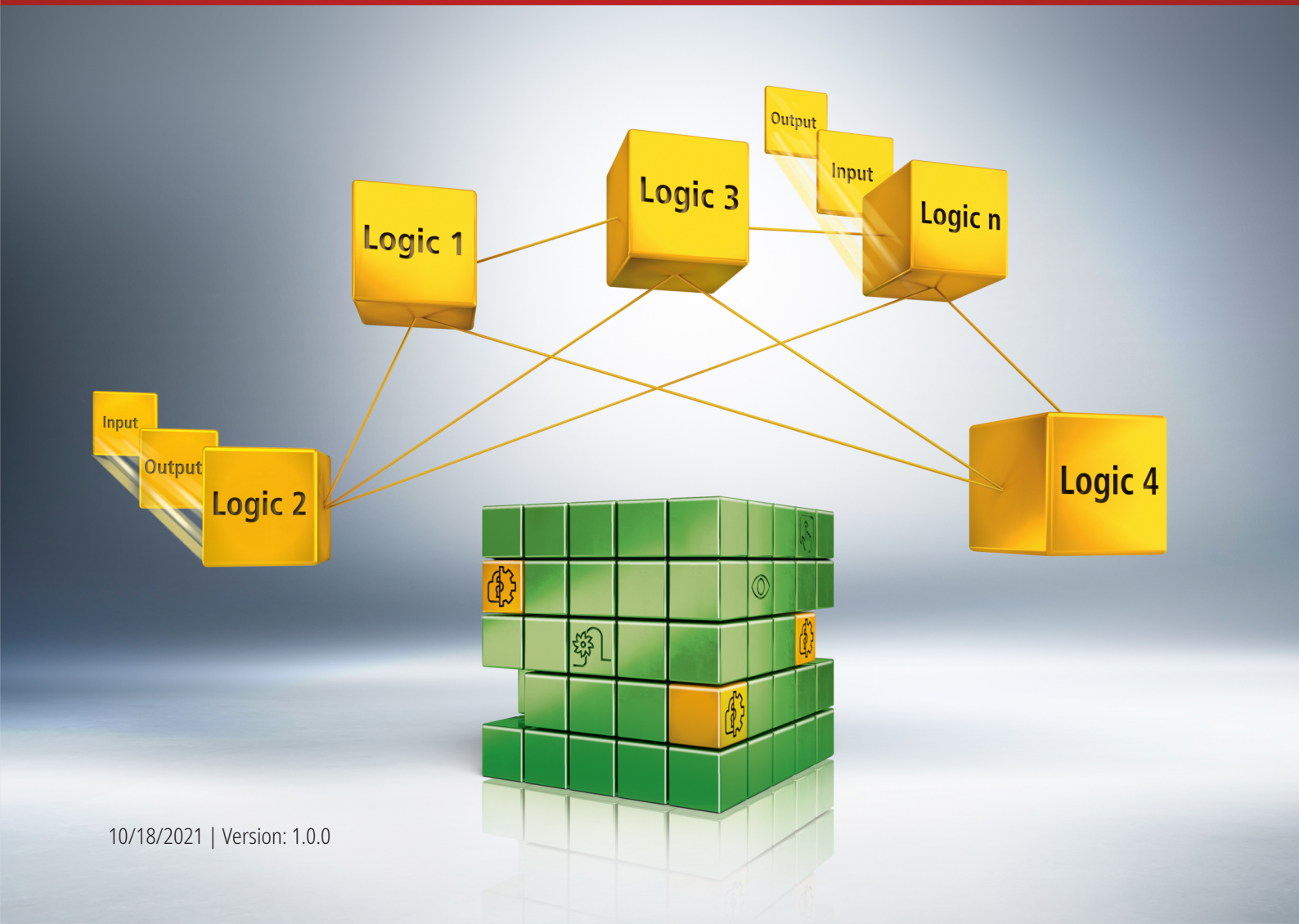
BECKHOFF New Automation Technology

TwinSAFE Tutorial 15 | EN

SafeMotion Wizard

SafeMotion Wizard for Gantry Axes (SLS)



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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 15 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 the realization of a SLS functionality for gantry axes using the SafeMotion Wizard.

1.1 Edition status

Edition	Comment
1.0.0	• First released edition
0.0.1	• First draft

1.2 Requirements

Meet the following requirements for this tutorial:

- TwinCAT 3 version ≥ 3.1.4024.11
- TwinCAT Safety Editor TE9000 ≥ 1.2.1.1
- TwinSAFE firmware ≥ 03
- AX8000 firmware ≥ 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 functionality:

- Safe speed for counter-rotating axes

2 Demonstration

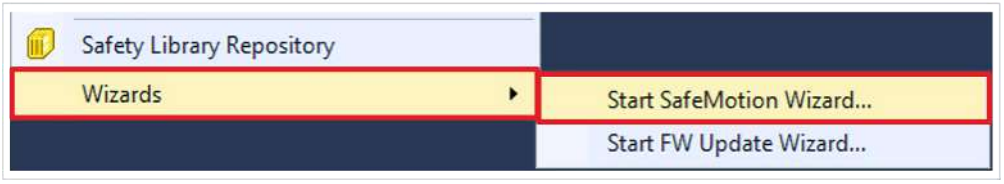
2.1 Create Safe Motion project

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

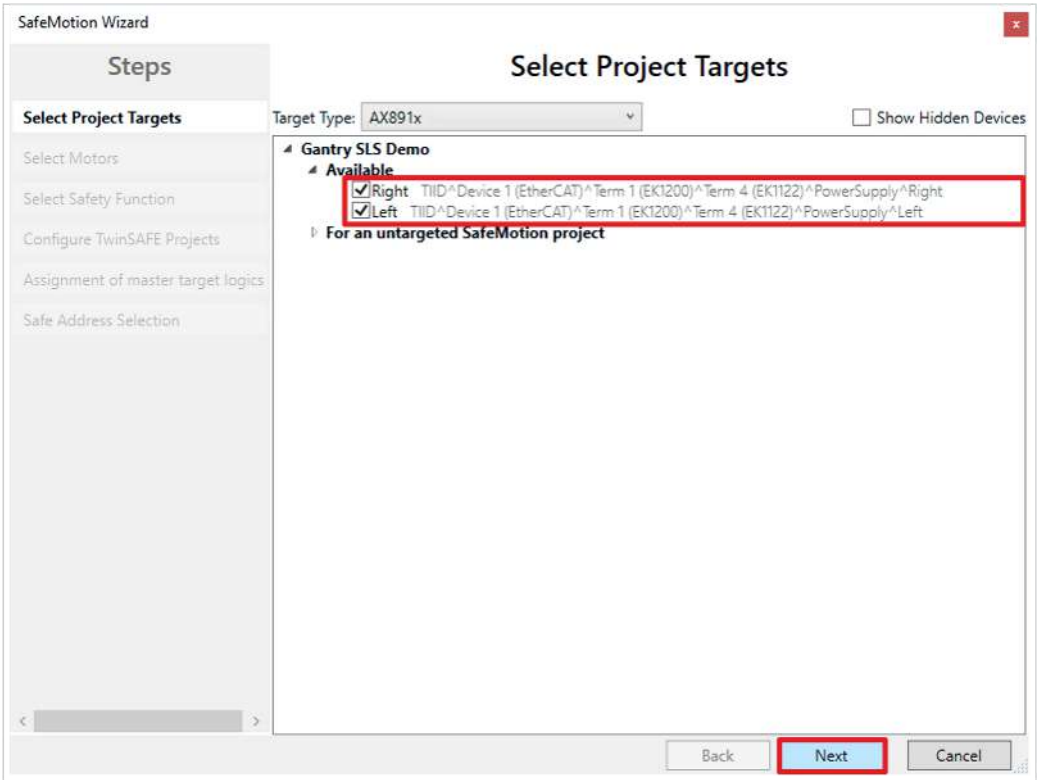
Proceed as follows to create a Safe Motion project with the SafeMotion Wizard:

