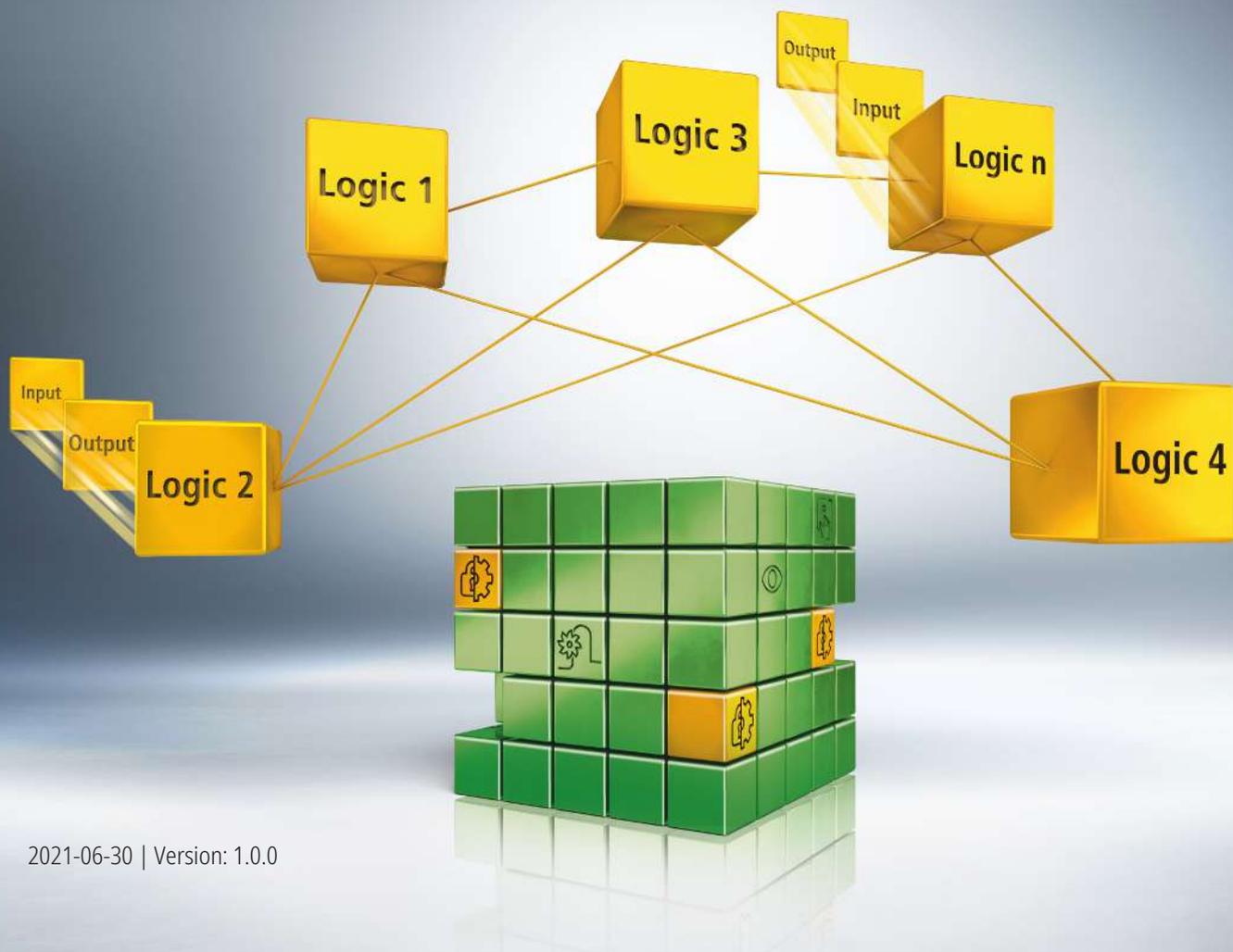


TwinSAFE Tutorial 1 | EN

SafeMotion Wizard

Creating and configuring a Safe Motion project with SLS1



1 Introduction

TwinSAFE includes several innovations that bring more functionality and performance to your safety controller. A major innovation is that the functionality of the safety controller is integrated in each TwinSAFE component. This means that you can, for example, use a TwinSAFE input component both as an input component and the safety control integrated on it to use application-specific pre-processing.

This is tutorial 1 of a tutorial series.

The aim of this tutorial series is to familiarize you with the TwinSAFE innovations using individual examples.

This tutorial is about working with the SafeMotion Wizard.

1.1 Issue statuses

Version	Comment
1.0.0	<ul style="list-style-type: none">• First released version
0.0.1	<ul style="list-style-type: none">• First draft

1.2 Requirements

Meet the following requirements for this tutorial:

- TwinCAT 3 version \geq 3.1.4024.11
- TwinCAT Safety Editor TE9000 \geq 1.2.1.1
- TwinSAFE firmware \geq 03
- AX8000 firmware \geq 0104; with default module ID active

1.3 Starting point

At the starting point of the tutorial

- a standard PLC project exists,
- an EL6910 project exists.

1.4 Demo system

1.4.1 Hardware

The demo system of this tutorial consists of the following hardware:

- CX for EtherCAT communication and the standard PLC controller
- EL6910 as master TwinSAFE Logic
- EL1918 with safe inputs for reading light barrier signals
- Light barrier
- AX8000-x2xx

1.4.2 Desired Safety functionality

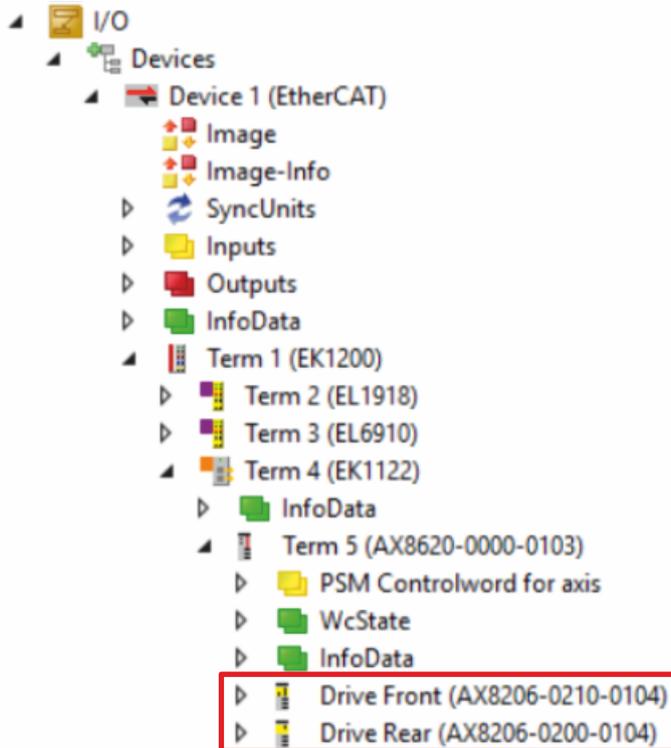
This tutorial describes the realization of the following safety functionalities:

- An interruption of the light barrier triggers SLS1.
- A violation of the speed limit triggers STO.

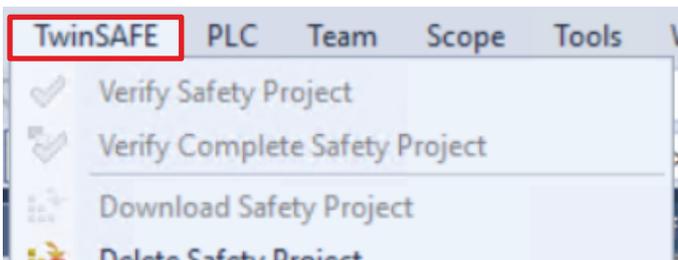
2 Implementation

2.1 Download Safe Motion project

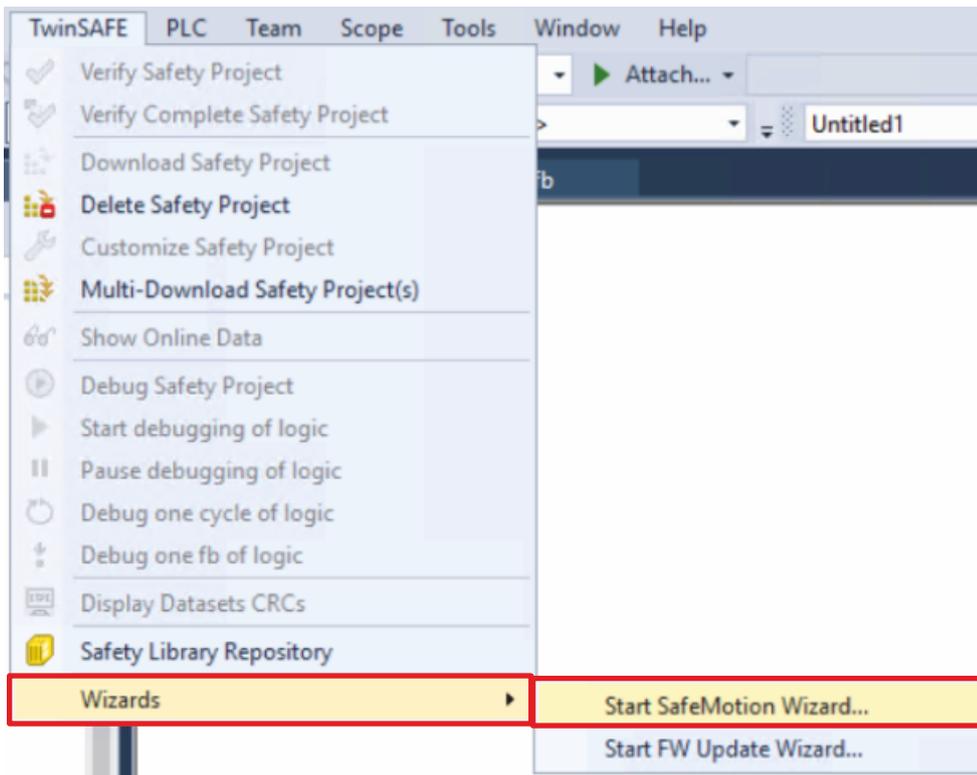
Starting point of the tutorial is an existing TwinCAT3 project with an existing I/O configuration and the corresponding AX8000 entries.



