

## Demo projects with Bosch Rexroth ctrlX

See also [Selmo Help Center](#)

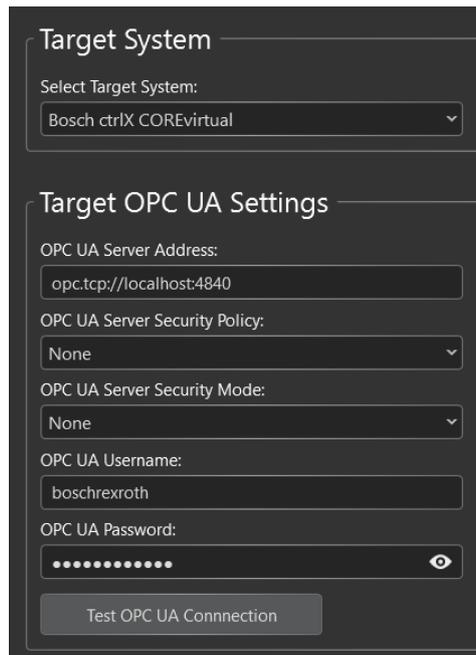
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## Customizing the Selmo Studio Project (SEO)

As part of a new Selmo Studio project, the decision has to be made in which control system the PLC program will be used. Although the main part of the program is identical, there are differences, especially in terms of communication and the use of internal libraries.

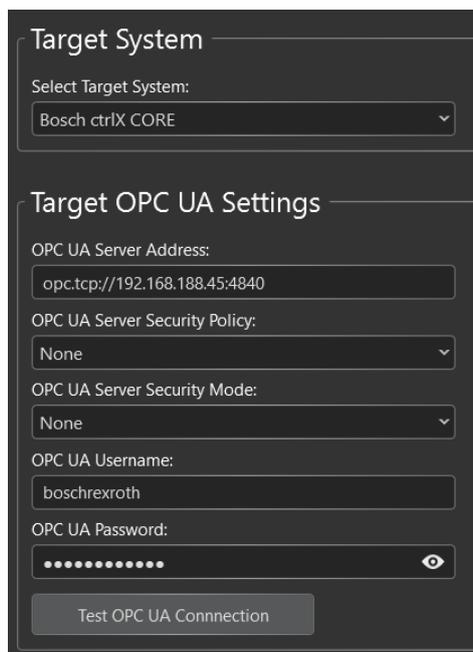
In Selmo Studio, the selection of the appropriate controller is done in the Target System section. In this case: "Bosch ctrlX COREvirtual". The OPC-UA communication protocol is used for this. The settings that were made during the installation and configuration of the OPC-UA server are entered here.



The screenshot shows a configuration window with two main sections. The top section, titled "Target System", contains a dropdown menu labeled "Select Target System:" with "Bosch ctrlX COREvirtual" selected. The bottom section, titled "Target OPC UA Settings", contains several input fields: "OPC UA Server Address:" with the value "opc.tcp://localhost:4840", "OPC UA Server Security Policy:" with a dropdown set to "None", "OPC UA Server Security Mode:" with a dropdown set to "None", "OPC UA Username:" with the value "boschrexroth", and "OPC UA Password:" with a masked password field. A "Test OPC UA Connection" button is located at the bottom of the settings section.

If a virtual PLC is used on the local PC, "Bosch ctrlX COREvirtual" must be entered with the server address localhost and the set port, usually 4840. "boschrexroth" must be entered as username and password. These credentials can be changed if necessary.

Here, communication can then be tested.

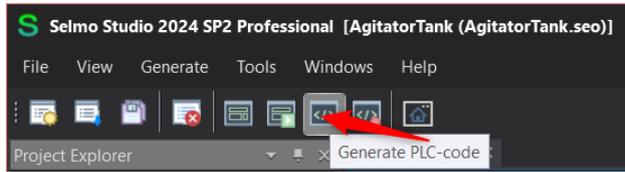


The screenshot shows a configuration window similar to the one above. The "Target System" section has "Bosch ctrlX CORE" selected in the dropdown. The "Target OPC UA Settings" section has the "OPC UA Server Address:" field set to "opc.tcp://192.168.188.45:4840". All other fields (Security Policy, Security Mode, Username, Password, and Test button) are identical to the virtual PLC configuration.

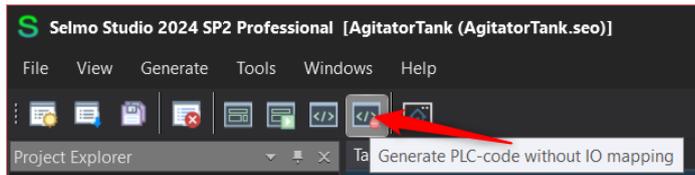
In the case of a hardware PLC, the target "Bosch ctrlX CORE" must be selected. In the "Server Address" field, enter the IP address of the PLC. In addition, the login data must be entered according to the settings in the OPC-UA server.

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After completion of the modeling, the PLC code is generated and exported in an XML file. It should be noted that the entire PLC program must be exported during the first export.

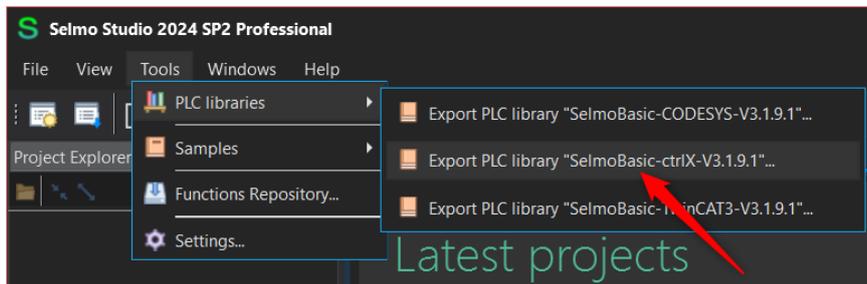


Afterwards, the export should take place without the IO mapping modules. These building blocks are edited in ctrlX (see below) and could be overwritten in a complete export. It should be noted that any links could be lost.



It is essential that this export and subsequent import into ctrlX is carried out in the Selmo Studio every time you make a change. For this reason, it is recommended not to make changes in the exported blocks in ctrlX, as they will be overwritten the next time they are imported.

The SelmoBasic library is still required for the integration of the internal functions. This can be obtained via the export function in the Selmo Studio.



It should always be ensured that the version of the library used in ctrlX matches the version of Selmo Studio. The procedure for import and activation is explained in the corresponding documentation.

## Installation and configuration of Bosch Rexroth ctrlX

First, download ctrlX WORKS and then perform the installation. The installation can be done using the default settings, but the following prerequisites should be met:

- MS Windows version 10 or 11.
- Selmo Studio in the current version 2024 SP2
- Currently used version of ctrlX WORKS is 2.6.3
- An OPC UA server is installed as part of the installation.
- A demo license is used locally, and a temporary license can be created online for the HW-PLC.

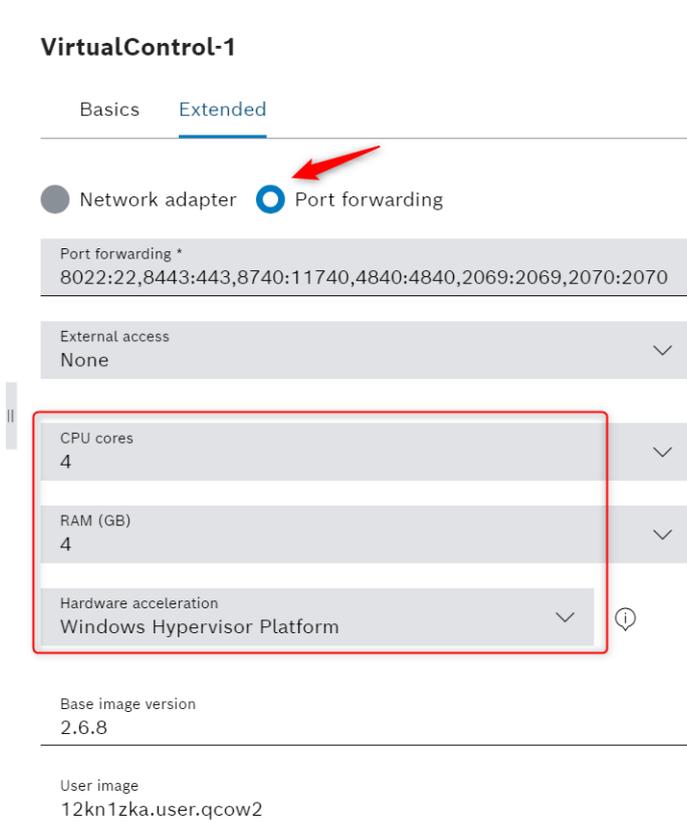
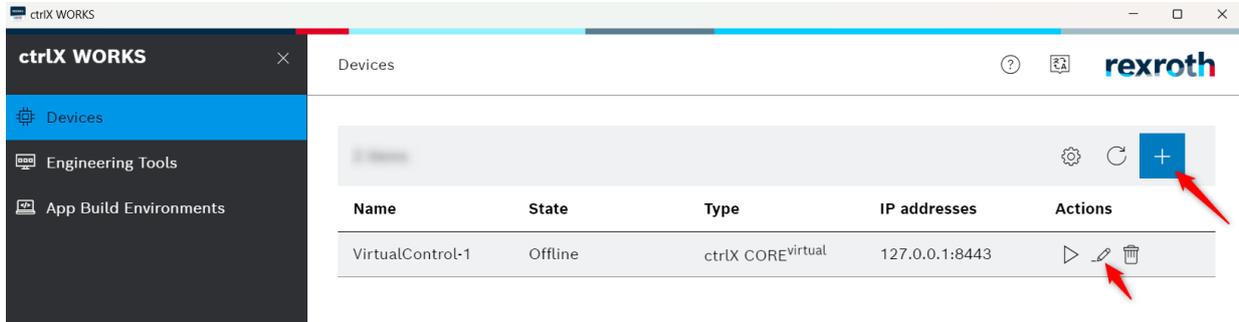
Optionally, UaExpert can be installed to monitor and diagnose OPC-UA communication.