1. Select project

2. Select “TwinSAFE” tab

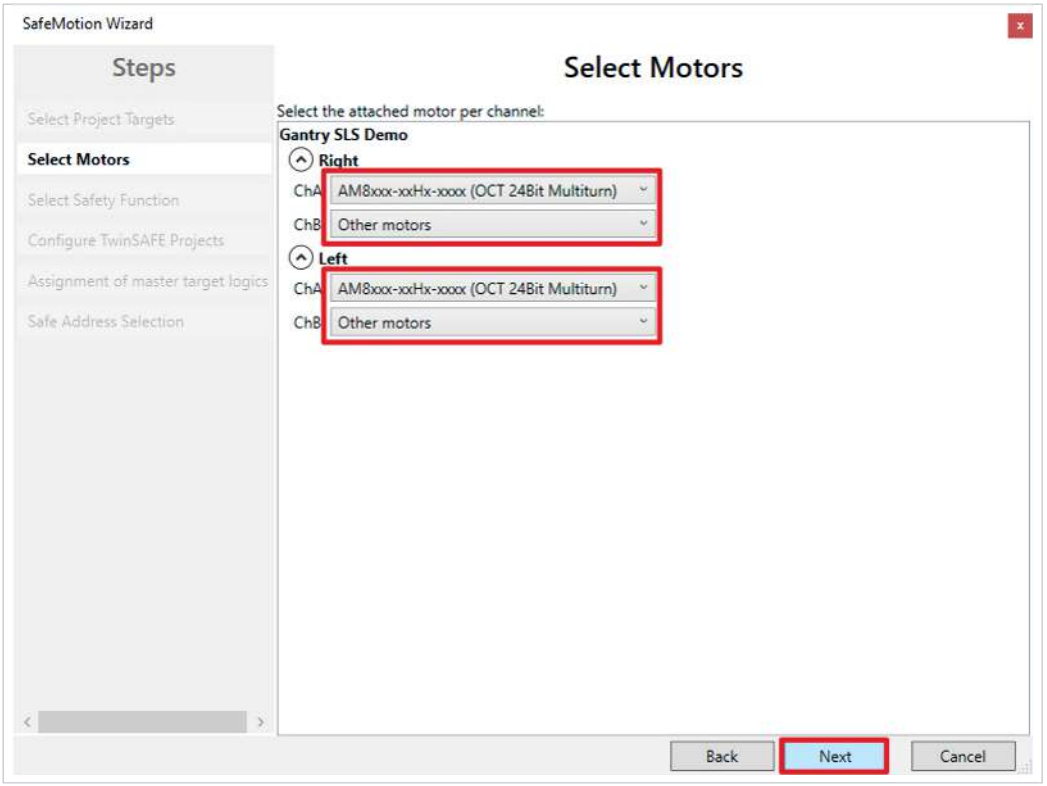


3. Select “Start SafeMotion Wizard...” via the wizard field



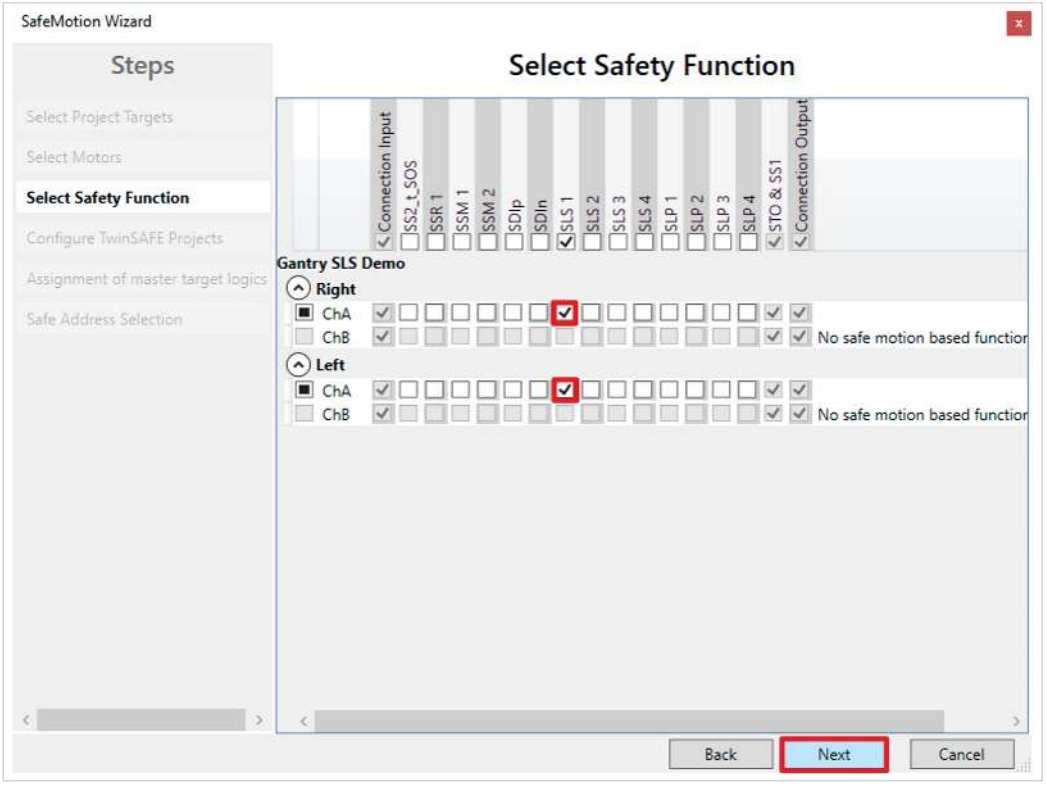
The “Select Project Targets” window opens and shows you an overview of all existing and virtual axes.

4. Select Safe-Motion component
5. Confirm selection with “Next”



In the “Select Motors” window, you configure the feedback for the individual axes.

6. Select “AM8xxx-xxHx-xxx (OCT 24Bit Multiturn)” for ChA
7. Select “Other Motors” for ChB
8. Confirm selection with “Next”

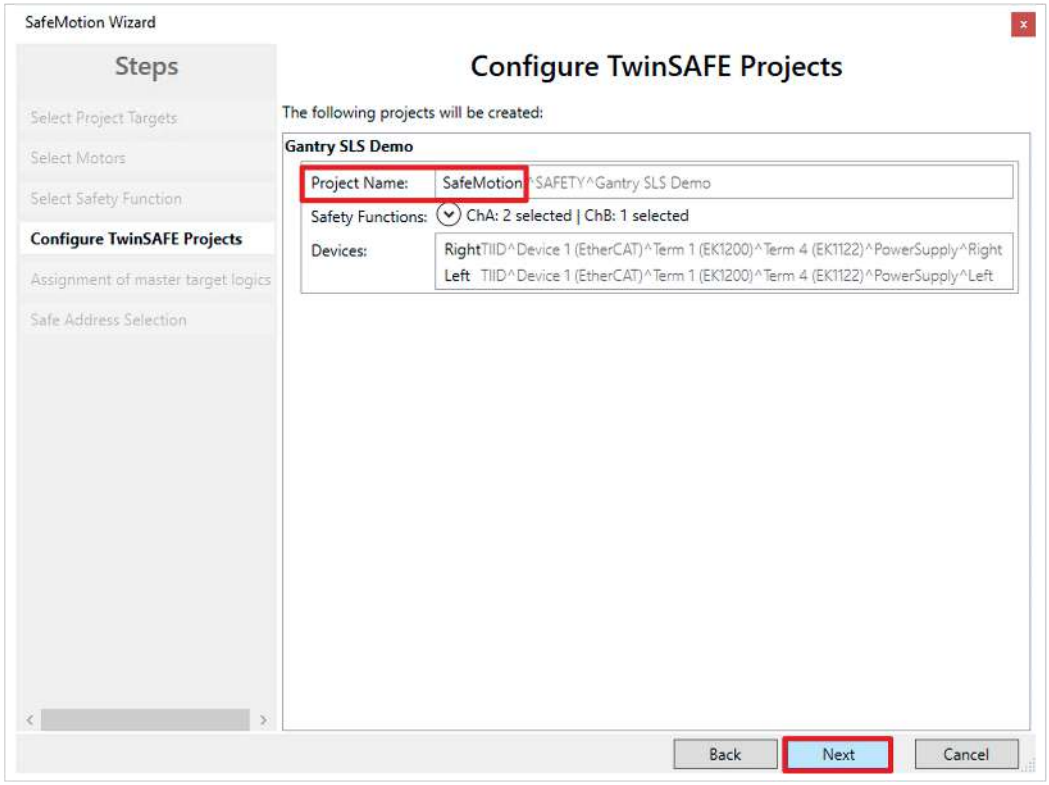


In the “Select Safety Function” window, select the desired safety functions.

