

Using Synapticon TwinCAT3 Library - Demo

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3. Overview

This document provides an example of how to use all of the Synapticon TwinCAT3 library function blocks.

NOTE

This is an *Application Note*. Variables used and function blocks descriptions are provided in the [TwinCAT3 Motion Control Library for Synapticon Drives](#) documentation.

3.1. Prerequisites

- TwinCAT3 XAE Engineering Environment (version > 3.1.4020)
- Configured PLC or installed TwinCAT adapter for your Ethernet card (if using a software PLC)
- Correct ESI file from the drive copied to `C:\TwinCAT\3.1\Config\Io\EtherCAT` (or another folder if TwinCAT does not use the default installation location or settings)

4. Steps for Setting Up the Library and Demo

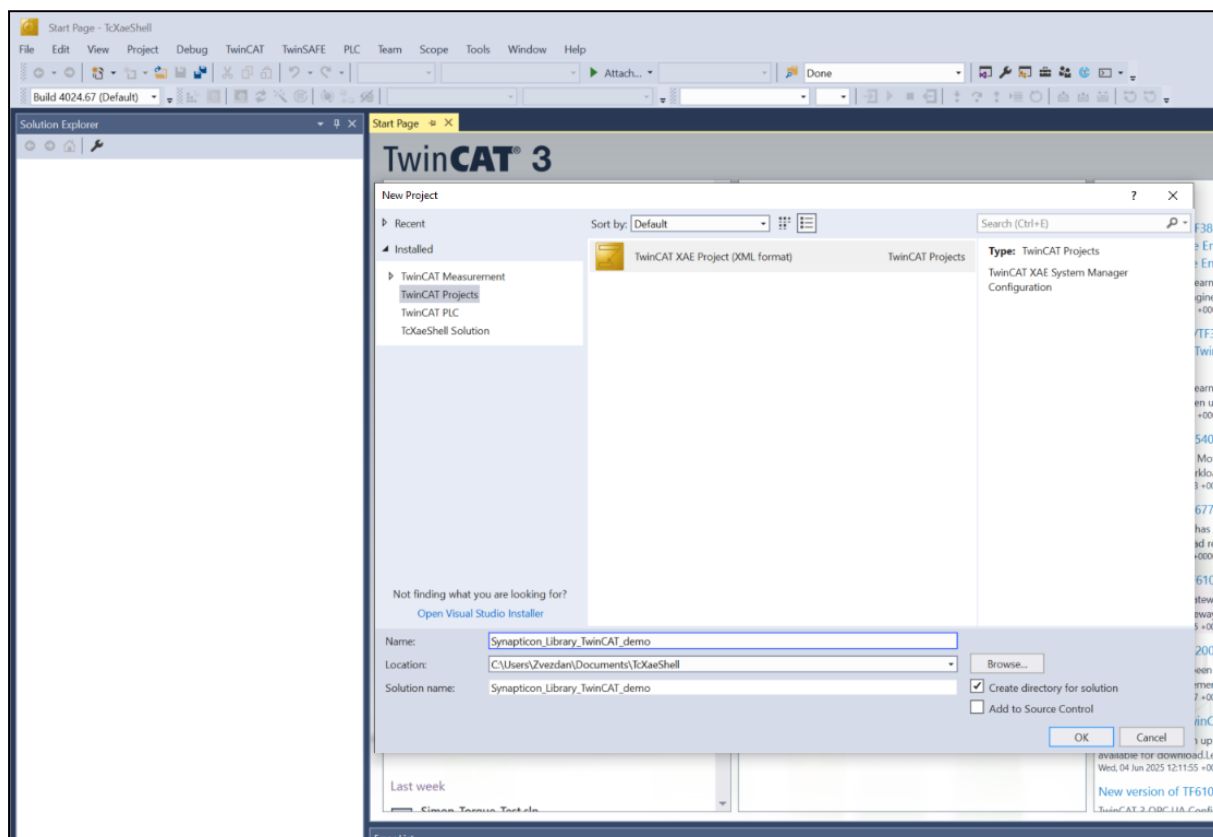
This section explains the initial creation of a TwinCAT project and the integration of the motion control library - a step-by-step guide on how to set up a TwinCAT project to use the Synapticon motion control library for CiA 402 compliant drives, such as SOMANET.

4.1. Creating a New TwinCAT Project

First, a new TwinCAT XAE project must be created. This will serve as the container for your PLC logic and system configuration.

To do this:

1. Open the TwinCAT XAE environment.
2. Go to *File > New > Project*.
3. From the *New Project* dialog box, select:
TwinCAT Projects > TwinCAT XAE Project and name the project, for example: Synapticon_Library_TwinCAT_Demo.

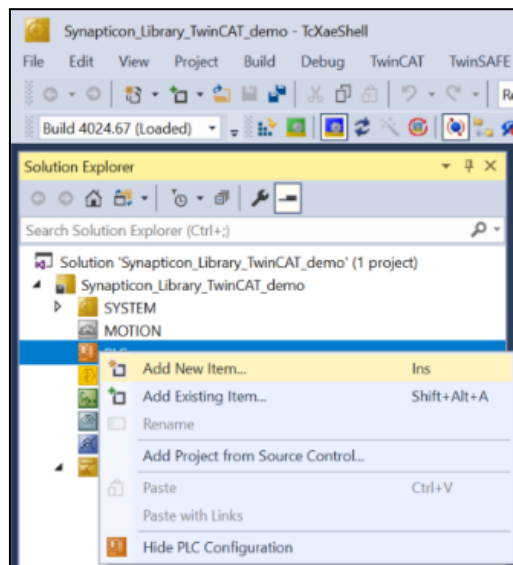


4.2. Adding a PLC Project

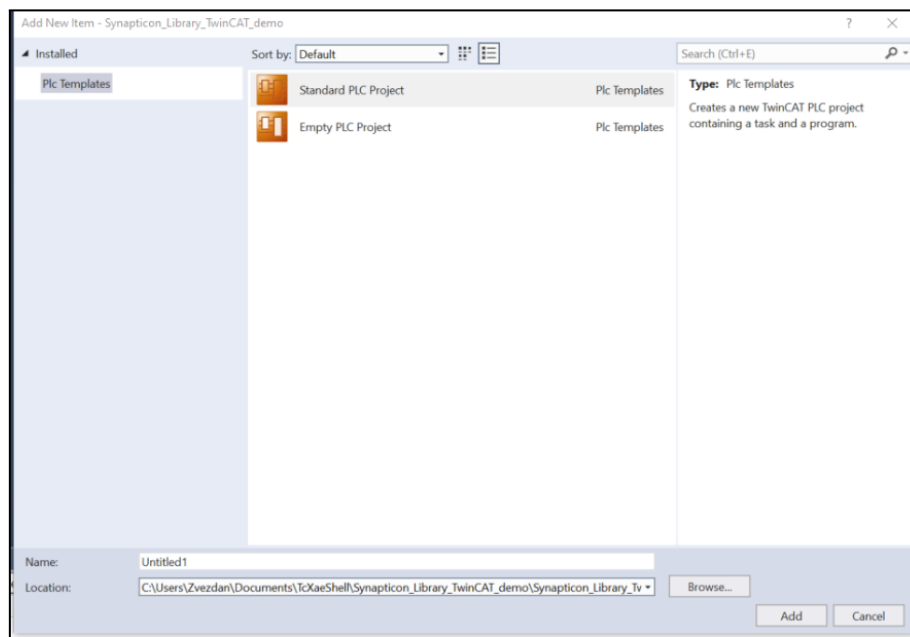
Once the main solution is created, add a standard PLC project where your application logic will reside.

