EcoStruxure™ Control Engineering

Verification

User Manual

Original instructions

EIO0000004424.00
12/2020

www.se.com

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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠WARNING
UNGUARDED EQUIPMENT • Do not use this software and related automation equipment on equipment which does not have point-of-operation protection. • Do not reach into machinery during operation. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and

serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.

- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

Introduction

EcoStruxure Control Engineering - Verification (formerly known as PLC Checker) is a static analysis tool that analyses PLC and PAC codes to verify if they respect programming and conception rules, and to measure metrics, as defined in a rules file. Following the analysis, the results are generated in two formats:

- Dashboard view – A graphical overview of the results, useful for monitoring the evolution of the program throughout the development process.
- Result Detail view – A list of all the non-conformity messages generated by the analysis, to support the automation engineers in improving their code.

The use of EcoStruxure Control Engineering - Verification is valuable at different stages of the software lifecycle, but it is generally used during program development, with two typical use cases:

- Regular use throughout the development to help find bugs as early as possible when it is cheapest and easiest to deal with them.
- Automate final code review step / Audit code – Two runs of the tool at the end of development. The first run to find any non-conformities and to support code improvement, and the second run to confirm the improvements have been made.

EcoStruxure Control Engineering - Verification is a SaaS application and is accessible via a web platform. How to access and use the web platform is explained in part two of this user guide.

EcoStruxure Control Engineering - Verification is an agnostic tool and supports programs written for a number of different PLC and PAC makes and models, including: Schneider Electric Control Expert (formerly Unity Pro), Schneider Electric Machine Expert, Schneider Electric PL7-PRO, Siemens TIA Portal, Siemens Symatic Step 7, Rockwell Automation RS Logix 5000, and many more.

Highlights

The reverse engineering method used to develop the product is unable to guaranty the support for all the possible constructions of control codes, this may result in missing elements during the analysis of the control codes.

⚠WARNING

RISK OF INACCURATE OR INCOMPLETE ANALYSIS DUE TO REVERSE ENGINEERING TECHNIQUES

- The user should consider that the results may be inaccurate or incomplete when interpreting them.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Software development tools provides code protection features to prevent access to intellectual property, EcoStruxure Control Engineering tools are not able to read these locked codes. If your program contains any locked code, this code will not be analyzed. The user is responsible for providing a complete code export of their PLC code. If some code is missing in input files, this code will not be analyzed. The user is responsible for providing a complete, up-to-date code export of their PLC code. If some code is missing in your program, this code will not be converted, analyzed or documented.

⚠WARNING

RISK OF INACCURATE OR INCOMPLETE ANALYSIS DUE TO QUALITY OF INPUT FILES

Before using EcoStruxure Control Engineering – Verification to analyze their program, the user must:

- Unlock the program elements in the input files.
- Check the completeness of the input files.
- Check that the input files contain the up to date version of the program.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The Schneider Electric default rules files are provided as is. If you create or modify a rules file, it is your responsibility to test it and ensure that it functions correctly.

NOTICE

RISK OF INACCURATE OR INCOMPLETE ANALYSIS DUE TO RULES FILE

- The user must provide a valid and tested rules file

Failure to follow these instructions can result in equipment damage.

Usages

In order to use EcoStruxure Control Engineering - Verification, there are some elements that you need to have before getting started.

1. First, the user needs to **access the EcoStruxure Control Engineering platform**. Depending on your setup, it can be an access to the Cloud server or on an on-premise server. The corresponding procedure is described in the chapter Register on EcoStruxure Control Engineering, page 14. Your account needs to be activated before being able to continue.
2. Secondly, once you have access to the platform, a specific program directory or repository should be created for the analysis. The different program directories can be ordered into a specific project. The procedure is explained in chapters Project and Program creation, page 16. Once created, you can invite other users to work on you program (to allow them to do the next steps).
3. Then, you may need to prepare your **rules file**. The rules file describes what will be verified in your program. If you will use a default rules file, no preparation is required as this is available directly on the platform and can be chosen during the program creation process. If you will use a custom rules file, you will need to get this from your client, quality service, or Schneider Electric services. If you get this rules file in advance, you can upload this during the program creation process. Otherwise, you can upload the rules file later on the already created program directory.
4. Then, you need to have an **export in the right format of your PLC application**. The export format and the export procedure are dependent on the type of PLC you are using. Refer to the chapter **5. PLC export file generation**, page 34 to learn more about the different exportation processes. If you get this export file(s) in advance, you can upload this during the program creation process. Otherwise, you can upload the export file(s) later on the already created program directory.
5. Lastly, you will need to have a **valid licence** to use EcoStruxure Control Engineering - Verification. A licence could already have been purchased and owned by you, otherwise contact your project leader or your local Schneider Electric vendor for more information. If you get this license in advance, you can upload this during the program creation process. Otherwise, you can associate the license later to the already created program directory. In all cases, chapter Manage licenses, page 15 provides more details about licences.
6. Once all the prerequisites are fulfilled, learn how to launch the tool in chapter Analyze a Program, page 27.
7. The chapter View Verification results, page 29 will help you benefit from the results of the static analysis.

EcoStruxure Control Engineering

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Register on EcoStruxure Control Engineering

Before using the tools available in EcoStruxure Control Engineering, user should first register and the account should be activated. This section presents the registration process.

A user account is required to use EcoStruxure Control Engineering. If you are using the cloud version of the tool, the server is **https://www.automationsquare.com/** or **https://ecostruxure-control-engineering.se.app/**. If you are using a private server installed on premise, you need to check with the server administrator for the URL. In both cases, the creation of a user account is required.

Once on the platform home, click on **Not registered? Sign up here** and fill in the form with your first and last names, your phone number, your email address (which will be used as your identifier) and choose a password. The password needs to contain at least one upper case character, one lower case character, one digit, one special character (such as ”{”, ”/”, “$”…) and needs to be between 8 and 32 characters long.

When the form is filled in with the valid information, click on **Sign Up**.

Depending on the setup, the created account should be activated:

- On the cloud, to verify your email address, you will receive **an email with a link** that you need to **click on**. Once done, your account will be reviewed by our validation process which will **validate** your account within 48 working hours.
- On premise, the activation is automatic as the server's mails are usually not available.

Manage licenses

Different licence options are available to best meet your use case requirements. Please contact your local Schneider Electric representative or partner for more information on the different licence types available and how to acquire one.

You can purchase a limited selection of EcoStruxure Control Engineering products licence types directly from the Schneider Electric Exchange shop (**https://exchange.se.com/shop**).

Project and Program creation

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Creation of a program stored inside the default project

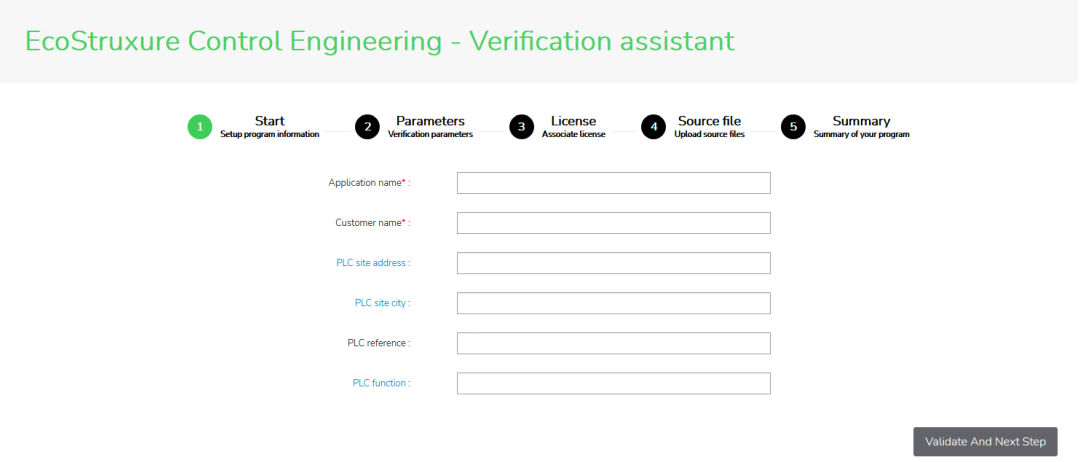
A wizard can be used to guide you through the different steps required to create your EcoStruxure Control Engineering - Verification program and launch the analysis. Here is a step by step description of how to proceed.

The **first step** consists of identifying the program.

To proceed, you are asked to provide some information :

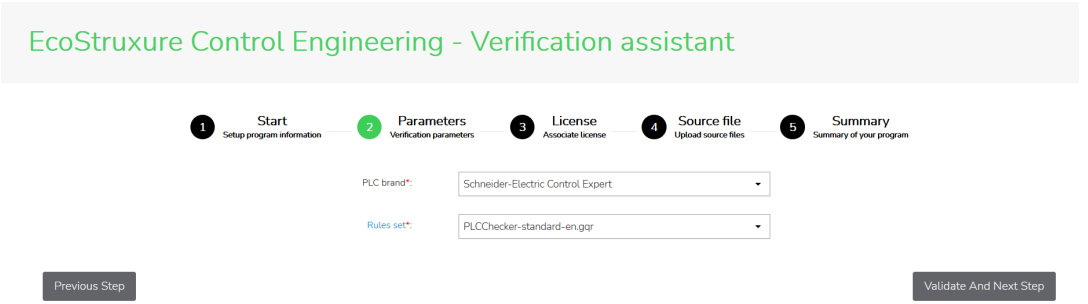
1. The fields **Program name** and **Customer name** are mandatory. The “Program name” will be used to identify the program in the different views of the EcoStruxure Control Engineering web platform.
2. Some complementary information can be specified for the program based on your needs.

Once the information has been provided, to proceed to the next step, click on the **Validate And Next Step** button.



The **second step** consists of identifying the source PLC/development environment used to develop the PLC application and select a Rules file to use.

You need to select the PLC type and the rules file you want to use. Some default rules files are available for you to choose from directly on the platform or you may choose to upload a custom rules file later, during the step 4.



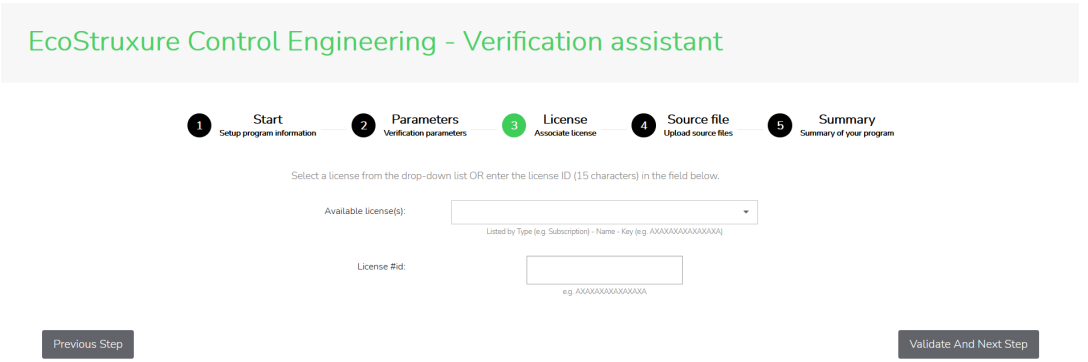
The **third step** is where you choose the license that you want to use with your new program.

To achieve that, a list of your licenses is displayed and you can choose the one you want to use for the project being created.

If no license is available for this action, you can still continue creating the program by pressing **Validate And Next Step**, in such a case, a license can be added to the program once the creation process has been completed. Without a valid license, you will not be able to run EcoStruxure Control Engineering - Verification.

If you have a license available for this action and want to use it, then select the license to associate with this application from the drop-down menu and press **Validate And Next Step** to continue.

In the case that your license has not yet been assigned to your current user account, you can use it by providing its identifier in the “License #id” box and click on the **Validate And Next Step** button.

