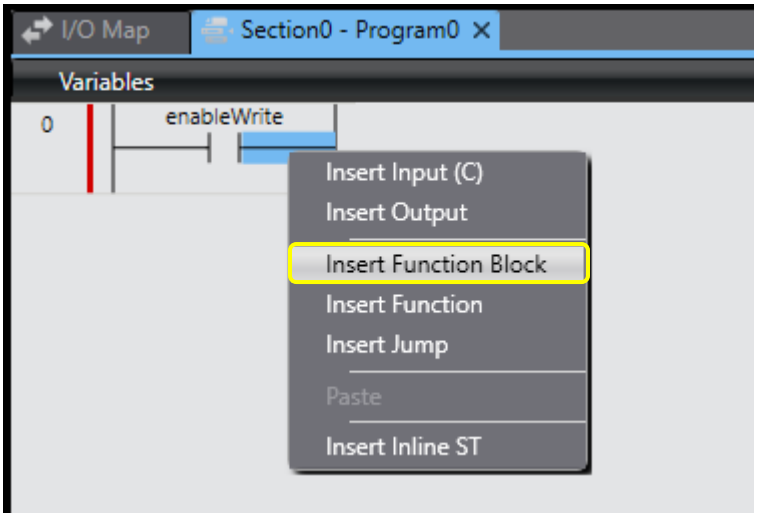
Right click Programs > Add > Ladder.



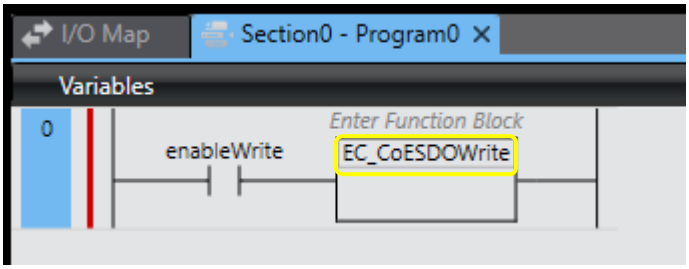
Right click the rung and select "Insert Input (C)" and name the contact.



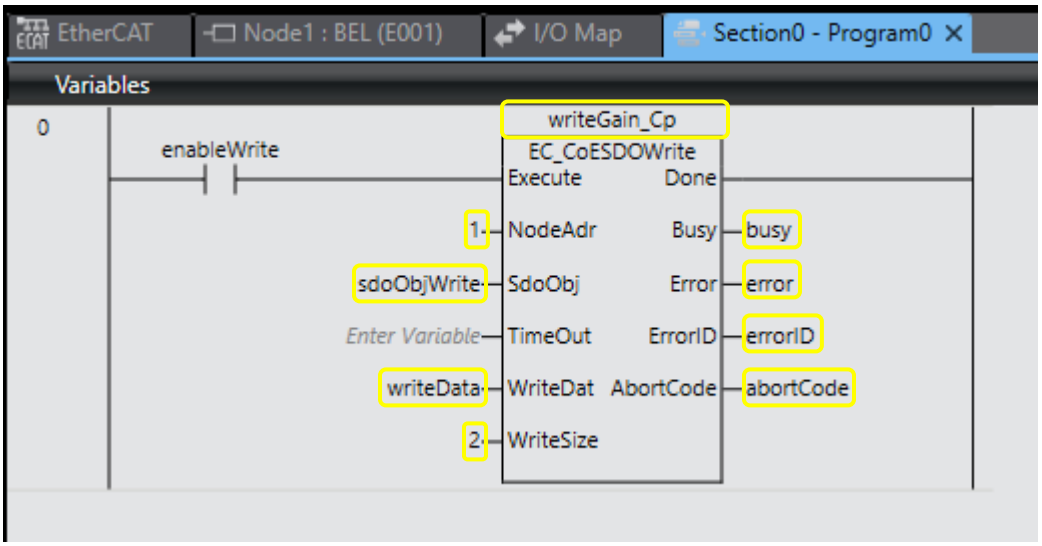
Right click to the right of the contact on the rung and select “Insert Function Block”.



