SIEMENS

SIMATIC Safety Workshop- 1200F

Experience the fast and easy way to safe machines – at highest productivity

Task: S7-1200F Configuration

Goal:

Demonstrate the ease of setup and programming of S7-1200 Failsafe PLC.

Main take away items:

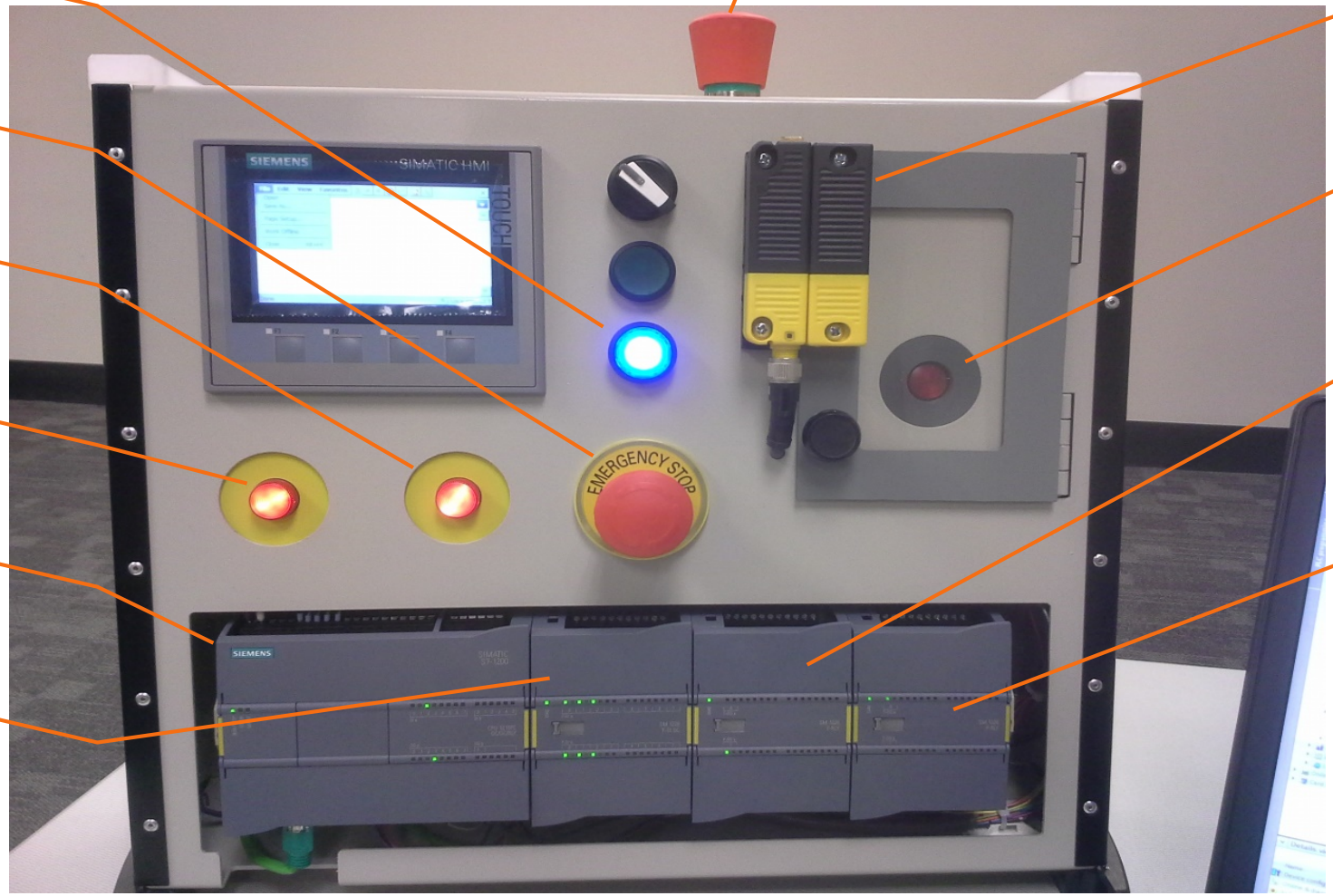
- Add an S7-1200 PLC with safety I/O. Commission entire safety system
- Add simple logic to the S7-1200 to control the buttons and lights on the demo unit.

The purpose of this workshop is to guide you through an example of how to configure a 1200F safety PLC using TIA Portal. The requirements for this lab include the safety demo pictured in the next slide, PC with TIA Portal V13 SP1 or greater, and a Ethernet cable for download.

This workshop will include programming of three safety functions. These safety functions will use ESTOP buttons and RFID Safety door switch. These safety functions will be divided into 3 zones. There will a Global ESTOP that will turn off all safety outputs and a Zone 1 ESTOP that will turn off Zone 1 outputs only. There will be one RFID safety door switch turning off Zone 3 output only. The ETSOP circuits will require a manual acknowledgement where the door switch will not need a manual acknowledgement.

The hardware and software configuration and programming will be covered during the workshop.

Demo Unit Layout

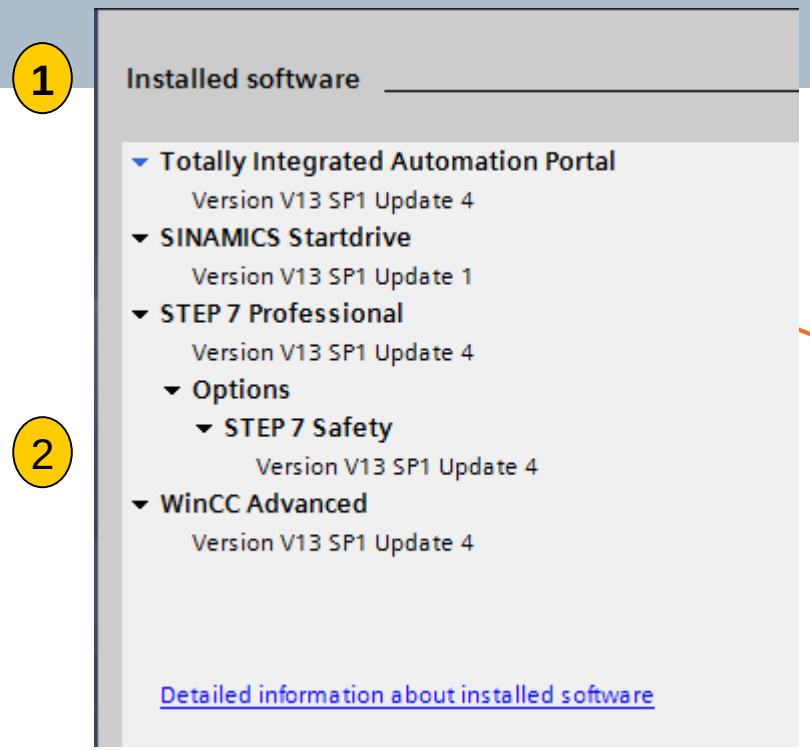


- Global Estop – This ESTOP will cause all safety outputs to turn off. This include Zone 1 Indicator, Zone 2 Indicator, and Safe Func 1 Indicator. The ESTOP function will need a manual acknowledgement once the ETSOP is cleared by pressing the blue ACK pushbutton.

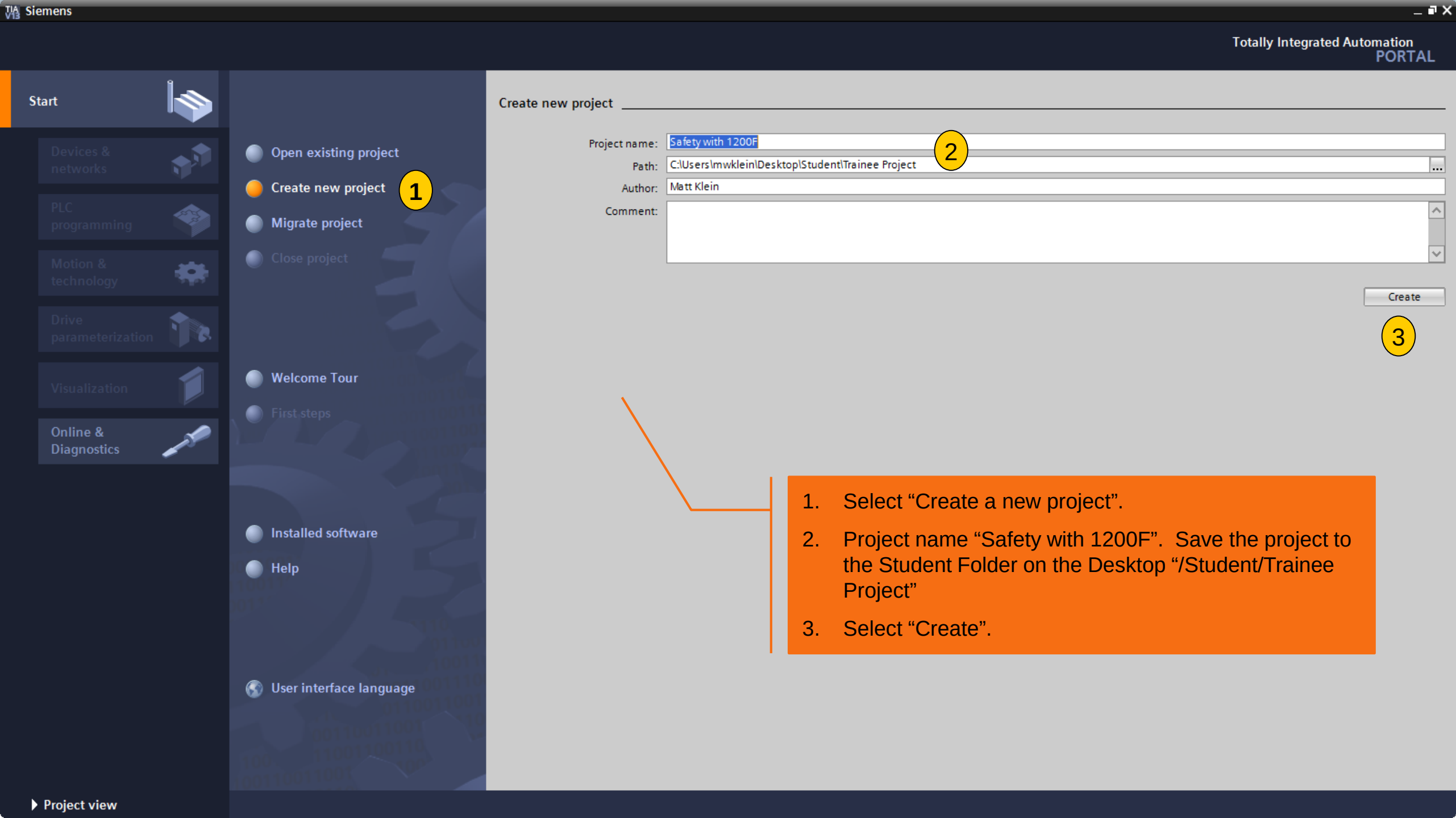
- Zone 2 ESTOP – This ETSOP will cause the Zone 2 Indicator and Safe Func 1 safety outputs to turn off. The ESTOP function will need a manual acknowledgement once the ESTOP is cleared by pressing the blue ACK pushbutton.

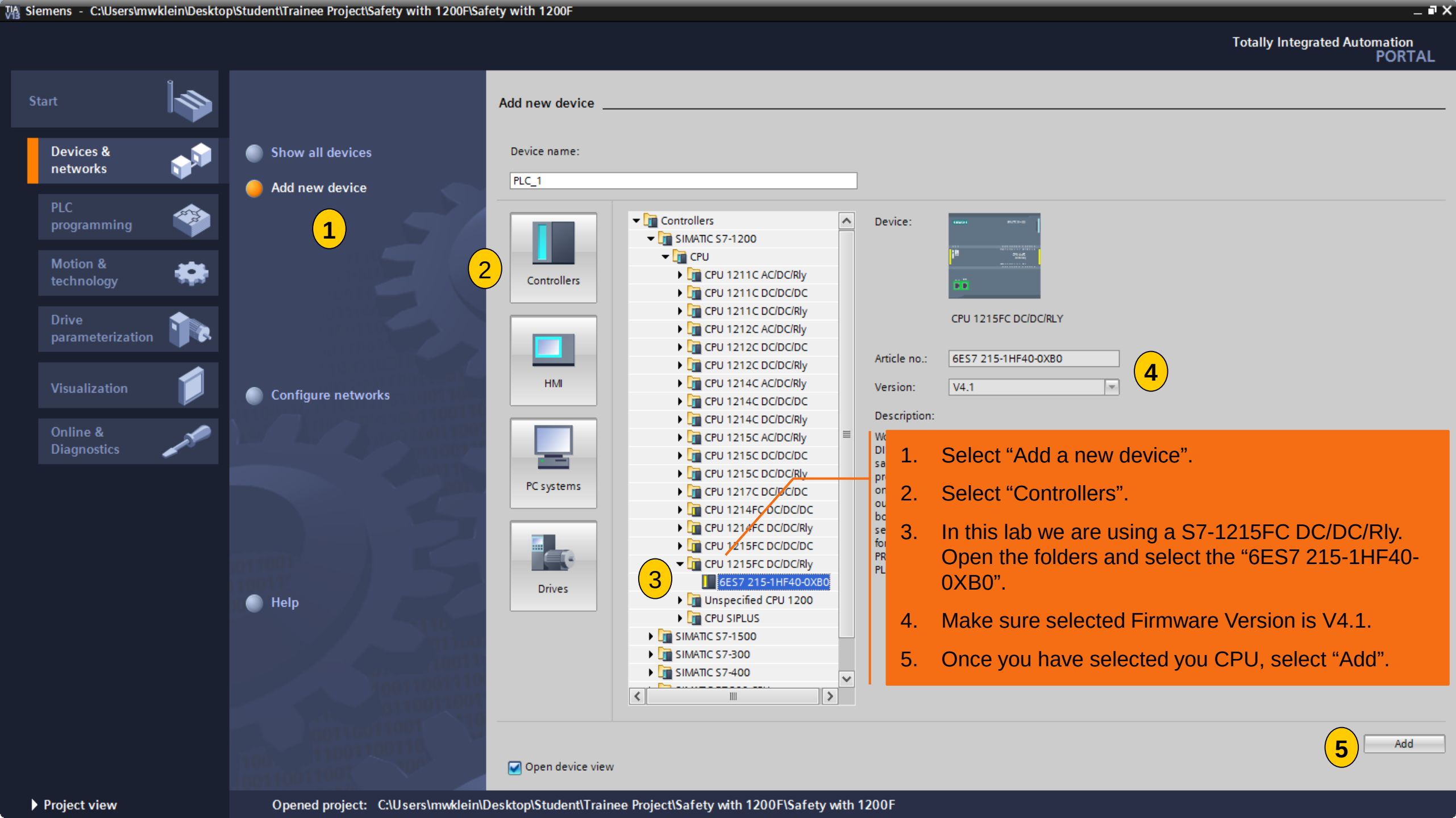
- Zone 1 Door Switch – This safety door switch will turn off the Zone 1 Indicator safety output. Once the door is closed there will be no need for a manual acknowledgement.

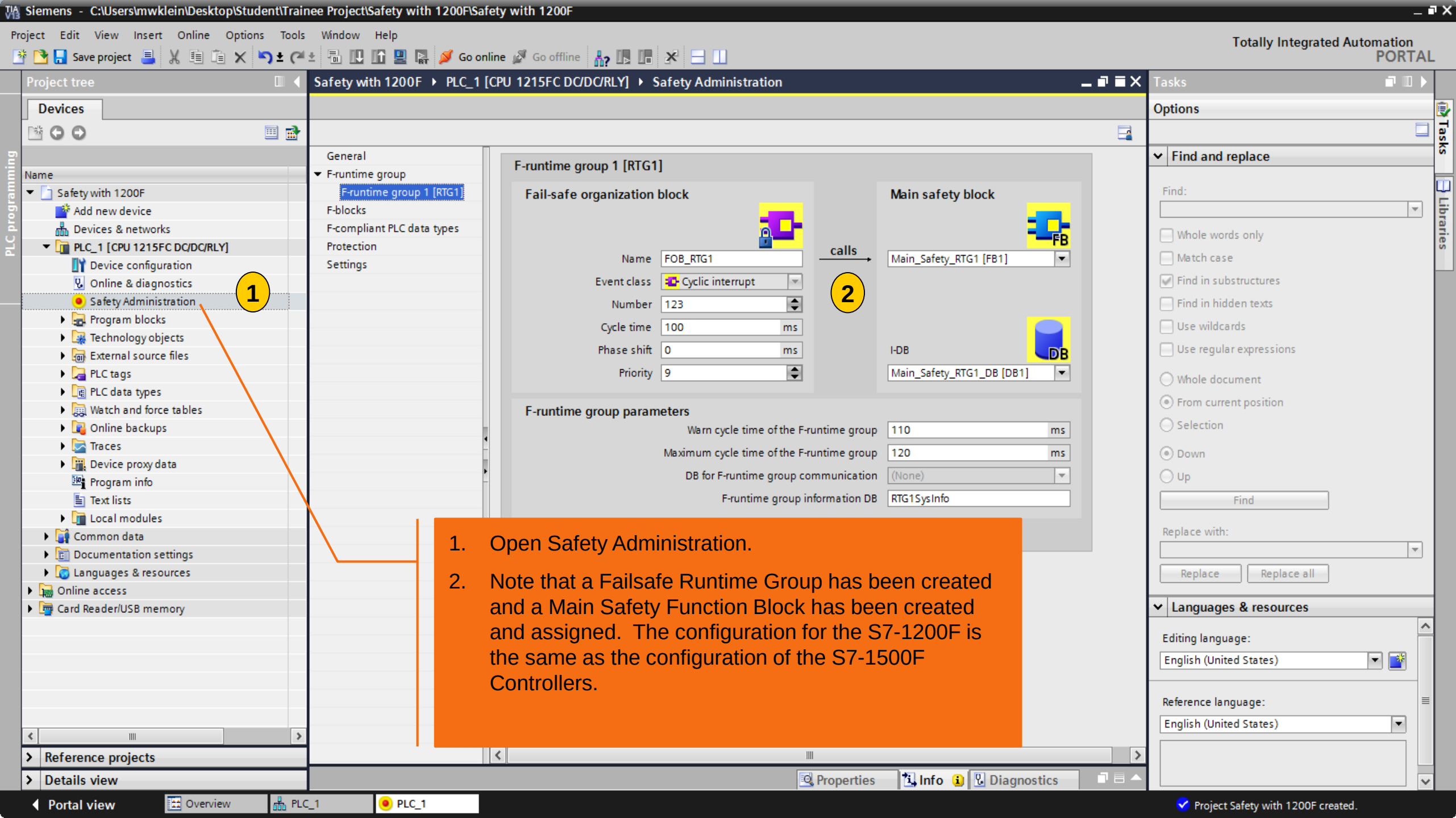
- Zone 2 Door Switch – This safety door switch will turn off the Zone 2 Indicator safety output. Once the door is closed there will be no need for a manual acknowledgement.

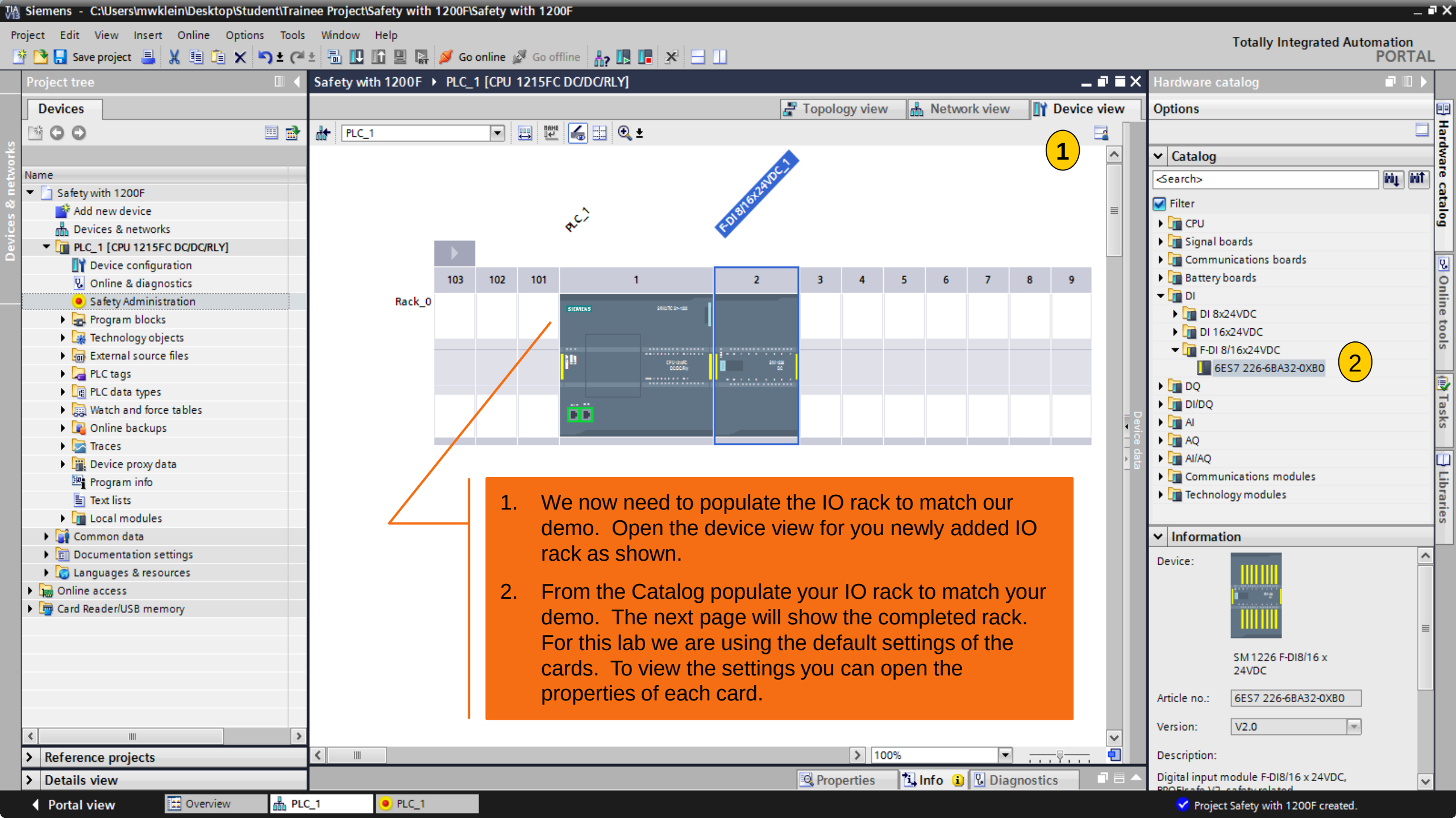


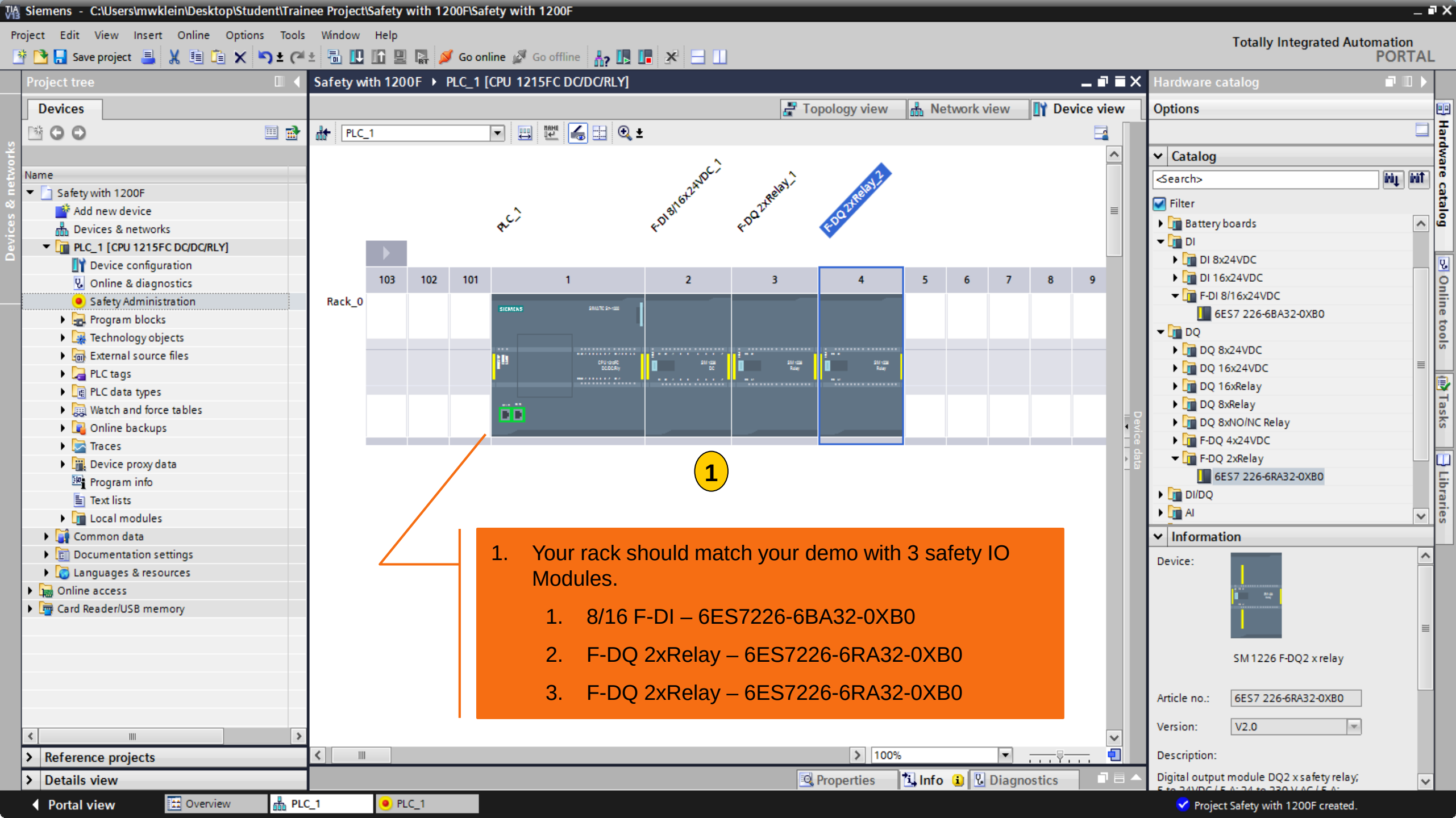
1. Installed Software on PC used to create labs.
2. Note that V13 SP1 Safety was also installed.