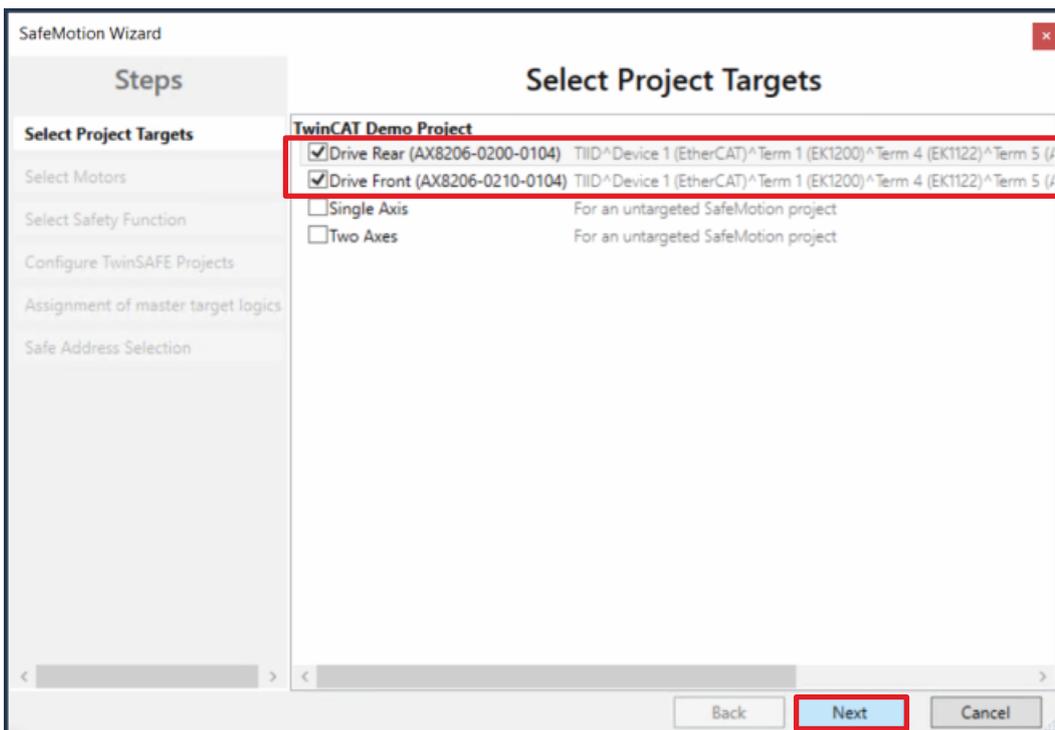
Proceed as follows to create a Safe Motion project with the SafeMotion Wizard:



1. Select the "TwinSAFE" tab.

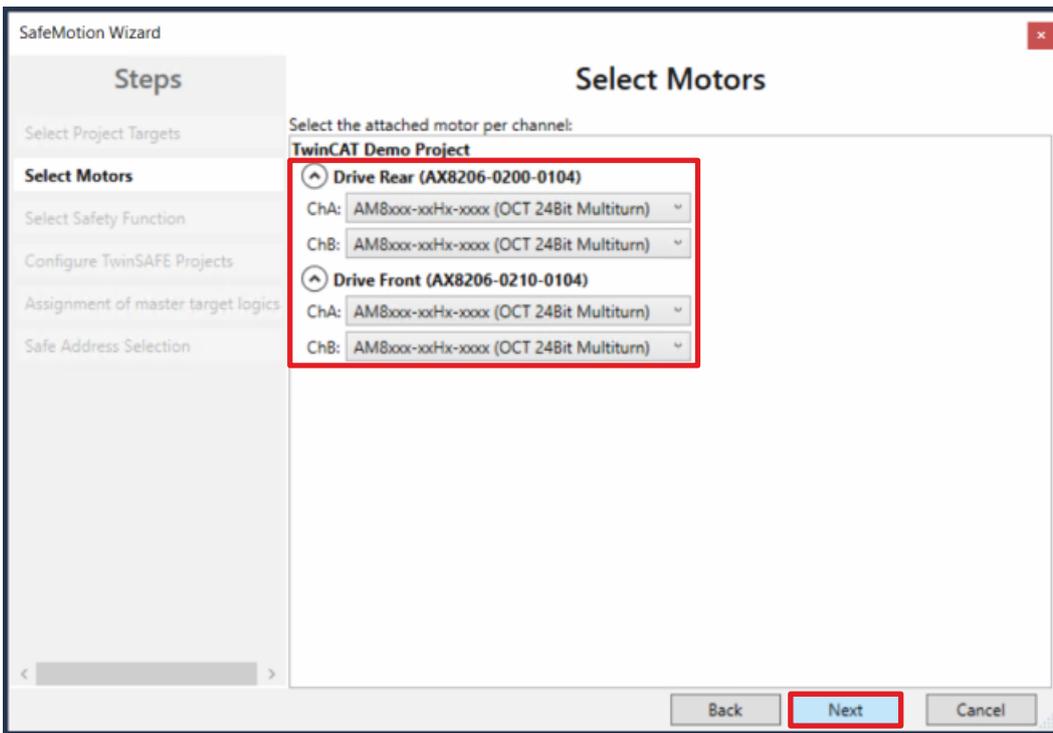


2. Select "Start SafeMotion Wizard..." via the Wizard field



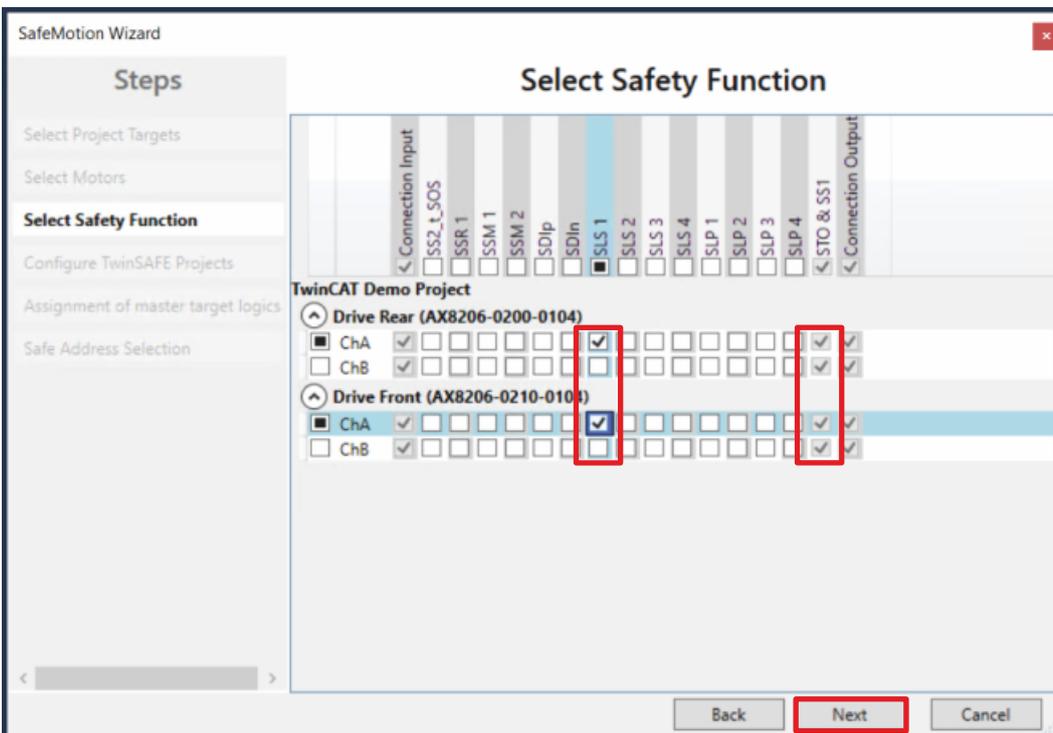
The "Select Project Targets" window opens and shows you an overview of all existing and virtual axes.

3. Select the AX8000 axes
4. Confirm with Next



In the "Select Motors" window, configure the feedback for the individual axes.

5. Select "AM8xxx-xxHx-xxx (OCT 24Bit Multiturn)" for all axes
6. Confirm with Next

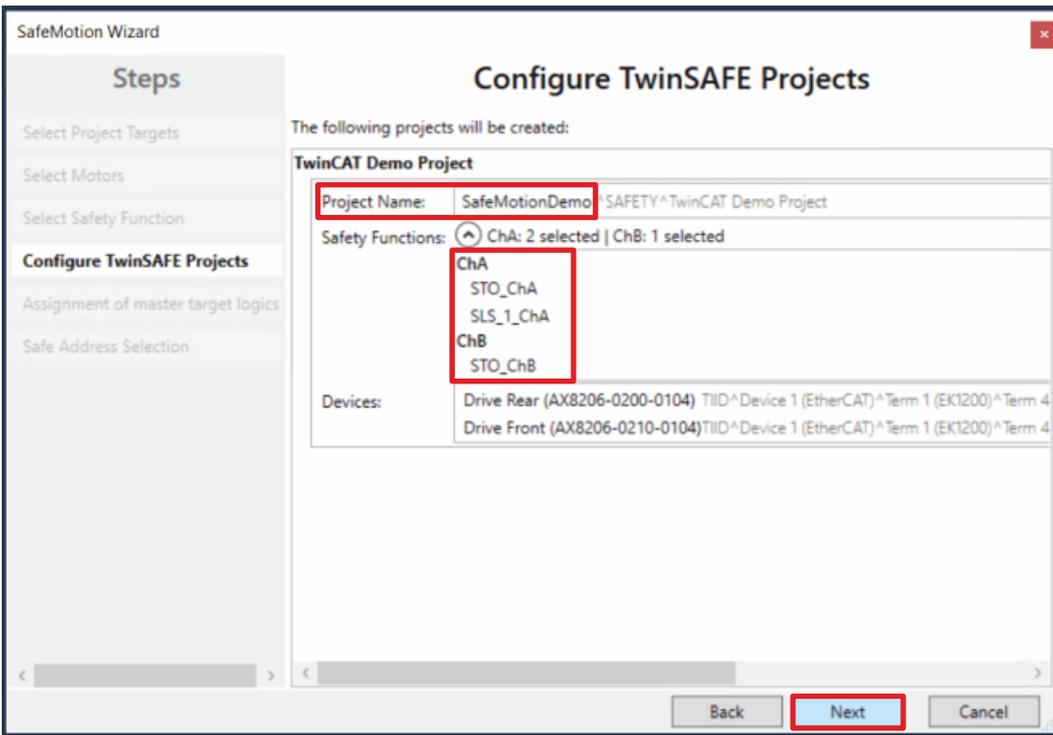


In the "Select Safety Function" window, select the desired safety functions.