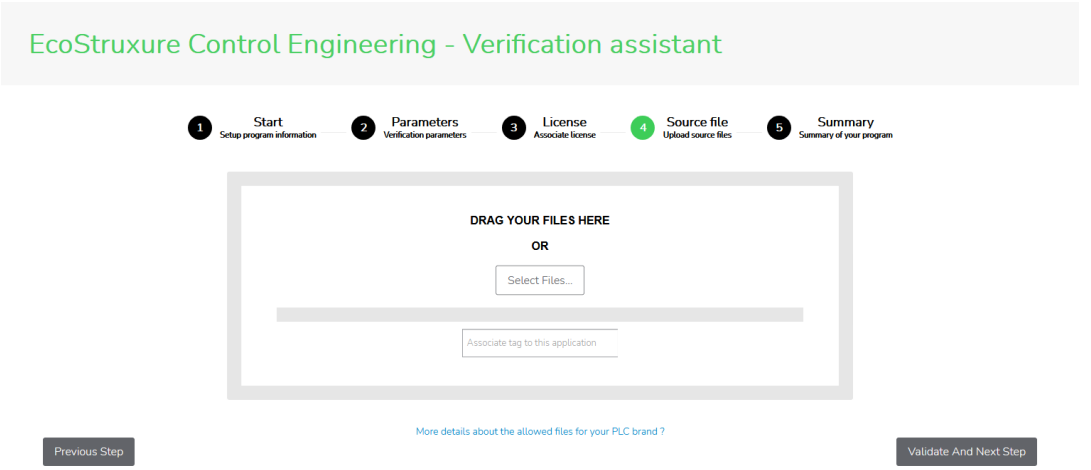


The **fourth step** is where you can upload an exported version of the PLC program to analyze and, if not provided in step two, the rules file.

To do so, click on the “SELECT FILES …” button to import the source files of the application and the rules file (if needed), and then click **Validate And Next Step** to validate.

As a reminder, the interface displays the type of source files that you need to provide to start an analysis based on your choice of development environment made in step 2.

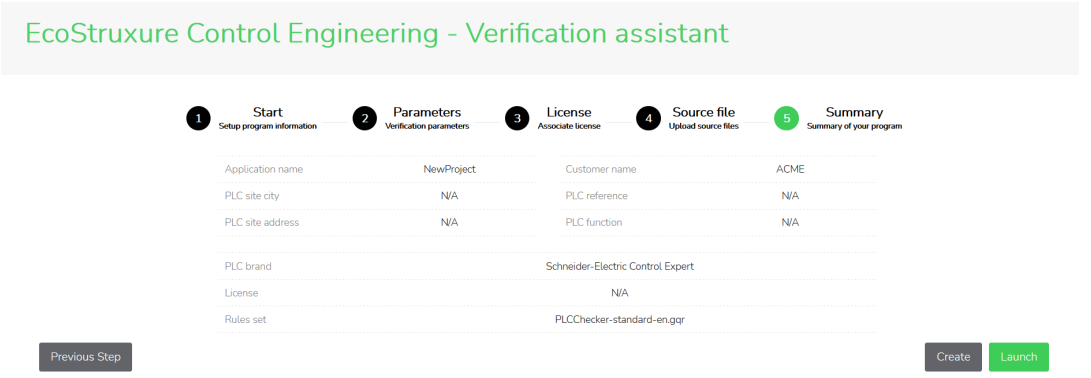
In the case that you prefer to send your files later or if a third party will send the files for you, you can click on **Validate And Next Step** to continue and send them later. Consider that unless files are uploaded, the EcoStruxure Control Engineering - Verification tool will not be able to run.



The **fifth step** is a summary of what has been done using the wizard.

In this step, you find the information you have entered during the application creation process.

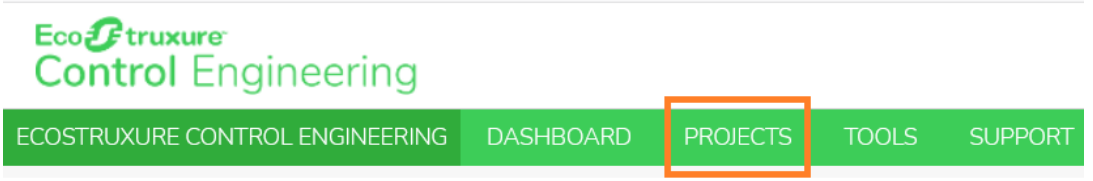
To modify them, you can click on the **Backward** button, otherwise click on **Create** to create the application or **Launch** to create and then launch EcoStruxure Control Engineering - Verification (this is possible if you have chosen a valid license and if you have sent all the required files).



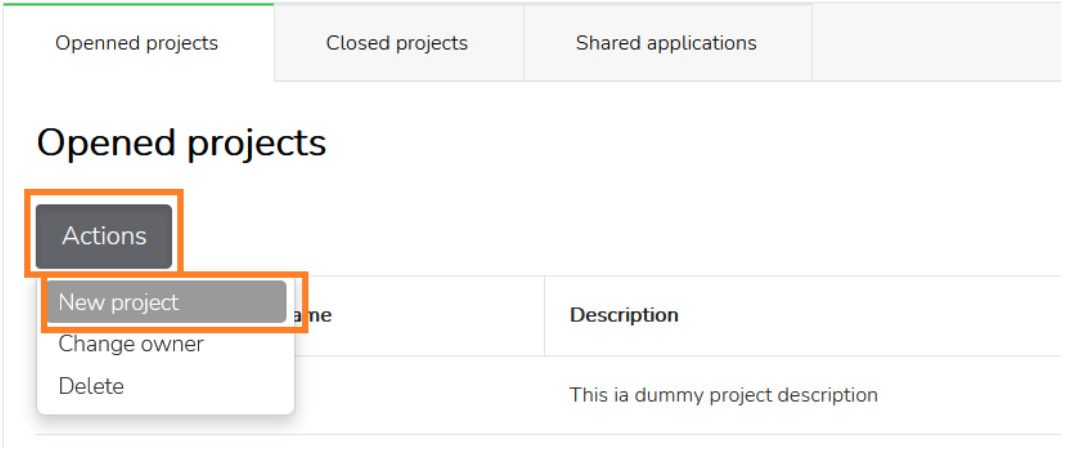
Creation of a program and assignation to a project

To organize your programs, you can store them into projects. A project can contain several programs. This procedure describes how to create a project and how to put a program inside.

First, to create your project, you need to access the projects page by clicking **Projects** in the top menu.



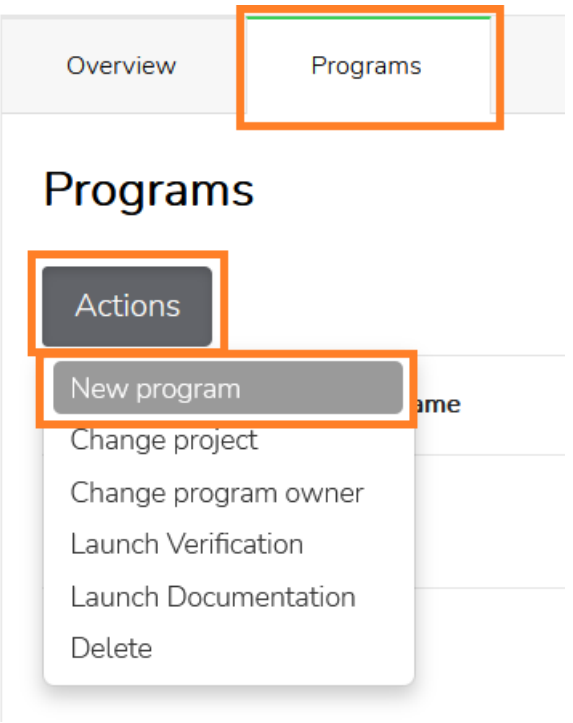
Then, press **Actions** followed by **New project**.



Provide a name for your project and click on **Add** to create it. You cannot create a project with the same name as another one (even if the case of the two projects is not the same).

Once created (you will find it into the “Opened projects” table), click on it to access its content. Once inside, two tabs are available. The first one, called “Overview” is the project's overview, that provides you with some statistics about the programs it contains. The second one, called “Programs”, is the list of your programs.

To create a new program using the creation wizard, click on the tab **Programs**, then on **Actions** followed by **New program**.



Select **Verification** to create a EcoStruxure Control Engineering - Verification project and click on **Launch assistant** to start the creation wizard.

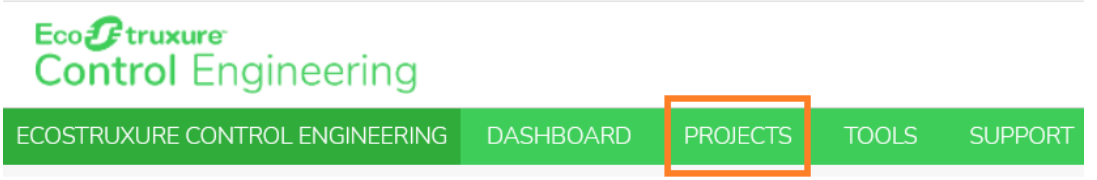
Once clicked, you are redirected to a program creation wizard. The different steps of this wizard are described in the chapter Creation of a program stored inside the default project, page 17.

Access to a shared Program

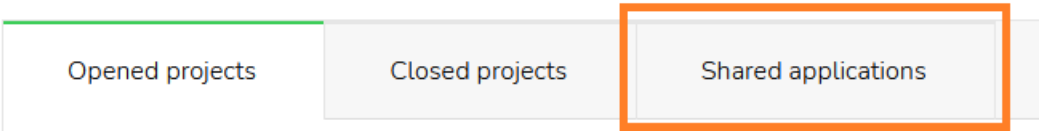
When a program is shared with you, or its access is not restricted, you can add it to your list of programs by providing its unique 6-digit key. The unique 6-digit key can be found in the program overview, under **Application key**.

To add a program to your list of programs using its unique 6-digit key, proceed as follows:

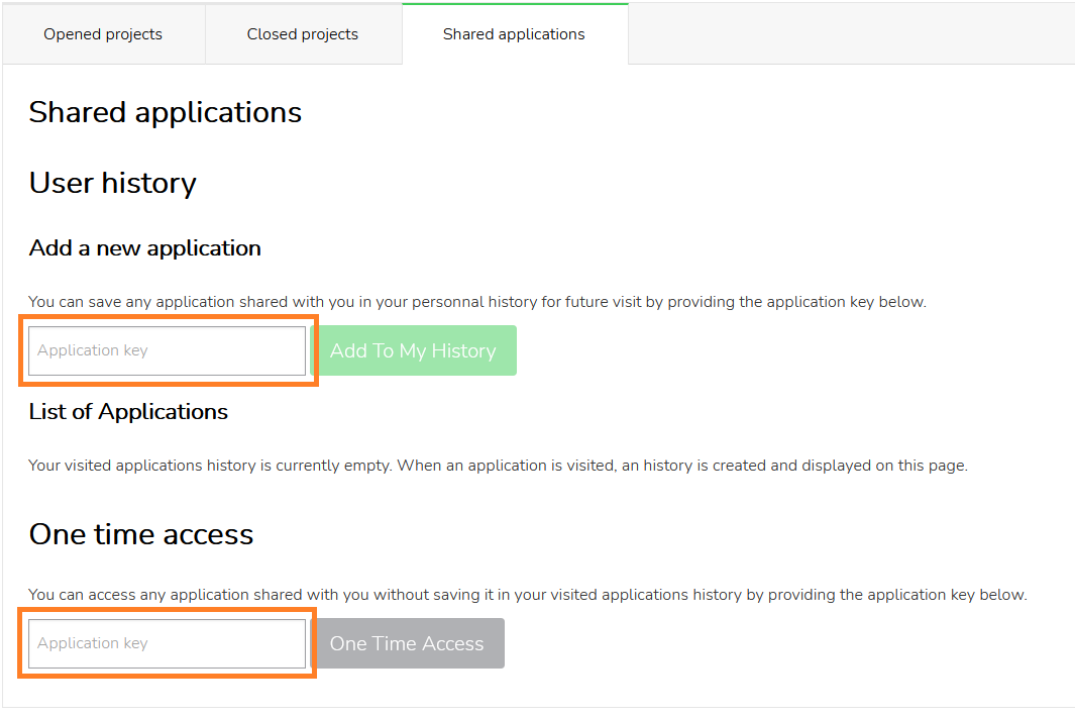
First, access the projects page by clicking on **PROJECTS** in the top menu.



Then click on the tab **Shared applications**.



Enter the program's unique 6-digit key in the **Application key** box below **User History** or **One time access**, depending if you want to save this program into your personal records for easier access later, or if you want to see it without saving it, then click on **Add to my history** or **One time access**.