9. Select the safety functions SLS1 for ChA

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

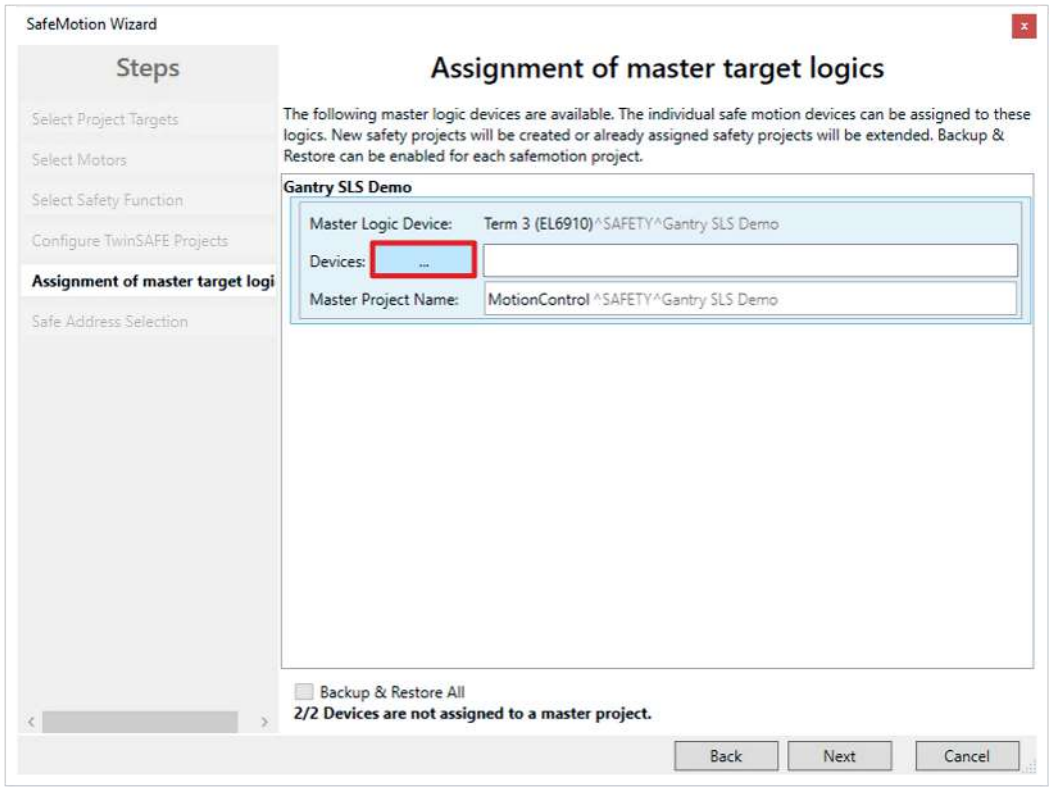
10. Confirm selection with “Next”



The “Configure TwinSAFE Projects” window opens. Here you have the option of renaming your safety project, which is generated for your safe motion component.

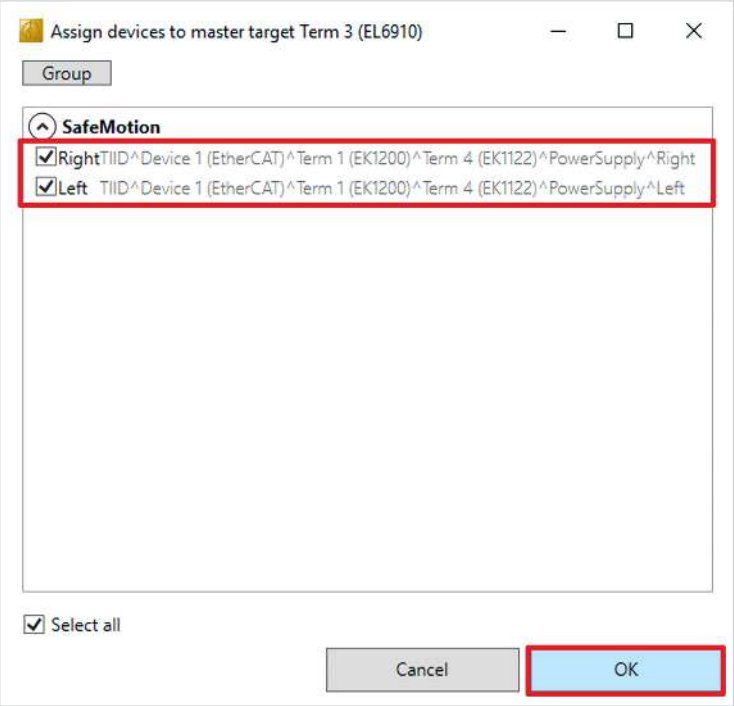
You also get an overview of the safety settings that have been made.

11. Rename project as desired
12. Check settings
13. Confirm selection with “Next”

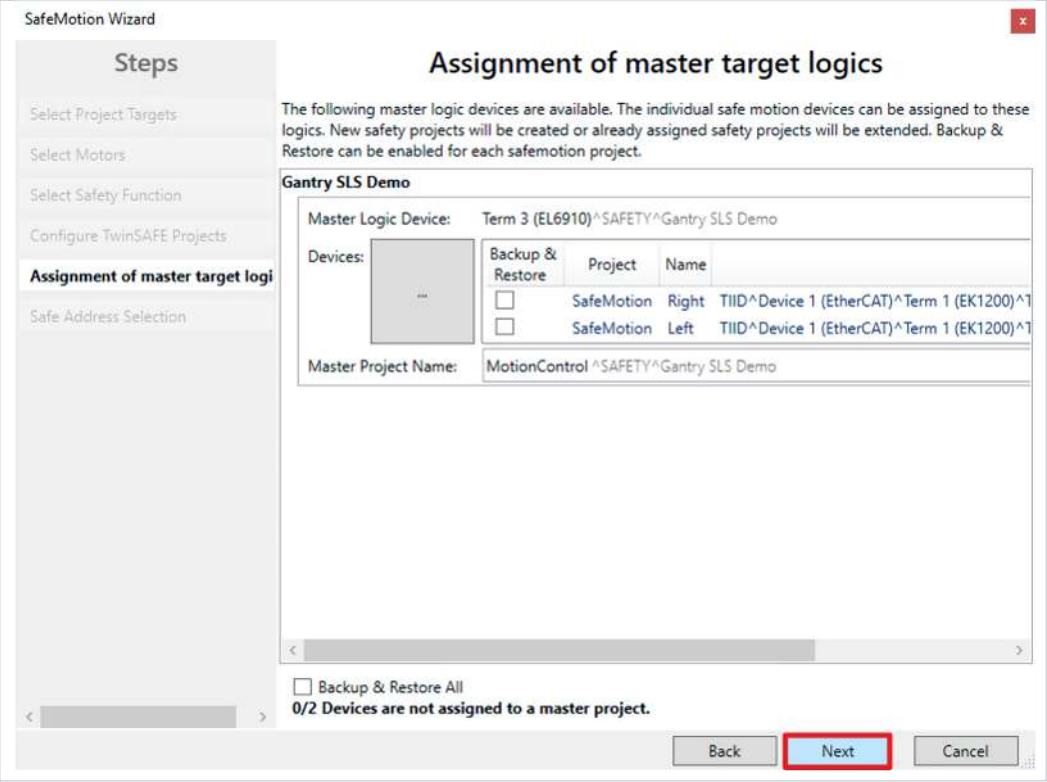


In the next window “Assignment of master target logics” the connection to the EL6910 project is closed so that your Safe Motion component can communicate with the EL6910 project. The EL6910 project is automatically found and displayed.

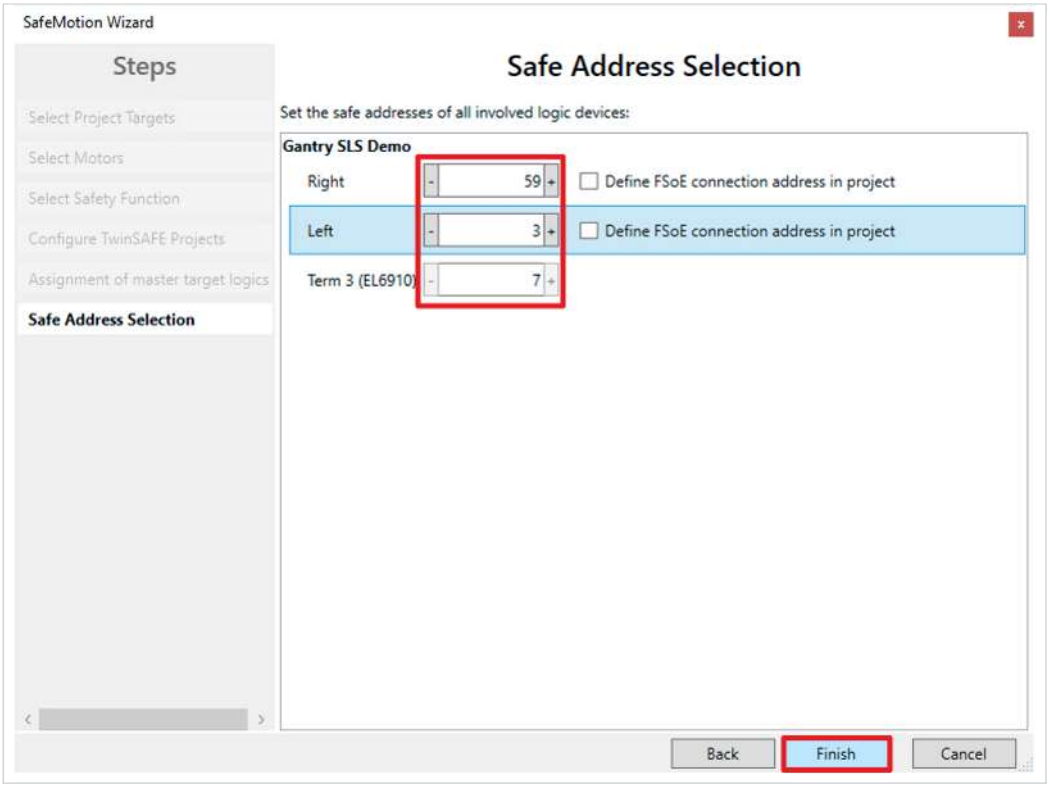
14. Click the button “ ... “



15. Select safe motion components that you want to connect to the EL6910 project
16. Confirm selection with “OK”



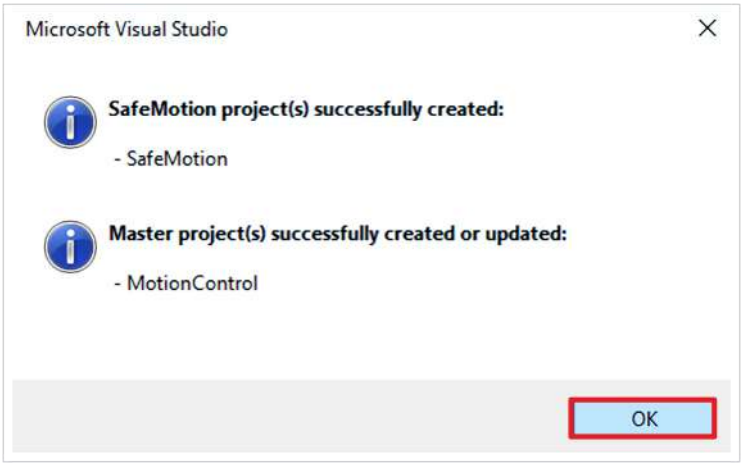
17. Confirm window with “Next”



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.