To do this:

1. In the Solution Explorer, right-click on the *PLC*.
2. Select **Add New Item....**



3. Select **Standard PLC Project**.

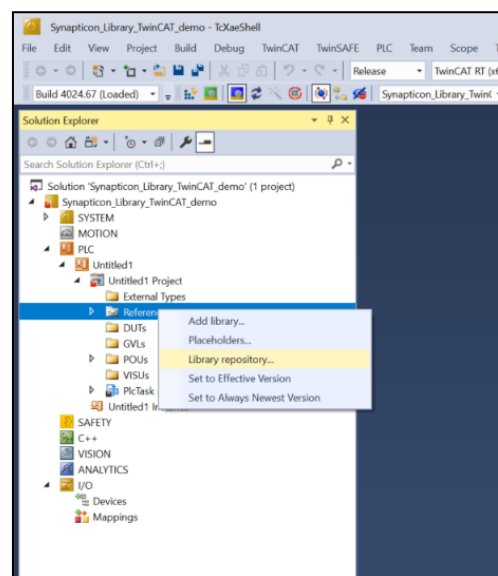


4.3. Installing the Motion Library

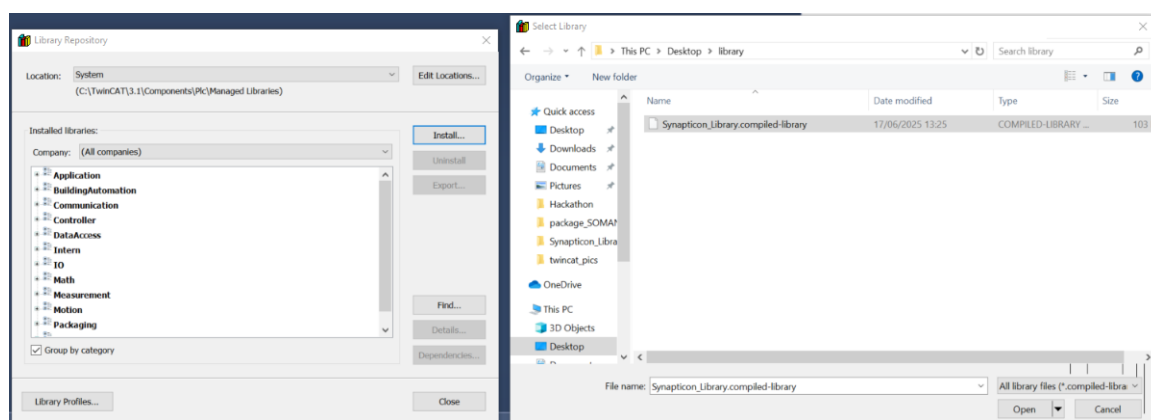
To use the function blocks, you must first install your compiled motion control library (*.compiled-library* file). Once installed, this library is available for all of your future projects.

To do this:

1. In the Solution Explorer, right-click on the *References* folder within your newly created PLC project.
2. Select **Library repository**.



3. Click the **Install** button and browse to the location of your *.compiled-library* file, select it, and click **Open**.



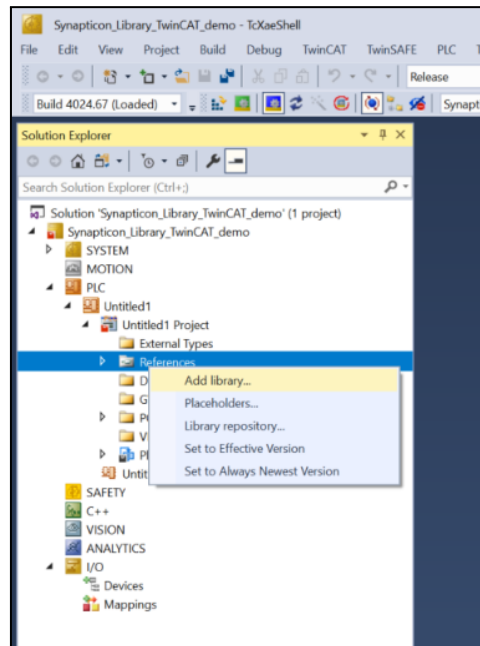
4. Close the dialog box.

4.4. Referencing the Motion Library

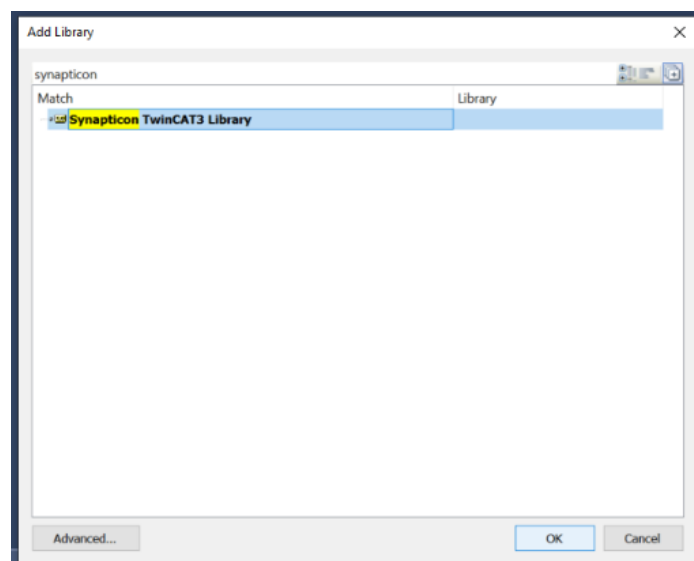
To use the installed library in your project, you must reference it.

To do this:

1. In the Solution Explorer, right-click on the *References* folder within your newly created PLC project.



2. Select **Add library**.
3. Search for "Synapticon" in the dialogue box to find the library among all the installed libraries; select it and confirm by clicking **OK**.



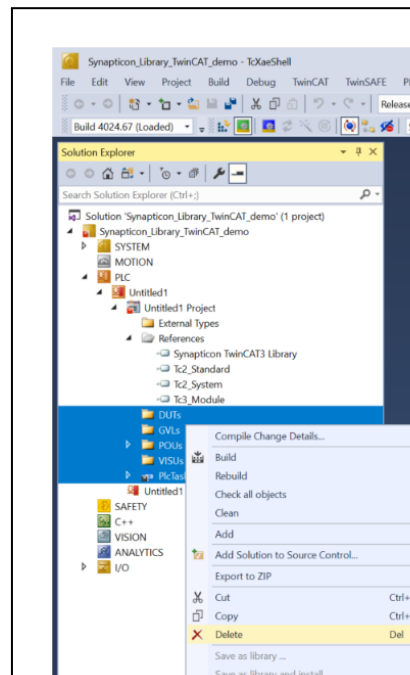
4. The library is now ready to be used in your project.

4.5. Importing the Demo Project

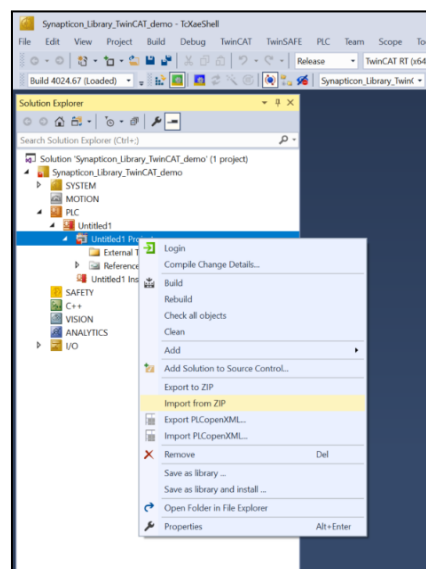
To use the demo project that demonstrates the use of all of the function blocks from the library, some of the default files from the standard project must be deleted.