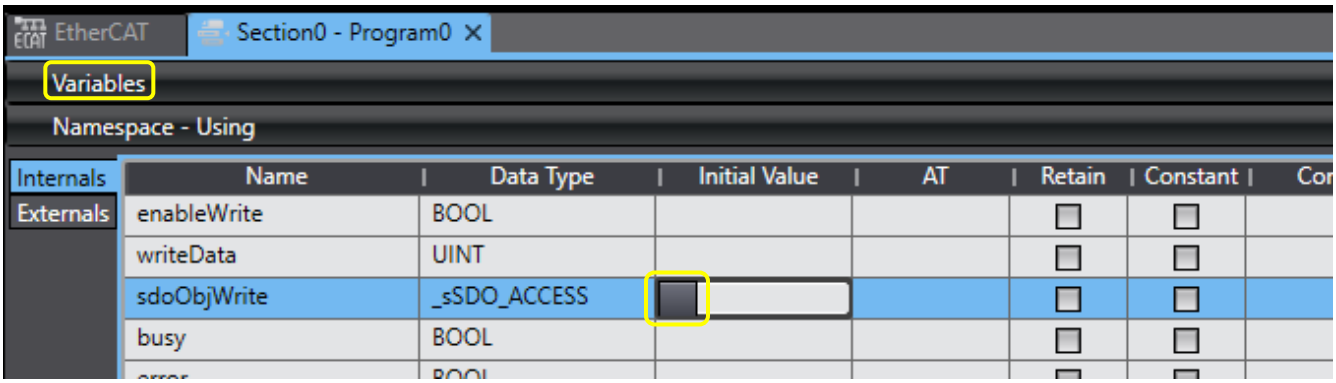
Type within the Function Block: “EC_CoESDOWrite” and press enter.



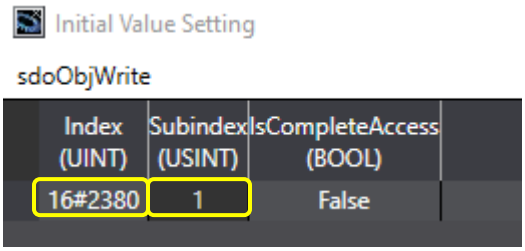
Fill in the data as shown below. The writeData variable type is UINT.



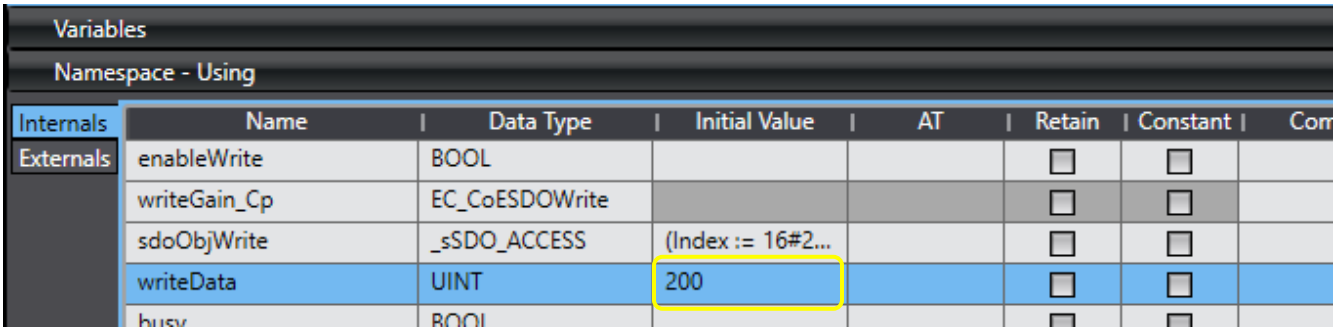
Click on the Variables Menu shown below. Double click in the empty cell sdoObjWrite "Initial Value". Click on the box located on the left side of the cell.



Enter the CANopen Object information and click OK. The Current Loop Proportional Gain is Object 0x2380 sub-index 1.