7. For the ChA channels of both AX8000s, select the SLS1 safety function

The STO safety function is active as a default setting for all channels.

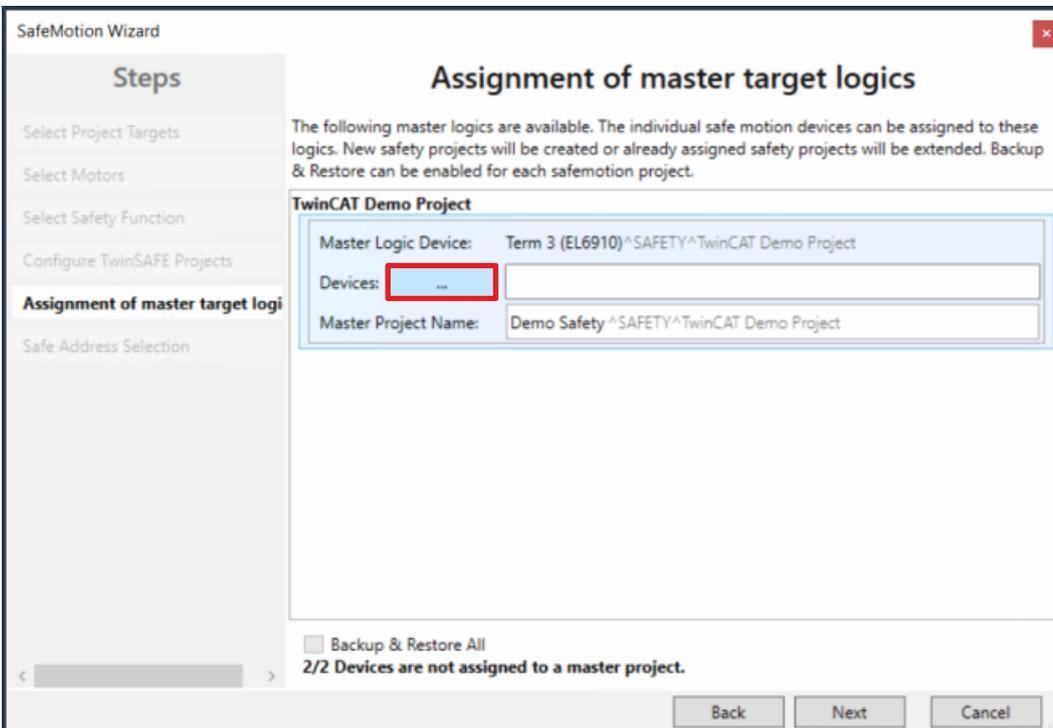
8. Confirm with Next



The "Configure TwinSAFE Projects" window opens. Here you have the option of renaming your Safe Motion project, which is generated for your AX8000s.

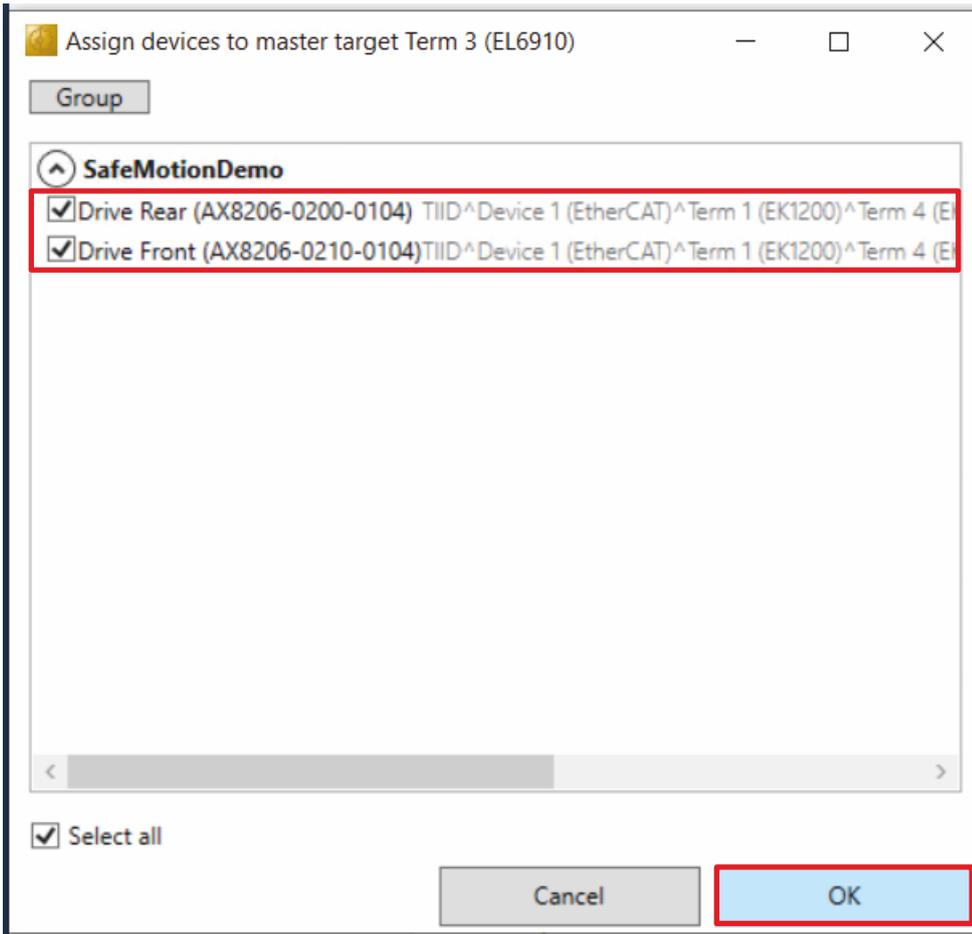
You also get an overview of the safety settings that have been made.

9. Rename project as desired
10. Check the settings
11. Confirm with Next



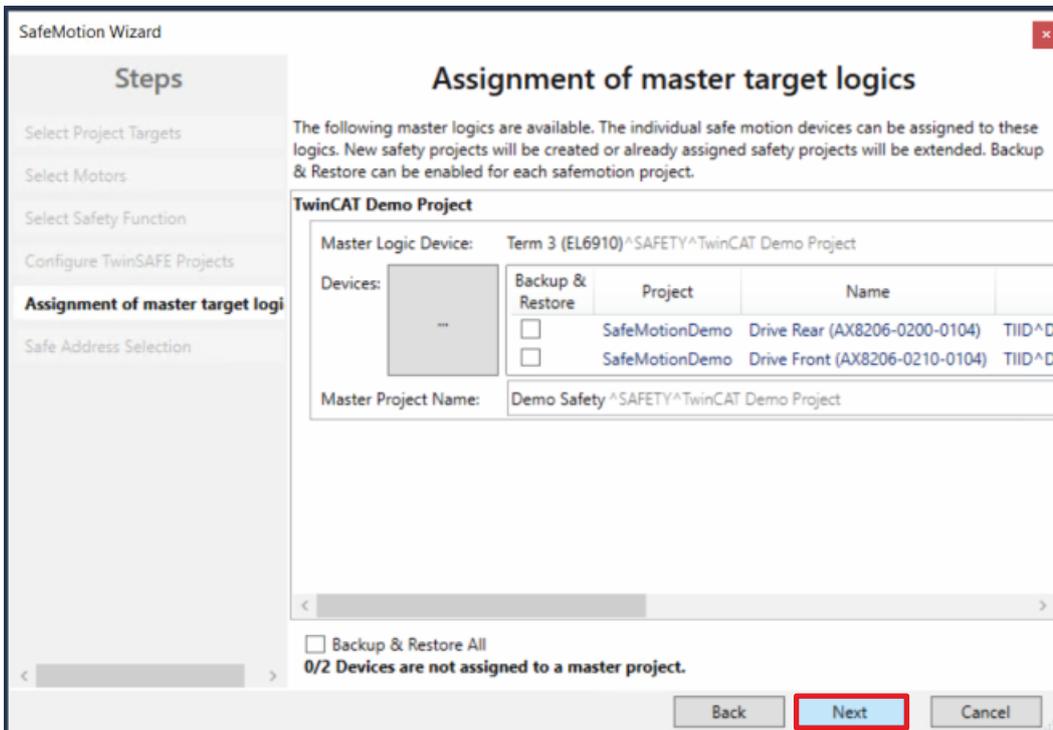
In the next window "Assignment of master target logics" the connection to the EL6910 project is closed, so that your AX8000s can communicate with the EL6910 project. The EL6910 project is automatically found and displayed.