Please also check which versions are current and what dependencies exist on the other components. It should also be ensured that the following ports are not blocked in the operating system:

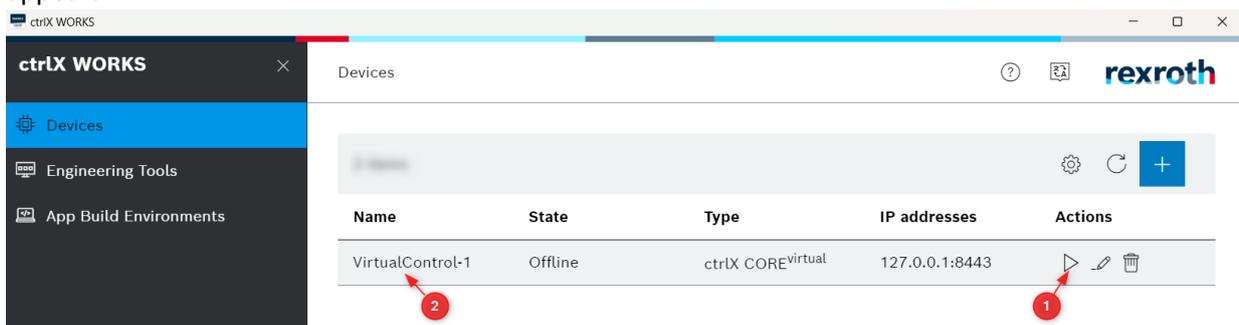
Service	Ports (Inbound)
<b>ctrlX CORE Web Interface:</b>	443/TCP (HTTPS, inbound)
<b>ctrlX Data Layer:</b>	2069/TCP (inbound)
<b>OPC UA:</b>	4840/TCP (inbound)
<b>MQTT:</b>	1883/TCP (inbound) and 8883/TCP (secure, inbound)
<b>Modbus TCP:</b>	502/TCP (inbound)
<b>EtherCAT:</b>	34980/UDP (incoming)

## Setting up Virtual Control

After successful installation of ctrlX WORKS, a virtual PLC can be created in the Devices section with the following settings:



Start Virtual Control and log in by clicking on "Virtual Control-1" as soon as the status "Online" appears.



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Log in with the user data "boschrexroth" and the corresponding password.

ⓘ Die Verwendung von ctrlX CORE<sup>virtual</sup> beschränkt sich auf Entwicklung, Evaluierung und Simulation. Eine operative Verwendung ist nicht vorgesehen.

## Anmeldung

Benutzername \*  
boschrexroth

Passwort \*  
boschrexroth

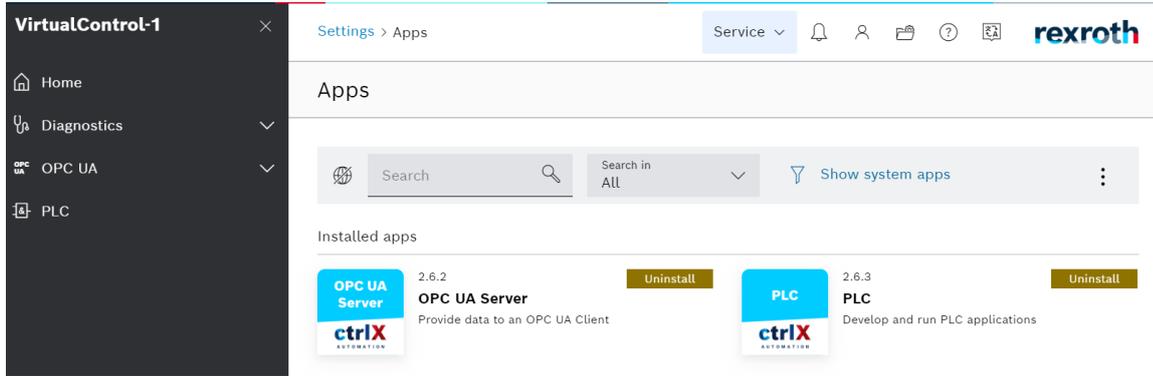


Anmelden

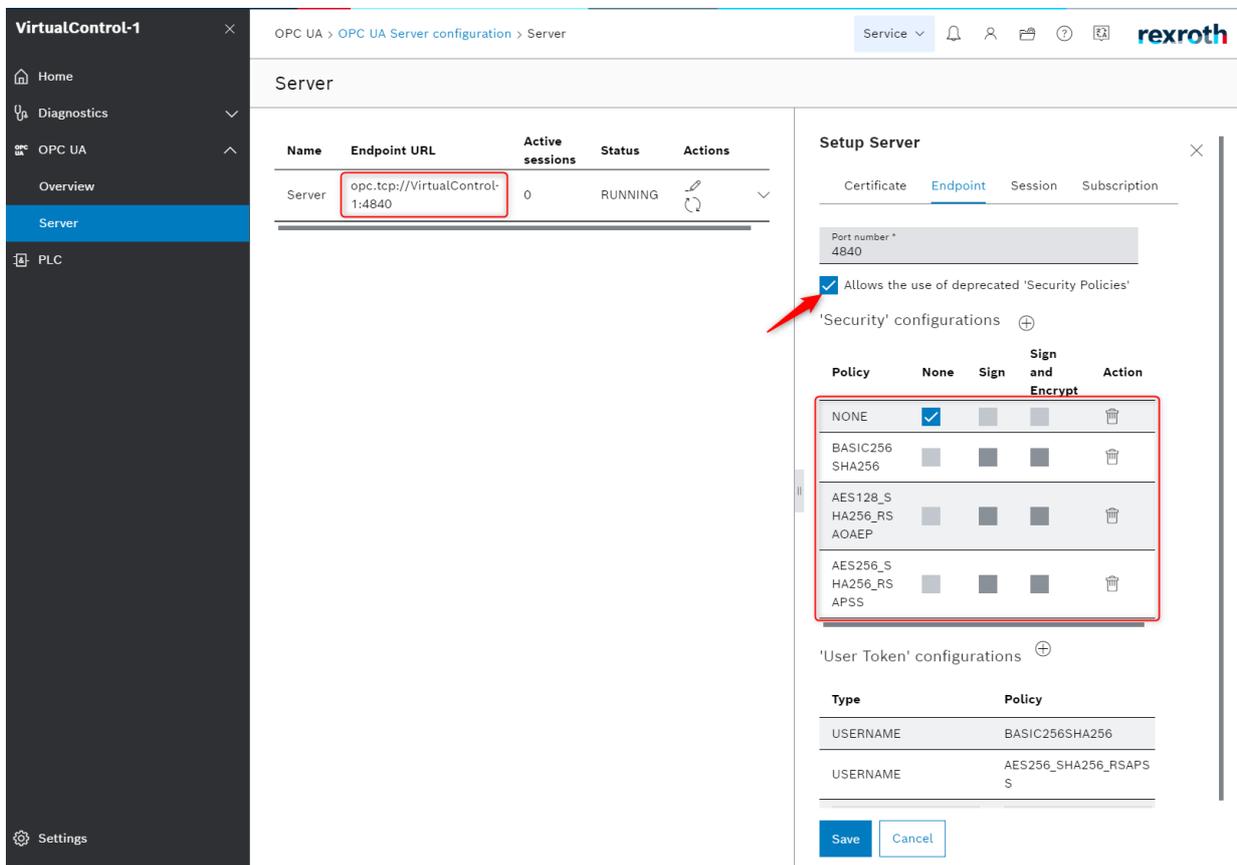
Click on "Install an app" and then select the desired apps from the local directory via "Install from file". These can be selected in the downloaded demo folder.

The screenshot shows the VirtualControl-1 application interface. On the left is a dark sidebar with a 'Home' button and a 'Diagnostics' button. The main content area has a 'Home' header and a 'Welcome' message. Below the welcome message is a large icon representing a lightbulb and a play button, with text: 'Get to know ctrlX OS and find out how to take your first steps with it. Check the How-To video series.' A 'Let's get started' button is located below this text. At the bottom of the main content area, there are three buttons: 'Install an app' (with a plus sign icon), 'Restore backup' (with a cube icon), and 'Manage app data' (with a folder icon). A red arrow points to the 'Install an app' button.