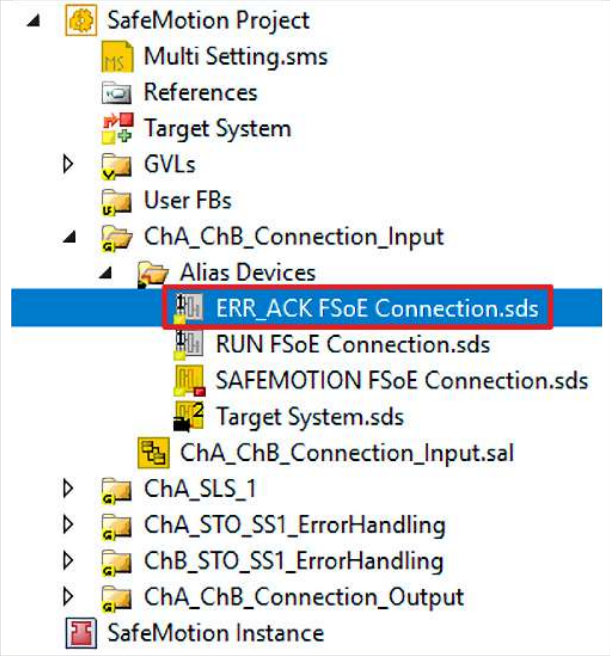
18. Close window with “Finish”

The SafeMotion Wizard configures the project.

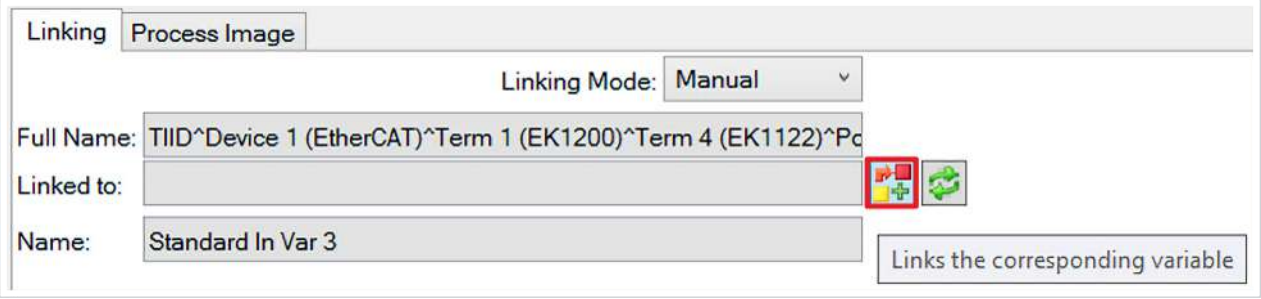


19. Close window with “OK”

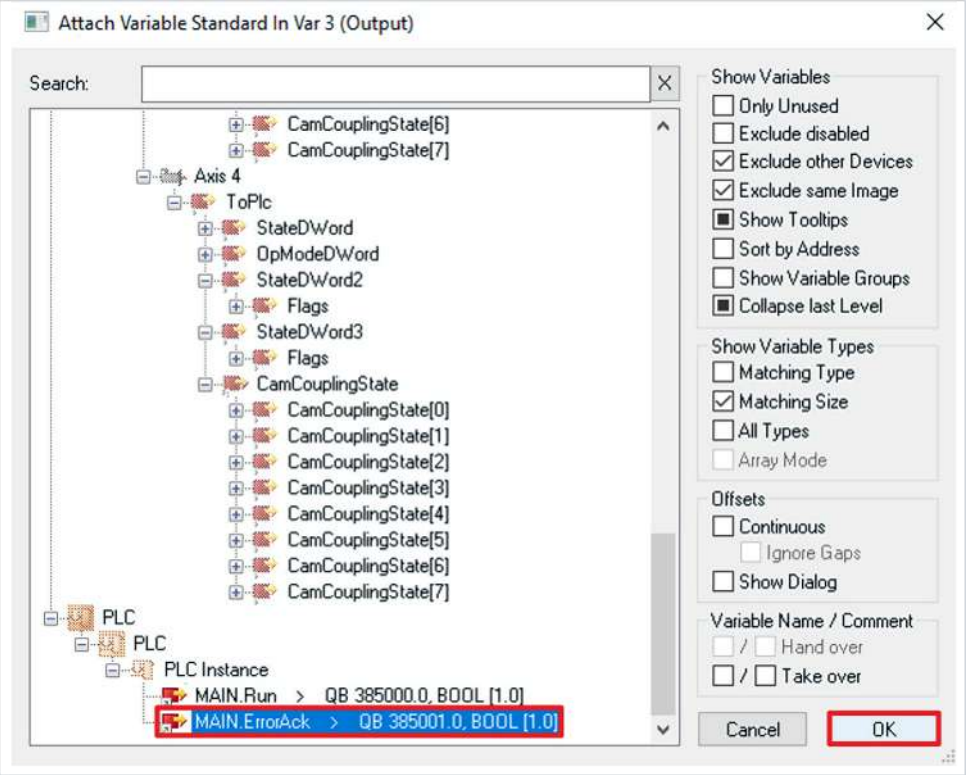
2.2 Link ErrAck and Run signal



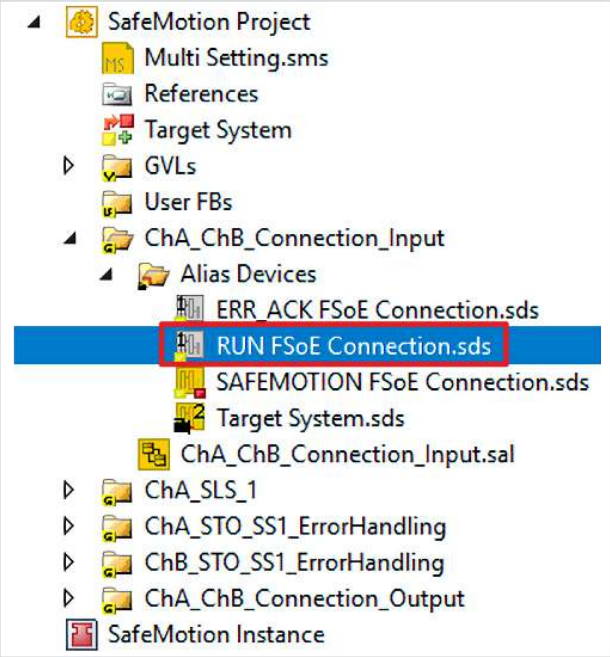
1. Open file “ERR_ACK FSoE Connection.sds”



2. Click the link icon in the linking tab

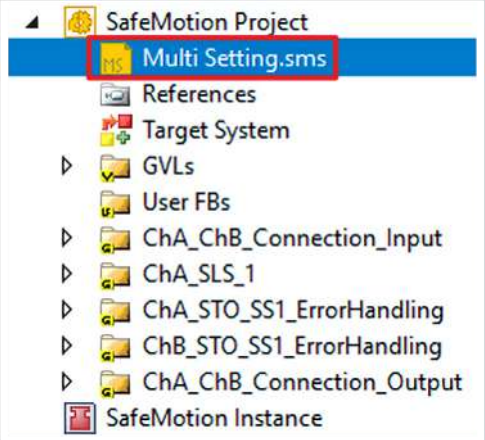


3. Select “MAIN.ErrorAack”
4. Confirm selection with “OK”

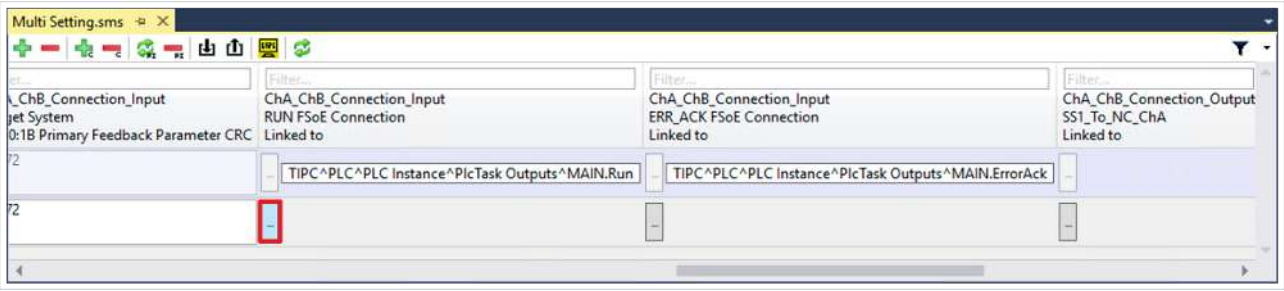


5. Open file “Run FSoE Connection.sds”
6. Run through steps 2 to 4. Select "MAIN.Run" as the signal.
7. Click "Save all" in the menu bar to save the settings

