

# S210 – S7-1500 Safely-Limited Speed

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## Requirement

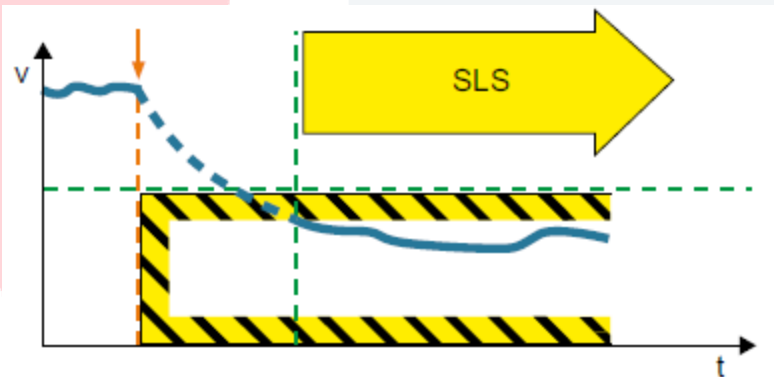
Initiate a fail-safe condition in the S210 that allows motion at, or below, a safe speed.

## Task Overview

Utilize the S210's Extended Safety Function, Safely-Limited Speed (SLS), to set a safe speed threshold upon an initiated safety condition.

## Safely-Limited Speed Overview

Definition according to EN 61800-5-2: "The SLS function prevents the motor from exceeding the defined speed limit."



The drive with an active "Safely-Limited Speed" (SLS) function monitors the speed/velocity of the motor to ensure that it does not exceed the speed/velocity threshold valid for SLS (SLS monitoring).

The SLS function prevents the parameterized maximum velocity from being exceeded. If the permitted speed is exceeded, then the drive initiates a parameterizable fault response. It is possible to switch between four (4) different limit value levels in operation. Additionally, you can specify variable limit values during operation via PROFIsafe.

## Application Examples

SLS is suitable for machines susceptible to hazardous situations if a speed is exceeded and wherever work must be performed directly on a machine, for example:

- during operation
- in setup mode
- during maintenance work

Example	Possible Solution
Setup mode: The machine operator must enter the danger area of a machine and manually introduce material into a machine part.	<ul style="list-style-type: none"><li>• Select SLS in the inverter using a fail-safe input or PROFIsafe .</li><li>• The inverter monitors the speed of the machine part.</li></ul>
A turning machine must not exceed a specific maximum torque in order to protect the drill chuck from damage.	
Depending on the diameter of the saw blade, a circular saw must not exceed a specific maximum speed.	<ul style="list-style-type: none"><li>• Select SLS and the corresponding SLS level in the inverter via PROFIsafe.</li></ul>

## How to Use SLS Function Block

### Functional Description

Safely-Limited Speed, SLS, is monitored in the drive. Once a SLS condition exists, the S210 will fault, after a pre-configured delay time, if the velocity threshold set in the S210's SLS condition is exceeded. This requires the PLC program to modify the S210's velocity upon the initiation of a SLS condition and then restore the velocity once the SLS condition is cleared.

### Sequence of Operation

1. A safety input initiates a SLS condition.
2. Before the S210's pre-configured SLS delay time, which is 100ms default, is reached, the PLC standard program lowers the current velocity setpoint to a value below the selected SLS velocity threshold.
3. Following the expiration of the SLS delay time, the safety telegram from the S210 indicates SLS is active.
4. The safety input resets to a non-SLS condition.
5. After the SLS delay time, the S210 clears the SLS condition from the safety telegram.
6. The PLC program standard program restores the velocity to the pre-SLS state.