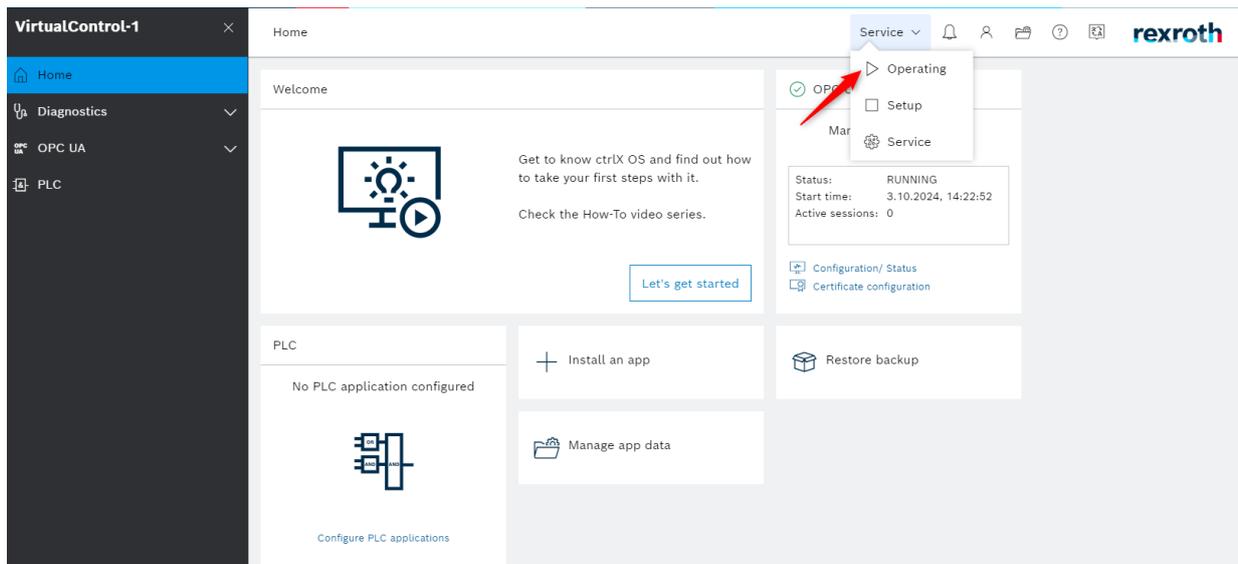
The apps "PLC" and "OPC UA Server" are required:



In the settings of the OPC UA server, activate the option "NONE" and set the check mark to "Allows the use of deprecated 'Security Policies'". Then restart the server.



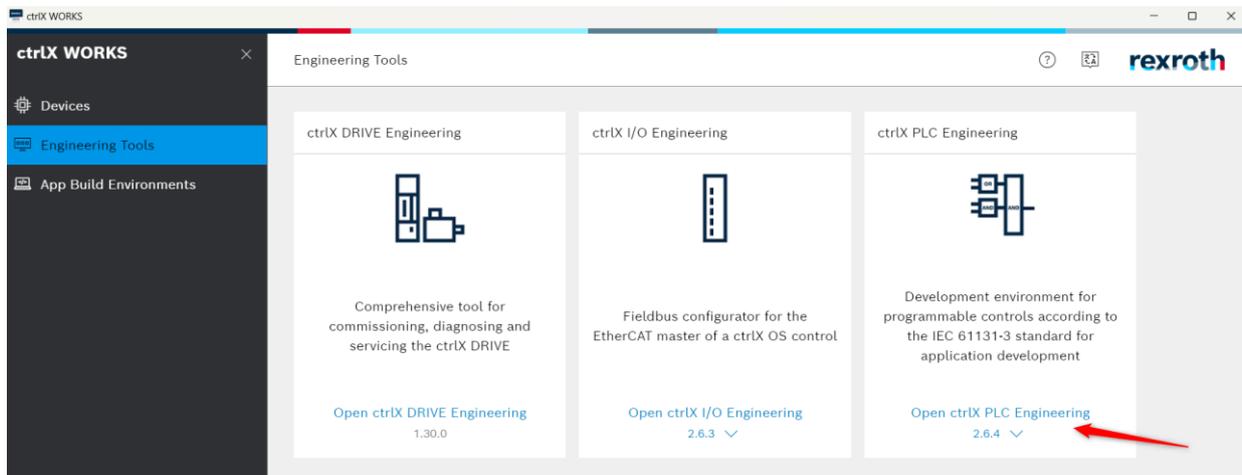
Then set the operating mode back to Operating.



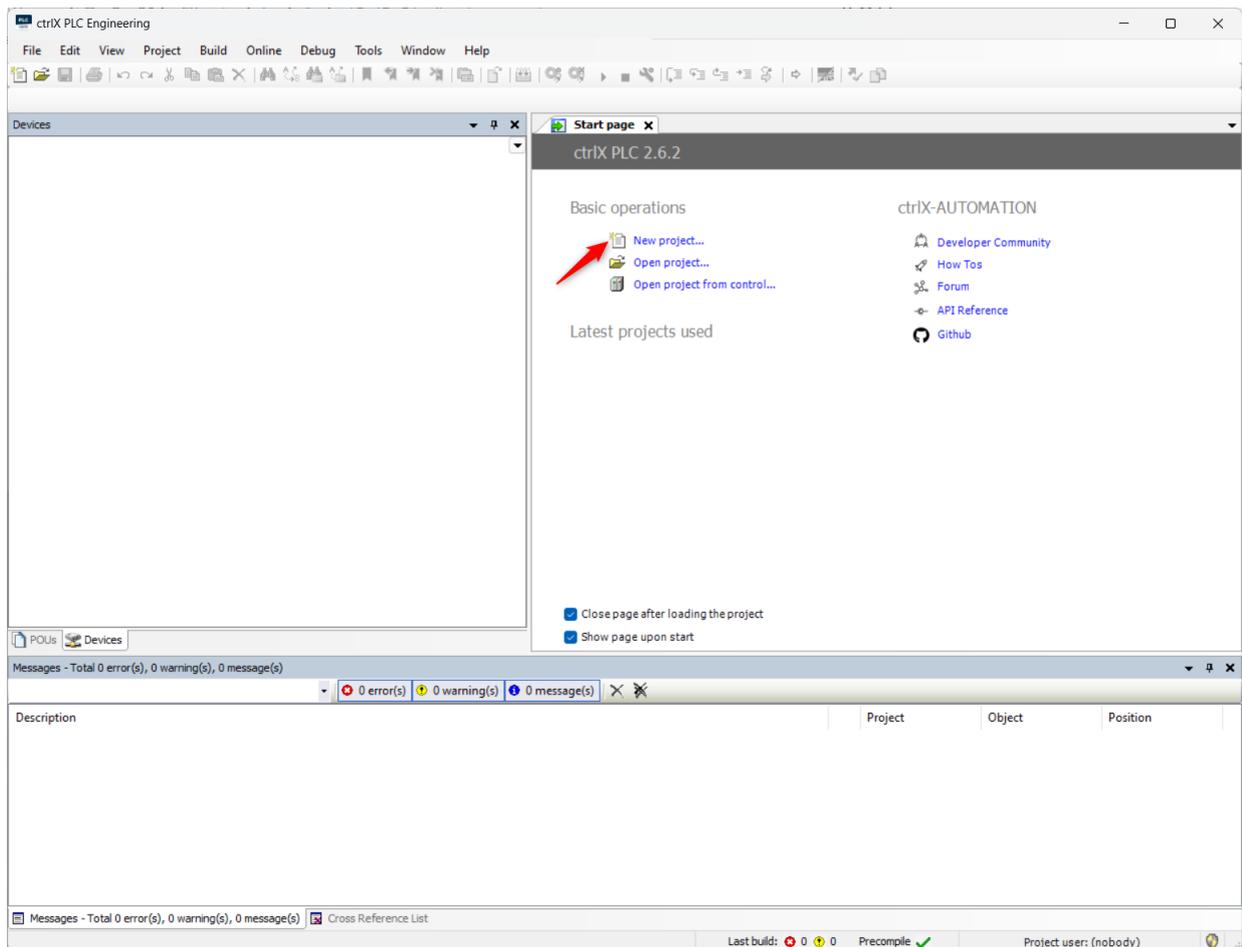
The settings for a ctrlX CORE controller are similar, you also have to transfer the licenses and set the IP address.

## Settings in the ctrlX PLC project

In the Engineering Tools section, open the program "ctrlX PLC-Engineering".