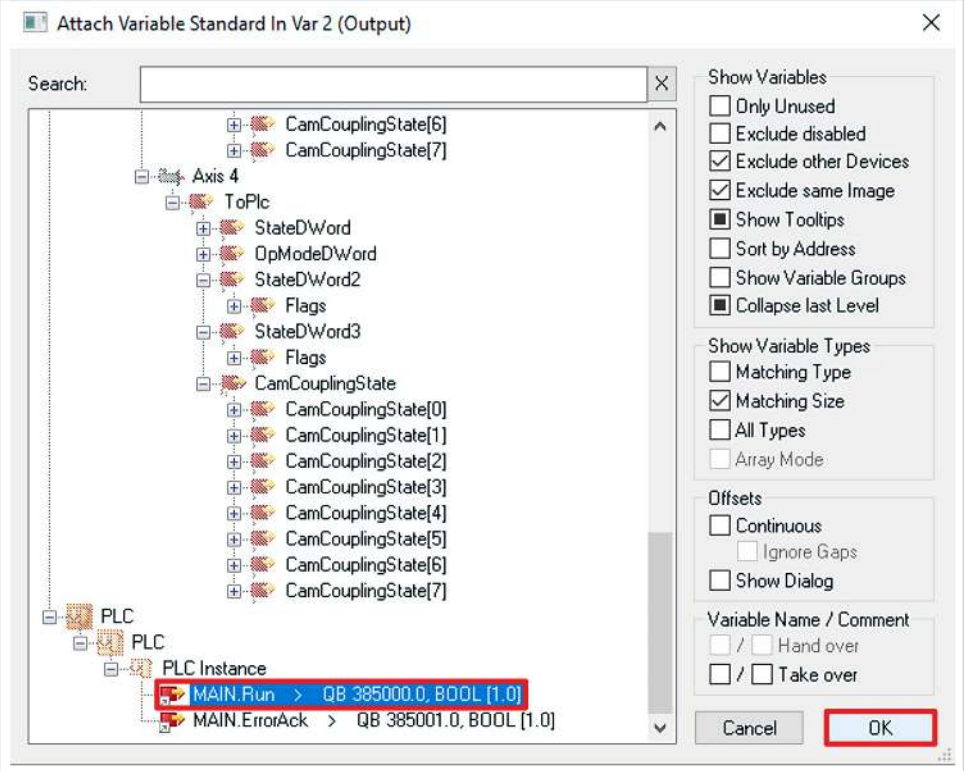
2.3 Link Multisettings



1. Open file “Multi Settings.sms”
2. Scroll to Run-FSoE-Connection



3. “ ... “ click



4. Select signal for Run
5. Confirm selection with “OK”
6. Repeat steps 3 to 5 for ErrAck
7. Click “Save all” in the menu bar to save the settings

2.4 Link projects

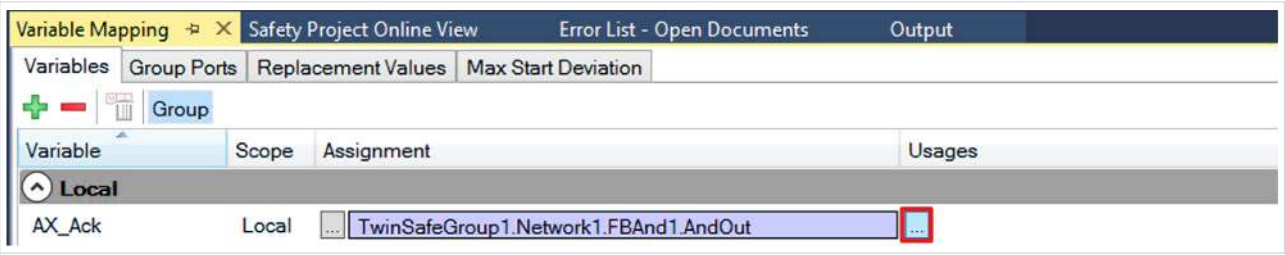
This chapter describes the linking of the SafeMotion project with the EL6910 Safety project via the EL6910 parameters.

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

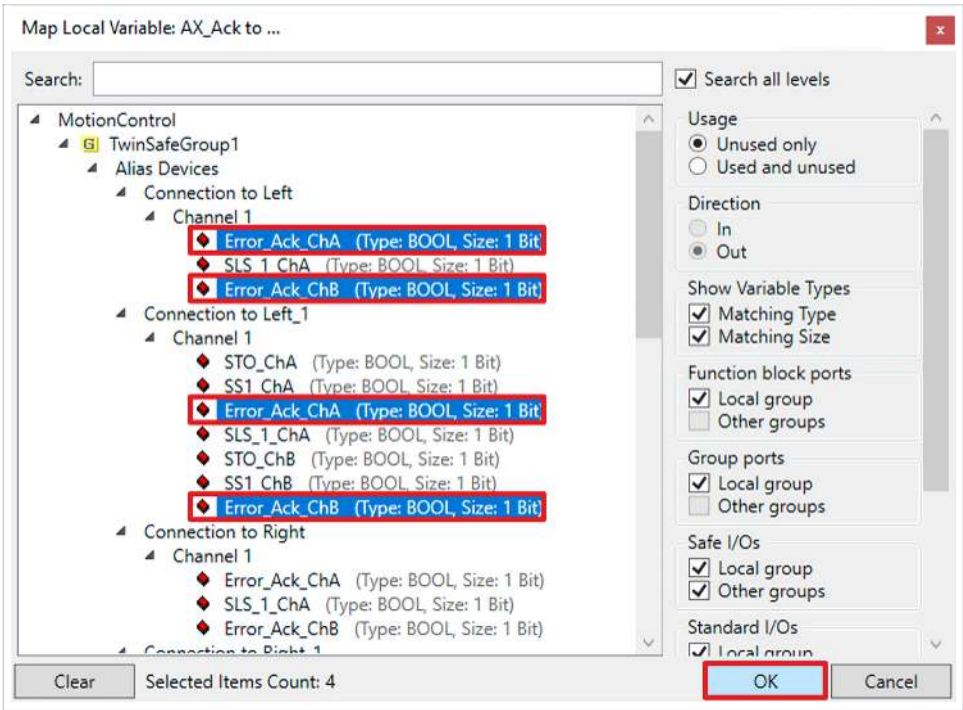
Proceed as follows:

1. Open the “TwinSafeGroup1.sal” file in your EL6910 project
2. Open the “Variable Mapping” tab

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



3. Click the button “ ... “ at the desired variable



4. Select the signal for your Safe Motion component
5. Confirm selection with “OK”

The following links result for the variables:

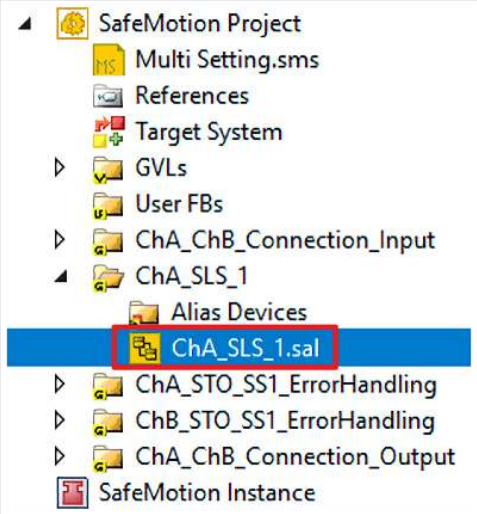
Verknüpfung

The cells with " / " are already filled in and do not need to be linked.