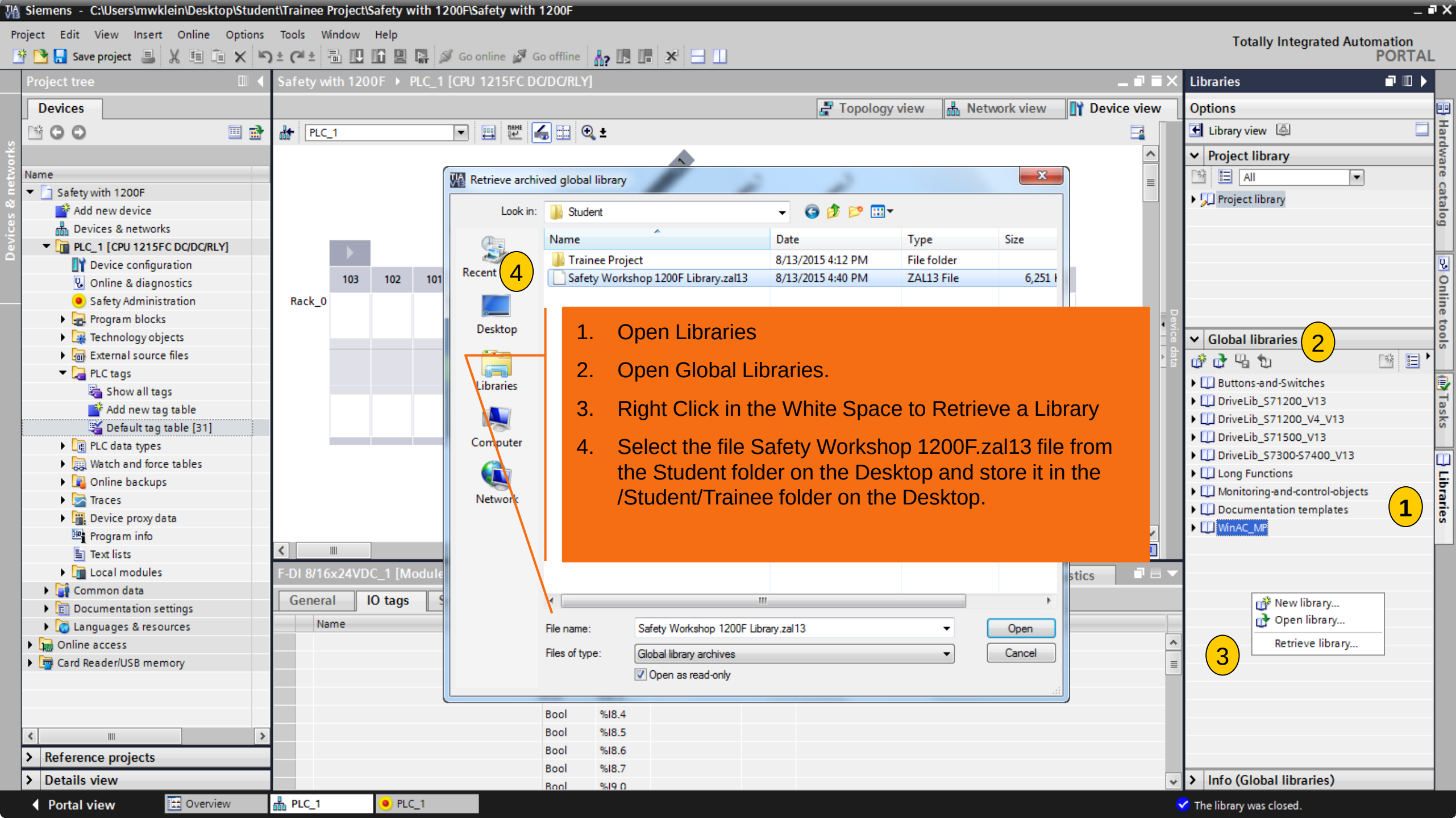

Siemens
Totally Integrated Automation
PORTAL
Start
Devices & networks
PLC programming
Motion & technology
Drive parameterization
Visualization
Online & Diagnostics
Open existing project
Create new project
1
Migrate project
Close project
Welcome Tour
First steps
Installed software
Help
User interface language
Create new project
Project name:
Safety with 1200F
2
Path:
C:\Users\mwklein\Desktop\Student\Trainee Project
Author:
Matt Klein
Comment:
Create
3
1. Select “Create a new project”.
2. Project name “Safety with 1200F”. Save the project to the Student Folder on the Desktop “/Student/Trainee Project”
3. Select “Create”.
Project view


Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Totally Integrated Automation
PORTAL
Start
Devices & networks
PLC programming
Motion & technology
Drive parameterization
Visualization
Online & Diagnostics
Show all devices
Add new device
1
Configure networks
Help
Add new device
Device name:
PLC_1
2
Controllers
HMI
PC systems
Drives
Controllers
SIMATIC S7-1200
CPU
CPU 1211C AC/DC/Rly
CPU 1211C DC/DC/DC
CPU 1211C DC/DC/Rly
CPU 1212C AC/DC/Rly
CPU 1212C DC/DC/DC
CPU 1212C DC/DC/Rly
CPU 1214C AC/DC/Rly
CPU 1214C DC/DC/DC
CPU 1214C DC/DC/Rly
CPU 1215C AC/DC/Rly
CPU 1215C DC/DC/DC
CPU 1215C DC/DC/Rly
CPU 1217C DC/DC/DC
CPU 1214FC DC/DC/DC
CPU 1214FC DC/DC/Rly
CPU 1215FC DC/DC/DC
CPU 1215FC DC/DC/Rly
3
6ES7 215-1HF40-0XB0
Unspecified CPU 1200
CPU SIPLUS
SIMATIC S7-1500
SIMATIC S7-300
SIMATIC S7-400
Device:
CPU 1215FC DC/DC/RLY
Article no.:
6ES7 215-1HF40-0XB0
4
Version:
V4.1
Description:
1. Select “Add a new device”.
2. Select “Controllers”.
3. In this lab we are using a S7-1215FC DC/DC/Rly. Open the folders and select the “6ES7 215-1HF40-0XB0”.
4. Make sure selected Firmware Version is V4.1.
5. Once you have selected you CPU, select “Add”.
5
Add
Open device view
Project view
Opened project: C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F


Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project Go online Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
PLC tags
PLC data types
Watch and force tables
Online backups
Traces
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Reference projects
Details view
1
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Safety Administration
General
F-runtime group
F-runtime group 1 [RTG1]
F-blocks
F-compliant PLC data types
Protection
Settings
F-runtime group 1 [RTG1]
Fail-safe organization block
Name FOB_RTG1
Event class Cyclic interrupt
Number 123
Cycle time 100 ms
Phase shift 0 ms
Priority 9
calls
2
Main safety block
Main_Safety_RTG1 [FB1]
I-DB
Main_Safety_RTG1_DB [DB1]
F-runtime group parameters
Warn cycle time of the F-runtime group 110 ms
Maximum cycle time of the F-runtime group 120 ms
DB for F-runtime group communication (None)
F-runtime group information DB RTG1SysInfo
1. Open Safety Administration.
2. Note that a Failsafe Runtime Group has been created and a Main Safety Function Block has been created and assigned. The configuration for the S7-1200F is the same as the configuration of the S7-1500F Controllers.
Properties Info Diagnostics
Tasks
Options
Find and replace
Find:
Whole words only
Match case
Find in substructures
Find in hidden texts
Use wildcards
Use regular expressions
Whole document
From current position
Selection
Down
Up
Find
Replace with:
Replace
Replace all
Languages & resources
Editing language:
English (United States)
Reference language:
English (United States)
Portal view
Overview
PLC_1
PLC_1
Project Safety with 1200F created.


Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project Go online Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
PLC tags
PLC data types
Watch and force tables
Online backups
Traces
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Reference projects
Details view
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
Topology view
Network view
Device view
PLC_1
1
PLC_1
F-DI 8/16x24VDC_1
103 102 101 1 2 3 4 5 6 7 8 9
Rack_0
1. We now need to populate the IO rack to match our demo. Open the device view for you newly added IO rack as shown.
2. From the Catalog populate your IO rack to match your demo. The next page will show the completed rack. For this lab we are using the default settings of the cards. To view the settings you can open the properties of each card.
100%
Properties
Info
Diagnostics
Hardware catalog
Options
Catalog
<Search>
Filter
CPU
Signal boards
Communications boards
Battery boards
DI
DI 8x24VDC
DI 16x24VDC
F-DI 8/16x24VDC
6ES7 226-6BA32-0XB0
2
DQ
DI/DQ
AI
AQ
AI/AQ
Communications modules
Technology modules
Information
Device:
SM 1226 F-DI8/16 x 24VDC
Article no.: 6ES7 226-6BA32-0XB0
Version: V2.0
Description:
Digital input module F-DI8/16 x 24VDC,
Hardware catalog
Online tools
Tasks
Libraries
Portal view
Overview
PLC_1
PLC_1
Project Safety with 1200F created.


Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project Go online Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
PLC tags
PLC data types
Watch and force tables
Online backups
Traces
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Reference projects
Details view
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
Topology view
Network view
Device view
PLC_1
PLC_1
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
F-DQ 2xRelay_2
103 102 101 1 2 3 4 5 6 7 8 9
Rack_0
1
1. Your rack should match your demo with 3 safety IO Modules.
1. 8/16 F-DI – 6ES7226-6BA32-0XB0
2. F-DQ 2xRelay – 6ES7226-6RA32-0XB0
3. F-DQ 2xRelay – 6ES7226-6RA32-0XB0
100%
Properties
Info
Diagnostics
Hardware catalog
Options
Catalog
<Search>
Filter
Battery boards
DI
DI 8x24VDC
DI 16x24VDC
F-DI 8/16x24VDC
6ES7 226-6BA32-0XB0
DQ
DQ 8x24VDC
DQ 16x24VDC
DQ 16xRelay
DQ 8xRelay
DQ 8xNO/NC Relay
F-DQ 4x24VDC
F-DQ 2xRelay
6ES7 226-6RA32-0XB0
DI/DQ
AI
Information
Device:
SM 1226 F-DQ2 x relay
Article no.: 6ES7 226-6RA32-0XB0
Version: V2.0
Description:
Digital output module DQ2 x safety relay;
Hardware catalog
Online tools
Tasks
Libraries
Devices & networks
Portal view
Overview
PLC_1
PLC_1
Project Safety with 1200F created.


Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation
PORTAL
Project tree
Devices
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
PLC tags
Show all tags
Add new tag table
Default tag table [31]
PLC data types
Watch and force tables
Online backups
Traces
Device proxy data
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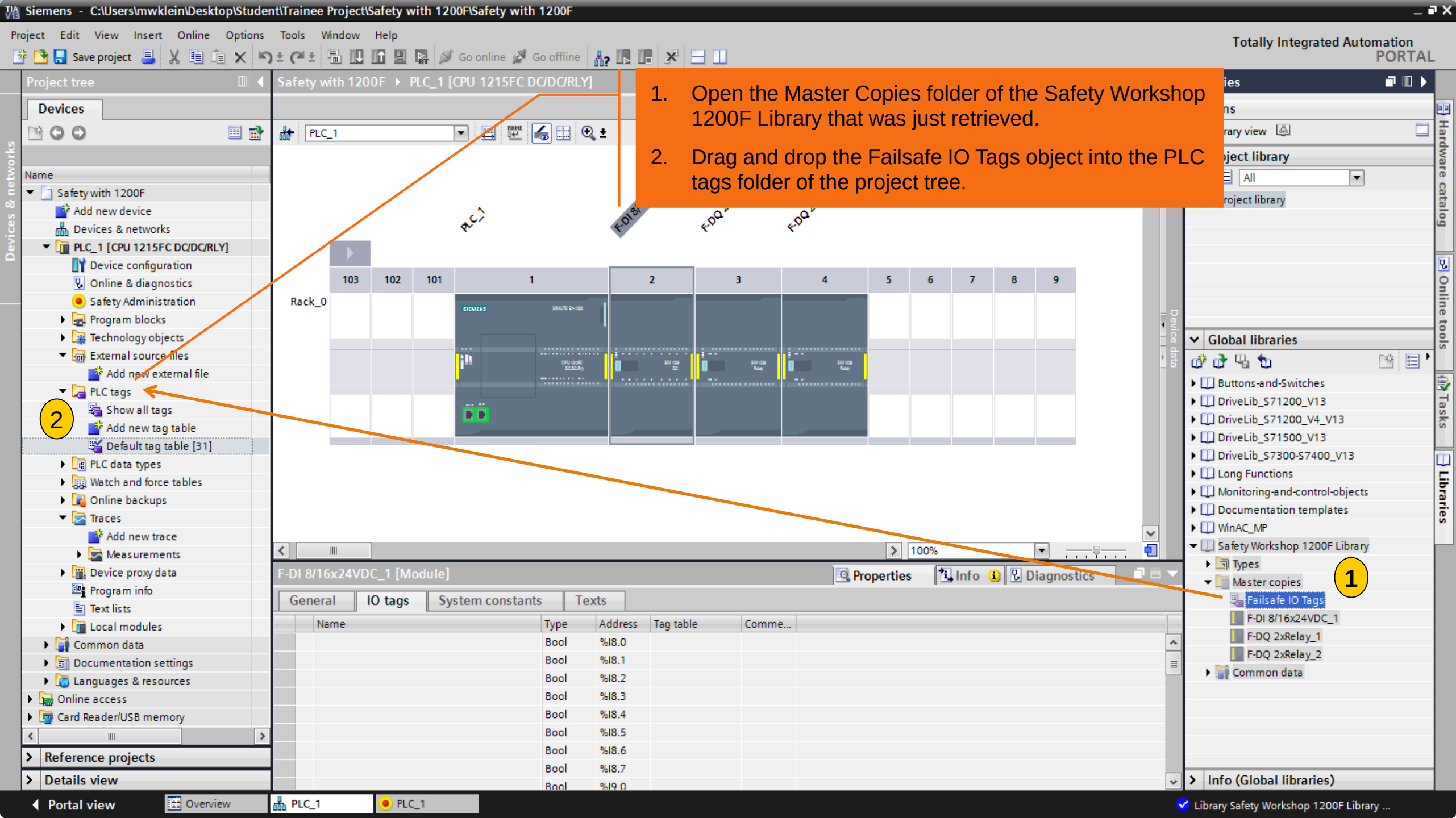
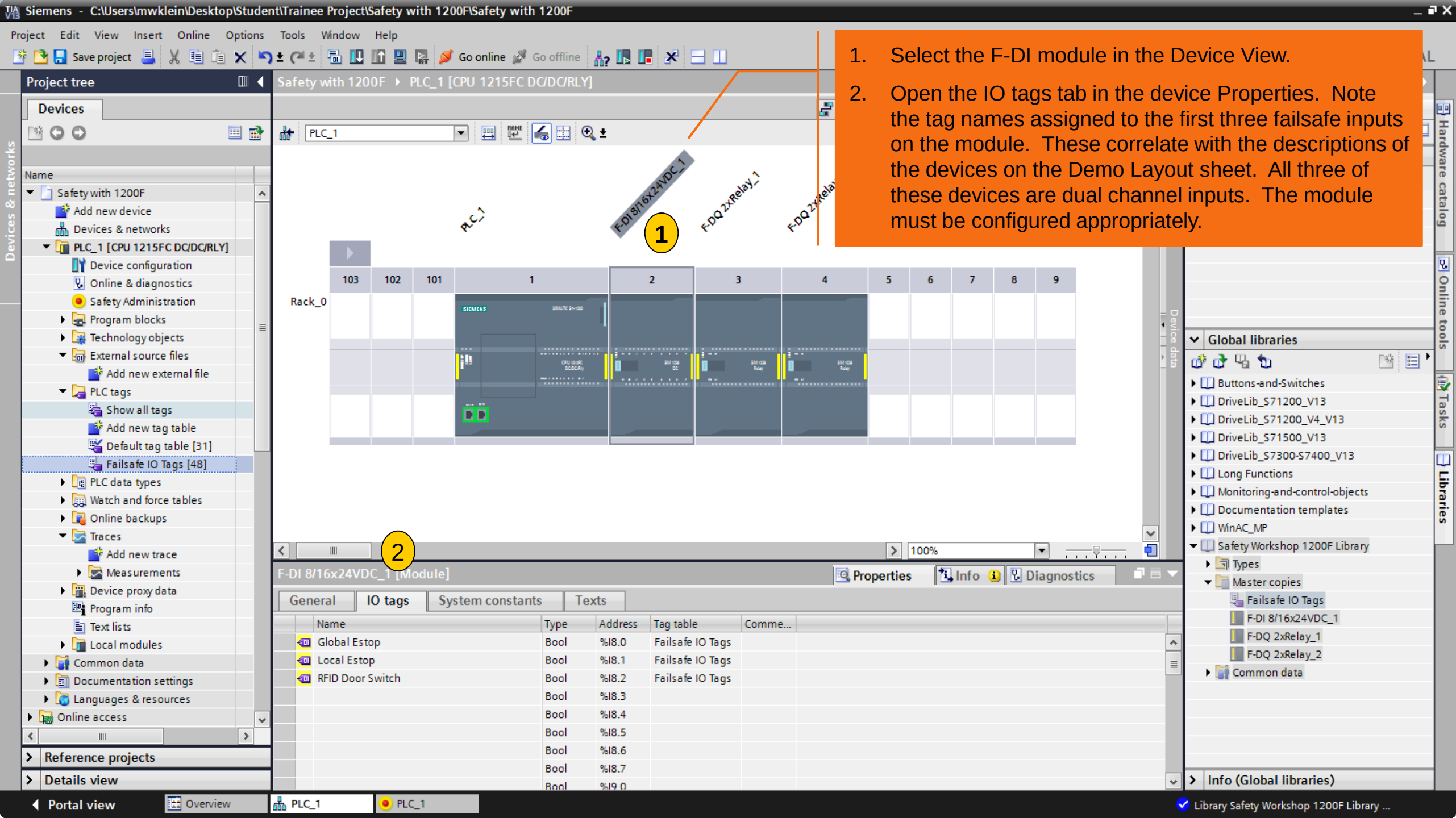
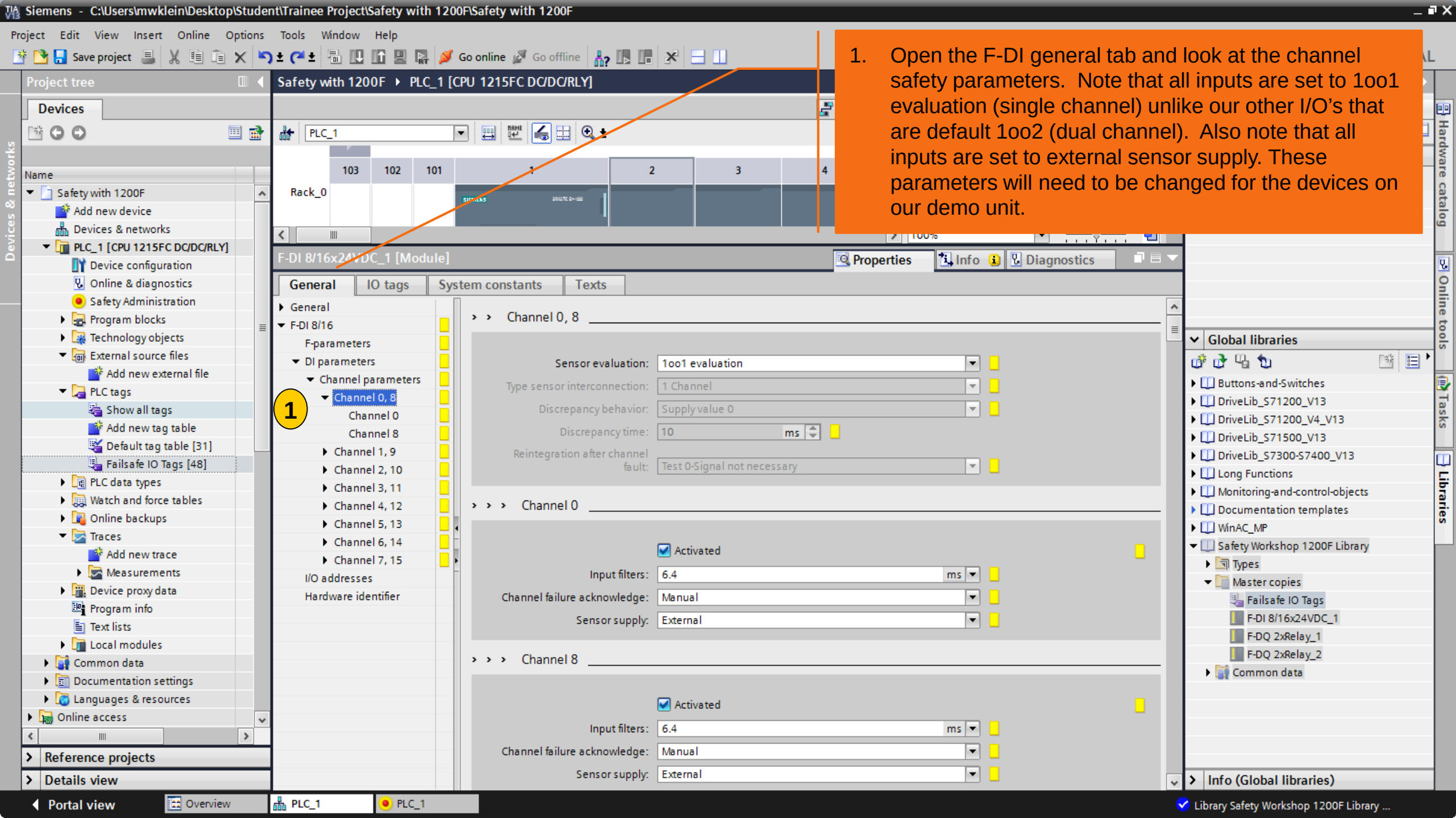
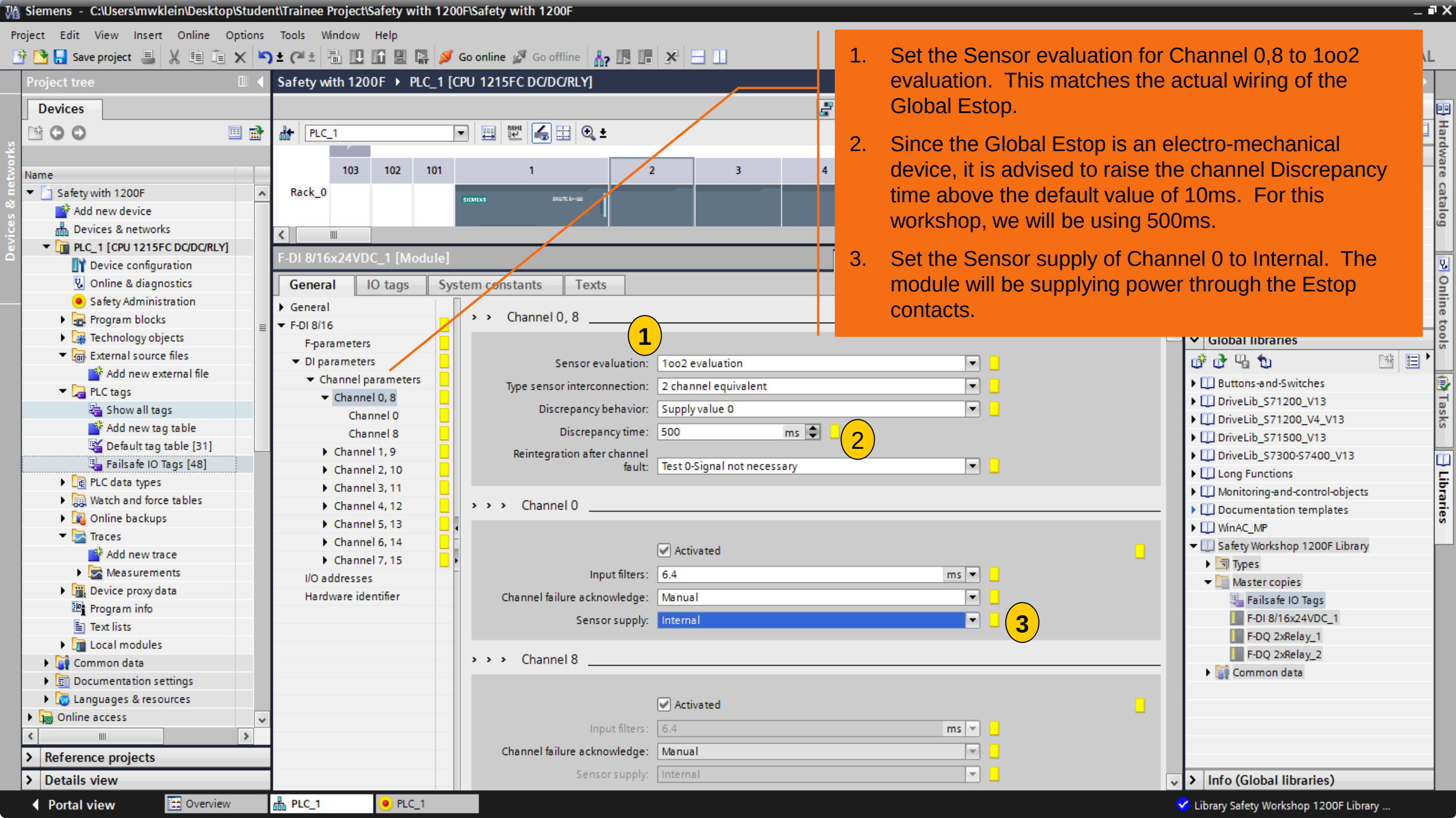
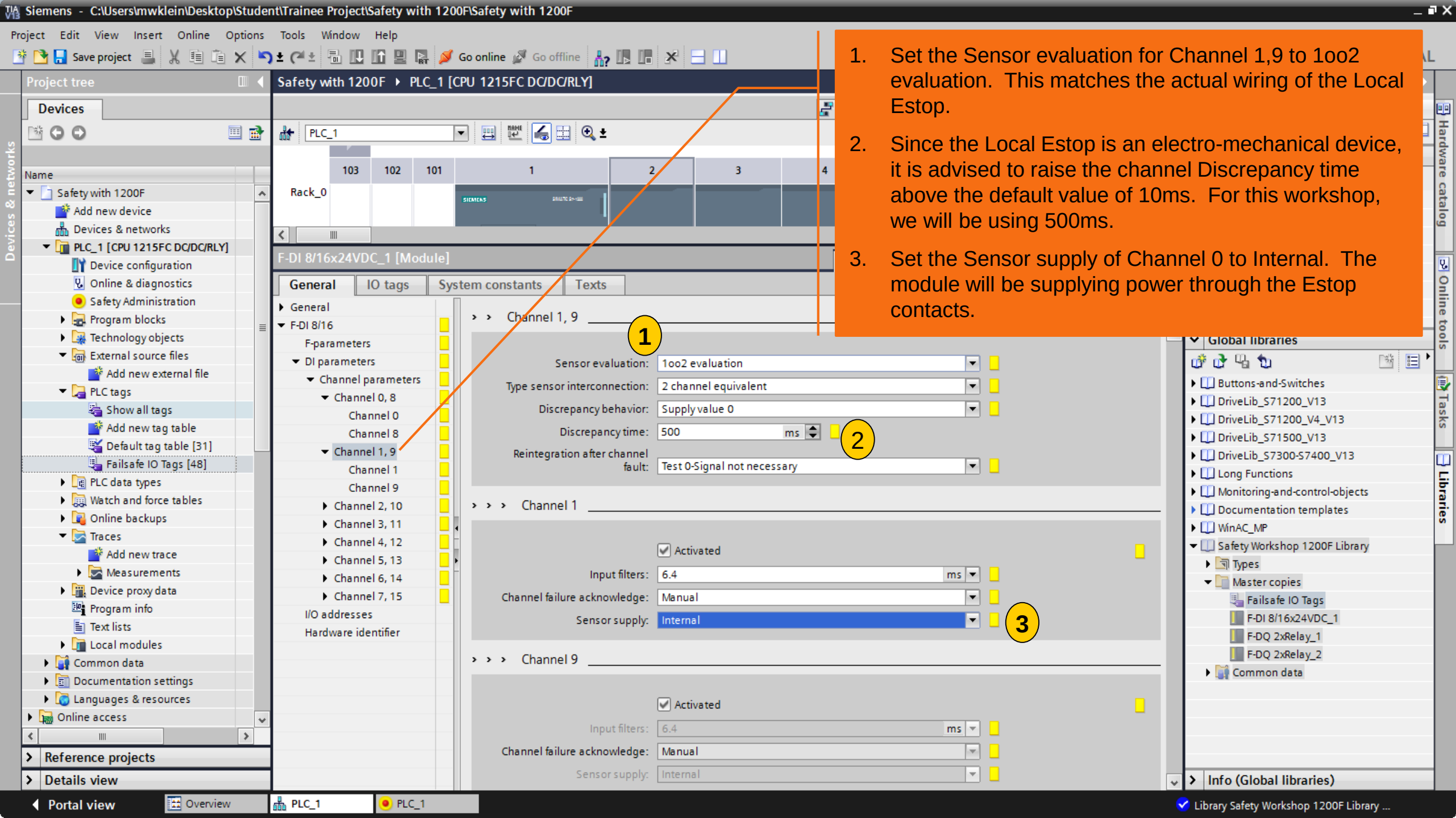
Reference projects
Details view
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
Topology view
Network view
Device view
PLC_1
Rack_0
103
102
101
Retrieve archived global library
Look in:
Student
Recent
Desktop
Libraries
Computer
Network
Name
Date
Type
Size
Trainee Project
8/13/2015 4:12 PM
File folder
Safety Workshop 1200F Library.zal13
8/13/2015 4:40 PM
ZAL13 File
6,251
4
1. Open Libraries
2. Open Global Libraries.
3. Right Click in the White Space to Retrieve a Library
4. Select the file Safety Workshop 1200F.zal13 file from the Student folder on the Desktop and store it in the /Student/Trainee folder on the Desktop.
File name:
Safety Workshop 1200F Library.zal13
Open
Files of type:
Global library archives
Cancel
Open as read-only
F-DI 8/16x24VDC_1 [Module
General
IO tags
Name
Bool %I8.4
Bool %I8.5
Bool %I8.6
Bool %I8.7
Bool %I9.0
Libraries
Options
Library view
Project library
All
Project library
Global libraries
2
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
1
New library...
Open library...
Retrieve library...
3
Info (Global libraries)
Hardware catalog
Online tools
Tasks
Libraries
Portal view
Overview
PLC_1
PLC_1
The library was closed.