## Programming SLS in TIA Portal

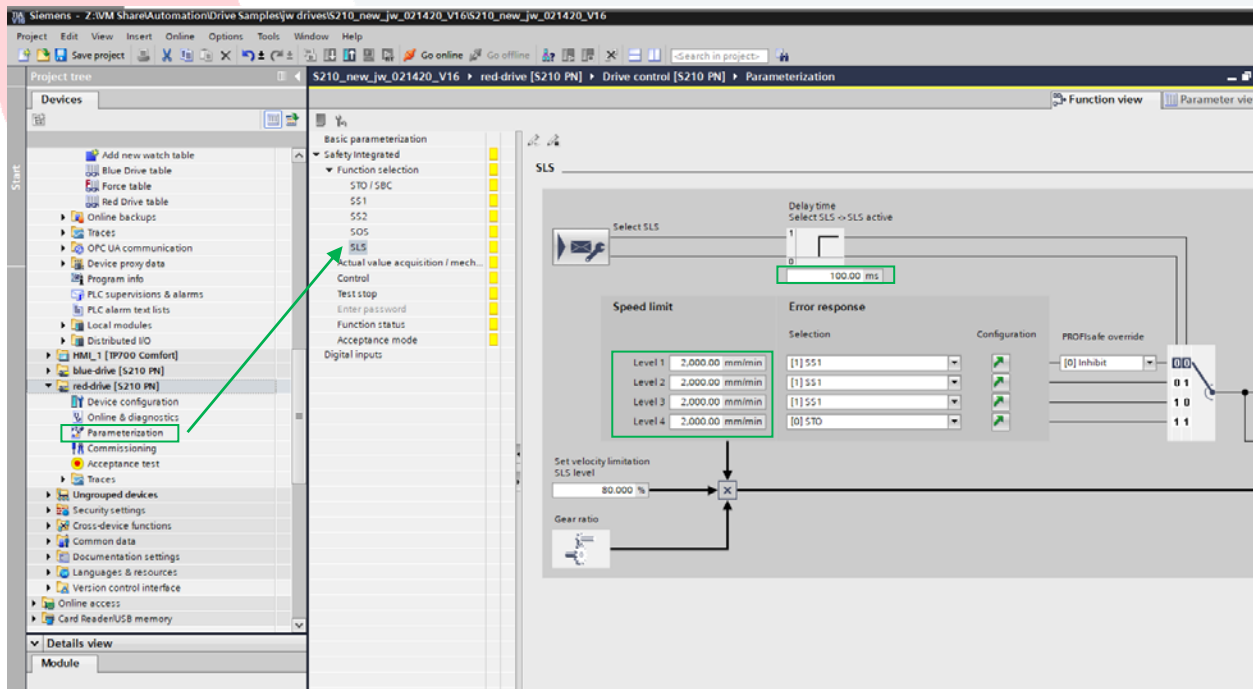
### 1. Configure SLS in the S210

To configure or make safety changes in the S210, the following procedure must be followed:

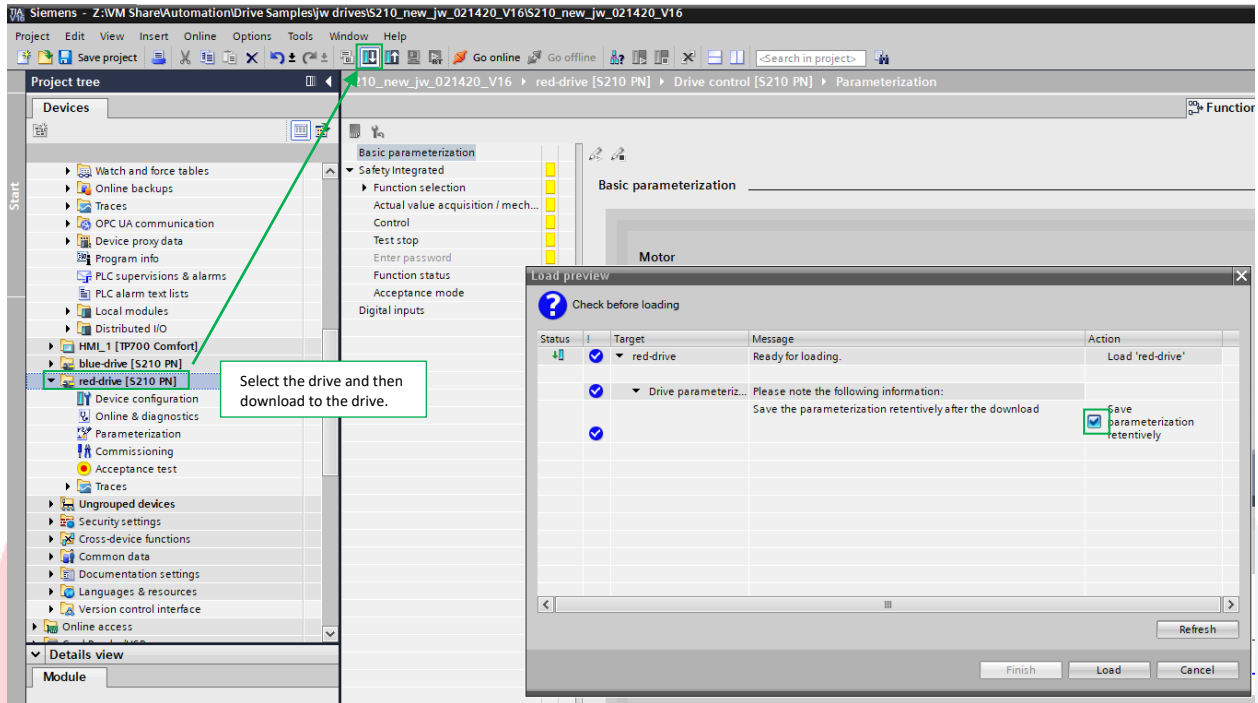
1. Go offline with the S210
2. Make the necessary safety changes in the S210's Parameterization
3. Download to the S210 drive and "Save parameterization retentively" (RAM to ROM)
4. Go online with the S210 and start Safety commissioning (must enter password)
5. Then stop Safety commissioning – this causes the S210 to copy its safety parameters into memory
6. Perform a save RAM to ROM in the S210
7. Go offline the S210 and cycle power
8. After the S210 boots, select the S210 in TIA and perform an upload