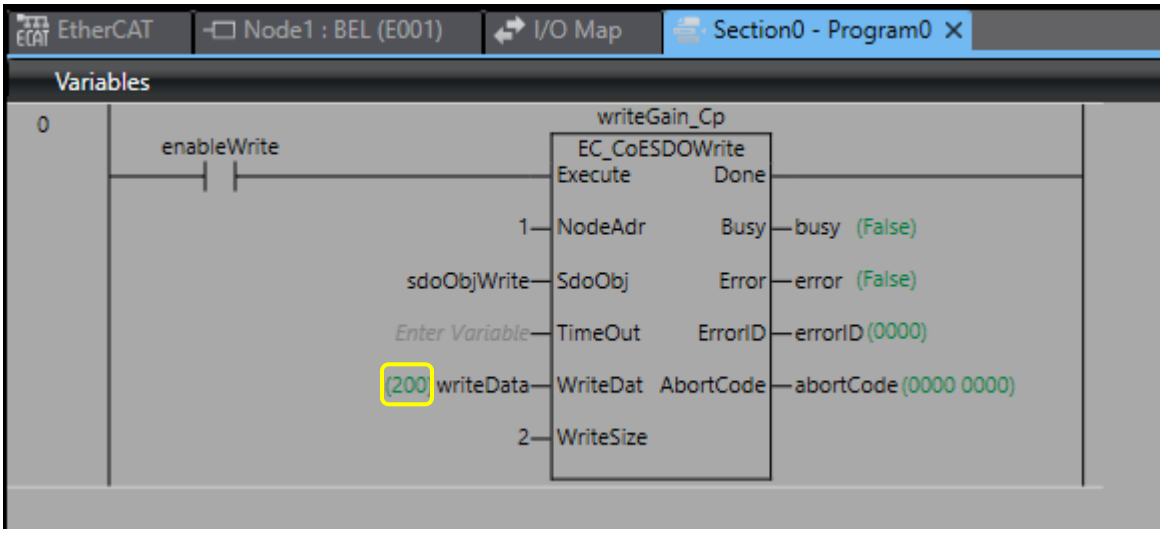


Enter the data to be sent to the CANopen Object in the writeData variable's Initial Value Column shown below.

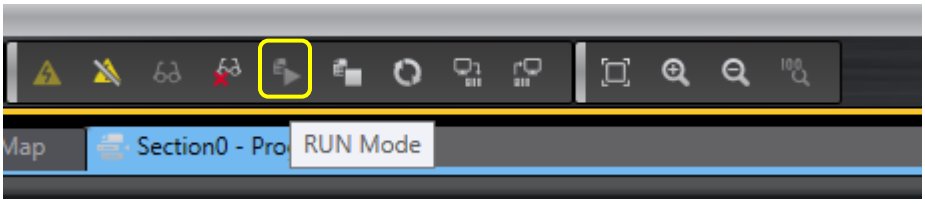


Press the Online Button then the Download to Controller Button. Collapse the Variables Menu by clicking on it again.

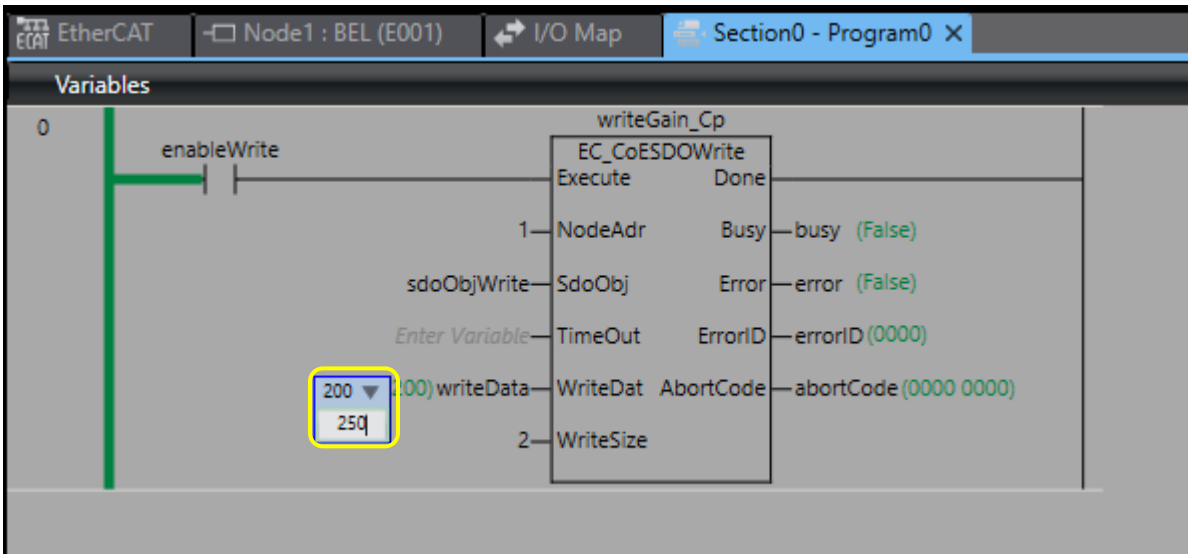
The writeData variable should now have a default value of 200.