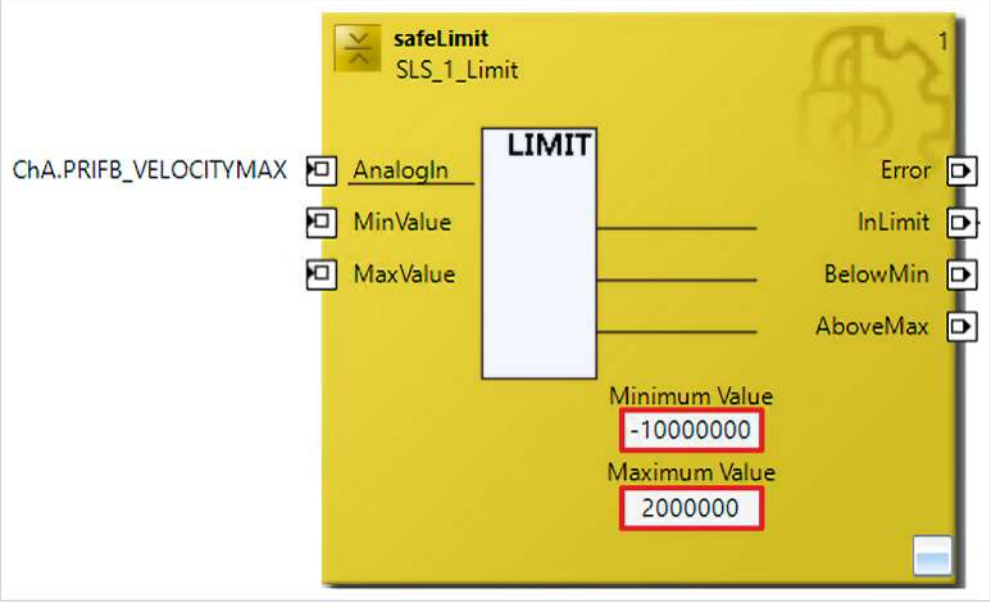
Variable	Assignment	Usages
AX_Ack	/	Connection to Left: • Error_Ack_ChA • Error_Ack_ChB Connection to Right: • Error_Ack_ChA • Error_Ack_ChB
AX1_ChA_AckReq	Connection to Left: • Error_AckReq_ChA	/
AX1_ChB_AckReq	Connection to Left: • Error_AckReq_ChB	/
AX2_ChA_AckReq	Connection to Right: • Error_AckReq_ChA	/
AX2_ChB_AckReq	Connection to Right: • Error_AckReq_ChB	/
Enable_Global	/	Connection to Left: • STO_ChA • SS1_ChA • STO_ChB • SS1_ChB Connection to Right: • STO_ChA • SS1_ChA • STO_ChB • SS1_ChB

6. Click on “Save all” in the menu bar to save the settings

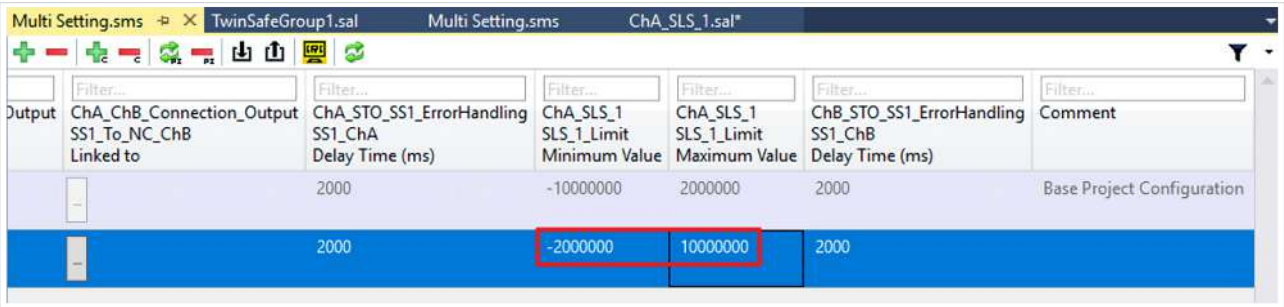
2.5 Configure SLS functionality



1. Open file “ChA_SLS_1.sal”



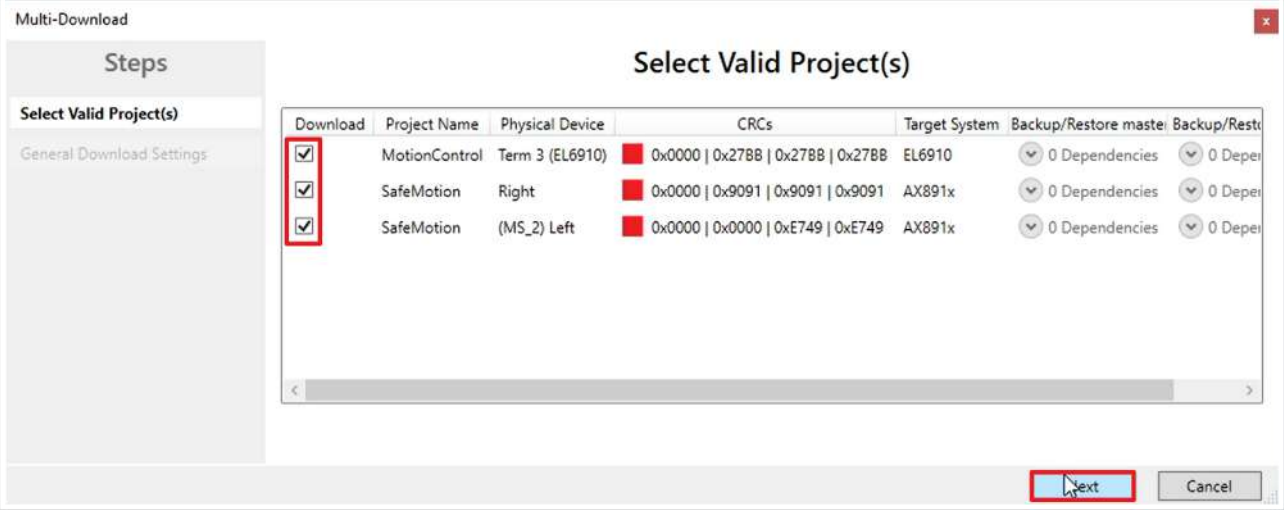
2. Enter the maximum value and the minimum value for FB safeLimit according to the illustration
3. Click “Save all” in the menu bar to save the settings



4. Open Multi Settings
5. Enter the maximum value and the minimum value
6. Click on “Save all” in the menu bar to save the settings

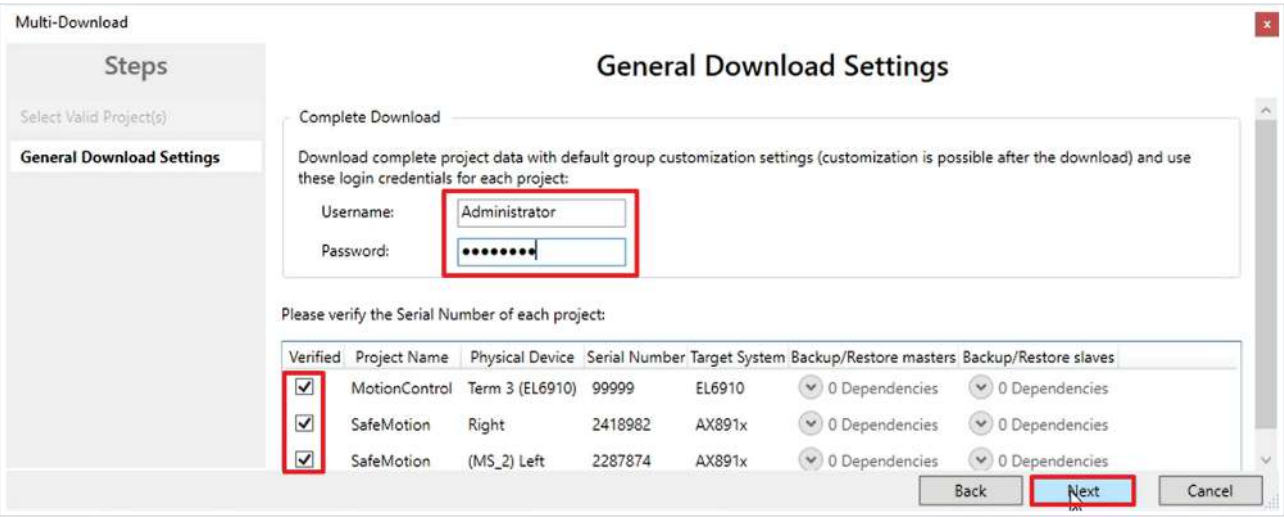
2.6 Download Safety projects

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 the safety projects that you want to download
3. Confirm selection with “Next”