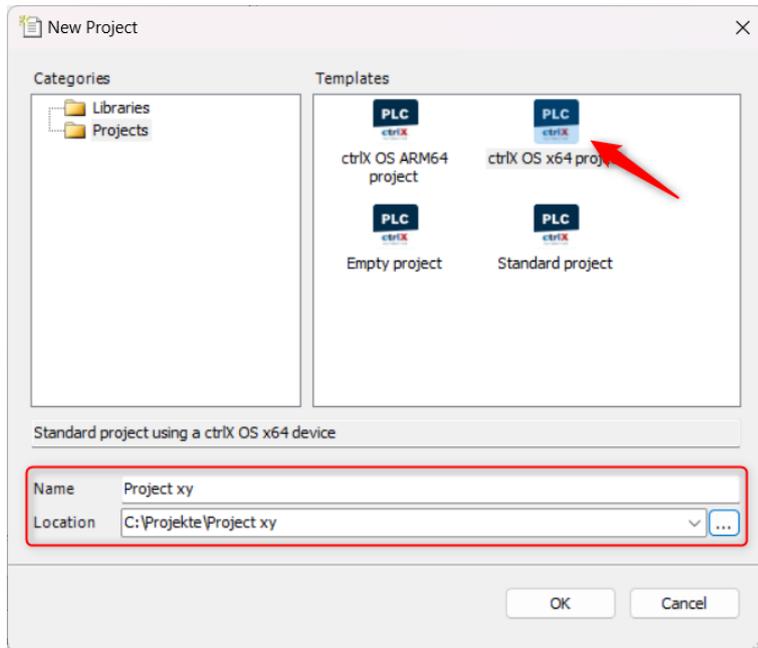


Create a new project and choose a name and path for the project:

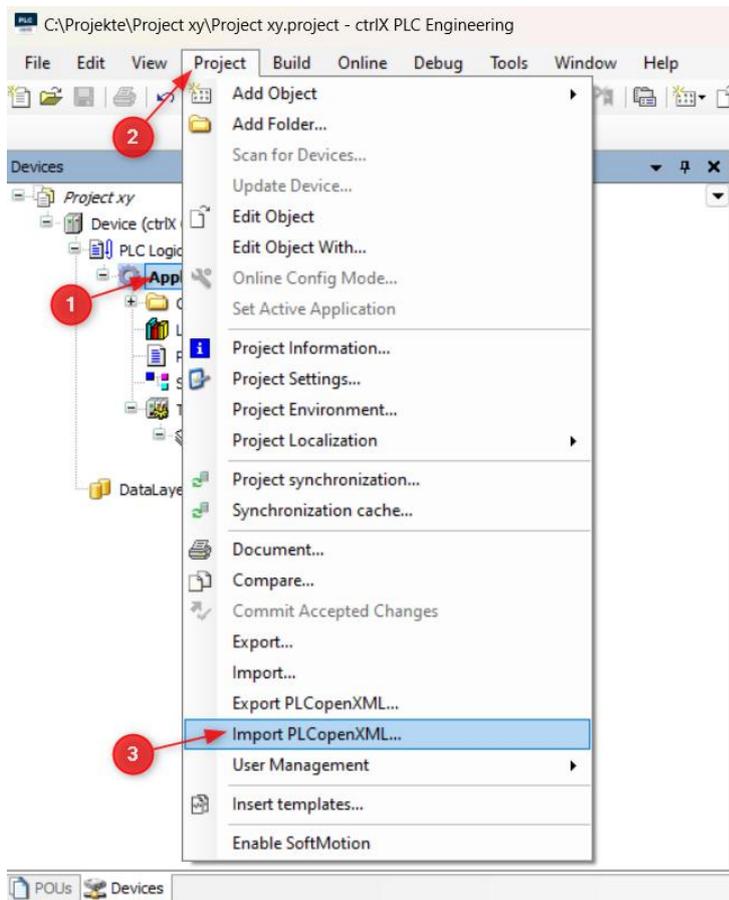


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Select "ctrlX OS x64 project" as the template and select name and save path.

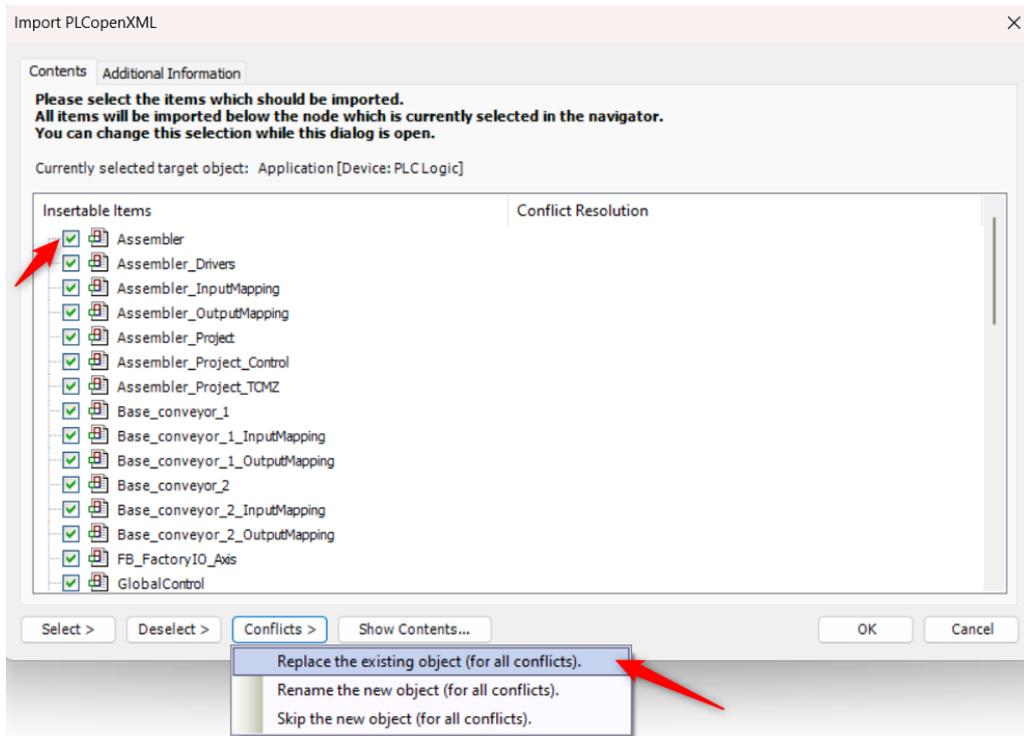


It is then necessary to import the PLCopenXML file from the Selmo Studio. First, select "Application" and then click on "Project". In the following menu, select the option "Import PLCopenXML".

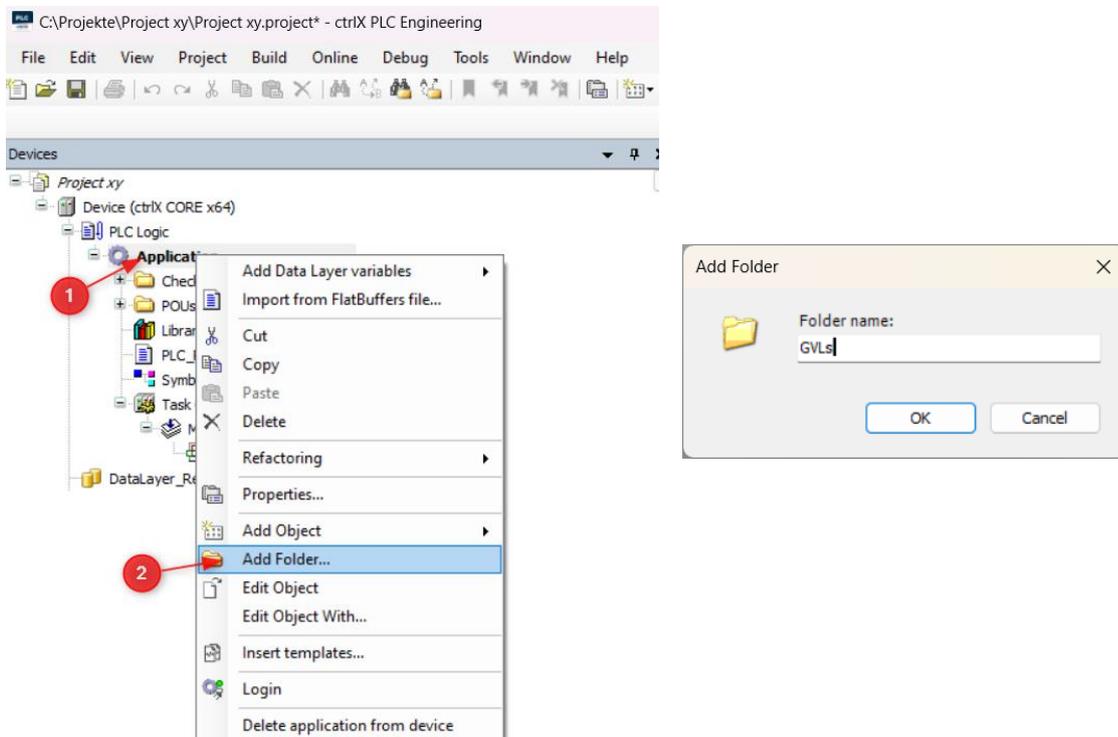


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Check all the "Insertable Items" you need and then press "Ok". If you have already created the project and only want to apply changes, select the option "Replace the existing objects (for all conflicts)".