While OFFLINE with the S210, open the S210 Parameterization and setup SLS. Four different SLS velocity thresholds are configurable. NOTE: The SLS speed/velocity thresholds are set in per minute units. These thresholds are selectable from the PLC program via the safety function block for telegram 30.

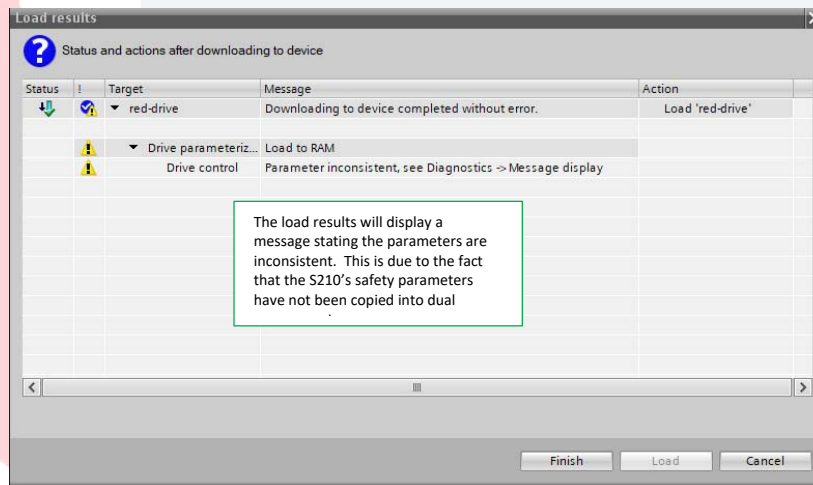
When a SLS condition occurs, the S210 will set SLS active after the delay time set here.



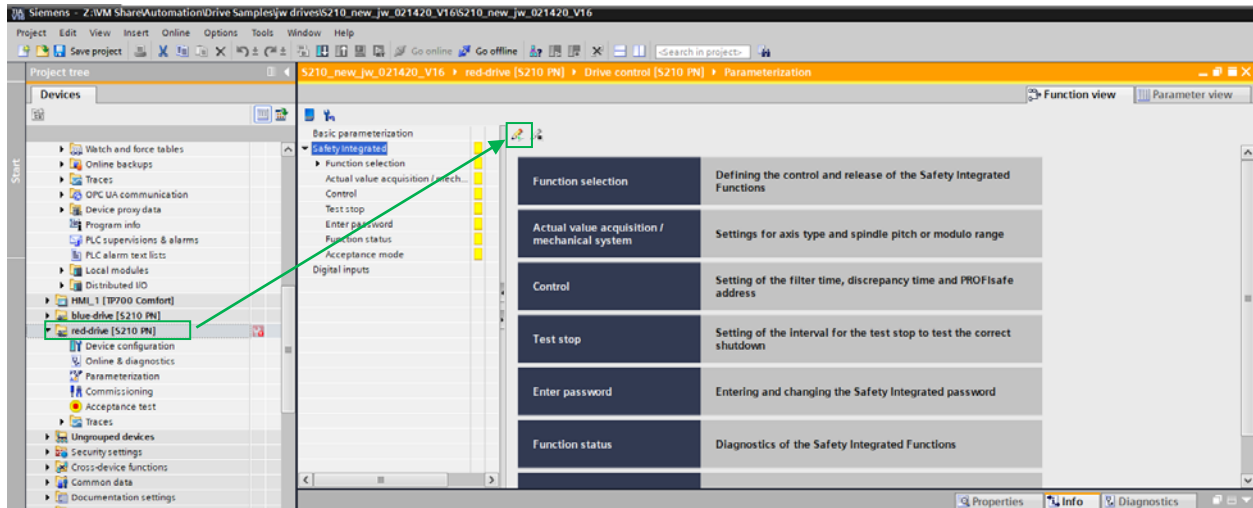
2. Download the safety configuration to the drive  
Select the drive in the project tree and download.