Opened projects
Closed projects
Shared applications
Shared applications
User history
Add a new application
You can save any application shared with you in your personnal history for future visit by providing the application key below.
Application key
Add To My History
List of Applications
Your visited applications history is currently empty. When an application is visited, an history is created and displayed on this page.
One time access
You can access any application shared with you without saving it in your visited applications history by providing the application key below.
Application key
One Time Access

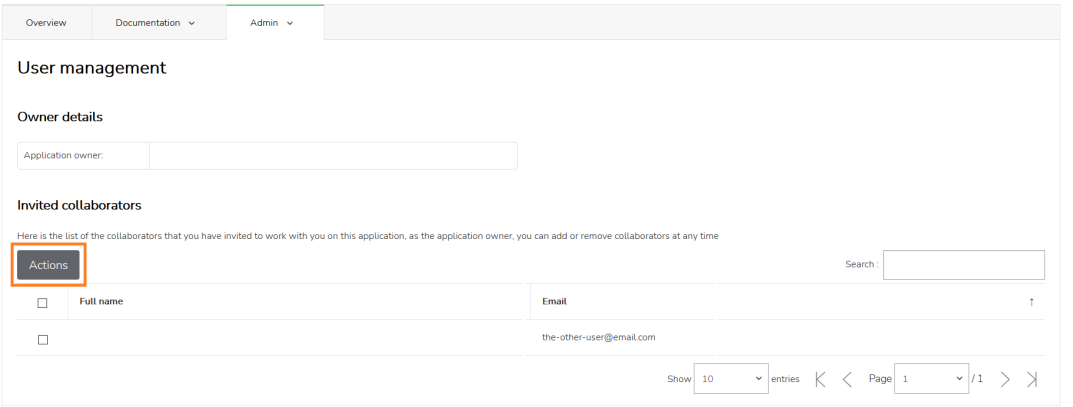
Share programs with other users

Your programs can be shared with other users in order for you and your collaborators or your commercial contacts to be able to work on a project together. To share a program, you need to be its owner, the other users cannot delegate their access.

There are 2 ways to share a program :

- User by user: You choose who can access to your program, by default, the other users cannot
- For everyone: Everyone can access to your program, which is the opposite of the default behavior

To **share your program with a selected user**, open the program page and then go to the program users using the tabs **Admin** and **Users management**. Then, under “Invited collaborators”, click on **Actions** and select **Add**. You are prompted to provide the invited user e-mail address. You can give the e-mail address used by this user to register on EcoStruxure Control Engineering platform if the user is already registered, or any other e-mail address if the user is not yet registered. You can also choose to send an invitation, which is recommended, to tell to the user that the program is now shared with it.



Once another user is added to the invited users list, it will be able to perform the same actions than you except sharing the program and accessing to its settings (if your program is also using the EcoStruxure Control Engineering - Verification tool, then the rules file update and the justifications feature may also be unusable by the invited user, for more details, please report to the EcoStruxure Control Engineering - Verification documentation). If you want your invited users to not update your program, then it is recommended to deactivate the program using the program settings. This action will put your program in a read-only state. You can revoke the invitation at any time by selecting the user(s) you want to remove from your program and then using the **Actions** button to select **Remove access**.

To **share your program with everyone**, open the program page and then go to the program settings using the tabs **Admin** and **Settings**. Simply enable the checkbox under **External share** to share your program with everyone.

Once another user accesses your program, it will be able to perform the same actions than you except sharing the program and accessing to its settings (if your program is also using the EcoStruxure Control Engineering - Verification tool, then the rules file update and the justifications feature may also be unusable by the invited user, for more details, please report to the EcoStruxure Control Engineering - Verification documentation). If you want these users to not update your program, then it is recommended to deactivate the program using the program settings. This action will put your program in a read-only state. You can revoke the access to your program at any time by disabling the checkbox. Once your program access is revoked, then no user can access it, even if previously accessed, and unless being in the invited users list (see below for more details).

EcoStruxure Control Engineering - Verification

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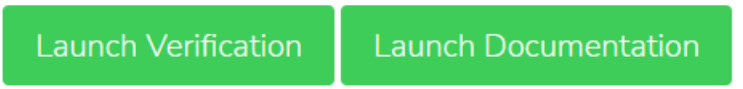
Analyze a Program

When the program is created, it is possible to run several analyses with EcoStruxure Control Engineering - Verification (depending on your license type).

To run a new analysis on an existing program, proceed as follows:

Go to your program page (accessible through the list of your projects).

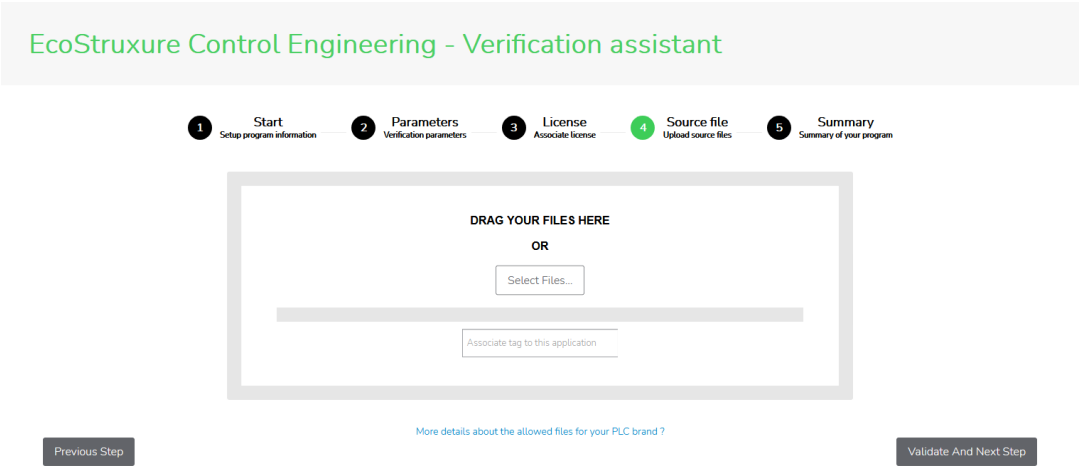
Then click on **Launch Verification**.

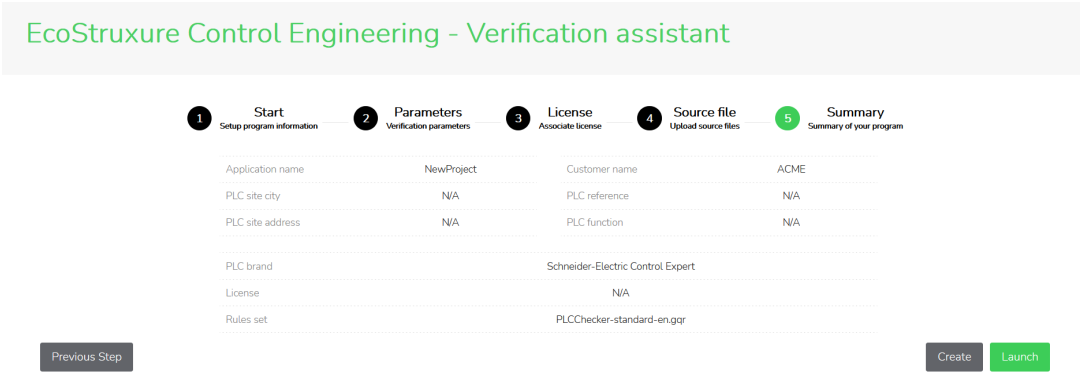


A wizard will ask you if you want to upload new files.

If you have already sent the necessary files for execution (source files and possibly a rules file), click on **Launch** to start the EcoStruxure Control Engineering - Verification analysis.

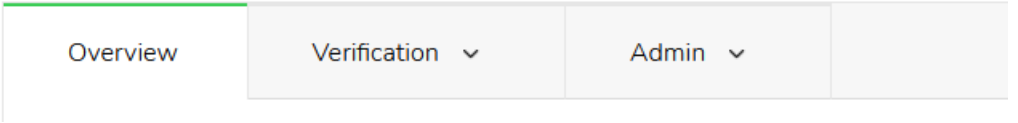
Otherwise, you can click on **Upload**, which will redirect you to step 4 of the program creation wizard, allowing you to send new files. When done, you can click on **Validate And Next Step** to continue, and then on **Launch** to run the analysis.




EcoStruxure Control Engineering - Verification assistant
1 Start
Setup program information
2 Parameters
Verification parameters
3 License
Associate license
4 Source file
Upload source files
5 Summary
Summary of your program
Application name
NewProject
Customer name
ACME
PLC site city
N/A
PLC reference
N/A
PLC site address
N/A
PLC function
N/A
PLC brand
Schneider-Electric Control Expert
License
N/A
Rules set
PLCChecker-standard-en.ggr
Previous Step
Create
Launch

View Verification results

Once EcoStruxure Control Engineering - Verification analysis is done, a tab with the name “Verification” is added to the application page.



To get an overview of the analyze result, click on the tab **Verification** and then **Dashboard**. You can find graphs showing the evolution of the results between the different analyses and a classification of the results by category of rule and by severity.

Overview Verification Admin

Dashboard

Last analysis details

Current analyze date:	December 1, 2020 15:33:54
Current program revision:	15
Amount of analyzes performed:	10

First analyze date:	November 27, 2020 08:15:41

Last analysis results



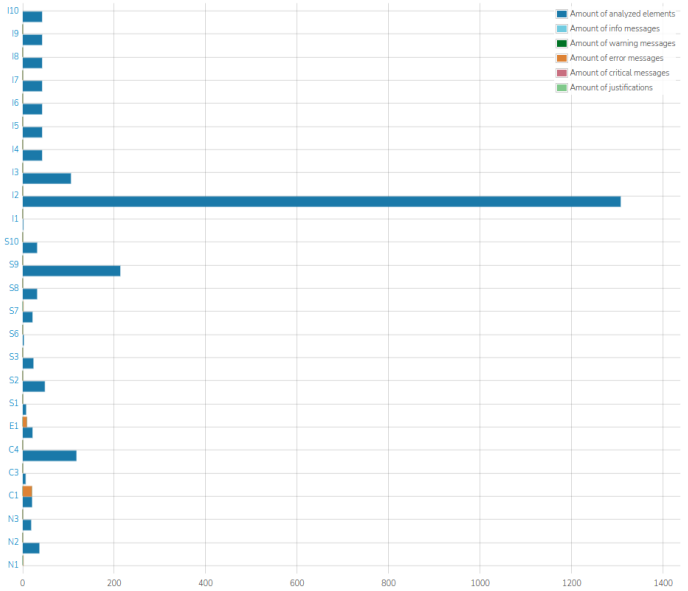
Amount of messages by severity



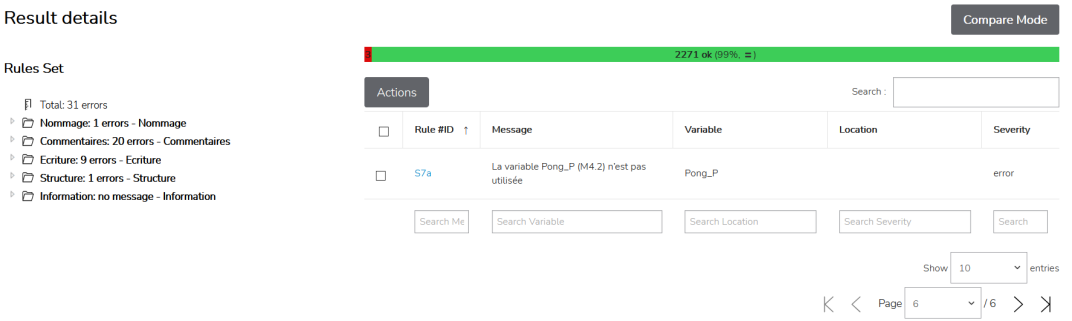
Amount of messages by rule kind

Amount of messages by rule

Amount of elements analyzed compared to the amount of messages reported



To get a detailed results, click on the tab **Verification** and then **Result details**. Here you will find the list of non-conformity and information messages that were generated during the analysis. You can click on the list of rules on the left-hand side to display the messages generated for each rule.



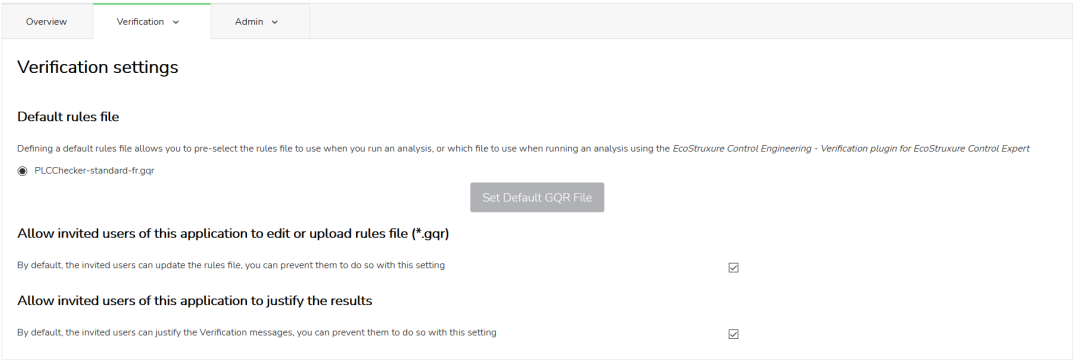
Manage set of rules files

The rules file is required to adapt the verifications performed by EcoStruxure Control Engineering - Verification. When verifying a PLC program, only the rules described and configured in the rules files will be applied.