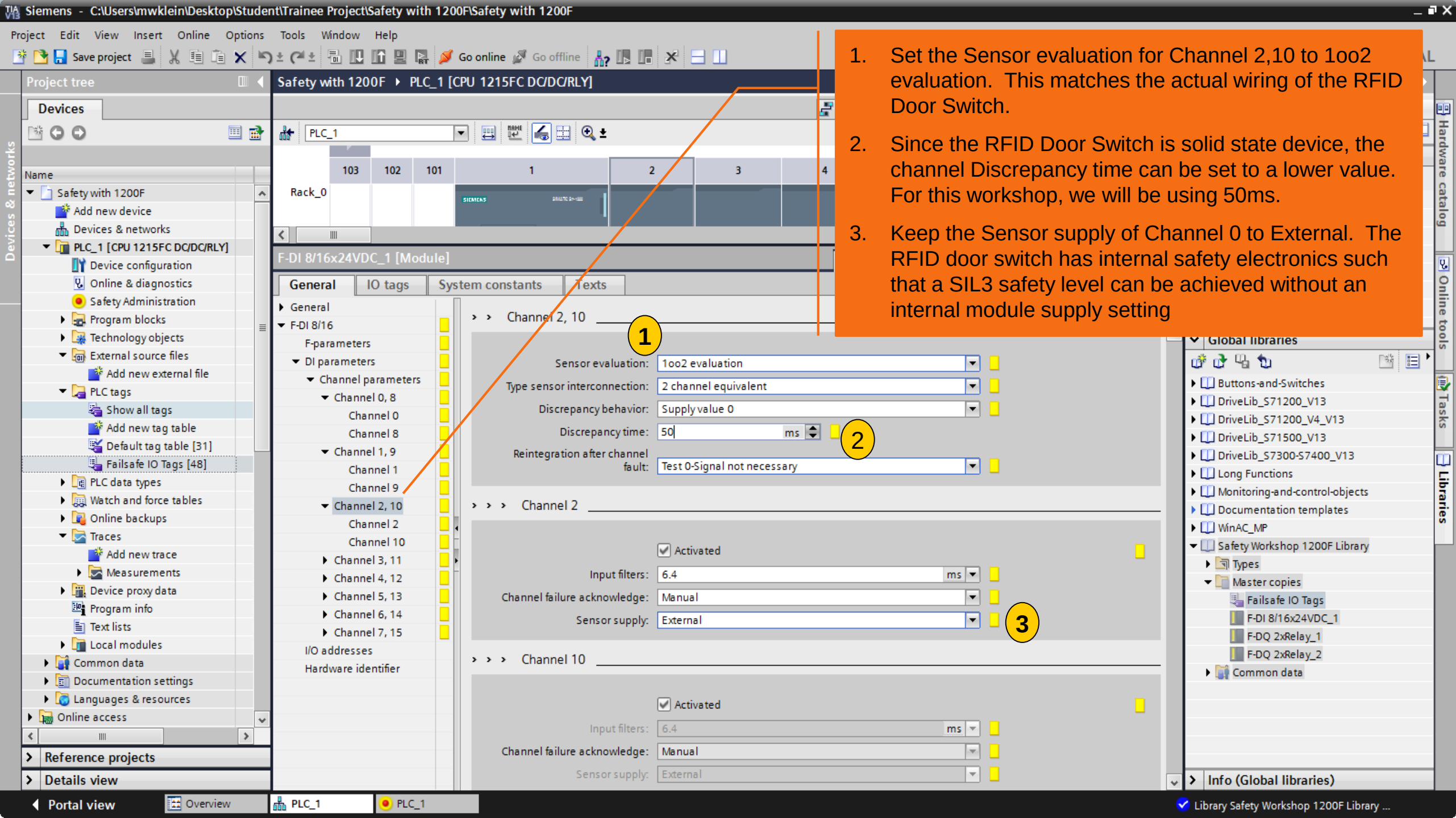

1. Open the Master Copies folder of the Safety Workshop 1200F Library that was just retrieved.
2. Drag and drop the Failsafe IO Tags object into the PLC tags folder of the project tree.
1
2
Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
Add new external file
PLC tags
Show all tags
Add new tag table
Default tag table [31]
PLC data types
Watch and force tables
Online backups
Traces
Add new trace
Measurements
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Reference projects
Details view
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
Rack_0
F-DI 8/16x24VDC_1 [Module]
Properties
Info
Diagnostics
General
IO tags
System constants
Texts
Name
Type
Address
Tag table
Bool %I8.0
Bool %I8.1
Bool %I8.2
Bool %I8.3
Bool %I8.4
Bool %I8.5
Bool %I8.6
Bool %I8.7
Global libraries
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
Safety Workshop 1200F Library
Types
Master copies
Failsafe IO Tags
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
F-DQ 2xRelay_2
Common data
Info (Global libraries)
Portal view
Overview
PLC_1
Library Safety Workshop 1200F Library ...

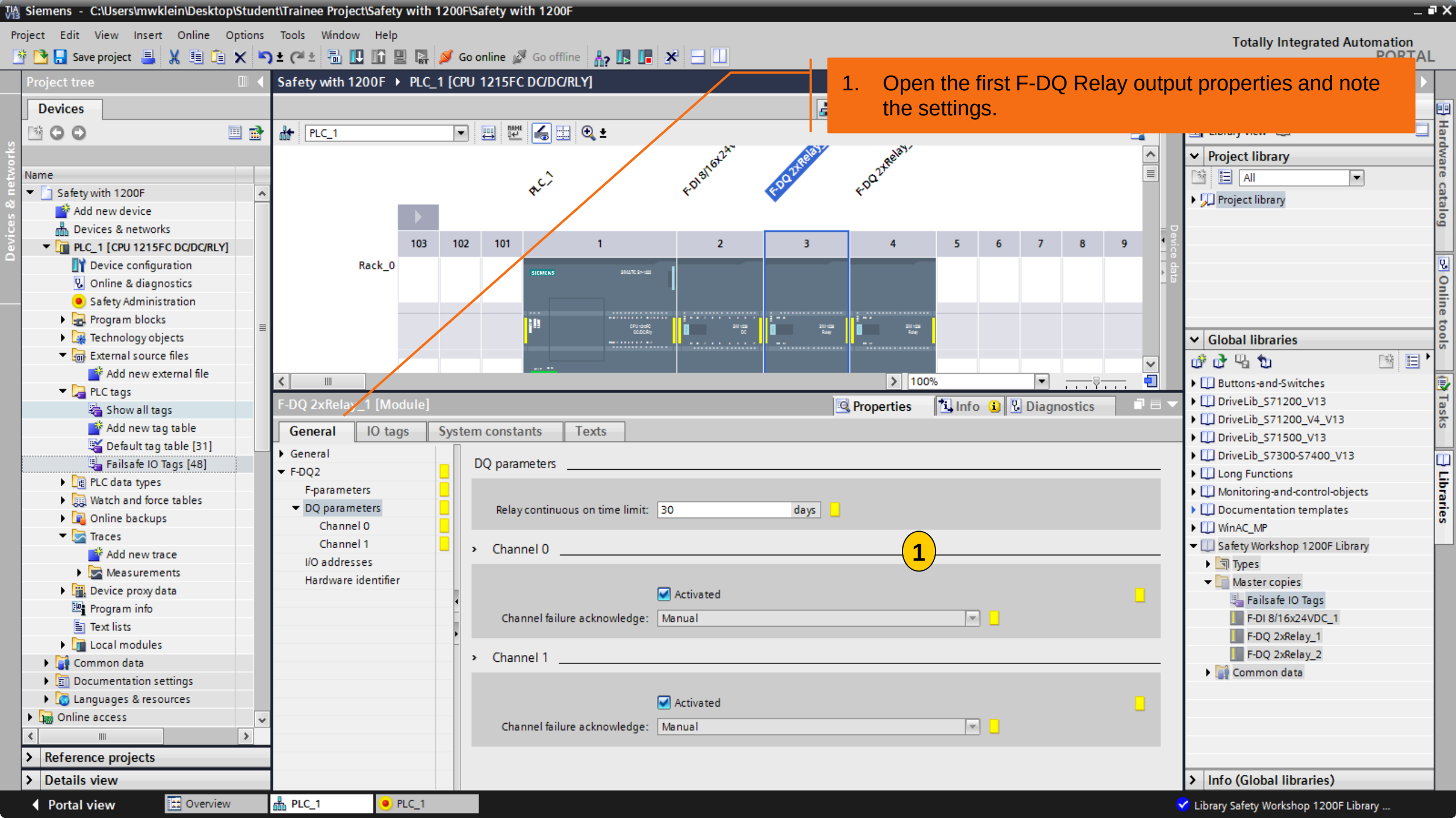

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
PLC_1
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
1
Rack_0
103 102 101 1 2 3 4 5 6 7 8 9
1. Select the F-DI module in the Device View.
2. Open the IO tags tab in the device Properties. Note the tag names assigned to the first three failsafe inputs on the module. These correlate with the descriptions of the devices on the Demo Layout sheet. All three of these devices are dual channel inputs. The module must be configured appropriately.
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
Add new external file
PLC tags
Show all tags
Add new tag table
Default tag table [31]
Failsafe IO Tags [48]
PLC data types
Watch and force tables
Online backups
Traces
Add new trace
Measurements
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Reference projects
Details view
2
F-DI 8/16x24VDC_1 [Module]
Properties
Info
Diagnostics
General
IO tags
System constants
Texts
Name Type Address Tag table Comme...
Global Estop Bool %I8.0 Failsafe IO Tags
Local Estop Bool %I8.1 Failsafe IO Tags
RFID Door Switch Bool %I8.2 Failsafe IO Tags
Bool %I8.3
Bool %I8.4
Bool %I8.5
Bool %I8.6
Bool %I8.7
Bool %I9.0
100%
Global libraries
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
Safety Workshop 1200F Library
Types
Master copies
Failsafe IO Tags
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
F-DQ 2xRelay_2
Common data
Info (Global libraries)
Hardware catalog
Online tools
Tasks
Libraries
Portal view
Overview
PLC_1
PLC_1
Library Safety Workshop 1200F Library ...

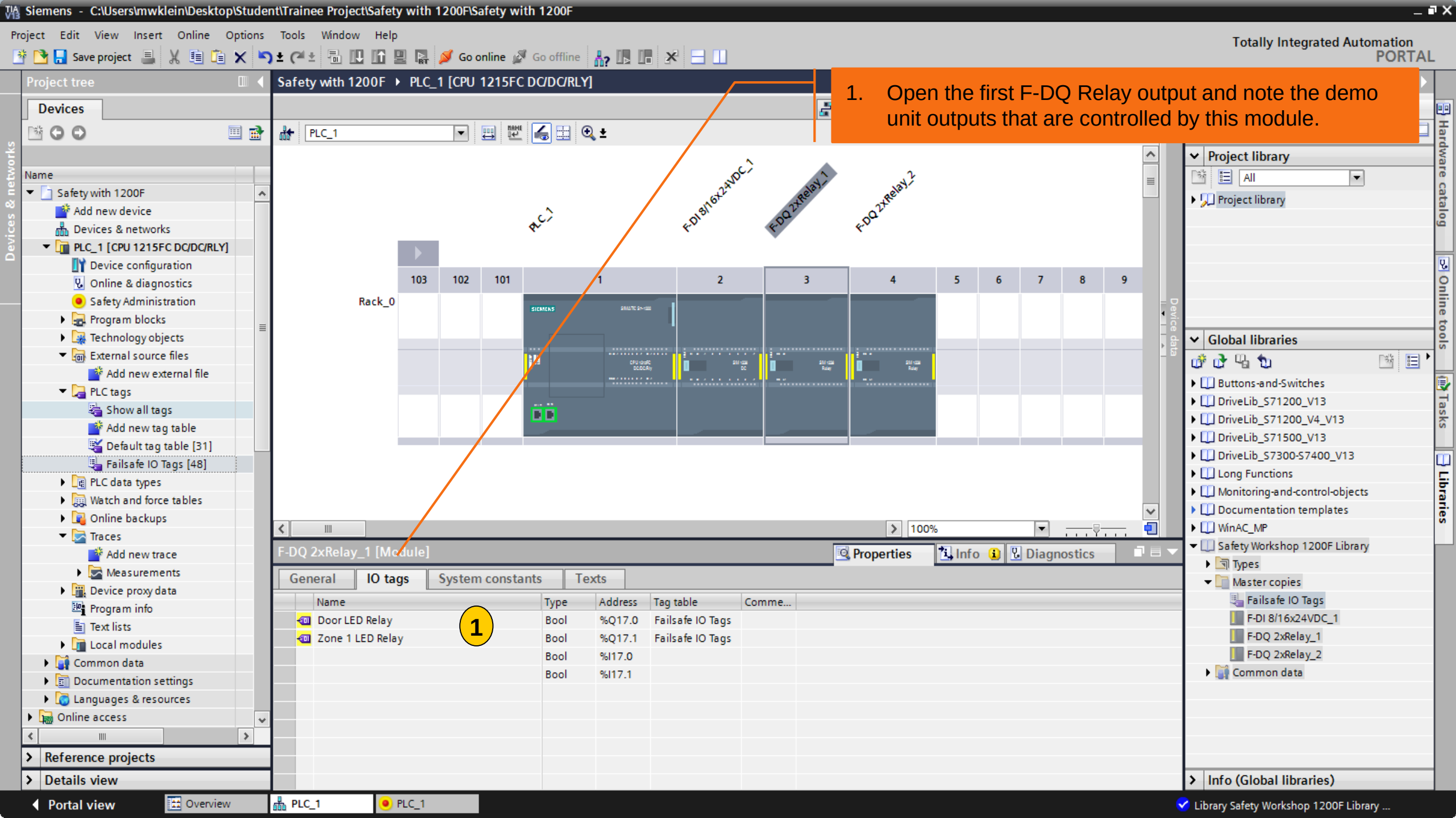

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Project tree
Devices
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
Add new external file
PLC tags
Show all tags
Add new tag table
Default tag table [31]
Failsafe IO Tags [48]
PLC data types
Watch and force tables
Online backups
Traces
Add new trace
Measurements
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Reference projects
Details view
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
PLC_1
103 102 101 1 2 3 4
Rack_0
F-DI 8/16x24VDC_1 [Module]
Properties
Info
Diagnostics
General
IO tags
System constants
Texts
General
F-DI 8/16
F-parameters
DI parameters
Channel parameters
Channel 0, 8
Channel 0
Channel 8
Channel 1, 9
Channel 2, 10
Channel 3, 11
Channel 4, 12
Channel 5, 13
Channel 6, 14
Channel 7, 15
I/O addresses
Hardware identifier
1
Channel 0, 8
Sensor evaluation: 1oo1 evaluation
Type sensor interconnection: 1 Channel
Discrepancy behavior: Supply value 0
Discrepancy time: 10 ms
Reintegration after channel fault: Test 0-Signal not necessary
Channel 0
Activated
Input filters: 6.4 ms
Channel failure acknowledge: Manual
Sensor supply: External
Channel 8
Activated
Input filters: 6.4 ms
Channel failure acknowledge: Manual
Sensor supply: External
1. Open the F-DI general tab and look at the channel safety parameters. Note that all inputs are set to 1oo1 evaluation (single channel) unlike our other I/O's that are default 1oo2 (dual channel). Also note that all inputs are set to external sensor supply. These parameters will need to be changed for the devices on our demo unit.
Global libraries
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
Safety Workshop 1200F Library
Types
Master copies
Failsafe IO Tags
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
F-DQ 2xRelay_2
Common data
Info (Global libraries)
Hardware catalog
Online tools
Tasks
Libraries
Portal view
Overview
PLC_1
PLC_1
Library Safety Workshop 1200F Library ...

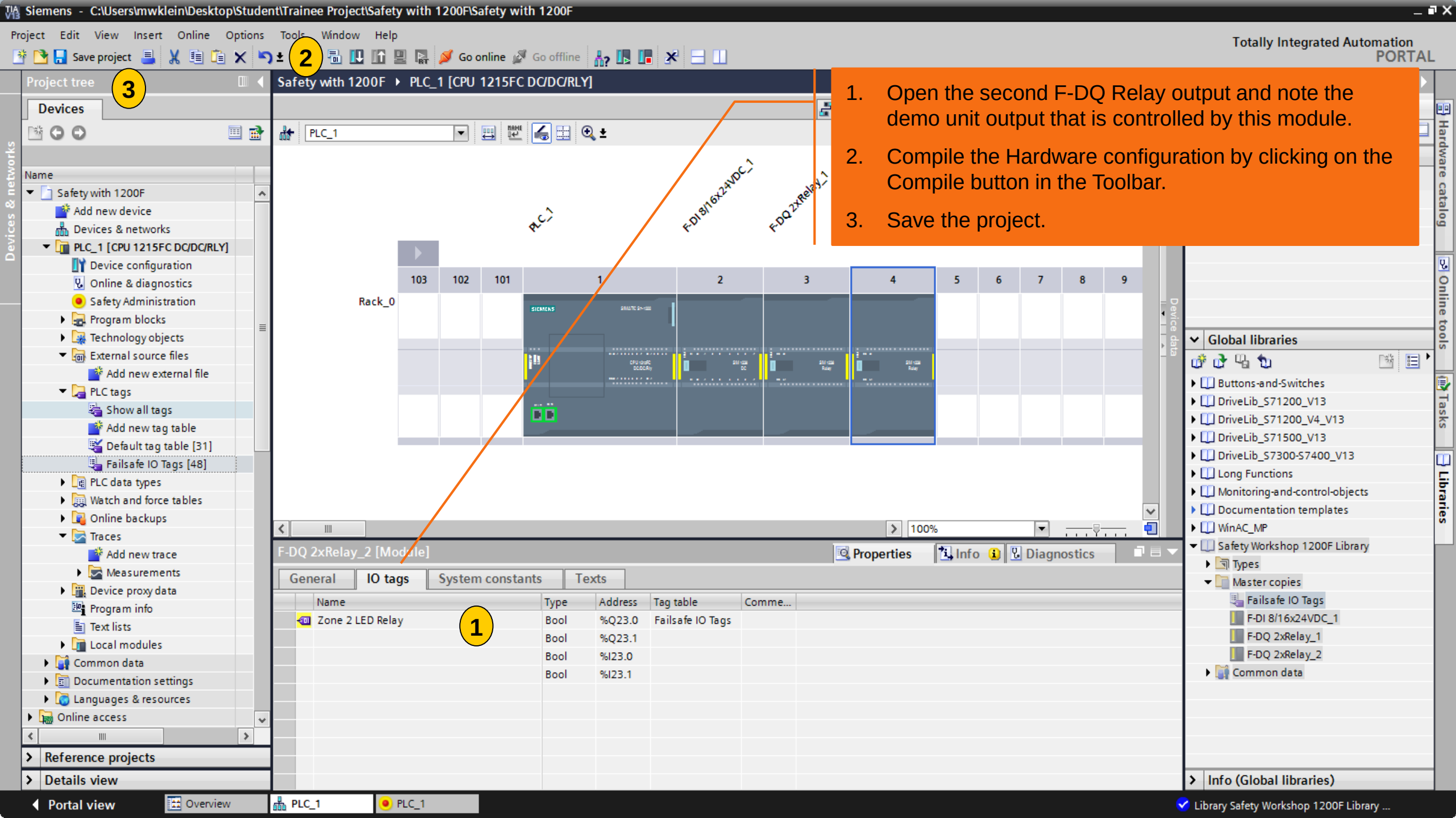

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
F-DI 8/16x24VDC_1 [Module]
General
IO tags
System constants
Texts
Channel 0, 8
Sensor evaluation: 1oo2 evaluation
Type sensor interconnection: 2 channel equivalent
Discrepancy behavior: Supply value 0
Discrepancy time: 500 ms
Reintegration after channel fault: Test 0-Signal not necessary
Channel 0
Activated
Input filters: 6.4 ms
Channel failure acknowledge: Manual
Sensor supply: Internal
Channel 8
Global libraries
Safety Workshop 1200F Library
1. Set the Sensor evaluation for Channel 0,8 to 1oo2 evaluation. This matches the actual wiring of the Global Estop.
2. Since the Global Estop is an electro-mechanical device, it is advised to raise the channel Discrepancy time above the default value of 10ms. For this workshop, we will be using 500ms.
3. Set the Sensor supply of Channel 0 to Internal. The module will be supplying power through the Estop contacts.

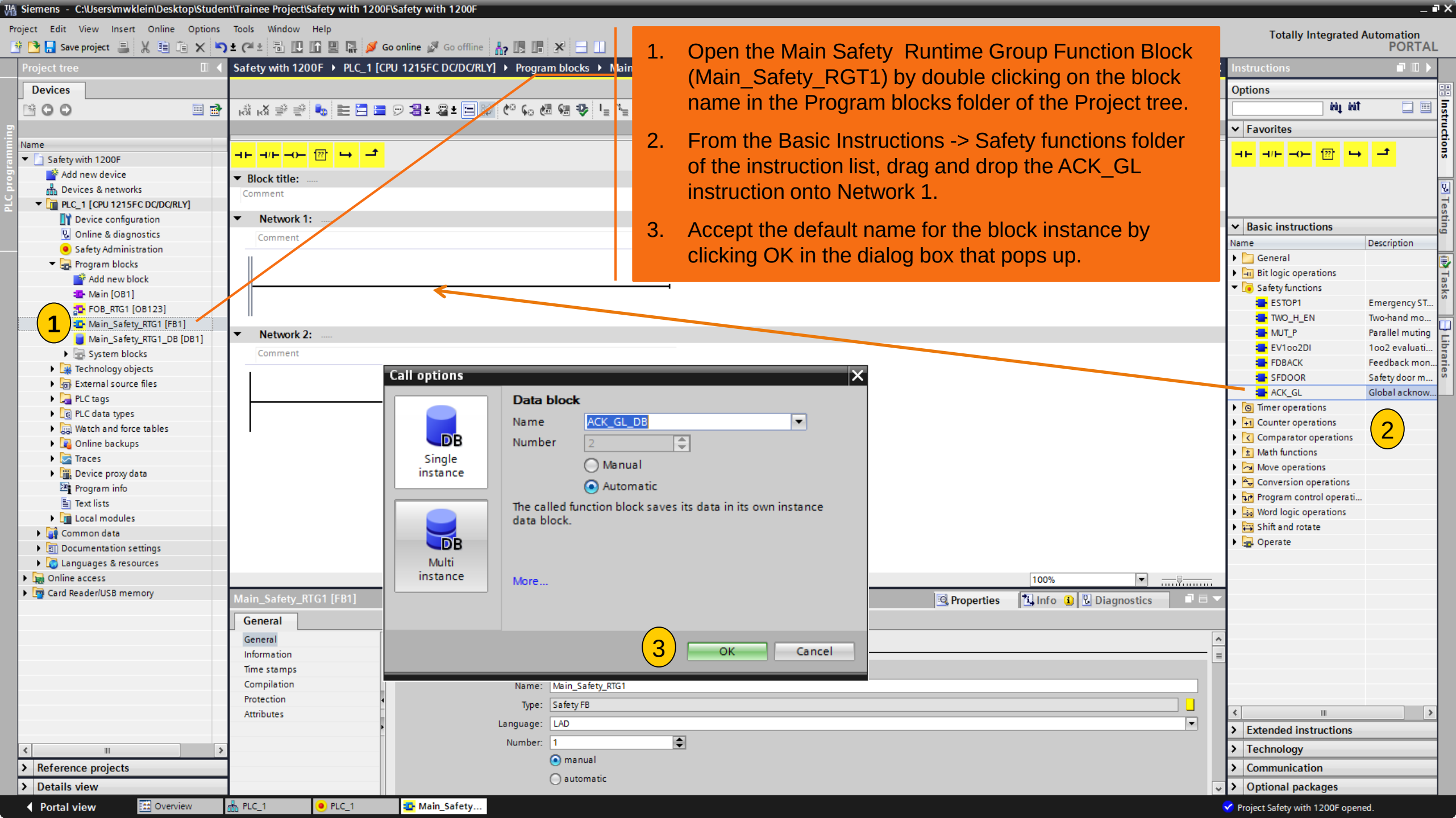

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
F-DI 8/16x24VDC_1 [Module]
General
IO tags
System constants
Texts
Channel 1, 9
Sensor evaluation: 1oo2 evaluation
Type sensor interconnection: 2 channel equivalent
Discrepancy behavior: Supply value 0
Discrepancy time: 500 ms
Reintegration after channel fault: Test 0-Signal not necessary
Channel 1
Activated
Input filters: 6.4 ms
Channel failure acknowledge: Manual
Sensor supply: Internal
Channel 9
Global libraries
Safety Workshop 1200F Library
1. Set the Sensor evaluation for Channel 1,9 to 1oo2 evaluation. This matches the actual wiring of the Local Estop.
2. Since the Local Estop is an electro-mechanical device, it is advised to raise the channel Discrepancy time above the default value of 10ms. For this workshop, we will be using 500ms.
3. Set the Sensor supply of Channel 0 to Internal. The module will be supplying power through the Estop contacts.

