

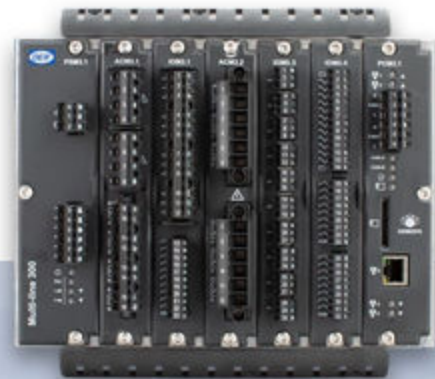
AMC 300

Programmable Automation Controller

CODESYS guidelines



Improve
Tomorrow



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5. Configure Multi Inputs/Outputs

1. About this manual

1.1 Software versions

The information in this document corresponds to the following software versions.

Table 1.1 Software versions

Software	Details	Version
BSP	Board Support Package	4.0.0.x
CODESYS	CODESYS runtime	3.5.15.0 or later
CODESYS IDE	PC software for development of CODESYS applications	3.5.15.0 or later
CODESYS TSP	AMC 300 CODESYS Target Support Package (TSP)	1.0.1.0

1.2 Technical support

CODESYS in general

The CODESYS store	My question: Ask questions about CODESYS. FAQ: Frequently asked questions. Forum: Discuss different CODESYS topics with other users.
CODESYS Development System online help	Online help is available from the Help menu.

DEIF support options

Technical documentation	Download all technical product documentation from https://www.deif.com/documentation .
Support	DEIF offers 24-hour support. See www.deif.com for contact details, there may be a DEIF subsidiary located near you. You can also e-mail support@deif.com .
Service	DEIF engineers can help with design, commissioning, operating and optimisation.
Training	DEIF regularly offers training courses at the DEIF offices worldwide.

1.3 System requirements

The requirements for the development PC to install the Development packages, PC tools and drivers are:

- Microsoft Windows 10, 32 bit version
- Microsoft Windows 10, 64 bit version (Recommended)

As the AMC 300 supports SSH (Secure Shell) and SCP (Secure Copy) as basic communication protocols, it can be accessed from any system supporting these protocols (if enabled).

NOTE Not all browsers are suitable for this software. We recommend to use Google Chrome or Mozilla Firefox.

1.4 Warnings and safety

Recommendations for data security

To minimise the risk of data security breaches we recommend to:

- As far as possible, avoid exposing controllers and controller networks to public networks and the Internet.
- Use additional security layers like a VPN for remote access, and install firewall mechanisms.
- Restrict access to authorised persons.

1.5 Legal information

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

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2. Installation

2.1 AMC 300 CODESYS development package

2.1.1 About the AMC 300 CODESYS development package

The AMC 300 CODESYS development package consists of two parts:

- CODESYS IDE
- AMC 300 CODESYS TSP.

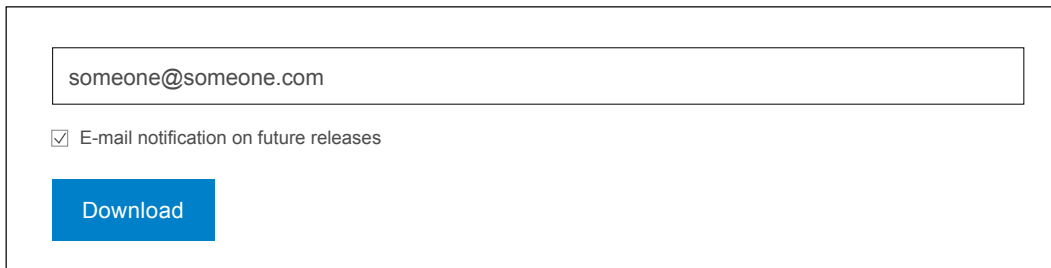
The CODESYS CONTROL (CODESYS PLC run-time) is integrated in the AMC 300 operating system.

2.1.2 Download the AMC 300 CODESYS development package

You can download the CODESYS IDE and AMC 300 CODESYS TSP by submitting your email address via the DEIF website. A link is sent to you to download the CODESYS IDE and AMC 300 CODESYS TSP respectively.

Follow these steps to download the CODESYS IDE:

1. Go to the DEIF website www.deif.com.
2. Open the search bar , and type the controller name to open a list of product options.
3. Select the controller from the list.
4. Select the **Software** tab.
5. Open the **CODESYS** list, and select **AMC 300 CODESYS TSP v1.x.x**.
6. Submit your email address to receive a download link to the software.

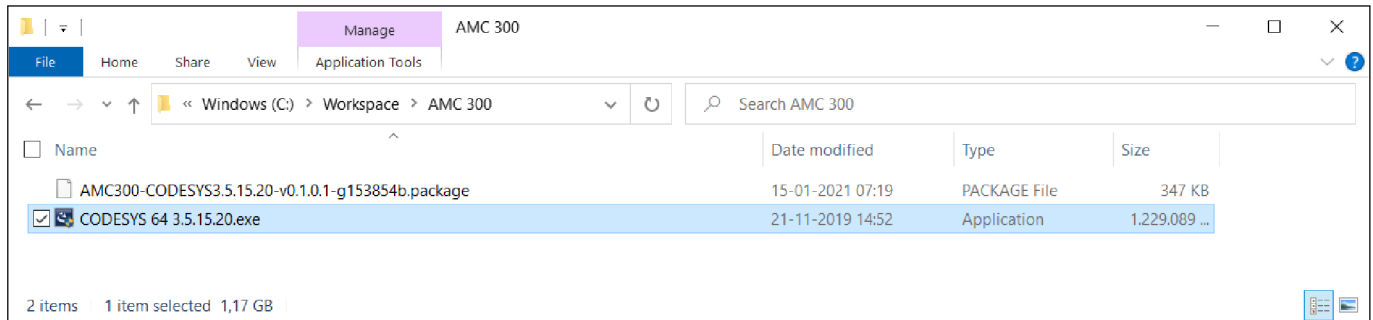


The screenshot shows a web form for downloading software. It features a text input field containing the email address "someone@someone.com". Below the input field is a checkbox labeled "E-mail notification on future releases", which is checked. At the bottom of the form is a blue button with the text "Download".

7. Follow the link in the email to download the DEIF CODESYS software package to your computer.
8. Repeat the steps to download the **CODESYS IDE** installation file.

2.2 Install CODESYS V3

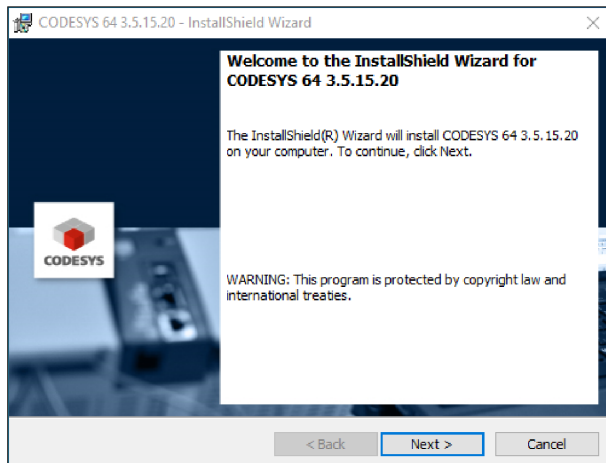
1. Run the installation file (for example, CODESYS 64 3.5.15.20.exe) to install CODESYS V3 to the development computer with default settings.



2. If you are prompted to install necessary Microsoft Visual C++ packages, follow the instructions on the screen.

The CODESYS InstallShield Wizard

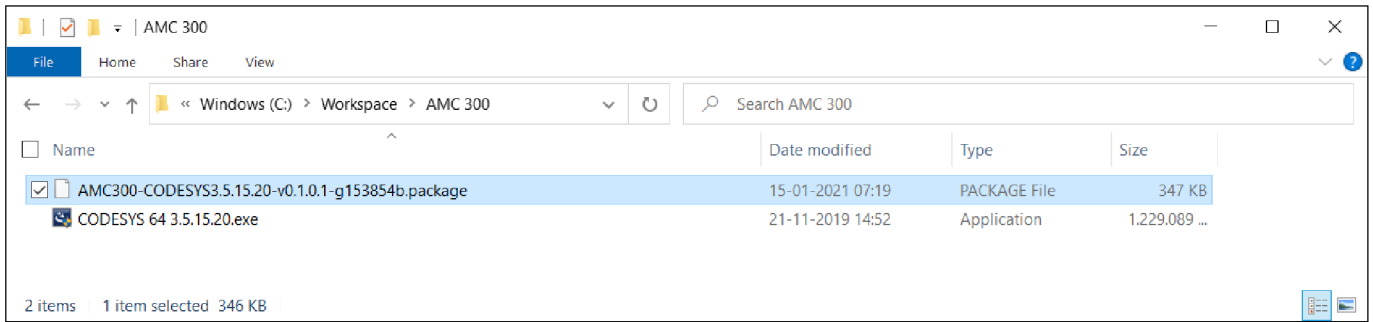
1. When the CODESYS InstallShield Wizard starts, select **Next**.



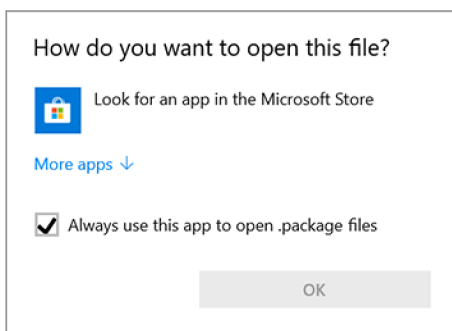
2. **Licence Agreement:** Accept the agreement and select **Next**.
3. **Choose Destination Location:** Choose a folder for the installation, and select **Next**.
4. **Select Features:** Choose the features you want to install, and select **Next**.
5. **Select Program Folder:** Choose a program folder, and select **Next**.
6. **Start Copying Files:** The chosen features and the destination folder are shown. If everything is correct, select **Next**.
7. **Very important information:** Confirm that you have read the information, and select **Next**.
8. **InstallShield Wizard Complete:** Select **Finish** to exit the installation wizard.

2.3 Install the AMC 300 CODESYS TSP

1. Run the installation file (for example, AMC300-CODESYS3.5.15.20.v1.0.0.0-g80afd0a.package) to install the AMC 300 CODESYS TSP (Target Support Package) to the development computer with default settings.



2. The file extension .package is registered with CODESYS on Windows. If CODESYS is not installed or is a wrong version you will see this message.

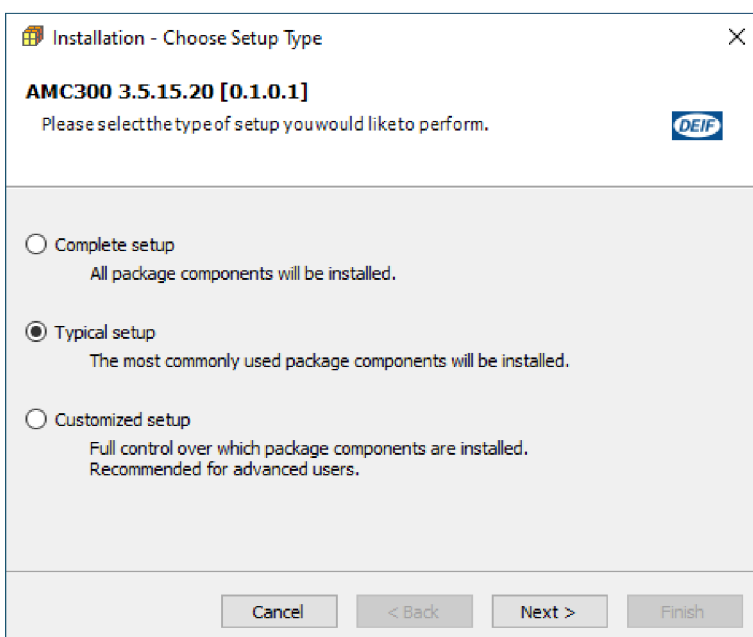


3. Install a correct version of CODESYS (see section **Install CODESYS V3**), then run the installation file again.

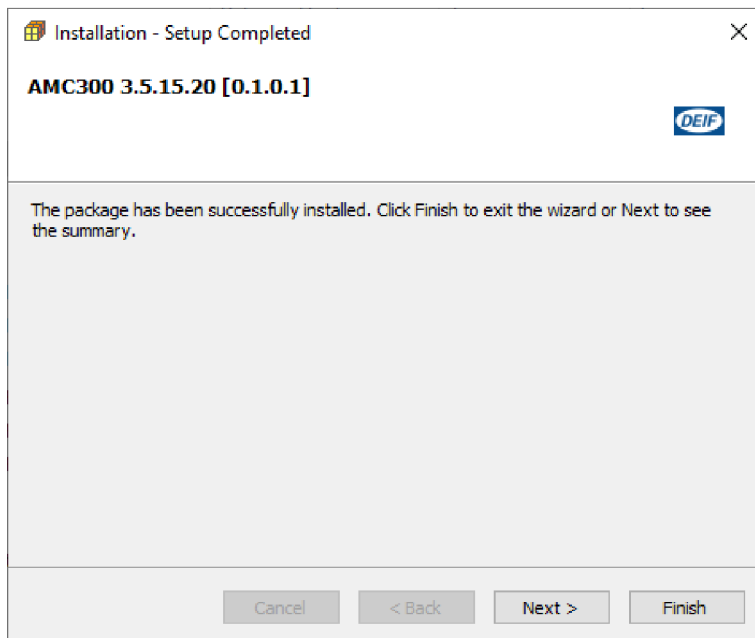
If CODESYS is installed, but you do not want the AMC 300 CODESYS TSP package associated with it, you can open CODESYS and install the package file via **Open > Install package**.

This starts the Package Manager and install the required AMC 300 Device Descriptions (and the EtherCAT Slave Information files).

1. Choose a setup, and select **Next**.



2. When the package is installed, select **Next** to finish the installation.



3. Select **Finish** to exit the installation wizard or **Next** to see a summary.

2.4 Open CODESYS for the first time

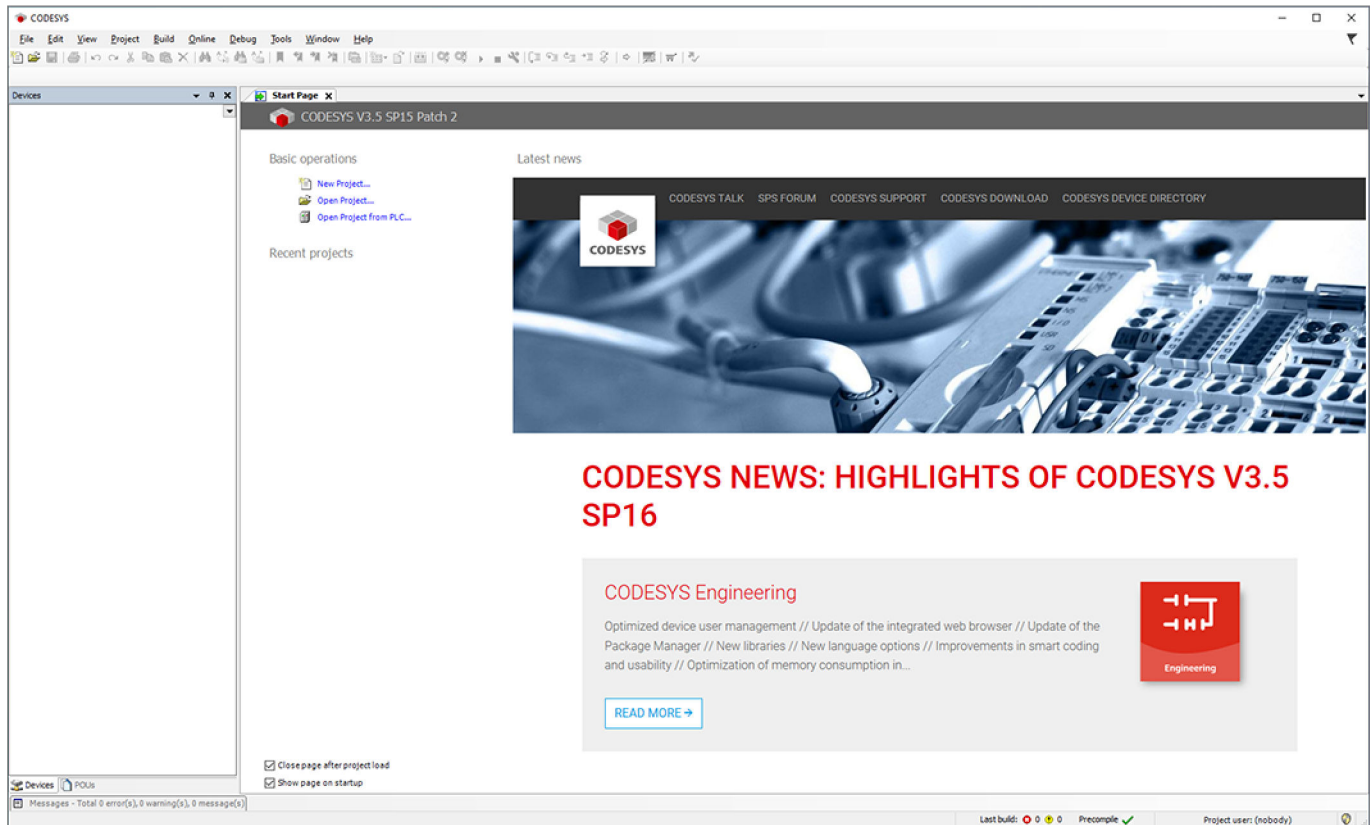
To open CODESYS you can:

- Double-click the desktop icon



- In the start menu, select **Start > 3S CODESYS > CODESYS V3.5 SP15 (or later version)**

The CODESYS start page:

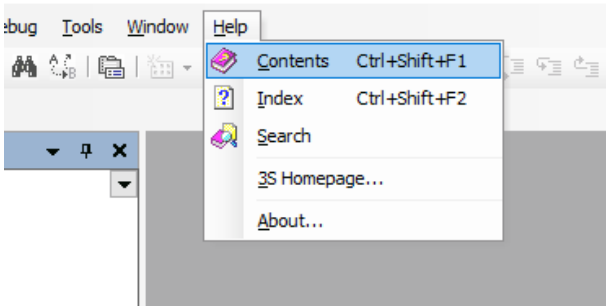


3. CODESYS Online Help

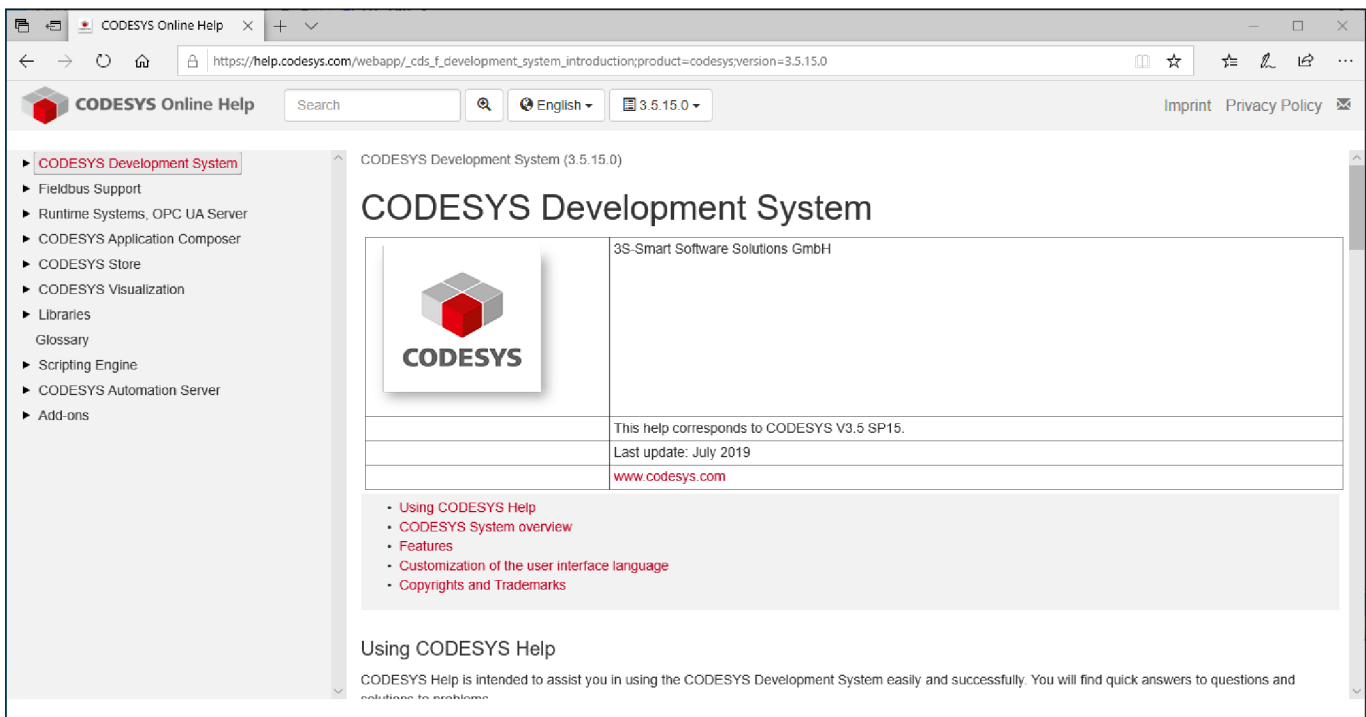
3.1 Start the CODESYS Online Help

Use the CODESYS Online Help to get more detailed information about the CODESYS programming environment.

On the CODESYS start page, select **Help > Contents** in the menu.

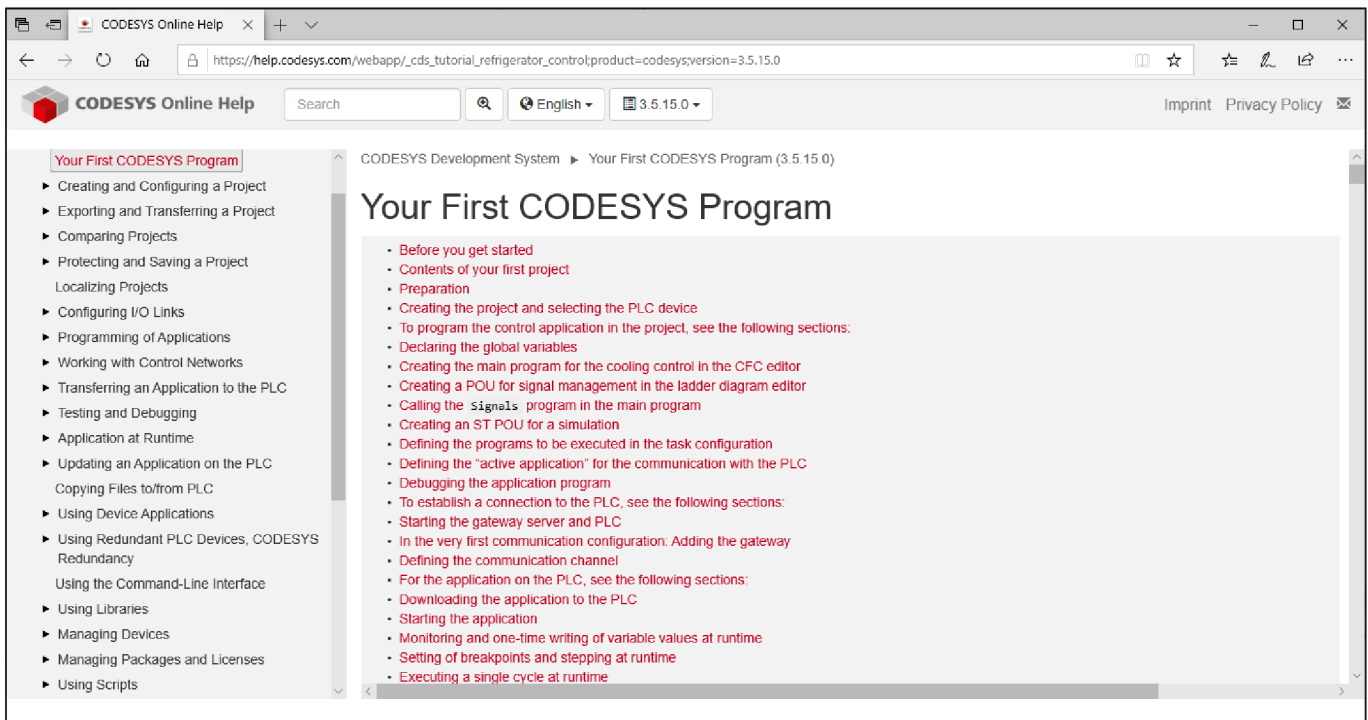


This opens the CODESYS Online Help page.



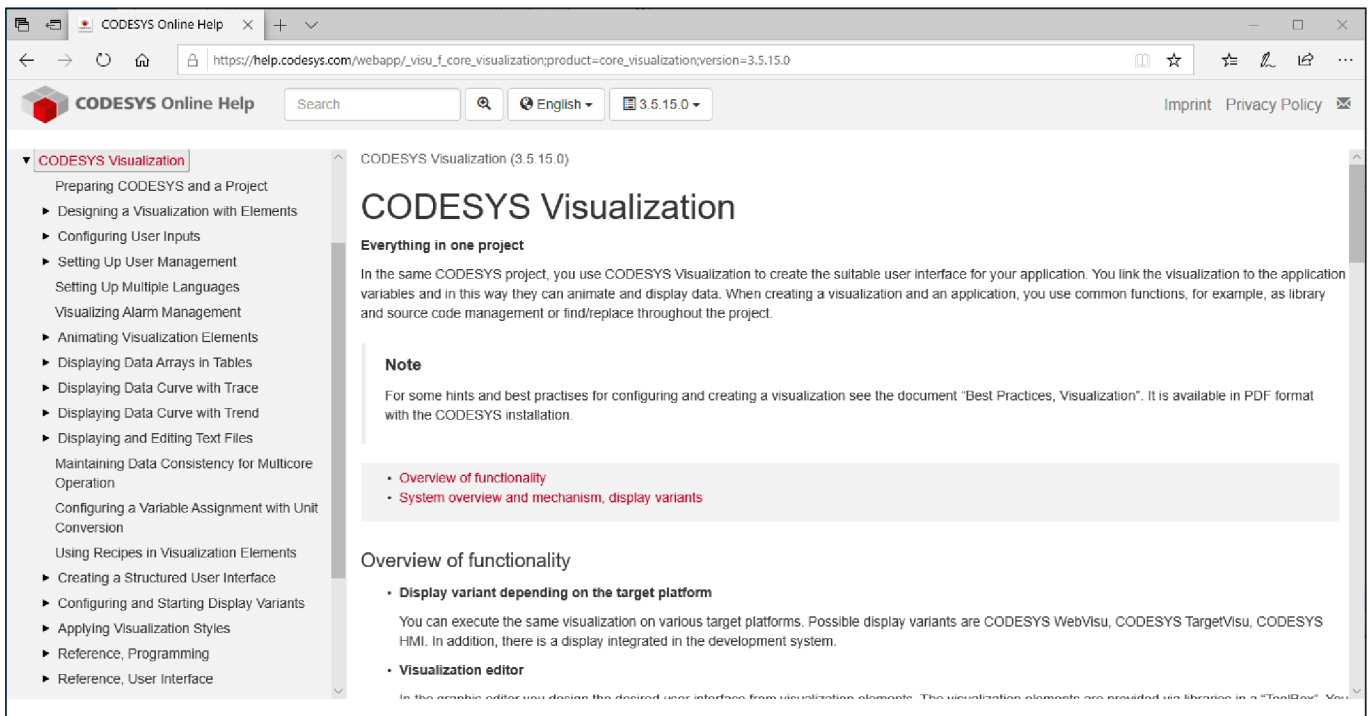
3.2 New to CODESYS

If you are new to CODESYS, we recommend to start with the guide under the menu **Your First CODESYS Program**.