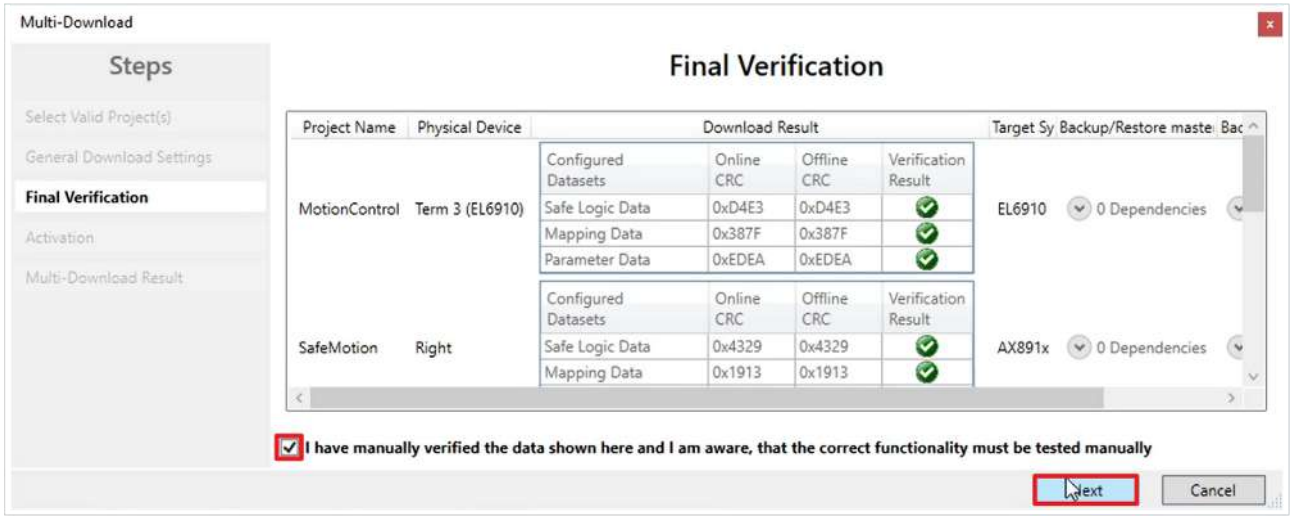


4. Enter the username and password in the “General Download Settings” window

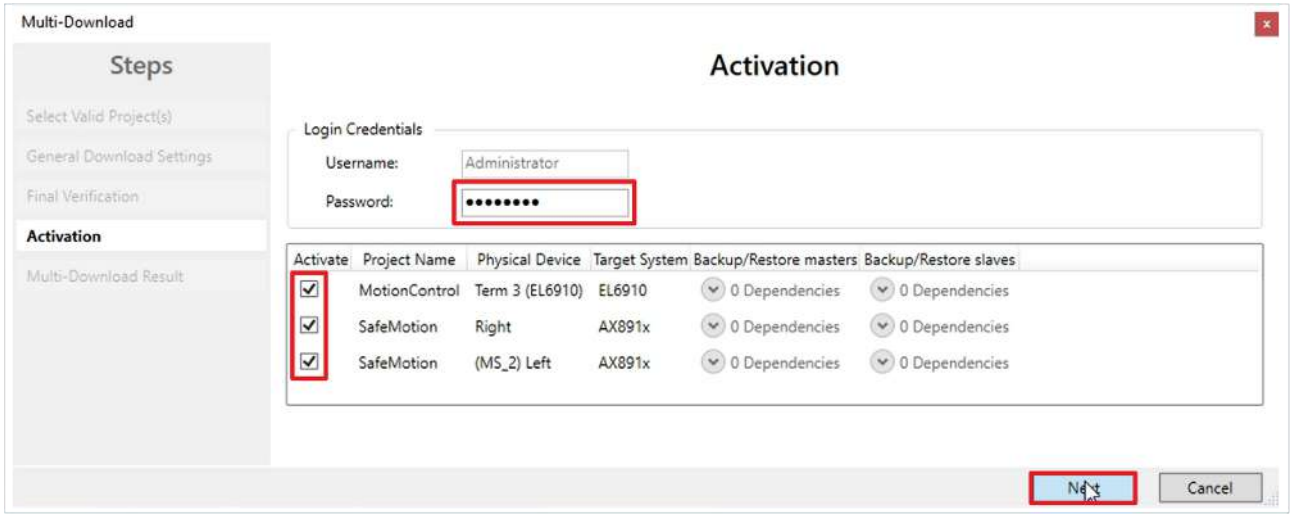
Default username: Administrator

Default password: TwinSAFE

5. Select the safety projects that you want to download
6. Confirm selection with “Next”

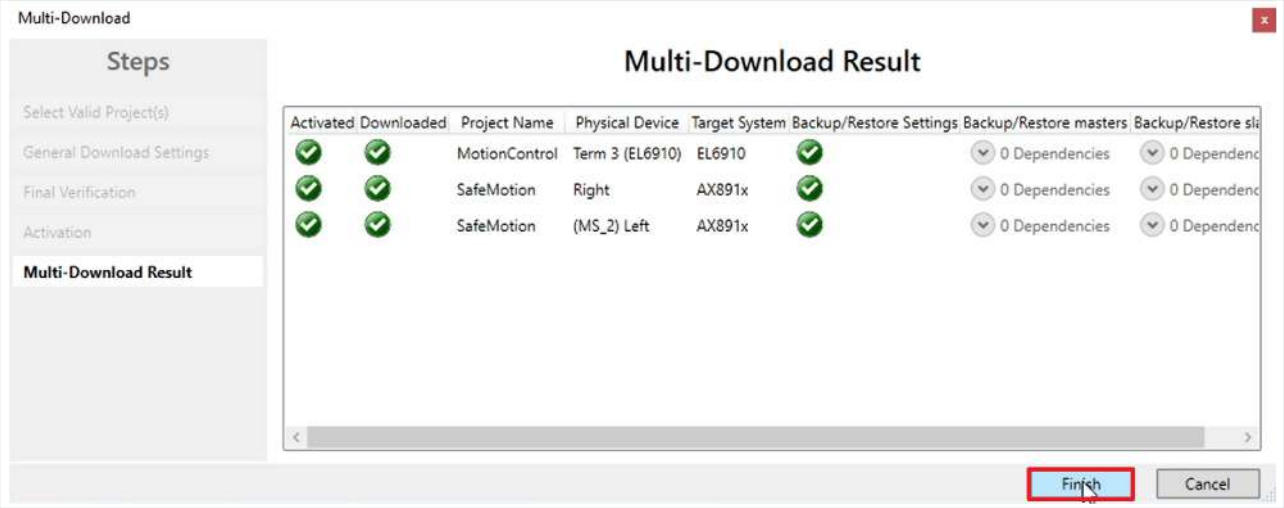


7. Check the CRCs in the “Final Verification” window
8. If the CRCs match, click on the box to confirm the verification
9. Confirm window with “Next”



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

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

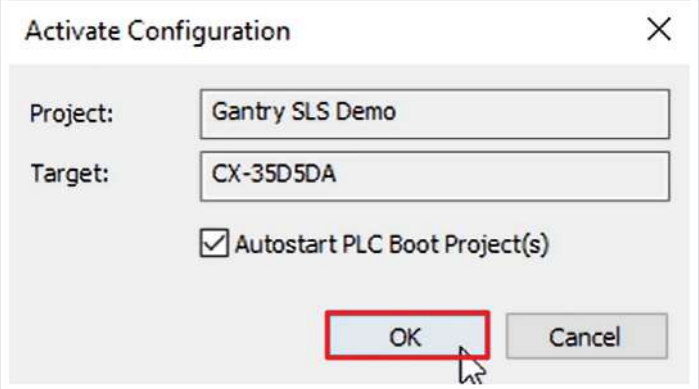


13. Close the window “Multi-Download Result” with “Finish”

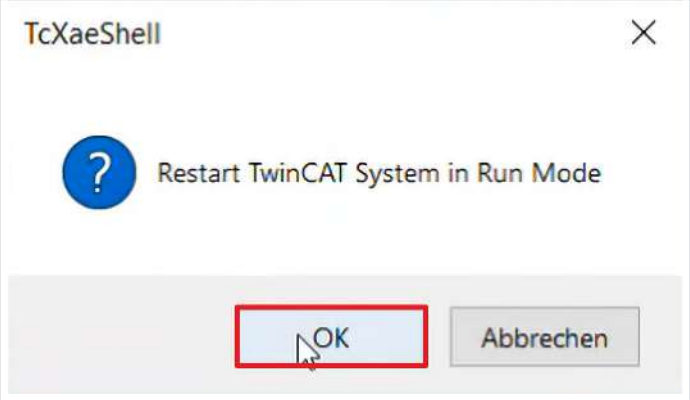
2.7 Activate configuration

Since the process images have been changed, it is necessary to reactivate the configuration. To do this, proceed as follows:

1. Click on “Activate Configuration” in the menu bar

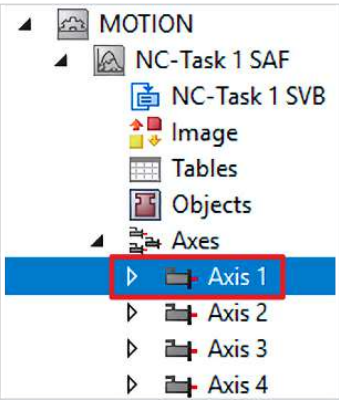


2. Confirm the “Activate Configuration” window with “OK”

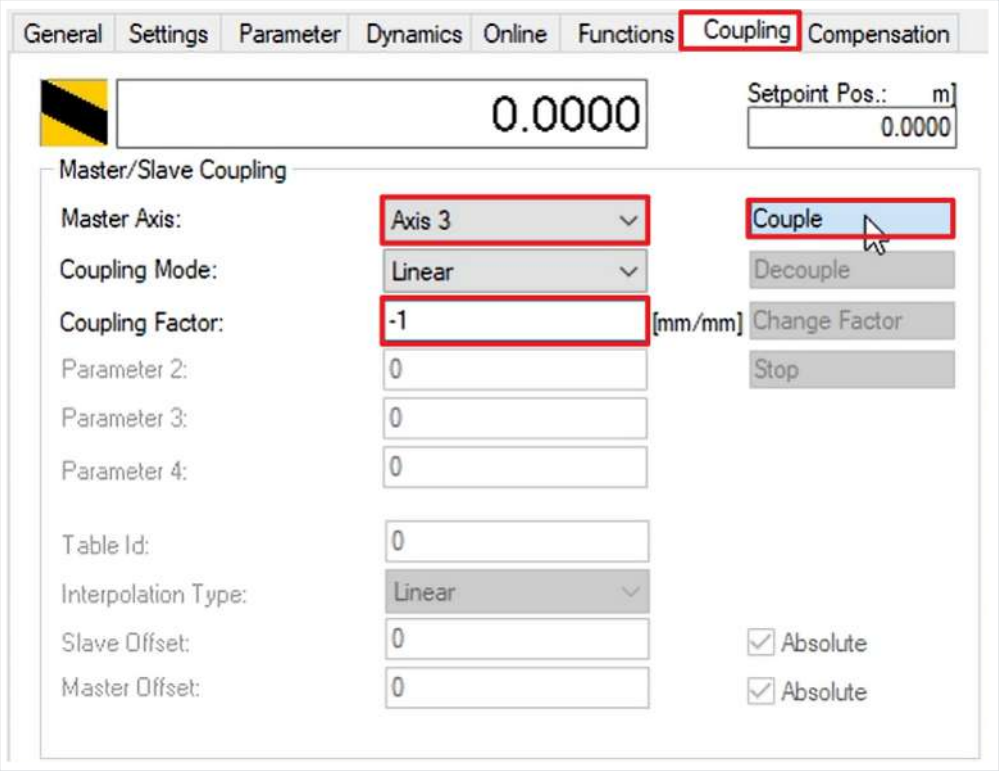


3. Confirm the “Restart TwinCAT System in Run Mode” window with “OK”

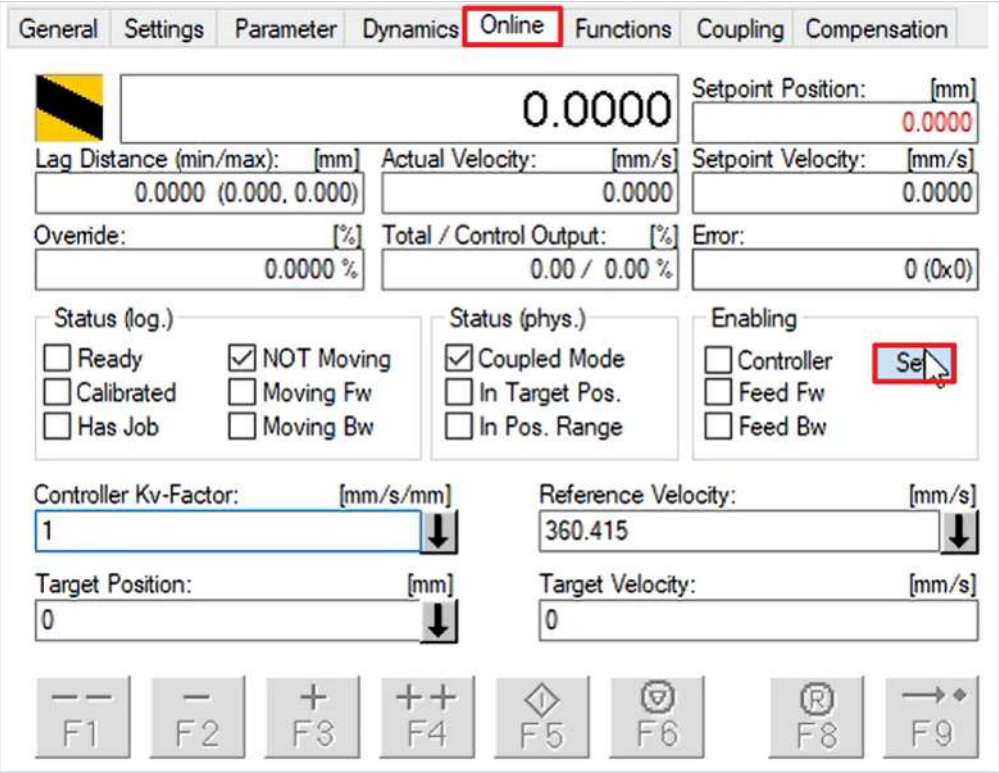
2.8 Couple axes



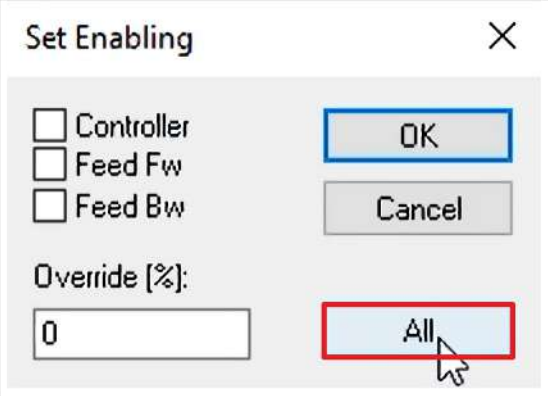
1. Open axis 1



2. Open tab “Coupling”
3. Select axis 3 in the drop-down menu of “Master Axis”
4. Enter Coupling Factor as shown
5. Click on “Couple”

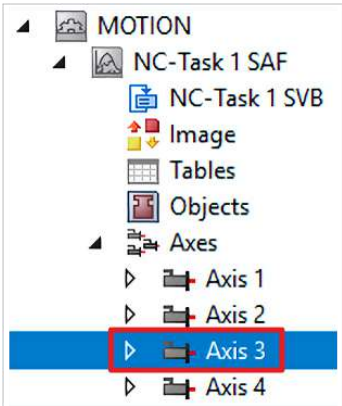


6. Open tab “Online”
7. Click on “Set”

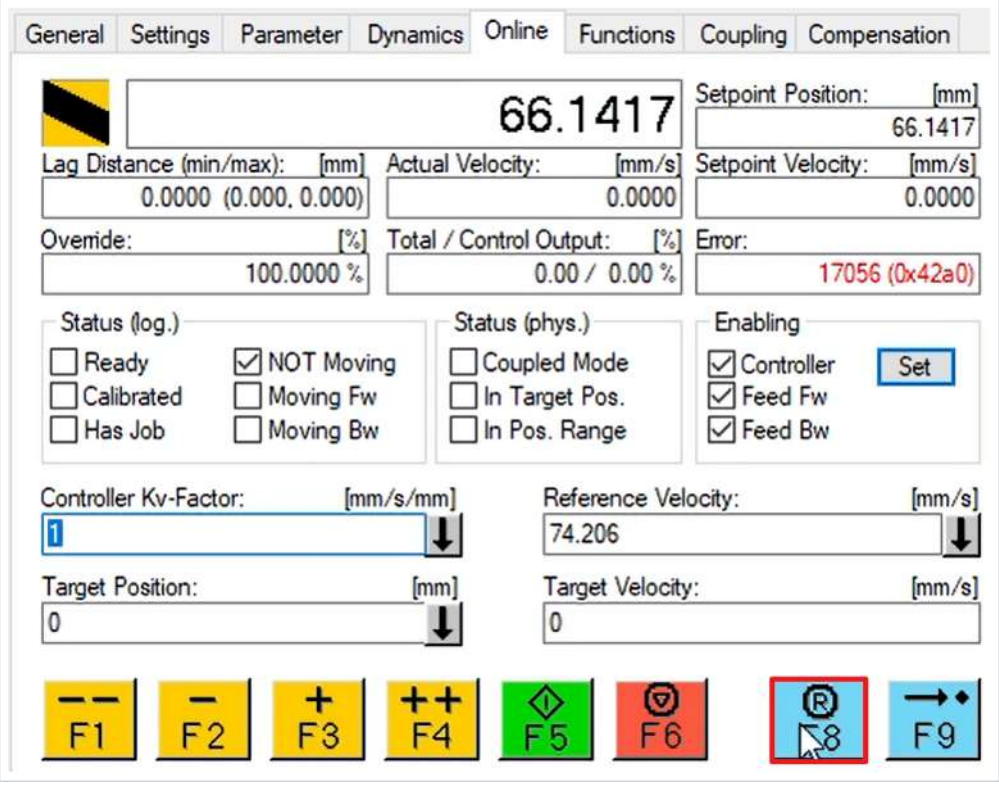


8. Click “All” in the “Set Enabling” window

2.9 Let drive traverse



1. Open axis 3
2. Open tab “Online”
3. Click on “Set”
4. Close window “Set Enabling” with “All”



An error message appears.

5. Click on F8 to reset the error

6. Move the drive with F1, F2, F3 and F4 until a speed violation occurs

An error message appears and the drive is set to the STO state due to the SLS functionality.

More Information:
www.beckhoff.com/twinsafe/

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com