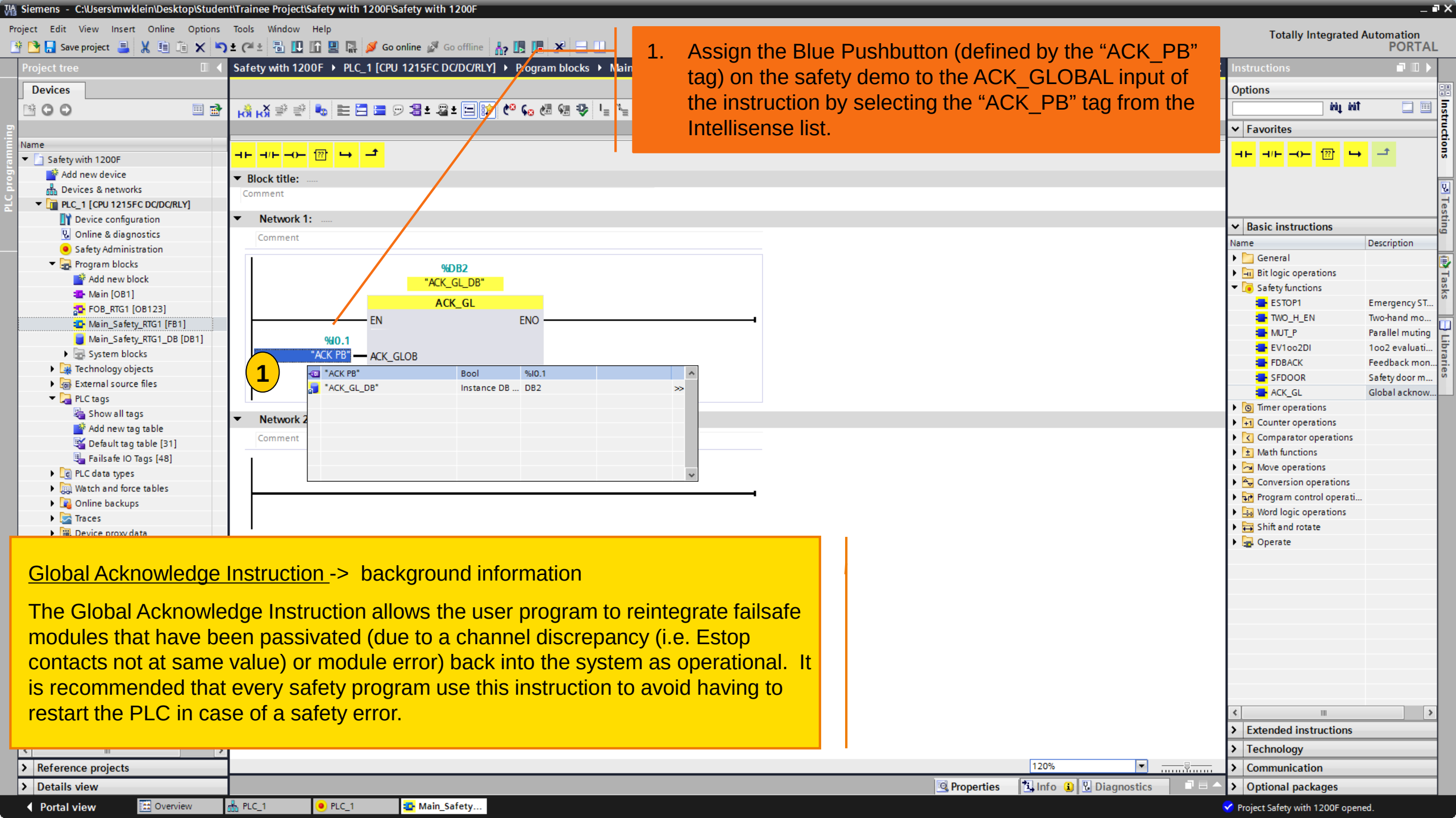

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
F-DI 8/16x24VDC_1 [Module]
General
IO tags
System constants
Texts
Channel 2, 10
Sensor evaluation: 1oo2 evaluation
Type sensor interconnection: 2 channel equivalent
Discrepancy behavior: Supply value 0
Discrepancy time: 50 ms
Reintegration after channel fault: Test 0-Signal not necessary
Channel 2
Activated
Input filters: 6.4 ms
Channel failure acknowledge: Manual
Sensor supply: External
Channel 10
Activated
Input filters: 6.4 ms
Channel failure acknowledge: Manual
Sensor supply: External
1
2
3
1. Set the Sensor evaluation for Channel 2,10 to 1oo2 evaluation. This matches the actual wiring of the RFID Door Switch.
2. Since the RFID Door Switch is solid state device, the channel Discrepancy time can be set to a lower value. For this workshop, we will be using 50ms.
3. Keep the Sensor supply of Channel 0 to External. The RFID door switch has internal safety electronics such that a SIL3 safety level can be achieved without an internal module supply setting
Global libraries
Safety Workshop 1200F Library
Portal view
Overview
PLC_1
Library Safety Workshop 1200F Library ...

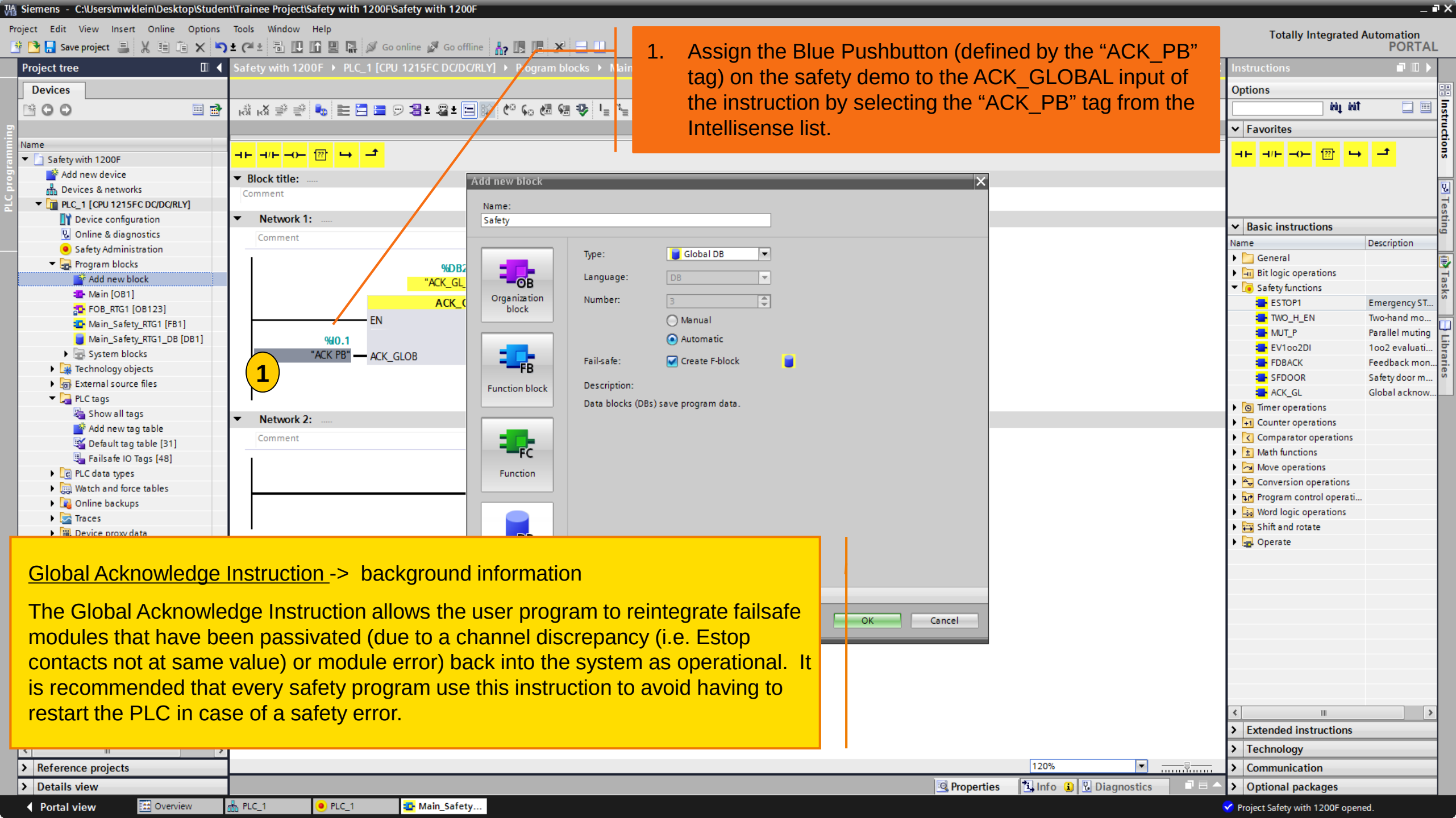

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Totally Integrated Automation PORTAL
Save project Go online Go offline
1. Open the first F-DQ Relay output properties and note the settings.
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
Add new external file
PLC tags
Show all tags
Add new tag table
Default tag table [31]
Failsafe IO Tags [48]
PLC data types
Watch and force tables
Online backups
Traces
Add new trace
Measurements
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Reference projects
Details view
PLC_1
F-DI 8/16x24
F-DQ 2xRelay
F-DQ 2xRelay
103 102 101 1 2 3 4 5 6 7 8 9
Rack_0
100%
F-DQ 2xRelay_1 [Module]
Properties Info Diagnostics
General IO tags System constants Texts
General
F-DQ2
F-parameters
DQ parameters
Channel 0
Channel 1
I/O addresses
Hardware identifier
DQ parameters
Relay continuous on time limit: 30 days
Channel 0
1
Activated
Channel failure acknowledge: Manual
Channel 1
Activated
Channel failure acknowledge: Manual
Project library
All
Project library
Global libraries
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
Safety Workshop 1200F Library
Types
Master copies
Failsafe IO Tags
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
F-DQ 2xRelay_2
Common data
Info (Global libraries)
Portal view
Overview
PLC_1
PLC_1
Library Safety Workshop 1200F Library ...
Hardware catalog
Online tools
Tasks
Libraries
Devices & networks

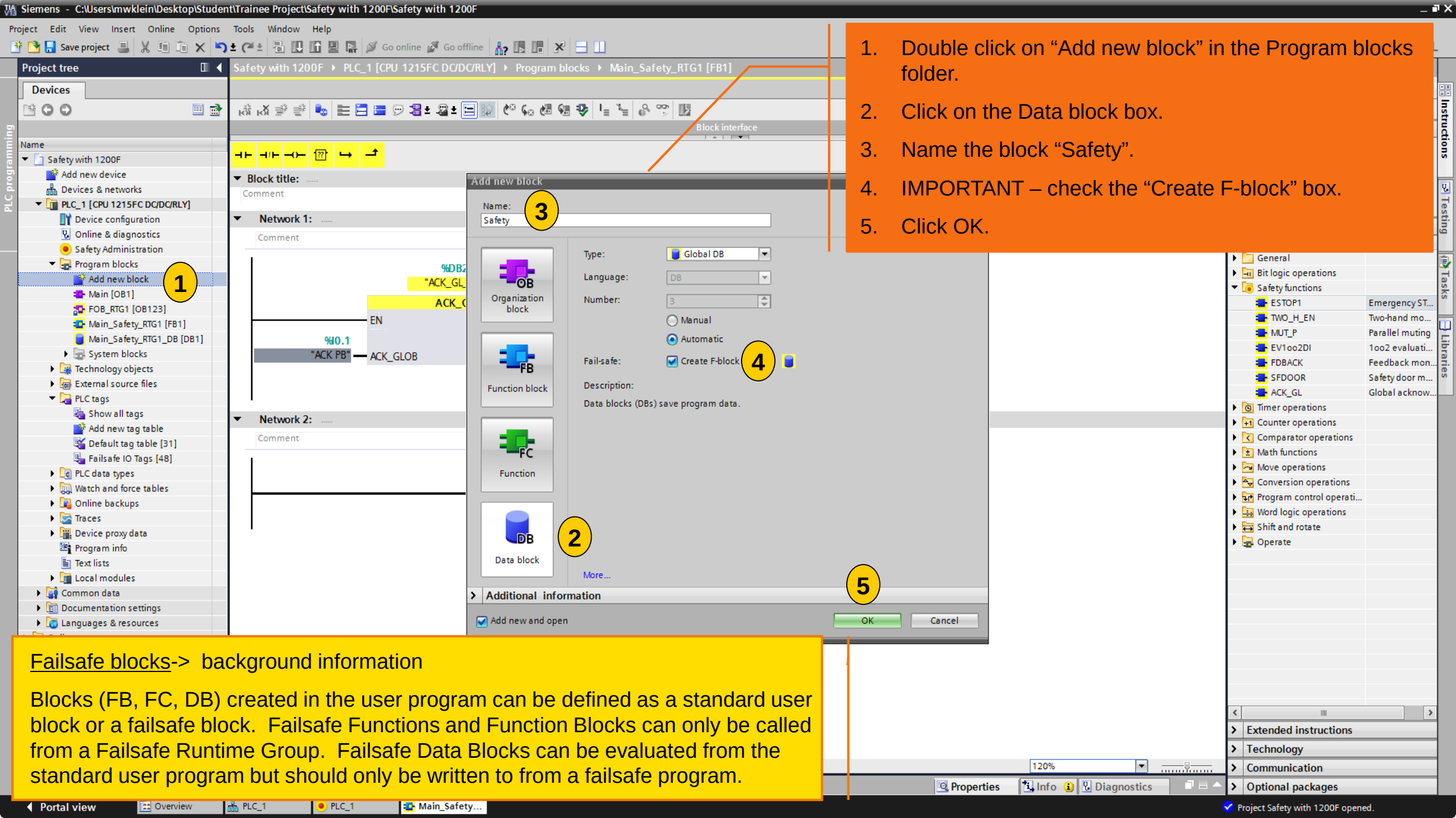

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation
PORTAL
Project tree
Devices
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Technology objects
External source files
Add new external file
PLC tags
Show all tags
Add new tag table
Default tag table [31]
Failsafe IO Tags [48]
PLC data types
Watch and force tables
Online backups
Traces
Add new trace
Measurements
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Reference projects
Details view
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
PLC_1
1. Open the first F-DQ Relay output and note the demo unit outputs that are controlled by this module.
PLC_1
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
F-DQ 2xRelay_2
103 102 101 1 2 3 4 5 6 7 8 9
Rack_0
100%
F-DQ 2xRelay_1 [Module]
Properties
Info
Diagnostics
General
IO tags
System constants
Texts
Name Type Address Tag table Comme...
Door LED Relay Bool %Q17.0 Failsafe IO Tags
Zone 1 LED Relay Bool %Q17.1 Failsafe IO Tags
Bool %I17.0
Bool %I17.1
1
Project library
All
Project library
Global libraries
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
Safety Workshop 1200F Library
Types
Master copies
Failsafe IO Tags
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
F-DQ 2xRelay_2
Common data
Info (Global libraries)
Portal view
Overview
PLC_1
PLC_1
Library Safety Workshop 1200F Library ...
Hardware catalog
Online tools
Tasks
Libraries
Devices & networks


Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY]
1. Open the second F-DQ Relay output and note the demo unit output that is controlled by this module.
2. Compile the Hardware configuration by clicking on the Compile button in the Toolbar.
3. Save the project.
PLC_1
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
Rack_0
103 102 101 1 2 3 4 5 6 7 8 9
F-DQ 2xRelay_2 [Module]
Properties
Info
Diagnostics
General
IO tags
System constants
Texts
Name Type Address Tag table Comme...
Zone 2 LED Relay Bool %Q23.0 Failsafe IO Tags
Bool %Q23.1
Bool %I23.0
Bool %I23.1
Global libraries
Safety Workshop 1200F Library
Types
Master copies
Failsafe IO Tags
F-DI 8/16x24VDC_1
F-DQ 2xRelay_1
F-DQ 2xRelay_2
Common data
Reference projects
Details view
Info (Global libraries)
Portal view
Overview
PLC_1
Library Safety Workshop 1200F Library ...

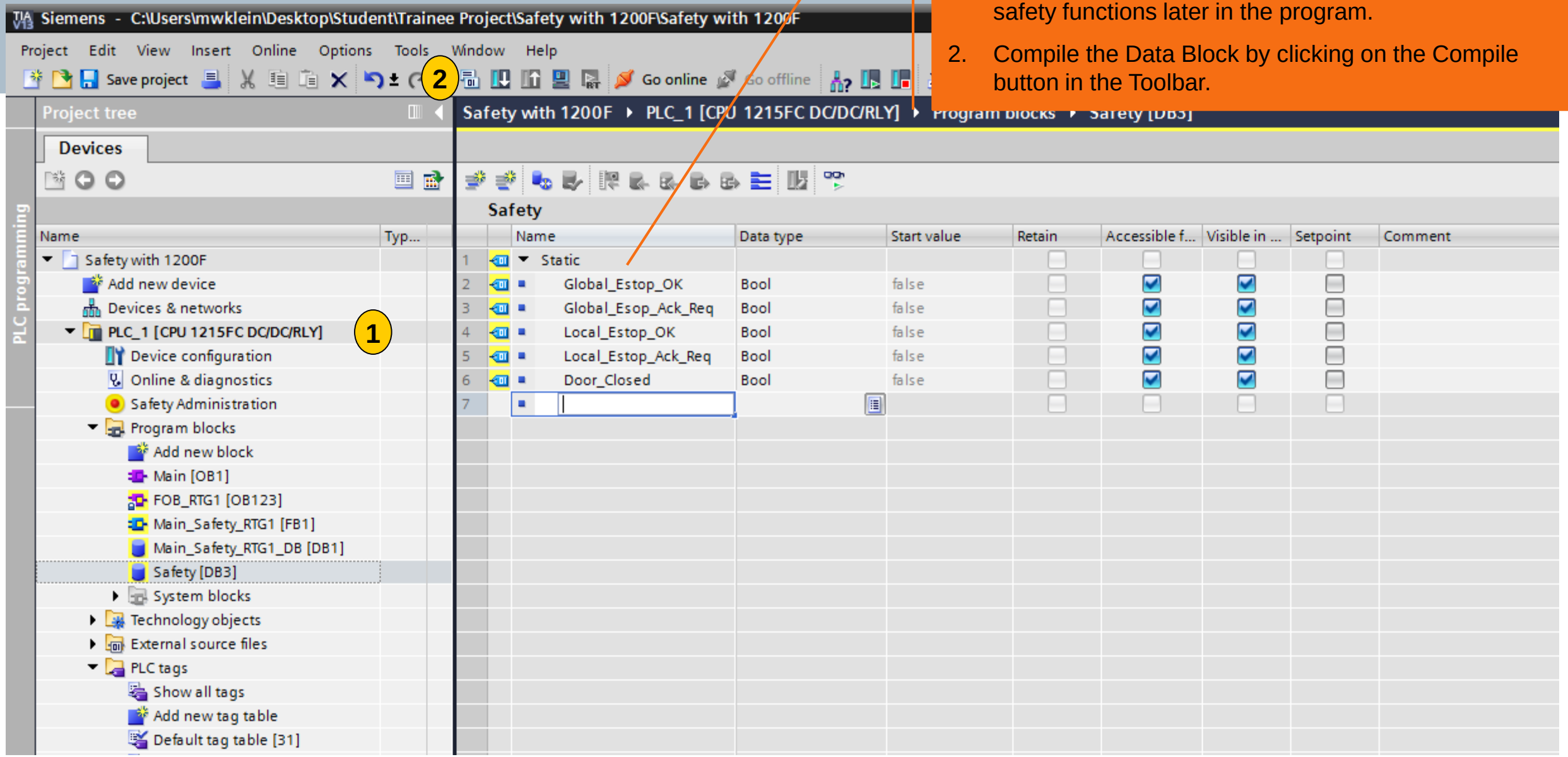

1. Open the Main Safety Runtime Group Function Block (Main_Safety_RGT1) by double clicking on the block name in the Program blocks folder of the Project tree.
2. From the Basic Instructions -> Safety functions folder of the instruction list, drag and drop the ACK_GL instruction onto Network 1.
3. Accept the default name for the block instance by clicking OK in the dialog box that pops up.
Call options
Data block
Name
ACK_GL_DB
Number
Manual
Automatic
The called function block saves its data in its own instance data block.
Single instance
Multi instance
More...
OK
Cancel
1
2
3

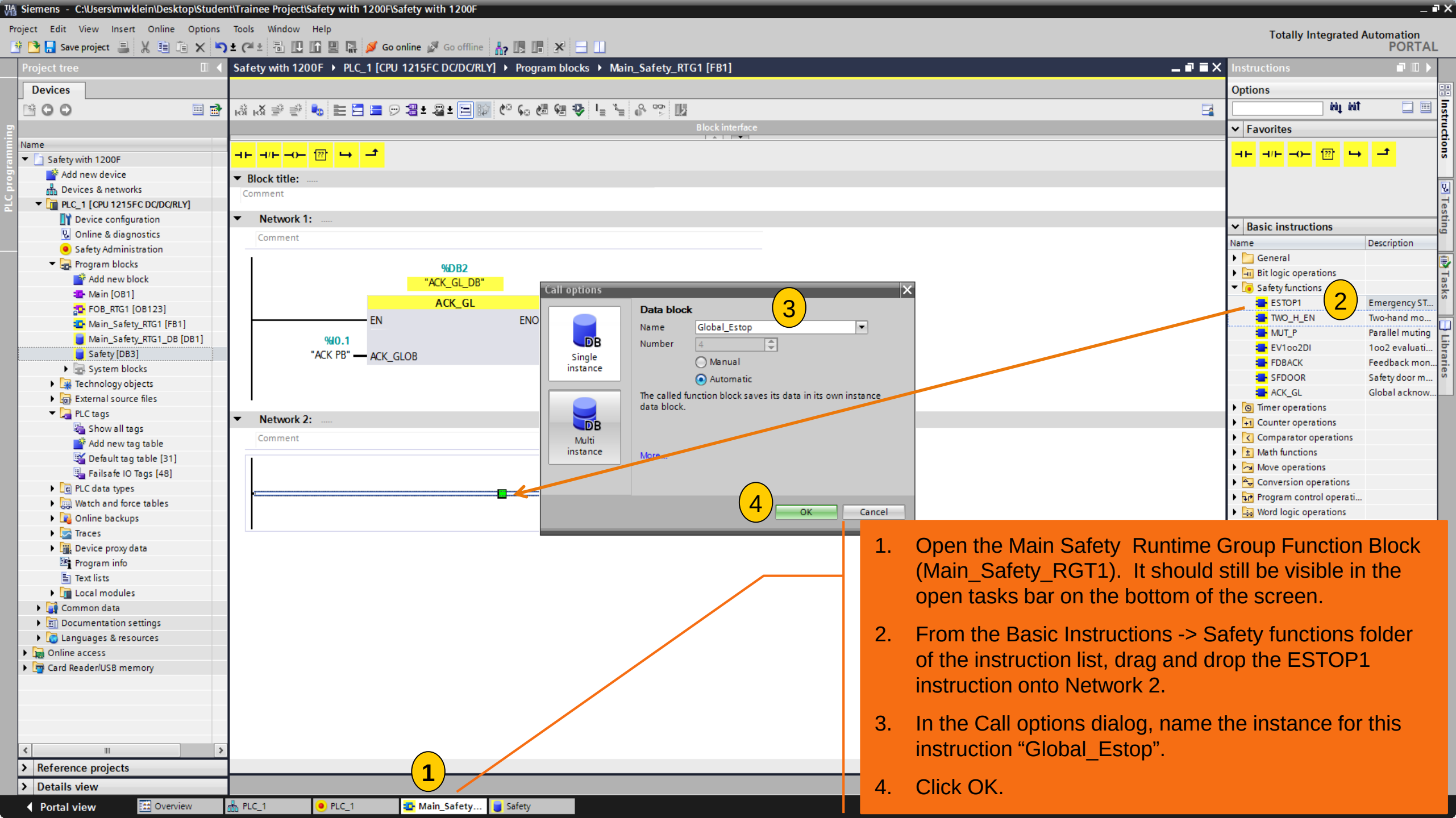

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
1. Assign the Blue Pushbutton (defined by the “ACK_PB” tag) on the safety demo to the ACK_GLOBAL input of the instruction by selecting the “ACK_PB” tag from the Intellisense list.
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
System blocks
Technology objects
External source files
PLC tags
Show all tags
Add new tag table
Default tag table [31]
Failsafe IO Tags [48]
PLC data types
Watch and force tables
Online backups
Traces
Device proxy data
Block title:
Comment
Network 1:
Comment
%DB2
"ACK_GL_DB"
ACK_GL
EN
ENO
%I0.1
"ACK PB"
ACK_GLOB
1
"ACK PB" Bool %I0.1
"ACK_GL_DB" Instance DB ... DB2
Network 2
Comment
Instructions
Options
Favorites
Basic instructions
Name Description
General
Bit logic operations
Safety functions
ESTOP1 Emergency ST...
TWO_H_EN Two-hand mo...
MUT_P Parallel muting
EV1oo2DI 1oo2 evaluati...
FDBACK Feedback mon...
SFDOOR Safety door m...
ACK_GL Global acknow...
Timer operations
Counter operations
Comparator operations
Math functions
Move operations
Conversion operations
Program control operati...
Word logic operations
Shift and rotate
Operate
Extended instructions
Technology
Communication
Optional packages
Global Acknowledge Instruction -> background information
The Global Acknowledge Instruction allows the user program to reintegrate failsafe modules that have been passivated (due to a channel discrepancy (i.e. Estop contacts not at same value) or module error) back into the system as operational. It is recommended that every safety program use this instruction to avoid having to restart the PLC in case of a safety error.
Reference projects
Details view
120%
Properties
Info
Diagnostics
Portal view
Overview
PLC_1
PLC_1
Main_Safety...
Project Safety with 1200F opened.

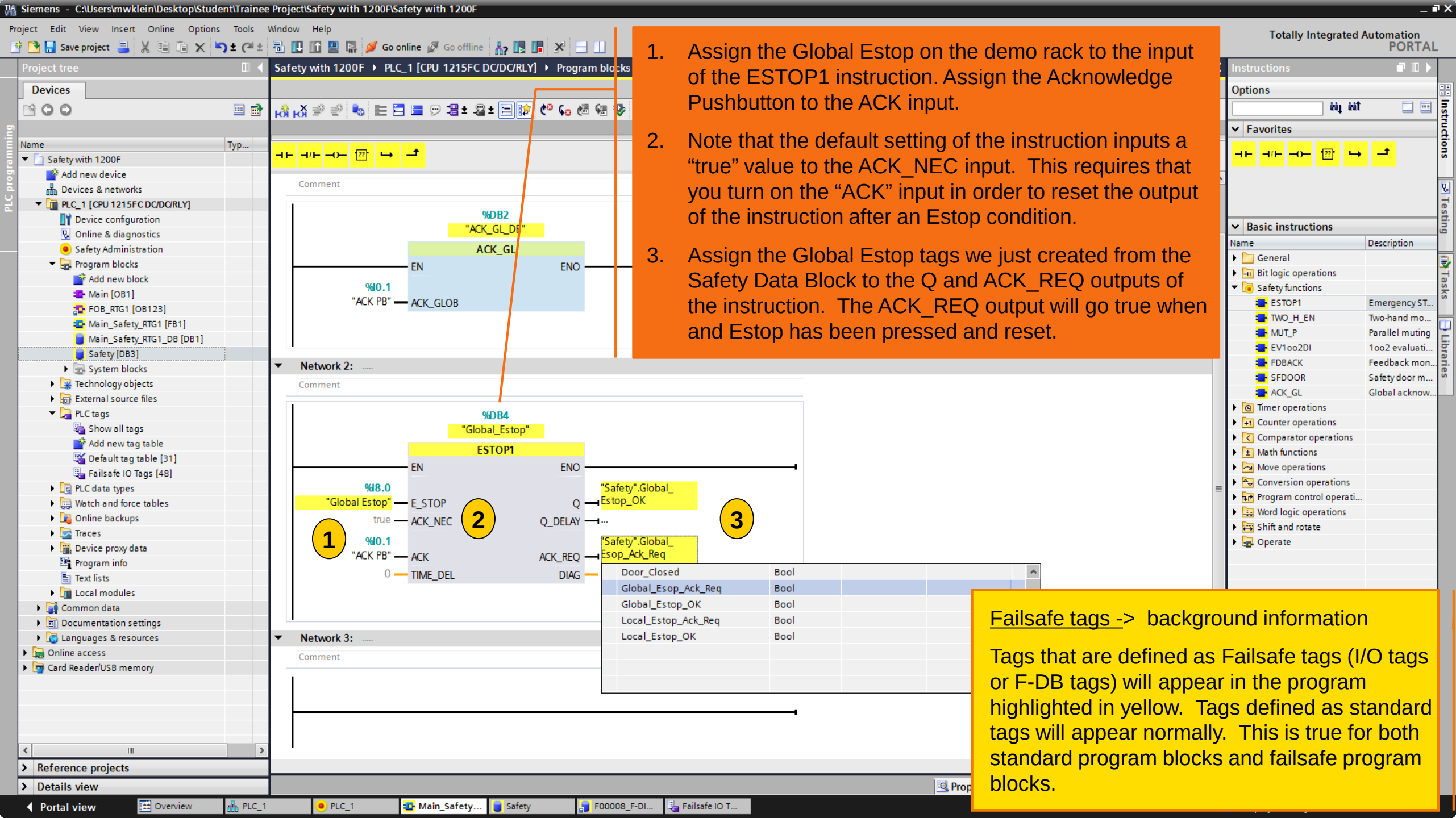

1. Assign the Blue Pushbutton (defined by the “ACK_PB” tag) on the safety demo to the ACK_GLOBAL input of the instruction by selecting the “ACK_PB” tag from the Intellisense list.
Add new block
Name:
Safety
Organization block
Function block
Function
Type:
Global DB
Language:
DB
Number:
3
Manual
Automatic
Fail-safe:
Create F-block
Description:
Data blocks (DBs) save program data.
OK
Cancel
Network 1:
Network 2:
"ACK_PB"
ACK_GLOB
Global Acknowledge Instruction -> background information
The Global Acknowledge Instruction allows the user program to reintegrate failsafe modules that have been passivated (due to a channel discrepancy (i.e. Estop contacts not at same value) or module error) back into the system as operational. It is recommended that every safety program use this instruction to avoid having to restart the PLC in case of a safety error.