12. Click the button " ... "

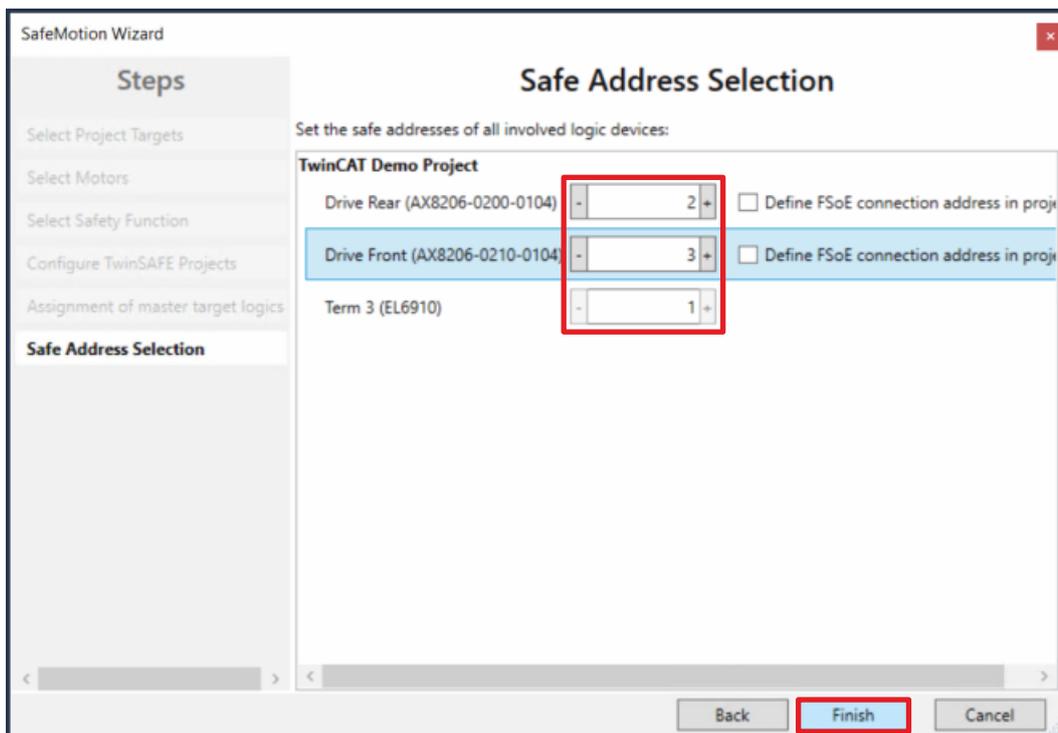


13. Select your AX8000s that you want to connect to the EL6910 project

14. Confirm your selection with OK



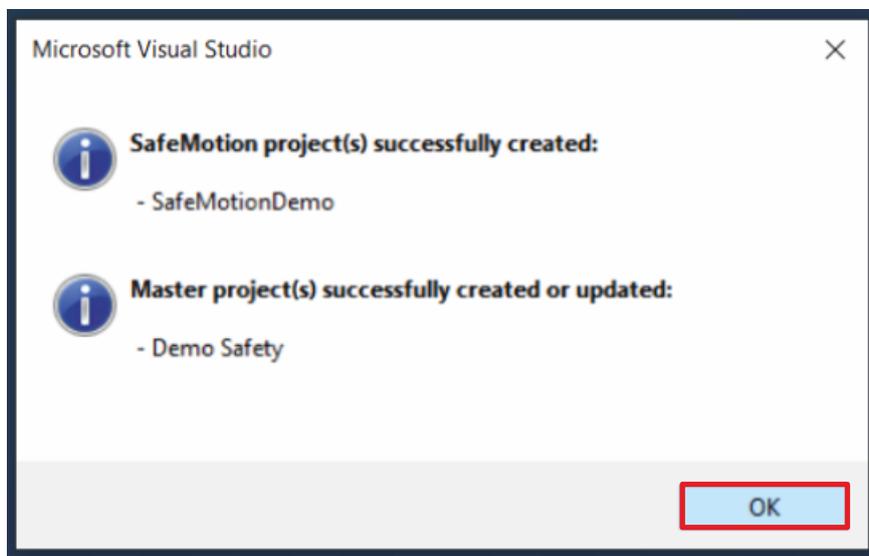
15. Confirm with Next



The "Safe Address Selection" window opens. Here the safe addresses are read out automatically. For virtual axes or axes that cannot be reached, you have the option of configuring the addresses yourself.

16. Close window with Finish

The SafeMotion Wizard configures the projects.

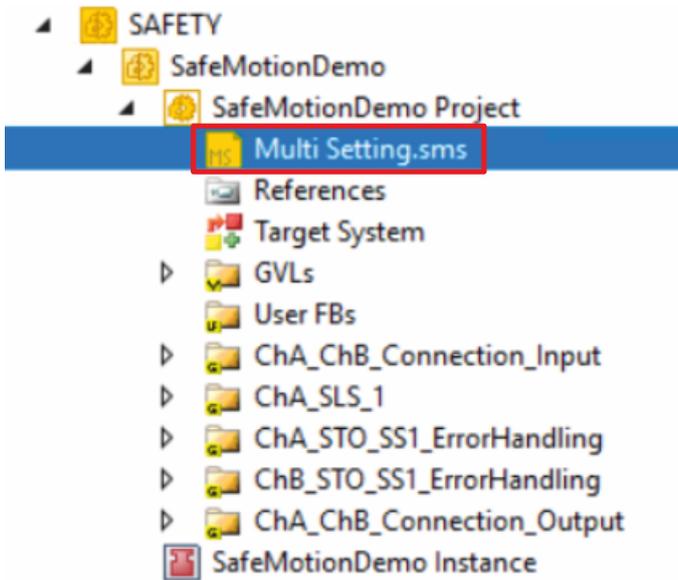


17. Close the window with OK

2.2 Configure SLS1 functionality

After the Safe Motion project has been created for your AX8000s, configuration takes place.

Proceed as follows for this:

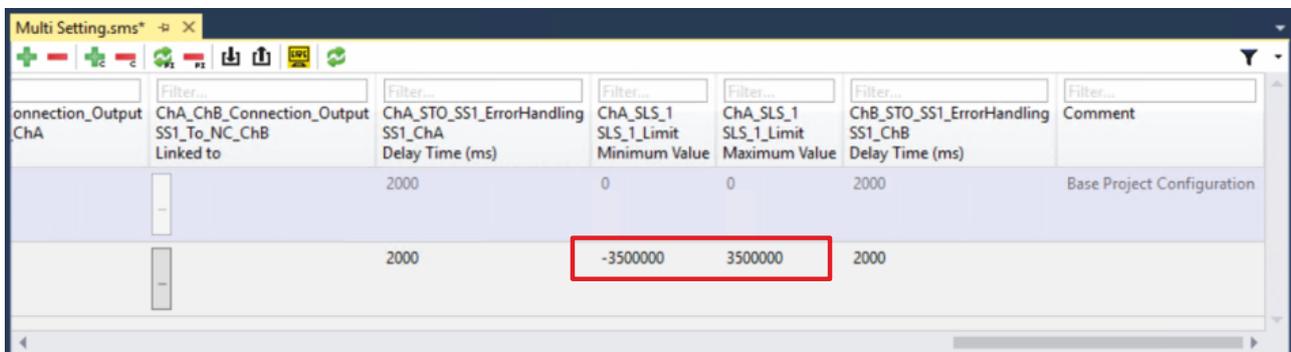


1. Open the Multi Settings file in the Safety project

Enter the required parameters in this file.

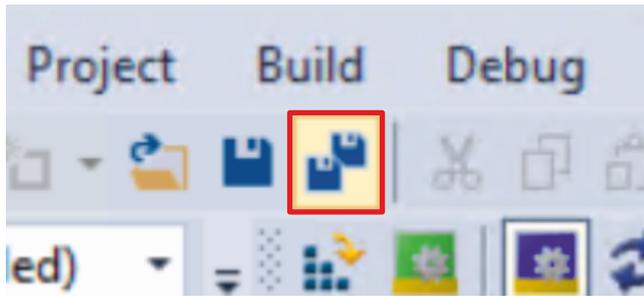


2. Scroll to the right in the table



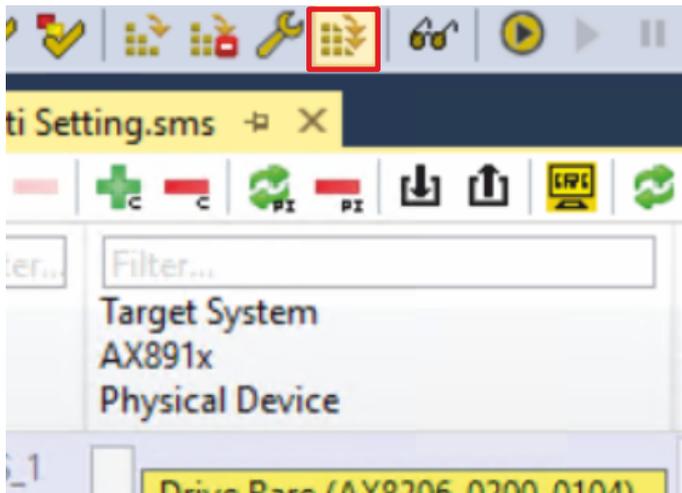
3. Enter the previously determined parameters as minimum value and maximum value for the SLS1 safety function

The SLS1 functionality for your AX8000s is now completely configured.