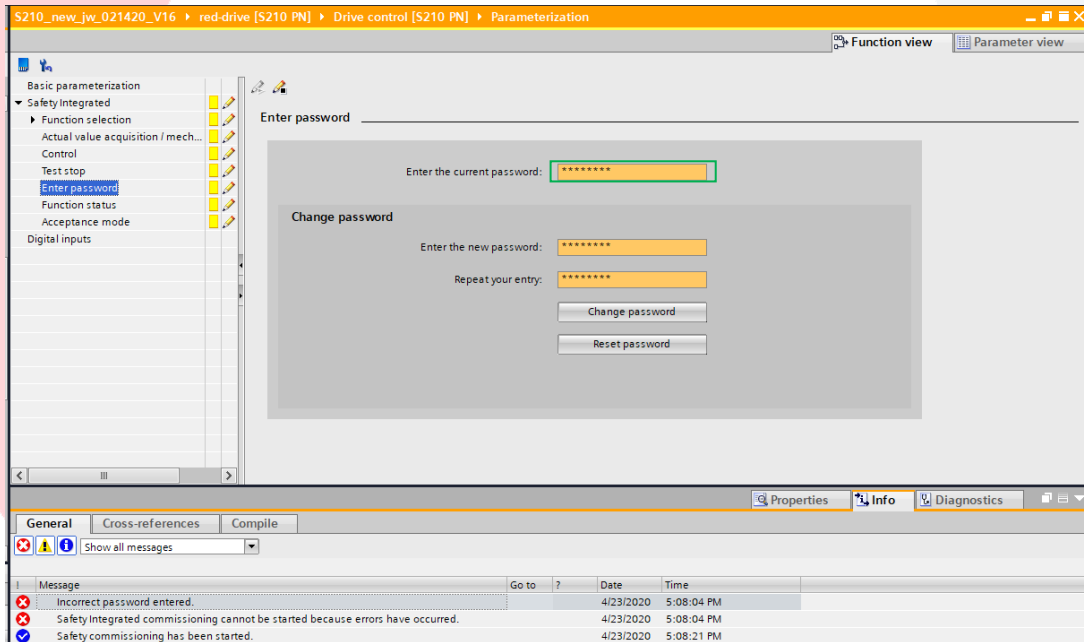
The parameters will be inconsistent, but select Finish.



## Go online with the S210 and start Safety commissioning

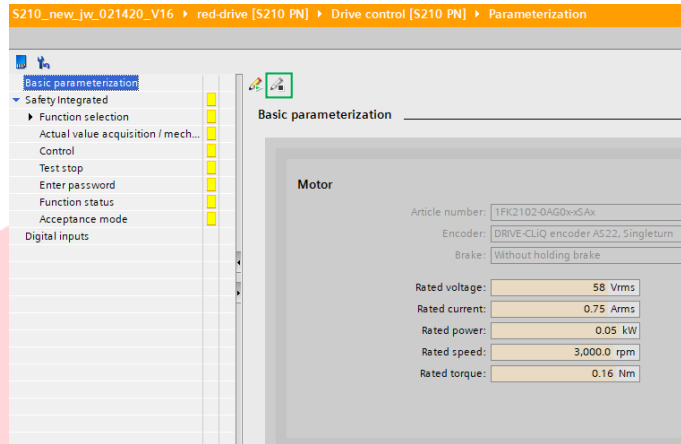


Enter the S210 safety password. When correctly entered, the inspection window will display the message "Safety commissioning has been started."