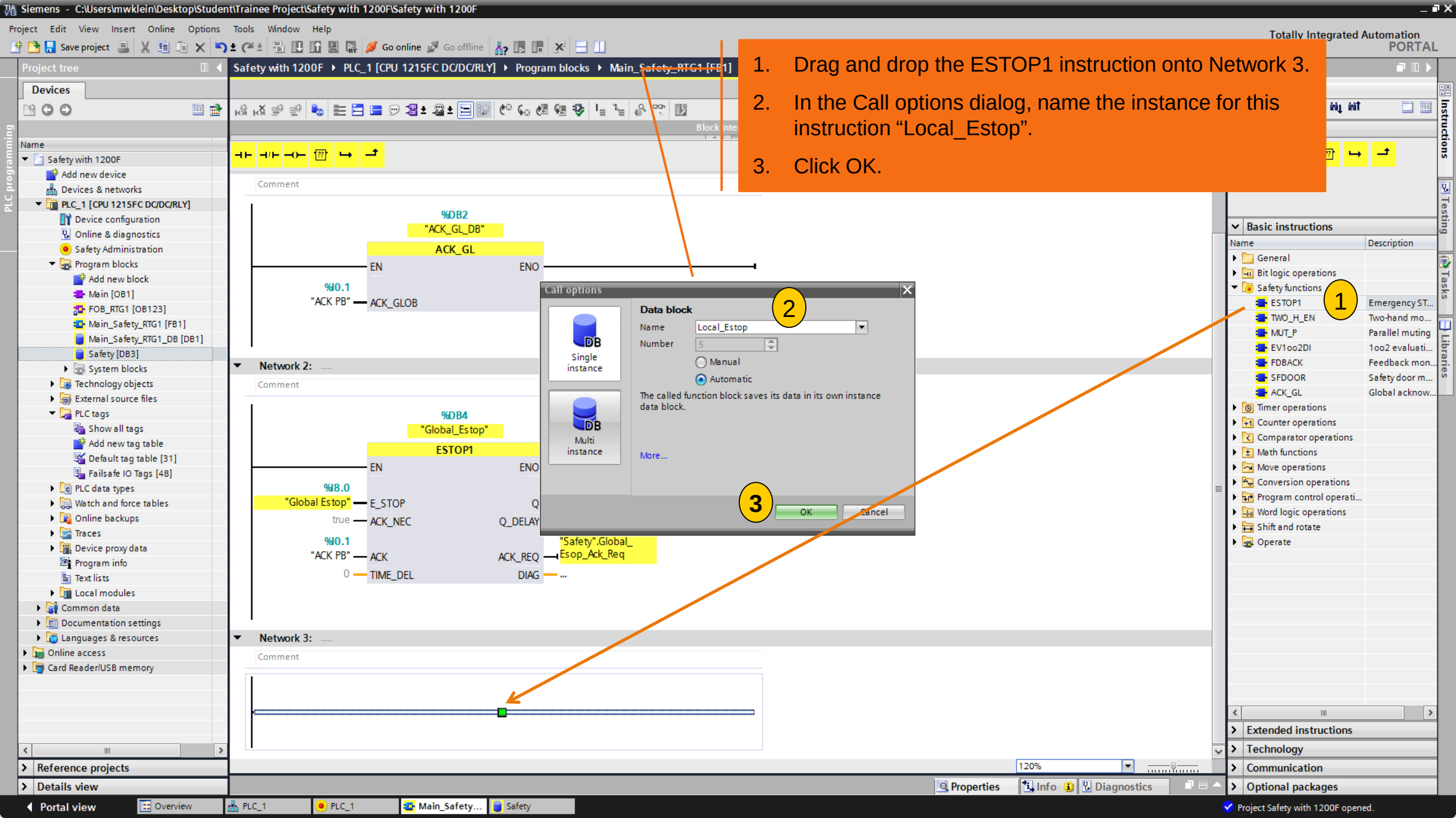

1. Double click on “Add new block” in the Program blocks folder.
2. Click on the Data block box.
3. Name the block “Safety”.
4. IMPORTANT – check the “Create F-block” box.
5. Click OK.
Add new block
Name: Safety
Organization block
Function block
Function
Data block
Type: Global DB
Language: DB
Number: 3
Manual
Automatic
Fail-safe: Create F-block
Description:
Data blocks (DBs) save program data.
More...
Additional information
Add new and open
OK
Cancel
Failsafe blocks-> background information
Blocks (FB, FC, DB) created in the user program can be defined as a standard user block or a failsafe block. Failsafe Functions and Function Blocks can only be called from a Failsafe Runtime Group. Failsafe Data Blocks can be evaluated from the standard user program but should only be written to from a failsafe program.

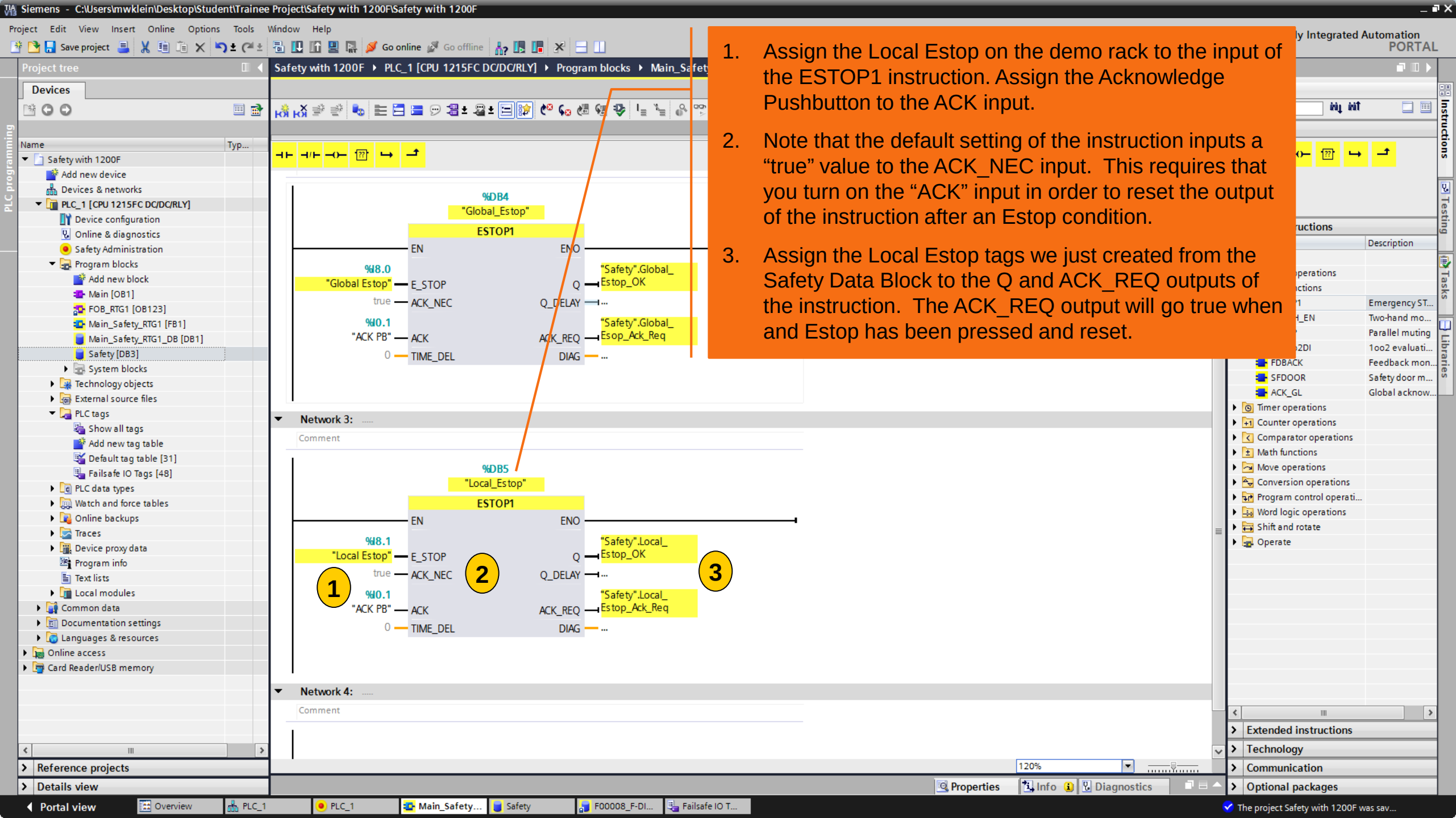
1. Add the tag names to the Safety Data Block as shown below. We will be using these tags to evaluate the safety functions later in the program.
2. Compile the Data Block by clicking on the Compile button in the Toolbar.

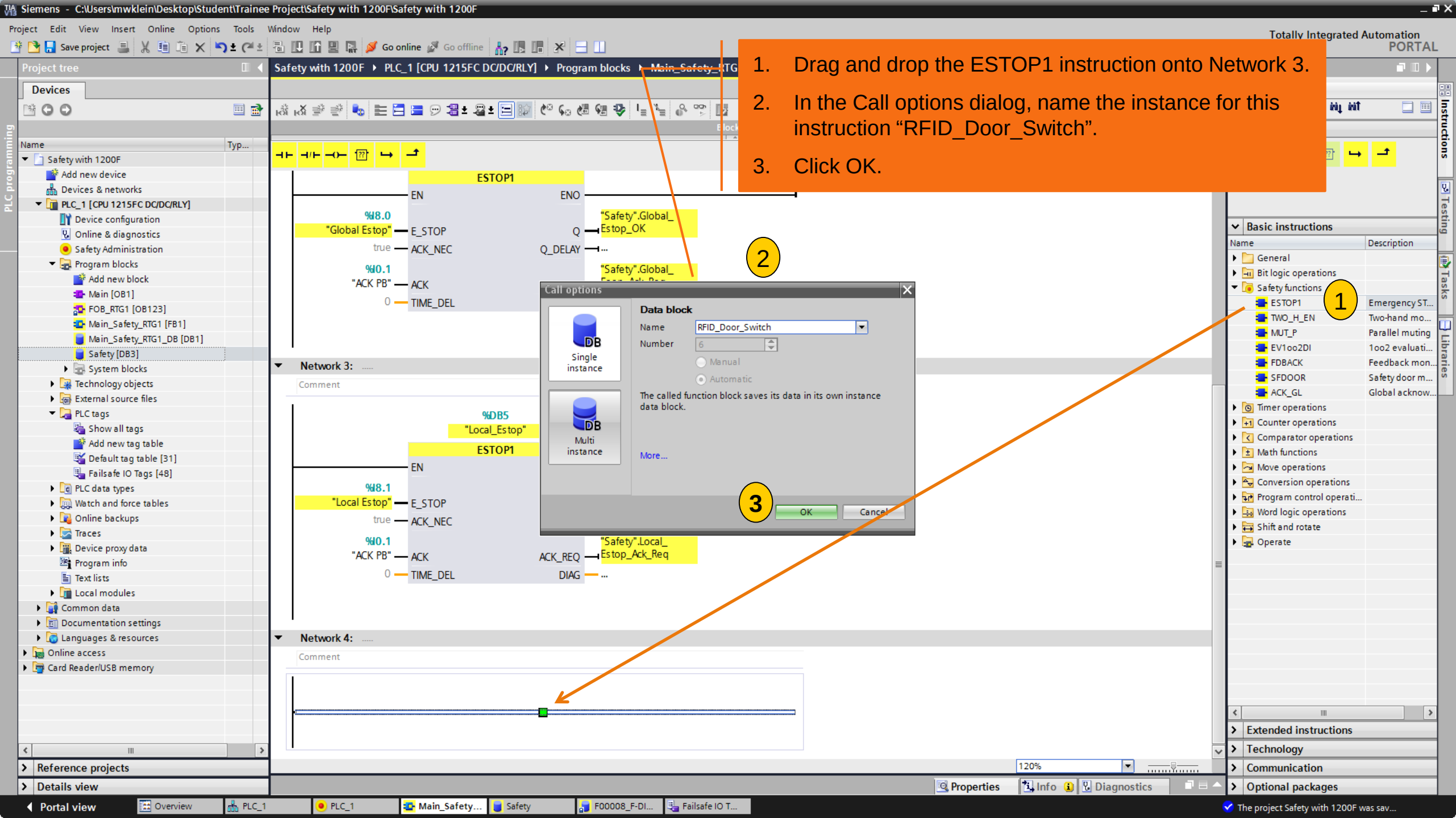


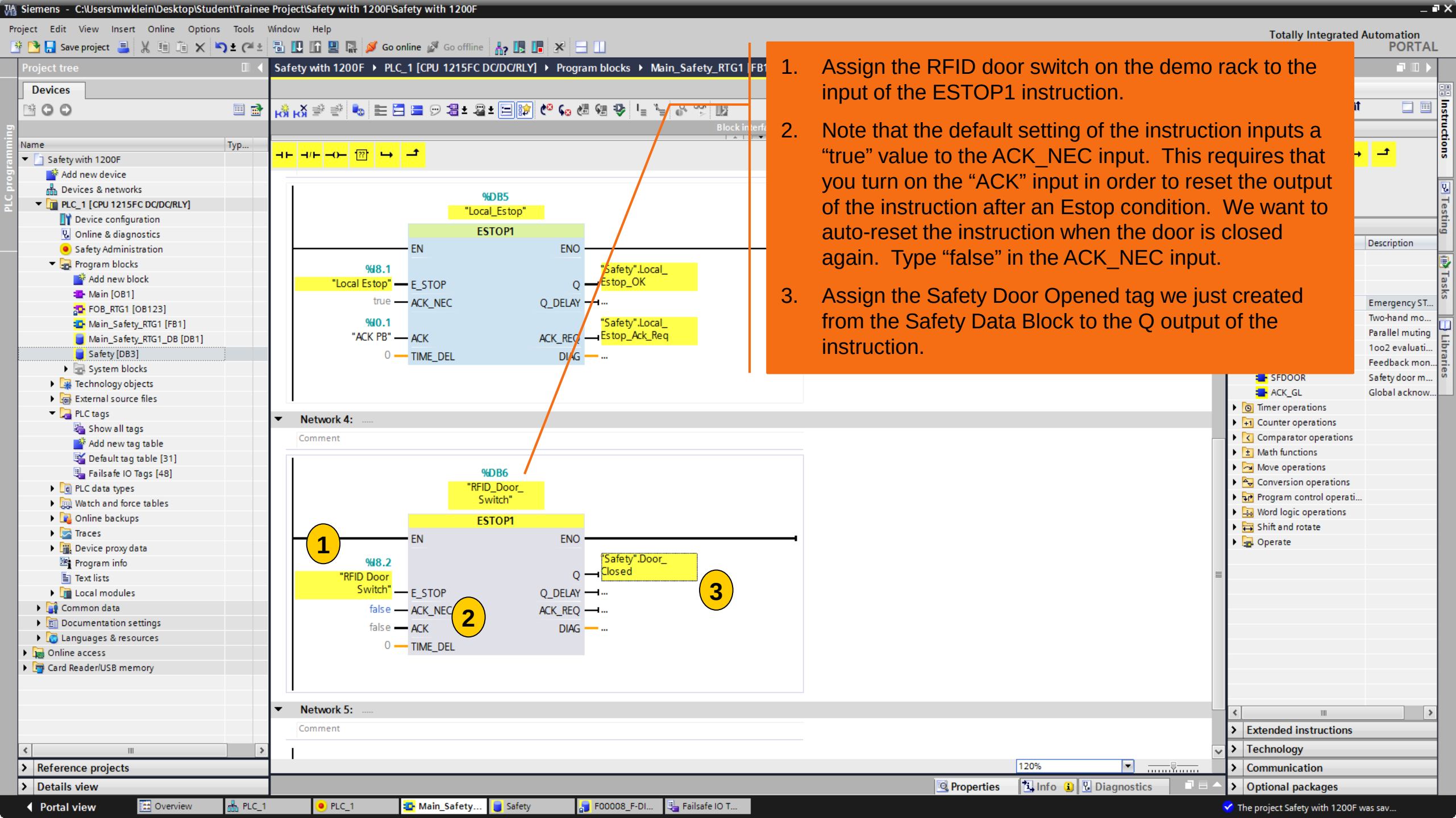

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main_Safety_RTG1 [FB1]
Instructions
Block interface
Block title:
Network 1:
%DB2
"ACK_GL_DB"
ACK_GL
EN
ENO
%I0.1
"ACK PB"
ACK_GLOB
Network 2:
Call options
Data block
Name
Global_Estop
Number
Manual
Automatic
The called function block saves its data in its own instance data block.
Single instance
Multi instance
More...
OK
Cancel
Basic instructions
Safety functions
ESTOP1
TWO_H_EN
MUT_P
EV1oo2DI
FDBACK
SFDOOR
ACK_GL
1
2
3
4
1. Open the Main Safety Runtime Group Function Block (Main_Safety_RGT1). It should still be visible in the open tasks bar on the bottom of the screen.
2. From the Basic Instructions -> Safety functions folder of the instruction list, drag and drop the ESTOP1 instruction onto Network 2.
3. In the Call options dialog, name the instance for this instruction “Global_Estop”.
4. Click OK.

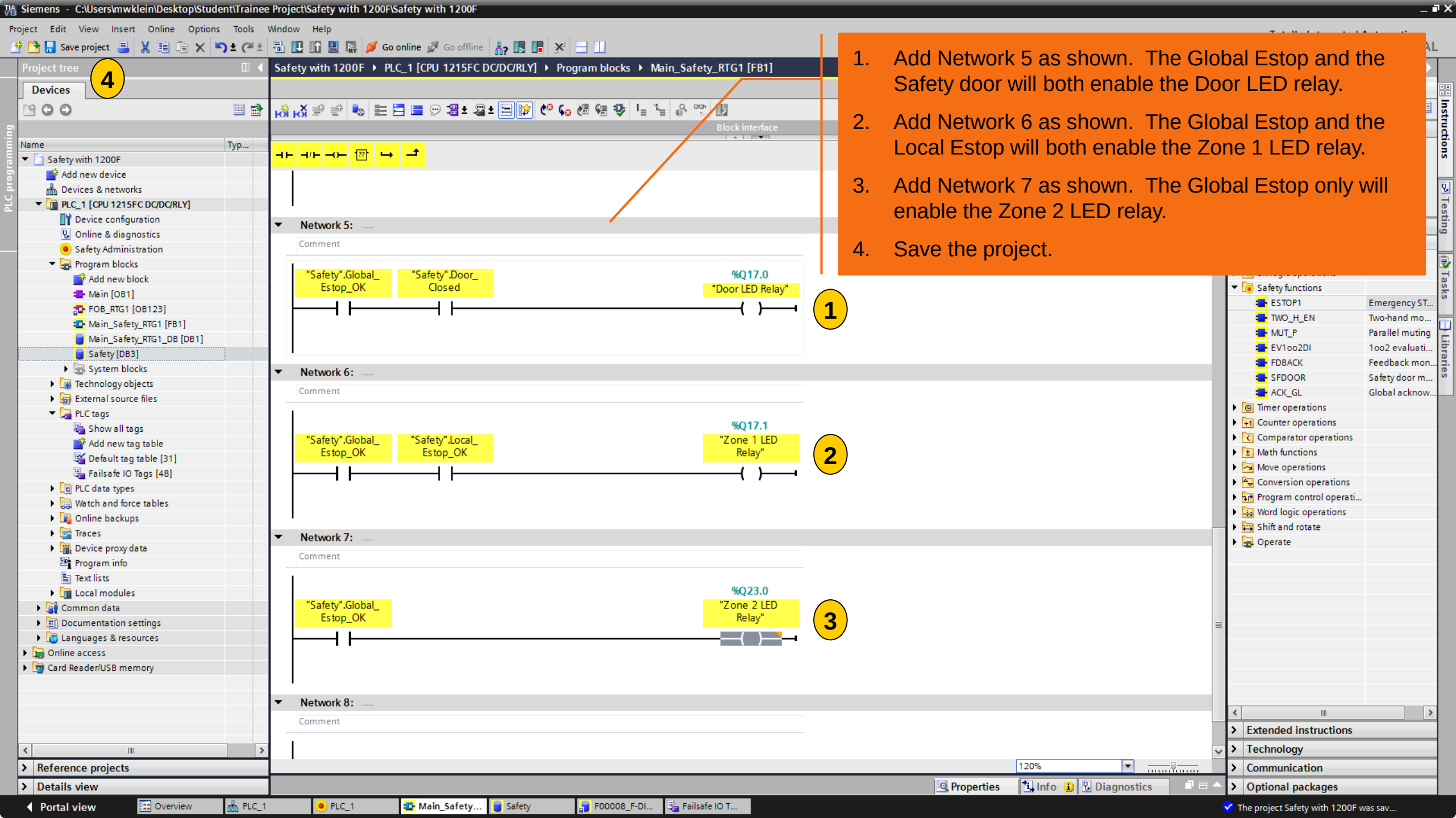

1. Assign the Global Estop on the demo rack to the input of the ESTOP1 instruction. Assign the Acknowledge Pushbutton to the ACK input.
2. Note that the default setting of the instruction inputs a “true” value to the ACK_NEC input. This requires that you turn on the “ACK” input in order to reset the output of the instruction after an Estop condition.
3. Assign the Global Estop tags we just created from the Safety Data Block to the Q and ACK_REQ outputs of the instruction. The ACK_REQ output will go true when and Estop has been pressed and reset.
Failsafe tags -> background information
Tags that are defined as Failsafe tags (I/O tags or F-DB tags) will appear in the program highlighted in yellow. Tags defined as standard tags will appear normally. This is true for both standard program blocks and failsafe program blocks.