To do this:

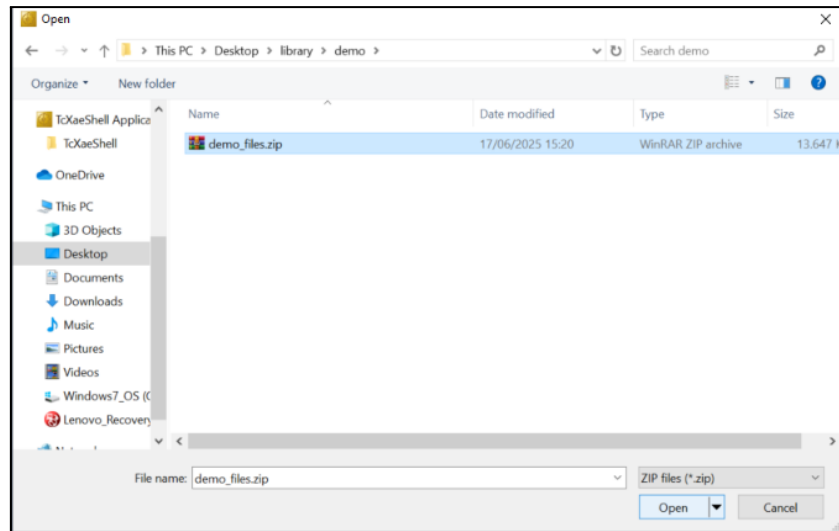
1. In the Solution Explorer, select DUTs, GVLs, POU's and VISUs and PlcTask, right click and select **Delete**.



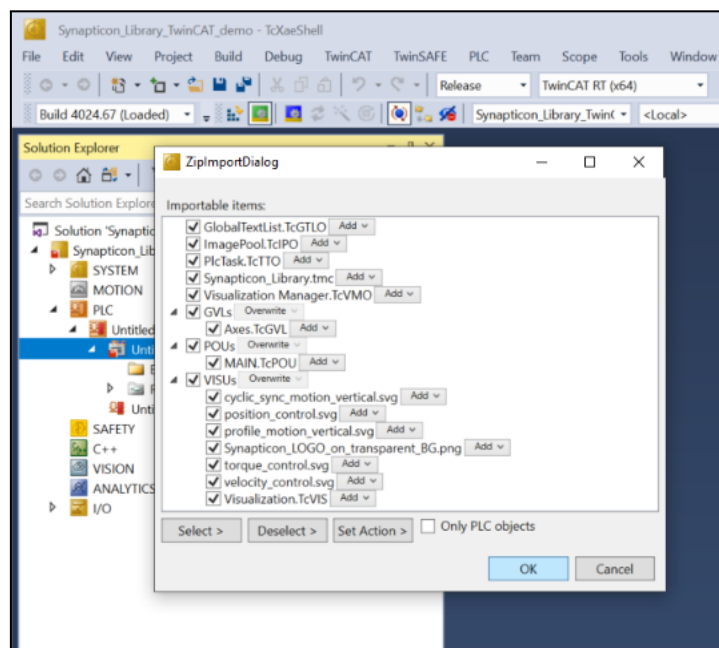
2. In the Solution Explorer, right click on your project and select **Import from ZIP**.



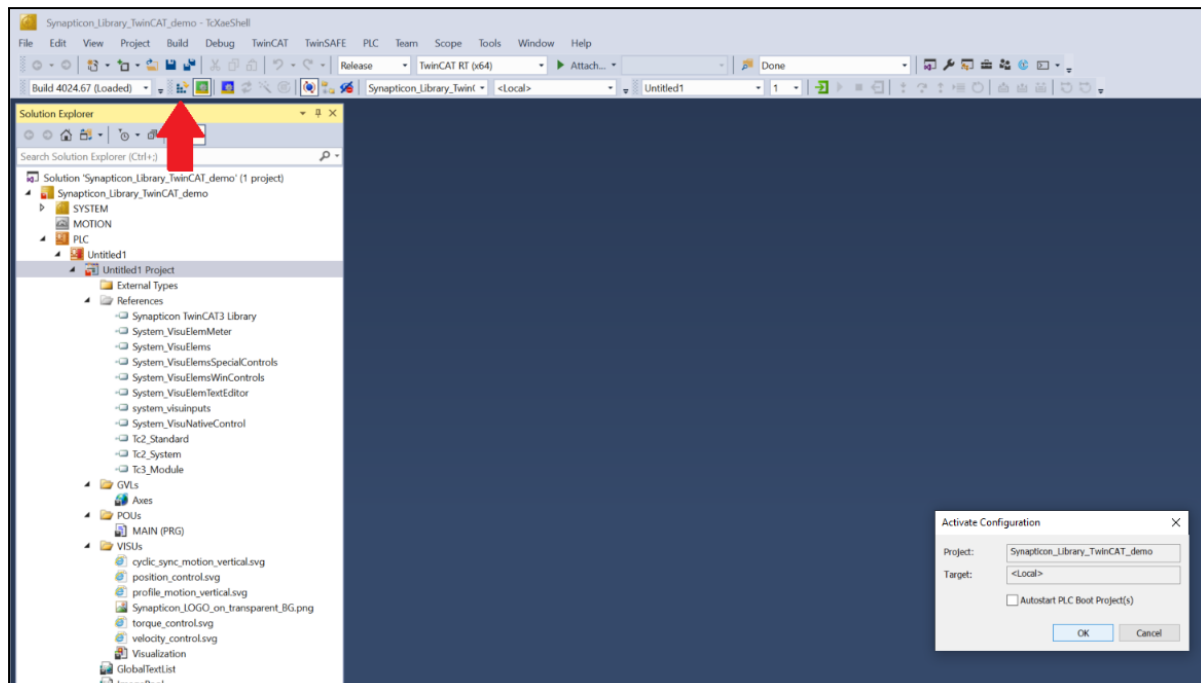
3. Browse to the location of your *demo_files.zip* file, select it, and click **Open**.



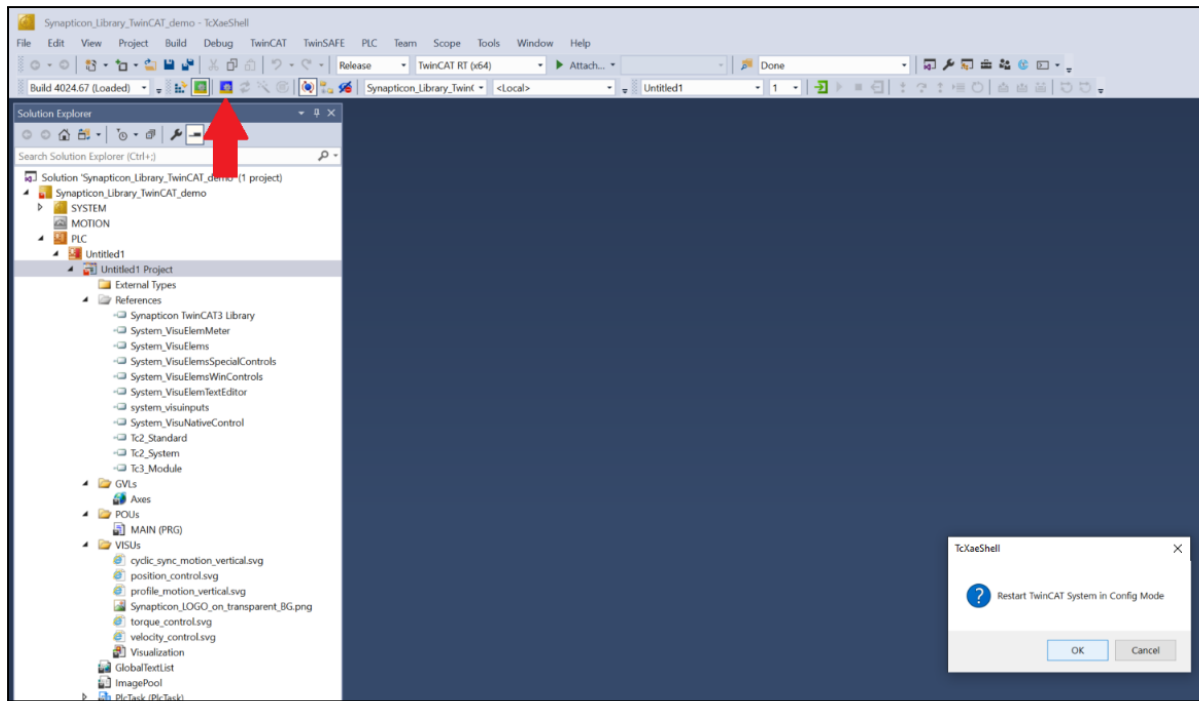
4. The *ZipImportDialog* box opens. Leave the settings as displayed in the image and select **OK**.