This file is, by default, managed like every other project file, meaning it can be updated or deleted. It is possible but not recommended to have more than one rules file in a PLC program repository.

If you share your program with other users, then it could be of a great value to restrict them from updating or deleting this file. To achieve that, go on the **Verification** tab and then **Settings**. Under **Rules file updates**, uncheck the checkbox to revoke the permission for the other users than yourself to update or delete the rules file.

When using the EcoStruxure Control Expert plugin for EcoStruxure Control Engineering - Verification, it is required to select a default rules file before a user can launch a verification from the plugin. To do that, you need to select the rules file in the list and click on the button “Set default GQR”.



Use justifications

EcoStruxure Control Engineering - Verification emits a message for each rule transgression it detects. Sometimes, some messages should not have been emitted, as for example when they are relative to codes on which the developer have no impact or because of technical choices that should not be considered by the analyze.

In such cases, it is possible to tell to EcoStruxure Control Engineering - Verification that the message have to be ignored. This mechanism is called **justification**. It consists of removing a message from the results when a good reason to do so exists.

To justify a message, go to your analyze results, from your program view, open the menus **Verification** and then **Results details**. Navigate up the the message(s) to justify, select its (their) checkbox and click on **Actions** then **Justify**. Then, provide the reason of your justification, and validate. The checkbox will disappear and won't be reported in the future analysis.

To see the list of the justifications, their reasons and their authors, then go on your program view, open the menus **Verification** and then **Justification**.

From this view, you are able to un-justify a justification by selecting its checkbox and clicking on **Actions** then **Delete**. In the next analyzes, the message will now be reported again.

Brand dependant export procedures

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EcoStruxure Control Engineering tools read PLC application files. The exact required files depend on the kind of PLC. This section details for the PAC/PLC/DCS/RTU supported what is the procedure to get the file.

Each subsection is dedicated to a specific Control system (PAC/PLC/DCS/RTU) model.

Schneider Electric EcoStruxure Control Expert (.XEF / ZEF file export)

EcoStruxure Control Expert (formerly Unity Pro) applications need to be exported in a XEF or ZEF export file in order to be analyzed by EcoStruxure Control Engineering products. This export could be done manually, using the procedure described below or automatically with the help of the Import/Export tool. The procedure requires the installation of EcoStruxure Control Engineering Import/Export product available on Exchange.

You can create a XEF or ZEF export file with the **File** and **Export application…** menu entries in the EcoStruxure Control Expert software.

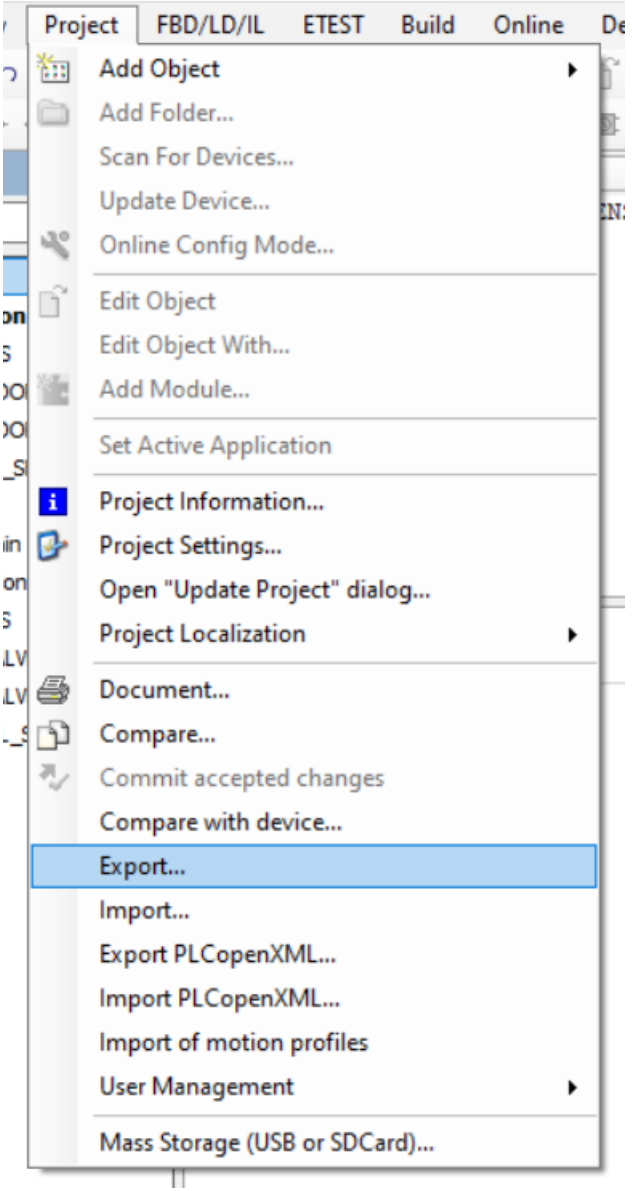
1. In EcoStruxure Control Expert menu, select **File** then **Export application…**
2. In the “Export application” dialog box, give a **name** to the XEF or ZEF file
3. If needed, change directory where the XEF or ZEF file will be created
4. Click on **Save**

Schneider Electric EcoStruxure Machine Expert (.EXPORT file export)

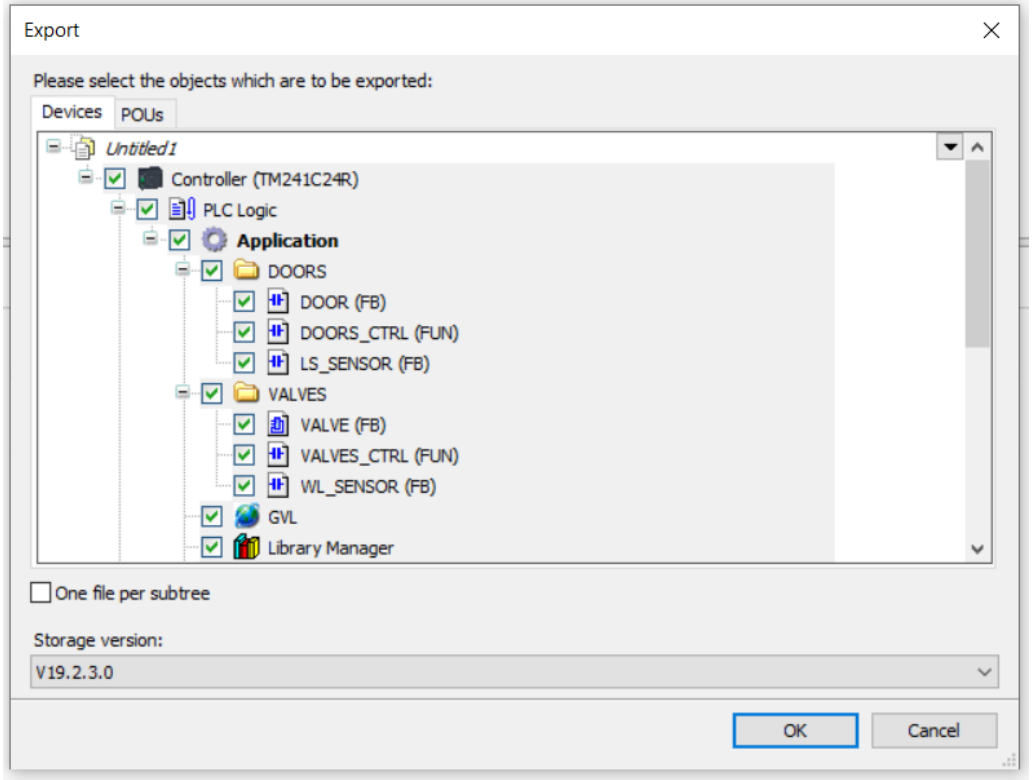
EcoStruxure Machine Expert (formerly SoMachine) applications need to be exported in an XML export file in order to be analyzed by EcoStruxure Control Engineering products.

You can create an XML export file with the **Project** then **Export…** menu entries in the EcoStruxure Machine Expert software.

1. In EcoStruxure Machine Expert menu, select **Project** then **Export…**



2. Choose the code blocks that you want to include in your export file, and if needed, change the storage version



3. Click on **OK** and select a name and a location for the export file when prompted

FEF export file generation from PL7 Pro

PL7 Pro application need to be exported in a FEF export file in order to be analyzed by EcoStruxure Control Engineering products.

You can create a FEF export file with the **File** and **Export application…** menu entries in PL7 Pro software.

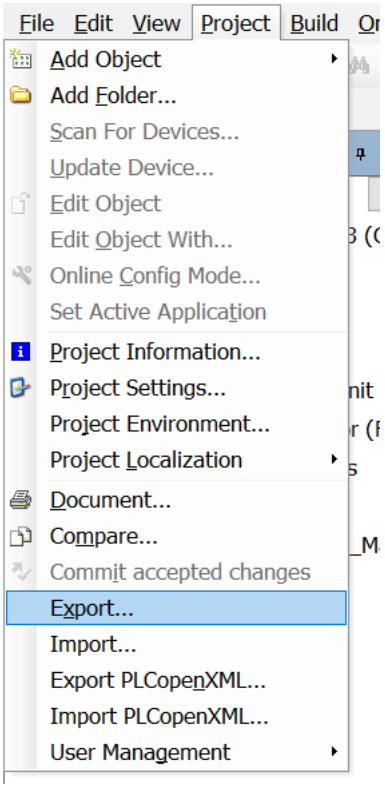
1. In PL7 Pro menu, select **File**, then **Export application…**
2. In the “Export application” dialog box, give a **name** to the FEF file
3. If needed, change directory where the FEF file will be created,
4. and click on **Save**

3S CODESYS V3 (.EXPORT file export)

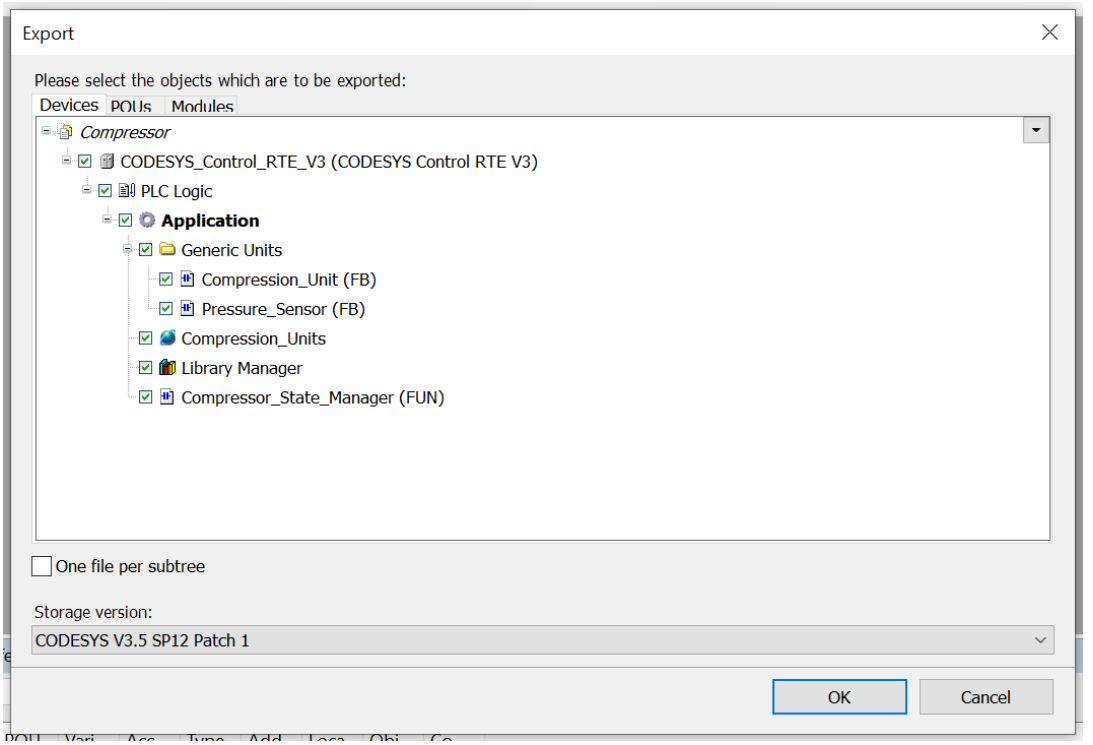
CODESYS V3 application need to be exported in a XML file (with the extension **.export**) in order to be analyzed by EcoStruxure Control Engineering - Verification.