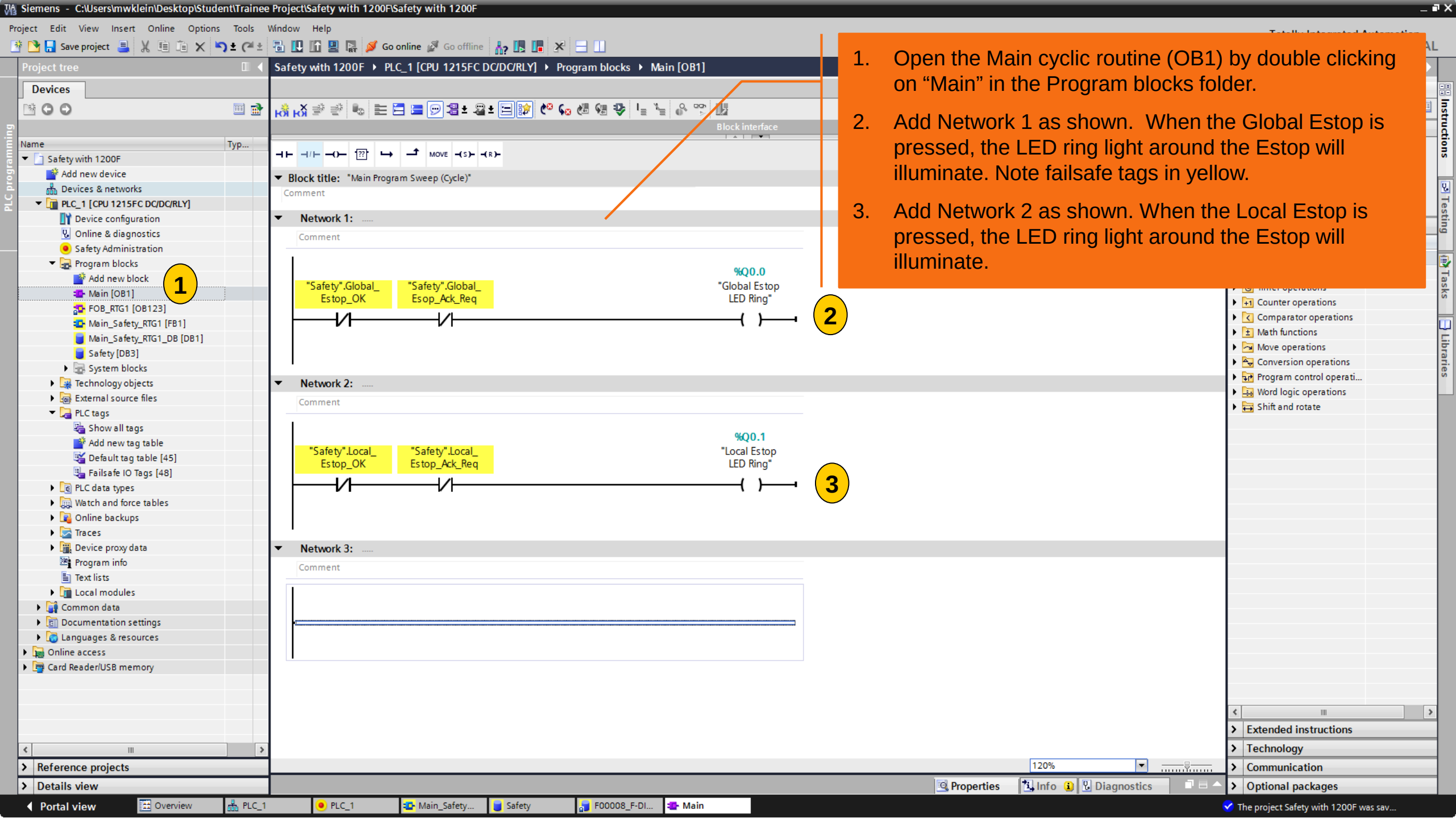

1. Drag and drop the ESTOP1 instruction onto Network 3.
2. In the Call options dialog, name the instance for this instruction “Local_Estop”.
3. Click OK.
Call options
Data block
Name
Local_Estop
Number
Manual
Automatic
The called function block saves its data in its own instance data block.
More...
Single instance
Multi instance
OK
Cancel
Network 2:
Network 3:
%DB2
"ACK_GL_DB"
ACK_GL
%I0.1
"ACK PB"
%DB4
"Global_Estop"
ESTOP1
%I8.0
"Global Estop"
"Safety".Global_Esop_Ack_Req
Basic instructions
Safety functions
ESTOP1
TWO_H_EN
MUT_P
EV1oo2DI
FDBACK
SFDOOR
ACK_GL

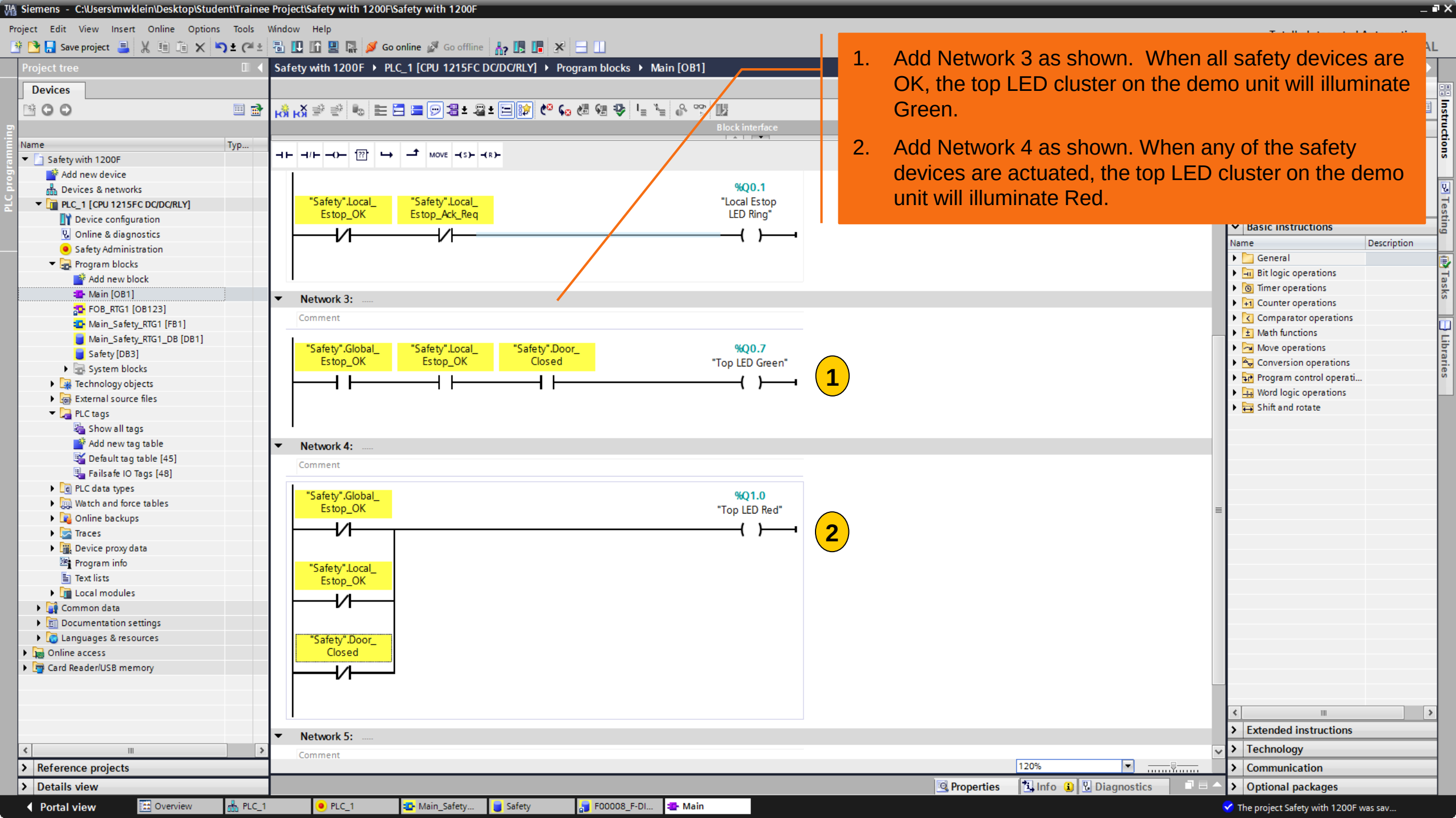

1. Assign the Local Estop on the demo rack to the input of the ESTOP1 instruction. Assign the Acknowledge Pushbutton to the ACK input.
2. Note that the default setting of the instruction inputs a “true” value to the ACK_NEC input. This requires that you turn on the “ACK” input in order to reset the output of the instruction after an Estop condition.
3. Assign the Local Estop tags we just created from the Safety Data Block to the Q and ACK_REQ outputs of the instruction. The ACK_REQ output will go true when and Estop has been pressed and reset.
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main_Safety
%DB4
"Global_Estop"
ESTOP1
EN
ENO
%I8.0
"Global Estop"
E_STOP
Q
"Safety".Global_Estop_OK
true
ACK_NEC
Q_DELAY
%I0.1
"ACK PB"
ACK
ACK_REQ
"Safety".Global_Esop_Ack_Req
0
TIME_DEL
DIAG
Network 3:
Comment
%DB5
"Local_Estop"
ESTOP1
EN
ENO
%I8.1
"Local Estop"
E_STOP
Q
"Safety".Local_Estop_OK
true
ACK_NEC
Q_DELAY
%I0.1
"ACK PB"
ACK
ACK_REQ
"Safety".Local_Estop_Ack_Req
0
TIME_DEL
DIAG
1
2
3
Network 4:
Comment
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Technology objects
External source files
PLC tags
Show all tags
Add new tag table
Default tag table [31]
Failsafe IO Tags [48]
PLC data types
Watch and force tables
Online backups
Traces
Device proxy data
Program info
Text lists
Local modules
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Reference projects
Details view
Instructions
Testing
Tasks
Libraries
Description
Emergency ST...
Two-hand mo...
Parallel muting
1oo2 evaluati...
Feedback mon...
Safety door m...
Global acknow...
Timer operations
Counter operations
Comparator operations
Math functions
Move operations
Conversion operations
Program control operati...
Word logic operations
Shift and rotate
Operate
Extended instructions
Technology
Communication
Optional packages
120%
Properties
Info
Diagnostics
Portal view
Overview
PLC_1
PLC_1
Main_Safety...
Safety
F00008_F-DI...
Failsafe IO T...
The project Safety with 1200F was sav...


1. Drag and drop the ESTOP1 instruction onto Network 3.
2. In the Call options dialog, name the instance for this instruction “RFID_Door_Switch”.
3. Click OK.
Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main_Safety_RTG
ESTOP1
EN
ENO
%I8.0
"Global Estop"
E_STOP
Q
"Safety".Global_Estop_OK
true
ACK_NEC
Q_DELAY
%I0.1
"ACK PB"
ACK
0
TIME_DEL
Network 3:
Comment
%DB5
"Local_Estop"
%I8.1
"Local Estop"
ACK_REQ
"Safety".Local_Estop_Ack_Req
DIAG
Network 4:
Call options
Data block
Name
RFID_Door_Switch
Number
6
Manual
Automatic
Single instance
Multi instance
The called function block saves its data in its own instance data block.
More...
OK
Cancel
Basic instructions
Name
Description
General
Bit logic operations
Safety functions
ESTOP1
Emergency ST...
TWO_H_EN
Two-hand mo...
MUT_P
Parallel muting
EV1oo2DI
1oo2 evaluati...
FDBACK
Feedback mon...
SFDOOR
Safety door m...
ACK_GL
Global acknow...
Timer operations
Counter operations
Comparator operations
Math functions
Move operations
Conversion operations
Program control operati...
Word logic operations
Shift and rotate
Operate
Extended instructions
Technology
Communication
Optional packages
Reference projects
Details view
Properties
Info
Diagnostics
Portal view
Overview
PLC_1
Main_Safety...
Safety
F00008_F-DI...
Failsafe IO T...
The project Safety with 1200F was sav...

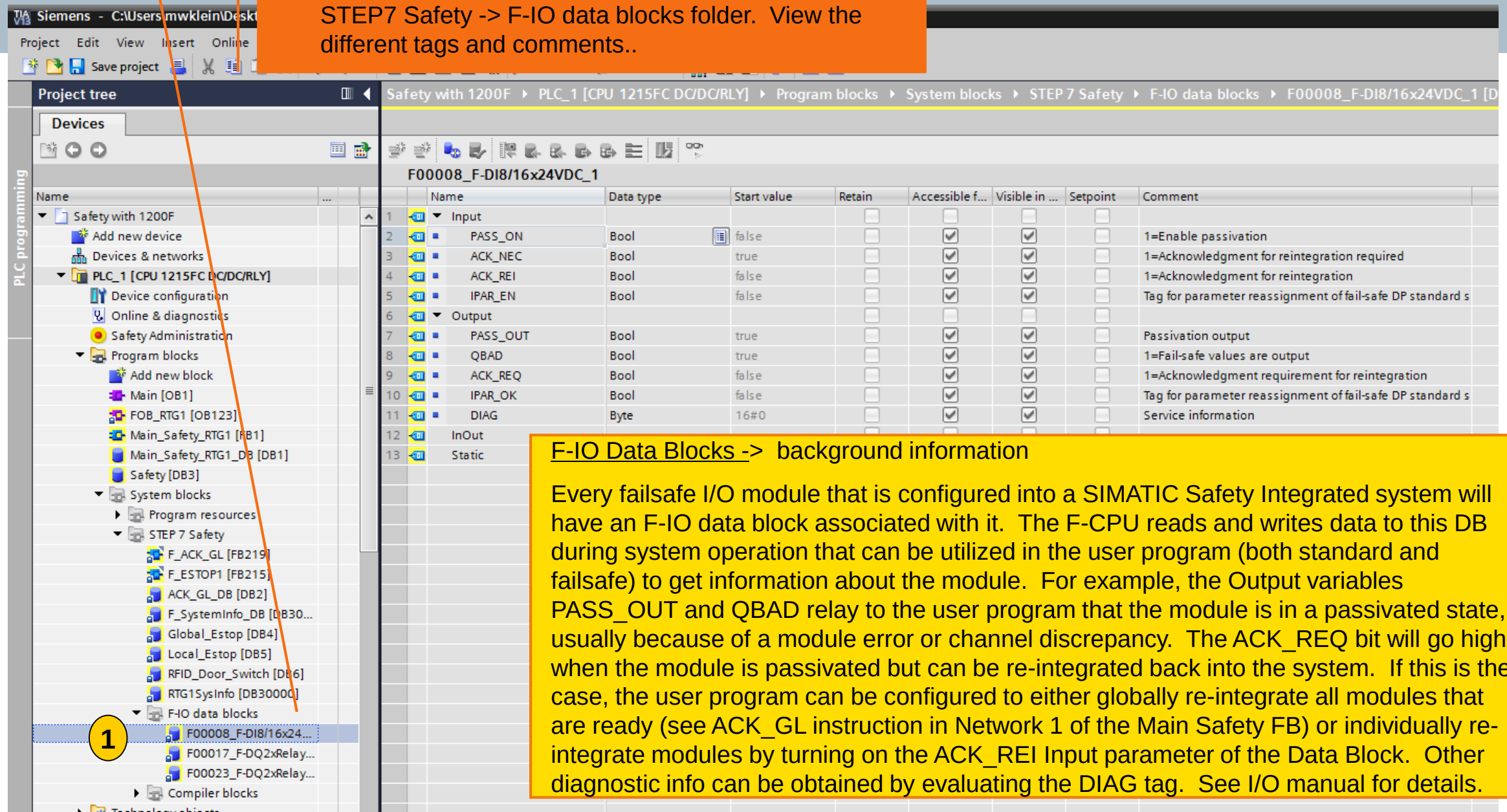

1. Assign the RFID door switch on the demo rack to the input of the ESTOP1 instruction.
2. Note that the default setting of the instruction inputs a “true” value to the ACK_NEC input. This requires that you turn on the “ACK” input in order to reset the output of the instruction after an Estop condition. We want to auto-reset the instruction when the door is closed again. Type “false” in the ACK_NEC input.
3. Assign the Safety Door Opened tag we just created from the Safety Data Block to the Q output of the instruction.
Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main_Safety_RTG1
%DB5
"Local_Estop"
ESTOP1
EN
ENO
%I8.1
"Local Estop"
E_STOP
Q
"Safety".Local_Estop_OK
true
ACK_NEC
Q_DELAY
%I0.1
"ACK PB"
ACK
ACK_REQ
"Safety".Local_Estop_Ack_Req
0
TIME_DEL
DIAG
Network 4:
Comment
%DB6
"RFID_Door_Switch"
ESTOP1
1
%I8.2
"RFID Door Switch"
"Safety".Door_Closed
3
false
2
Network 5:
Comment
120%
Properties
Info
Diagnostics
Portal view
Overview
PLC_1
Main_Safety...
Safety
F00008_F-DI...
Failsafe IO T...
The project Safety with 1200F was sav...


Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
4
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main_Safety_RTG1 [FB1]
Block interface
Network 5:
Comment
"Safety".Global_ Estop_OK
"Safety".Door_ Closed
%Q17.0
"Door LED Relay"
1
Network 6:
Comment
"Safety".Global_ Estop_OK
"Safety".Local_ Estop_OK
%Q17.1
"Zone 1 LED Relay"
2
Network 7:
Comment
"Safety".Global_ Estop_OK
%Q23.0
"Zone 2 LED Relay"
3
Network 8:
Comment
1. Add Network 5 as shown. The Global Estop and the Safety door will both enable the Door LED relay.
2. Add Network 6 as shown. The Global Estop and the Local Estop will both enable the Zone 1 LED relay.
3. Add Network 7 as shown. The Global Estop only will enable the Zone 2 LED relay.
4. Save the project.
Safety functions
ESTOP1
TWO_H_EN
MUT_P
EV1oo2DI
FDBACK
SFDOOR
ACK_GL
Timer operations
Counter operations
Comparator operations
Math functions
Move operations
Conversion operations
Program control operati...
Word logic operations
Shift and rotate
Operate
Extended instructions
Technology
Communication
Optional packages
Reference projects
Details view
Portal view
Overview
PLC_1
Main_Safety...
Safety
F00008_F-DI...
Failsafe IO T...
The project Safety with 1200F was sav...


1. Open the Main cyclic routine (OB1) by double clicking on “Main” in the Program blocks folder.
2. Add Network 1 as shown. When the Global Estop is pressed, the LED ring light around the Estop will illuminate. Note failsafe tags in yellow.
3. Add Network 2 as shown. When the Local Estop is pressed, the LED ring light around the Estop will illuminate.
Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main [OB1]
Block interface
Block title: "Main Program Sweep (Cycle)"
Network 1:
"Safety".Global_ Estop_OK
"Safety".Global_ Esop_Ack_Req
%Q0.0
"Global Estop LED Ring"
Network 2:
"Safety".Local_ Estop_OK
"Safety".Local_ Estop_Ack_Req
%Q0.1
"Local Estop LED Ring"
Network 3:
1
2
3

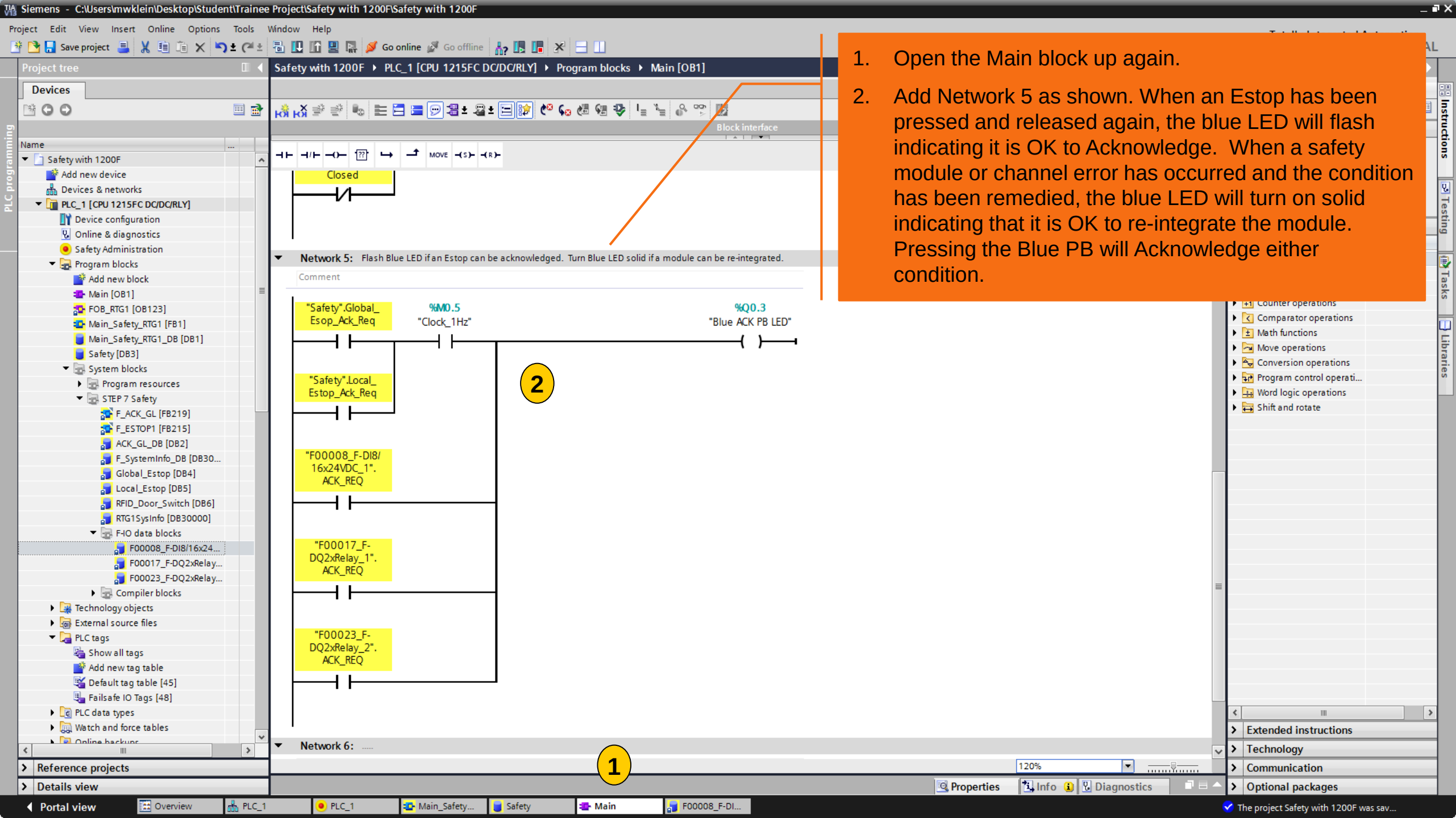

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main [OB1]
Block interface
"Safety".Local_ Estop_OK
"Safety".Local_ Estop_Ack_Req
%Q0.1
"Local Estop LED Ring"
Network 3:
Comment
"Safety".Global_ Estop_OK
"Safety".Local_ Estop_OK
"Safety".Door_ Closed
%Q0.7
"Top LED Green"
1
Network 4:
Comment
"Safety".Global_ Estop_OK
%Q1.0
"Top LED Red"
"Safety".Local_ Estop_OK
"Safety".Door_ Closed
2
Network 5:
Comment
1. Add Network 3 as shown. When all safety devices are OK, the top LED cluster on the demo unit will illuminate Green.
2. Add Network 4 as shown. When any of the safety devices are actuated, the top LED cluster on the demo unit will illuminate Red.
Basic instructions
Extended instructions
Technology
Communication
Optional packages
Reference projects
Details view
Portal view
The project Safety with 1200F was sav...

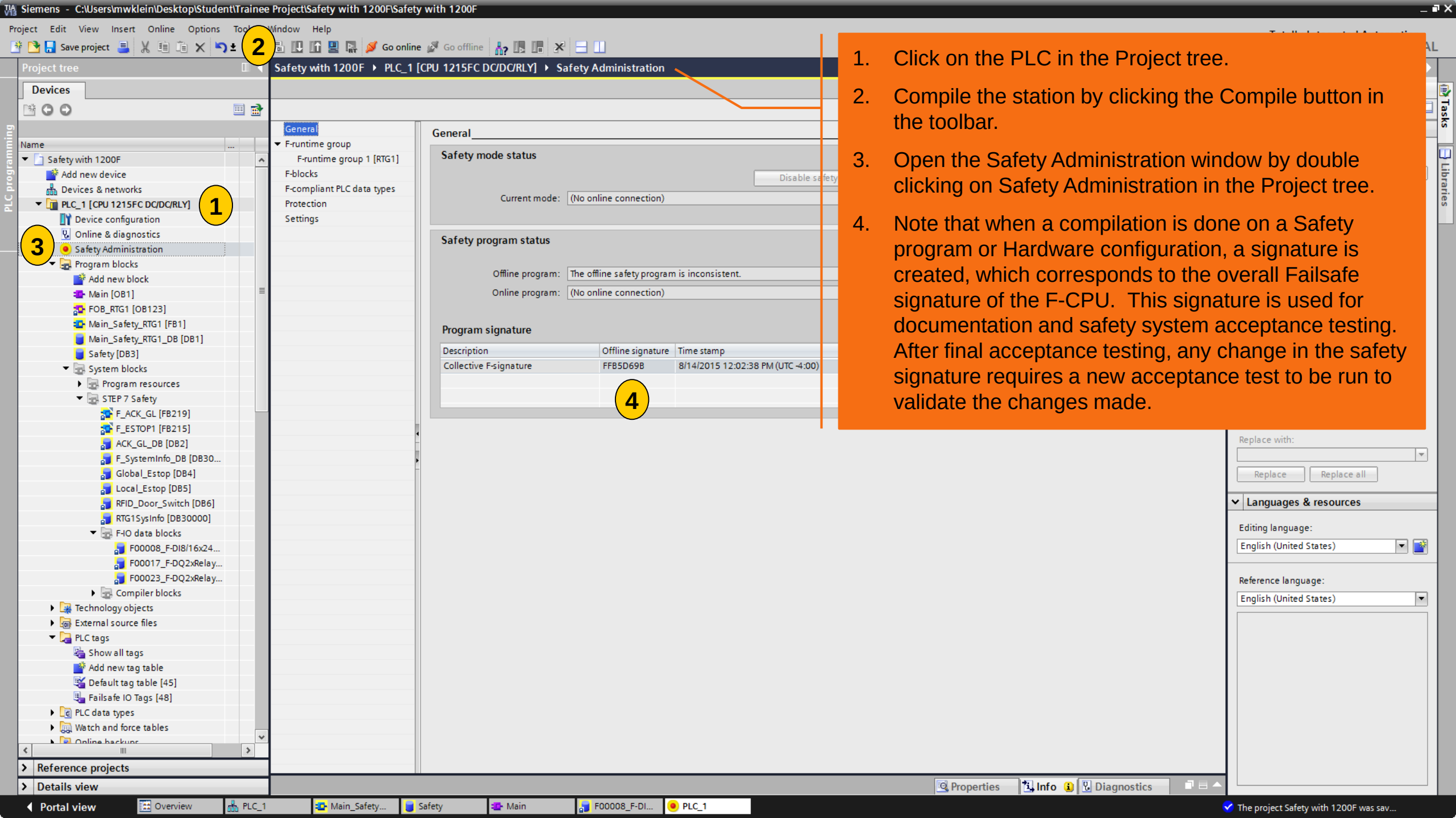
1. Open the F-IO data block for the Safety Input module on the demo unit by double clicking on the DB name shown in the Program blocks -> System blocks -> STEP7 Safety -> F-IO data blocks folder. View the different tags and comments..



F-IO Data Blocks -> background information

Every failsafe I/O module that is configured into a SIMATIC Safety Integrated system will have an F-IO data block associated with it. The F-CPU reads and writes data to this DB during system operation that can be utilized in the user program (both standard and failsafe) to get information about the module. For example, the Output variables PASS_OUT and QBAD relay to the user program that the module is in a passivated state, usually because of a module error or channel discrepancy. The ACK_REQ bit will go high when the module is passivated but can be re-integrated back into the system. If this is the case, the user program can be configured to either globally re-integrate all modules that are ready (see ACK_GL instruction in Network 1 of the Main Safety FB) or individually re-integrate modules by turning on the ACK_REI Input parameter of the Data Block. Other diagnostic info can be obtained by evaluating the DIAG tag. See I/O manual for details.