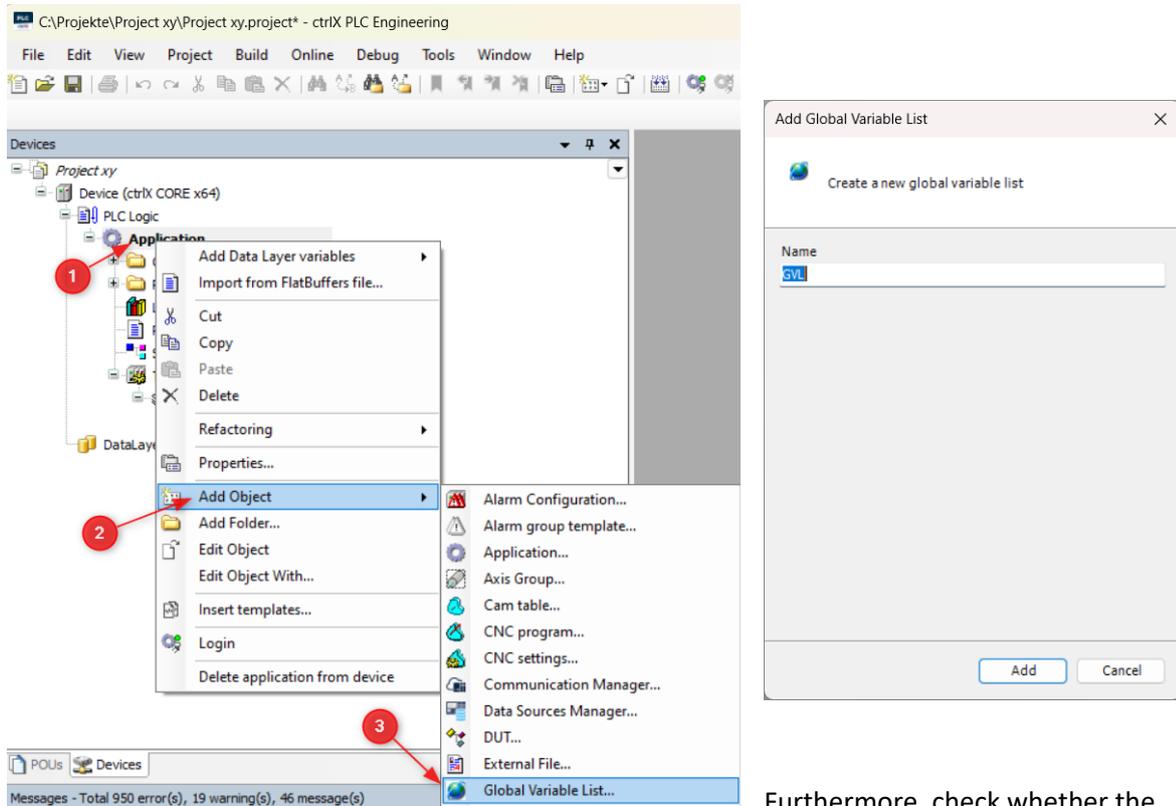


Under "Application", add a new folder named "GVLs".

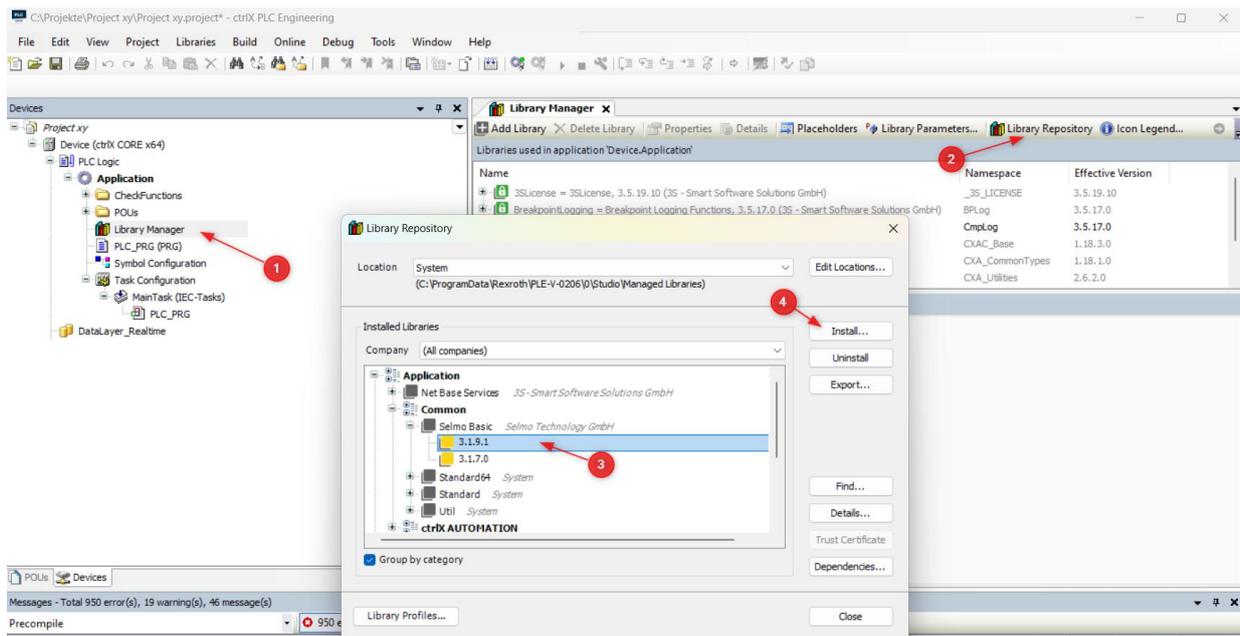


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Right-click the new GVLs folder, and then select Add Object. Then select "Global Variable List..." from.

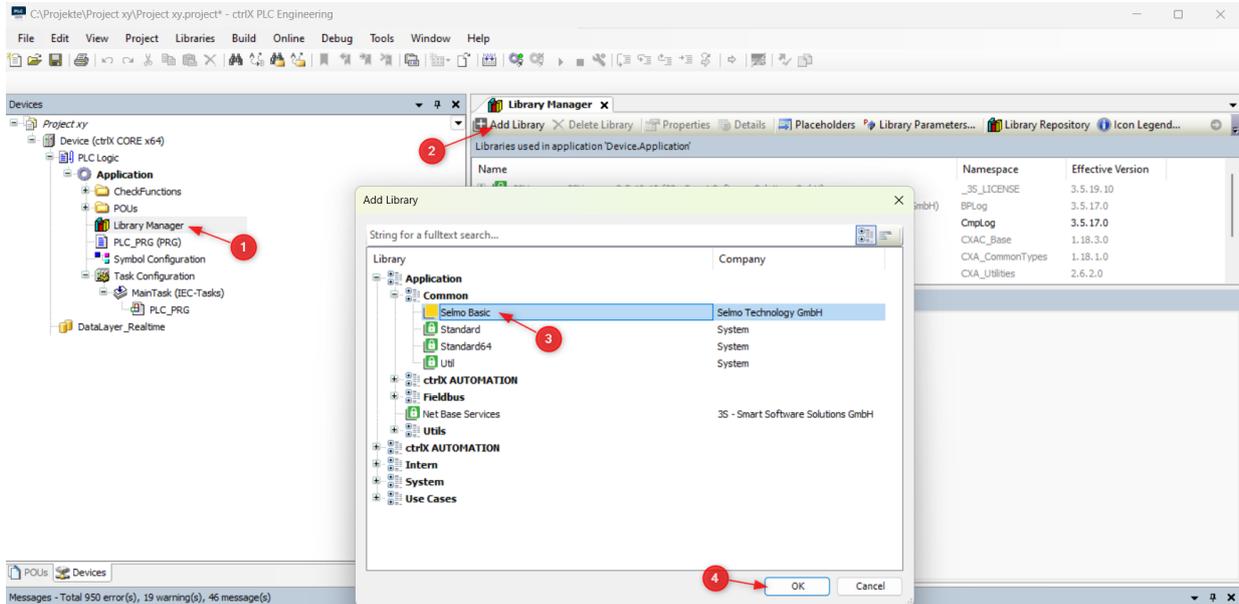


Furthermore, check whether the current "Selmo Basic" library is already installed. To do this, first select the "Library Manager" menu item and then select the "Library Repository" menu item. In the selection there, under "Application → Common", the library "Selmo Basic" should be available in the version that was previously exported from the Selmo Studio. Otherwise, you will need to reinstall the library via the "Install" menu item.

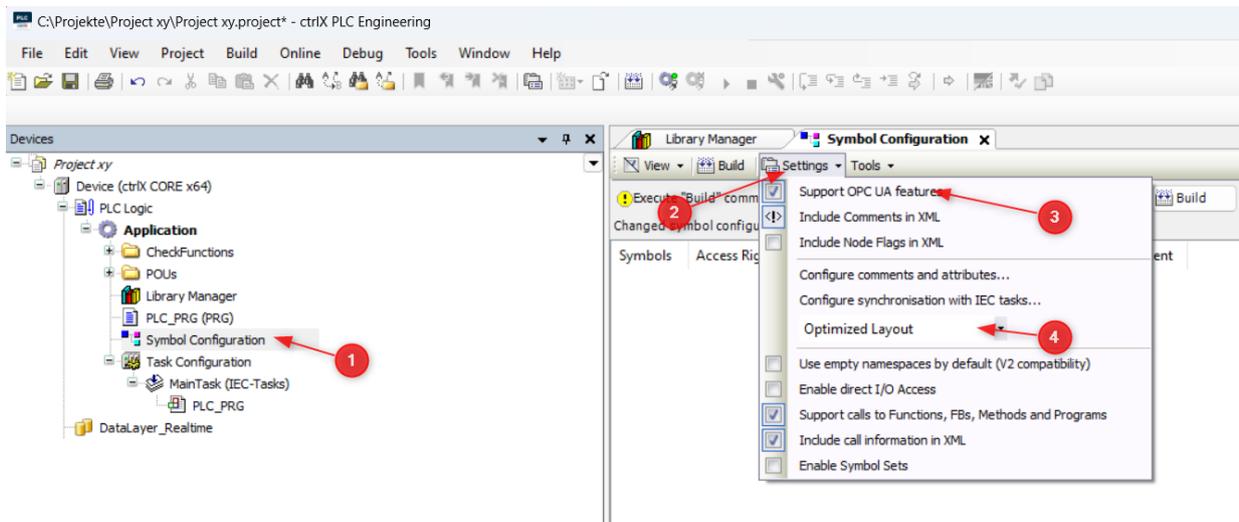


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If the library exists, it must be accessed via "Add Library..." can be added to the project.