You can create an export file with the **Project** then **Export…** menu entries in the CODESYS V3 software.

1. In CODESYS V3 menu, select **Project** then **Export…**



1. In the exportation window, select the code units that you want to include in your export, if needed, you can also choose the export format (if you are using EcoStruxure Control Engineering - Verification for CODESYS V3, make sure to select a format from the version 3 family (**CODESYS V3 …**))



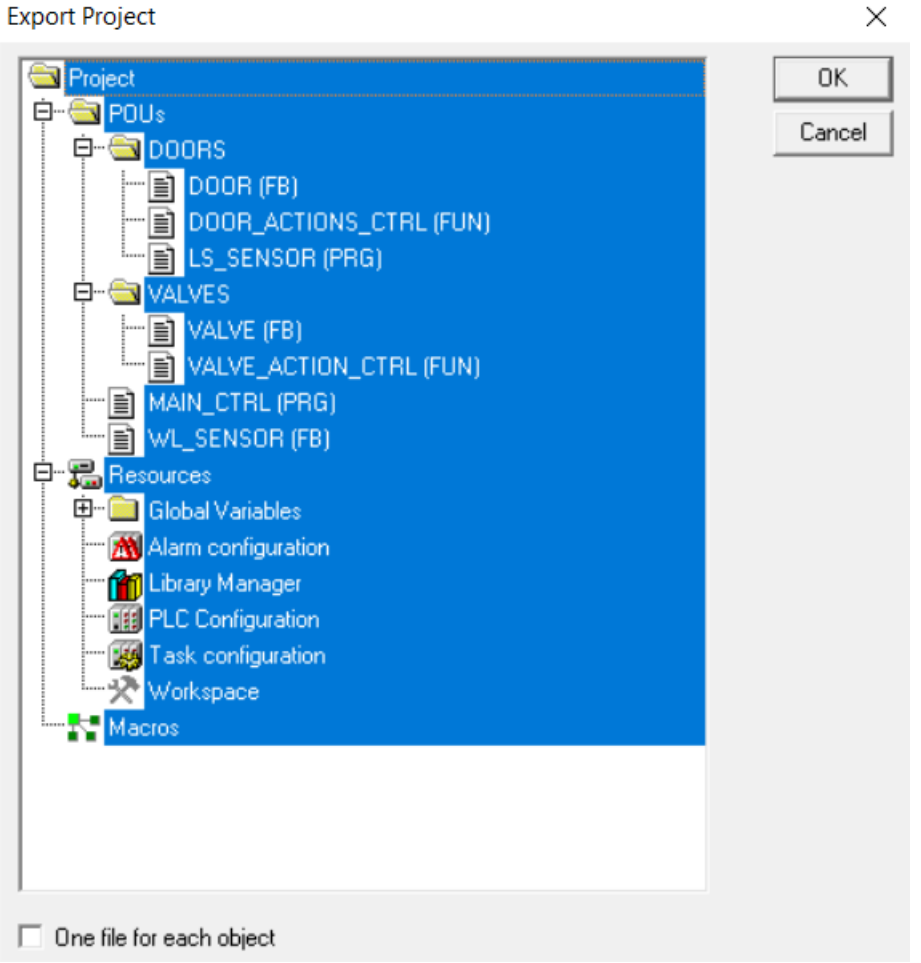
1. Click on **OK** and select a location to save your export file

3S CODESYS V2 (.EXP file export)

CODESYS V2 application need to be exported in a **.EXP** export file in order to be analyzed by EcoStruxure Control Engineering products.

You can create a **.EXP** export file with the **Project** then **Export…** menu entries in CODESYS V2 software.

1. In CODESYS V2 menu, select **Project** then **Export…**
2. In the “Export application” dialog box, ensure that all your code is selected (a selected item background is usually in blue), then click on **OK**



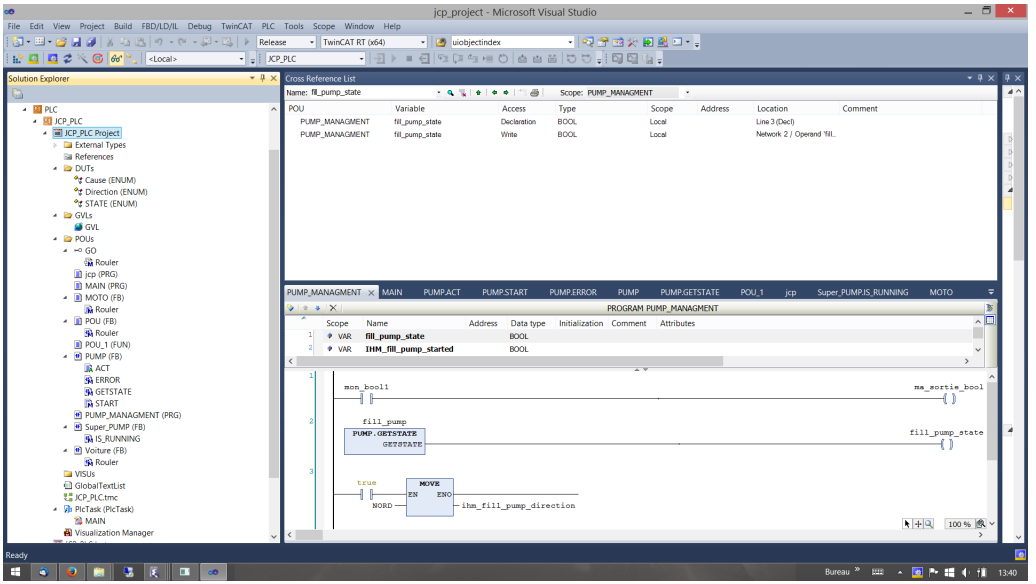
3. When prompted, give a **name** and choose a **location** for the EXP file and then click on **Save**

BECKHOFF TwinCAT V3 (.XML file export)

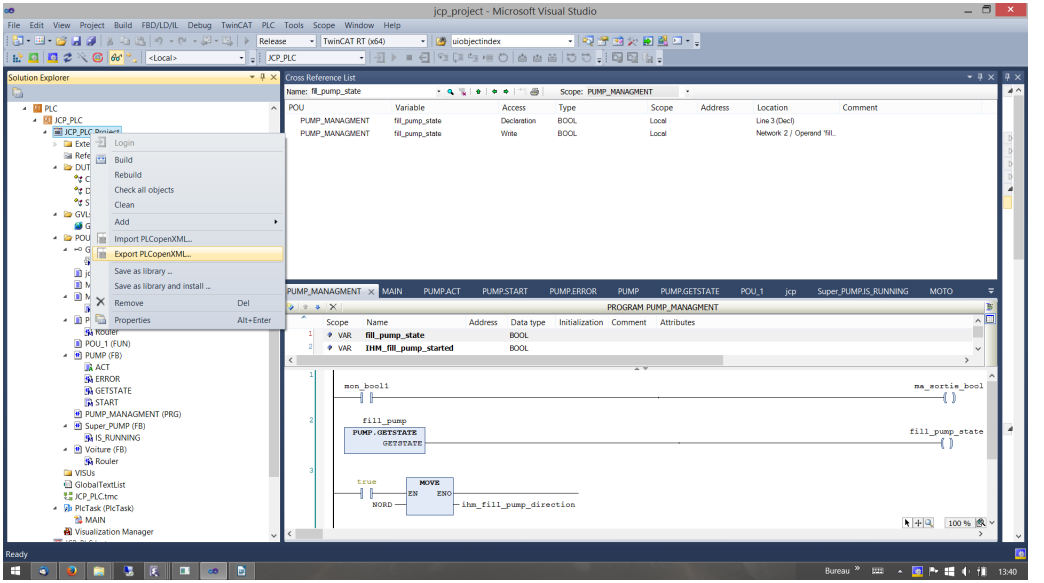
Beckhoff TwinCAT application needs to be exported in an PLCopen XML file in order to be analyzed by EcoStruxure Control Engineering - Verification.

You can create a PLCopen XML export file with the **Solution Explorer** then **Export PLCopenXML…** menu entries.

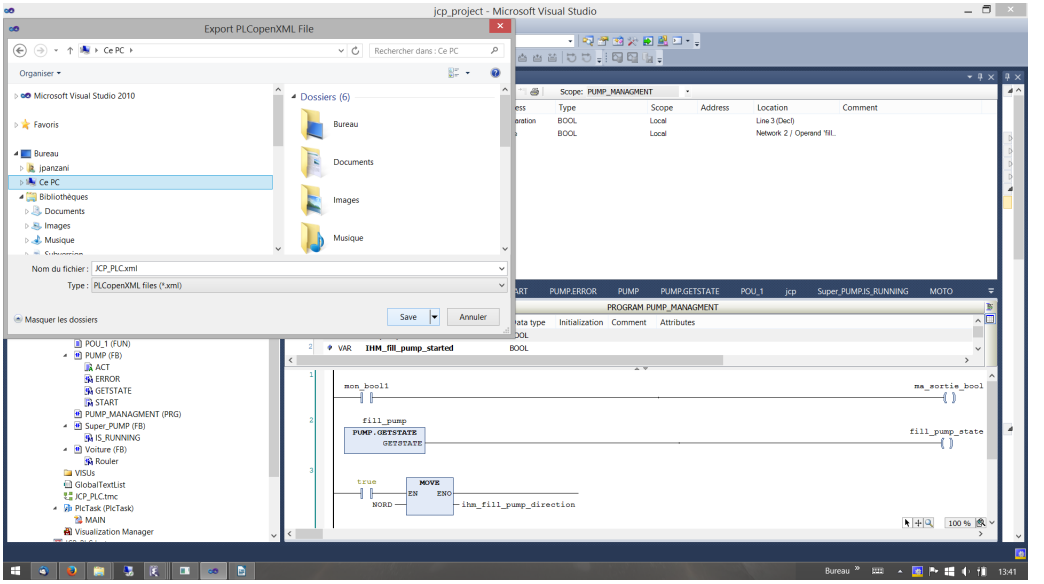
1. In the Solution Explorer window , select the project



2. Open the contextual menu by clicking on the right button and choose **Export PLCopenXML…**



3. Click on **Save**

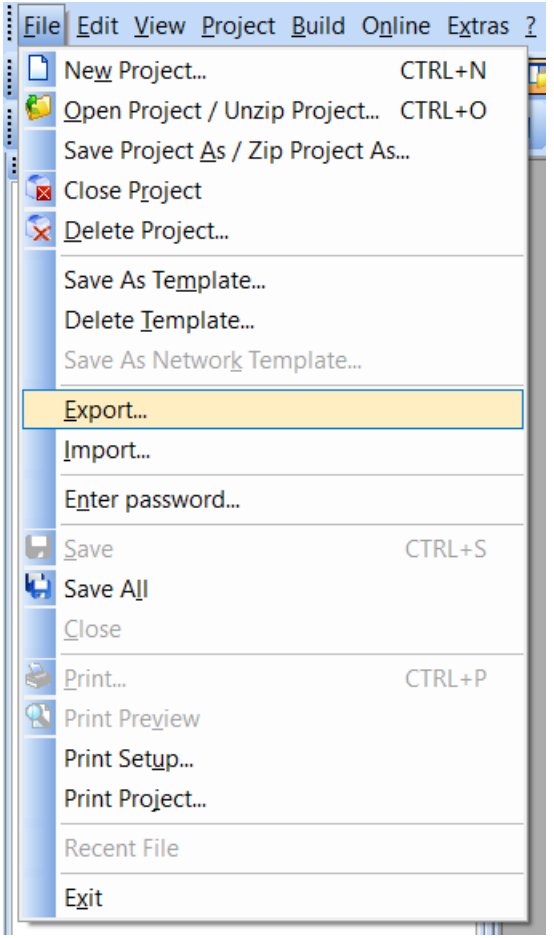


PHOENIX CONTACT Multiprog v5.5 (.XML export)

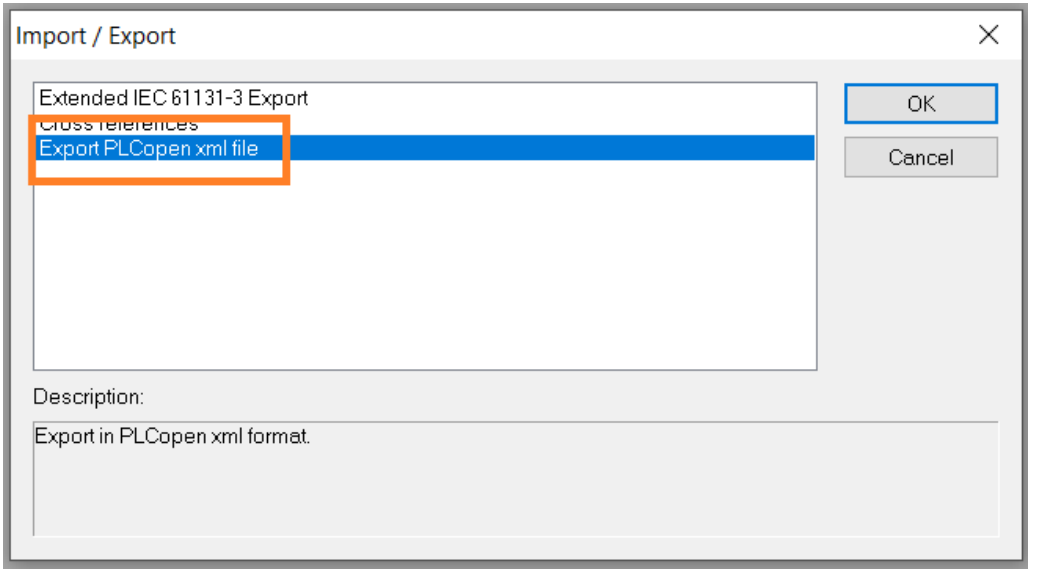
KW-Software GmbH MULTIPROG applications need to be exported in an XML export file in order to be analyzed by EcoStruxure Control Engineering - Verification.