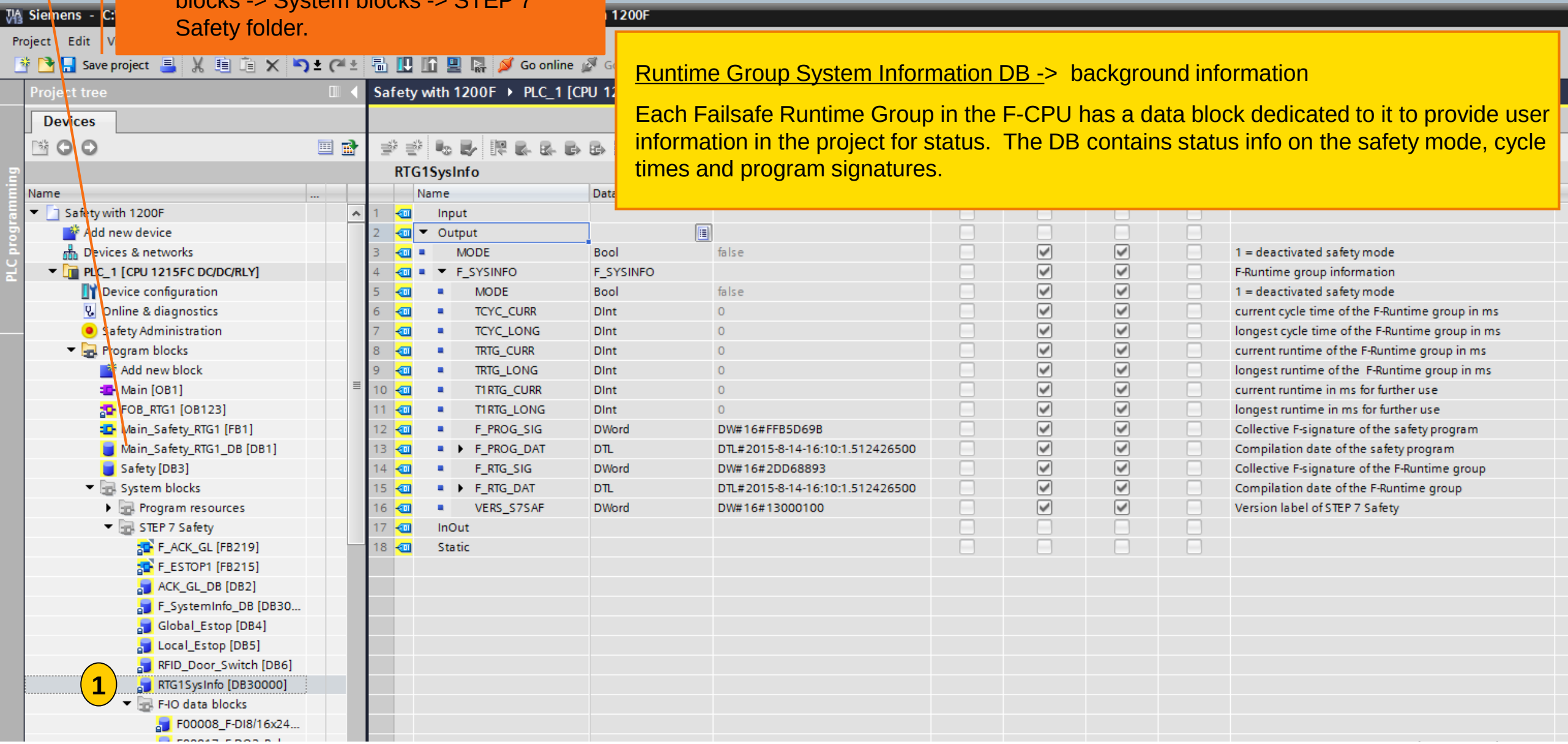

1. Open the Main block up again.
2. Add Network 5 as shown. When an Estop has been pressed and released again, the blue LED will flash indicating it is OK to Acknowledge. When a safety module or channel error has occurred and the condition has been remedied, the blue LED will turn on solid indicating that it is OK to re-integrate the module. Pressing the Blue PB will Acknowledge either condition.
Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main [OB1]
Block interface
Closed
Network 5: Flash Blue LED if an Estop can be acknowledged. Turn Blue LED solid if a module can be re-integrated.
Comment
"Safety".Global_ Esop_Ack_Req
%M0.5
"Clock_1Hz"
%Q0.3
"Blue ACK PB LED"
"Safety".Local_ Estop_Ack_Req
"F00008_F-DI8/ 16x24VDC_1". ACK_REQ
"F00017_F-DQ2xRelay_1". ACK_REQ
"F00023_F-DQ2xRelay_2". ACK_REQ
2
1
Network 6:
Extended instructions
Technology
Communication
Optional packages
Reference projects
Details view
Portal view
Overview
PLC_1
Main
Properties
Info
Diagnostics

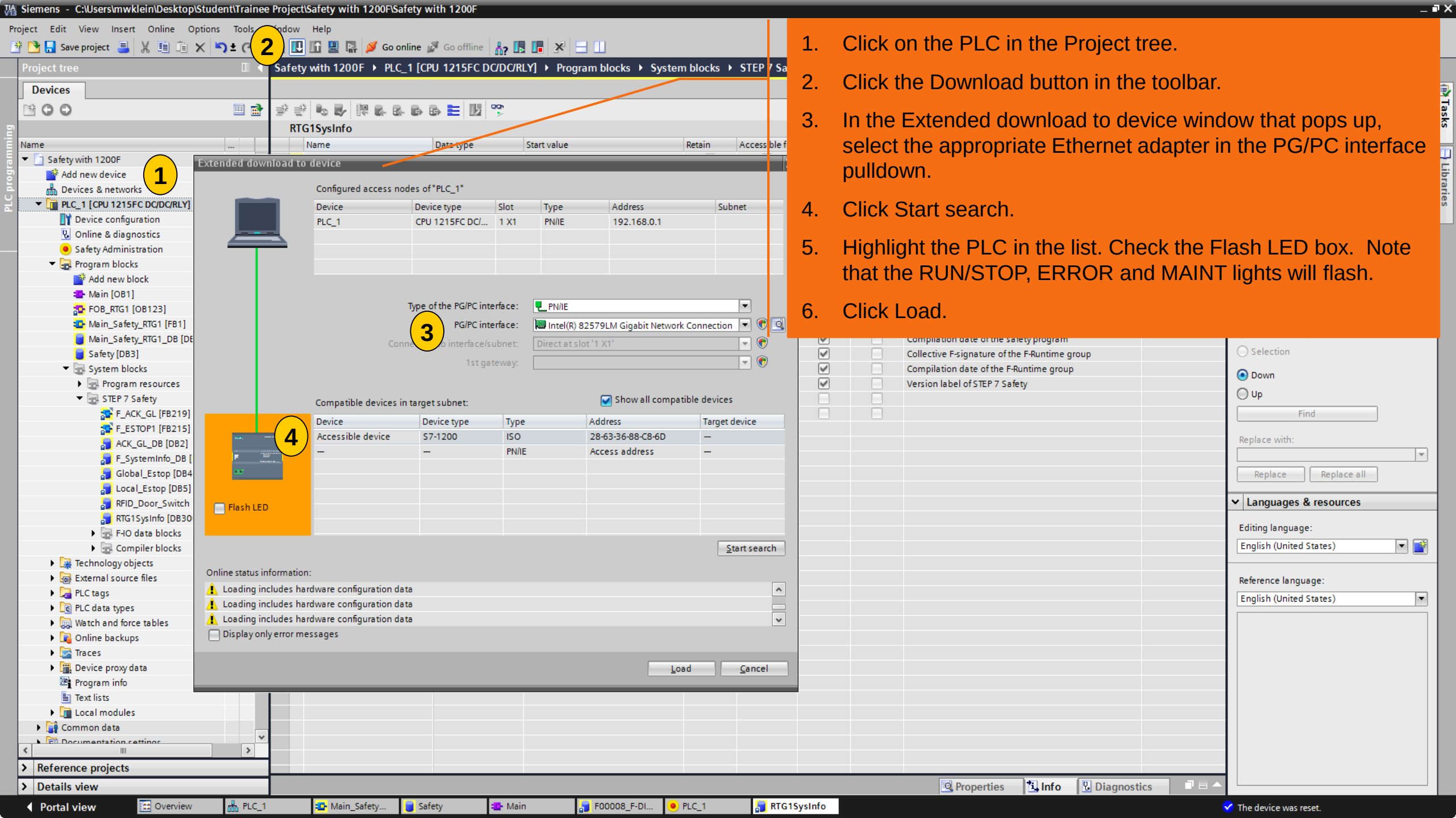

Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
2
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Safety Administration
Name
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
1
Device configuration
Online & diagnostics
3
Safety Administration
Program blocks
Add new block
Main [OB1]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30...
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24...
F00017_F-DQ2xRelay...
F00023_F-DQ2xRelay...
Compiler blocks
Technology objects
External source files
PLC tags
Show all tags
Add new tag table
Default tag table [45]
Failsafe IO Tags [48]
PLC data types
Watch and force tables
Online backups
Reference projects
Details view
General
F-runtime group
F-runtime group 1 [RTG1]
F-blocks
F-compliant PLC data types
Protection
Settings
General
Safety mode status
Disable safety
Current mode: (No online connection)
Safety program status
Offline program: The offline safety program is inconsistent.
Online program: (No online connection)
Program signature
Description
Offline signature
Time stamp
Collective F-signature
FFB5D69B
8/14/2015 12:02:38 PM (UTC -4:00)
4
1. Click on the PLC in the Project tree.
2. Compile the station by clicking the Compile button in the toolbar.
3. Open the Safety Administration window by double clicking on Safety Administration in the Project tree.
4. Note that when a compilation is done on a Safety program or Hardware configuration, a signature is created, which corresponds to the overall Failsafe signature of the F-CPU. This signature is used for documentation and safety system acceptance testing. After final acceptance testing, any change in the safety signature requires a new acceptance test to be run to validate the changes made.
Replace with:
Replace
Replace all
Languages & resources
Editing language:
English (United States)
Reference language:
English (United States)
Properties
Info
Diagnostics
Portal view
Overview
PLC_1
Main_Safety...
Safety
Main
F00008_F-DI...
PLC_1
The project Safety with 1200F was sav...

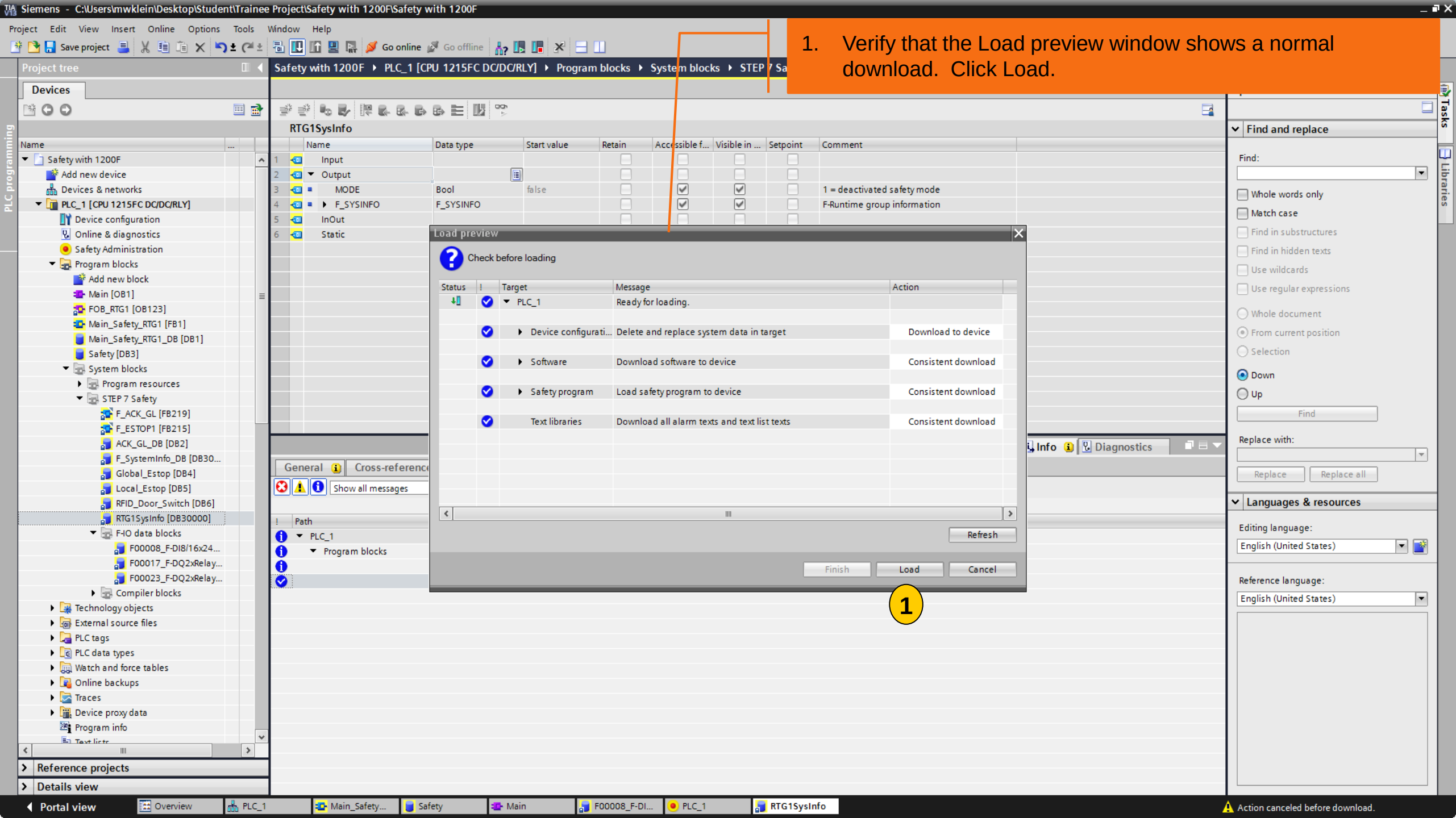
1. Open the Runtime Group System Information Data Block by double clicking on RTG1SysInfo block in the Program blocks -> System blocks -> STEP 7 Safety folder.

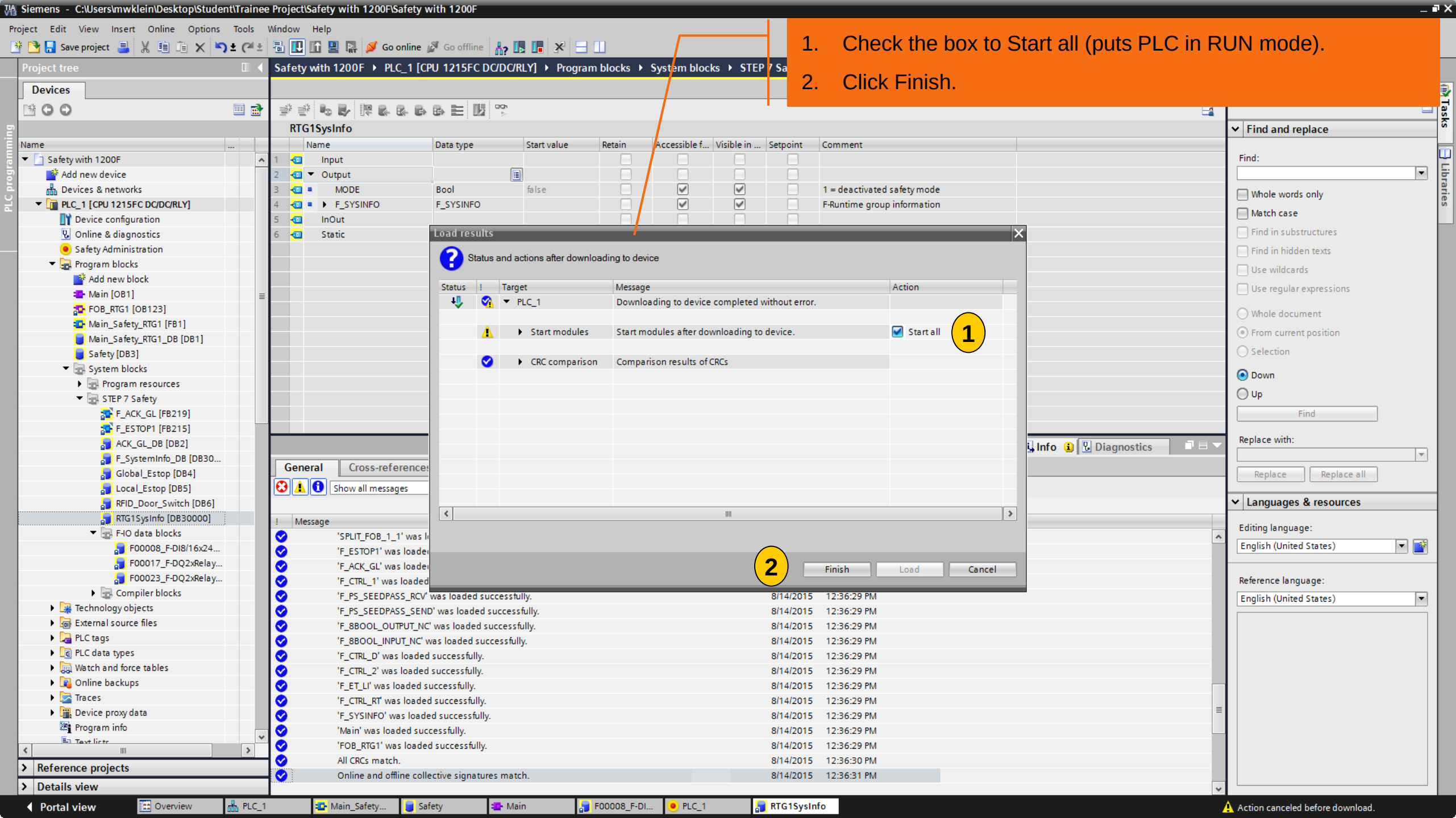
Runtime Group System Information DB -> background information

Each Failsafe Runtime Group in the F-CPU has a data block dedicated to it to provide user information in the project for status. The DB contains status info on the safety mode, cycle times and program signatures.




1. Click on the PLC in the Project tree.
2. Click the Download button in the toolbar.
3. In the Extended download to device window that pops up, select the appropriate Ethernet adapter in the PG/PC interface pulldown.
4. Click Start search.
5. Highlight the PLC in the list. Check the Flash LED box. Note that the RUN/STOP, ERROR and MAINT lights will flash.
6. Click Load.
Extended download to device
Configured access nodes of "PLC_1"
Type of the PG/PC interface:
PG/PC interface:
Compatible devices in target subnet:
Show all compatible devices
Flash LED
Start search
Online status information:
Loading includes hardware configuration data
Display only error messages
Load
Cancel


Siemens - C:\Users\mwklein\Desktop\Student\Trainee Project\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ System blocks ▸ STEP 7 Sa
RTG1SysInfo
Load preview
Check before loading
Status
Target
Message
Action
PLC_1
Ready for loading.
Device configurati...
Delete and replace system data in target
Download to device
Software
Download software to device
Consistent download
Safety program
Load safety program to device
Consistent download
Text libraries
Download all alarm texts and text list texts
Consistent download
Refresh
Finish
Load
Cancel
1
1. Verify that the Load preview window shows a normal download. Click Load.
Find and replace
Languages & resources
Portal view
Overview
PLC_1
Main_Safety...
Safety
Main
F00008_F-DI...
PLC_1
RTG1SysInfo
Action canceled before download.


1. Check the box to Start all (puts PLC in RUN mode).
2. Click Finish.
Load results
Status and actions after downloading to device
Status
Target
Message
Action
PLC_1
Downloading to device completed without error.
Start modules
Start modules after downloading to device.
Start all
CRC comparison
Comparison results of CRCs
1
2
Finish
Load
Cancel
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ System blocks ▸ STEP 7 Sa
RTG1SysInfo
Name
Data type
Start value
Retain
Accessible f...
Visible in ...
Setpoint
Comment
Input
Output
MODE
Bool
false
1 = deactivated safety mode
F_SYSINFO
F_SYSINFO
F-Runtime group information
InOut
Static
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30...
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24...
F00017_F-DQ2xRelay...
F00023_F-DQ2xRelay...
Compiler blocks
Technology objects
External source files
PLC tags
PLC data types
Watch and force tables
Online backups
Traces
Device proxy data
Program info
Reference projects
Details view
General
Cross-references
Show all messages
Message
'SPLIT_FOB_1_1' was l
'F_ESTOP1' was loade
'F_ACK_GL' was loade
'F_CTRL_1' was loaded
'F_PS_SEEDPASS_RCV' was loaded successfully. 8/14/2015 12:36:29 PM
'F_PS_SEEDPASS_SEND' was loaded successfully. 8/14/2015 12:36:29 PM
'F_8BOOL_OUTPUT_NC' was loaded successfully. 8/14/2015 12:36:29 PM
'F_8BOOL_INPUT_NC' was loaded successfully. 8/14/2015 12:36:29 PM
'F_CTRL_D' was loaded successfully. 8/14/2015 12:36:29 PM
'F_CTRL_2' was loaded successfully. 8/14/2015 12:36:29 PM
'F_ET_LI' was loaded successfully. 8/14/2015 12:36:29 PM
'F_CTRL_RT' was loaded successfully. 8/14/2015 12:36:29 PM
'F_SYSINFO' was loaded successfully. 8/14/2015 12:36:29 PM
'Main' was loaded successfully. 8/14/2015 12:36:29 PM
'FOB_RTG1' was loaded successfully. 8/14/2015 12:36:29 PM
All CRCs match. 8/14/2015 12:36:30 PM
Online and offline collective signatures match. 8/14/2015 12:36:31 PM
Info
Diagnostics
Find and replace
Find:
Whole words only
Match case
Find in substructures
Find in hidden texts
Use wildcards
Use regular expressions
Whole document
From current position
Selection
Down
Up
Find
Replace with:
Replace
Replace all
Languages & resources
Editing language:
English (United States)
Reference language:
English (United States)
Portal view
Overview
PLC_1
Main_Safety...
Safety
Main
F00008_F-DI...
PLC_1
RTG1SysInfo
Action canceled before download.

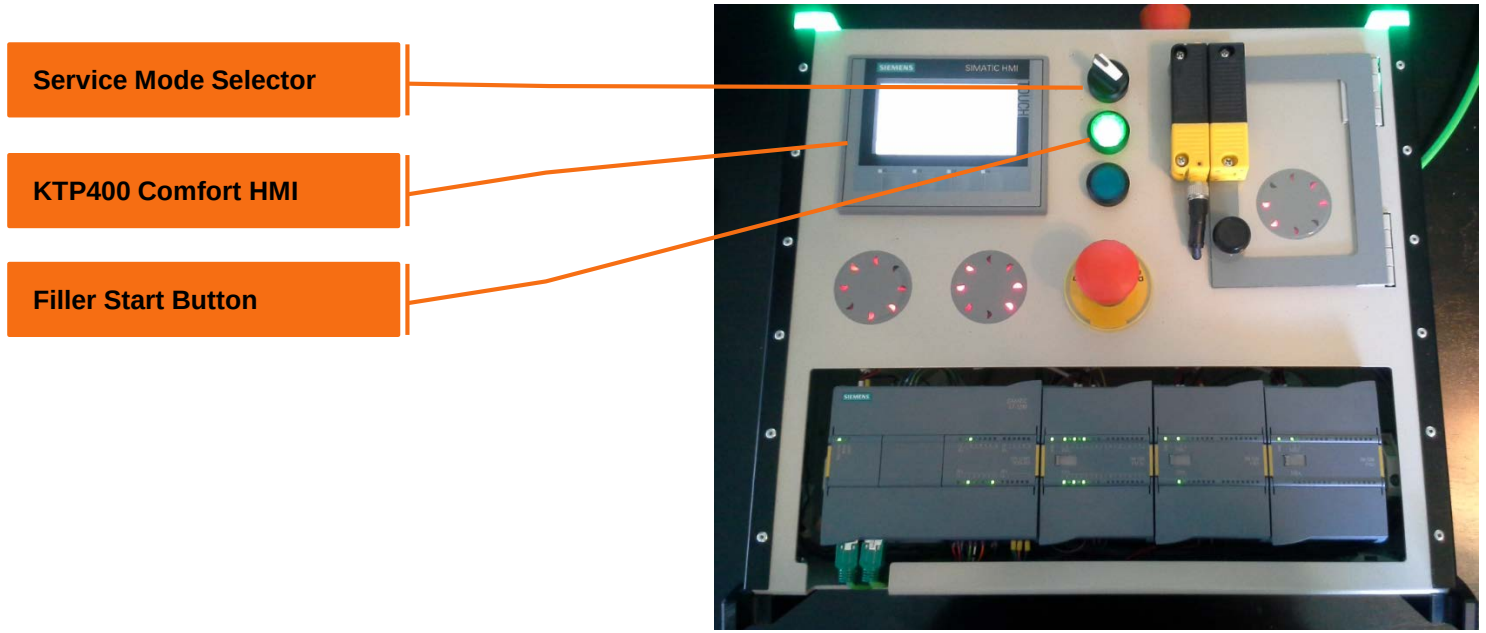
Test Demo unit functionality:

- Upon power up/Download the blue LED on the ACK button may flash. Press the ACK button to ACK the safety system. The LED light rings should illuminate and the top LEDs should turn green.
- Pressing of the Global E-Stop should turn off Zone 1, Zone 2, and Door LED and turn the top LEDs red. Upon releasing of the E-Stop the blue ACK light should flash. Press ACK button to reset safety system.
- Pressing of the Local E-Stop should turn off only Zone 1 LED and turn the top LEDs red. Upon Releasing of the E-Stop the blue ACL light should flash. Press ACK button to reset safety system.
- Opening of the safety door should turn off only the door LED and turn the top LEDs red. Upon closer of the door the door LED should come on need no ACK reset.

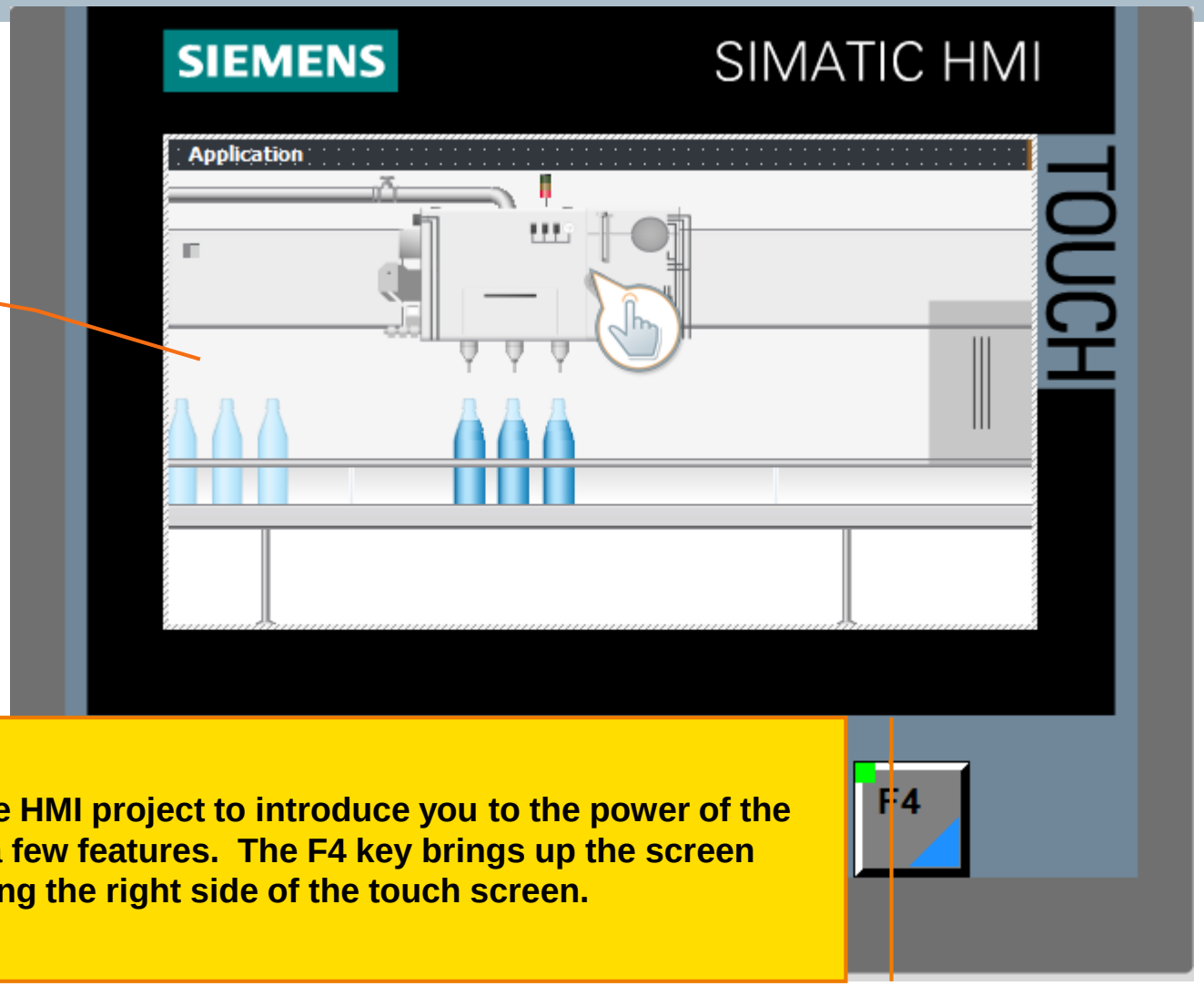
1. Test your safety functions to make sure they perform correctly.

Extra – Add on HMI and extra safety function for Bottle Filler.