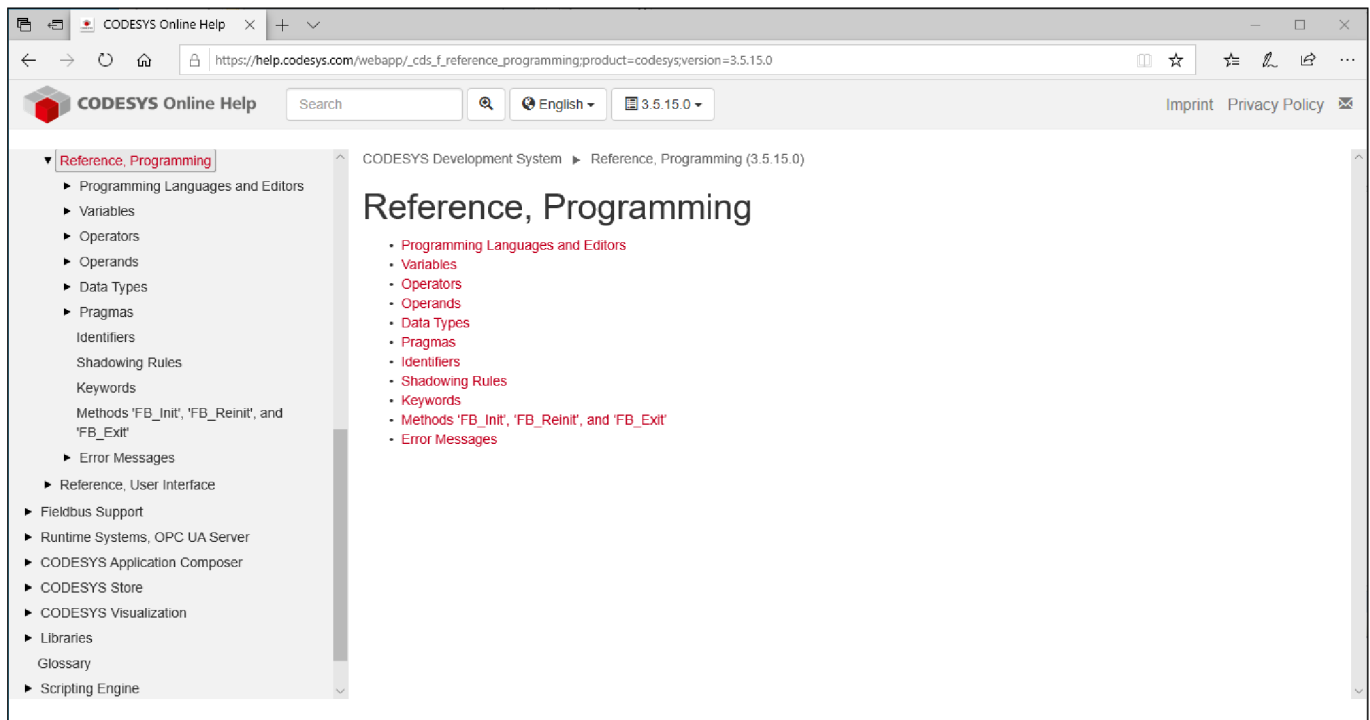
3.3 Visualization

Under the menu **CODESYS Visualization** you can read more about the possibilities with visualization.



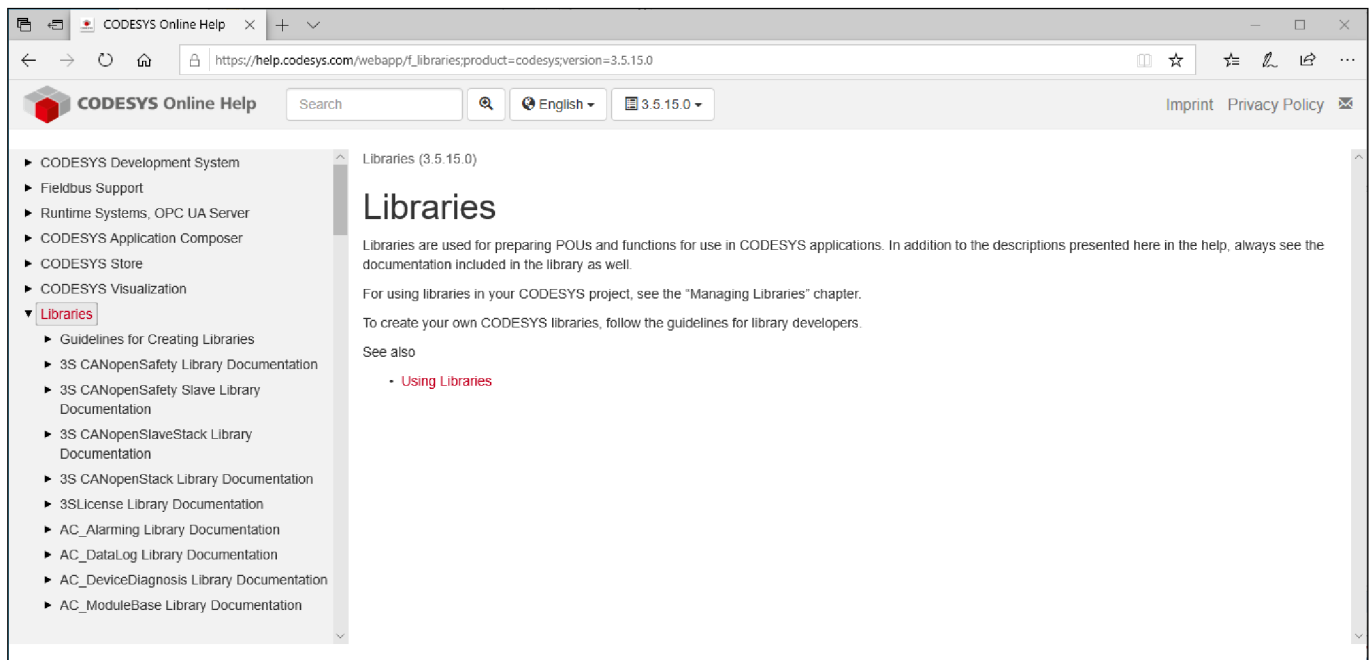
3.4 Programming references

Detailed information about programming is found under the menu **Reference, Programming**.



3.5 Libraries included in CODESYS

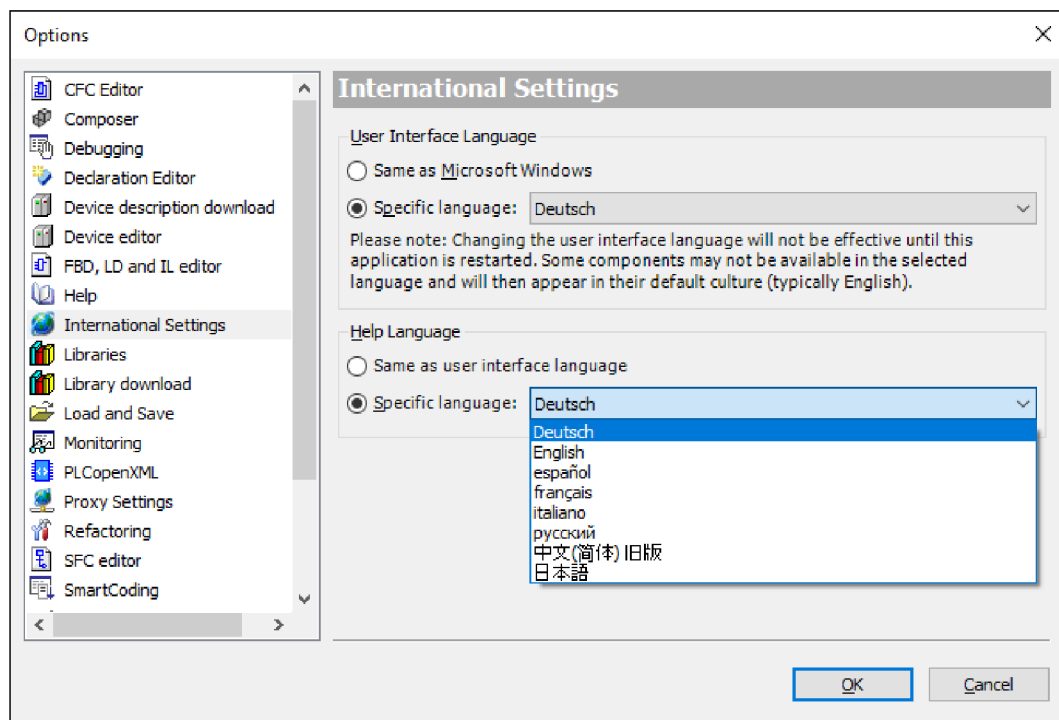
The standard libraries are described under the menu **Libraries**.



More information about libraries is found in the **Library Manager** for DEIF AMC 300 specific libraries.

3.6 Language settings

The default language for the menu and help files is English. You can change this under **Tool > Options > International Settings** to a variety of languages.



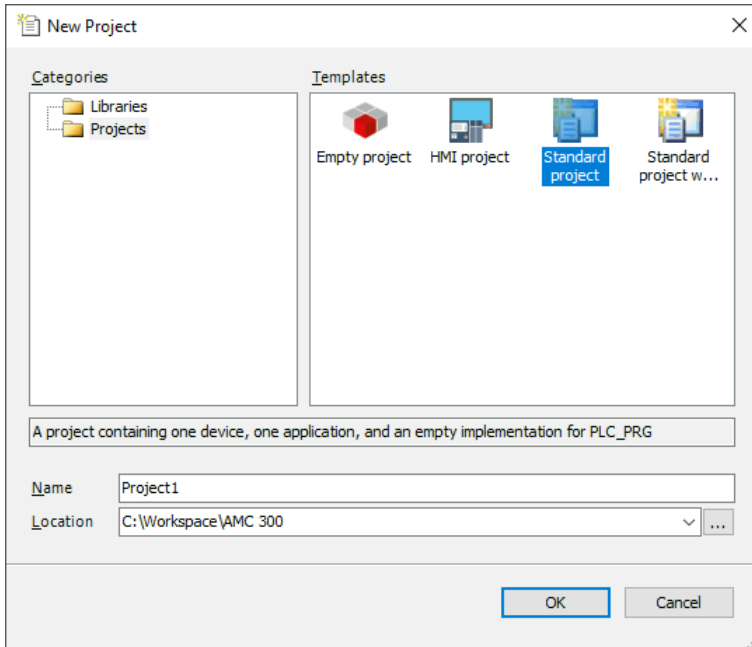
NOTE The AMC 300 CODESYS TSP must be installed before you change the language settings.

4. Create a CODESYS project

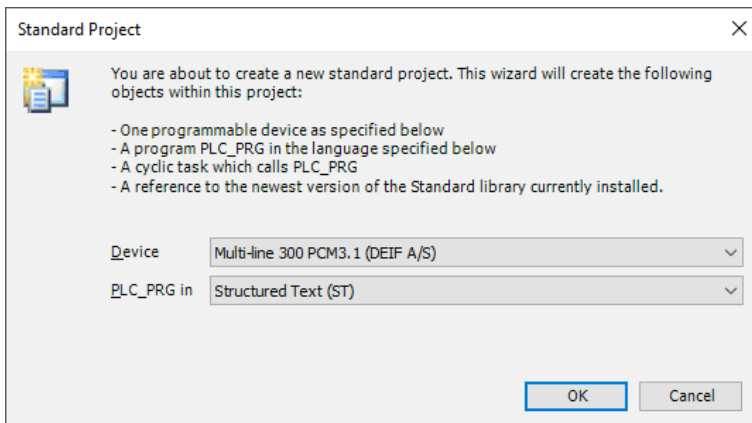
4.1 Create a new project

To create a new CODESYS project:

1. Go to **File > New Project**.*



2. Select **Standard project** in the Templates field.
3. Write a project name.
4. Select a location path for the project file.
5. Select **OK** to open the Standard Project window.



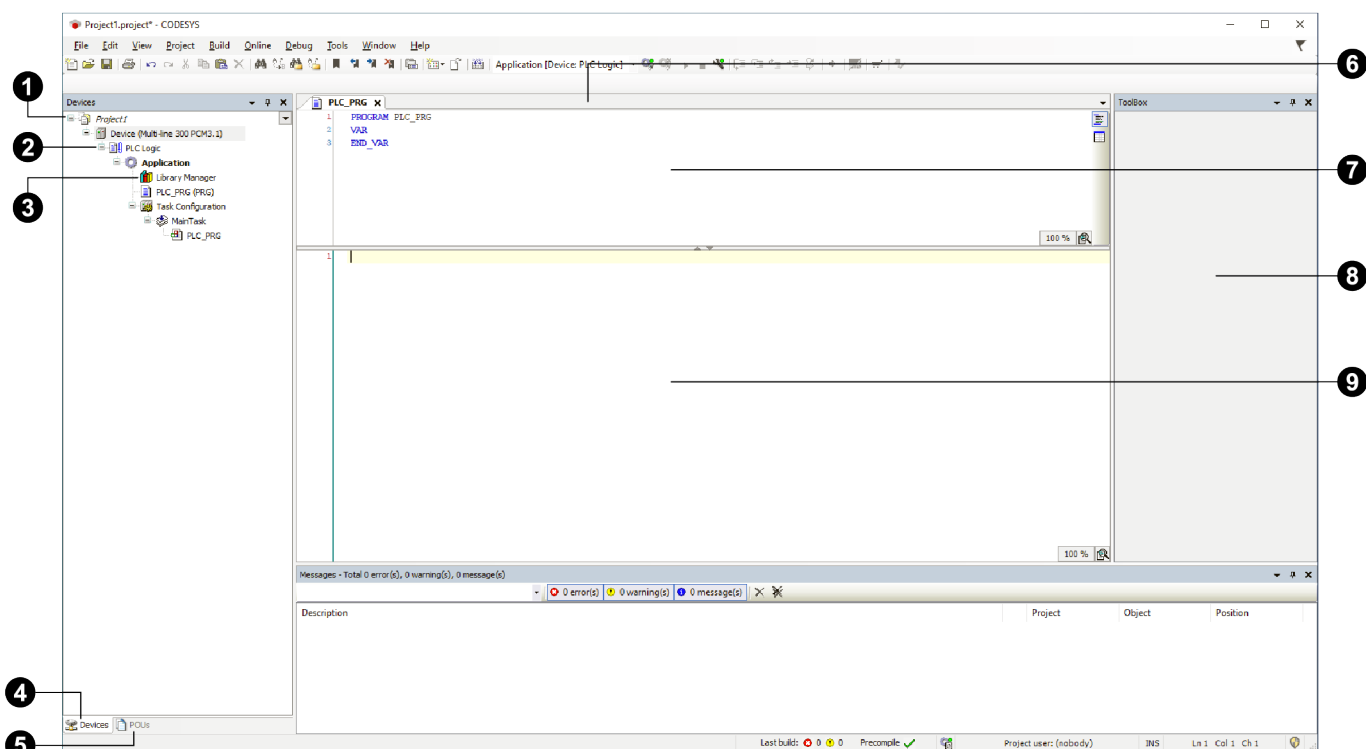
6. In the Device field, select **AMC 300 PCM 3.1 (DEIF A/S)** as the device.
7. In the PLC_PRG in field, select **Structured Text (ST)** as programming language. **
8. Select **OK** to continue.

NOTE * You can also select **Empty project** if you want to create an entire project from scratch.

NOTE ** New POU's can use a different programming language.

4.2 CODESYS layout

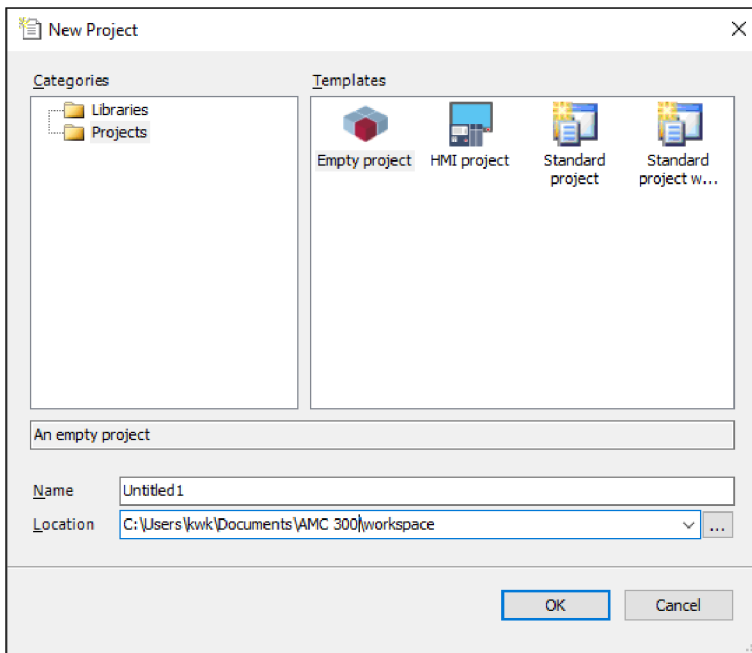
The image below shows the terminology used for the project view throughout the CODESYS manual.



No.	Item	Description
1	Project tree	The project tree is an overview of your project. A typical project will consist of: - One or more devices (AMC 300 controllers). - One or more applications containing the Libraries, POU's and tasks.
2	PLC Logic node	A PLC Logic node shows that the device is a programmable device and has no other functions associated to it.
3	Library manager	The Library manager contains the libraries for the project. Each library consists of functions and function blocks that can be used in your programs.
4	Devices tab	The Devices tab gives you quick access to the project tree.
5	POUs tab	The POU's (Program Object Units) tab gives you quick access to the device independent POU's.
6	Working area	The working area consists of tabs representing different parts of the project. These project parts can be opened from the project tree. The illustration shows the working area for the POU, PLC_PRG. The working area for this POU consists of a declaration workspace, an implementation workspace and a toolbox menu.
7	Declaration workspace	The declaration workspace consists of the variables for the POU functions.
8	Additional toolboxes	Some elements have additional toolboxes to help you build your program, for example Visualisation.
9	Implementation workspace	The implementation workspace is used to program your POU.

4.3 Build from an empty project

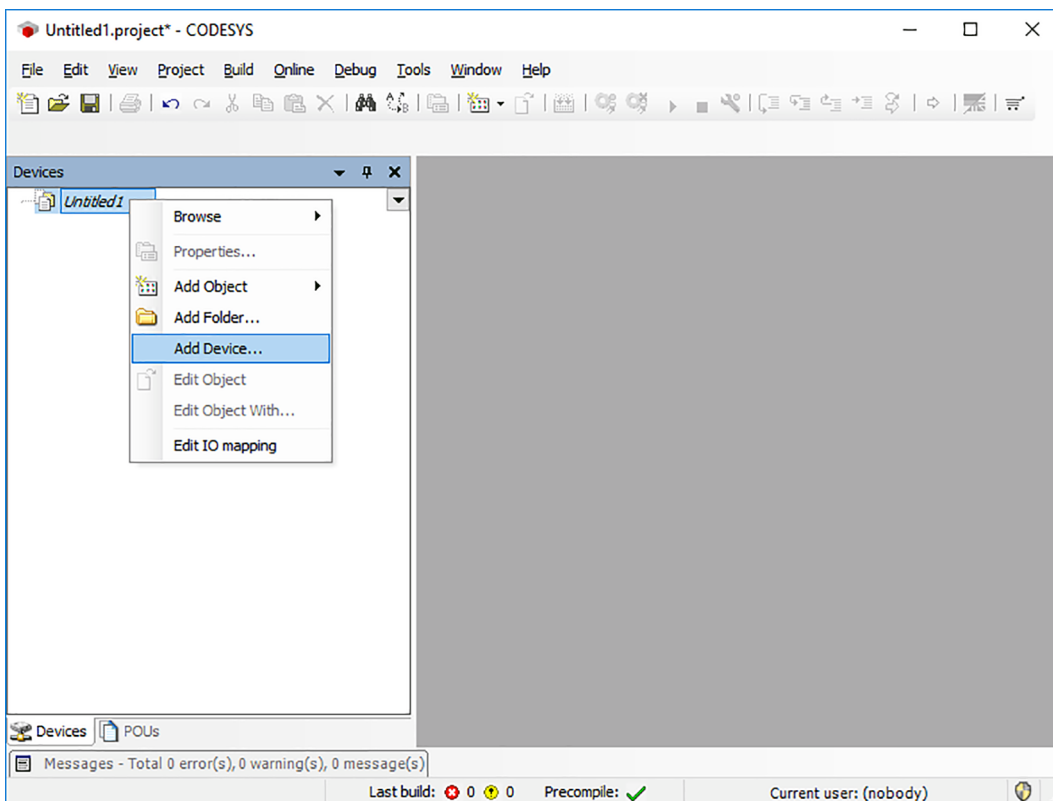
1. Select **File > New Project > Empty project**.



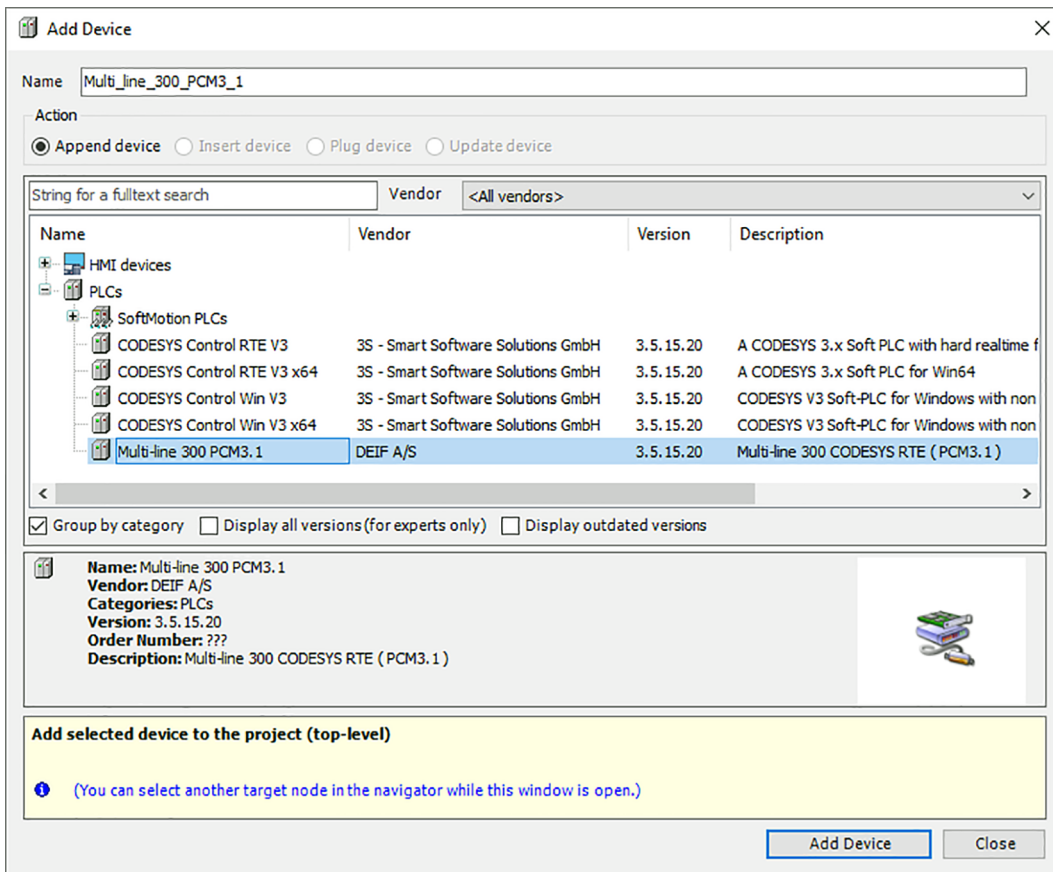
2. Write a project name in the field **Name** (for example, Project1).
3. Select a location to save the project (for example, C:\Workspace\AMC 300\).
4. Select **OK** to continue.