You can create an XML export file with the **File** and **Export…** menu in KW-Software GmbH MULTIPROG software.

1. In the KW-Software GmbH MULTIPROG menu, select **File**, then **Export…**



2. Choose “Export PLCopen XML file…”



3. Rename the export file and then click on **Save**

As MULTIPROG is able to export the application in different versions of the PLCopen format, you may find some differences between the EcoStruxure Control Engineering - Verification results as the amount of exported elements and their format depends on the version of PLCopen.

Rockwell Automation RSLogix 5000® or Studio 5000 (.L5K export file)

Rockwell Automation RSLogix 5000® applications need to be exported in a L5K export file in order to be analyzed by EcoStruxure Control Engineering - products.

You can create an L5K export file with the **File** and **Save as…** menu entries in RSLogix 5000® software.

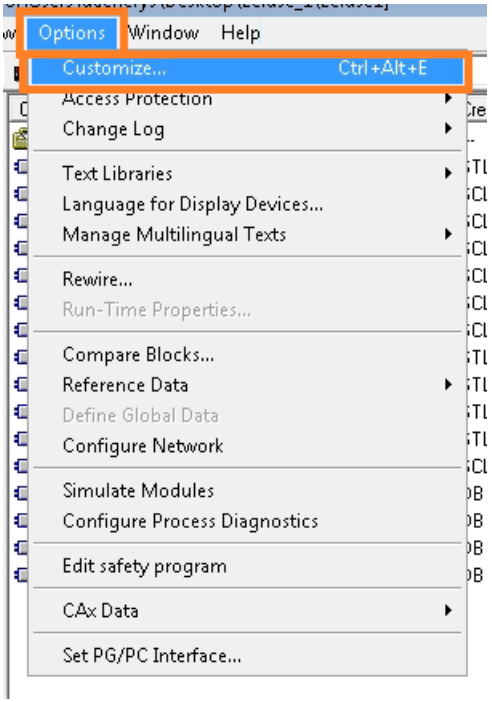
1. In RSLogix 5000® menu, select **File** and then **Save as…**
2. In the “Save as” dialog box, give a **name** to the L5K file
3. Choose the file type : **RSLogix 5000 Import/Export File (*.L5K)**
4. If needed, change directory where the L5K file will be created and then click on **Save** to create the L5K file

Siemens SIMATIC STEP 7 (ASC, AWL, GR7 and SCL Export files)

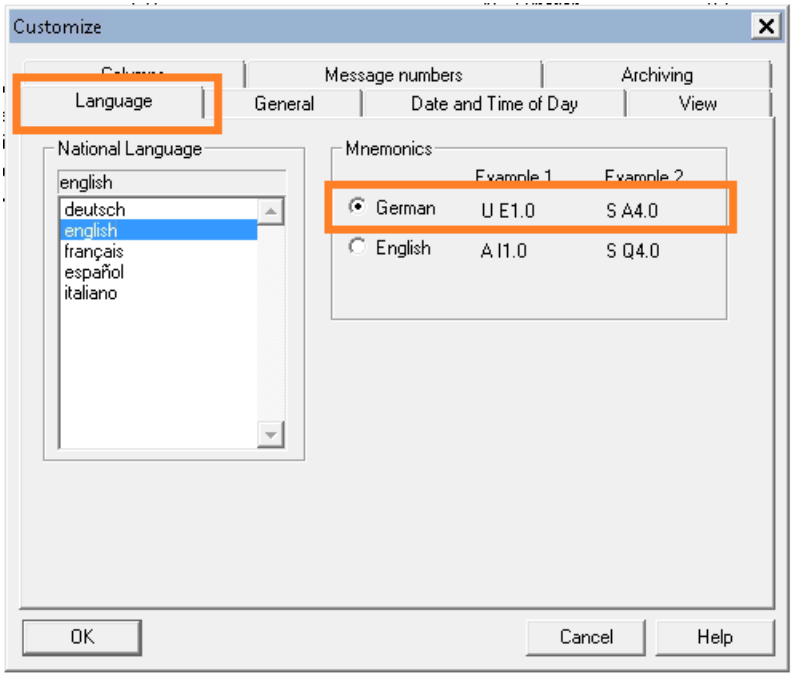
To analyze a Siemens SIMATIC STEP 7 application with EcoStruxure Control Engineering products, you need to:

- Create and export the symbols of this application in an **.ASC** file, using the German abbreviations,
- Create and export the contact code (CONT) in an **.AWL** file,
- Create and export all graph blocks (GRAPH) in **.GR7** files (if any),
- Compile CFC codes, if any, to create the corresponding **SCL** sources,
- Export structural codes (SCL) in **.SCL** files.

To create the export files, you must first make sure that your SIMATIC STEP 7 workshop uses the German abbreviations (they can be enabled using the menus **Options** and then **Customize…**)

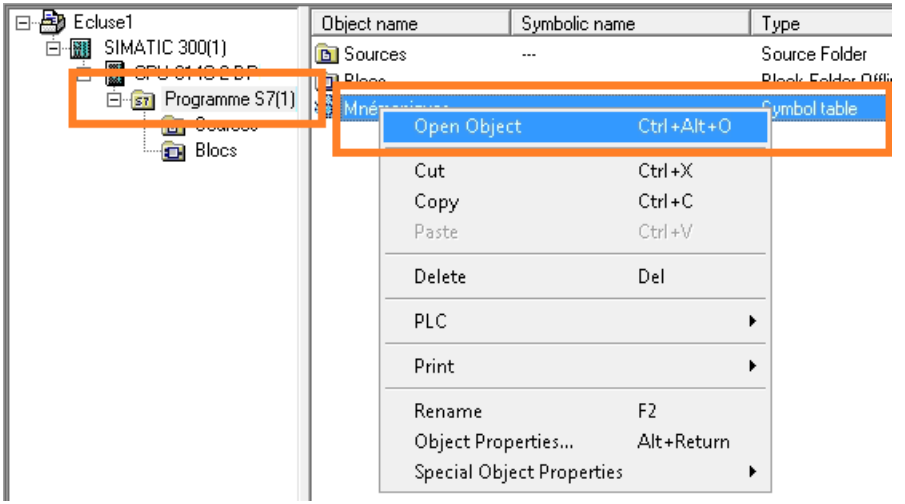


In **Language** tab, select **German mnemonics** and then click on **OK**.

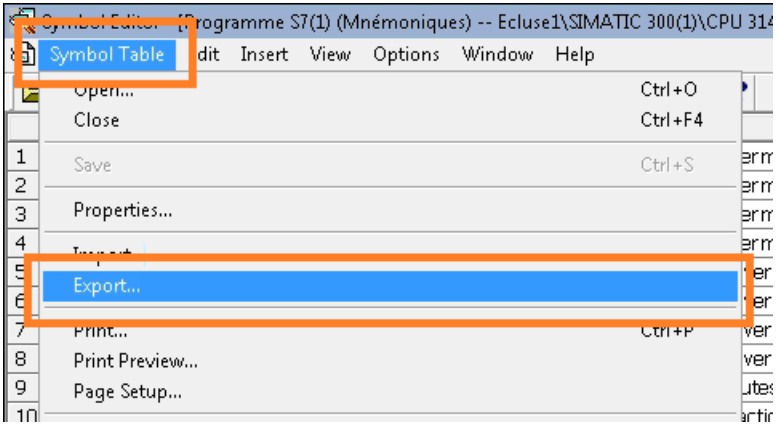


Create ASC file

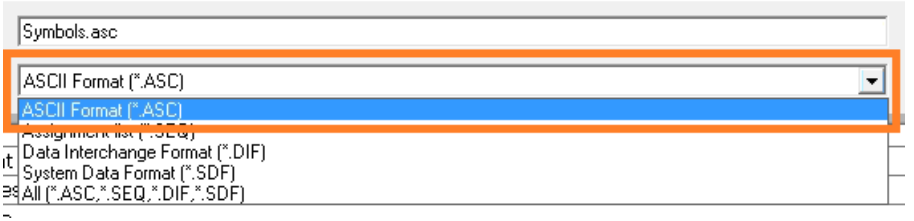
To create an **.ASC** file, you need to open the symbols editor by going on your program folder and right-clicking on your Symbols table, then select **Open object**



In the symbols editor, click on the **Symbol Table** menu and then select the **Export…** entry



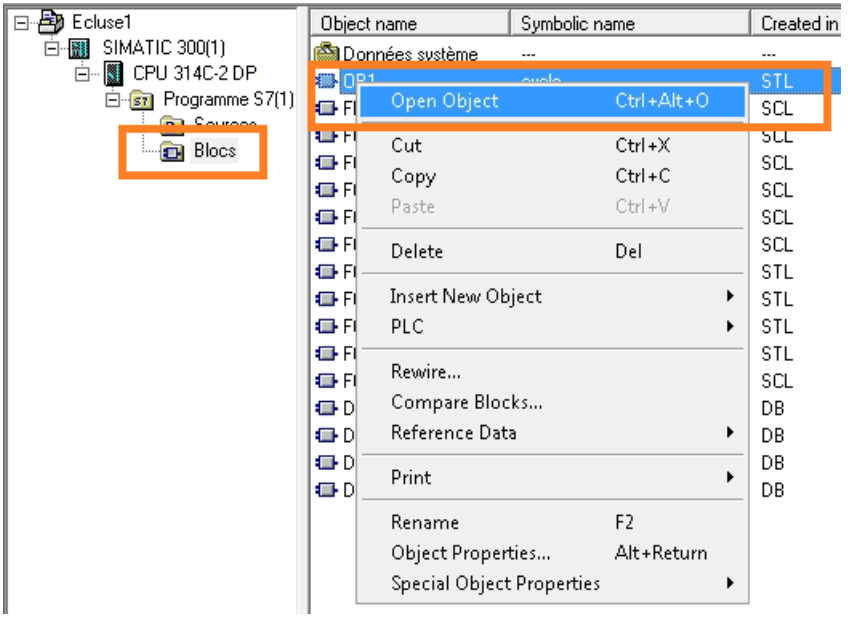
When prompted to save your symbols table, choose the **ASCII Format** (*.ASC) file type, the **name** and the **directory** where **.ASC** will be created, and click on **Save**.



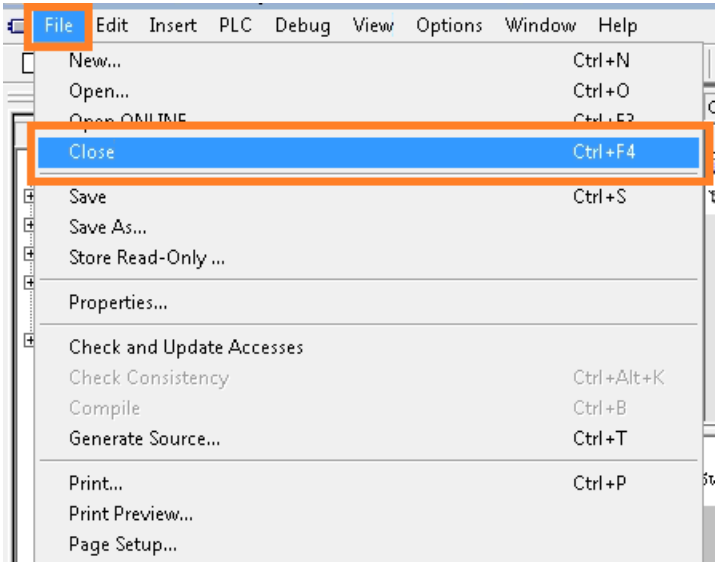
Create AWL file

To create the **.AWL** file, you first need to generate the LIST source for the blocks developed in languages CONT, LIST and LOG.