5. To compile the code, press the **Activate Configuration** button one time (identified by the red arrow) and confirm by selecting **OK**.



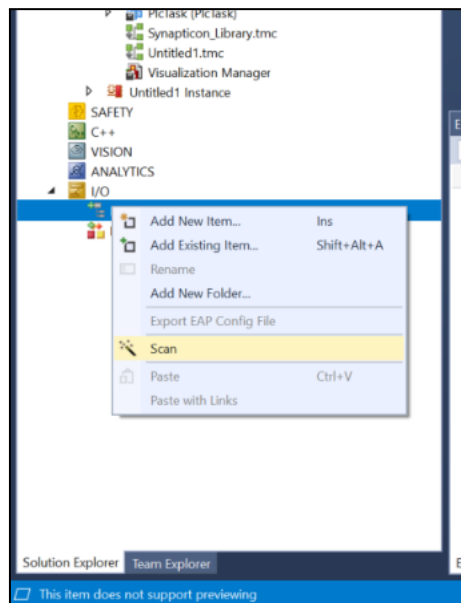
6. To search for the connected devices, activate **Config Mode** by pressing the button identified by the red arrow, and confirm by selecting **OK**..



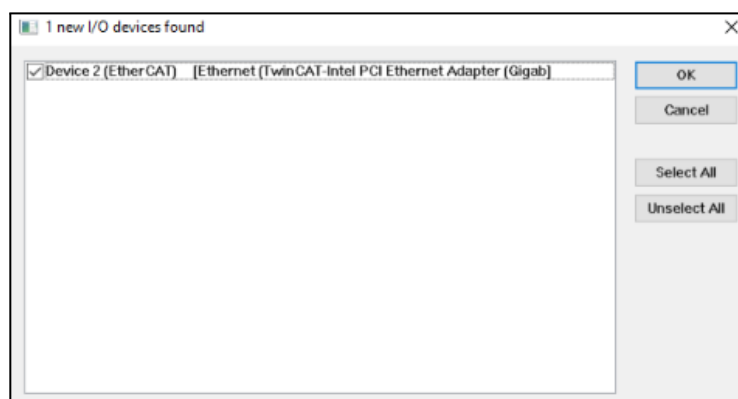
4.6. Scanning for Devices

To scan for devices:

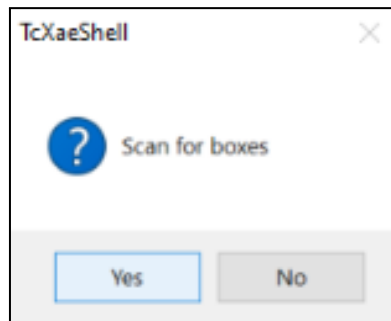
1. Navigate to the I/O section in the Solution Explorer.
2. Right-click on *Devices* and select Scan.



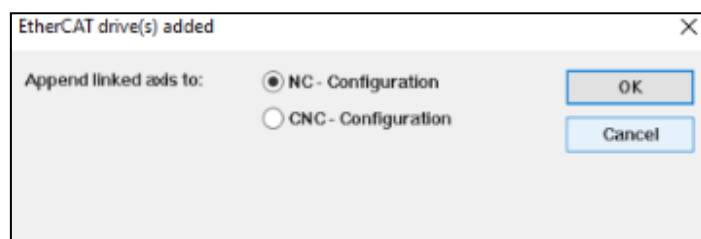
3. TwinCAT scans the EtherCAT network. If an I/O device is found, it will be displayed. Confirm by pressing **OK**.



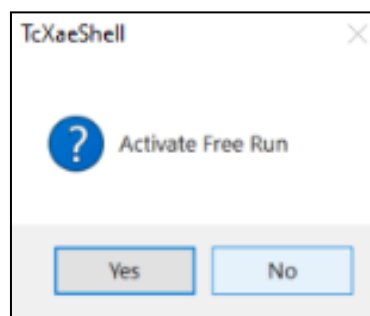
4. Confirm the prompts to scan for boxes (slaves). *Note:* This will only work if the correct ESI file from the drive is copied to `C:\TwinCAT\3.1\Config\Io\EtherCAT` and the descriptions are reloaded.



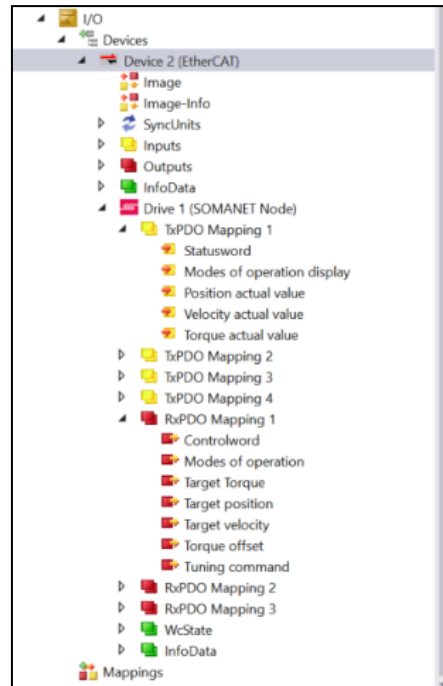
5. When prompted to append the linked axis, press **Cancel**.