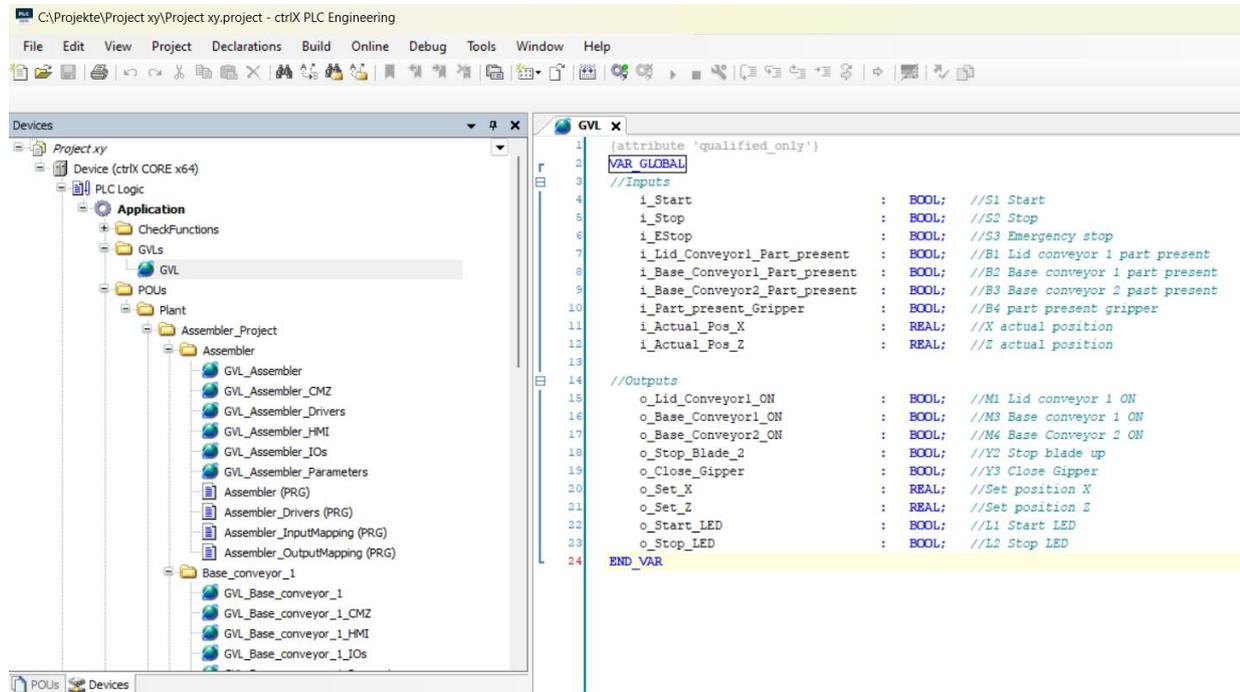


In the menu item "Symbol Configuration...", check whether the options "Support OPC UA features" and "Optimized Layout" are selected.



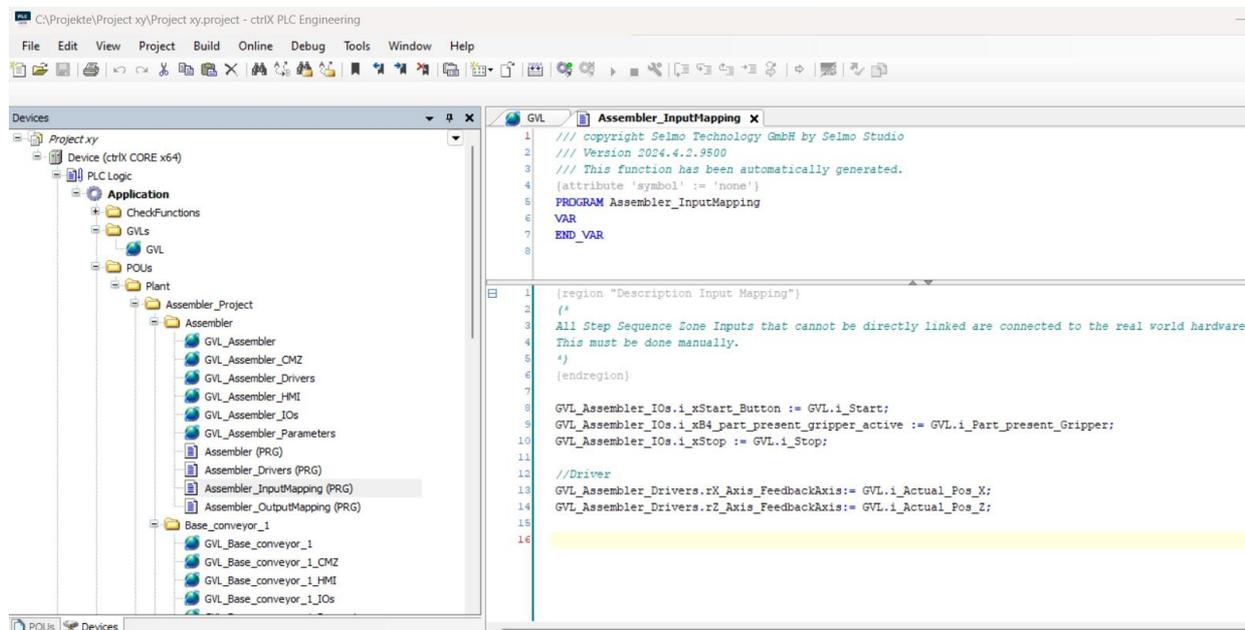
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In the following, the inputs and outputs in the GVL are written, which can be found in the documentation of the demo program. The use of these specific labels is crucial to ensure optimal communication with the simulation.



```
1 {attribute 'qualified_only'}
2 VAR GLOBAL
3 //Inputs
4   i_Start           : BOOL; //S1 Start
5   i_Stop            : BOOL; //S2 Stop
6   i_EStop           : BOOL; //S3 Emergency stop
7   i_Lid_Conveyor1_Part_present : BOOL; //B1 Lid conveyor 1 part present
8   i_Base_Conveyor1_Part_present : BOOL; //B2 Base conveyor 1 part present
9   i_Base_Conveyor2_Part_present : BOOL; //B3 Base conveyor 2 part present
10  i_Part_present_Gripper : BOOL; //B4 part present gripper
11  i_Actual_Pos_X      : REAL; //X actual position
12  i_Actual_Pos_Z      : REAL; //Z actual position
13
14 //Outputs
15  o_Lid_Conveyor1_ON : BOOL; //M1 Lid conveyor 1 ON
16  o_Base_Conveyor1_ON : BOOL; //M3 Base conveyor 1 ON
17  o_Base_Conveyor2_ON : BOOL; //M4 Base Conveyor 2 ON
18  o_Stop_Blade_2     : BOOL; //Y2 Stop blade up
19  o_Close_Gripper    : BOOL; //Y3 Close Gripper
20  o_Set_X             : REAL; //Set position X
21  o_Set_Z             : REAL; //Set position Z
22  o_Start_LED        : BOOL; //L1 Start LED
23  o_Stop_LED         : BOOL; //L2 Stop LED
24 END_VAR
```

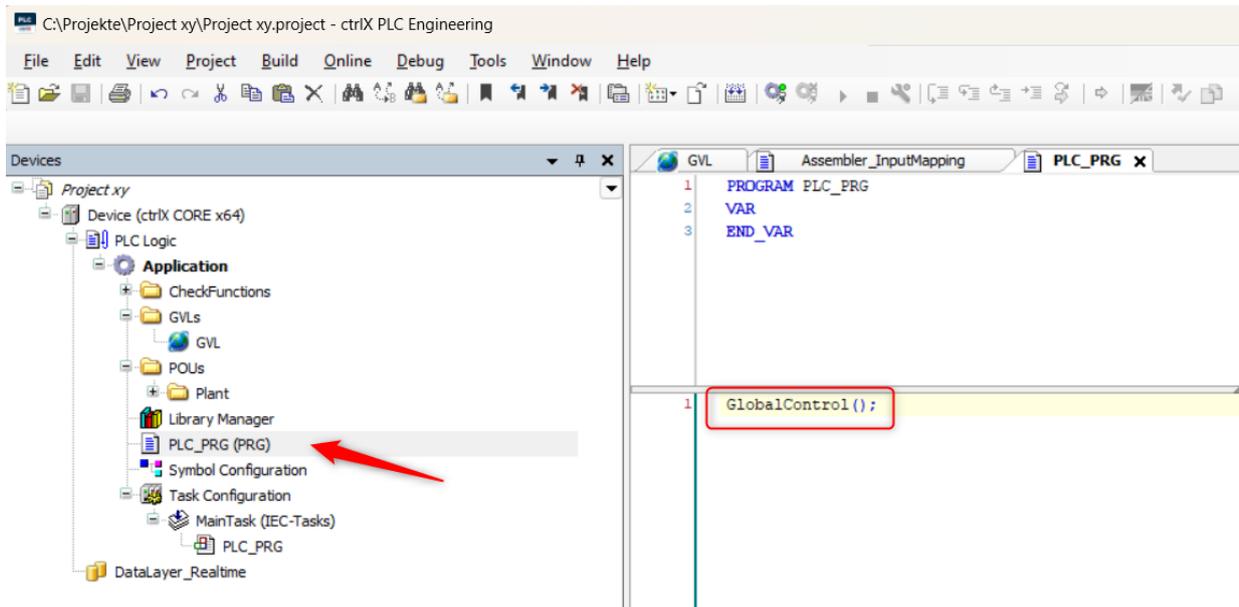
The variables are linked to the prepared I/Os of the respective sequences in the corresponding "xxx\_InputMapping" or "xxx\_OutputMapping" modules. For this purpose, it is necessary to remove the comment of the lines and to read or write the variables from the GVL.