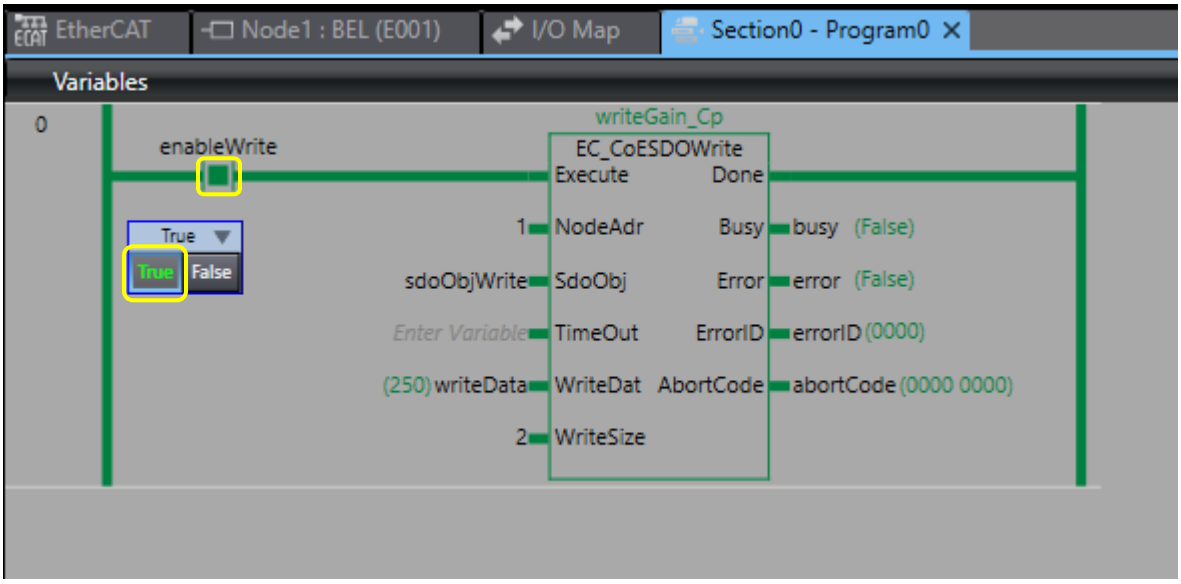
Click the RUN Mode Button shown below.



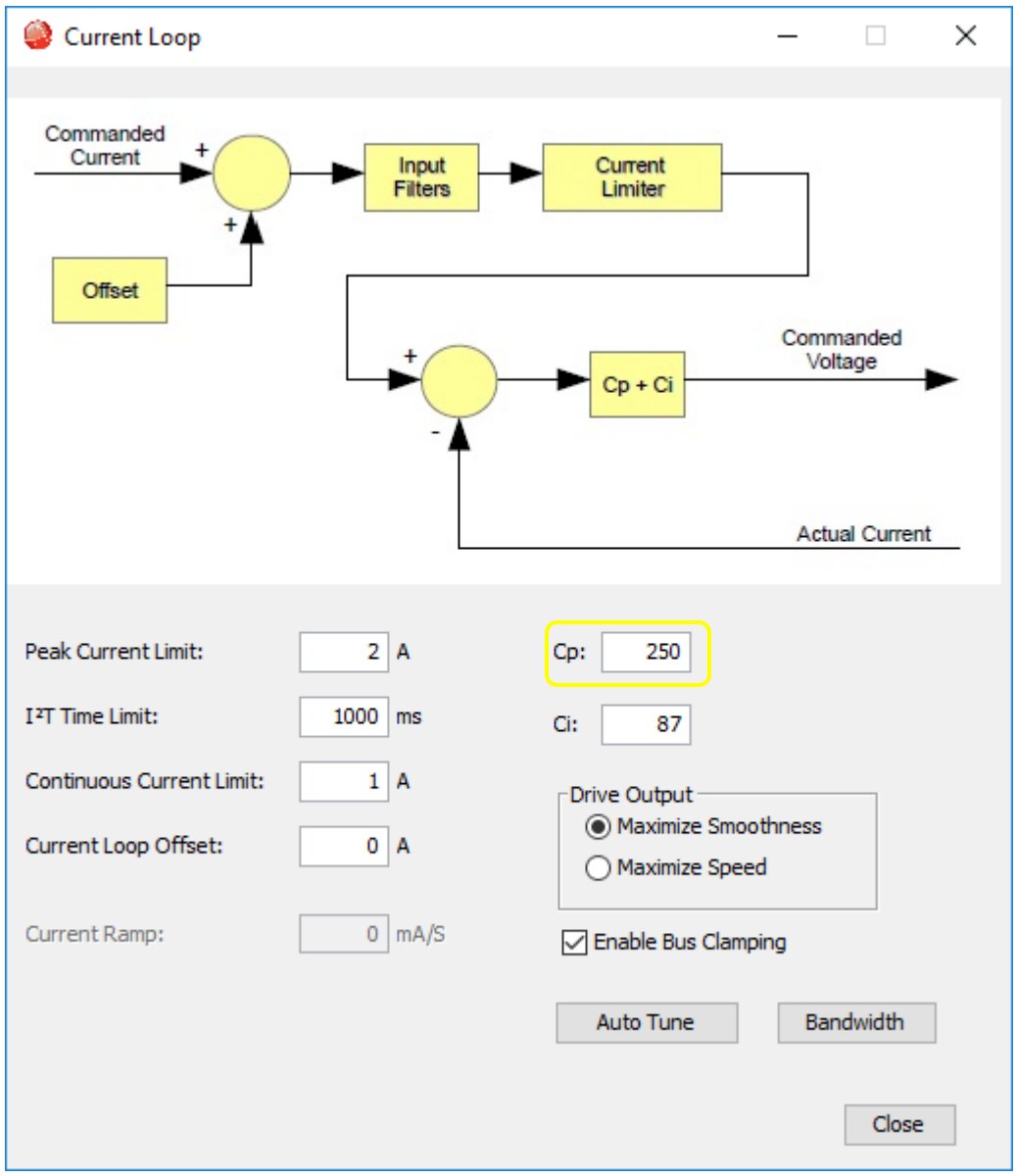
The writeData variable can be edited while the program is running by double clicking it and entering a new value. The value of the writeData variable below was changed from 200 to 250.