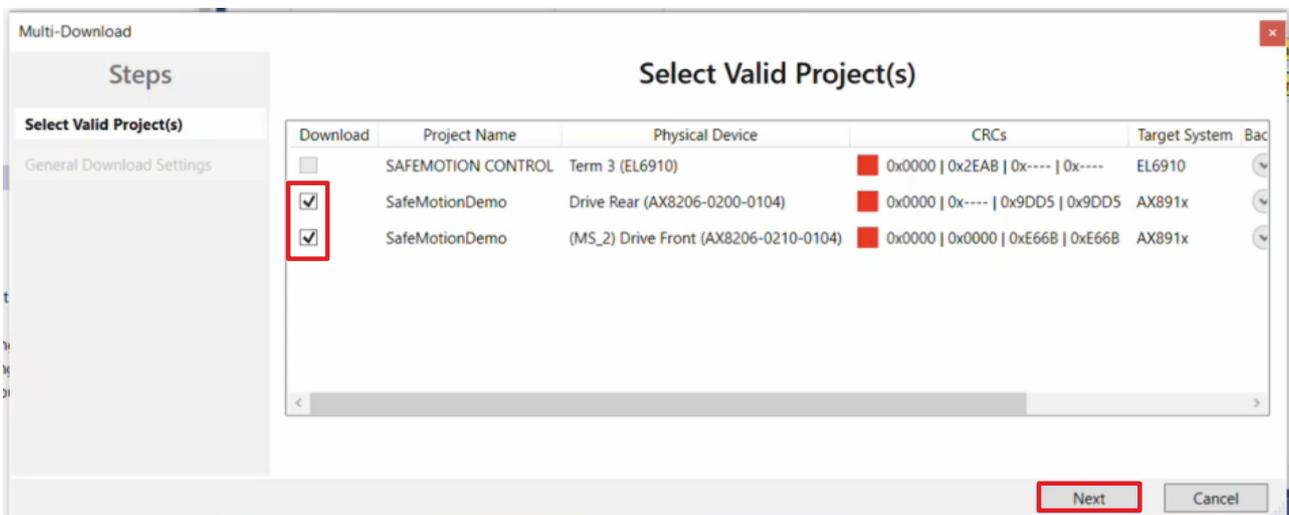


4. Click on "Save all" in the menu bar to save the settings

2.3 Download Safety projects

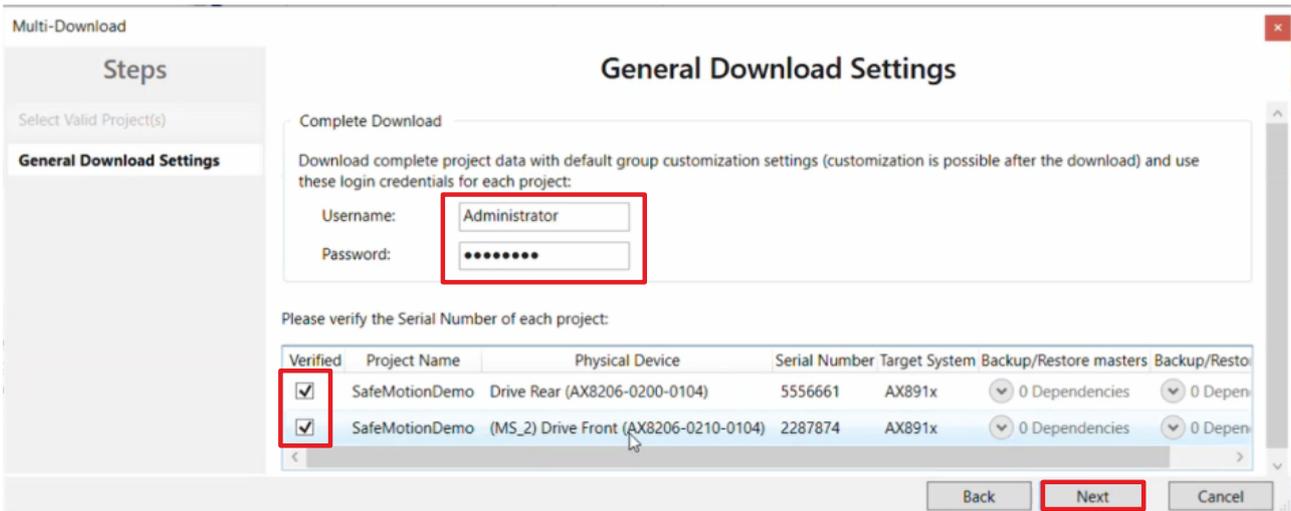


1. Click on "Multi-Download Safety Project(s)"



The "Select Valid Project(s)" window opens. Here you can see which safety projects you can download.

2. Select AX8000 projects
3. Confirm with Next



4. Enter the username and password in the "General Download Settings" window

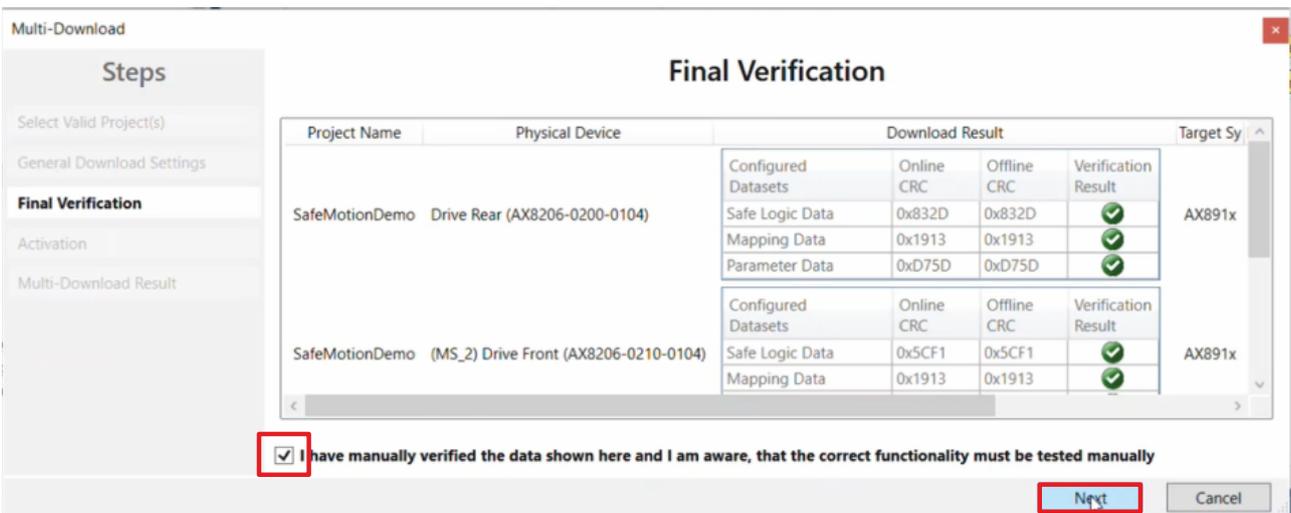
Default username: Administrator

Default password: TwinSAFE

5. Select the safety projects you want to download

6. Confirm selection with Next

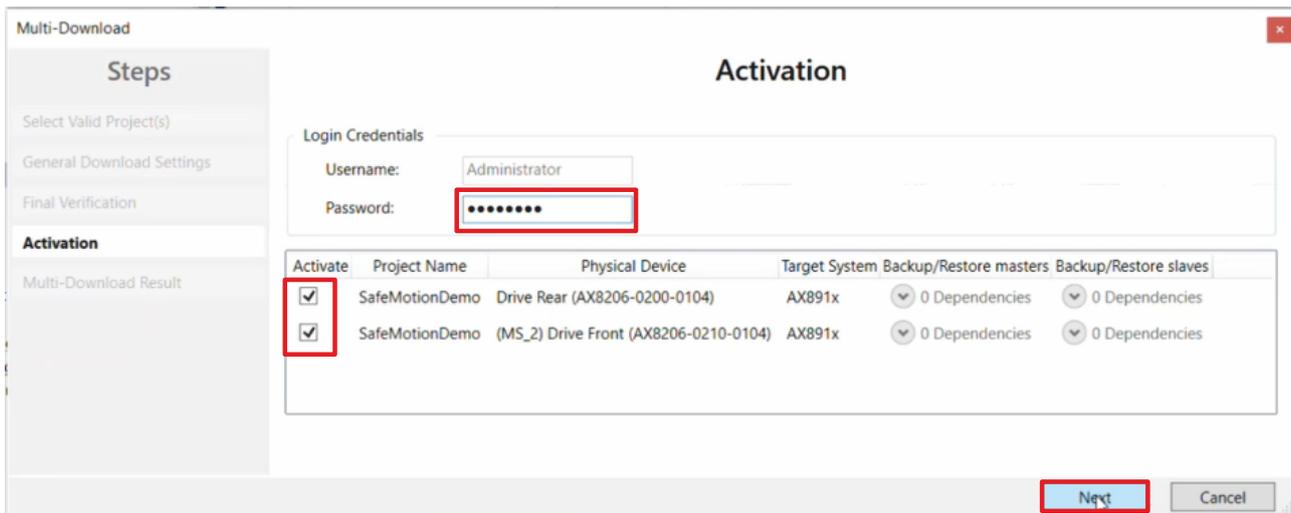
The safety project for the two AX8000s is now converted into the appropriate form and transferred to your AX8000s.



7. Check the CRCs in the "Final Verification" window

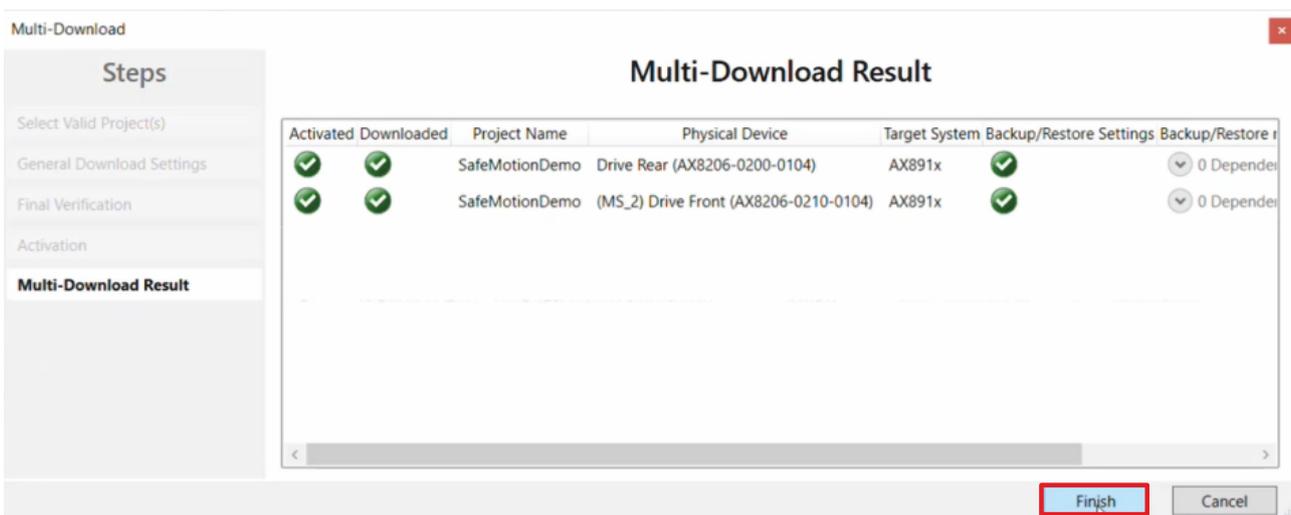
8. If the CRCs match, click on the box to confirm the verification

9. Confirm the window with Next



The "Activation" window opens, in which you activate the safety projects.