4.4 Add the AMC 300

1. In the project window, select **Add Device**.



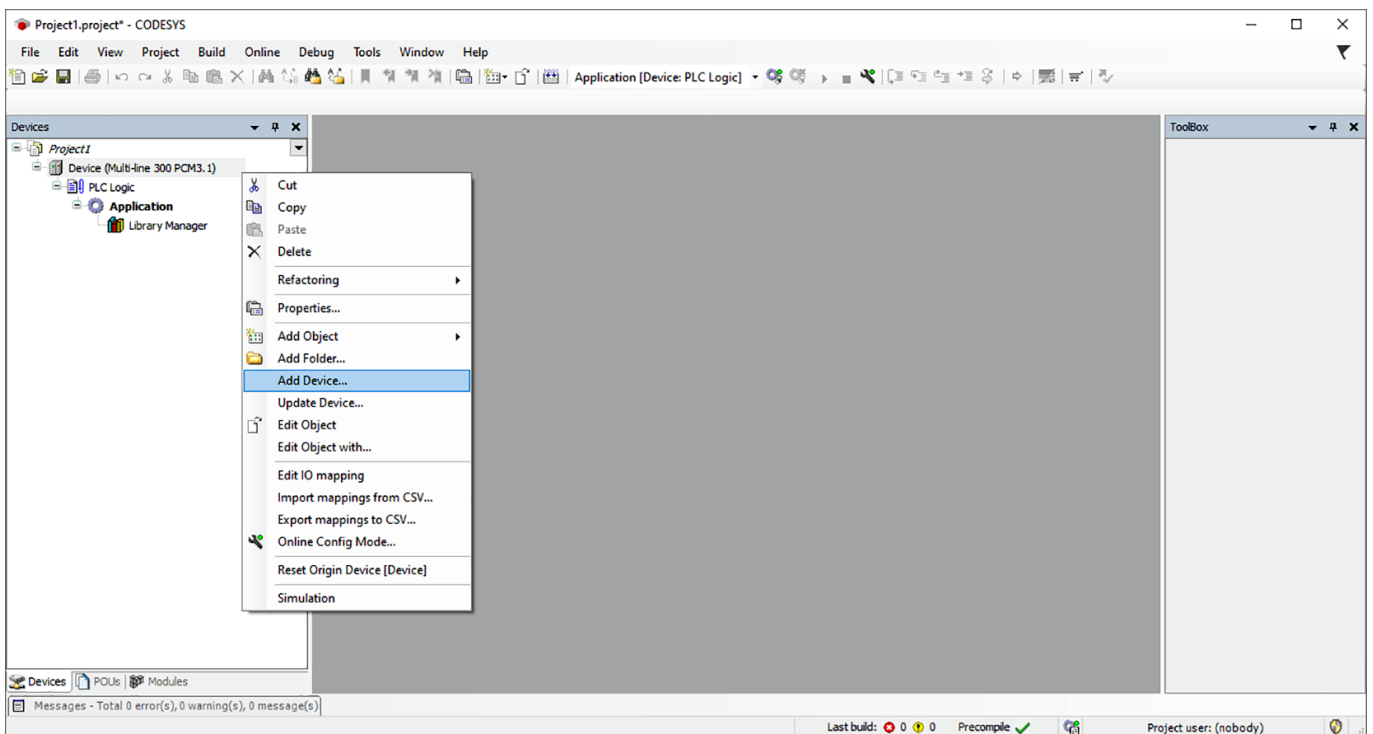
2. In the Add Device window, select a device from the list.



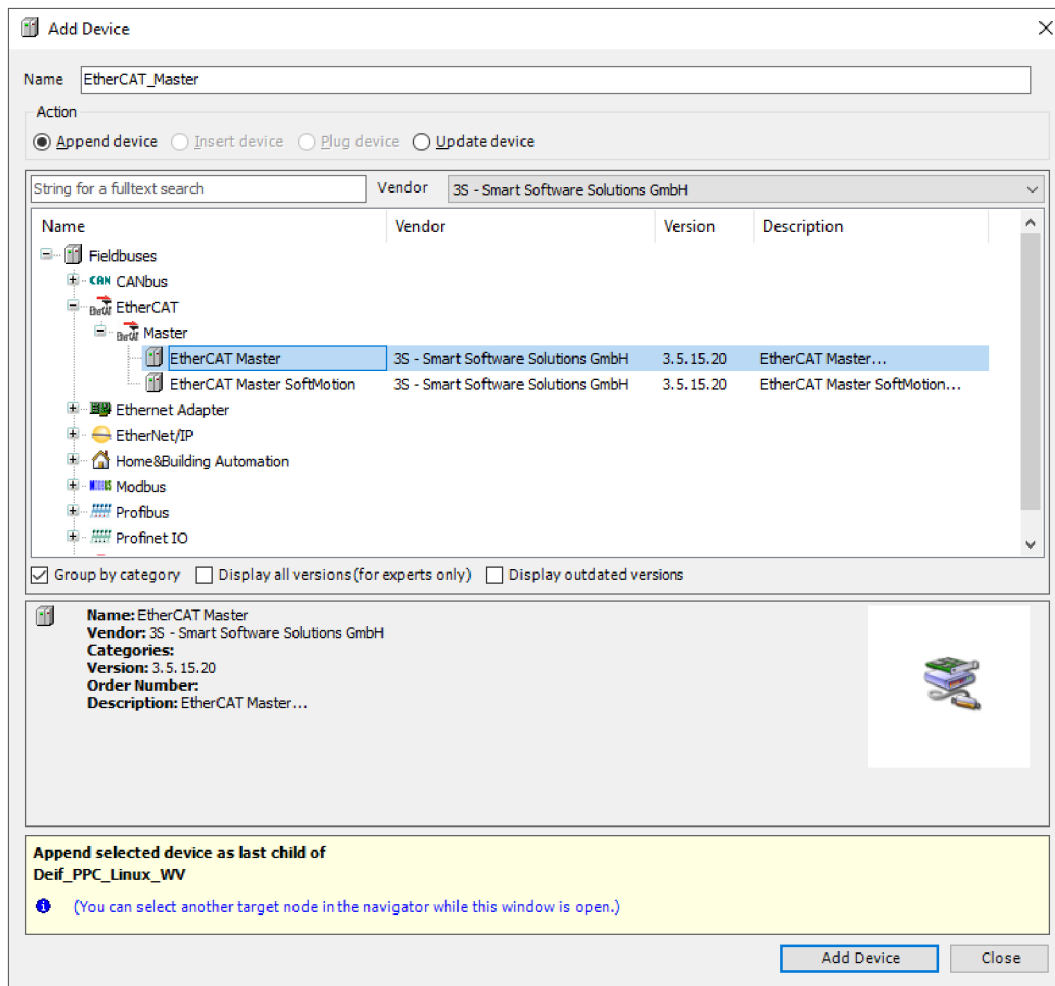
3. Select **Add Device**.

4.5 Add EtherCAT master device

1. In the project window, select **Add Device**.



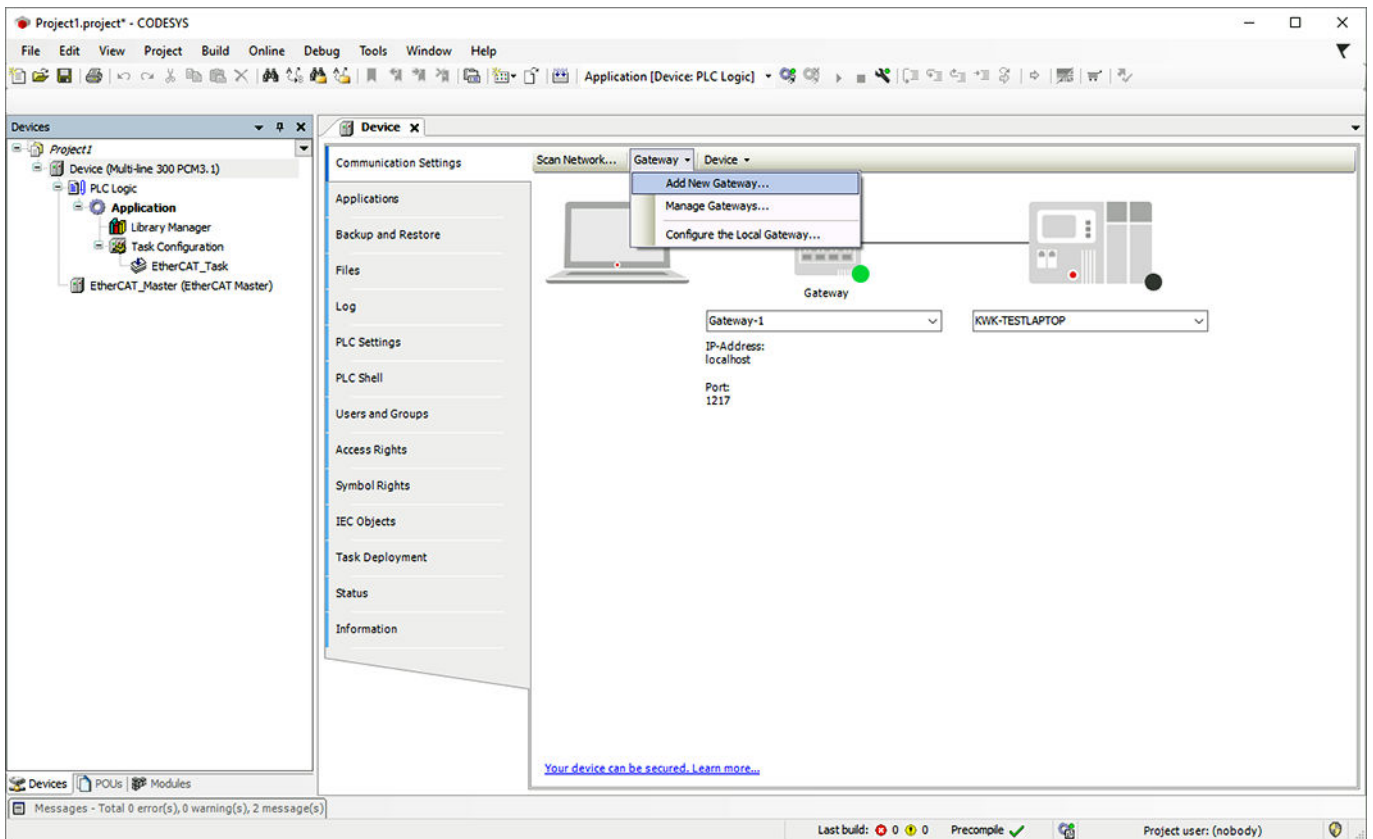
2. In the Add Device window, select a device from the list.



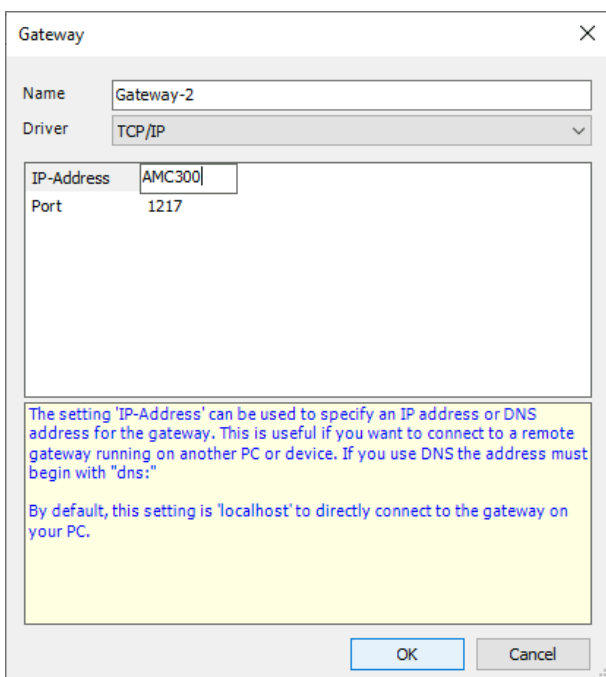
3. Select **Add Device**.

4.6 Connect to AMC 300

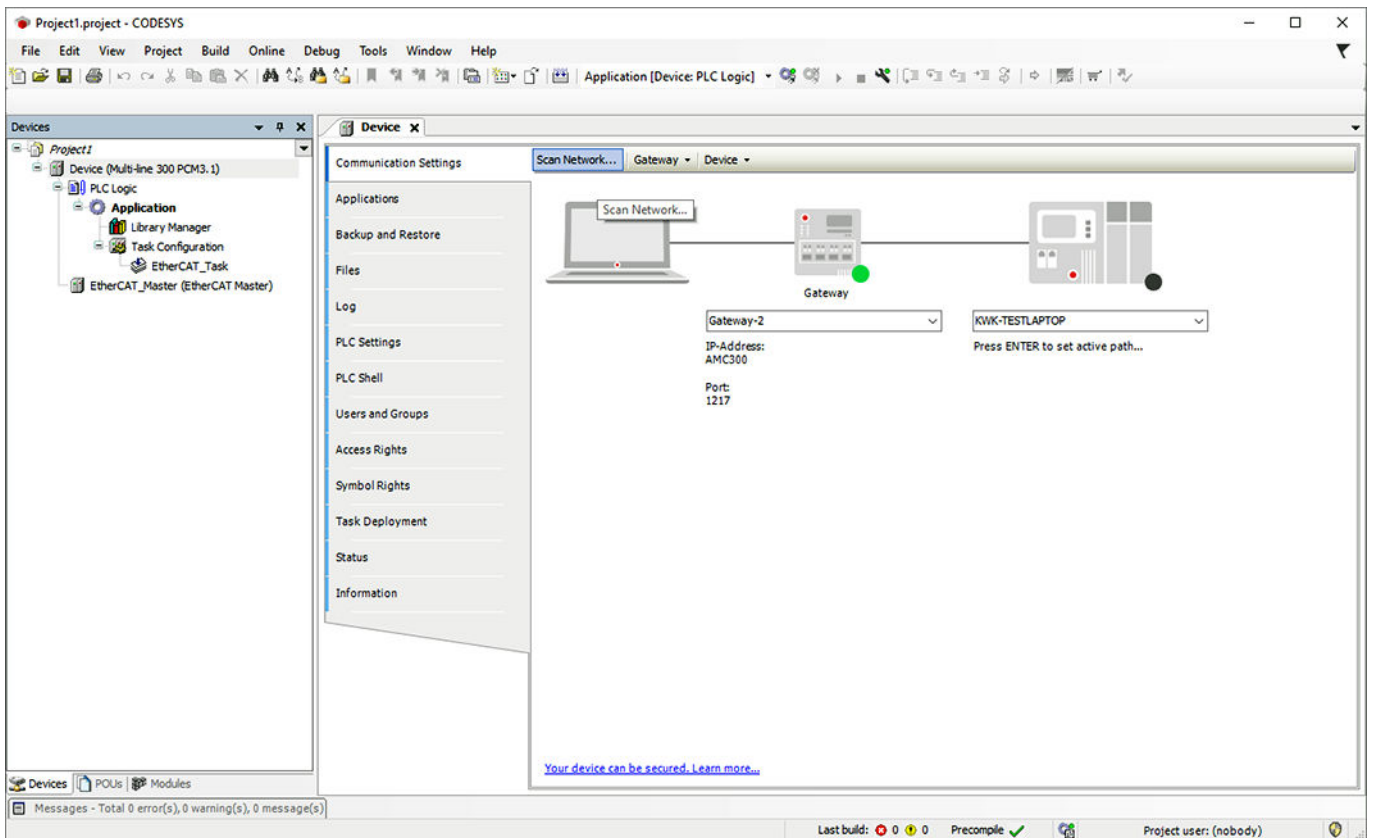
1. In the project window, double-click the AMC 300.
 - A gateway with the default IP address **localhost** is shown.
 - We recommend to create a new gateway with a new IP address or hostname for the AMC 300.
2. Select **Gateway > Add new gateway**.



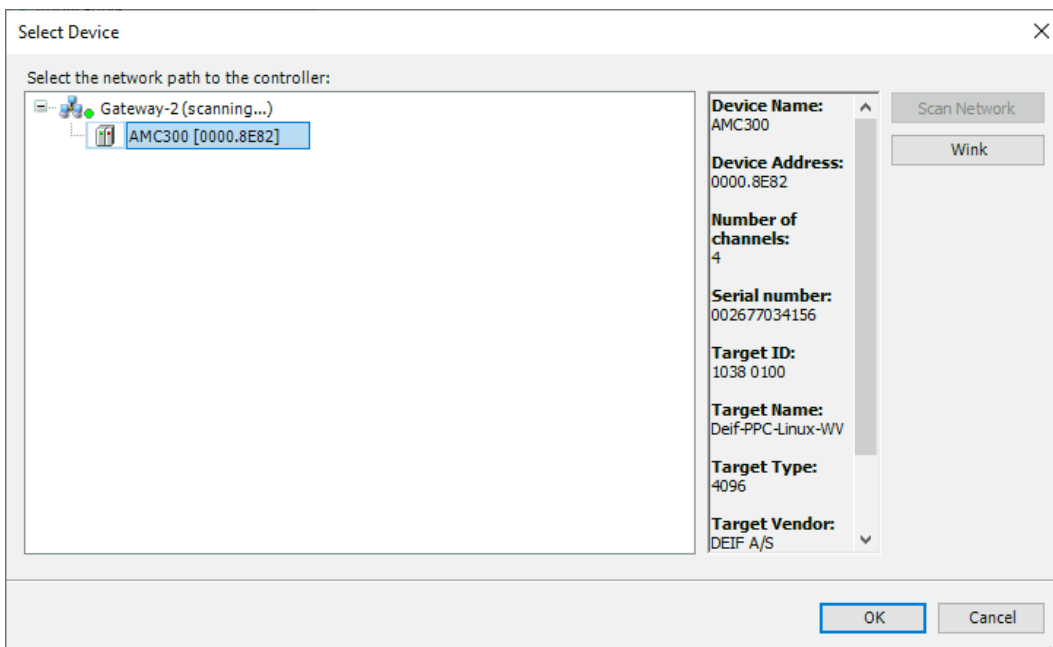
3. Enter the hostname or the IP address for AMC 300 (for example, 192.168.20.13).



4. Select **OK**.
5. Select **Scan Network** to find the AMC 300 on the network.



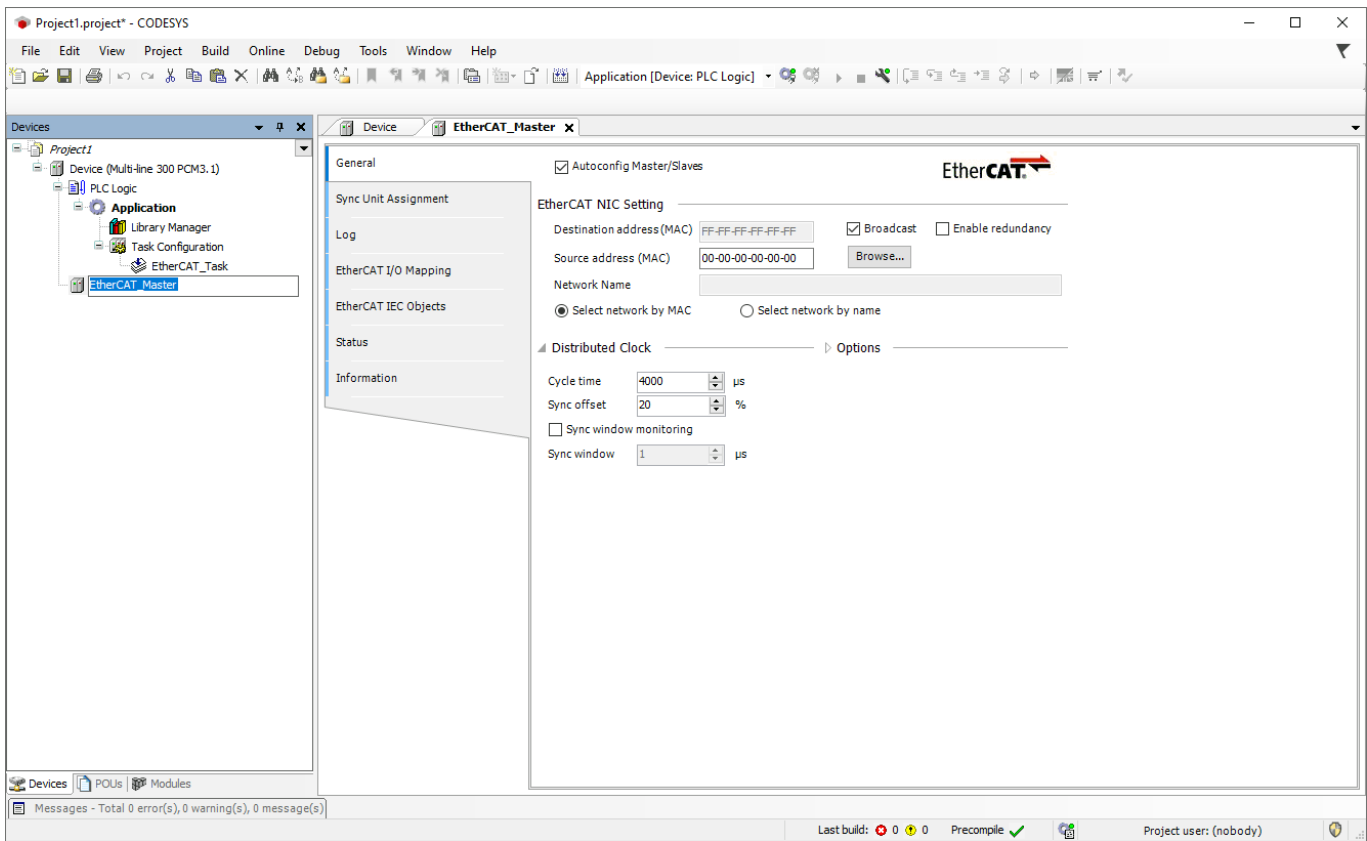
6. Select the device.
7. Select **OK**.
8. Select **Device**.
9. Select the device to set the active network path to the controller.



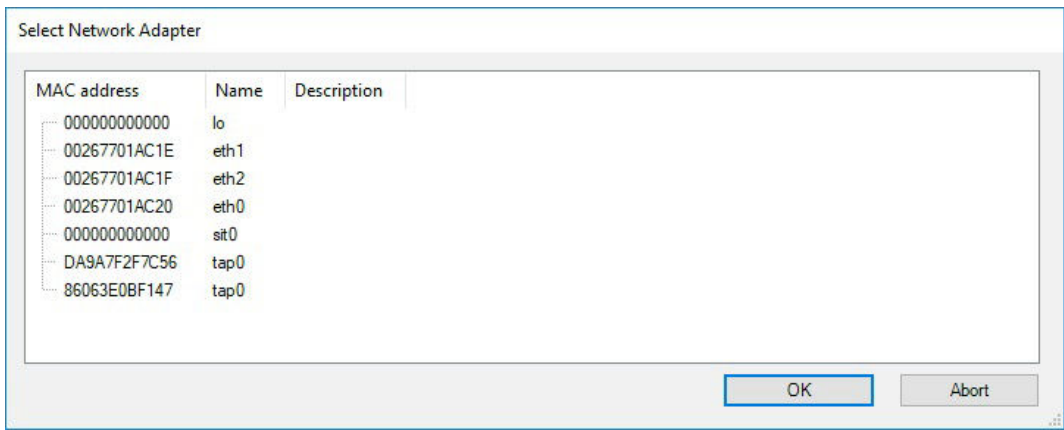
10. Select **OK**

4.7 Setup EtherCAT master

1. Open the **EtherCAT_Master** tag.



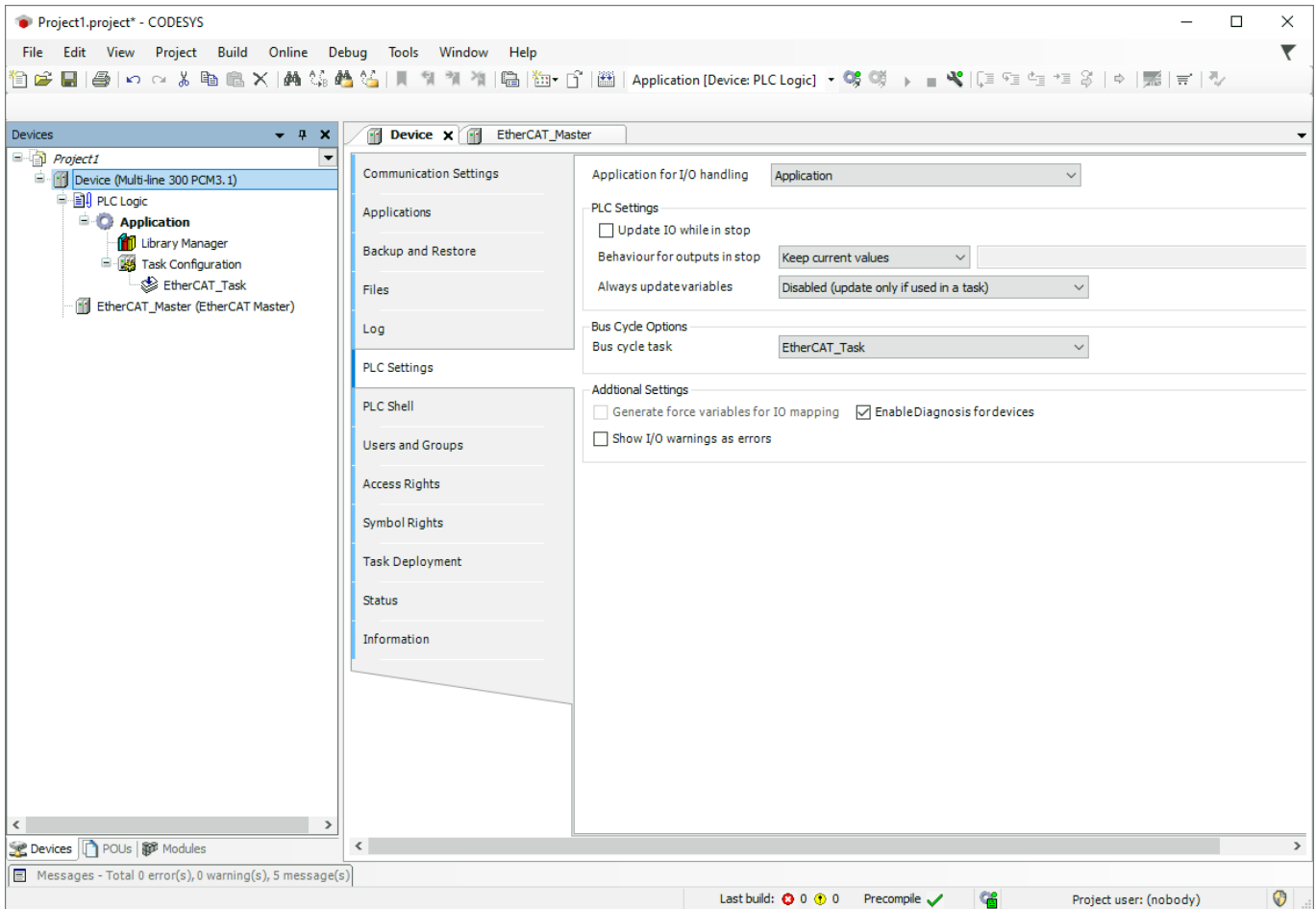
2. Select Browse.
3. Select the **eth0** adapter* (corresponding to EtherCAT OUT port 1 and EtherCAT OUT port 2).



NOTE *The same network adapter number for the eth0 (EtherCAT port) is used on all shipped devices.