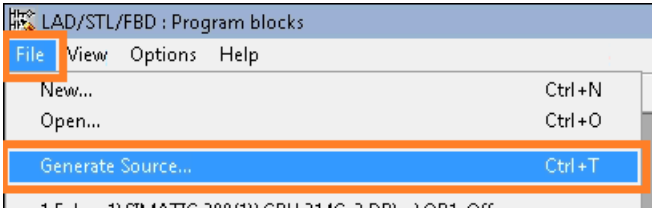
Open the CONT/LIST/LOG code editor by right-clicking on a CONT, LIST or LOG source and selecting **Open object**



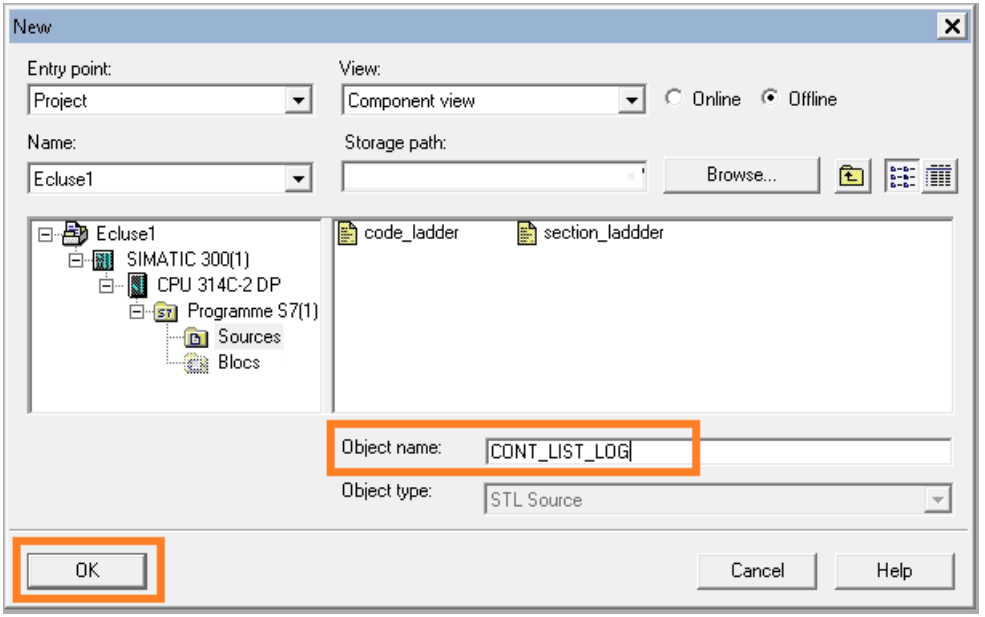
Close all objects being edited by clicking on the menu entries **File** and **Close**



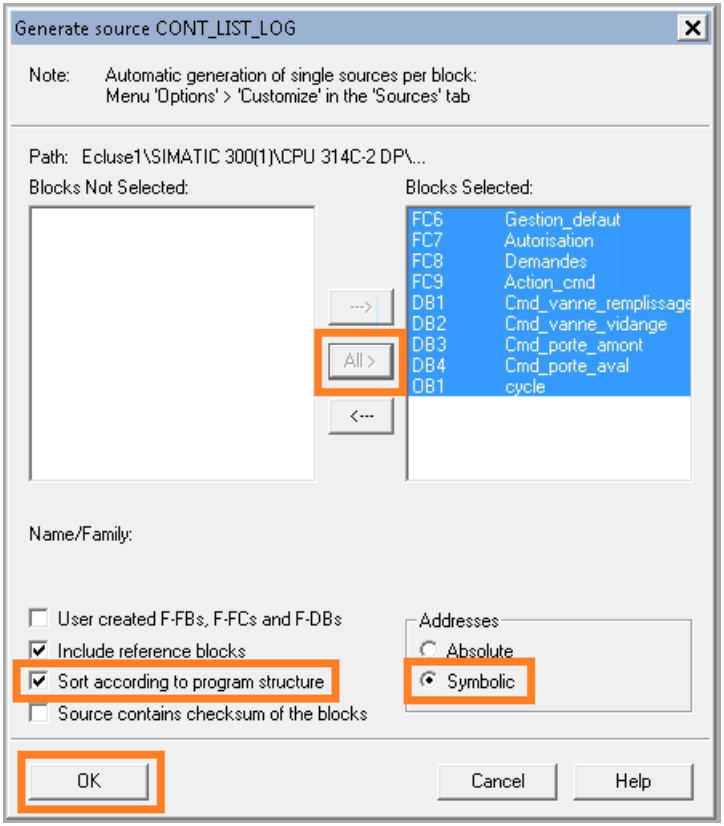
Then, generate the program source with the menu entries **File** and then **Generate source…**



Give a name to the object to be generated



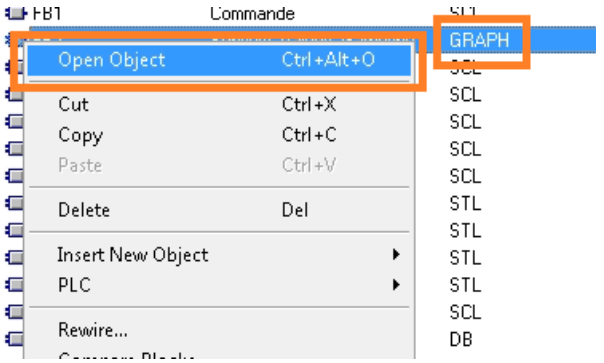
On the selection window, click on the button **All** to select all the program's blocks, select the options **Sort according to program structure** and **symbolic operands**, then click on **OK**



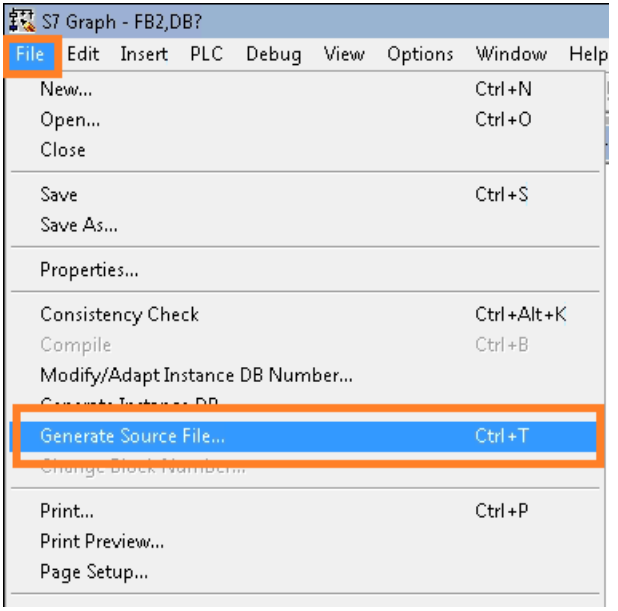
If your application contains Safety blocks, you need to export those blocks in a separated **AWL** file, more information is available below on how to proceed in the dedicated chapter.

Create GR7 file

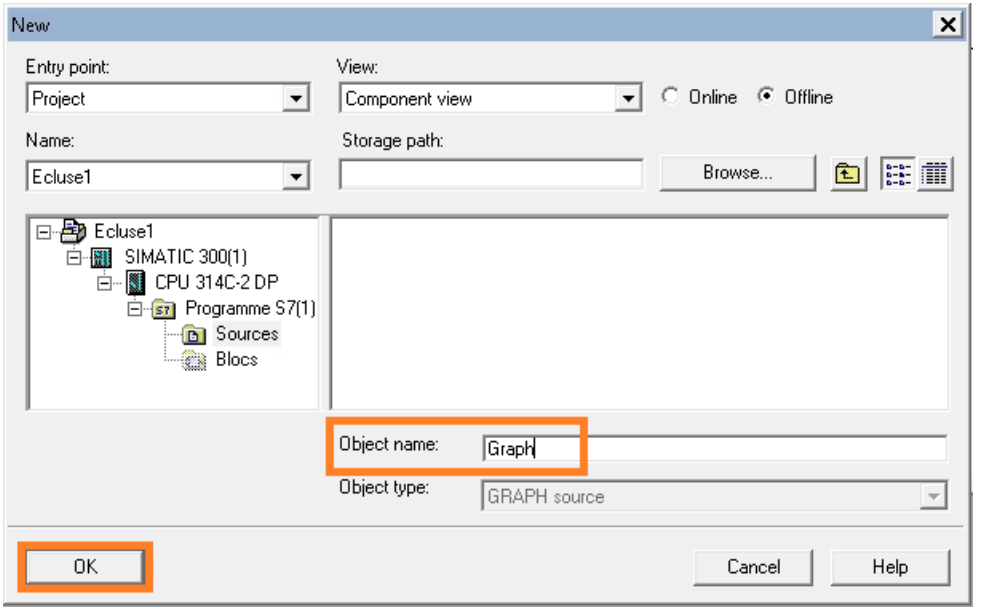
To create the **.GR7** sources, select **all** the GRAPH blocks and open the GRAPH editor by right-clicking on the selected elements and then selecting the **Open object** menu entry.



For **each** GRAPH block, generate the source using the menu entries **File** and **Generate source file**



Give a name to **each** GRAPH source file and press **OK**



Create CFG file

The CFG file is required for analyzing the communication and the hardware configuration of the Station.

To get the CFG, you need to open the NetPro utility to edit the network configuration by double-clicking on your CPU's links, in the main window.

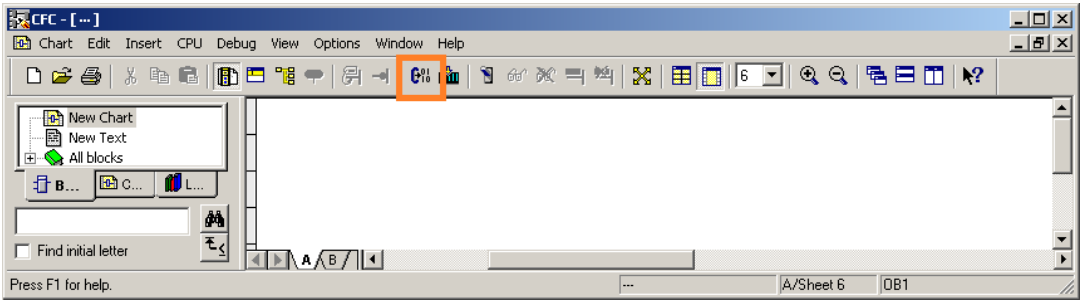
On NetPro window, select the station that you want to export by double clicking on its CPU, this opens the HW Config utility.

In the **Station** menu, select **Export…** to export your Station configuration (the default settings in the window are sufficient).

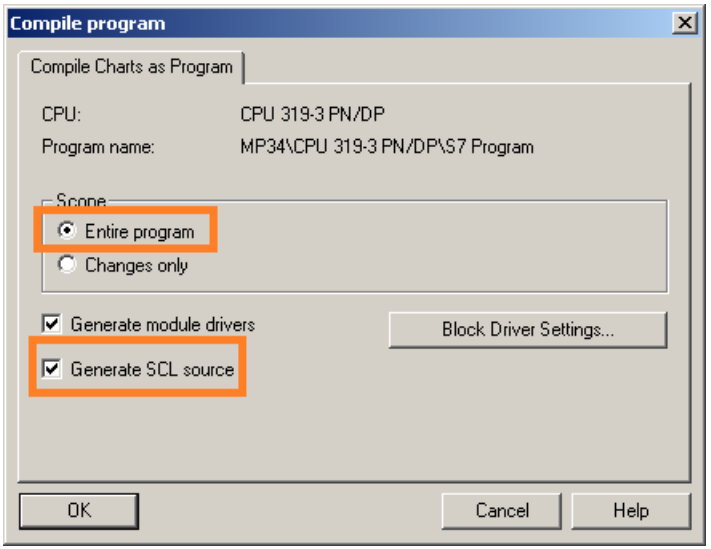
Create SCL source for CFC codes

If the application contains some CFC codes, those codes need to be compiled to generate the corresponding SCL source files which are the files analyzed by EcoStruxure Control Engineering products.