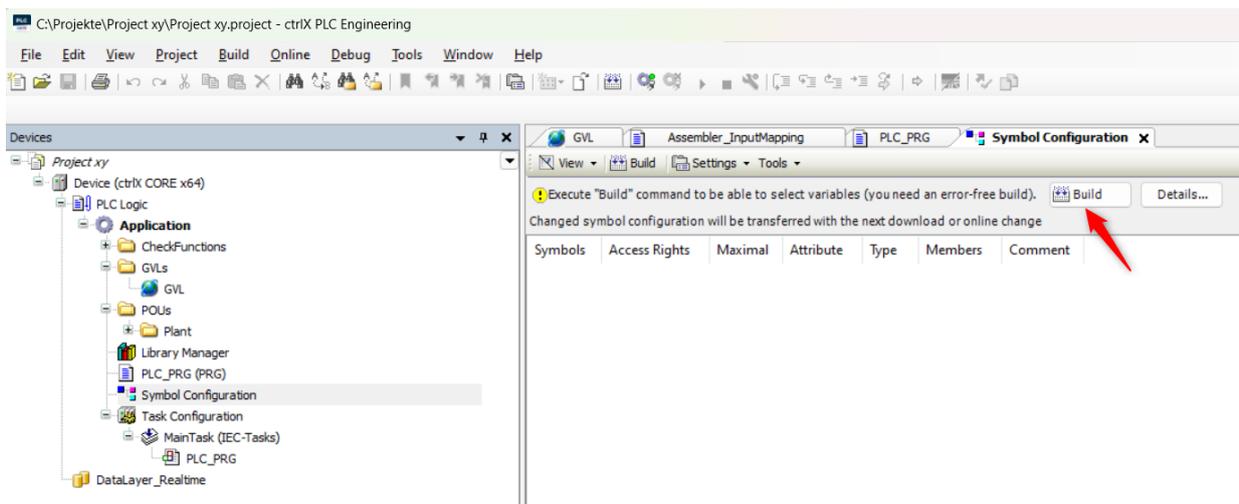
```
1 // copyright Selmo Technology GmbH by Selmo Studio
2 // Version 2024.4.2.9500
3 // This function has been automatically generated.
4 {attribute 'symbol' := 'none'}
5 PROGRAM Assembler_InputMapping
6 VAR
7 END_VAR
8
9 [region "Description Input Mapping"]
10 (*
11 All Step Sequence Zone Inputs that cannot be directly linked are connected to the real world hardware
12 This must be done manually.
13 *)
14 [endregion]
15
16 GVL_Assembler_IOs.i_xStart_Button := GVL.i_Start;
17 GVL_Assembler_IOs.i_xB4_part_present_gripper_active := GVL.i_Part_present_Gripper;
18 GVL_Assembler_IOs.i_xStop := GVL.i_Stop;
19
20 //Driver
21 GVL_Assembler_Drivers.rX_Axis_FeedbackAxis:= GVL.i_Actual_Pos_X;
22 GVL_Assembler_Drivers.rZ_Axis_FeedbackAxis:= GVL.i_Actual_Pos_Z;
```

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Open PLC\_PRG (PRG) and enter "GlobalControl ();".

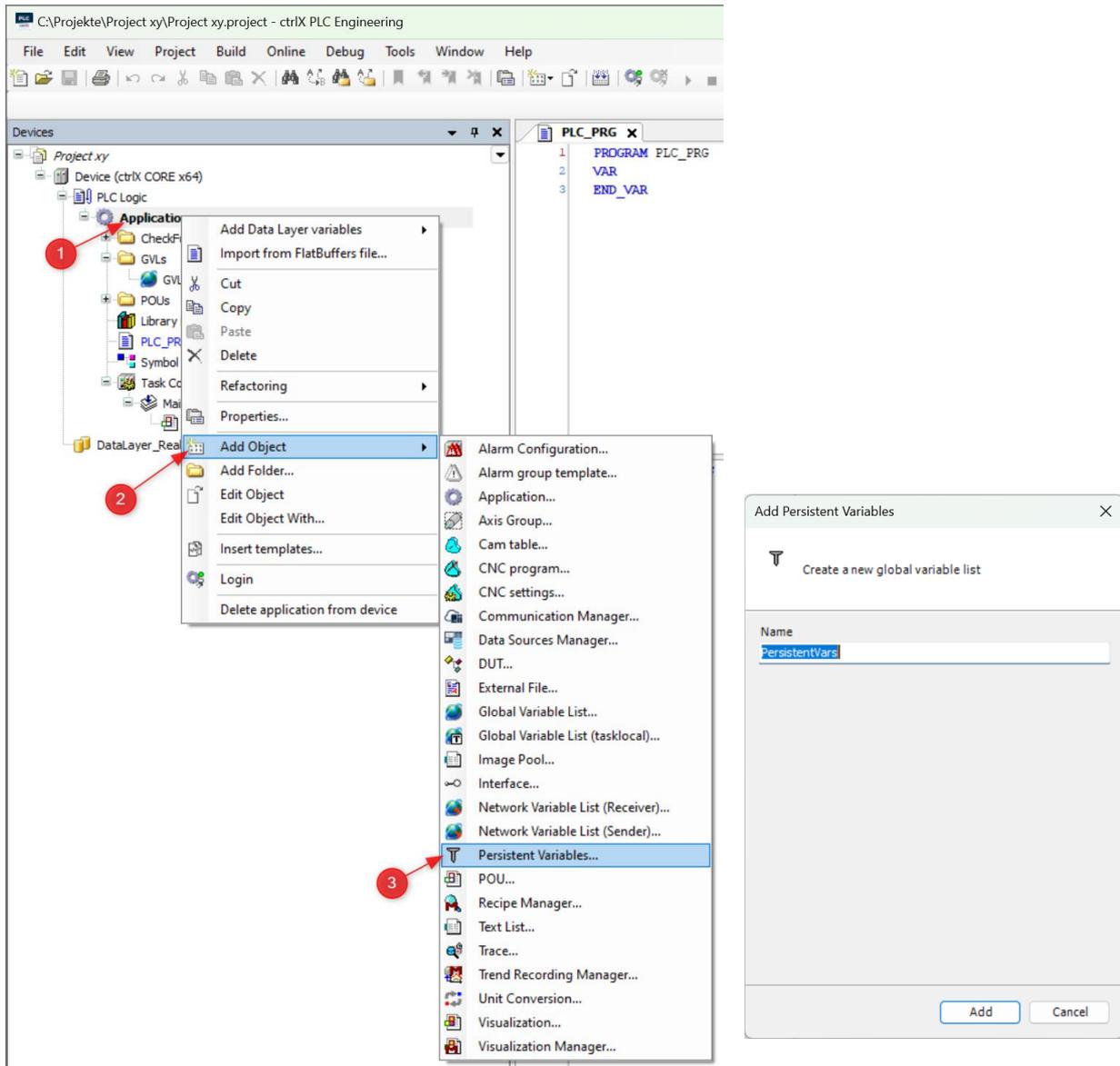


Go to the icon configuration and click on "Build".