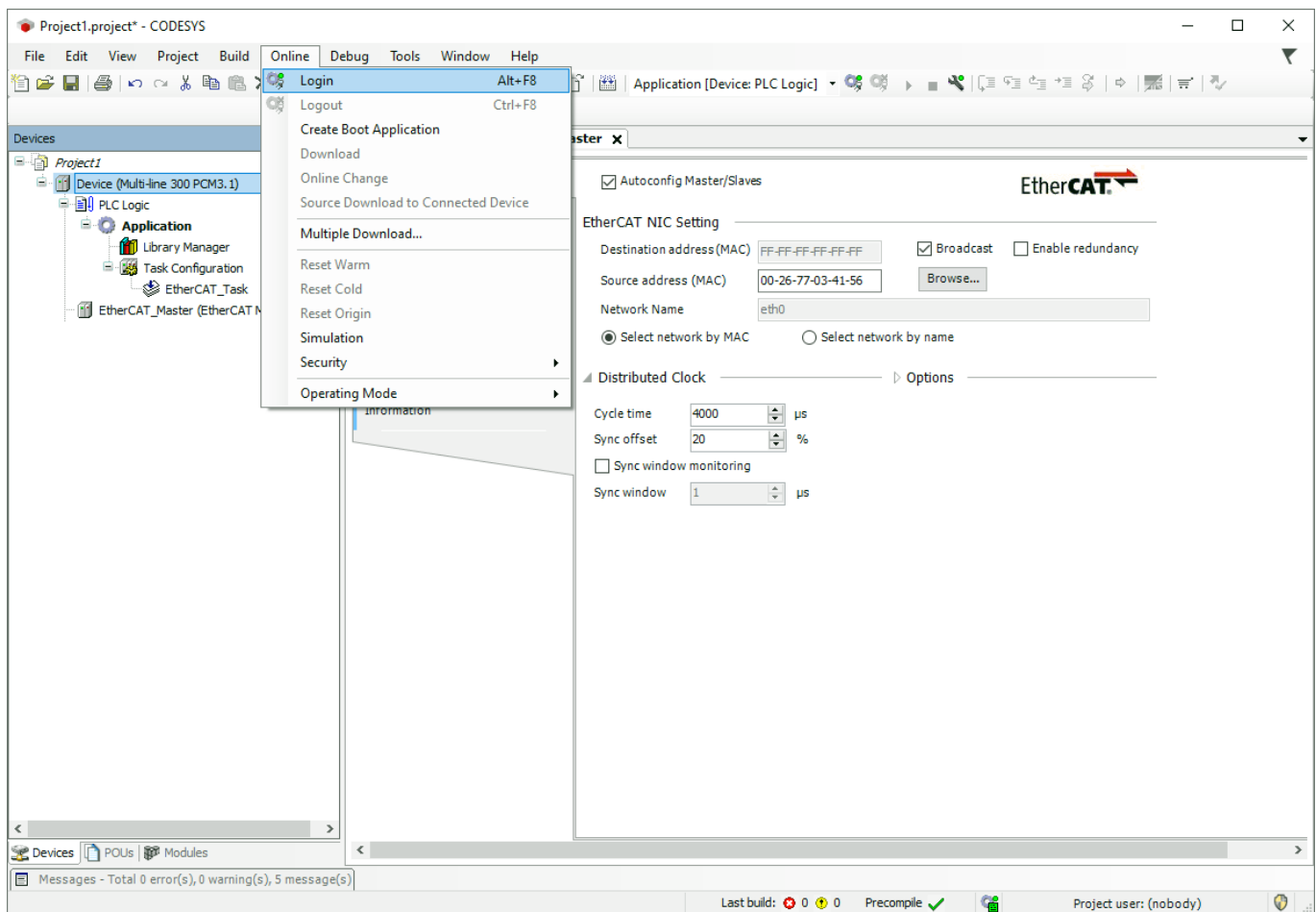
We recommend to specify which task handles the bus communication:

- In **AMC_300_PCM3_1 > PLC Settings > Bus cycle options:** ◦ Specify the **Bus cycle task** to **EtherCAT_master**.

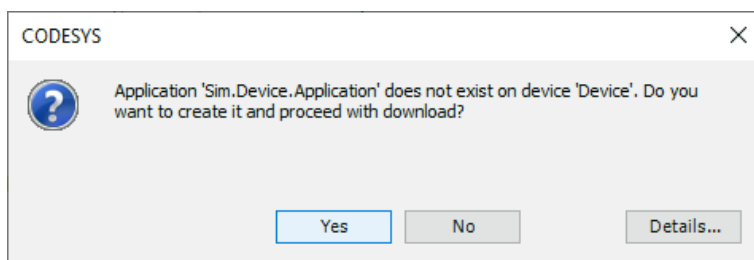


4.8 Scan for devices

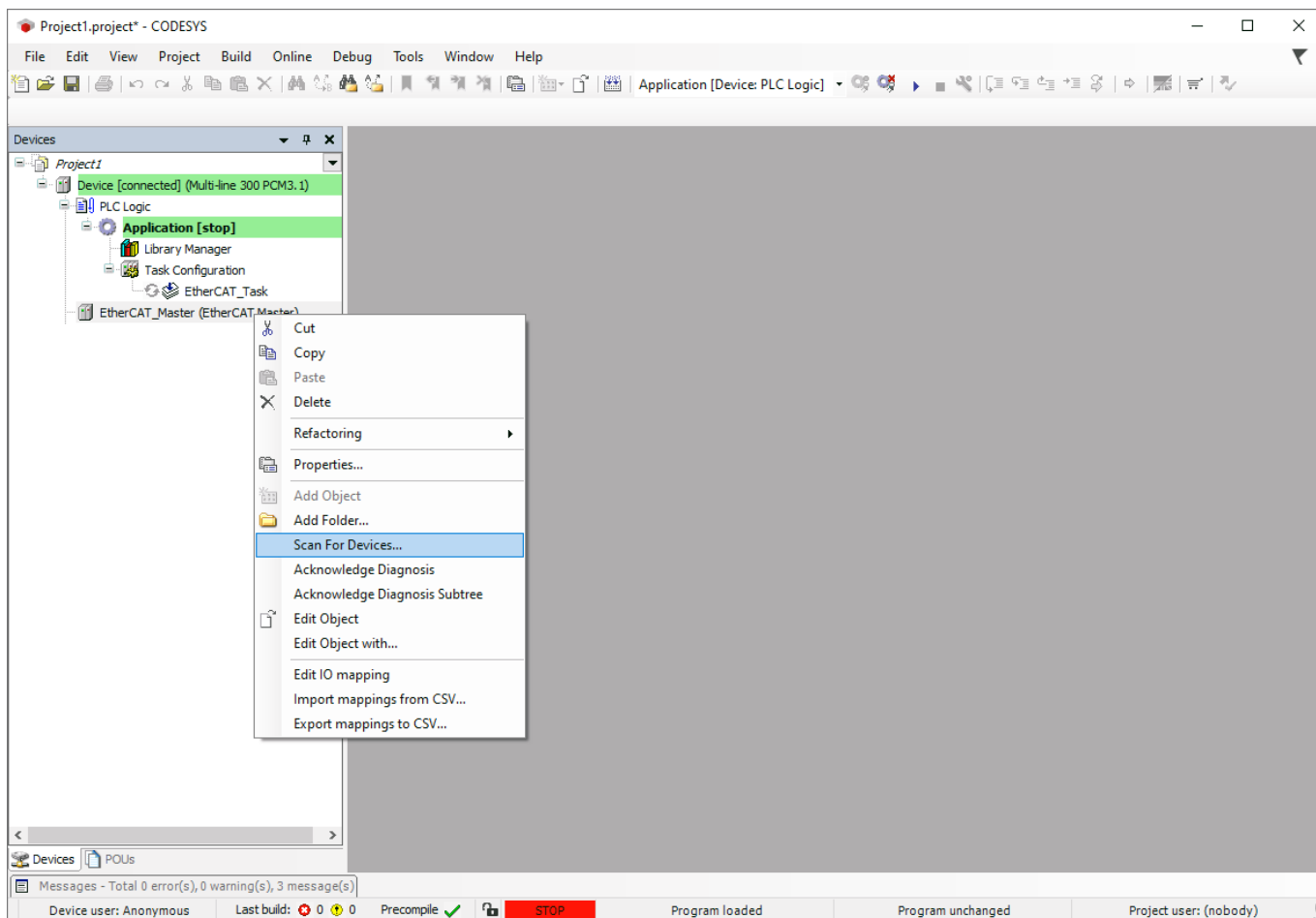
1. Login to the AMC 300.



2. In the pop-up window, select **Yes** to create an application.

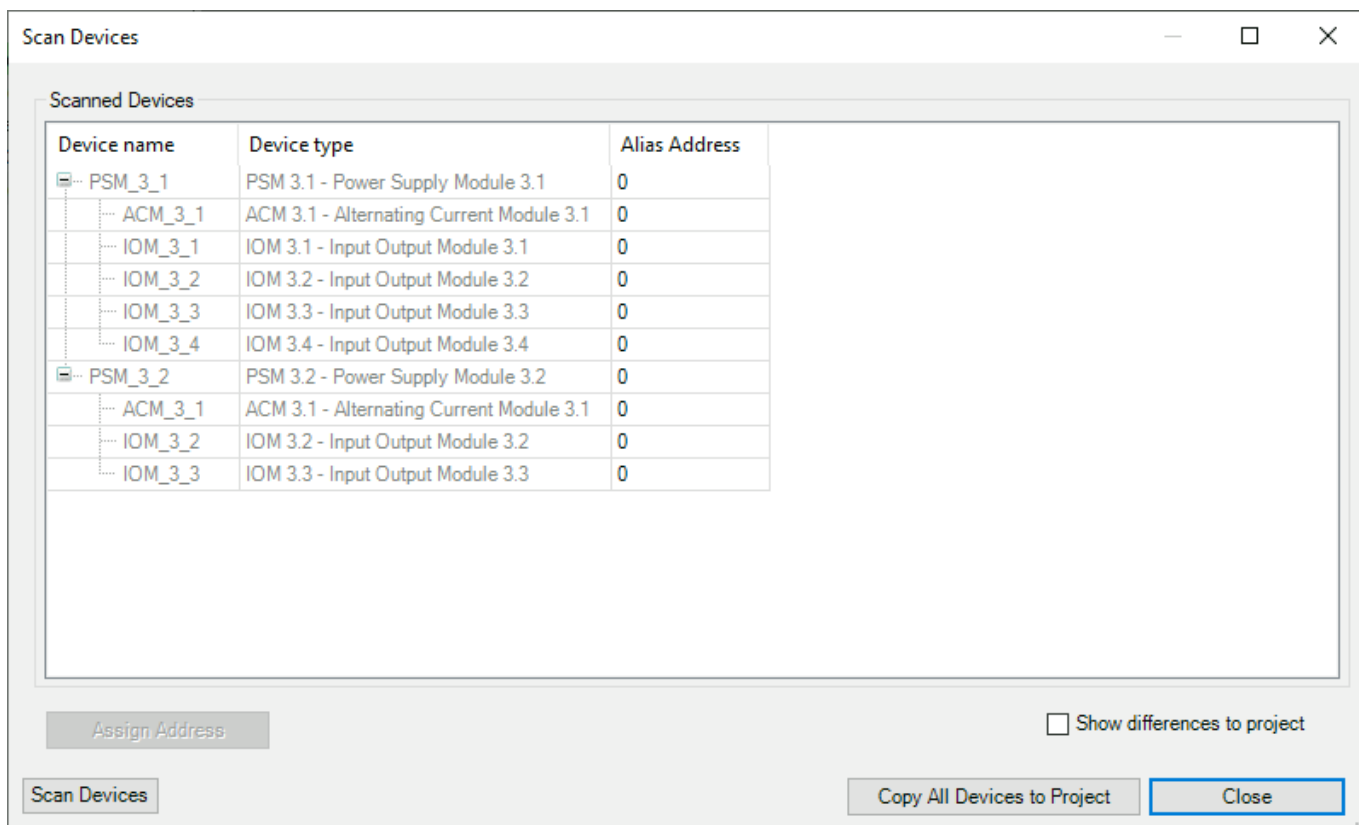


3. Select **EtherCAT_Master (EtherCAT_Master)**, and then **Scan For Devices...** in the drop-down menu.

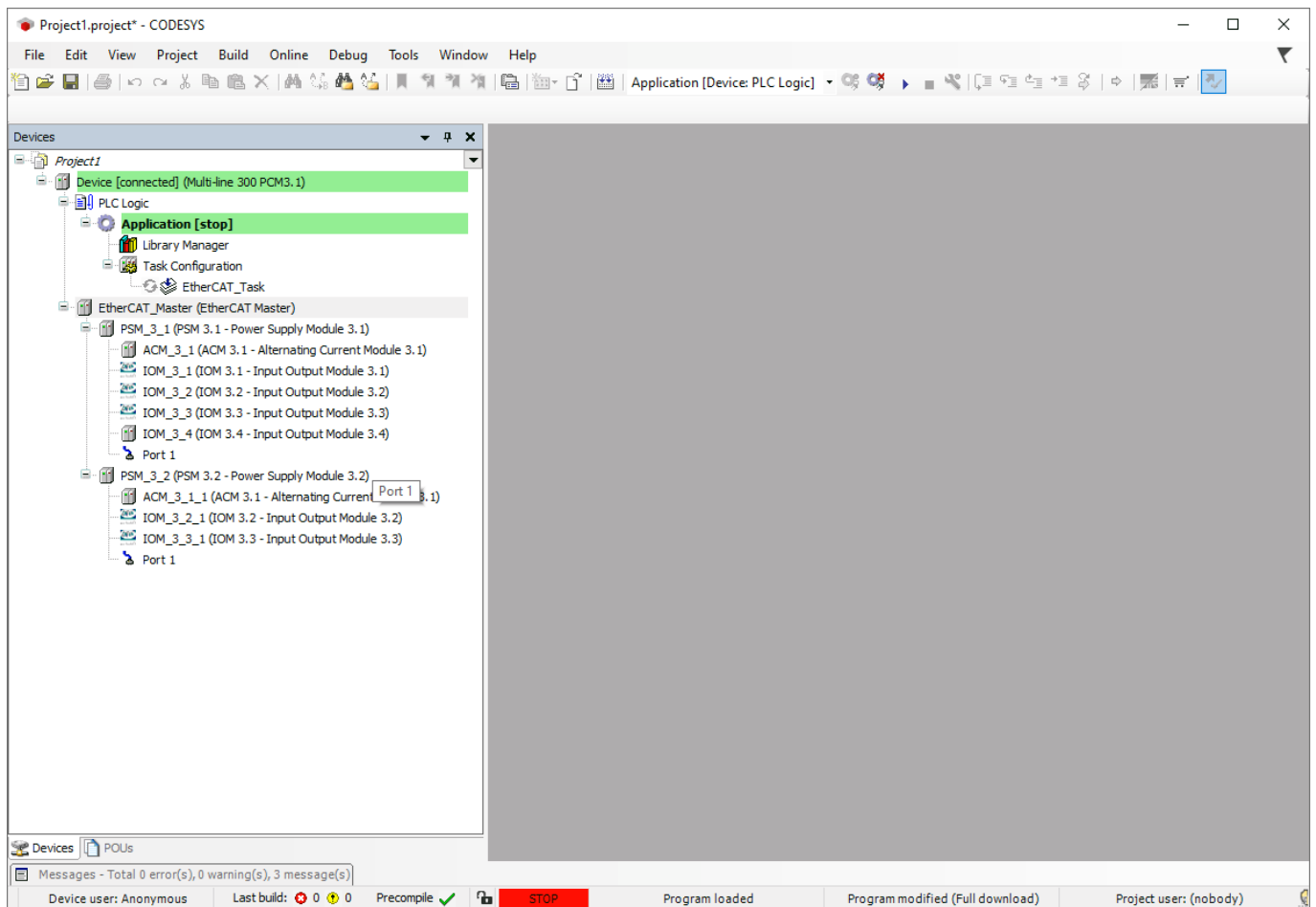


NOTE If EtherCAT Master is running on the AMC 300, you can scan for devices without being logged in. If a scan fails, then use the above procedure

4. In the devices window, select **Copy All Devices to Project**.



5. The devices are now displayed in the Devices tree.



4.9 I/O module variables

IOM3.1 variables

Project1.project - CODESYS

File Edit View Project Build Online Debug Tools Window Help

Application [Device: PLC Logic]

Devices

Project1

Device (Multi-line 300 PCM3.1)

PLC Logic

Application

Library Manager

Task Configuration

EtherCAT_Task

EtherCAT_Master (EtherCAT Master)

PSM_3.1 (PSM 3.1 - Power Supply Module 3.1)

ACM_3.1_1 (ACM 3.1 - Alternating Current Module 3.1)

IOM_3.1 (IOM 3.1 - Input Output Module 3.1)

IOM_3.2 (IOM 3.2 - Input Output Module 3.2)

IOM_3.3 (IOM 3.3 - Input Output Module 3.3)

IOM_3.4 (IOM 3.4 - Input Output Module 3.4)

Port 1

PSM_3.2 (PSM 3.2 - Power Supply Module 3.2)

ACM_3.1_1 (ACM 3.1 - Alternating Current Module 3.1)

IOM_3.2_1 (IOM 3.2 - Input Output Module 3.2)

IOM_3.3_1 (IOM 3.3 - Input Output Module 3.3)

Port 1

Device

IOM_3.1

General

Process Data

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Find

Filter Show all

Add FB for IO Channel...

Variable	Mapping	Channel	Address	Type	Unit	Description
		Relay 1	%QX10.2	BIT		Relay 1
		Relay 2	%QX10.3	BIT		Relay 2
		Relay 3	%QX10.4	BIT		Relay 3
		Relay 4	%QX10.5	BIT		Relay 4
		DI 1	%IX632.0	BIT		DI 1
		DI 2	%IX632.1	BIT		DI 2
		DI 3	%IX632.2	BIT		DI 3
		DI 4	%IX632.3	BIT		DI 4
		DI 5	%IX632.4	BIT		DI 5
		DI 6	%IX632.5	BIT		DI 6
		DI 7	%IX632.6	BIT		DI 7
		DI 8	%IX632.7	BIT		DI 8
		DI 9	%IX633.0	BIT		DI 9
		DI 10	%IX633.1	BIT		DI 10

Reset Mapping Always update variables Use parent device setting

Create new variable Map to existing variable

Devices

POUs

Modules

Last build: 0 0 0 Precompile Project user: (nobody)

IOM3.2 variables

Project1.project - CODESYS

File Edit View Project Build Online Debug Tools Window Help

Application [Device: PLC Logic]

Devices

Project1

- Device (Multi-line PCM3.1)
 - PLC Logic
 - Application
 - Library Manager
 - Task Configuration
 - EtherCAT_Task
 - EtherCAT_Master (EtherCAT Master)
 - PSM_3_1 (PSM 3.1 - Power Supply Module 3.1)
 - ACM_3_1 (ACM 3.1 - Alternating Current Module 3.1)
 - IOM_3_1 (IOM 3.1 - Input Output Module 3.1)
 - IOM_3_2 (IOM 3.2 - Input Output Module 3.2)
 - IOM_3_3 (IOM 3.3 - Input Output Module 3.3)
 - IOM_3_4 (IOM 3.4 - Input Output Module 3.4)
 - Port 1
 - PSM_3_2 (PSM 3.2 - Power Supply Module 3.2)
 - ACM_3_1_1 (ACM 3.1 - Alternating Current Module 3.1)
 - IOM_3_2_1 (IOM 3.2 - Input Output Module 3.2)
 - IOM_3_3_1 (IOM 3.3 - Input Output Module 3.3)
 - Port 1

Device

IOM_3_1

ACM_3_1

IOM_3_2

IOM_3_3

General

Process Data

Startup Parameters

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Find

Filter Show all

Add FB for IO Channel...

Variable	Mapping	Channel	Address	Type	Unit	Description
		Relay_1	%QX12.0	BIT		Relay_1
		Relay_2	%QX12.1	BIT		Relay_2
		Relay_3	%QX12.2	BIT		Relay_3
		Relay_4	%QX12.3	BIT		Relay_4
		Output Value	%QD4	REAL		Output Value
		Output Value	%QD5	REAL		Output Value
		Output Value	%QD6	REAL		Output Value
		Output Value	%QD7	REAL		Output Value
		DI1	%IX636.0	BIT		DI1
		DI2	%IX636.1	BIT		DI2
		DI3	%IX636.2	BIT		DI3
		DI4	%IX636.3	BIT		DI4
		Output Value	%ID160	REAL		Output Value
		Output Enabled	%IW322	INT		Output Enabled
		Output Value	%ID162	REAL		Output Value
		Output Enabled	%IW326	INT		Output Enabled
		Output Value	%ID164	REAL		Output Value
		Output Enabled	%IW330	INT		Output Enabled
		Output Value	%ID166	REAL		Output Value
		Output Enabled	%IW334	INT		Output Enabled
		Input Value	%ID168	REAL		Input Value
		Status	%IW338	INT		Status
		Input Value	%ID170	REAL		Input Value
		Status	%IW342	INT		Status
		Input Value	%ID172	REAL		Input Value
		Status	%IW346	INT		Status
		Input Value	%ID174	REAL		Input Value
		Status	%IW350	INT		Status

Reset Mapping Always update variables Use parent device setting

Create new variable Map to existing variable

Devices

POUs

Modules

Last build: 0 0 0

Precompile

Project user: (nobody)

IOM3.3 variables

Project1.project - CODESYS

File Edit View Project Build Online Debug Tools Window Help

Application [Device: PLC Logic]

Devices

Project1

- Device (Multi-line PCM3.1)
 - PLC Logic
 - Application
 - Library Manager
 - Task Configuration
 - EtherCAT_Task
 - EtherCAT_Master (EtherCAT Master)
 - PSM_3_1 (PSM 3.1 - Power Supply Module 3.1)
 - ACM_3_1 (ACM 3.1 - Alternating Current Module 3.1)
 - IOM_3_1 (IOM 3.1 - Input Output Module 3.1)
 - IOM_3_2 (IOM 3.2 - Input Output Module 3.2)
 - IOM_3_3 (IOM 3.3 - Input Output Module 3.3)
 - IOM_3_4 (IOM 3.4 - Input Output Module 3.4)
 - Port 1
 - PSM_3_2 (PSM 3.2 - Power Supply Module 3.2)
 - ACM_3_1_1 (ACM 3.1 - Alternating Current Module 3.1)
 - IOM_3_2_1 (IOM 3.2 - Input Output Module 3.2)
 - IOM_3_3_1 (IOM 3.3 - Input Output Module 3.3)
 - Port 1

Device

IOM_3_1

ACM_3_1

IOM_3_2

IOM_3_3

IOM_3_3

General

Process Data

Startup Parameters

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Find

Filter Show all

Add FB for IO Channel...

Variable	Mapping	Channel	Address	Type	Unit	Description
		Reserved	%QW16	UINT		Reserved
		Input Value	%ID176	REAL		Input Value
		Status	%IW354	INT		Status
		Input Value	%ID178	REAL		Input Value
		Status	%IW358	INT		Status
		Input Value	%ID180	REAL		Input Value
		Status	%IW362	INT		Status
		Input Value	%ID182	REAL		Input Value
		Status	%IW366	INT		Status
		Input Value	%ID184	REAL		Input Value
		Status	%IW370	INT		Status
		Input Value	%ID186	REAL		Input Value
		Status	%IW374	INT		Status
		Input Value	%ID188	REAL		Input Value
		Status	%IW378	INT		Status
		Input Value	%ID190	REAL		Input Value
		Status	%IW382	INT		Status
		Input Value	%ID192	REAL		Input Value
		Status	%IW386	INT		Status
		Input Value	%ID194	REAL		Input Value
		Status	%IW390	INT		Status
		MI_PowerEnabled	%IX782.0	BIT		MI_PowerEnabled
		Temperature_1	%ID196	REAL		Temperature_1
		Temperature_2	%ID197	REAL		Temperature_2
		Temperature_3	%ID198	REAL		Temperature_3
		Temperature_4	%ID199	REAL		Temperature_4
		Temperature_5	%ID200	REAL		Temperature_5
		CompensationTemperature_1	%ID201	REAL		CompensationTemper...

Reset Mapping Always update variables Use parent device setting

Create new variable Map to existing variable

Devices

POUs

Modules

Last build: 0 0 0

Precompile

Project user: (nobody)

IOM3-4 variables

Project1.project - CODESYS

File Edit View Project Build Online Debug Tools Window Help

Application [Device: PLC Logic]

Devices

Project1

- Device (Multi-line 300 PCM3.1)
 - PLC Logic
 - Application
 - Library Manager
 - Task Configuration
 - EtherCAT_Task
 - EtherCAT_Master (EtherCAT Master)
 - PSM_3_1 (PSM 3.1 - Power Supply Module 3.1)
 - ACM_3_1 (ACM 3.1 - Alternating Current Module 3.1)
 - IOM_3_1 (IOM 3.1 - Input Output Module 3.1)
 - IOM_3_2 (IOM 3.2 - Input Output Module 3.2)
 - IOM_3_3 (IOM 3.3 - Input Output Module 3.3)
 - IOM_3_4 (IOM 3.4 - Input Output Module 3.4)
 - Port 1
 - PSM_3_2 (PSM 3.2 - Power Supply Module 3.2)
 - ACM_3_1_1 (ACM 3.1 - Alternating Current Module 3.1)
 - IOM_3_2_1 (IOM 3.2 - Input Output Module 3.2)
 - IOM_3_3_1 (IOM 3.3 - Input Output Module 3.3)
 - Port 1

General

Process Data

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Find

Filter Show all

Add FB for IO Channel...