6. Do not activate Free Run - press **No**.



7. If everything is performed correctly, the I/O in the Solution Explorer should appear as follows:

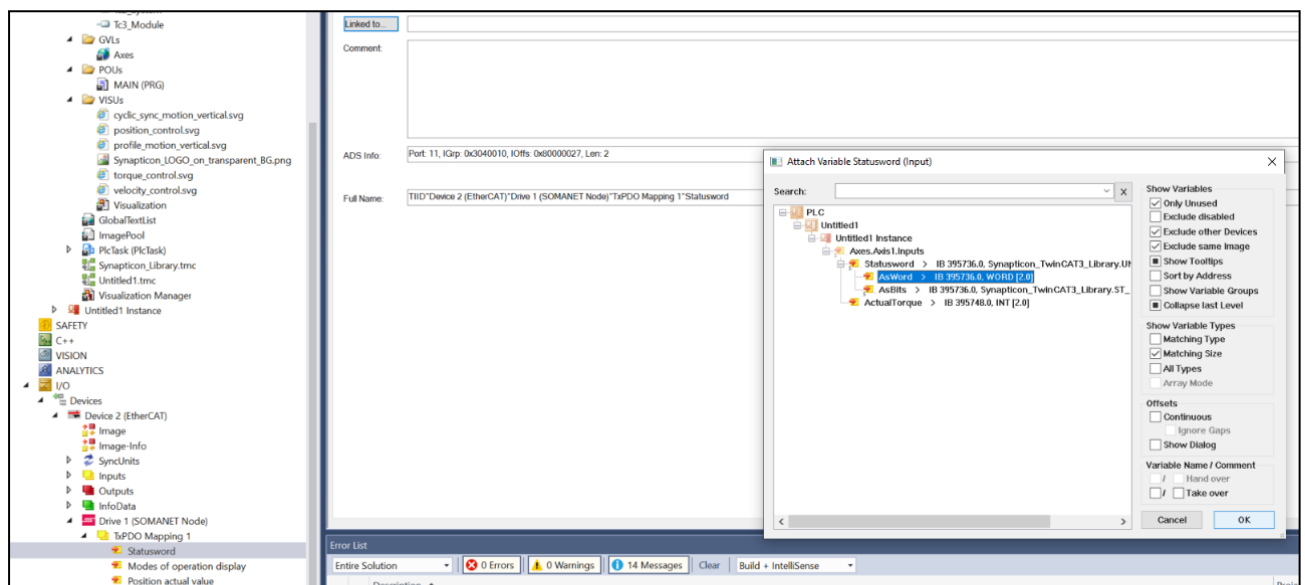


4.7. Linking PDOs to the PLC Axis Variable

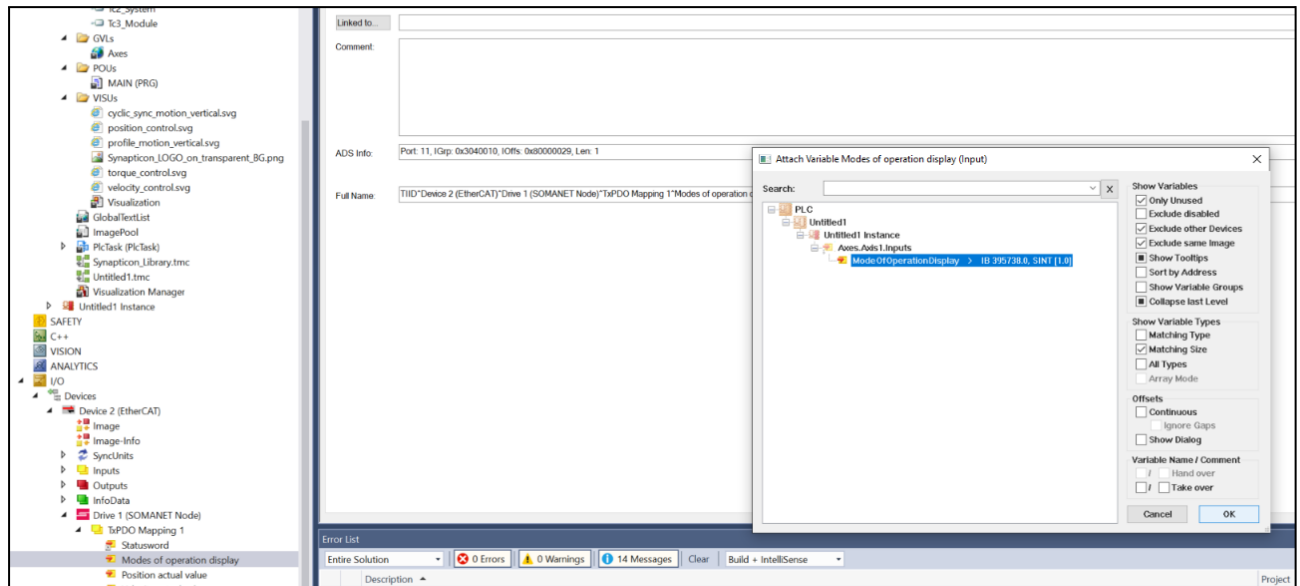
The library uses the `ST\_AxisRef` data structure to interface with the drive. This is defined in the GVL folder that you imported when importing the .zip file. You must link your drive inputs and outputs to that structure.

To do this:

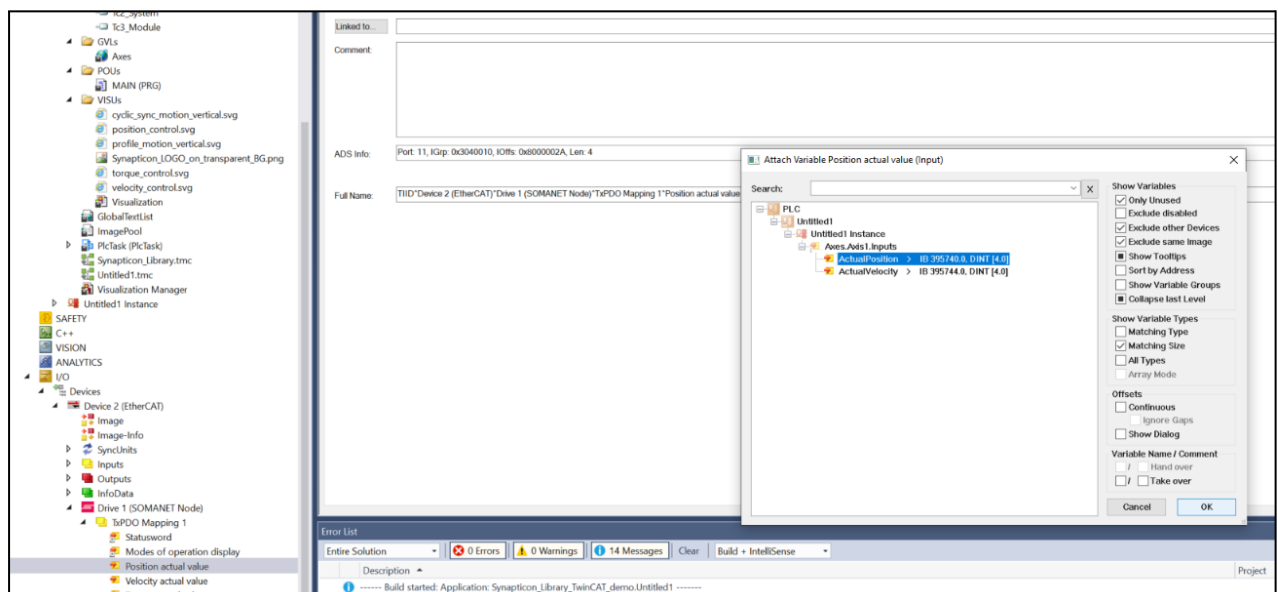
1. In the Solution Explorer, navigate to your drive under *I/O > Devices > Device [N] (EtherCAT)*.
2. Expand mappings for TxPDO Mapping 1 and RxPDO Mapping 1.
3. Select **Statusword**, click **Linked to...**, then browse to and select **MAIN.Axes.Axis1.Inputs.Statusword.AsWord** and confirm.



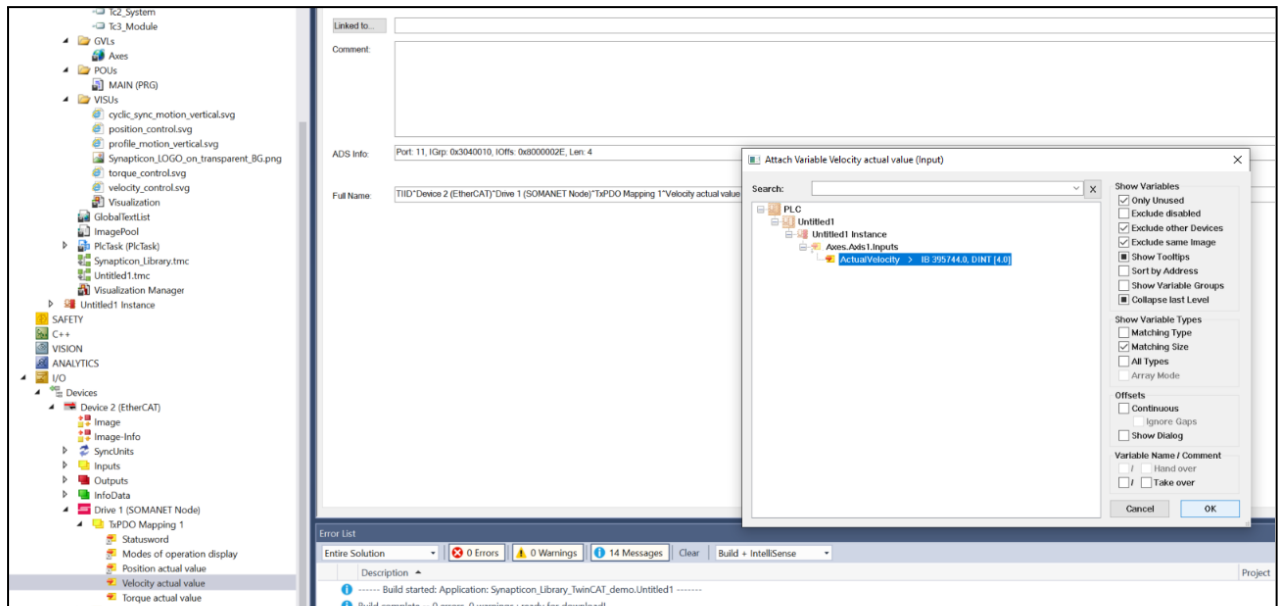
4. Select **Modes of operation display**, click **Linked to...**, select **MAIN.Axes.Axis1.Inputs.ModeOfOperationDisplay** and confirm.