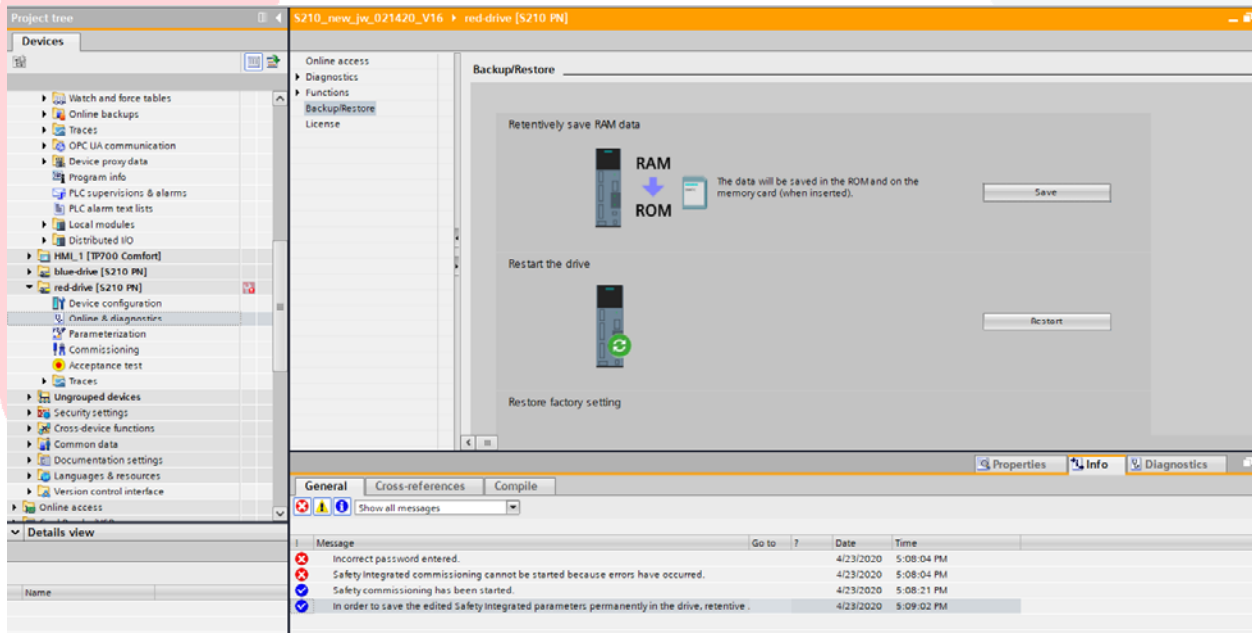




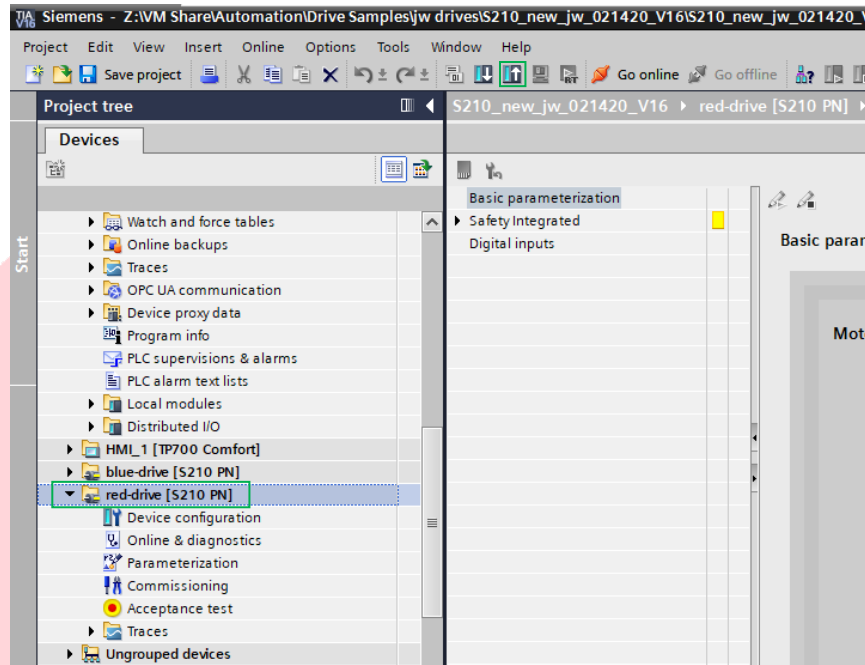
Stop safety commissioning to copy parameters to dual memory.