Variable	Mapping	Channel	Address	Type	Unit	Description
		Relay 1	%QX34.0	BIT		Relay 1
		Relay 2	%QX34.1	BIT		Relay 2
		Relay 3	%QX34.2	BIT		Relay 3
		Relay 4	%QX34.3	BIT		Relay 4
		Relay 5	%QX34.4	BIT		Relay 5
		Relay 6	%QX34.5	BIT		Relay 6
		Relay 7	%QX34.6	BIT		Relay 7
		Relay 8	%QX34.7	BIT		Relay 8
		Relay 9	%QX35.0	BIT		Relay 9
		Relay 10	%QX35.1	BIT		Relay 10
		Relay 11	%QX35.2	BIT		Relay 11
		Relay 12	%QX35.3	BIT		Relay 12
		DI 1	%IX846.4	BIT		DI 1
		DI 2	%IX846.5	BIT		DI 2
		DI 3	%IX846.6	BIT		DI 3
		DI 4	%IX846.7	BIT		DI 4
		DI 5	%IX847.0	BIT		DI 5
		DI 6	%IX847.1	BIT		DI 6
		DI 7	%IX847.2	BIT		DI 7
		DI 8	%IX847.3	BIT		DI 8
		DI 9	%IX847.4	BIT		DI 9
		DI 10	%IX847.5	BIT		DI 10
		DI 11	%IX847.6	BIT		DI 11
		DI 12	%IX847.7	BIT		DI 12
		DI 13	%IX848.0	BIT		DI 13
		DI 14	%IX848.1	BIT		DI 14
		DI 15	%IX848.2	BIT		DI 15
		DI 16	%IX848.3	BIT		DI 16

Reset Mapping

Always update variables

Use parent device setting

Create new variable

Map to existing variable

Last build: 0 0 0 Precompile Project user: (nobody)

ACM3-1 variables

Project1.project - CODESYS

File Edit View Project Build Online Debug Tools Window Help

Application [Device: PLC Logic]

Devices

Project1

- Device (Multi-line 300 PCM3.1)
 - PLC Logic
 - Application
 - Library Manager
 - Task Configuration
 - EtherCAT_Task
 - EtherCAT_Master (EtherCAT Master)
 - PSM_3_1 (PSM 3.1 - Power Supply Module 3.1)
 - ACM_3_1 (ACM 3.1 - Alternating Current Module 3.1)
 - IOM_3_1 (IOM 3.1 - Input Output Module 3.1)
 - IOM_3_2 (IOM 3.2 - Input Output Module 3.2)
 - IOM_3_3 (IOM 3.3 - Input Output Module 3.3)
 - IOM_3_4 (IOM 3.4 - Input Output Module 3.4)
 - Port 1
 - PSM_3_2 (PSM 3.2 - Power Supply Module 3.2)
 - ACM_3_1_1 (ACM 3.1 - Alternating Current Module 3.1)
 - IOM_3_2_1 (IOM 3.2 - Input Output Module 3.2)
 - IOM_3_3_1 (IOM 3.3 - Input Output Module 3.3)
 - Port 1

General

Process Data

Startup Parameters

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Find

Filter Show all

Add FB for IO Channel...

Go to Instance

Variable	Mapping	Channel	Address	Type	Unit	Description
		InhibitPdo_Out	%Q01	UDINT		InhibitPdo_Out
		SuppressFastDetectPdo_Out	%QW4	UINT		SuppressFastDetectPdo_Out
		RMS_AC1V_UL1N	%ID12	REAL		RMS_AC1V_UL1N
		RMS_AC1V_UL2N	%ID13	REAL		RMS_AC1V_UL2N
		RMS_AC1V_UL3N	%ID14	REAL		RMS_AC1V_UL3N
		RMS_AC1V_URESIDUAL	%ID15	REAL		RMS_AC1V_URESIDUAL
		RMS_AC1V_UL1L2	%ID16	REAL		RMS_AC1V_UL1L2
		RMS_AC1V_UL2L3	%ID17	REAL		RMS_AC1V_UL2L3
		RMS_AC1V_UL3L1	%ID18	REAL		RMS_AC1V_UL3L1
		RMS_AC3C_IL4_ACV1	%ID19	REAL		RMS_AC3C_IL4_ACV1
		RMS_AC2V_UL1N	%ID20	REAL		RMS_AC2V_UL1N
		RMS_AC2V_UL2N	%ID21	REAL		RMS_AC2V_UL2N
		RMS_AC2V_UL3N	%ID22	REAL		RMS_AC2V_UL3N
		RMS_AC2V_URESIDUAL	%ID23	REAL		RMS_AC2V_URESIDUAL
		RMS_AC2V_UL1L2	%ID24	REAL		RMS_AC2V_UL1L2
		RMS_AC2V_UL2L3	%ID25	REAL		RMS_AC2V_UL2L3
		RMS_AC2V_UL3L1	%ID26	REAL		RMS_AC2V_UL3L1
		RMS_AC3C_IL1	%ID27	REAL		RMS_AC3C_IL1
		RMS_AC3C_IL2	%ID28	REAL		RMS_AC3C_IL2
		RMS_AC3C_IL3	%ID29	REAL		RMS_AC3C_IL3
		RMS_AC3C_URESIDUAL	%ID30	REAL		RMS_AC3C_URESIDUAL
		RMS_AC3C_IL4_ACV2	%ID31	REAL		RMS_AC3C_IL4_ACV2
		RMS_AC3C_I_EARTH_IL4_ACV2	%ID32	REAL		RMS_AC3C_I_EARTH_IL4_ACV2
		P_AC2V_L1	%ID33	REAL		P_AC2V_L1
		P_AC2V_L2	%ID34	REAL		P_AC2V_L2
		P_AC2V_L3	%ID35	REAL		P_AC2V_L3
		P_AC2V_L4	%ID36	REAL		P_AC2V_L4
		P_AC1V_UL1L4	%ID37	REAL		P_AC1V_UL1L4

Reset Mapping

Always update variables

Use parent device setting

Create new variable

Map to existing variable

Last build: 0 0 0 Precompile Project user: (nobody)

PSM3.1 variables

Project1.project - CODESYS

File Edit View Project Build Online Debug Tools Window Help

Application [Device: PLC Logic]

Devices

Project1

Device (Multi-line PCM3.1)

PLC Logic

Application

Library Manager

Task Configuration

EtherCAT_Task

EtherCAT_Master (EtherCAT Master)

PSM_3_1 (PSM 3.1 - Power Supply Module 3.1)

ACM_3_1 (ACM 3.1 - Alternating Current Module 3.1)

IOM_3_1 (IOM 3.1 - Input Output Module 3.1)

IOM_3_2 (IOM 3.2 - Input Output Module 3.2)

IOM_3_3 (IOM 3.3 - Input Output Module 3.3)

IOM_3_4 (IOM 3.4 - Input Output Module 3.4)

Port 1

PSM_3_2 (PSM 3.2 - Power Supply Module 3.2)

ACM_3_1_1 (ACM 3.1 - Alternating Current Module 3.1)

IOM_3_2_1 (IOM 3.2 - Input Output Module 3.2)

IOM_3_3_1 (IOM 3.3 - Input Output Module 3.3)

Port 1

General

Process Data

Startup Parameters

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Find

Filter Show all

Add FB for IO Channel...

Variable	Mapping	Channel	Address	Type	Unit	Description
		Relay 1	%QX0.0	BIT		Relay 1
		Relay 2	%QX0.1	BIT		Relay 2
		Relay 3	%QX0.2	BIT		Relay 3
		Temperature	%ID0	REAL		Temperature
		CardOK	%IW2	INT		CardOK
		LinkStatus	%IW3	INT		LinkStatus
		Battery voltage	%ID2	REAL		Battery voltage
		Backplane voltage	%ID3	REAL		Backplane voltage
		Power Fail Early Warning	%IW8	INT		Power Fail Early Warning
		PSM counter	%ID5	DINT		PSM counter
		Min	%ID6	REAL		Min
		Max	%ID7	REAL		Max
		ADCvalue	%IW16	UINT		ADCvalue
		index	%IW17	UINT		index
		Start	%IW18	UINT		Start
		Gain	%IW19	UINT		Gain
		Offset	%IW20	INT		Offset

Reset Mapping Always update variables Use parent device setting

Create new variable Map to existing variable

Devices

POUs

Modules

Last build: 0 0 0 Precompile Project user: (nobody)

PSM3.2 variables

Project1.project - CODESYS

File Edit View Project Build Online Debug Tools Window Help

Application [Device: PLC Logic]

Devices

Project1

Device (Multi-line PCM3.1)

PLC Logic

Application

Library Manager

Task Configuration

EtherCAT_Task

EtherCAT_Master (EtherCAT Master)

PSM_3_1 (PSM 3.1 - Power Supply Module 3.1)

ACM_3_1 (ACM 3.1 - Alternating Current Module 3.1)

IOM_3_1 (IOM 3.1 - Input Output Module 3.1)

IOM_3_2 (IOM 3.2 - Input Output Module 3.2)

IOM_3_3 (IOM 3.3 - Input Output Module 3.3)

IOM_3_4 (IOM 3.4 - Input Output Module 3.4)

Port 1

PSM_3_2 (PSM 3.2 - Power Supply Module 3.2)

ACM_3_1_1 (ACM 3.1 - Alternating Current Module 3.1)

IOM_3_2_1 (IOM 3.2 - Input Output Module 3.2)

IOM_3_3_1 (IOM 3.3 - Input Output Module 3.3)

Port 1

General

Process Data

Startup Parameters

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Find

Filter Show all

Add FB for IO Channel...

Variable	Mapping	Channel	Address	Type	Unit	Description
		Relay 1	%QX36.0	BIT		Relay 1
		Relay 2	%QX36.1	BIT		Relay 2
		Relay 3	%QX36.2	BIT		Relay 3
		Temperature	%ID213	REAL		Temperature
		CardOK	%IW428	INT		CardOK
		LinkStatus	%IW429	INT		LinkStatus
		Battery voltage	%ID215	REAL		Battery voltage
		Backplane voltage	%ID216	REAL		Backplane voltage
		Power Fail Early Warning	%IW434	INT		Power Fail Early Warning
		PSM counter	%ID218	DINT		PSM counter
		Min	%ID219	REAL		Min
		Max	%ID220	REAL		Max
		ADCvalue	%IW442	UINT		ADCvalue
		index	%IW443	UINT		index
		Start	%IW444	UINT		Start
		Gain	%IW445	UINT		Gain
		Offset	%IW446	INT		Offset

Reset Mapping Always update variables Use parent device setting

Create new variable Map to existing variable

Devices

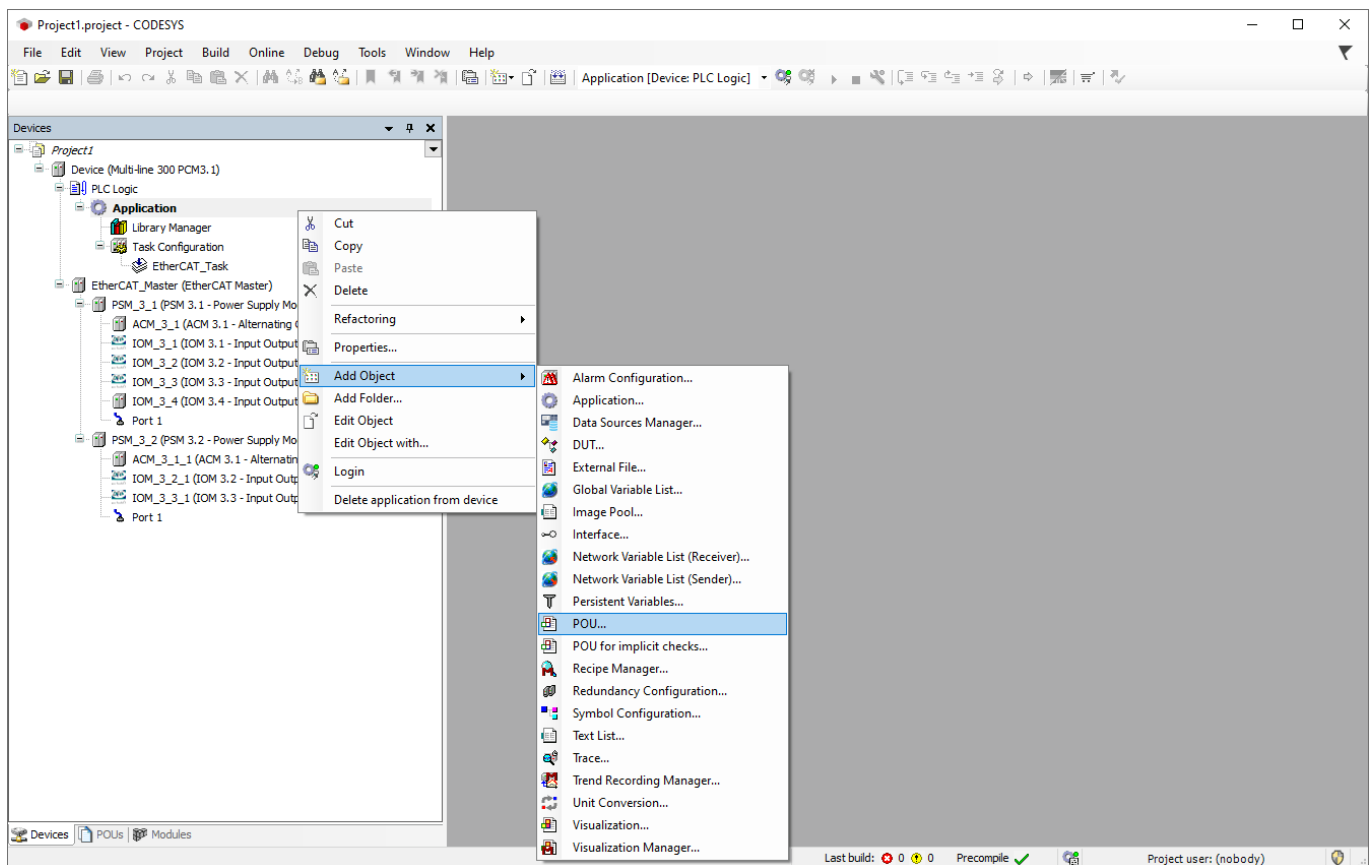
POUs

Modules

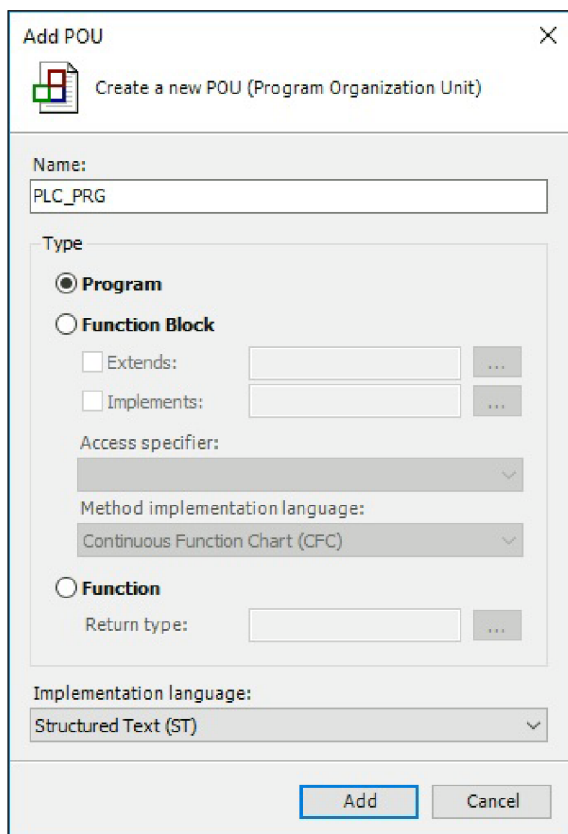
Last build: 0 0 0 Precompile Project user: (nobody)

4.10 Add a program

1. Select **Application > Add Object > POU....**

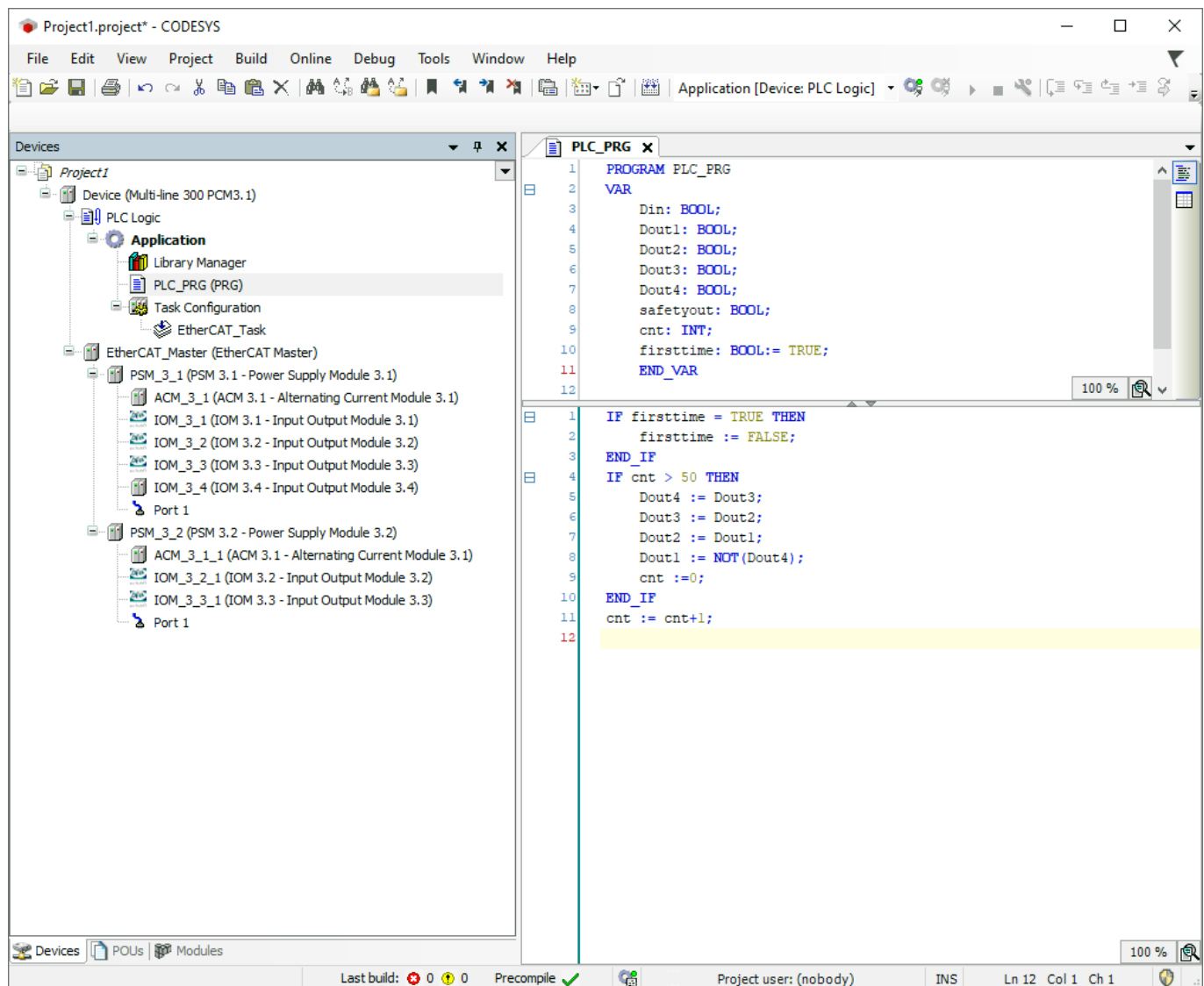


2. In the Add POU window, tick **Program** and select **Add**.



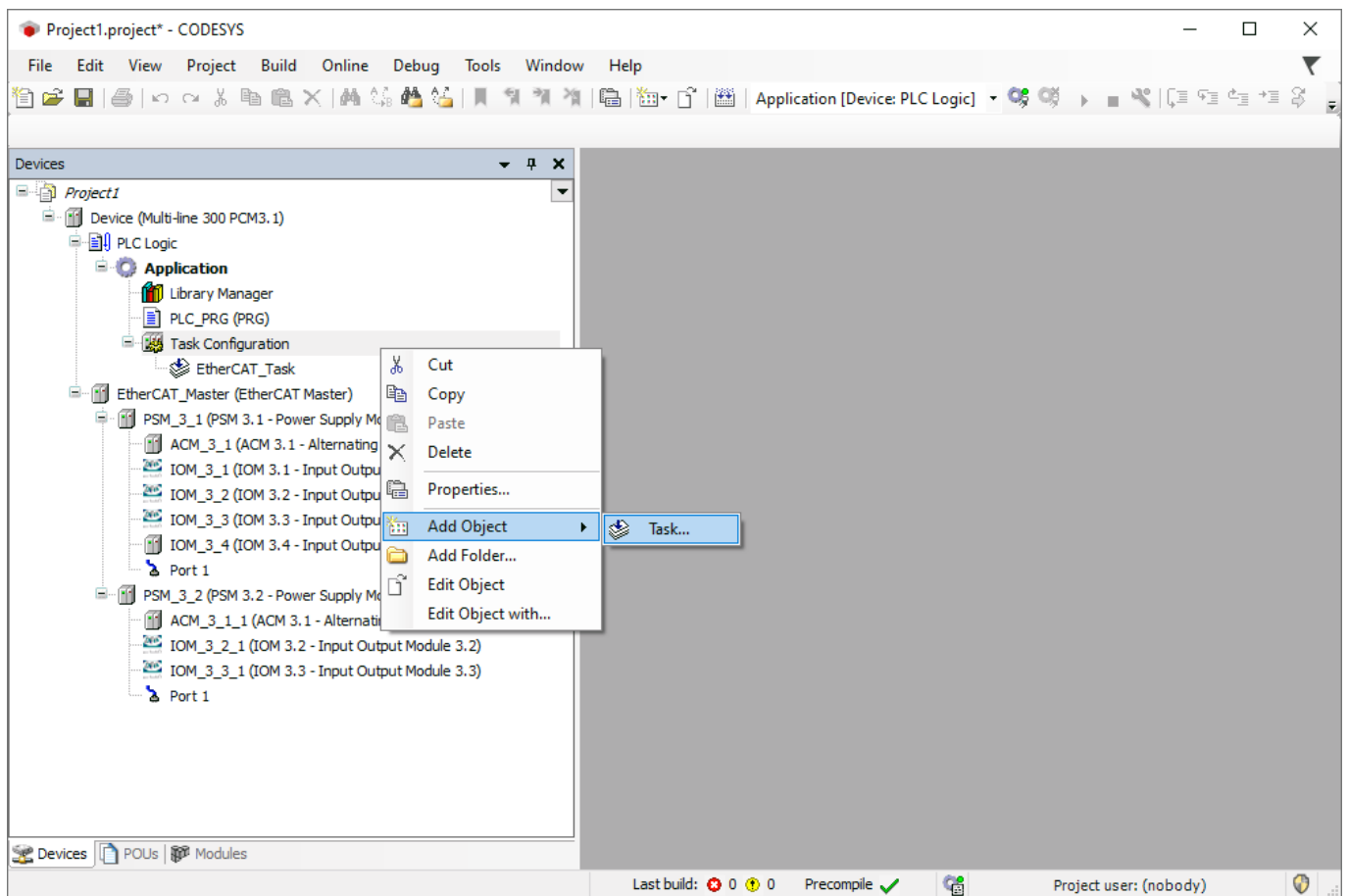
4.11 Write a program

Example of a program

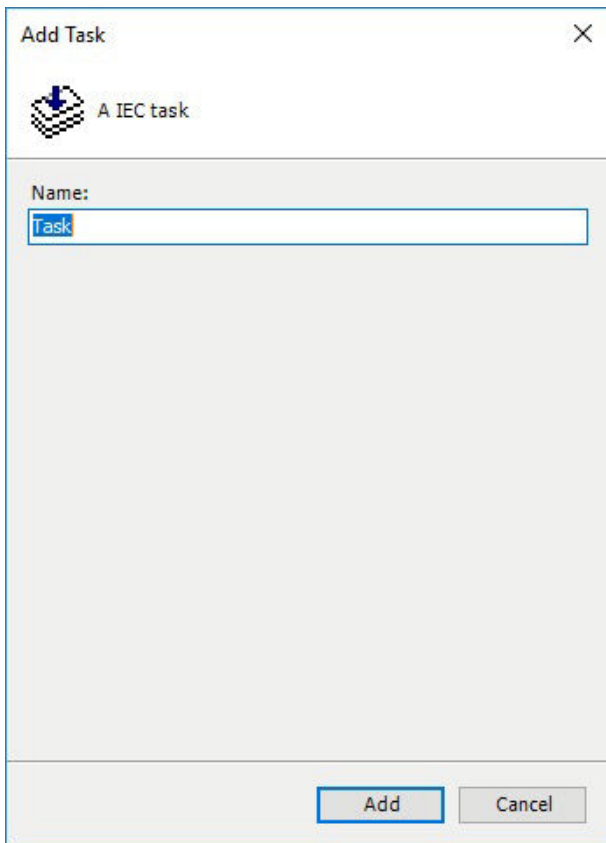


4.11.1 Add a task

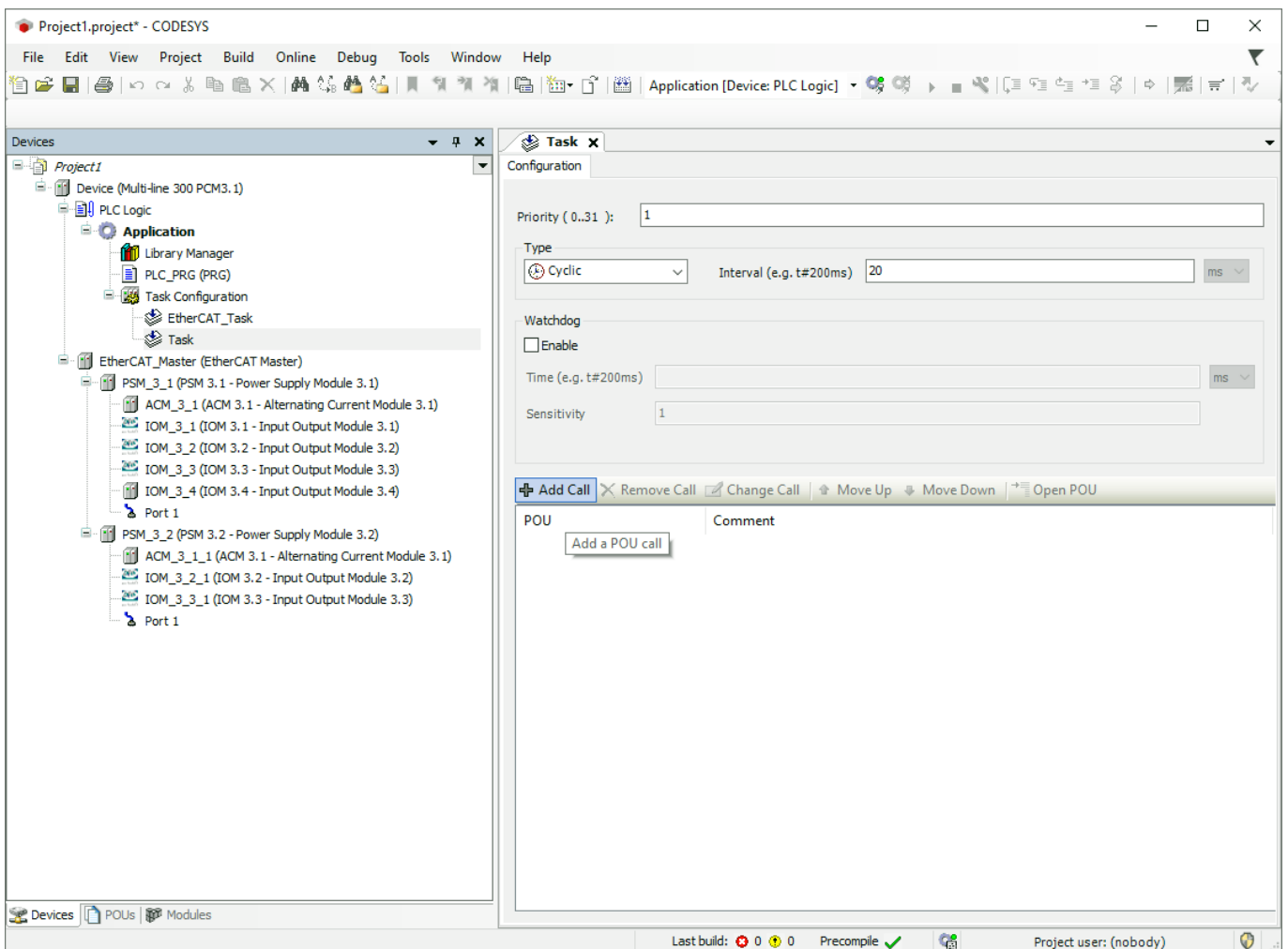
1. Select **Task configuration > Add Object > Task....**



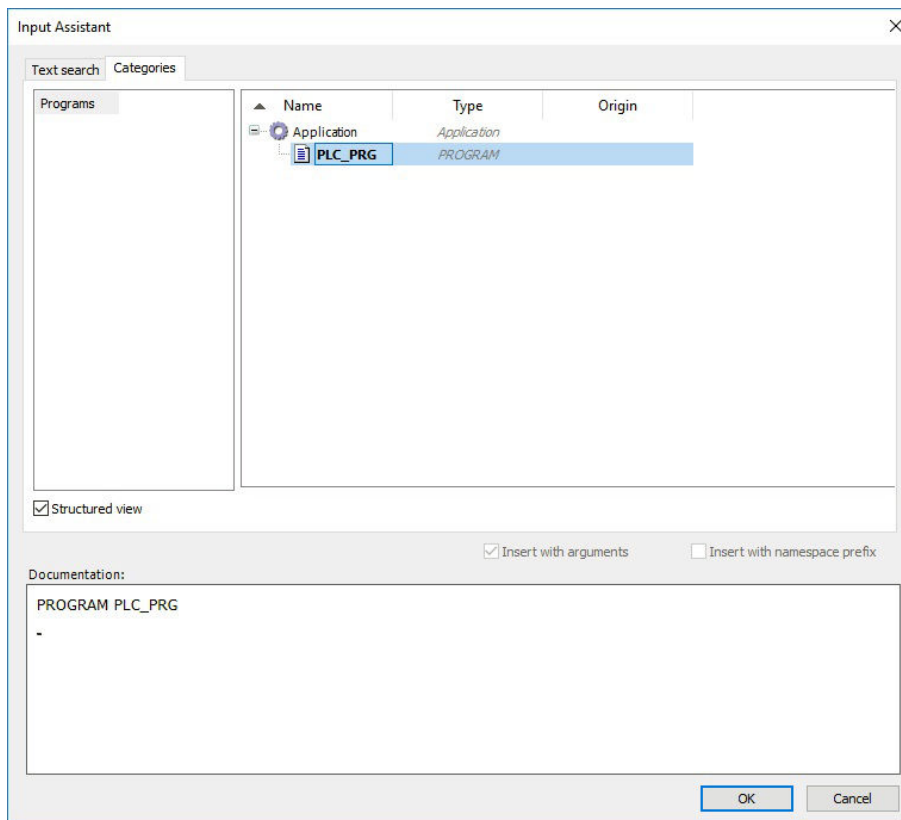
2. In the Add Task window, write a Task name and select **Add**.