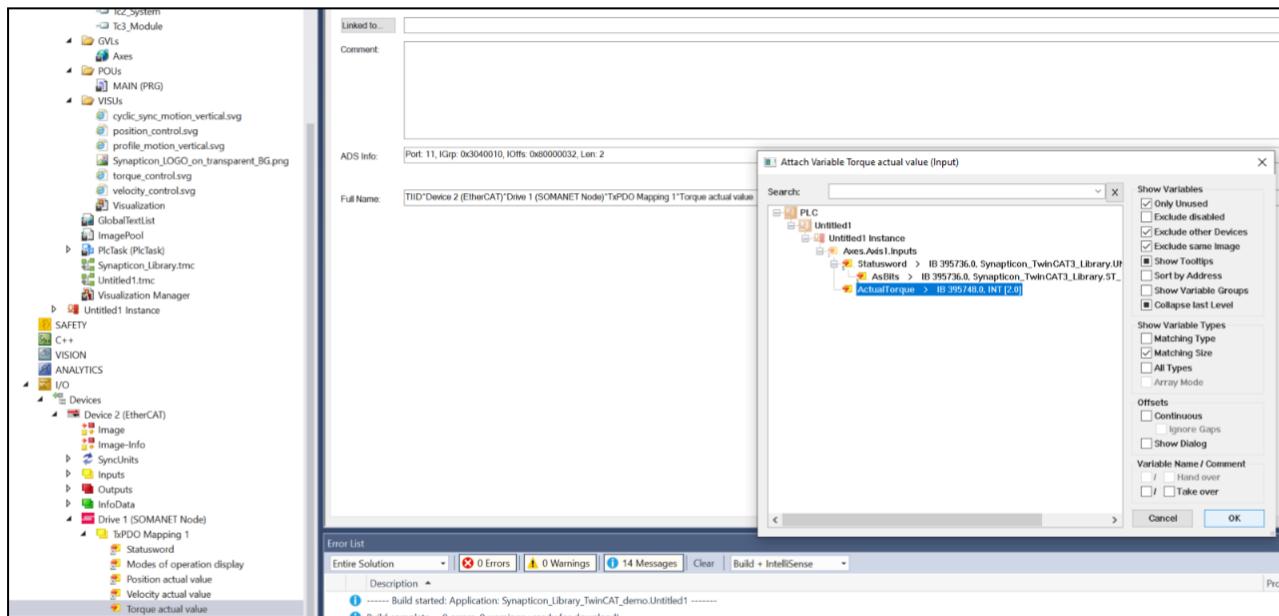
5. Select **Position actual value**, click **Linked to...**, select **MAIN.Axes.Axis1.Inputs.ActualPosition** and confirm.



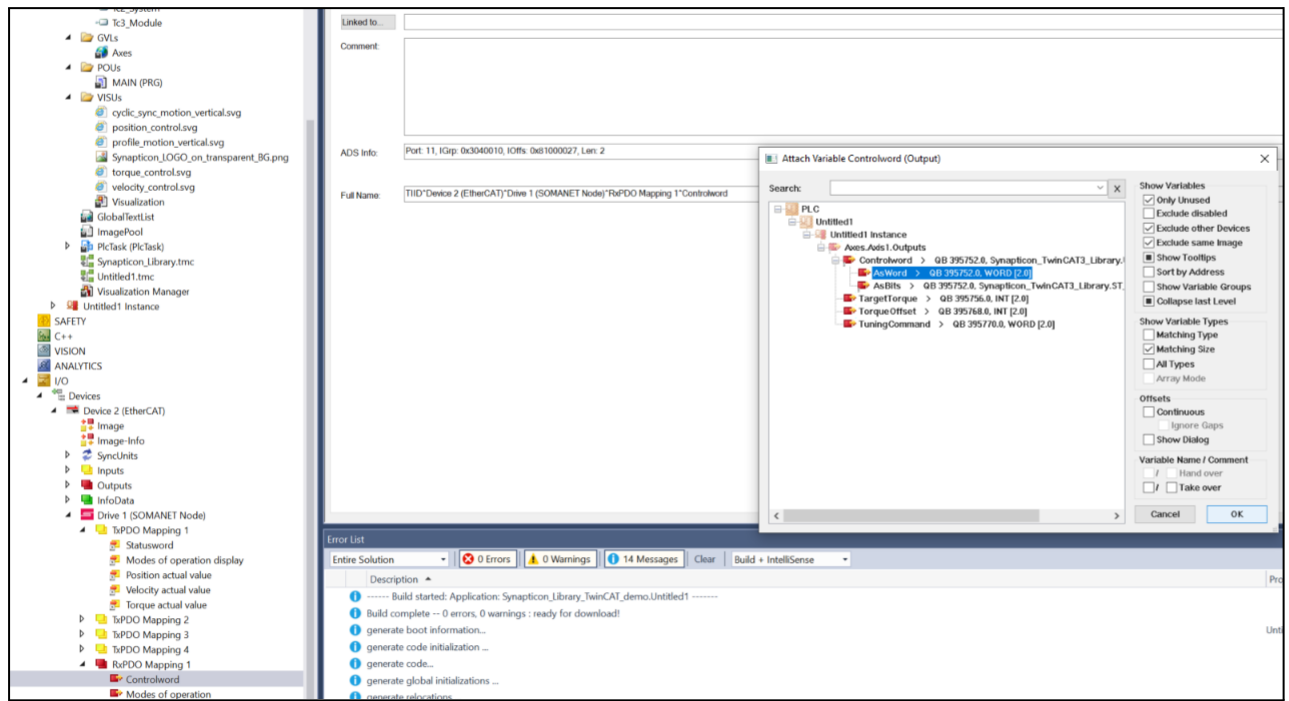
6. Select **Velocity actual value**, click **Linked to...**, select **MAIN.Axes.Axis1.Inputs.ActualVelocity** and confirm.



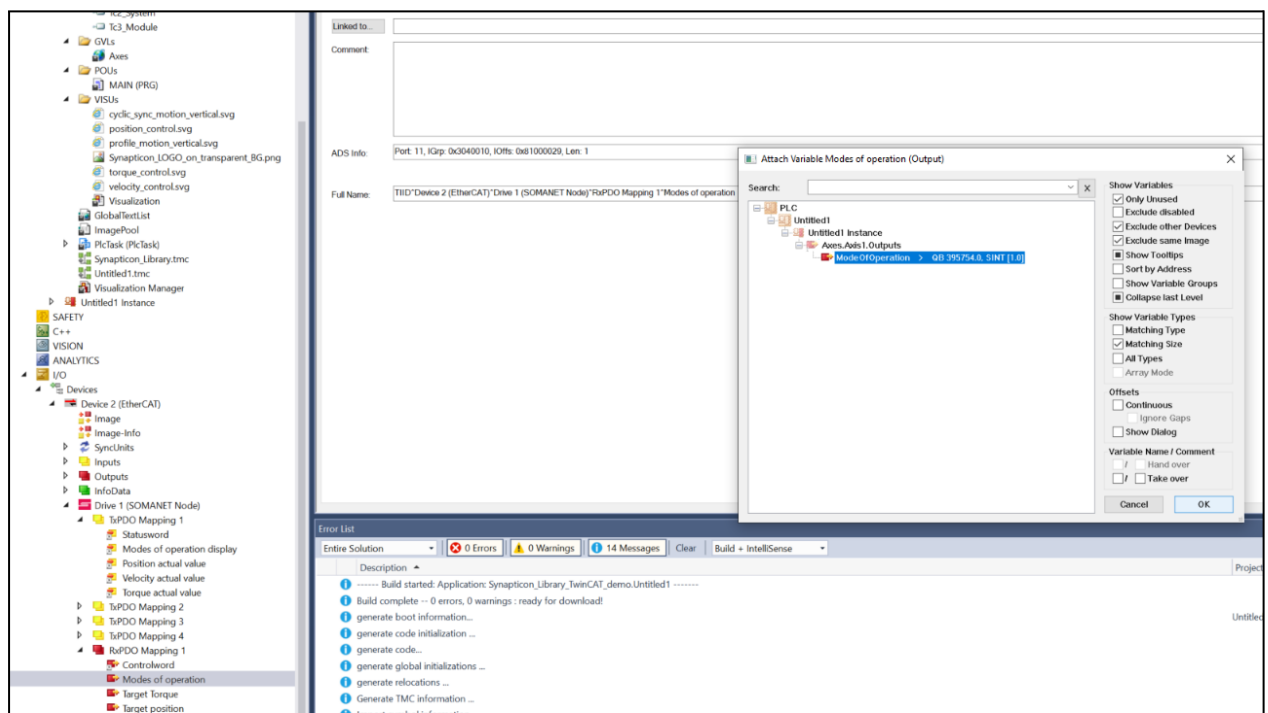
7. Select **Torque actual value**, click **Linked to...**, select **MAIN.Axes.Axis1.Inputs.ActualTorque** and confirm.