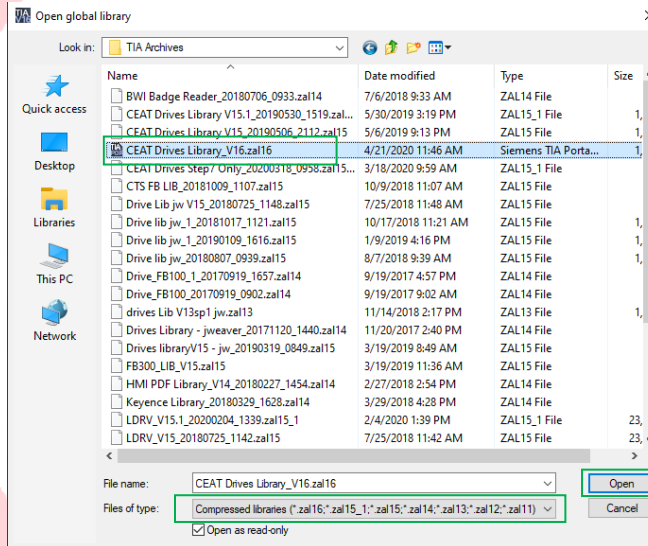
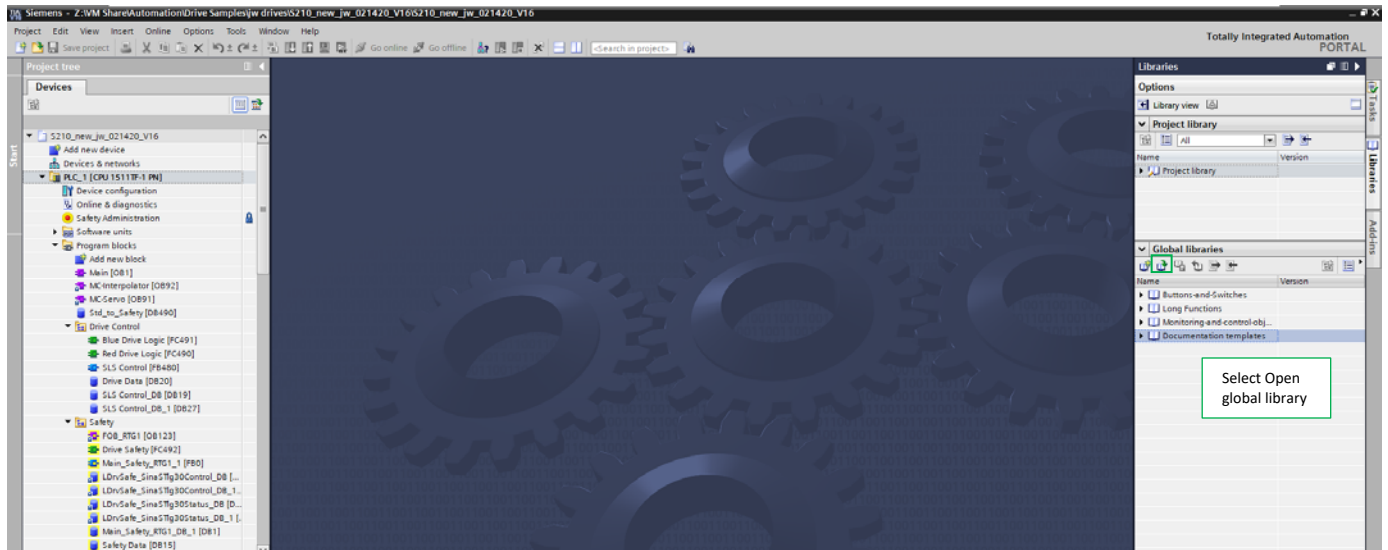
Open the S210's Online & diagnostics, select Backup/Restore, and save RAM to ROM.



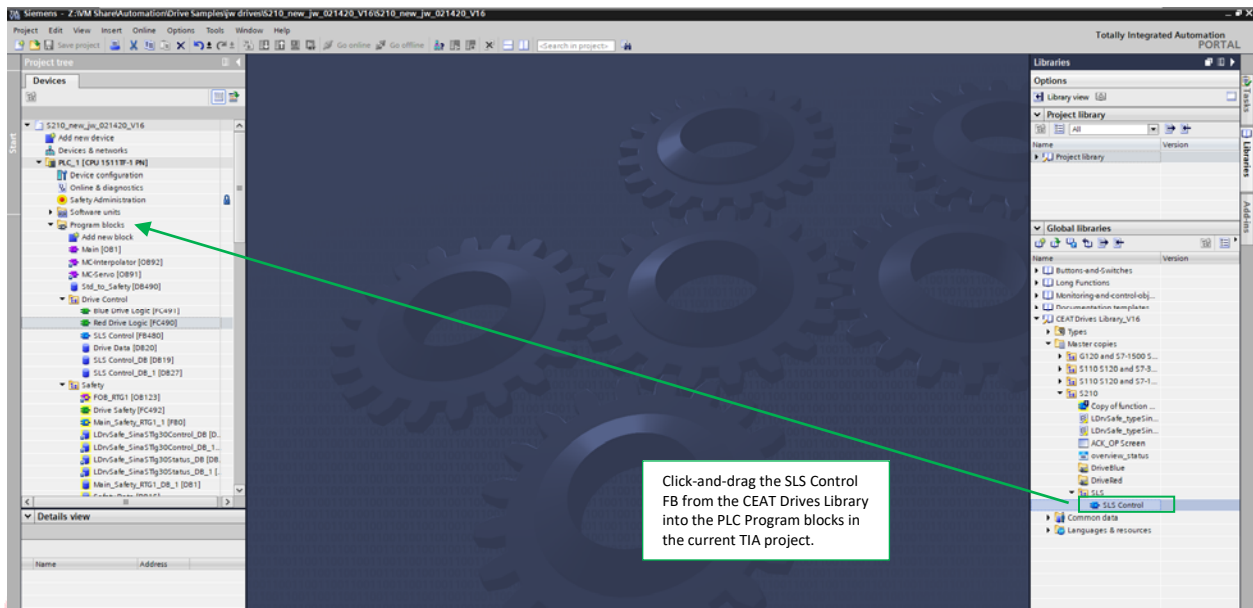
Go offline with the S210, cycle power on the S210, wait for the S210 to boot up, and then upload parameters to the TIA project.