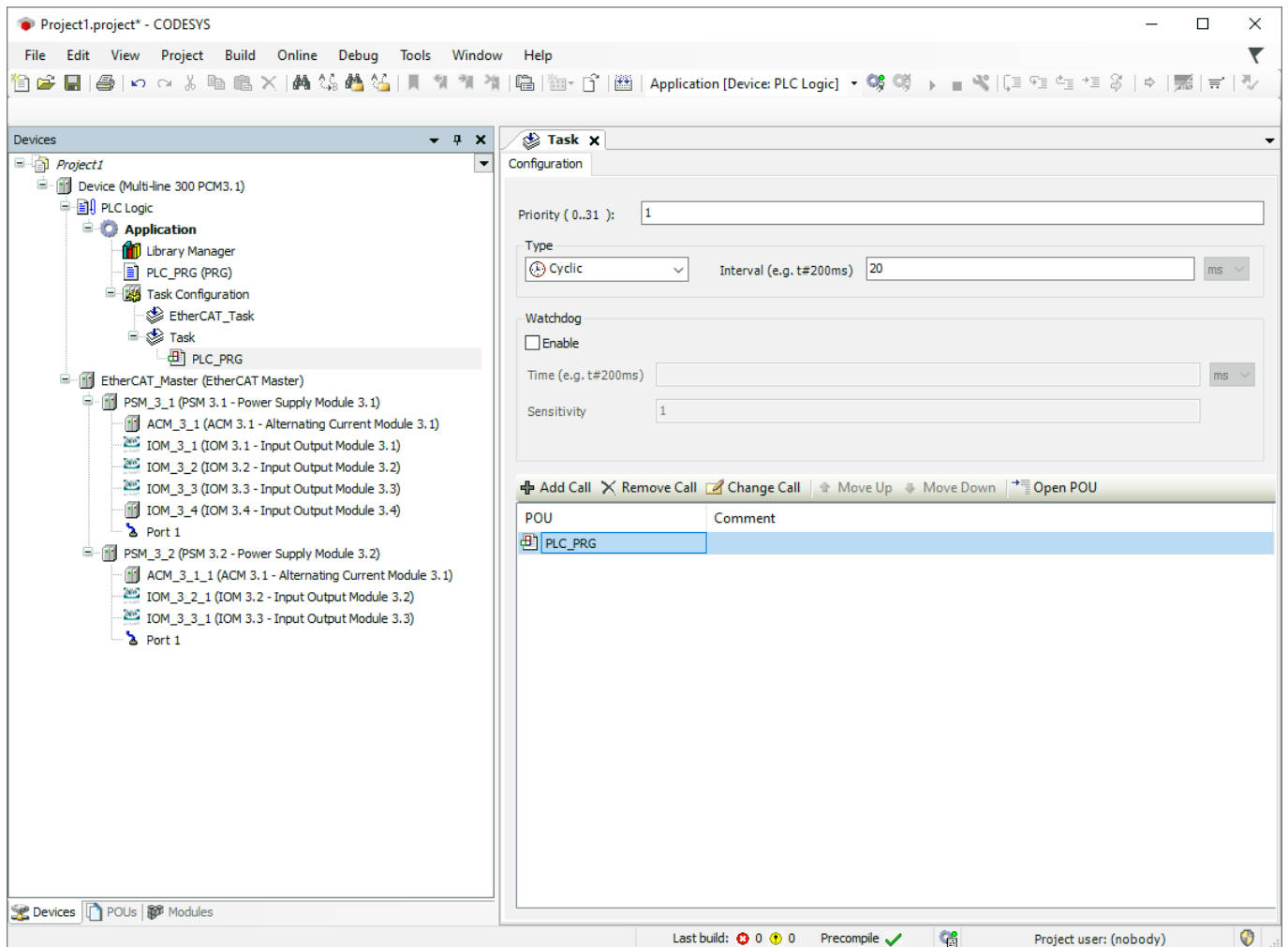
3. Select the **Add Call** tab.



4. In the Input Assistant window, select the program **PLC_PRG**.



5. The program PLC_PRG is now added to the project.

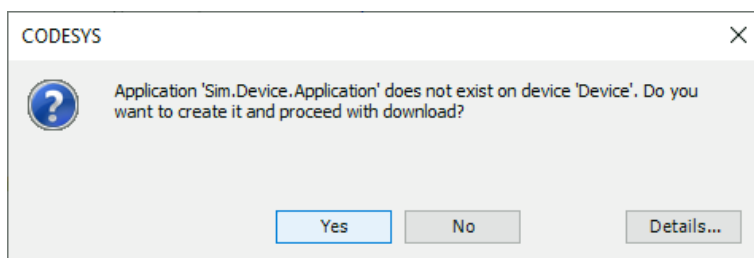


6. Login to the AMC 300.

4.11.2 Simulation mode

It is possible to use Simulation mode, if an AMC 300 controller is not connected.

1. Select Simulation mode with **Online > Simulation**.
2. Login to the AMC 300 with **Online > Login**.
3. In the pop-up window, select **Yes** to create the program.



4. Select **Debug > Start** to run the program.

Project1.project* - CODESYS

FileEditViewProjectBuildOnlineDebugToolsWindowHelp

Replace occurrences of a certain string by another in the current project. (Ctrl+Shift+H)

TaskPLC_PRGDevice

Project1

Device [connected] (Multi-line 300 PCM3.1)

PLC Logic

Application [run]

Library Manager

PLC_PRG (PRG)

Task Configuration

EtherCAT_Task

Task

PLC_PRG

EtherCAT_Master (EtherCAT Master)

PSM_3_1 (PSM 3.1 - Power Supply Module 3.1)

ACM_3_1 (ACM 3.1 - Alternating Current Module 3.1)

IOM_3_1 (IOM 3.1 - Input Output Module 3.1)

IOM_3_2 (IOM 3.2 - Input Output Module 3.2)

IOM_3_3 (IOM 3.3 - Input Output Module 3.3)

IOM_3_4 (IOM 3.4 - Input Output Module 3.4)

Port 1

PSM_3_2 (PSM 3.2 - Power Supply Module 3.2)

ACM_3_1_1 (ACM 3.1 - Alternating Current Module 3.1)

IOM_3_2_1 (IOM 3.2 - Input Output Module 3.2)

IOM_3_3_1 (IOM 3.3 - Input Output Module 3.3)

Port 1

Device.Application.PLC_PRG

Expression	Type	Value	Prepared value	Address
Din	BOOL	FALSE		
Dout1	BOOL	TRUE		
Dout2	BOOL	TRUE		
Dout3	BOOL	TRUE		
Dout4	BOOL	FALSE		
safetyout	BOOL	FALSE		
cnt	INT	25		

```

1 IF firsttime FALSE = TRUE THEN
2   firsttime FALSE := FALSE;
3 END_IF
4 IF cnt 25 > 50 THEN
5   Dout4 FALSE := Dout3 TRUE;
6   Dout3 TRUE := Dout2 TRUE;
7   Dout2 TRUE := Dout1 TRUE;
8   Dout1 TRUE := NOT (Dout4 FALSE);
9   cnt 25 := 0;
10 END_IF
11 cnt 25 := cnt 25 + 1;
12 RETURN

```

Devices

POUs

Messages - Total 0 error(s), 0 warning(s), 5 message(s)

Device user: Anonymous

Last build: 0 0 0

Precompile

RUN

SIMULATI

Program loaded

Program unchanged

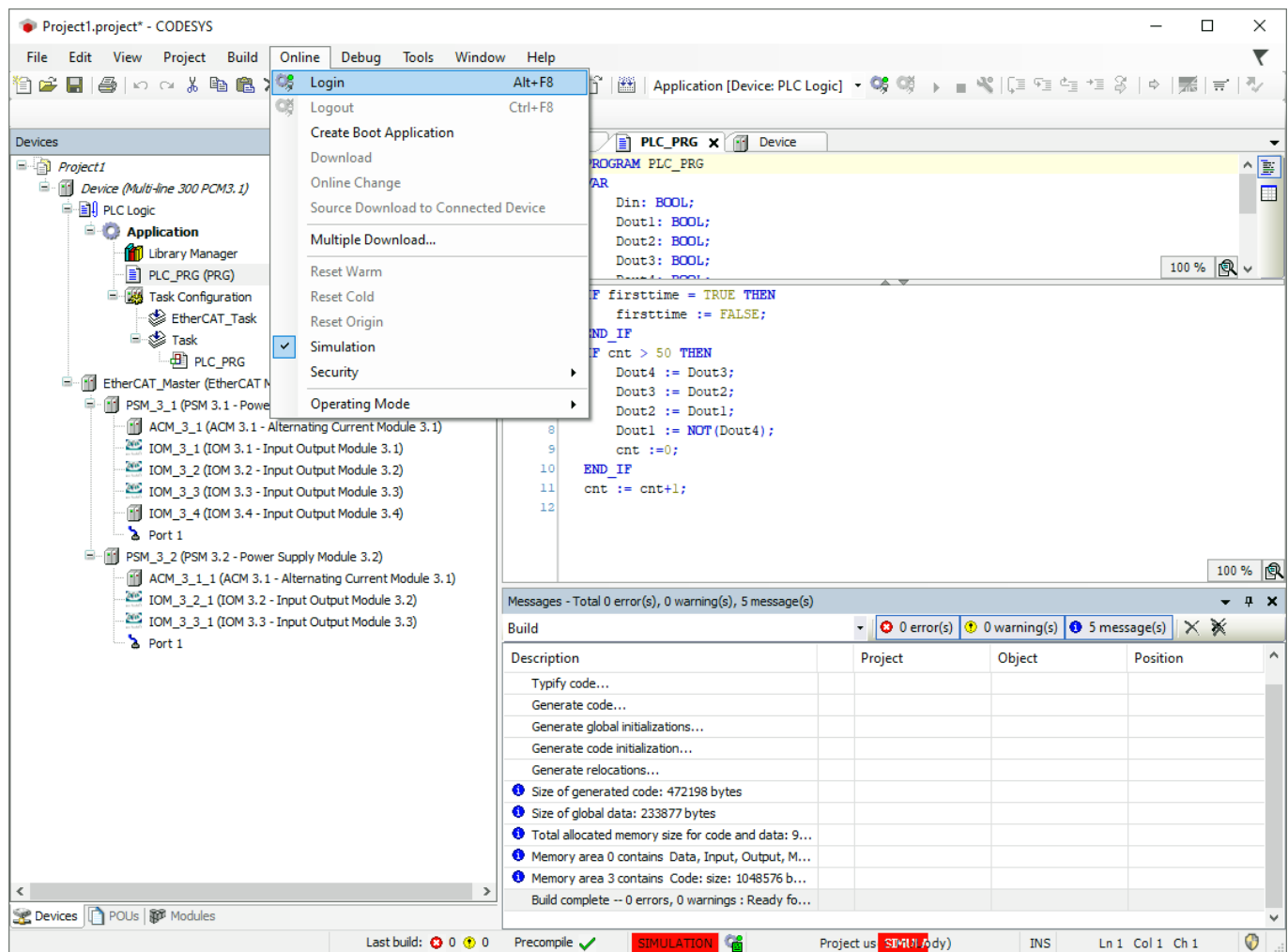
Project user: (nobody)

USER MANUAL 4189341271F EN

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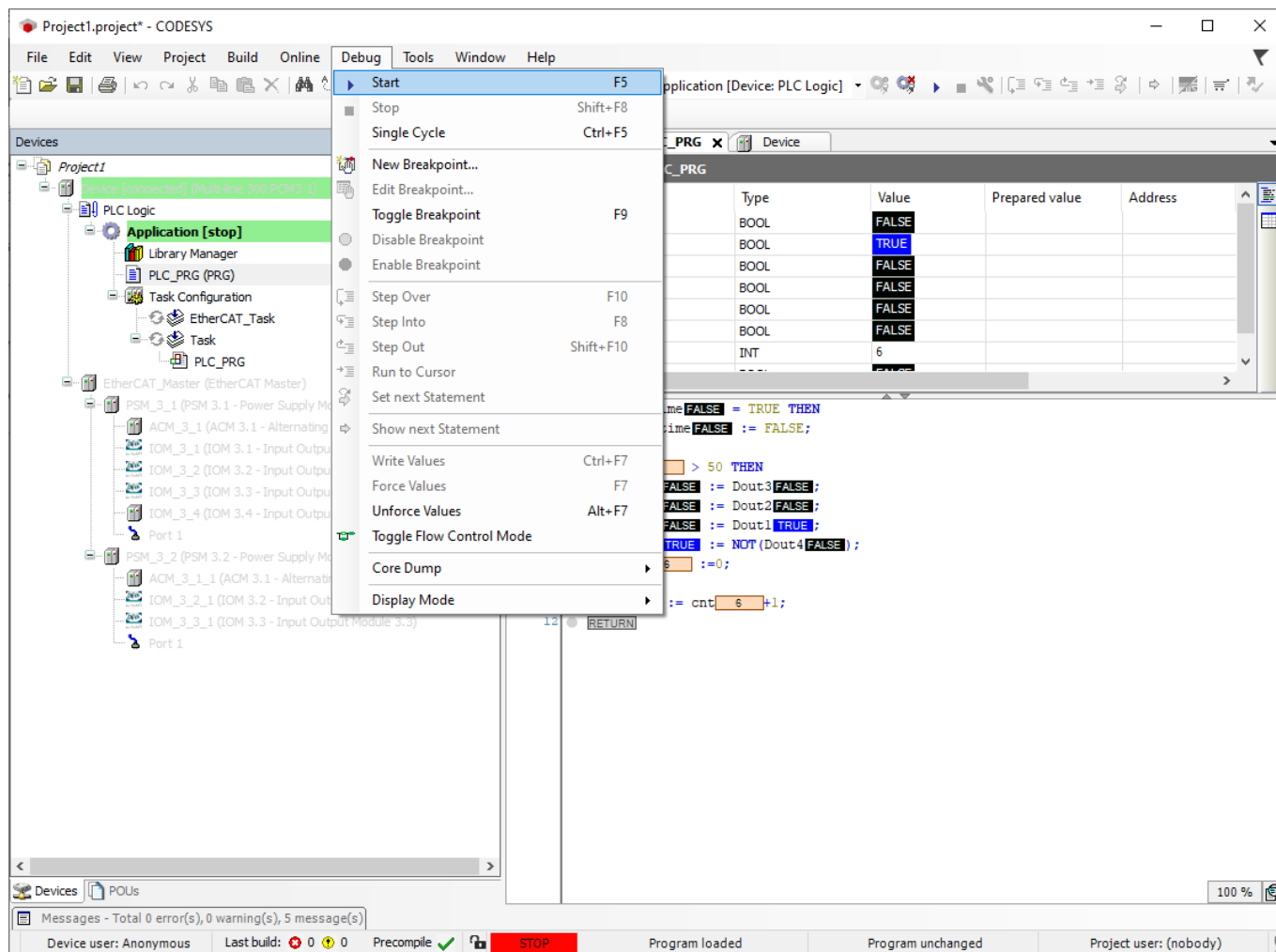
4.11.3 Login to AMC 300

Select **Online** > **Login**.



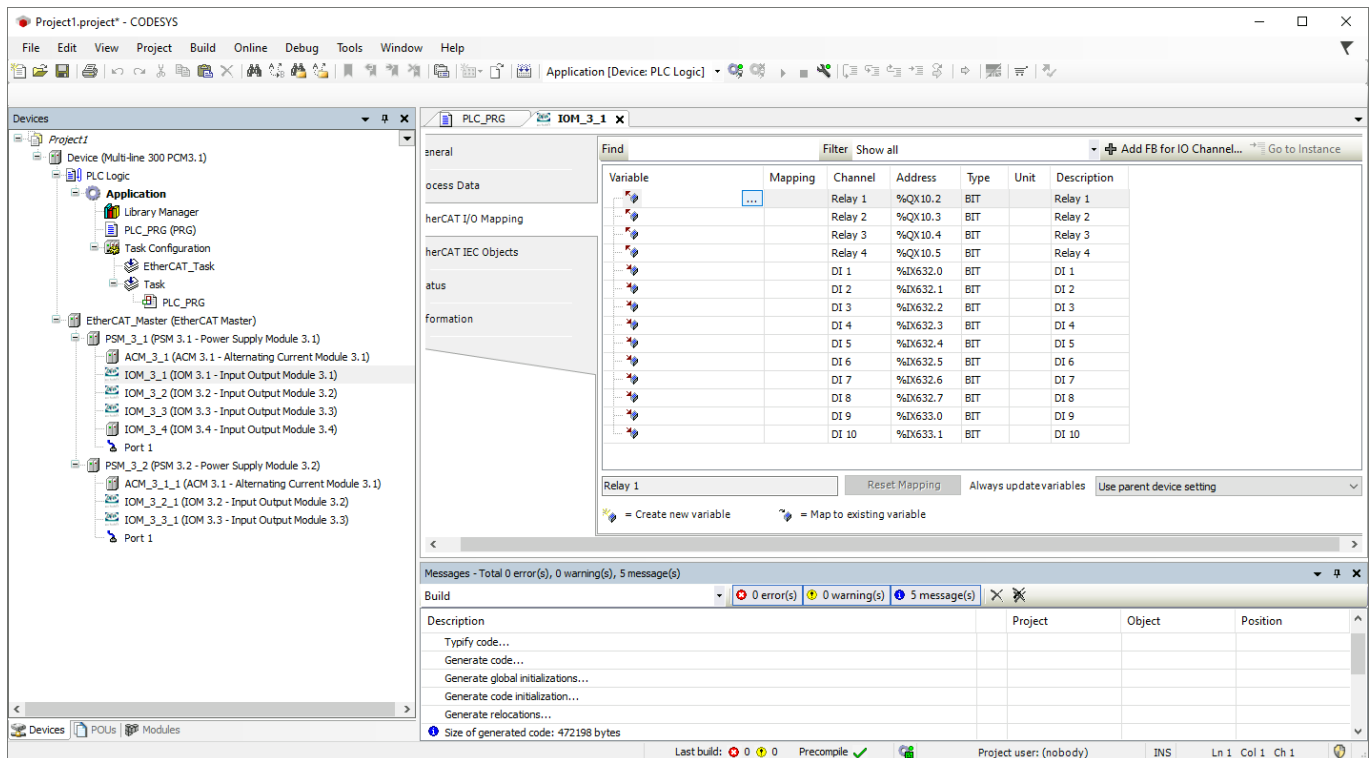
4.11.4 Start the program

To start the program, select **Debug > Start**.

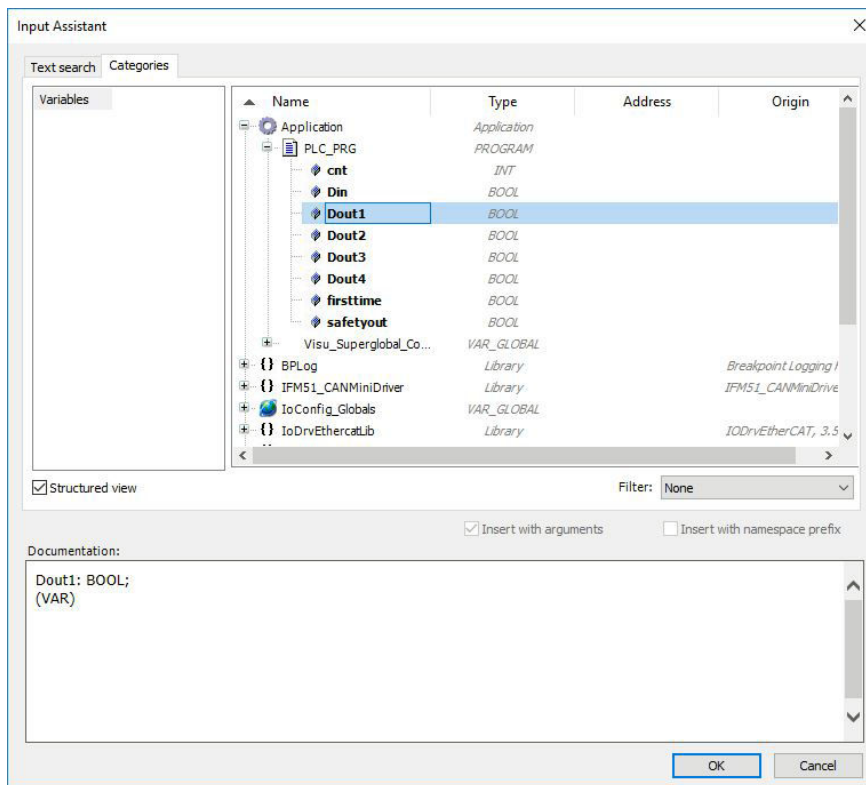


4.12 Link I/O variables to physical I/O

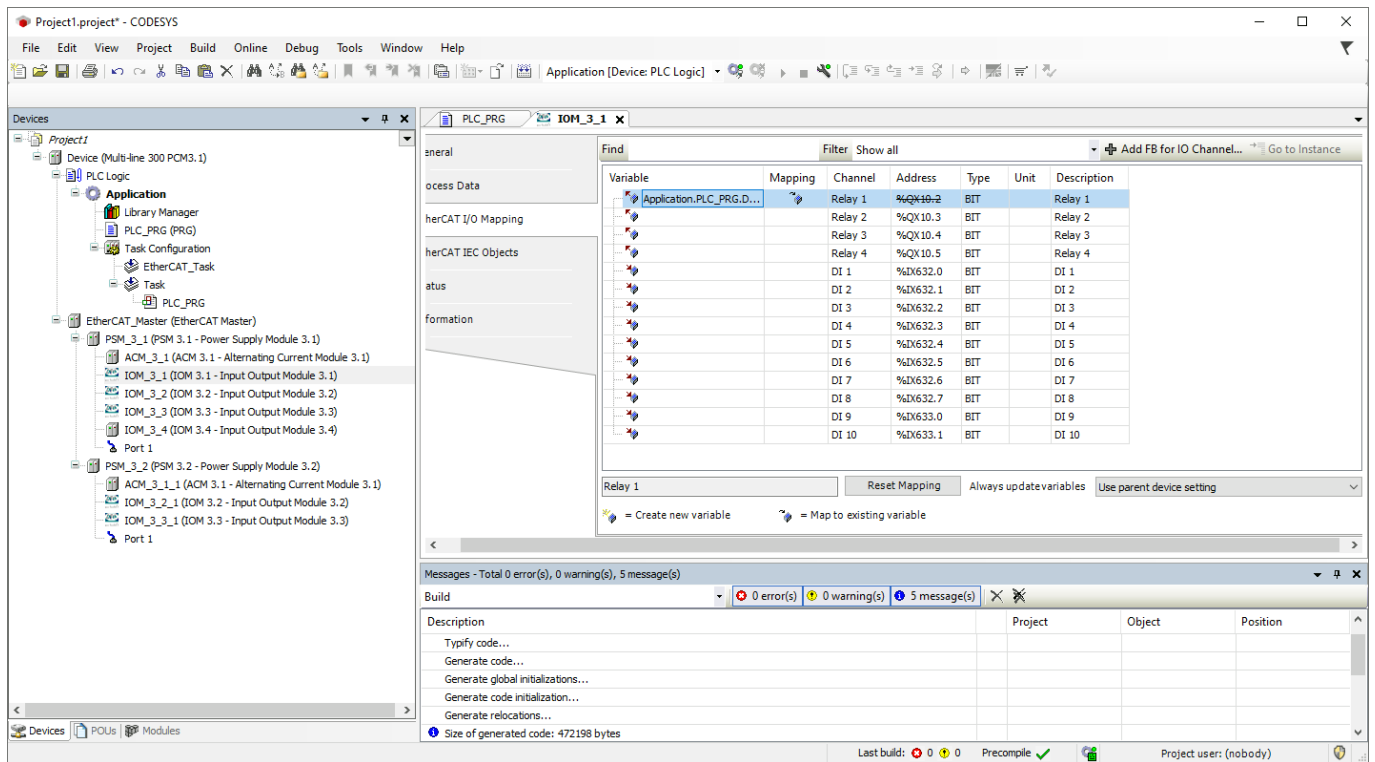
1. Select **Online > Logout** to go to offline mode.
2. Select a physical I/O.