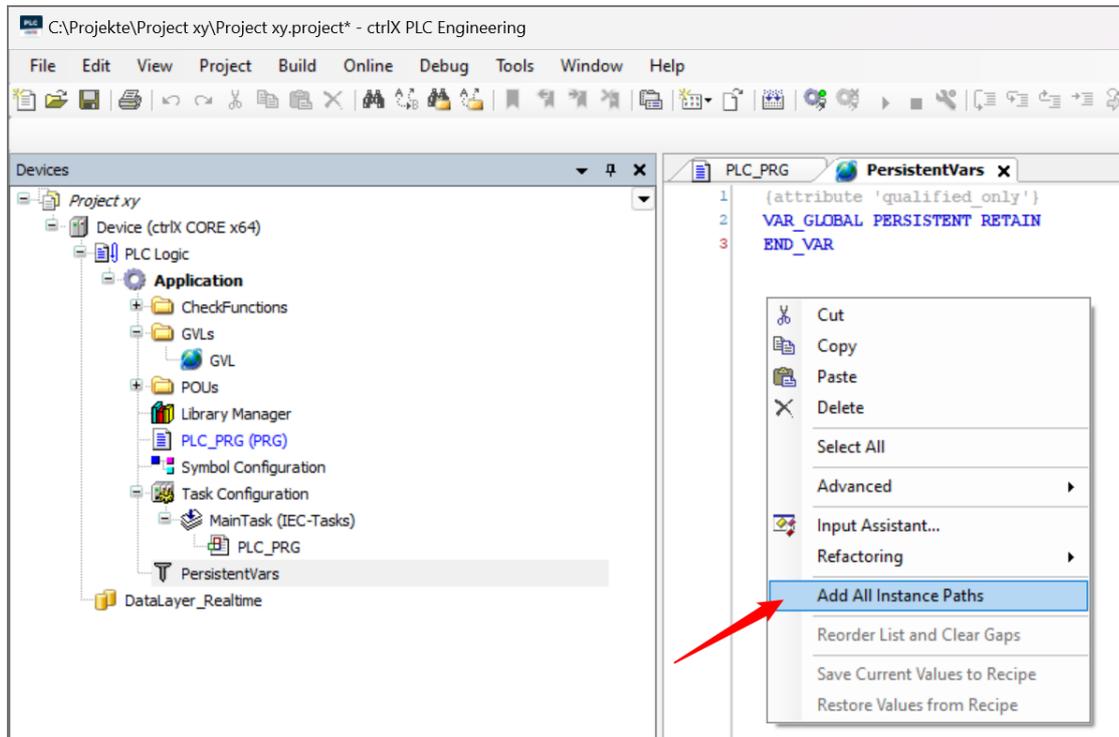


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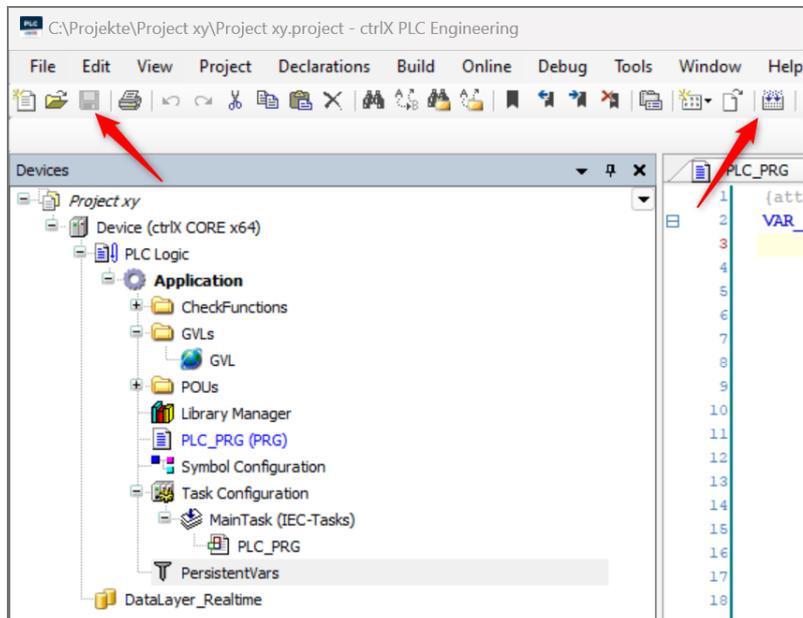
Right-click the context menu and select "Application" and then "Add Object". Then select "Persistent Variables..." from.



Open "Persistent Variables", right-click and go to "Add All Instance Paths".

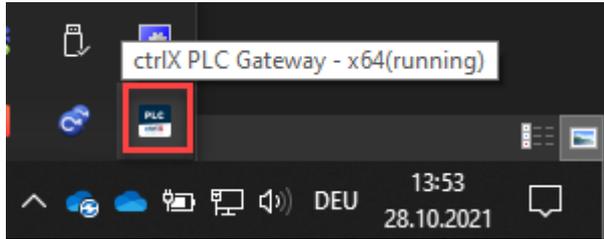


Press F11 or "Build", after which you can save the project.

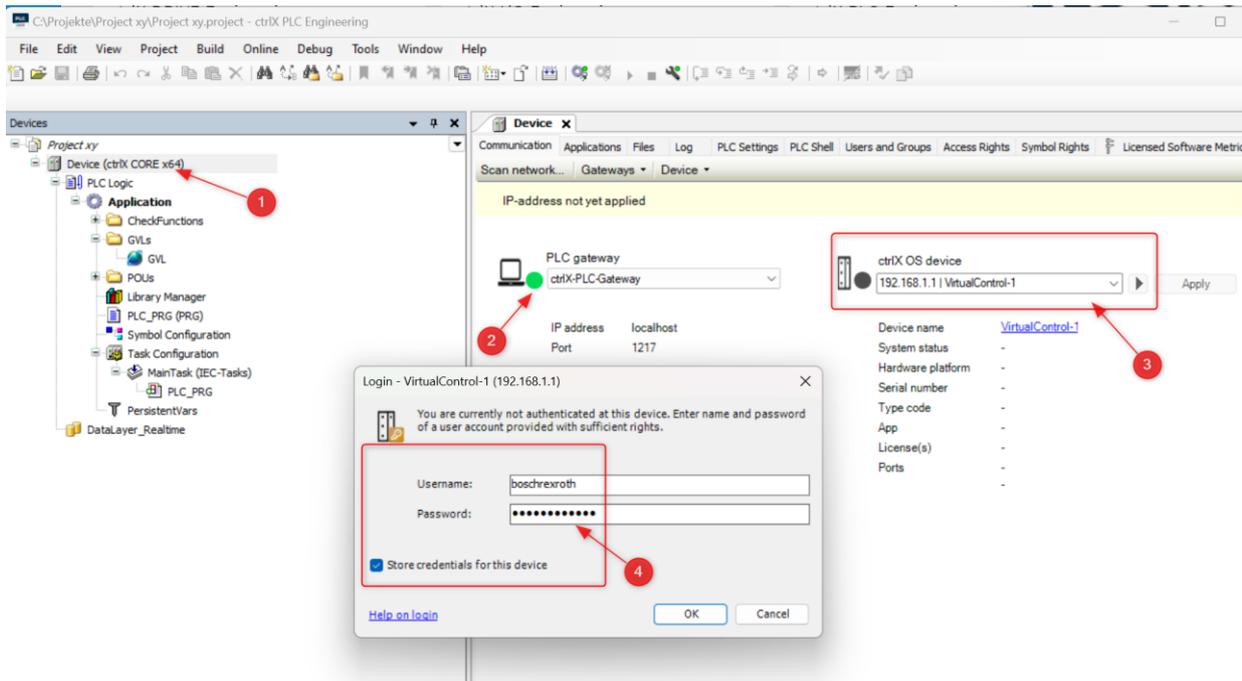


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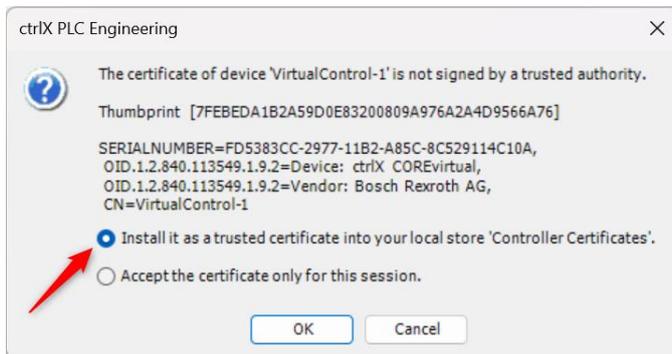
Make sure that "ctrlX PLC Gateway - x64" is running.



Next, select the network path to the controller. Use "Scan Network" to find the active device and log in with an IP address:

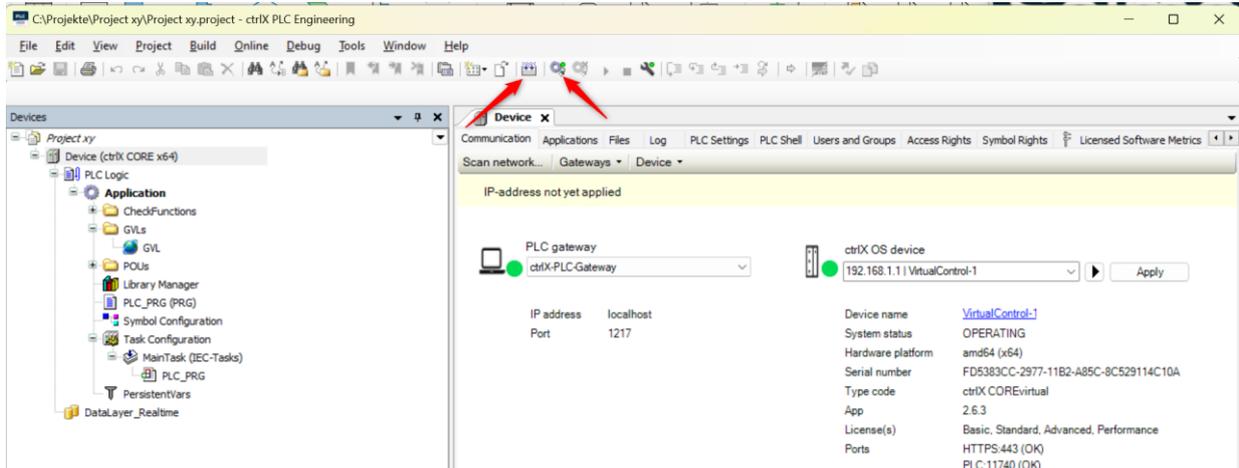


You may be asked to accept the controller's certificate and install it.



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Now you can generate the code (F11) and log in. In the process, the code is transmitted.



The controller can now be started and you can observe, set/reset the variables online, etc.