### 3. Retrieve the CEAT Drives Library

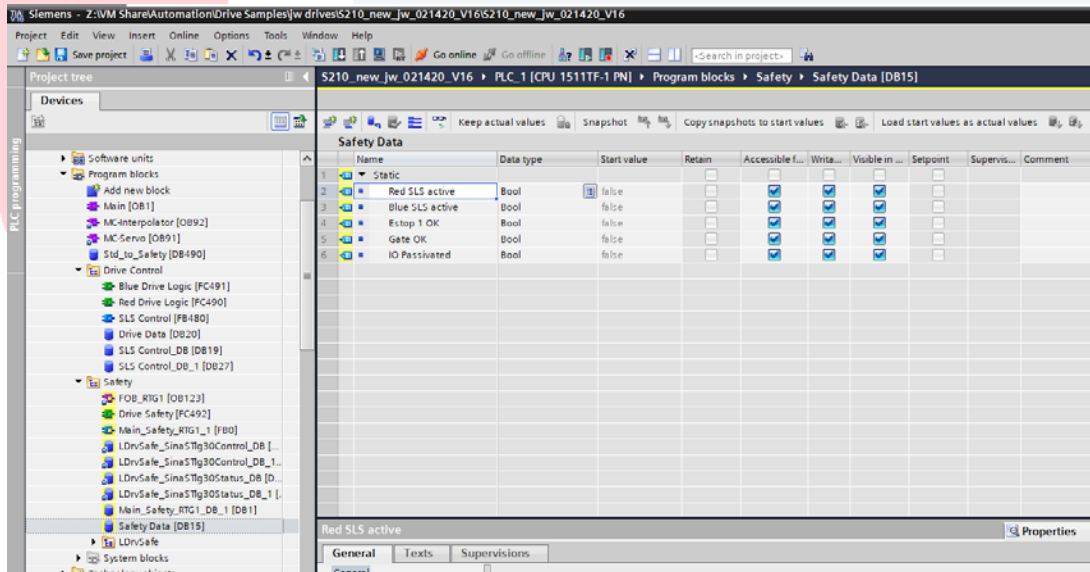


#### 4. Copy the SLS FB into the current project

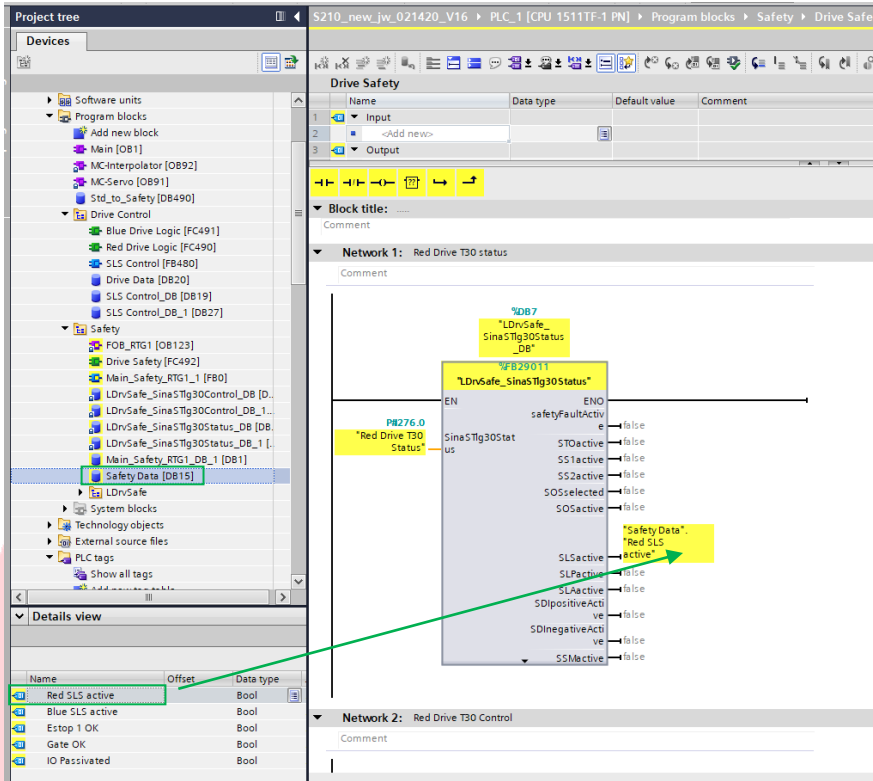


#### 5. Create SLS status feedback in safety program

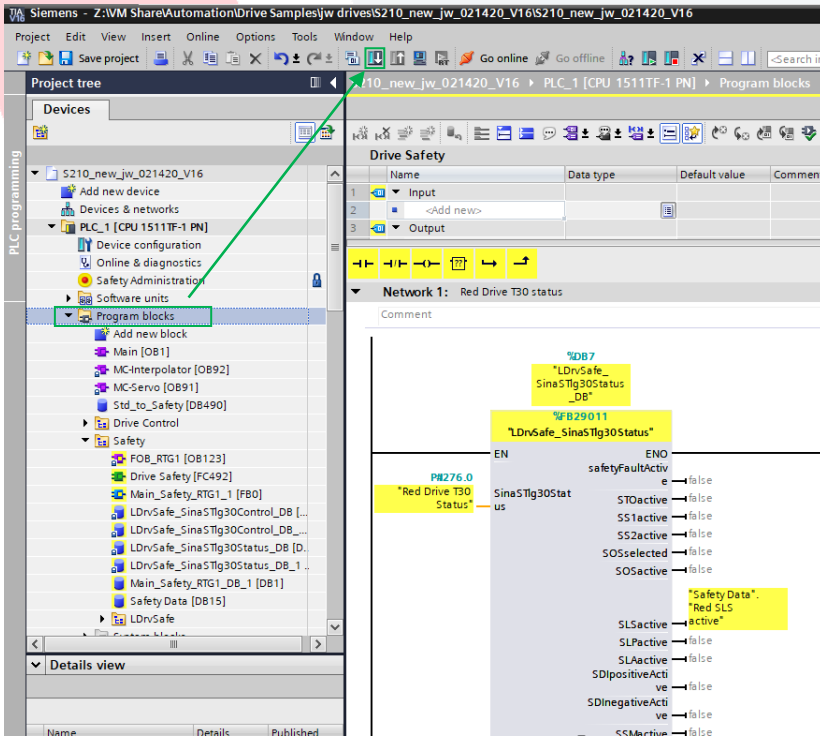
Create a new safety data block, or add to the existing safety data block, a Boolean element for SLS status from the S210.



Add the Boolean SLS status data block element to the SLSactive output of the safety telegram, telegram 30, function block.