3. Select ... of **F2** to edit.
4. In the Input Assistant window, select a variable.



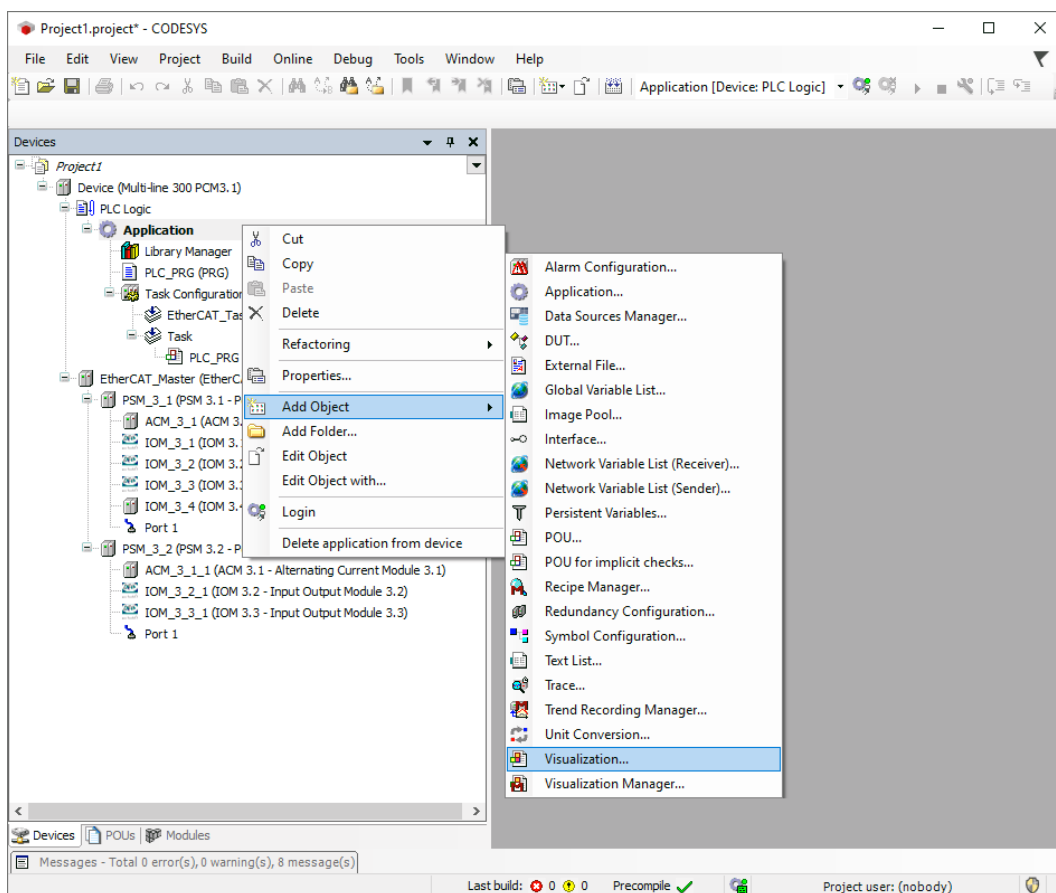
5. Select **OK** to link the variable to the physical I/O.



6. Repeat 1 to 5 for for all output variables.

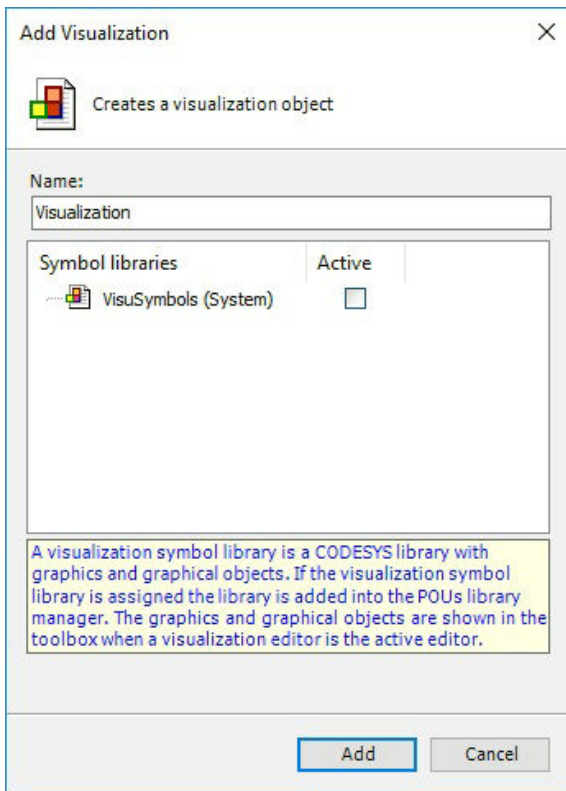
4.13 Add visualization

1. Select **Application > Add Object > Visualization**.



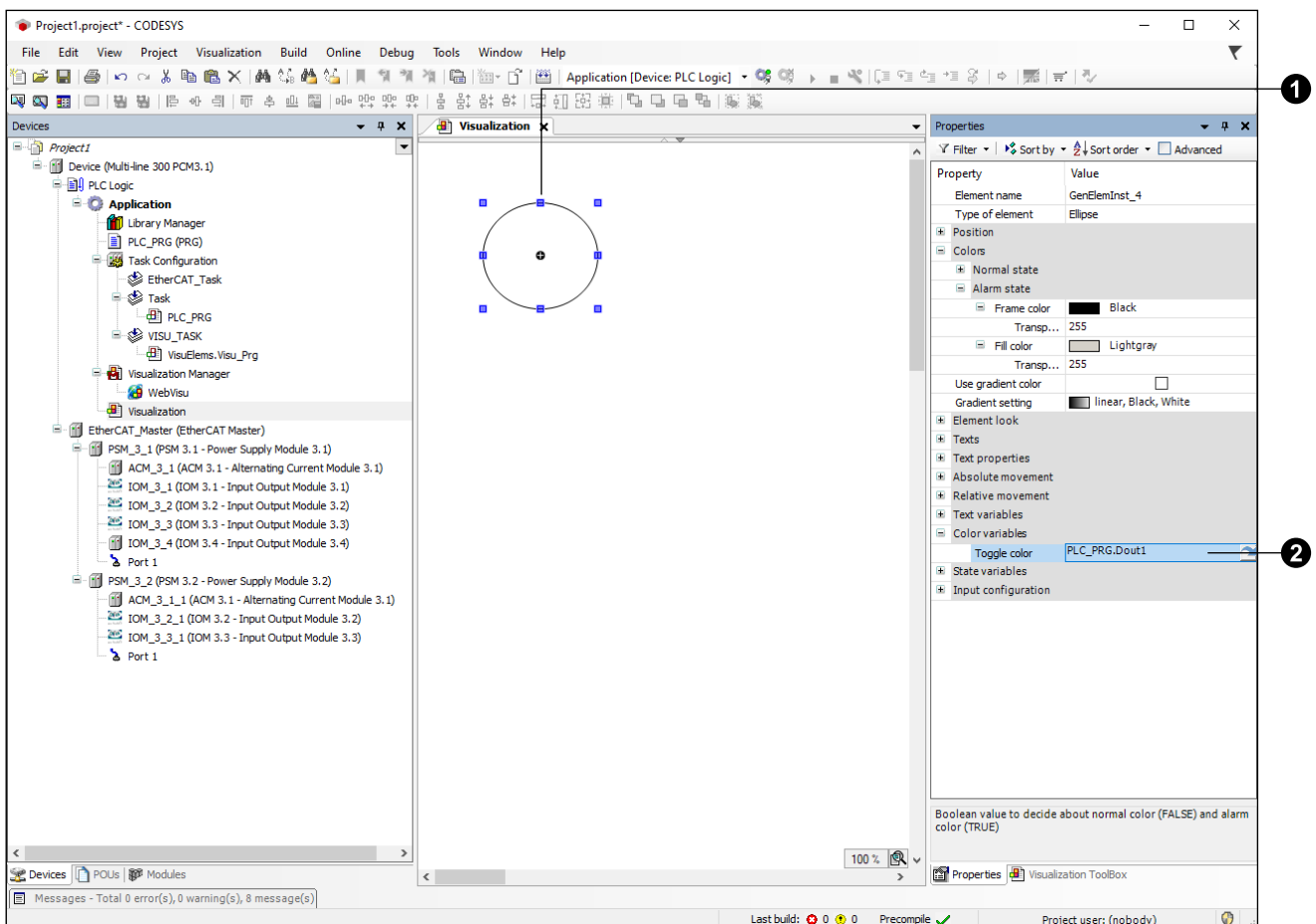
2. In the Add Visualization window, activate the **VisuSymbols (System)** library.

3. Select **Add**.

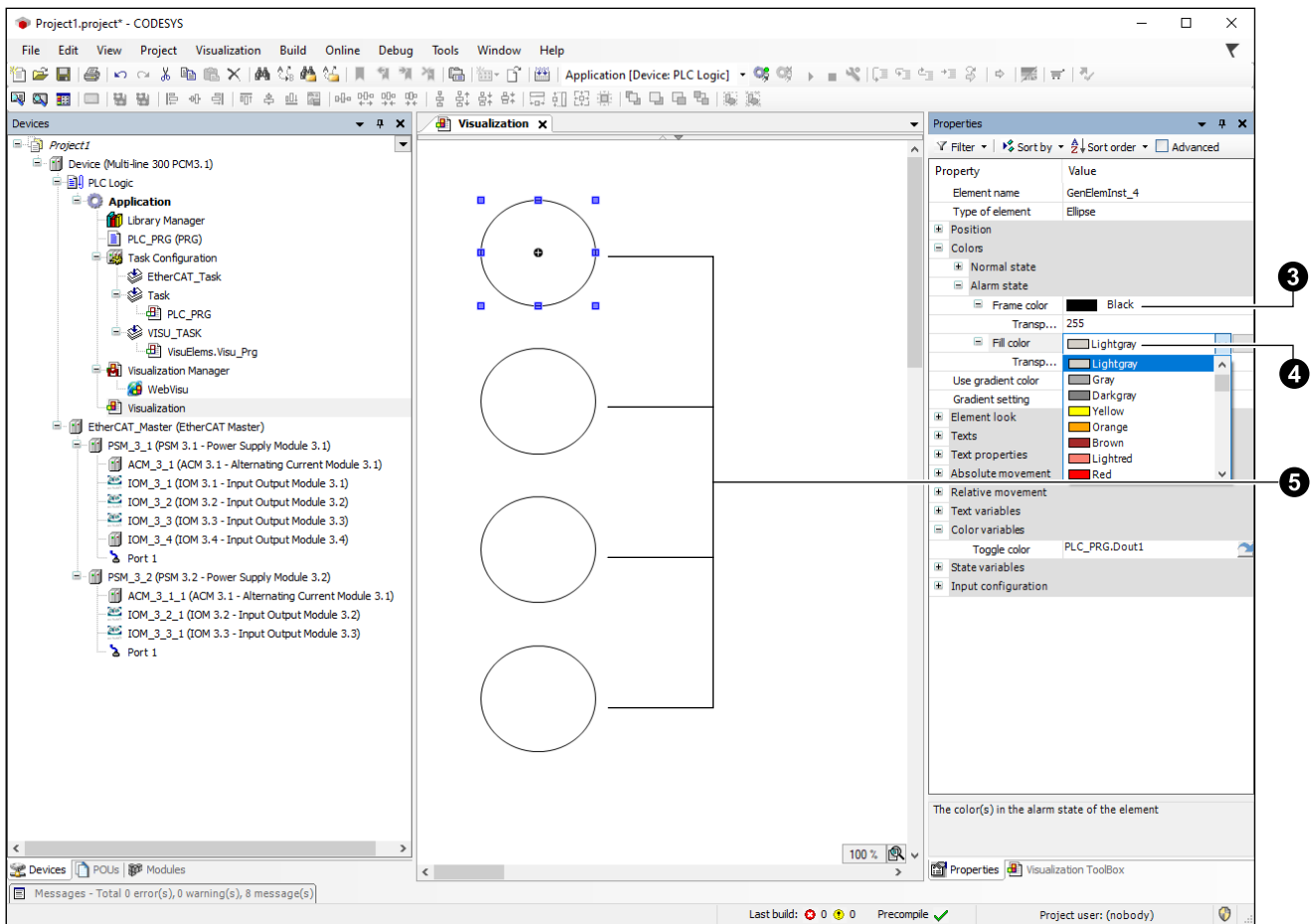


4.13.1 Drawing visualization (example)

1. Draw an ellipse in the Visualization field.
2. Select **Properties > Color variation > Toggle Color** to link the ellipse to a variable.



3. Set **Properties > Colors > Alarmstate > Frame color** to Black.
4. Set **Properties > Colors > Alarmstate > Fill color** to Grey.
5. Repeat 1 to 4 (or copy-paste the ellipse) 3 times.



6. Use **Toggle Color** to change the new variables to other outputs.
7. Add a counter field (rectangle).

Project1.project* - CODESYS

FileEditViewProjectVisualizationBuildOnlineDebugToolsWindowHelp

Project1

Device (Multi-line 300 PCM3.1)

PLC Logic

Application

Library Manager
PLC_PRG (PRG)
Task Configuration
EtherCAT_Task
Task
PLC_PRG
VISU_TASK
VisuElems.Visu_Prg
Visualization Manager
WebVisu
Visualization

EtherCAT_Master (EtherCAT Master)

PSM_3_1 (PSM 3.1 - Power Supply Module 3.1)

ACM_3_1 (ACM 3.1 - Alternating Current Module 3.1)
IOM_3_1 (IOM 3.1 - Input Output Module 3.1)
IOM_3_2 (IOM 3.2 - Input Output Module 3.2)
IOM_3_3 (IOM 3.3 - Input Output Module 3.3)
IOM_3_4 (IOM 3.4 - Input Output Module 3.4)

Port 1

PSM_3_2 (PSM 3.2 - Power Supply Module 3.2)

ACM_3_1_1 (ACM 3.1 - Alternating Current Module 3.1)
IOM_3_2_1 (IOM 3.2 - Input Output Module 3.2)
IOM_3_3_1 (IOM 3.3 - Input Output Module 3.3)

Port 1

Visualization

Counter: %i

Properties

Filter

Sort by

Sort order

Advanced

Property

Value

Element name

GenElemInst_17

Type of element

Rectangle

Position

Colors

Normal state

Frame color

Baseelementalarmframecolor

Fill color

Baseelementalarmfillcolor

Use gradient color

Gradient setting

linear, Black, White

Element look

Texts

Counter: %i

Text

Counter: %i

Tooltip

Text properties

Horizontal align...

Centered

Vertical alignment

Centered

Text format

Default

Font

Default

Font color

Fontcolor

Absolute movement

Relative movement

Text variables

Text variable

PLC_PRG.cnt

Tooltip variable

Color variables

PLC_PRG.cnt

Toggle color

<toggle/tap variable>

State variables

Invisible

Deactivate inputs

Input configuration

Variables to be displayed within the text or tooltip of this element

100 %

Messages - Total 0 error(s), 0 warning(s), 8 message(s)

Last build:

0 0 0

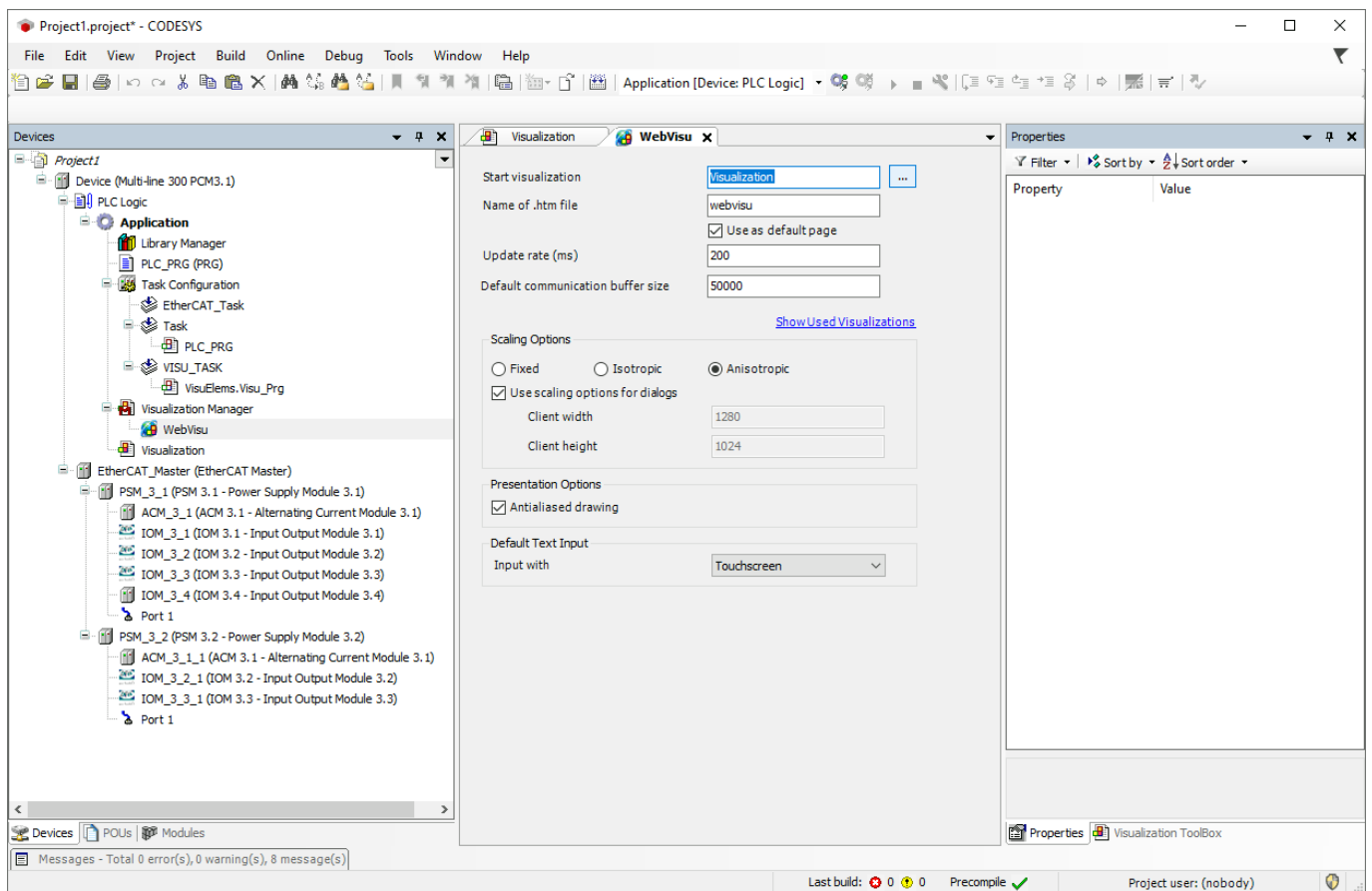
Precompile

Project user: (nobody)

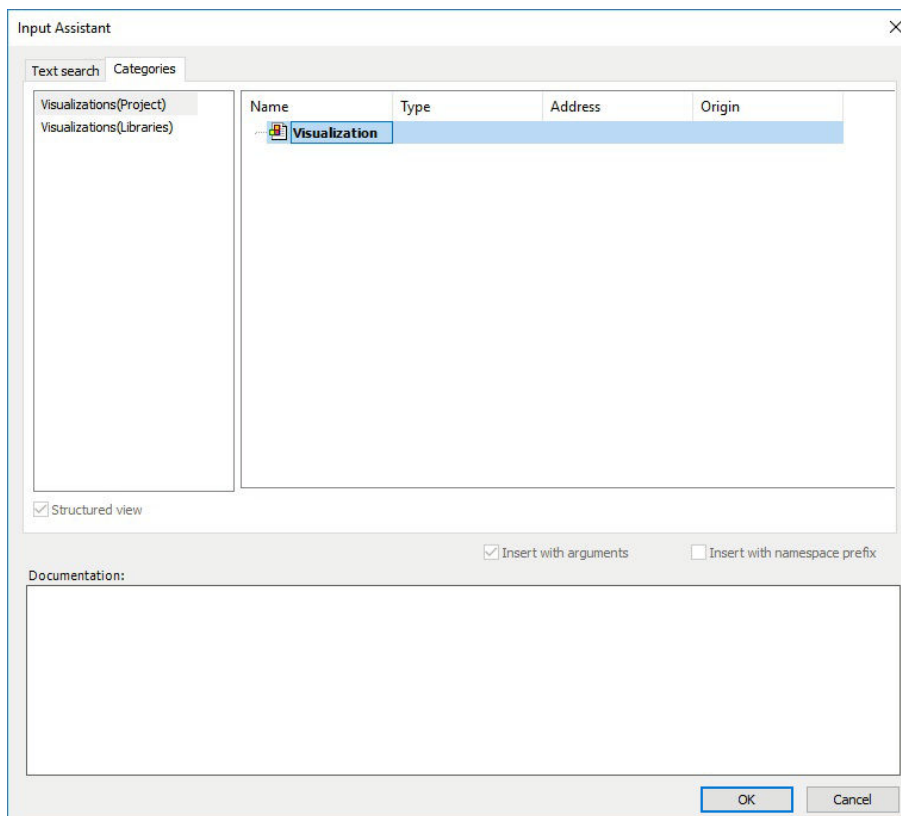
7

4.13.2 Set main visualization

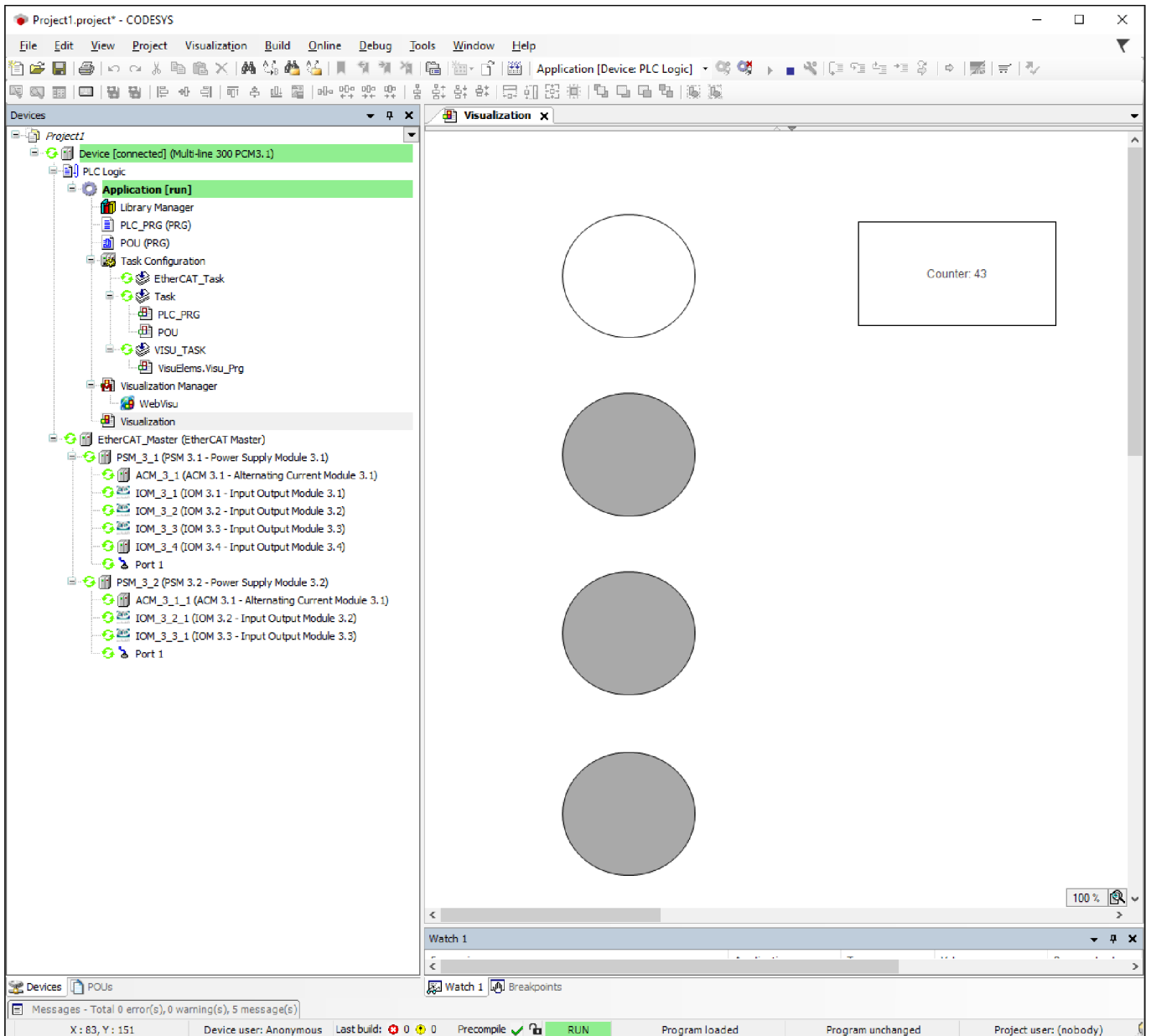
1. Select the **WebVisualization** tab.