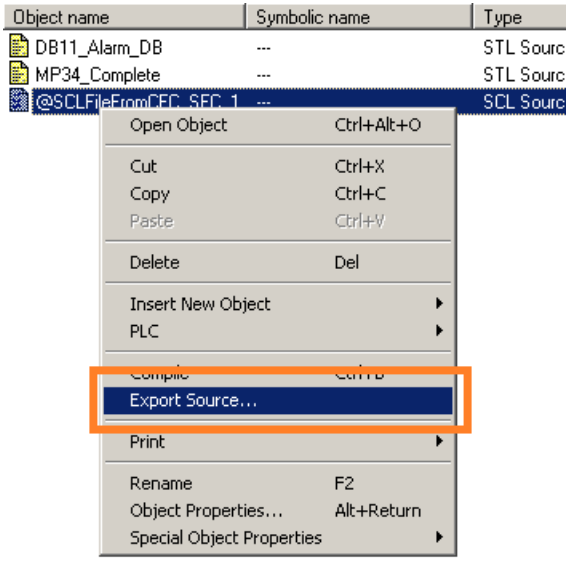
Open the CFC code editor by clicking on its icon on the main window menu.



Then, compile the code with the options **Entire Program** and **Generate SCL sources**



The generated SCL source file can then be exported like other source files, see **export files**



Safety applications

A Safety application contains two parts:

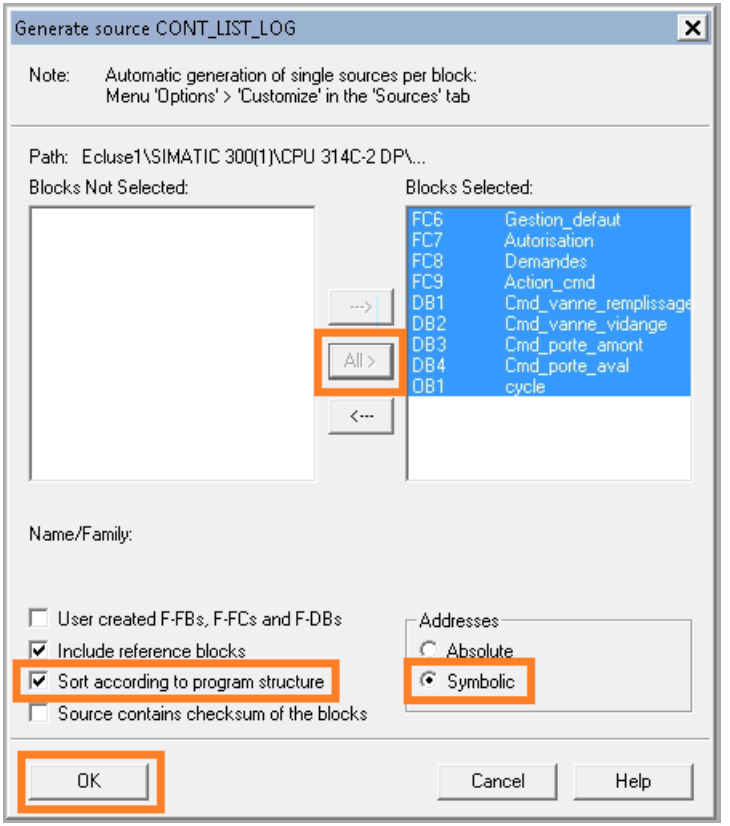
- The standard code part
- The safety code part

Exports for safety applications

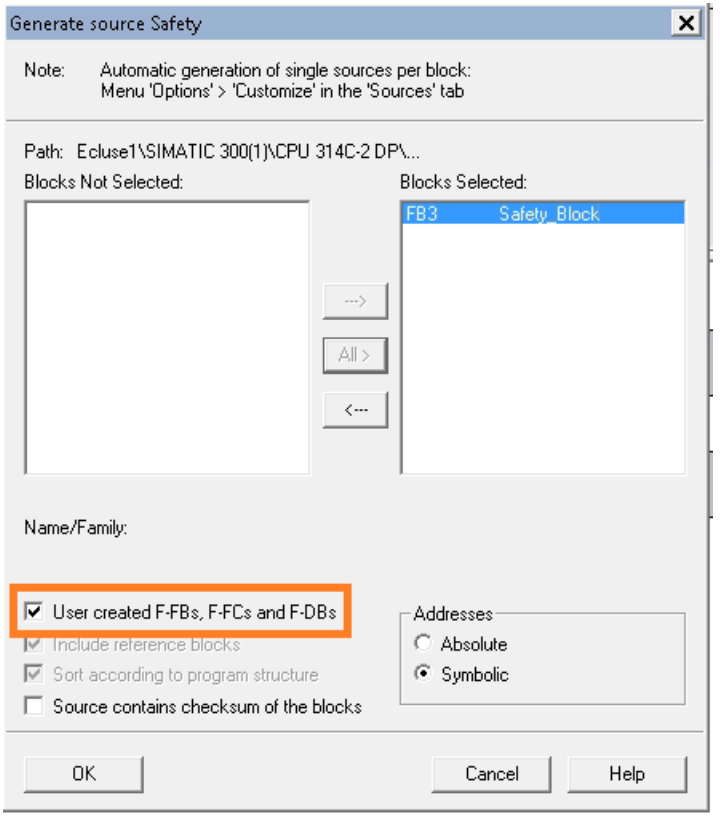
The export for safety applications is made with the following steps :

First export the **.ASC** file that contains the database for the program's Safety and standard codes, see above how to export the **.ASC** file

Then, generate the sources for the standard part (non-safety), see above how to generate **.AWL** and **.GR7** files



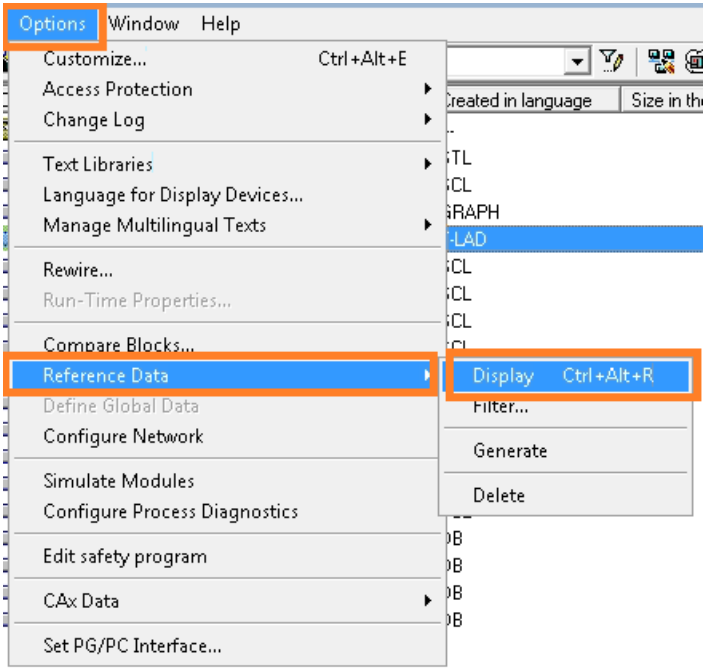
Continue by Generating the source for the safety part in a different **.AWL** file by following the same procedure until the **Generate Source Safety** window, where you need to select the **User-created F-FBs, F-FCs and F-DBs** option.



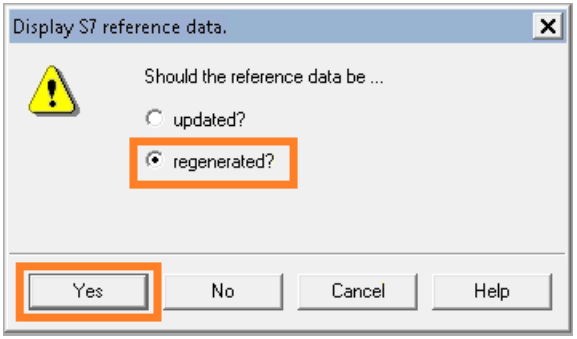
Finally, export the program structure in a **.dif** file (it will be used to determine whether a module is Safety or not)

Create dif file

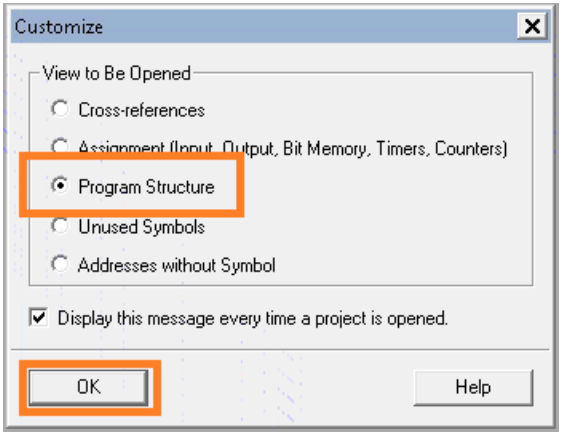
To create the **.dif** file, in the SIMATIC Manager of SIMATIC STEP 7, use the menu **Options**, **Reference Data** then **Display**



If prompted, let SIMATIC STEP 7 regenerate the references

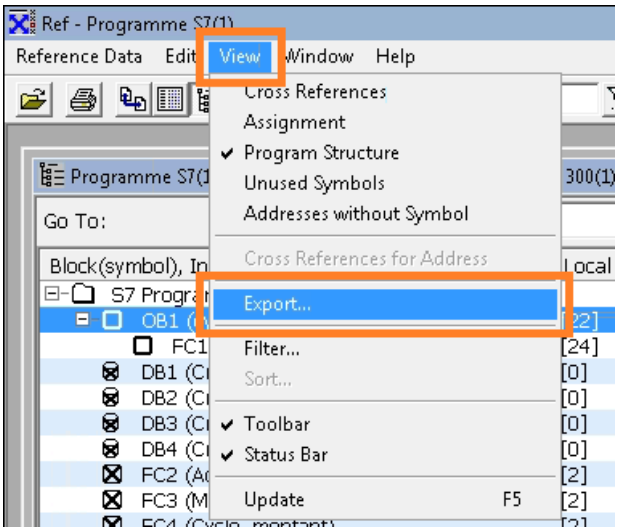


In the **Customize** window, select the **Program structure** entry and click on **OK**



The program structure is displayed

Use the menu entries **View** and **Export** to open the save dialog box



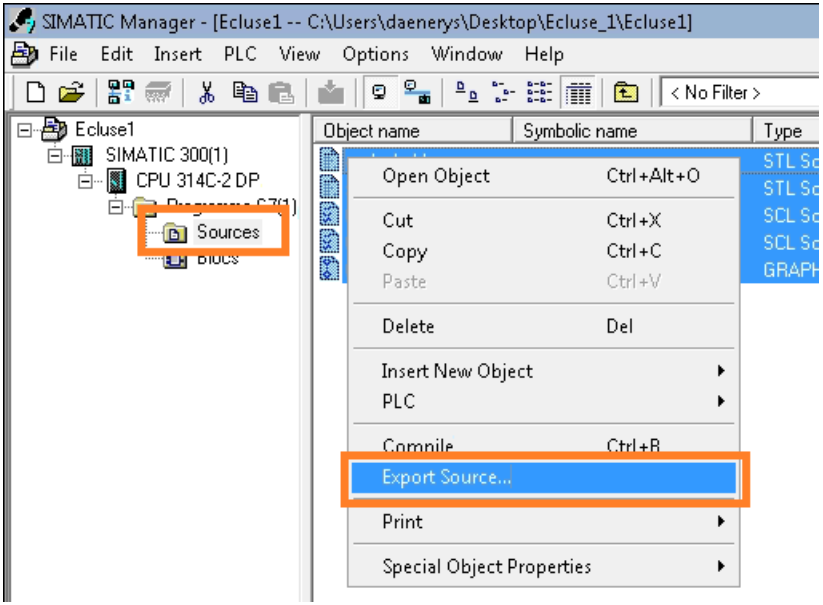
Give a name to the file (for instance structure.dif) and save it

Export files

Once the files are exported, then you need to extract them from SIMATIC STEP 7 to get them into a folder of your choice.

Select the LIST, GRAPH(resp. **.AWL** and **.GR7** files) and SCL sources that have been previously generated (when applicable)

Copy these sources using the contextual menu **Export source…**



Select the folder where you want to export the source files

Siemens TIAPortal SIMATIC STEP 7 (.zip export file)

Siemens TIA Portal SIMATIC STEP 7 application need to be exported in a ZIP file in order to be analyzed by EcoStruxure Control Engineering - Verification.

This export is done automatically with the help of the Import/Export tool. The procedure requires the installation of software described in **ias-import-export-tool** and the export procedure itself is described in **tiaportal**.

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