10. Enter the default password
11. Check if both safety projects are selected
12. Confirm selection with Next

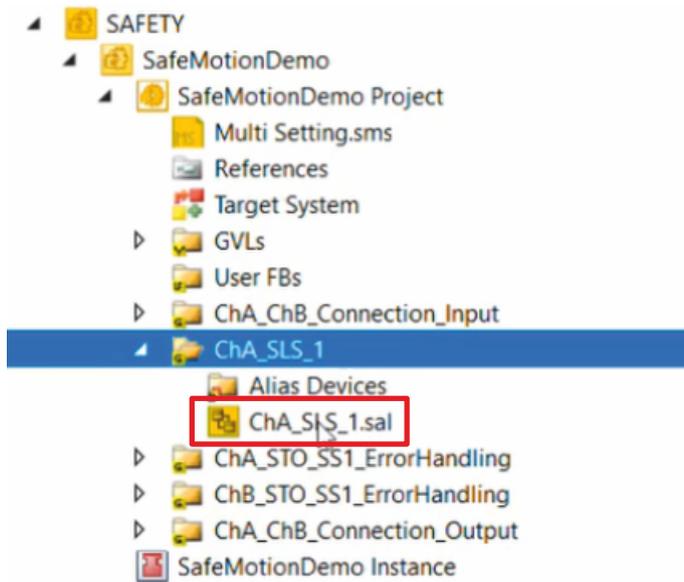


13. Close the window "Multi-Download Result" with Finish

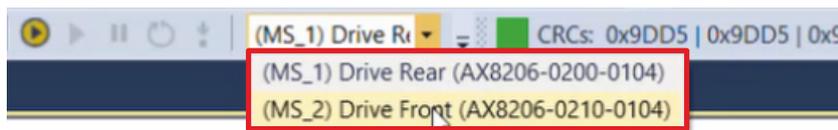
The first commissioning of the SLS1 functionality on the AX8000s is now complete.

2.4 View SLS1 functionality in online view

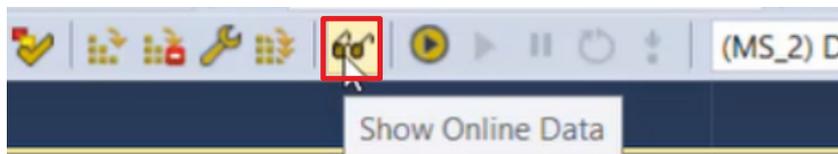
To view the SLS1 functionality in the online view, proceed as follows:



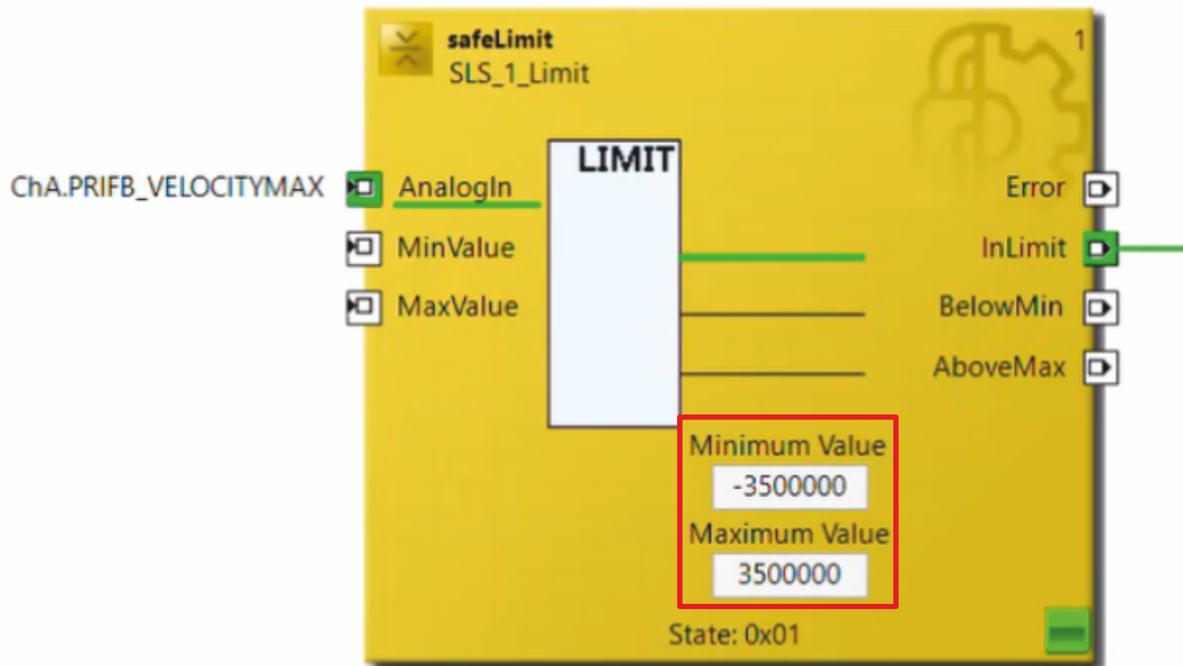
1. In the folder "ChA_SLS_1" open the sal file to view the implementation



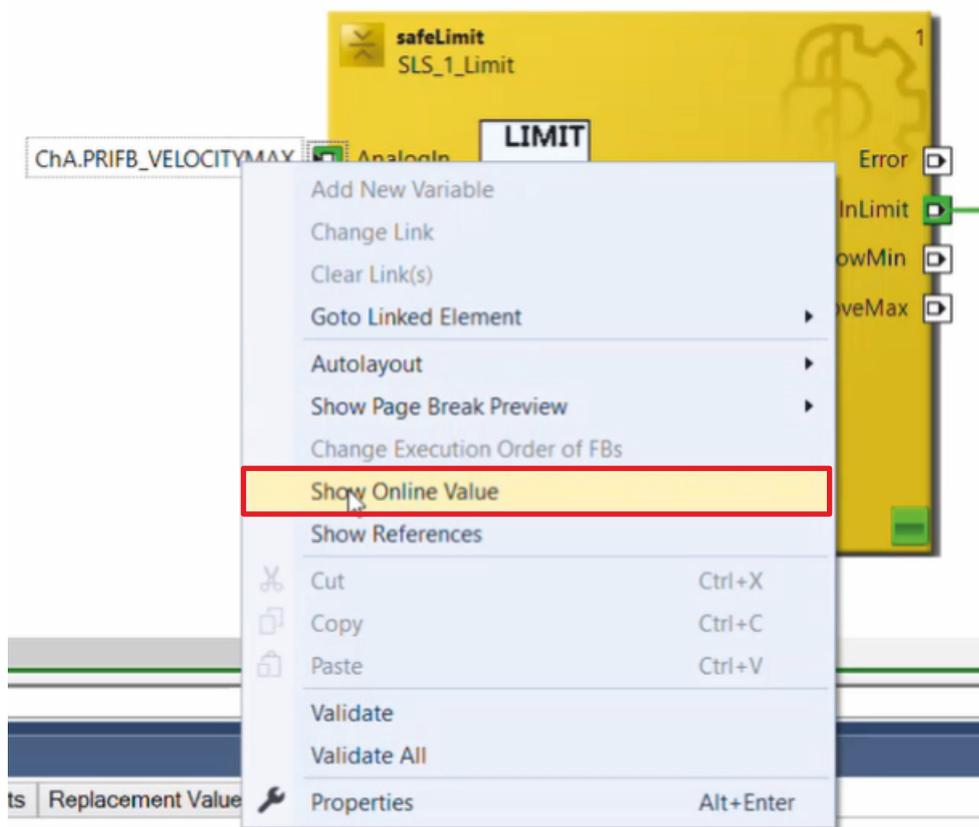
2. Select an AX8000 in the drop-down menu



3. Select the button for "Show Online Data" to activate the online view



In the online view you can see the online values as well as the set minimum value and maximum value for the selected AX8000.



4. Right click on the parameter "ChA_PRIFB_VELOCITYMAX"
5. Select "Show Online Value" to display the online values

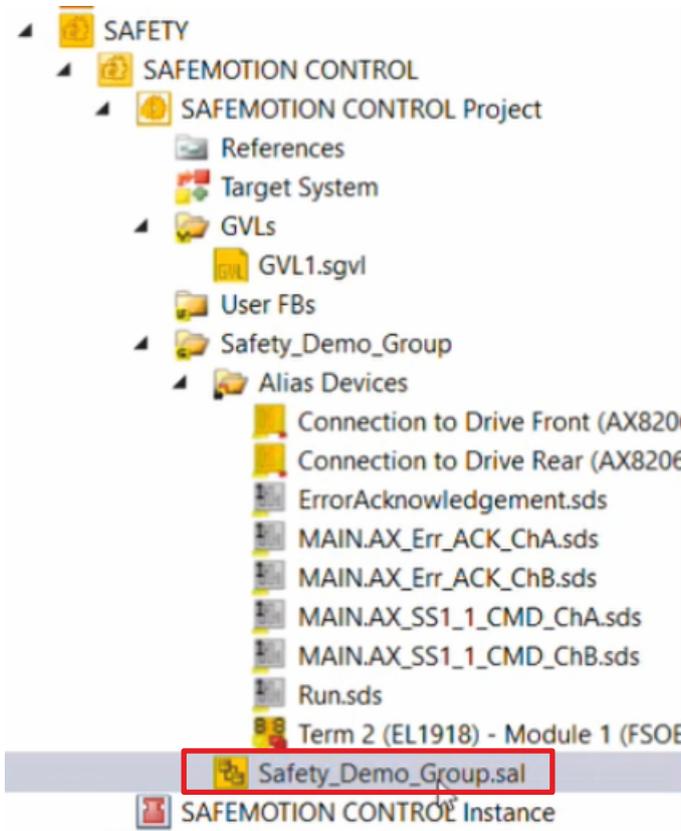
If you deactivate the online view again using the same button you used to activate it (step 3), you will see that the analog value is 0. This is because only the AX8000 project has been downloaded so far. The next chapter contains the connection to the EL6910 project.

2.5 Link projects

This chapter describes the step-by-step procedure for connecting the AX8000 project to the EL6910 project via the parameters.

The SafeMotion Wizard has already created the connections via the Alias Devices.