2. In the Input Assistant window, select **Visualization**.



3. Select **OK**.
4. Login and run the program.
5. Select Visualization to view the first page.



4.13.3 View webvisualization or remote visualization

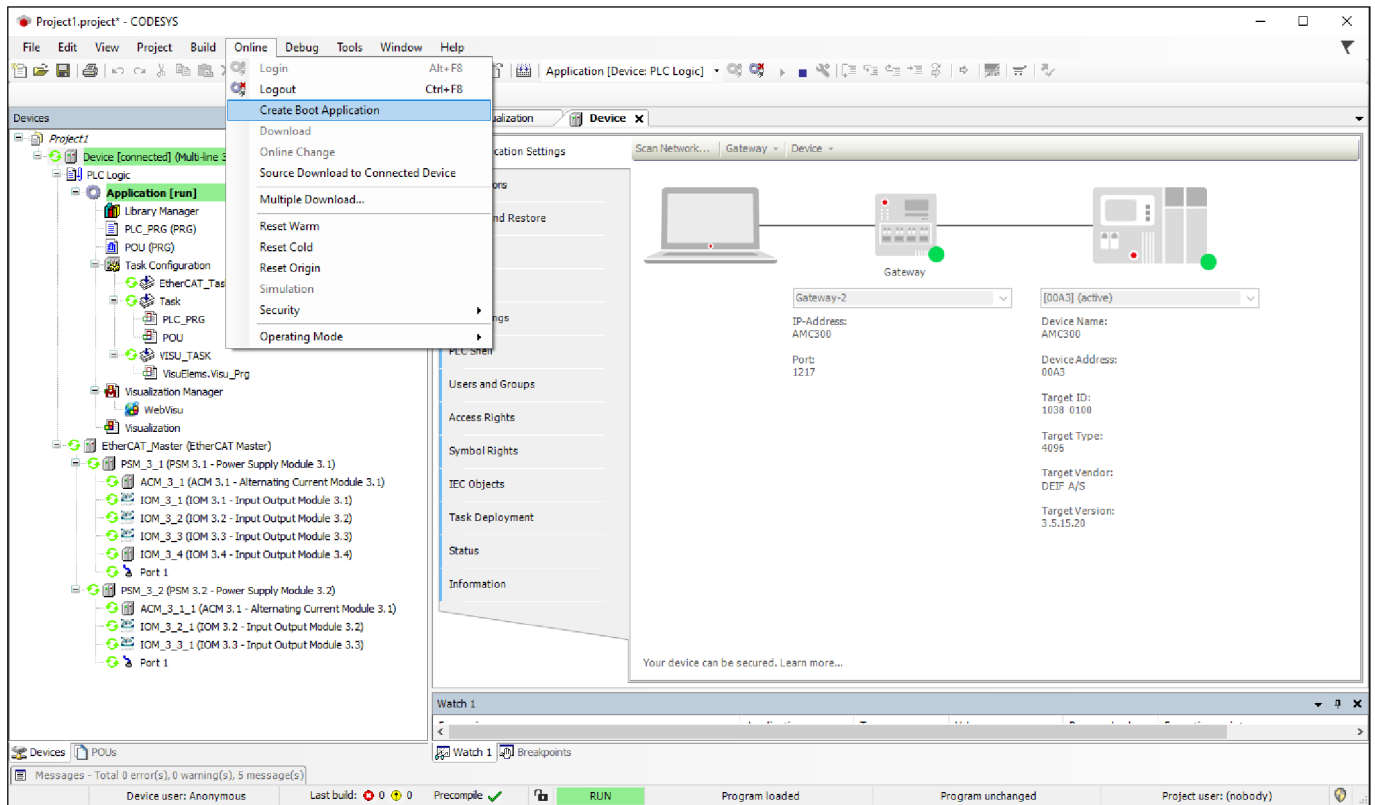
To see the webvisualization go to either

- [http://\[hostname or ip\]:8000/webvisu.htm](http://[hostname or ip]:8000/webvisu.htm) (for example, <http://amc300.local:8000/webvisu.htm>)
- (Please note : the port is to be changed to port 8080 in later software versions)
- via secure http to [https://\[hostname or ip\]:8443/webvisu.htm](https://[hostname or ip]:8443/webvisu.htm) (for example, <https://amc300.local:8443/>)

4.14 Create a boot project

To make the AMC 300 start with the application at power up, you can create a boot project in CODESYS.

1. Login to the AMC 300 via **Online > Login**.
2. Select **Online > Create boot application**.

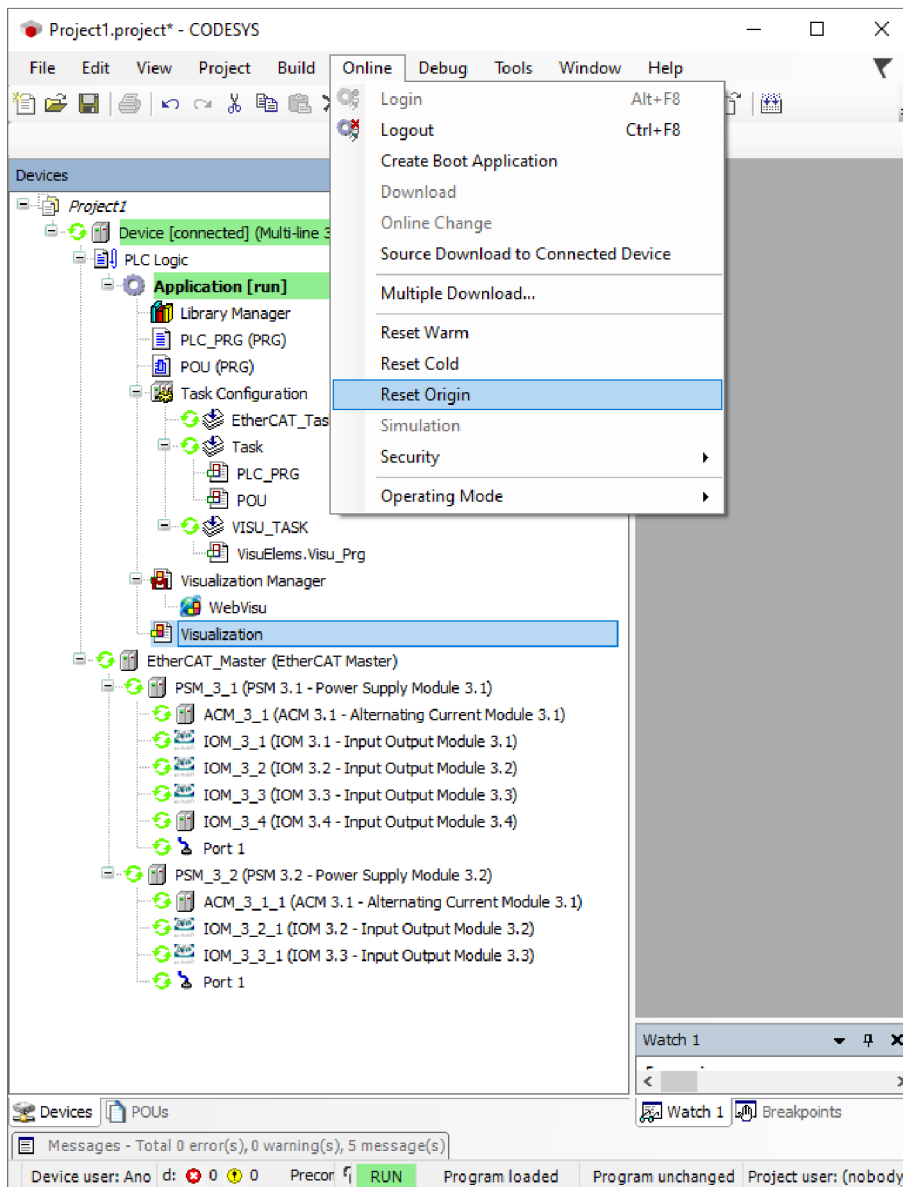


3. The boot project files are created under
 - /app/codesysapp/PlcLogic/Application
 - /app/codesysapp/PlcLogic/visu
4. Reboot the AMC 300.

Remove a boot project

Remove a boot project and clean all the application files in /app/codesysapp/PlcLogic/Application and /app/codesysapp/PlcLogic/visu folders.

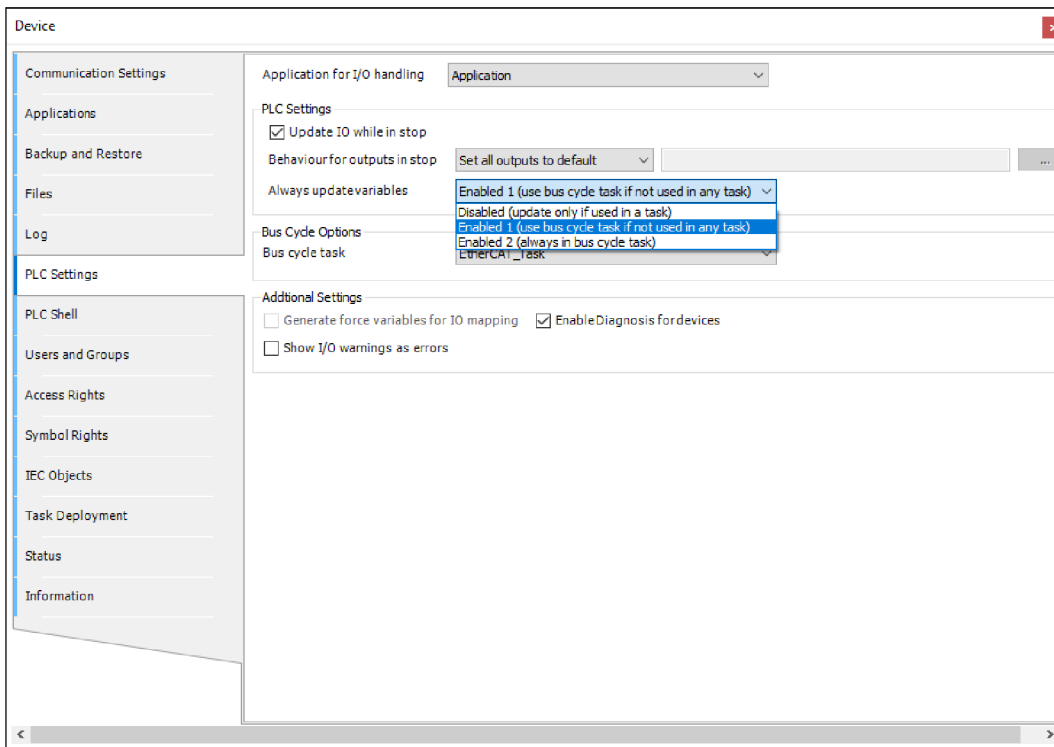
1. Login to the AMC 300 via **Online > Login**.
2. Select **Online > Reset origin**.



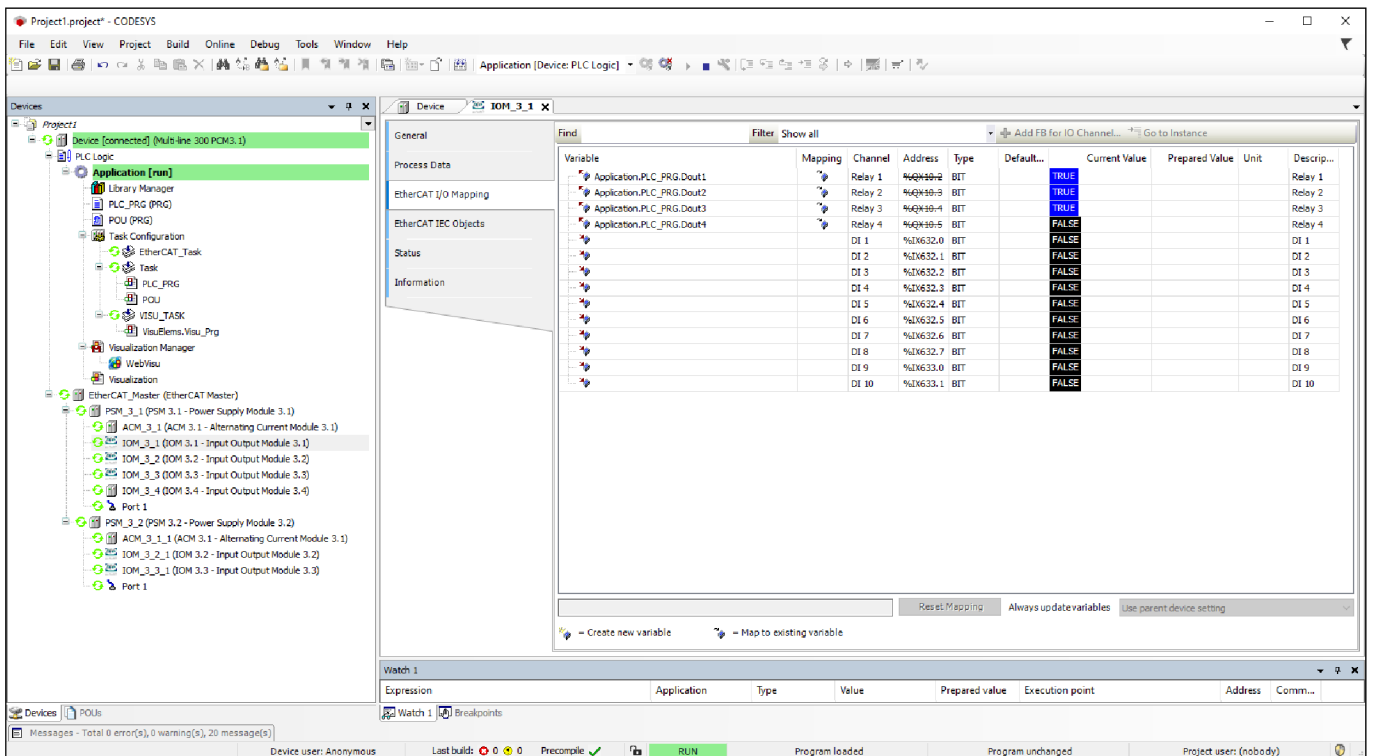
4.15 Manually force digital outputs for system testing

To manually force the digital outputs, for example for system testing, you must create a new empty project (see section **Create a new project**).

1. Scan for devices.
2. Add devices.
3. Select **AMC_300_PCM3-1 > PLC Settings**.
4. Check the box **Update IO while in stop**.
5. In the **Always update variables** drop-down list, select **Enable 1 (use bus cycle task if not used in any task)**.



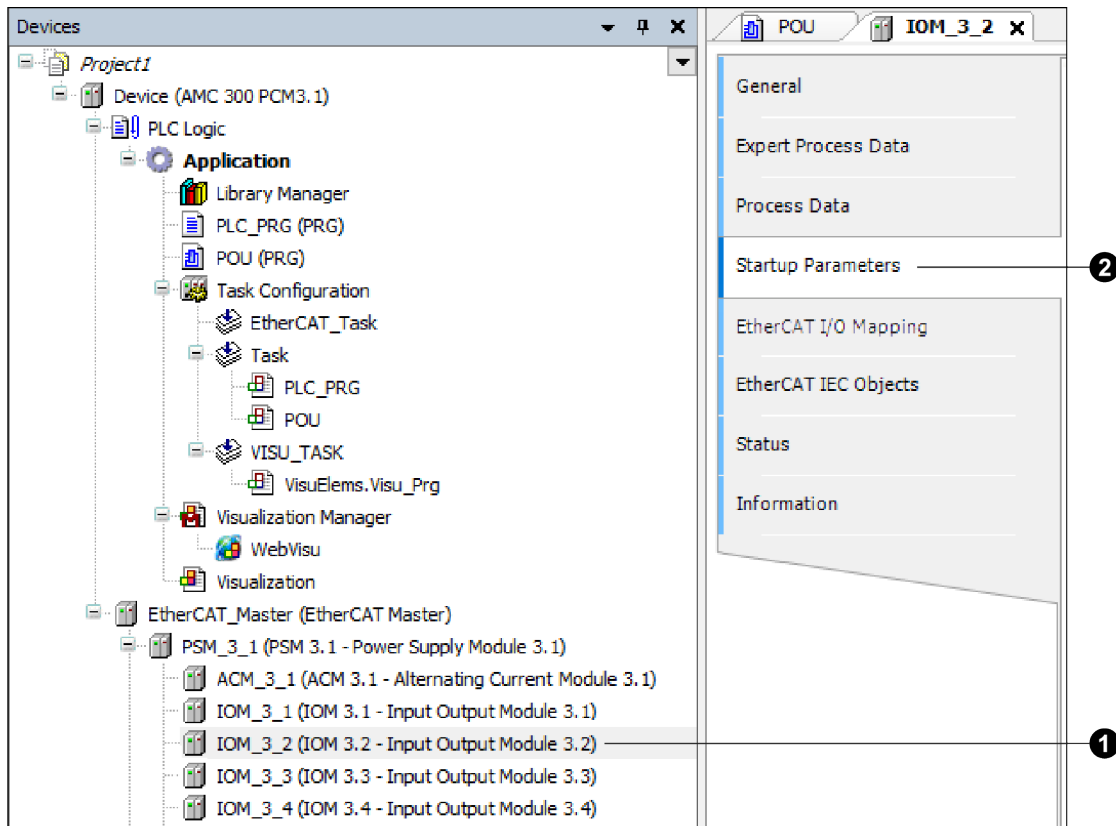
6. In the **Bus cycle task** drop-down list, select **EtherCAT_Task**.
7. Select **AMC_300_PCM3.1 > Application [run]**.
8. Under a module tab, select **EtherCAT I/O Mapping** to see the values of all inputs.
9. Double-click **Prepared value** for the value you wish to change.



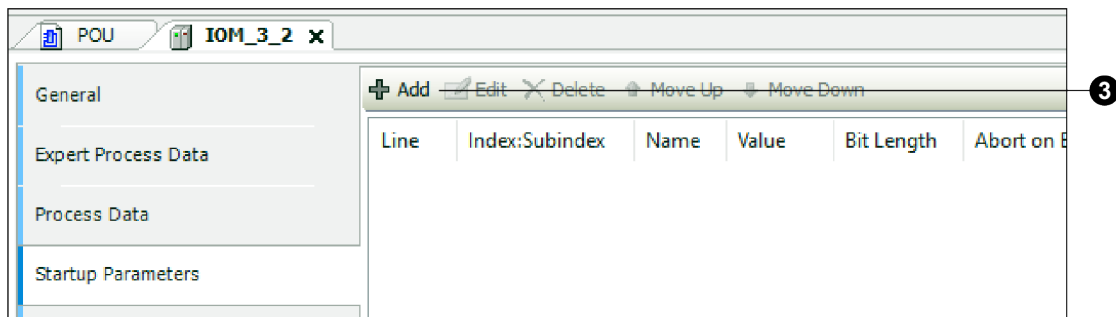
10. Select **F7** to force the new value.
11. Repeat #6 to #8 for other modules.

5. Configure Multi Inputs/Outputs

1. Select the relevant I/O module (example, IOM3.2).
2. Select *Startup parameters*.



3. Select *Add*.



4. Select the setup parameters for an analogue output (example, MultiOutput_4).

Select Item from Object Directory

Index:Subindex	Name	Flags	Type	Default
16#7202:16#00	MultiOutput_2			
16#7203:16#00	MultiOutput_3			
16#7204:16#00	MultiOutput_4			
16#8201:16#00	MultiOutput_1_Configuration			
16#8202:16#00	MultiOutput_2_Configuration			
16#8203:16#00	MultiOutput_3_Configuration			
16#8204:16#00	MultiOutput_4_Configuration			
16#01	Output Enable	RW	INT	0
16#02	Mode	RW	INT	0
16#03	Frequency	RW	REAL	0
16#04	Low	RW	REAL	0
16#05	High	RW	REAL	0
16#06	PWMVoltageLevel	RW	REAL	6
16#82F1:16#00	MultiOutput_1_Calibration			
16#82F2:16#00	MultiOutput_2_Calibration			
16#82F3:16#00	MultiOutput_3_Calibration			

Name:

Index: 16# Bit length:

SubIndex: 16# Value:

☐ Byte array

OK Cancel

- a. Output Enable
b. Mode
c. Low
d. High

5. In the Value field, set the values for the MultiOutput Startup Parameters.

Example: Multi functional output configured as a 4-20 mA analogue current output.

IOH_3_2

General Expert Process Data Process Data Startup Parameters EtherCAT I/O Mapping EtherCAT IEC Objects Status Information

Line	Index:Subindex	Name	Value	Bit Length	Abort on Error	Jump to Line on Error	Next Line	Comment
1	16#8204:16#01	Output Enable	1	16	☐	☐	0	
2	16#8204:16#02	Mode	2	16	☐	☐	0	
3	16#8204:16#04	Low	4.0	32	☐	☐	0	
4	16#8204:16#05	High	20.0	32	☐	☐	0	
5	16#8301:16#01	Mode	2	16	☐	☐	0	
6	16#8301:16#02	Low	4.0	32	☐	☐	0	
7	16#8301:16#03	High	20.0	32	☐	☐	0	

- a
b
c
d

Parameter	Value	Note
a. Output Enable	0 = Output not active 1 = Output active	
b. Mode	0 = Unknown 15 = Voltage out mode 16 = Current out mode	
c. Low	4.0 or -10.0	Lower measured limit. Examples: • 4-20 mA • ± 10 V
d. High	20.0 or 10.0	Upper measured limit.

6. Configure the start parameters for a multi functional input (example, MultiInput_1).

Select Item from Object Directory

Index:Subindex	Name	Flags	Type	Default
16#8204:16#00	MultiOutput_4_Configuration			
16#82F1:16#00	MultiOutput_1_Calibration			
16#82F2:16#00	MultiOutput_2_Calibration			
16#82F3:16#00	MultiOutput_3_Calibration			
16#82F4:16#00	MultiOutput_4_Calibration			
16#8300:16#00	Multi Input General Configuration			
16#8301:16#00	MultiInput_1_Configuration			
16#8301:16#01	Mode	RW	UINT	0
16#8301:16#02	Low	RW	REAL	0
16#8301:16#03	High	RW	REAL	0
16#8301:16#04	Settling Time	RW	UINT	0
16#8301:16#05	Sample Rate	RW	UINT	0
16#8302:16#00	MultiInput_2_Configuration			
16#8303:16#00	MultiInput_3_Configuration			
16#8304:16#00	MultiInput_4_Configuration			
16#83F1:16#00	MULTIN_CAL_1_Calibration Values			

Name

Index: 16# 0 Bit length 8

SubIndex: 16# 0 Value 0

☐ Byte array

OK

Cancel

e. Mode
f. Low
g. High

7. In the Value field, set the values for the Multilinput Startup Parameters.

Example: Multi functional output configured as a 4-20 mA analogue current output.

IOH_3.2

General

Expert Process Data

Process Data

Startup Parameters

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Add Edit Delete Move Up Move Down

Line	Index:Subindex	Name	Value	Bit Length	Abort on Error	Jump to Line on Error	Next Line	Comment
1	16#8204:16#01	Output Enable	1	16	☐	☐	0	
2	16#8204:16#02	Mode	2	16	☐	☐	0	
3	16#8204:16#04	Low	4.0	32	☐	☐	0	
4	16#8204:16#05	High	20.0	32	☐	☐	0	
5	16#8301:16#01	Mode	2	16	☐	☐	0	
6	16#8301:16#02	Low	4.0	32	☐	☐	0	
7	16#8301:16#03	High	20.0	32	☐	☐	0	

e. Mode
f. Low
g. High

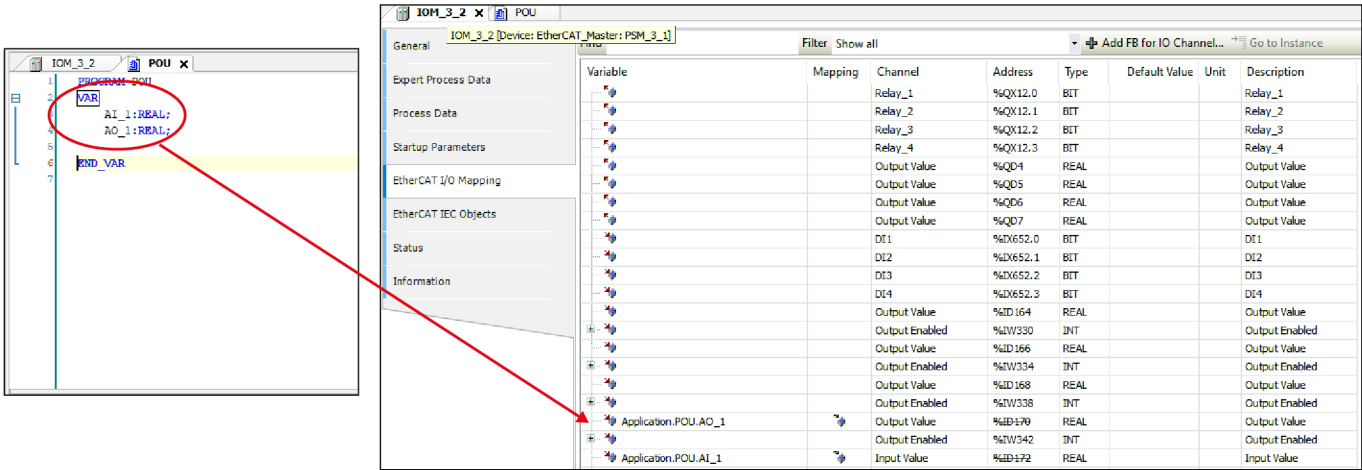
Parameter	Value	Note
e. Mode	0 = Unknown 1 = Voltage mode 2 = Current mode 3 = resistance mode 4 = Temperature mode 5 = Dry Contact mode	
f. Low	4.0 or -10.0	Lower measured limit. Examples: 4-20 mA ± 10 V
g. High	20.0 or 10.0	Upper measured limit.

Multinput error codes

Parameter	Value
MI error	-10000 = Wire break
	-9999 = Input error
	-9998 = Under voltage
	-9997 = Over voltage
	-9996 = Under current
	-9995 = Over current
	-9994 = Under frequency
	-9993 = Over frequency
	-9992 = Short circuit
	-9991 = Over load
	-9990 = Unsupported mode
	-9989 = Unsupported range
	-9988 = Unsupported configuration
	-9987 = Invalid calibration

Attach I/Os to variables

I/Os can be attached from the POU tab to variables and used in the application logic.



A simple test is to wire the terminals of the MultiOutput as feedback to the MultiInput.

After download of the application, the MultiOutput analogue value can be forced and seen on the MultiInput analogue input.