To send the SDO, click on the gap of the enableWrite Input and click “True”.



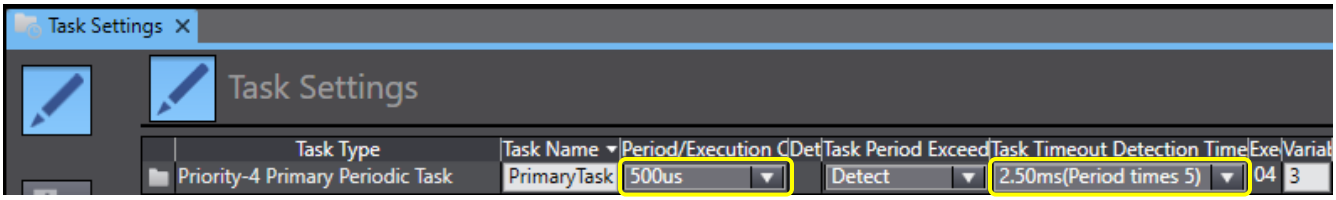
To check that the SDO was sent and that the Current Loop Proportional Gain was set to 250, connect the drive to CME. The drive can be connected to CME over serial for monitoring purposes while Sysmac is controlling the drive over EtherCAT. Do not use CME to command the drive because the drive can have only one master controlling it at one time. The Current Loop Proportional Gain was indeed set to 250 shown in the Current Loop Screen in CME.


Current Loop
Commanded Current
+
+
Input Filters
Current Limiter
Offset
+
-
Cp + Ci
Commanded Voltage
Actual Current
Peak Current Limit:
2
A
I²T Time Limit:
1000
ms
Continuous Current Limit:
1
A
Current Loop Offset:
0
A
Current Ramp:
0
mA/S
Cp:
250
Ci:
87
Drive Output
Maximize Smoothness
Maximize Speed
Enable Bus Clamping
Auto Tune
Bandwidth
Close

Edit Watchdog Timer

Navigate to the Task Settings Menu under Configurations and Setup in the Multiview Explorer.

The Watchdog Timer is the same as the Task Timeout Detection Time and is calculated by multiplying the Period/Execution Time by the Task Timeout Detection Multiplier. The Watchdog Timer is displayed in the Task Timeout Detection Time along with the multiplier. Edit either the Period or the multiplier to change the Watchdog Timeout Value. For example, if the Period/Execution Rate is every 500us and the Task Timeout Detection Multiplier is set to "Period times 5", then the Watchdog Timeout Value is 2.50ms.



Revision History

Date	Version	Revision
11/27/2019	Rev 00	Initial release