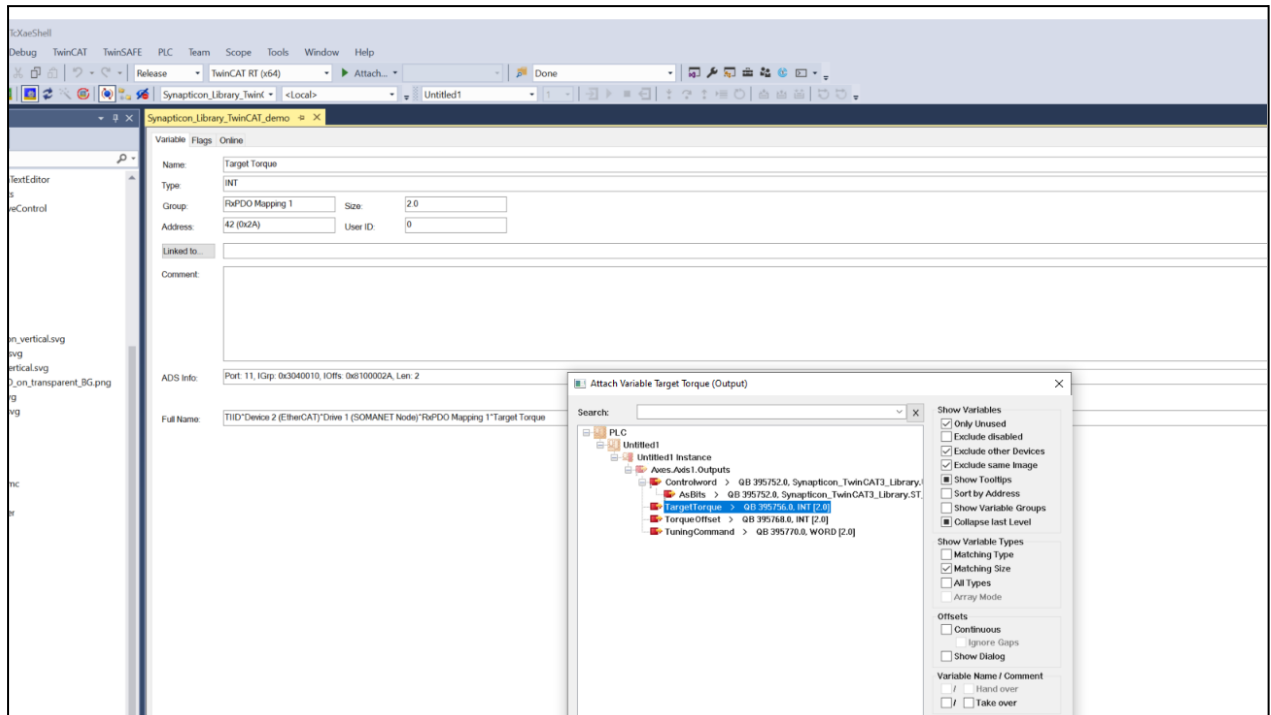
8. Select **Controlword**, click **Linked to...**, then browse to and select **MAIN.Axes.Axis1.Outputs.Controlword.AsWord** and confirm.



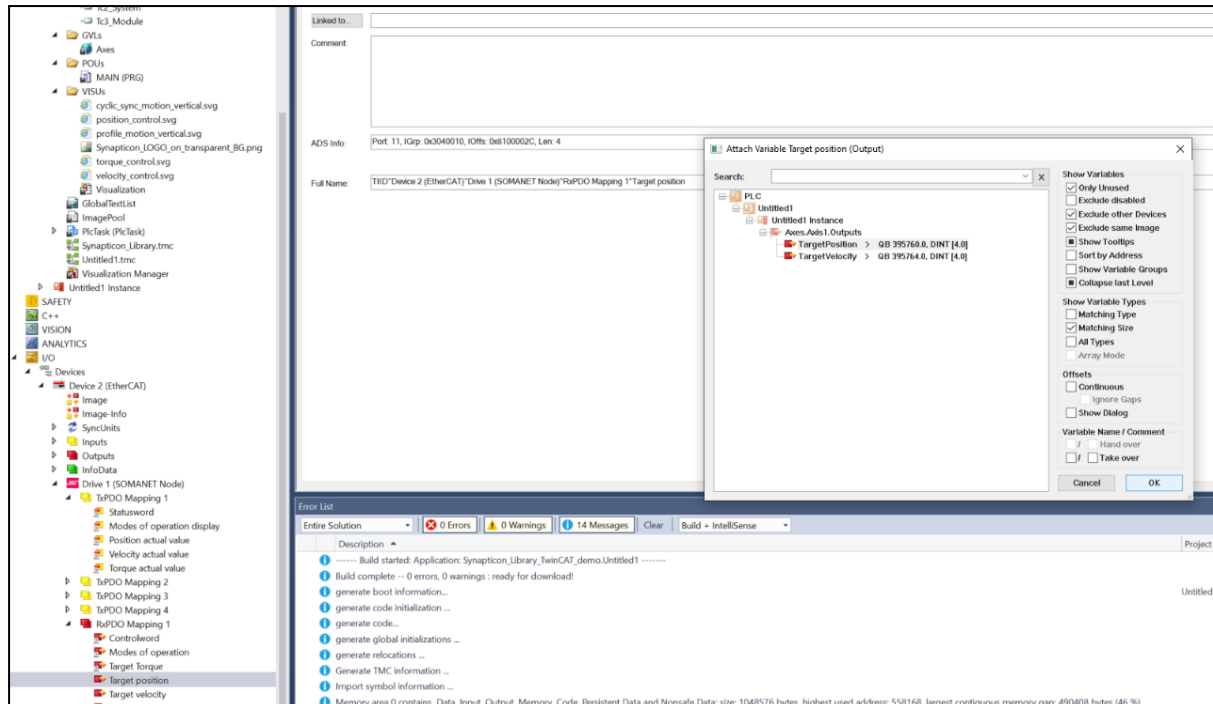
9. Select **Modes of operation**, click **Linked to...**, select **MAIN.Axes.Axis1.Outputs.ModeOfOperation** and confirm.