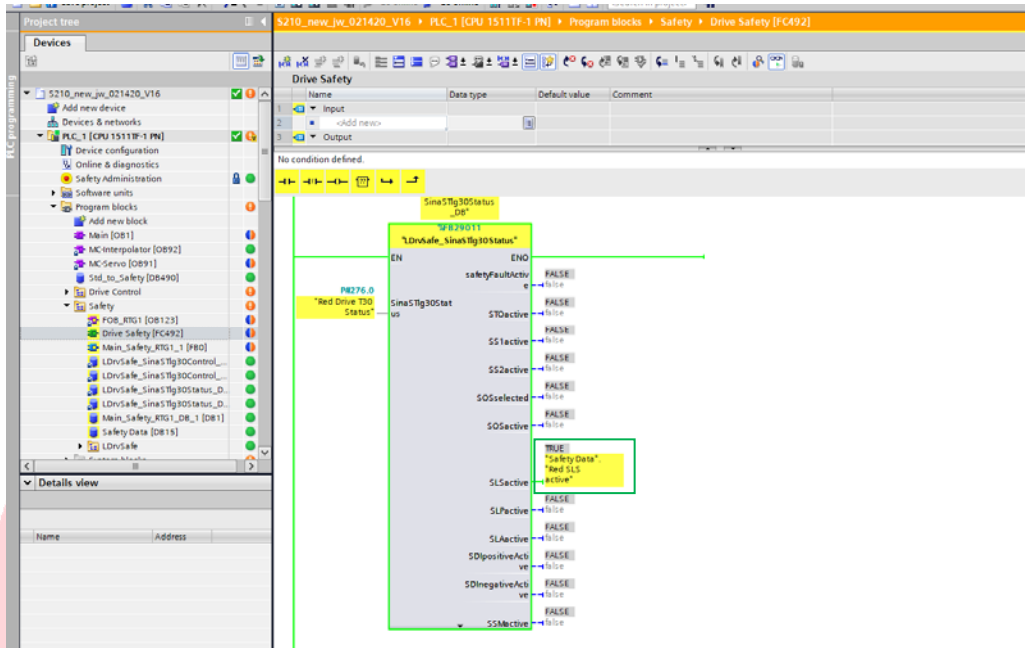


Save and download to the PLC.



## 6. SLS Feedback

When a SLS condition occurs, status from telegram 30 will indicate the SLS condition is active.



Additionally, when a SLS condition occurs, the safety status of the S210 can be observed in the S210 Safety Integrated Function status in Parameterization. The same information can be observed in the S210's Online & diagnostics.