Proceed as follows:

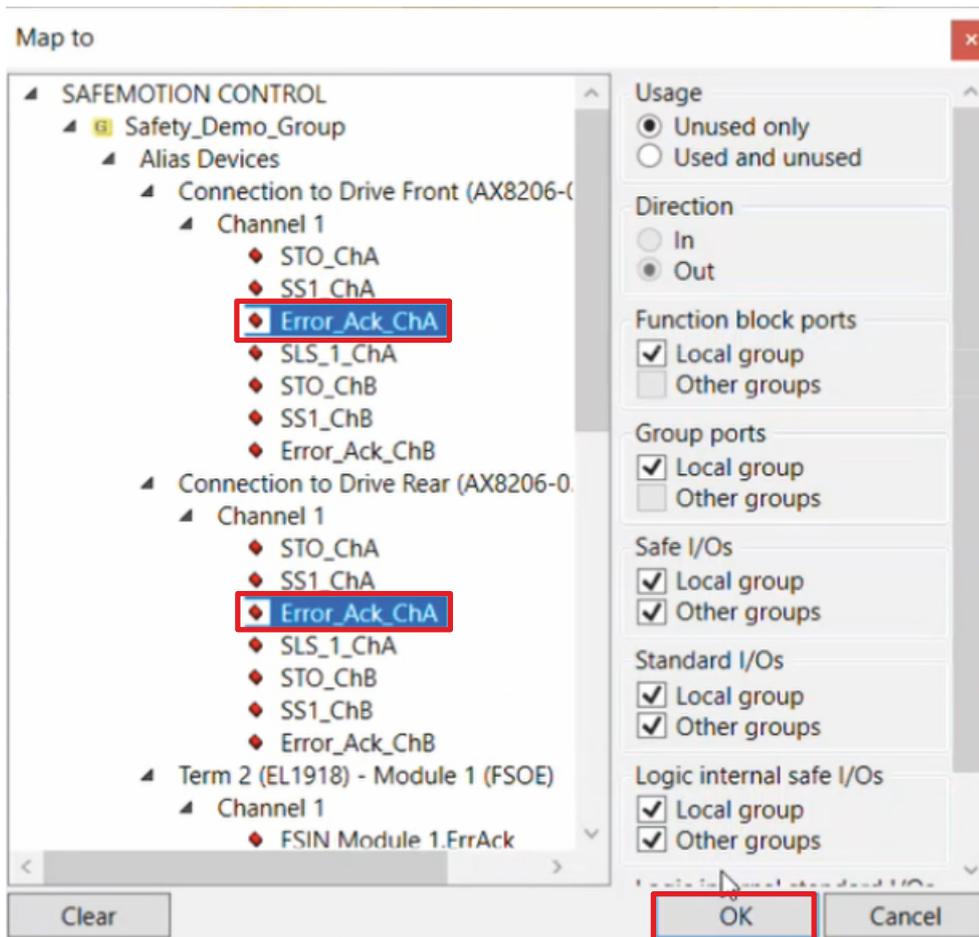


1. Open the sal file in your EL6910 project

In the following you must link the individual signals and parameters in the "Variable Mapping" tab. The procedure is identical for all parameters and is shown here as an example for one parameter using the screenshots.



2. Click the " ..." button for the desired parameter



3. Select the signals for both AX8000s
4. Confirm the window with OK

The following links result for the AX8000 parameters:

Parameter	Signal
ERR_ACK_AX8000_ChA	Error_Ack_ChA
SS1_AX8000_ChA	SS1_ChA
SLS_AX8000_ChA	SLS_1_ChA
SS1_AX8000_ChB	SS1_ChB
ERR_ACK_AX8000_ChB	Error_Ack_ChB
STO_ChA	STO_ChA
STO_ChB	STO_ChB

5. Click on "Save all" in the menu bar to save the settings

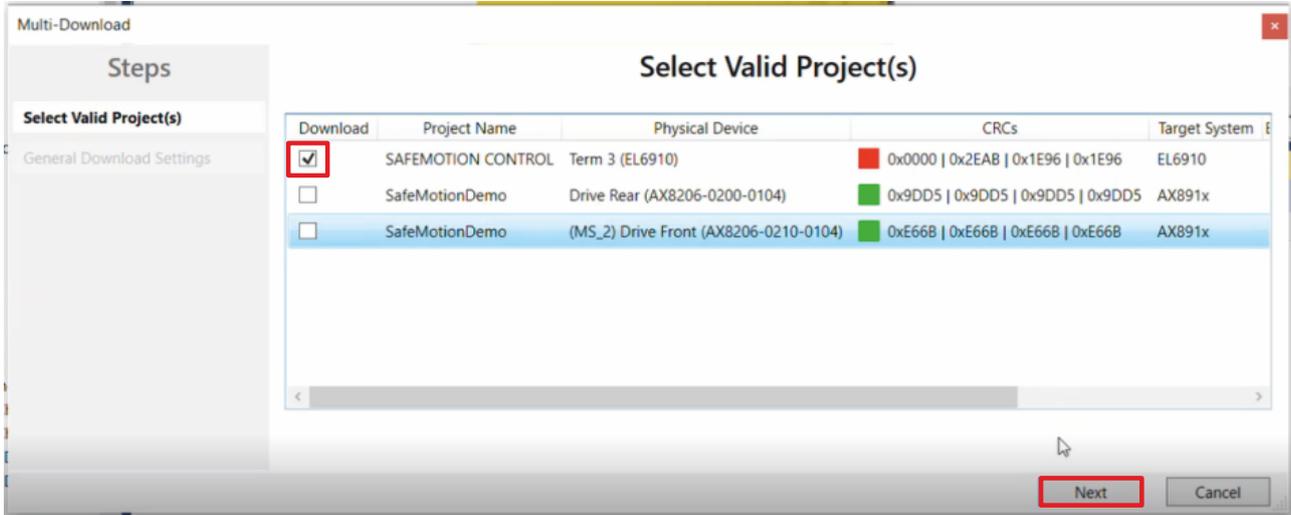
The AX8000 project and the EL6910 project are now linked.

2.6 Download EL6910 project

The last step before commissioning is to download the EL6910 project.

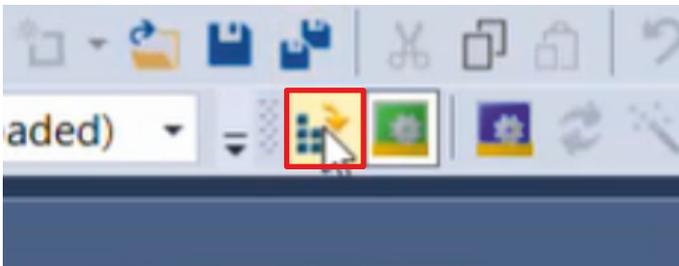
To do this, proceed as follows:

1. Click on "Multi-Download Safety Project(s)" in the menu bar

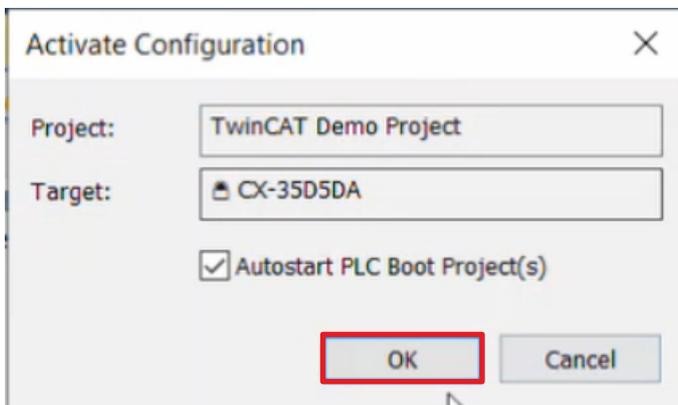


2. Uncheck the boxes for the AX8000 projects so that only the EL6910 project is selected
3. Confirm selection with Next
4. Go through steps 4 - 13 of the chapter Download Safety Projects
5. Click on "Save all" in the menu bar to save the settings

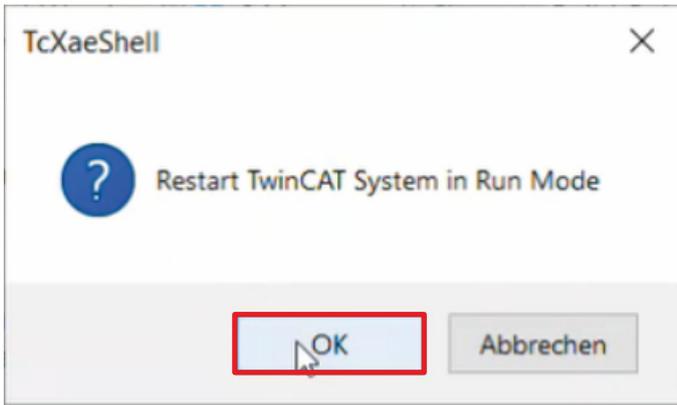
After downloading the EL6910 project, it is necessary to re-enable the configuration, as the EL6910 image has been modified. Proceed as follows:



6. Click on "Activate Configuration" in the menu bar

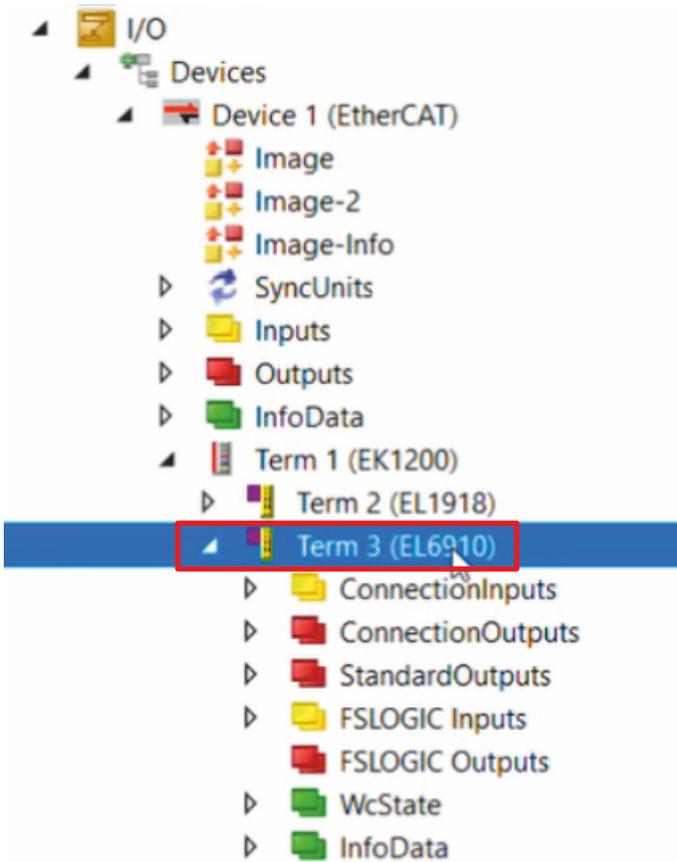


7. Confirm the "Activate Configuration" window with OK



8. Confirm the "Restart TwinCAT System in Run Mode" window with OK

Next check whether the safe connections are working.