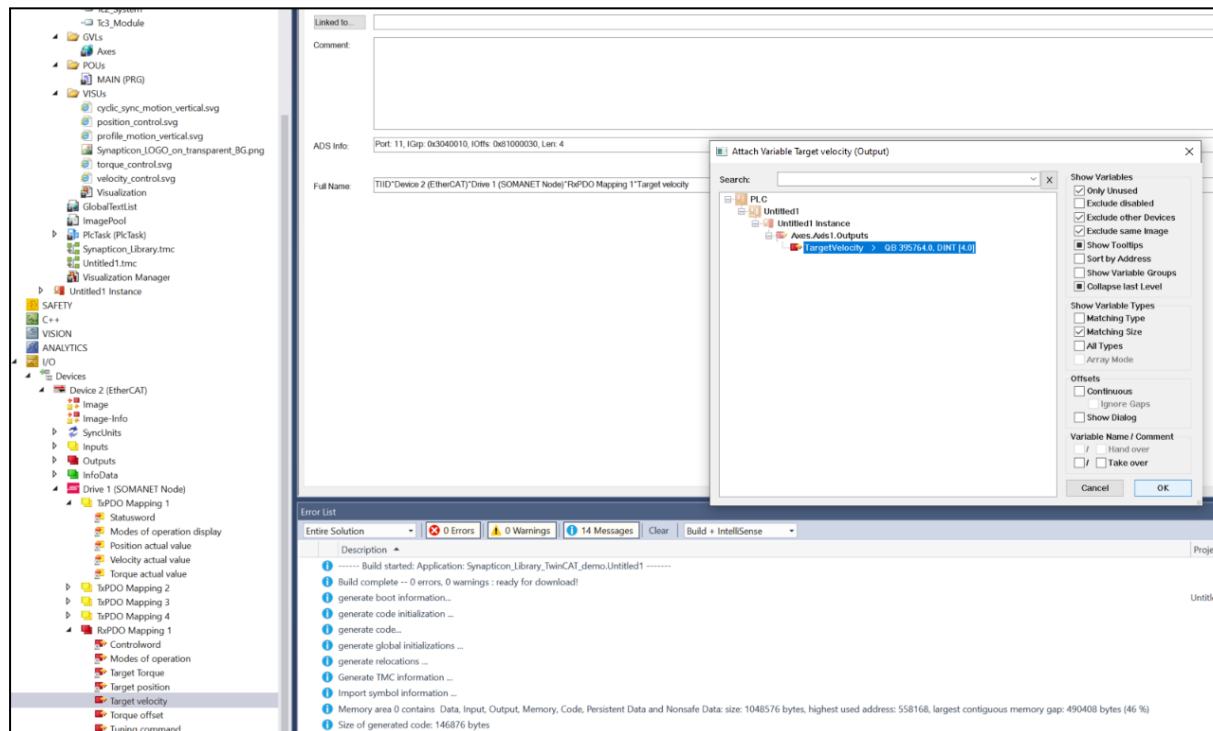
10. Select **Target torque**, click **Linked to...**, select **MAIN.Axes.Axis1.Outputs.TargetTorque** and confirm.



11. Select **Target position**, click **Linked to...**, select **MAIN.Axes.Axis1.Outputs.TargetPosition** and confirm.

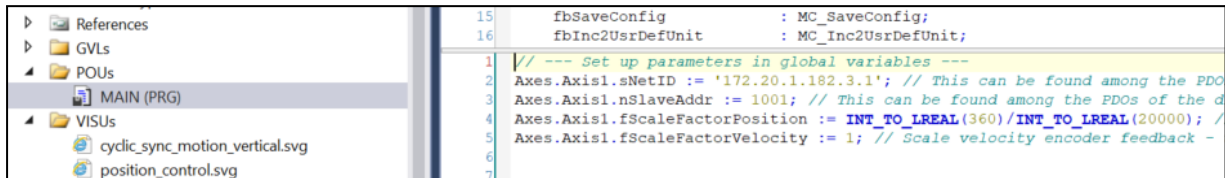


12. Select **Target velocity**, click **Linked to...**, select **MAIN.Axes.Axis1.Outputs.TargetVelocity** and confirm.



4.8. Setting Axis Parameters in the PLC

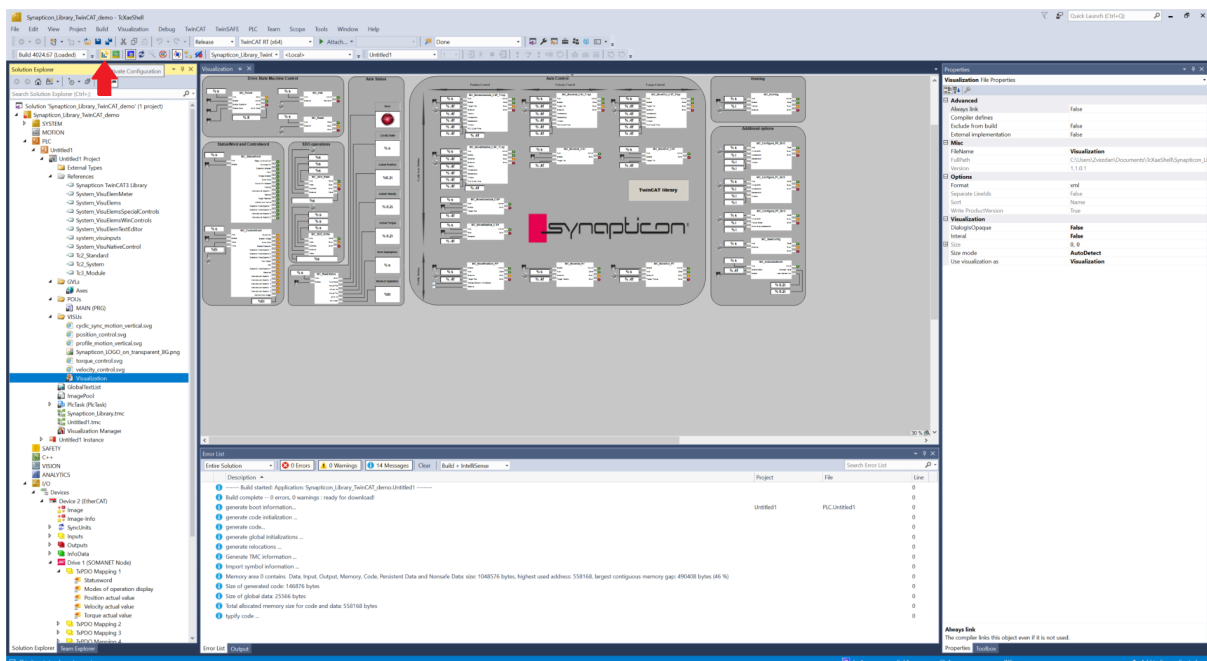
Before running the function blocks, you must configure the axis-specific parameters within your `ST_AxisRef` variable. This is typically done once at the start of your 'MAIN' program.



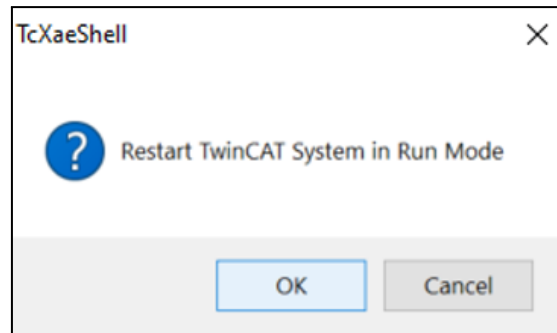
4.9. Visualization and Running the Project

All the function blocks can be run using the visualization provided in this demo.

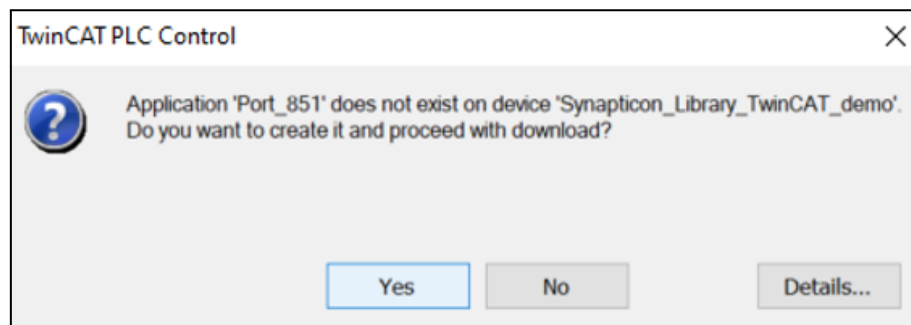
1. In the Solution Explorer, navigate to the visualization under *VISUs* and select **Visualization**. To run it, press **Activate Configuration** once (as indicated by the red arrow) and confirm by pressing OK.



2. Confirm restarting TwinCAT in Run Mode.



3. Confirm port creation.



4. Start the program by pressing the **Start** button (as indicated by the red arrow).
Now, the GUI can be used to control your drive using the Synapticon Library.