9. To do this, open the EL6910 in I/O Configuration

Name	Online	Type	Size	>Addre...	In/Out	User ID	Linked to
Safe Logic State	1	USINT	1.0	1599.0	Input	0	
Cycle Counter	101	USINT	1.0	1600.0	Input	0	
WcState	0	BIT	0.1	3058.0	Input	0	
InputToggle	1	BIT	0.1	3060.0	Input	0	
State	8	UINT	2.0	3094.0	Input	0	
AdsAddr	5.53.213.218.2.1:1002	AMSADDR	8.0	3096.0	Input	0	
Message_4 RxPDO X	36 50 10 90 62 04 00	FSOE_7	7.0	1571.0	Output	0	FSOE . FSoE Inputs . Mod...
Message_48 RxP...	X 36 81 00 93 BE 81 0...	FSOE_11	11.0	1578.0	Output	0	Message_1 . FSoE Slave ...
Message_49 RxP...	X 36 00 00 27 85 81 0...	FSOE_11	11.0	1589.0	Output	0	Message_1 . FSoE Slave ...
Standard In Var 1	X 1	BIT	0.1	1600.0	Output	0	MAIN.TS_Run . PlcTask O...
Standard In Var 2	X 0	BIT	0.1	1600.1	Output	0	MAIN.TS FrrAck . PlcTask ...

In the "General" tab you can now see the 3 connections of the EL1918 and the two AX8000s running in the Data state. The connection of the two AX8000s and the EL6910 is thus successful.

The commissioning is now completed.

Also see about this

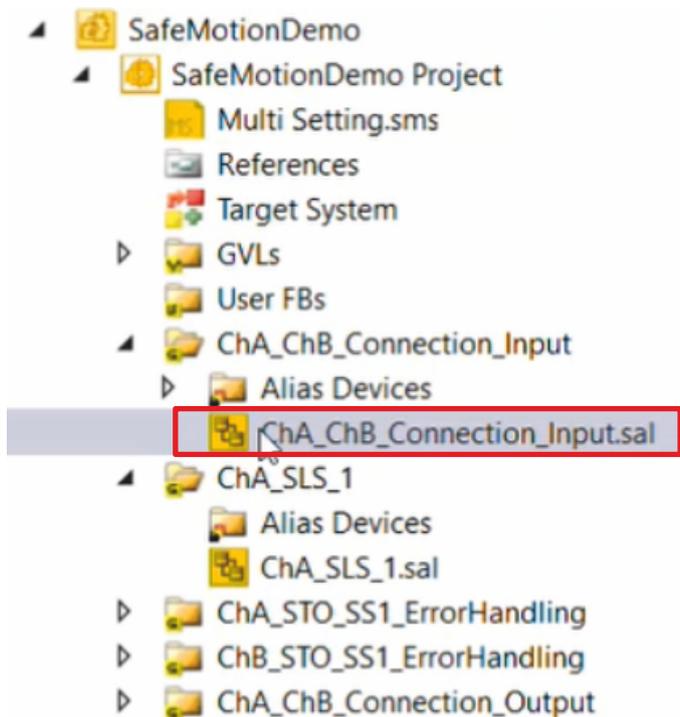
 Download Safety projects [[▶ 12](#)]

2.7 Check application

As a last step you have the possibility to check the wiring of your application.

Check light barrier

First, the connection to the light barrier is checked. Proceed as follows:

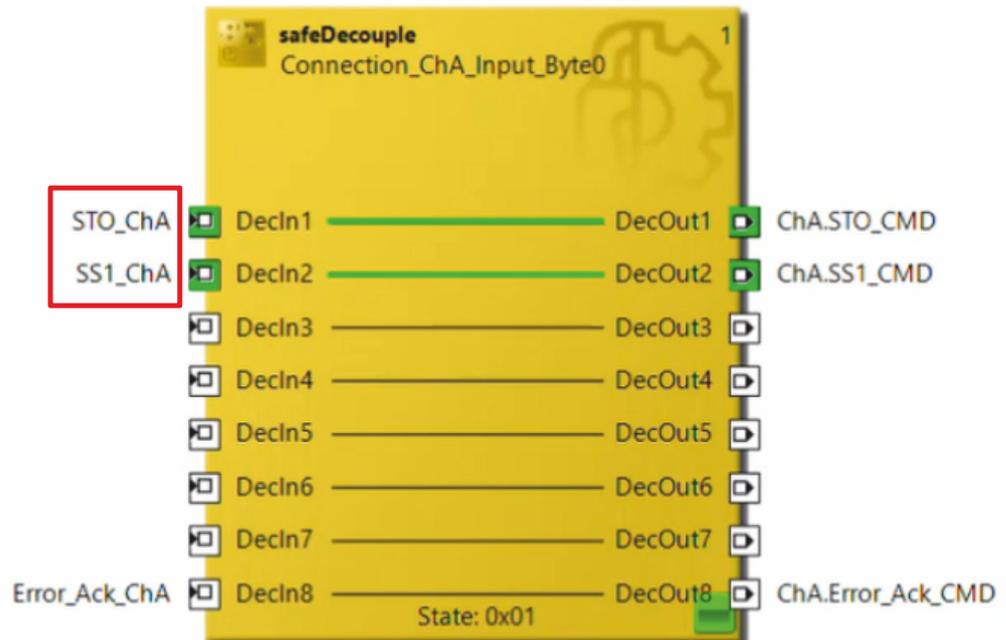


1. Open the file "ChA_ChB_Connection_Input.sal" in the AX8000 project

If the light barrier is interrupted, SS1 and STO are to be triggered. You can see whether the signals are transmitted according to your configuration in the online view.

2. Click on "Show Online Data" in the menu bar

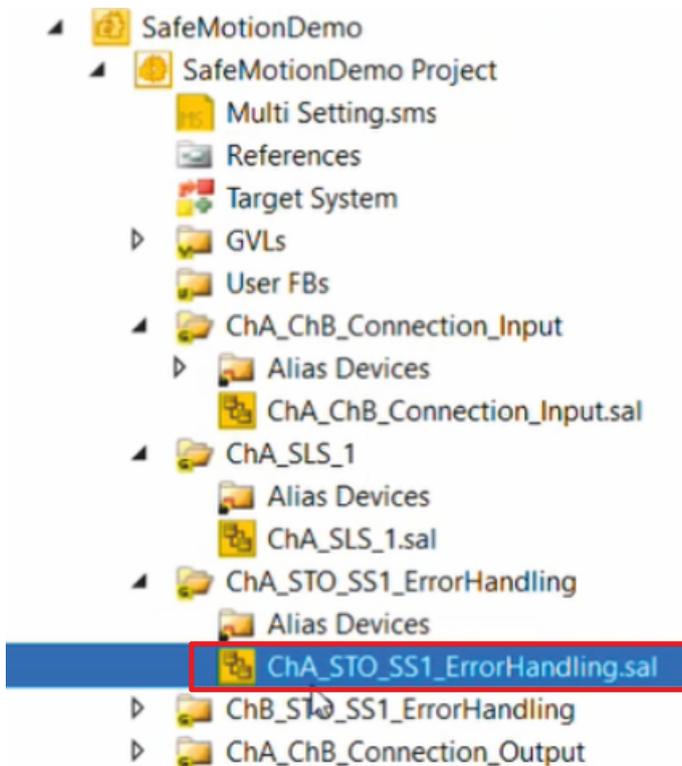
Connection_Input_ChA



As shown in the screenshot, you can see in the online view that the signals SS1 and STO arrive successfully at channel ChA.

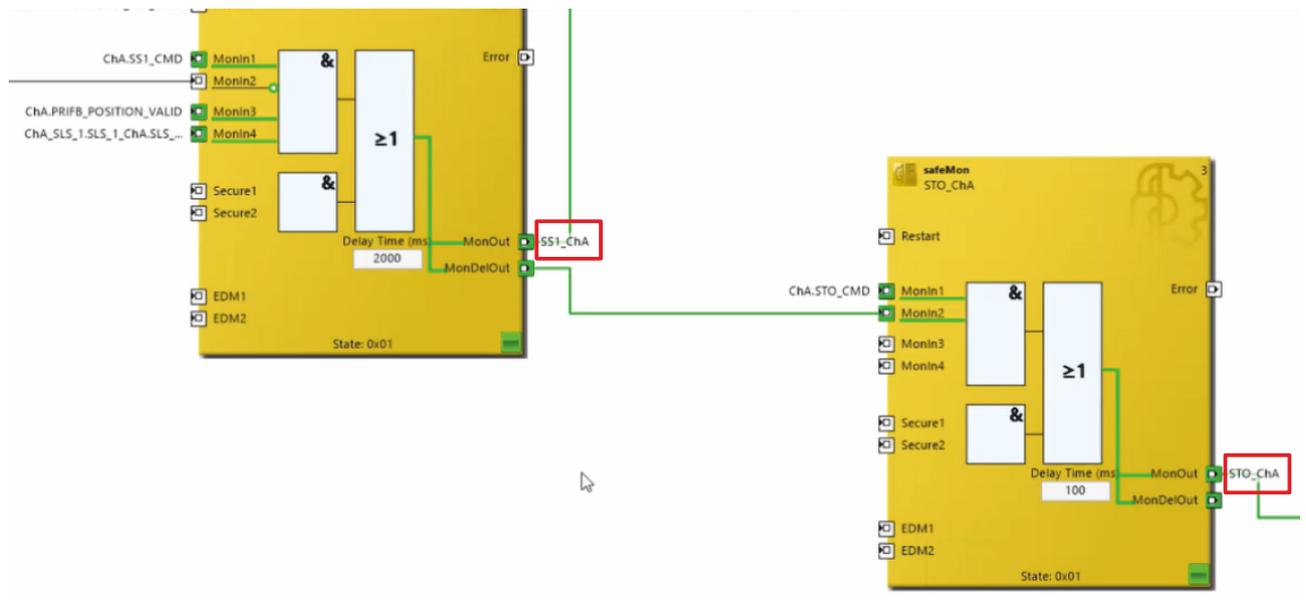
Check Error Handling

Next, check the error handling as follows:



3. Open the file "ChA_STO_SS1_ErrorHandling.sal" in the AX8000 project

4. Click on "Show Online Data" in the menu bar



As also shown here in the screenshot, you see a successful configuration, because the axes output the corresponding signals SS1 and STO.

More Information:
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