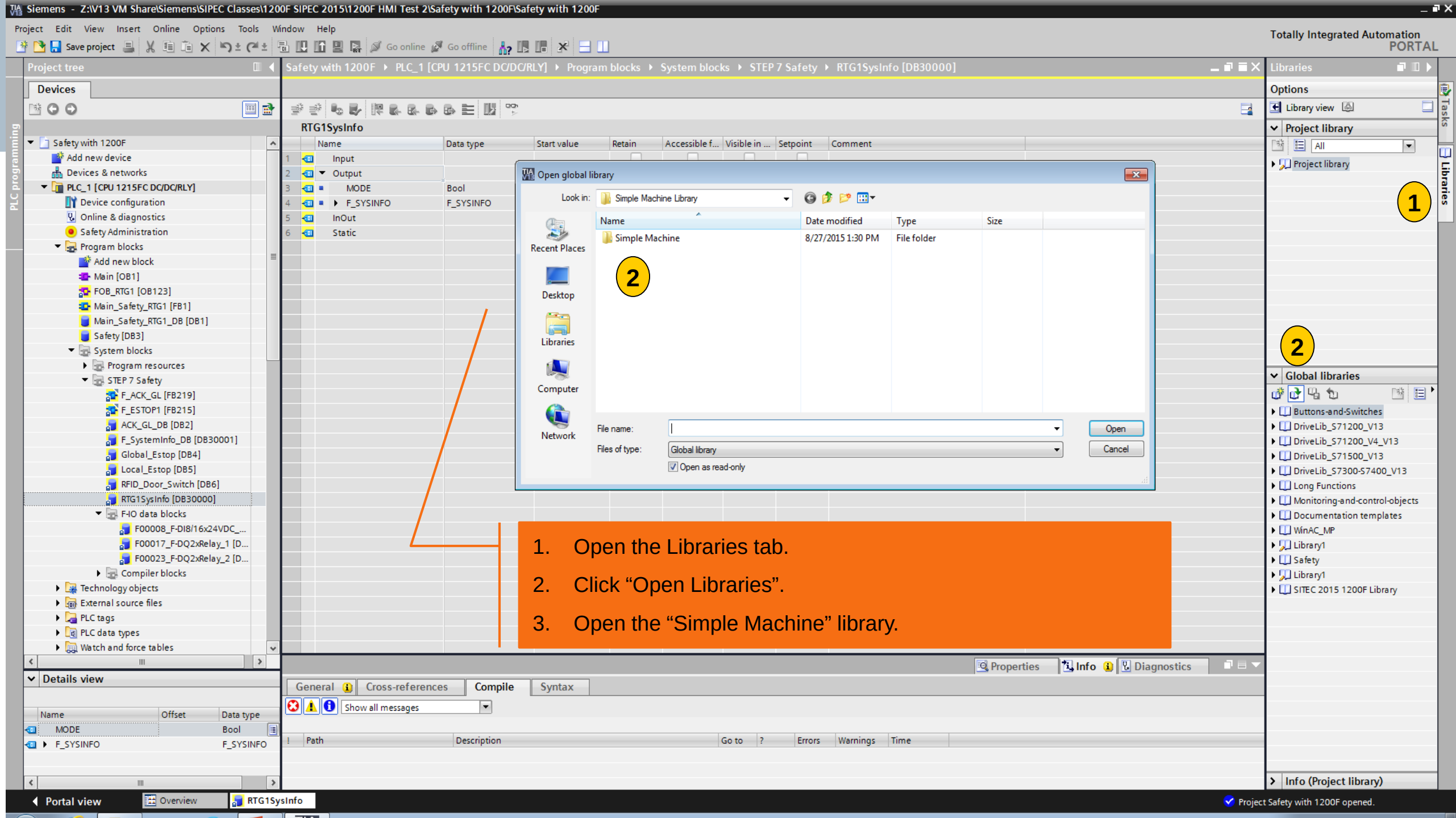
For this section we will insert an HMI project from the library and some PLC blocks to control a bottle filler on the HMI. Upon completion of this section the safety function of the safety door will include a service mode that will place the bottle filler in a safe speed when the door is opened. Below are the items added for this section.

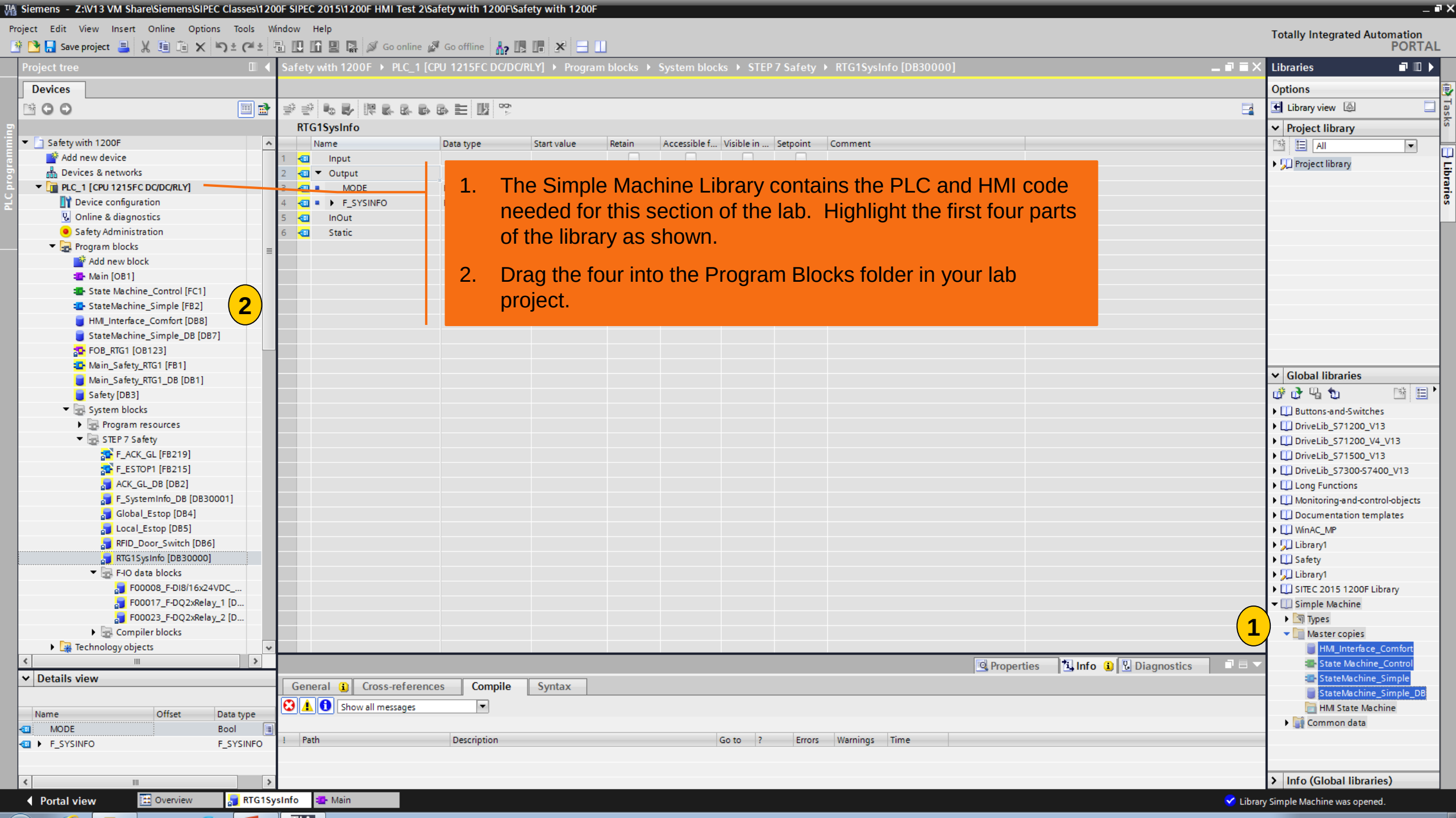


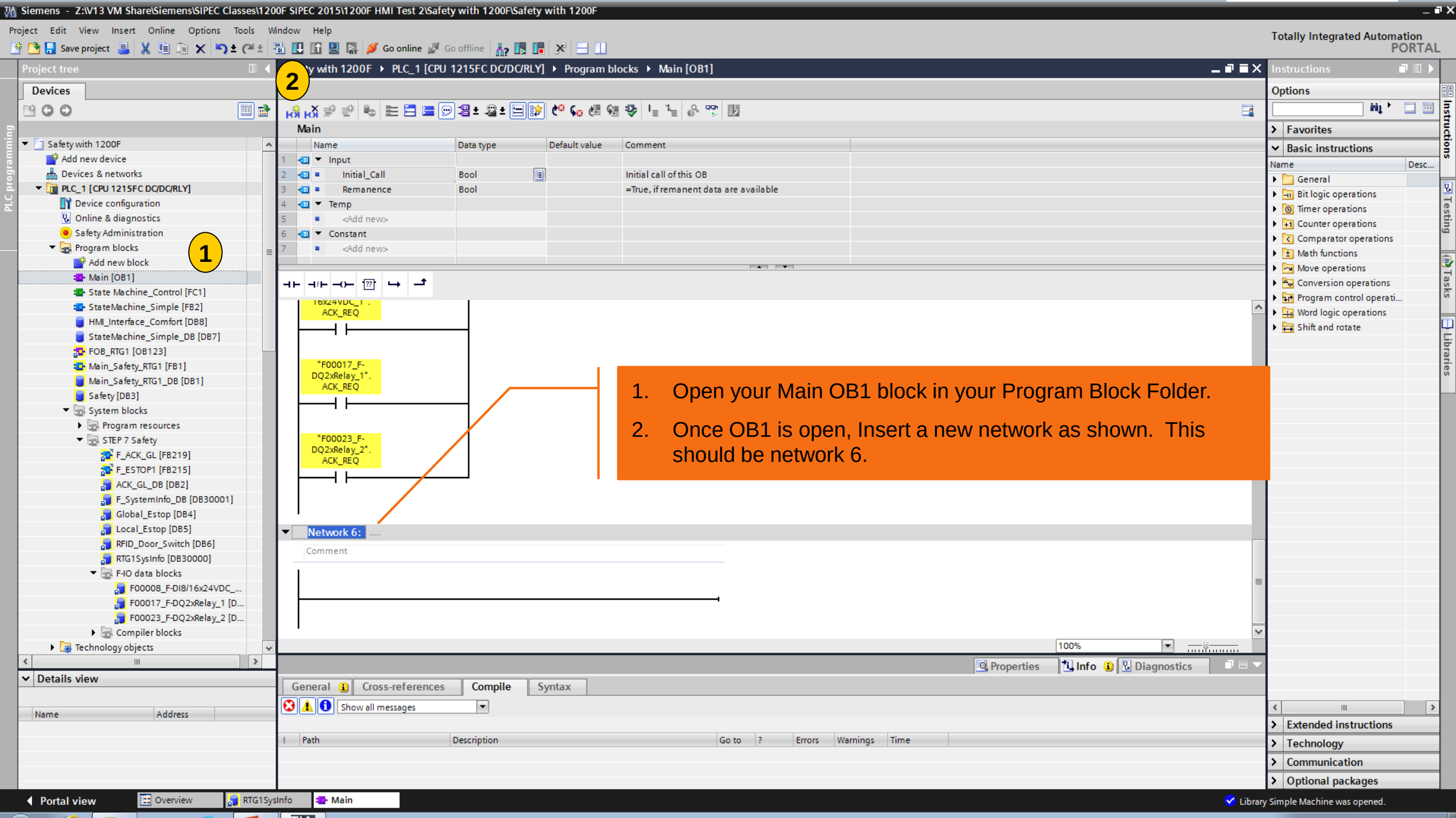
KTP400 Comfort Bottle Filler Screen

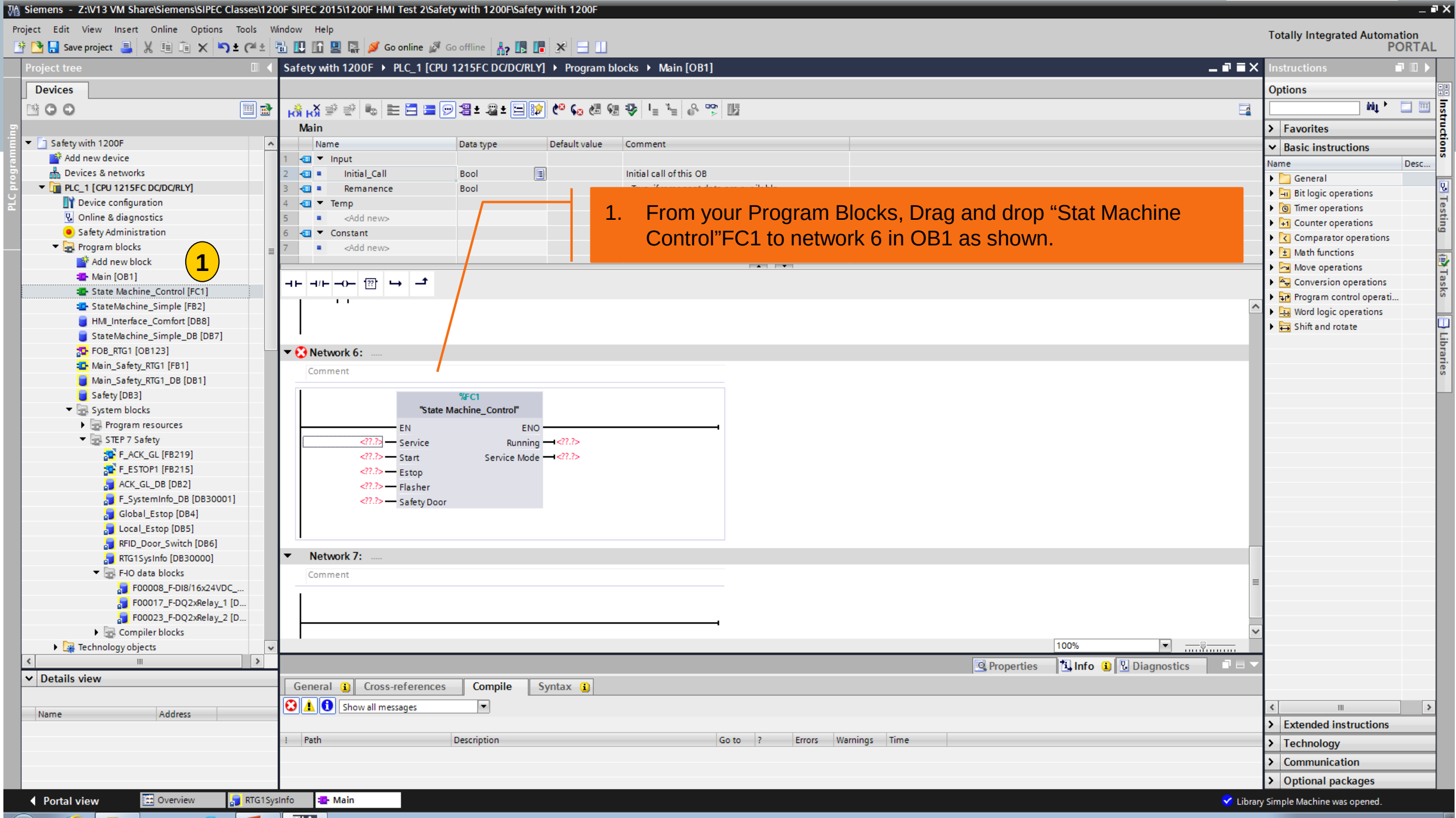


KTP400 Project – This is a simple HMI project to introduce you to the power of the Comfort panels and just shows a few features. The F4 key brings up the screen menu along with just simply taping the right side of the touch screen.


Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30001]
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24VDC_...
F00017_F-DQ2xRelay_1 [D...
F00023_F-DQ2xRelay_2 [D...
Compiler blocks
Technology objects
External source files
PLC tags
PLC data types
Watch and force tables
Details view
Name Offset Data type
MODE Bool
F_SYSINFO F_SYSINFO
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ System blocks ▸ STEP 7 Safety ▸ RTG1SysInfo [DB30000]
RTG1SysInfo
Name Data type Start value Retain Accessible f... Visible in ... Setpoint Comment
1 Input
2 Output
3 MODE Bool
4 F_SYSINFO F_SYSINFO
5 InOut
6 Static
Open global library
Look in: Simple Machine Library
Recent Places
Desktop
Libraries
Computer
Network
Name Date modified Type Size
Simple Machine 8/27/2015 1:30 PM File folder
2
File name:
Files of type: Global library
Open as read-only
Open
Cancel
1. Open the Libraries tab.
2. Click “Open Libraries”.
3. Open the “Simple Machine” library.
Properties Info Diagnostics
General Cross-references Compile Syntax
Show all messages
! Path Description Go to ? Errors Warnings Time
Libraries
Options
Library view
Project library
All
Project library
1
2
Global libraries
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
Library1
Safety
Library1
SITEC 2015 1200F Library
Info (Project library)
Portal view
Overview
RTG1SysInfo
Project Safety with 1200F opened.

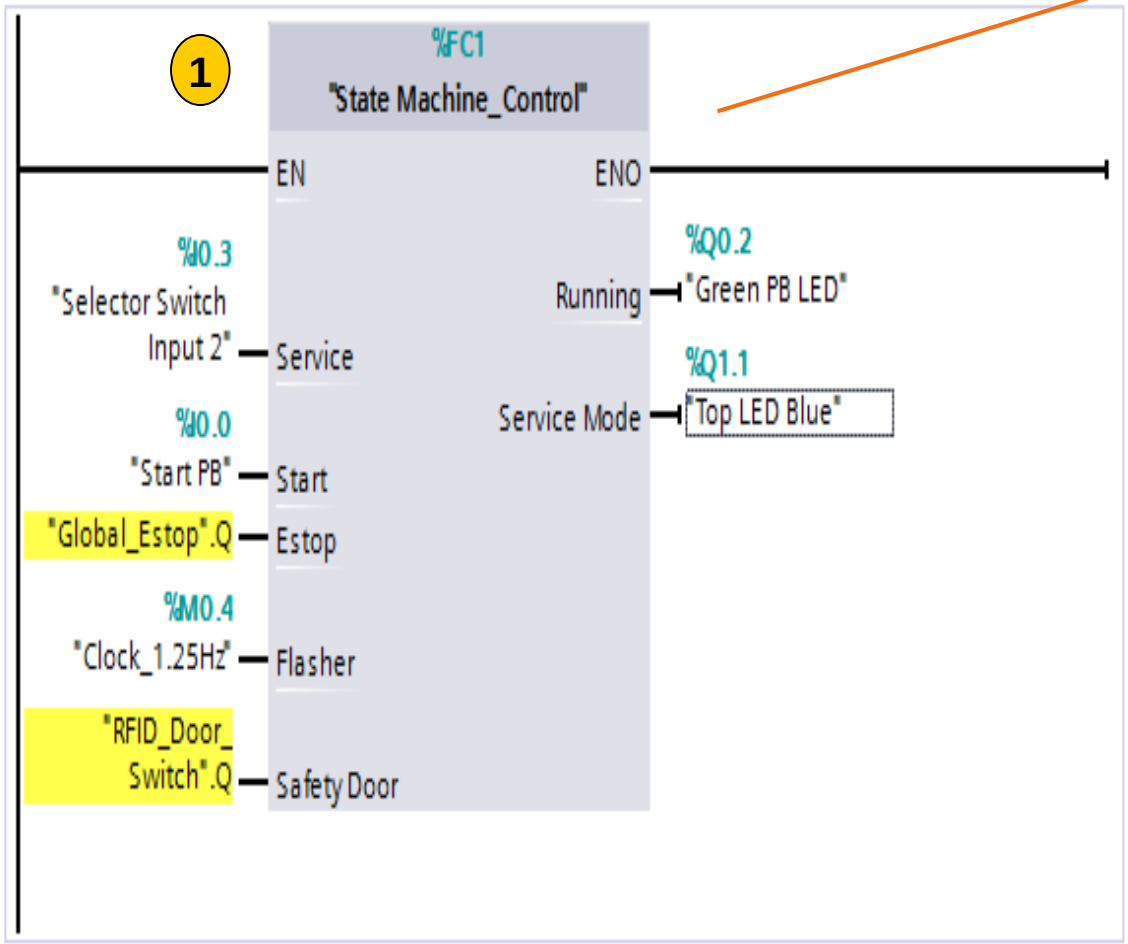

Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
State Machine_Control [FC1]
StateMachine_Simple [FB2]
HMI_Interface_Comfort [DB8]
StateMachine_Simple_DB [DB7]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30001]
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24VDC_...
F00017_F-DQ2xRelay_1 [D...
F00023_F-DQ2xRelay_2 [D...
Compiler blocks
Technology objects
2
Details view
Name Offset Data type
MODE Bool
F_SYSINFO F_SYSINFO
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ System blocks ▸ STEP 7 Safety ▸ RTG1SysInfo [DB30000]
RTG1SysInfo
Name Data type Start value Retain Accessible f... Visible in ... Setpoint Comment
1 Input
2 Output
3 MODE
4 F_SYSINFO
5 InOut
6 Static
1. The Simple Machine Library contains the PLC and HMI code needed for this section of the lab. Highlight the first four parts of the library as shown.
2. Drag the four into the Program Blocks folder in your lab project.
Libraries
Options
Library view
Project library
All
Project library
Global libraries
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
Library1
Safety
Library1
SITEC 2015 1200F Library
Simple Machine
Types
Master copies
HMI_Interface_Comfort
State Machine_Control
StateMachine_Simple
StateMachine_Simple_DB
HMI State Machine
Common data
1
Info (Global libraries)
Properties
Info
Diagnostics
General
Cross-references
Compile
Syntax
Show all messages
! Path Description Go to ? Errors Warnings Time
Portal view
Overview
RTG1SysInfo
Main
Library Simple Machine was opened.


Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
State Machine_Control [FC1]
StateMachine_Simple [FB2]
HMI_Interface_Comfort [DB8]
StateMachine_Simple_DB [DB7]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30001]
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24VDC_...
F00017_F-DQ2xRelay_1 [D...
F00023_F-DQ2xRelay_2 [D...
Compiler blocks
Technology objects
1
2
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main [OB1]
Main
Name Data type Default value Comment
Input
Initial_Call Bool Initial call of this OB
Remanence Bool =True, if remanent data are available
Temp
<Add new>
Constant
<Add new>
ACK_REQ
"F00017_F-DQ2xRelay_1".ACK_REQ
"F00023_F-DQ2xRelay_2".ACK_REQ
Network 6:
Comment
1. Open your Main OB1 block in your Program Block Folder.
2. Once OB1 is open, Insert a new network as shown. This should be network 6.
100%
Properties
Info
Diagnostics
General
Cross-references
Compile
Syntax
Show all messages
Path Description Go to ? Errors Warnings Time
Details view
Name Address
Instructions
Options
Favorites
Basic instructions
General
Bit logic operations
Timer operations
Counter operations
Comparator operations
Math functions
Move operations
Conversion operations
Program control operati...
Word logic operations
Shift and rotate
Extended instructions
Technology
Communication
Optional packages
Portal view
Overview
RTG1SysInfo
Main
Library Simple Machine was opened.


Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
State Machine_Control [FC1]
StateMachine_Simple [FB2]
HMI_Interface_Comfort [DB8]
StateMachine_Simple_DB [DB7]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30001]
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24VDC_...
F00017_F-DQ2xRelay_1 [D...
F00023_F-DQ2xRelay_2 [D...
Compiler blocks
Technology objects
1
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main [OB1]
Main
Name
Data type
Default value
Comment
Input
Initial_Call
Bool
Initial call of this OB
Remanence
Bool
Temp
<Add new>
Constant
<Add new>
1. From your Program Blocks, Drag and drop “Stat Machine Control”FC1 to network 6 in OB1 as shown.
Network 6:
Comment
%FC1
"State Machine_Control"
EN
ENO
Service
Running
Start
Service Mode
Estop
Flasher
Safety Door
Network 7:
Comment
100%
Instructions
Options
Favorites
Basic instructions
Name
Desc...
General
Bit logic operations
Timer operations
Counter operations
Comparator operations
Math functions
Move operations
Conversion operations
Program control operati...
Word logic operations
Shift and rotate
Extended instructions
Technology
Communication
Optional packages
Details view
Name
Address
Properties
Info
Diagnostics
General
Cross-references
Compile
Syntax
Show all messages
Path
Description
Go to
?
Errors
Warnings
Time
Portal view
Overview
RTG1SysInfo
Main
Library Simple Machine was opened.

Network 6:

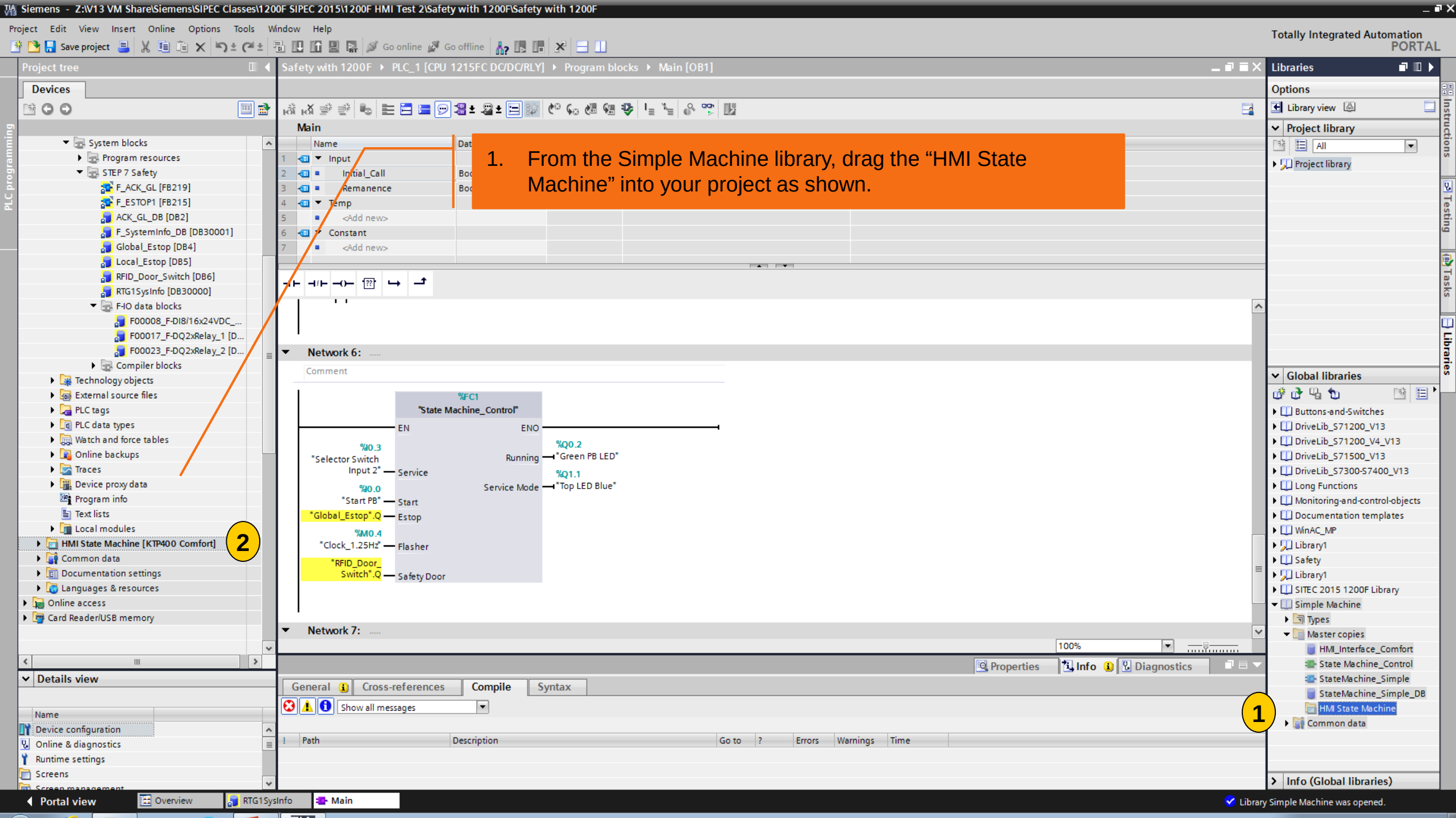
Comment

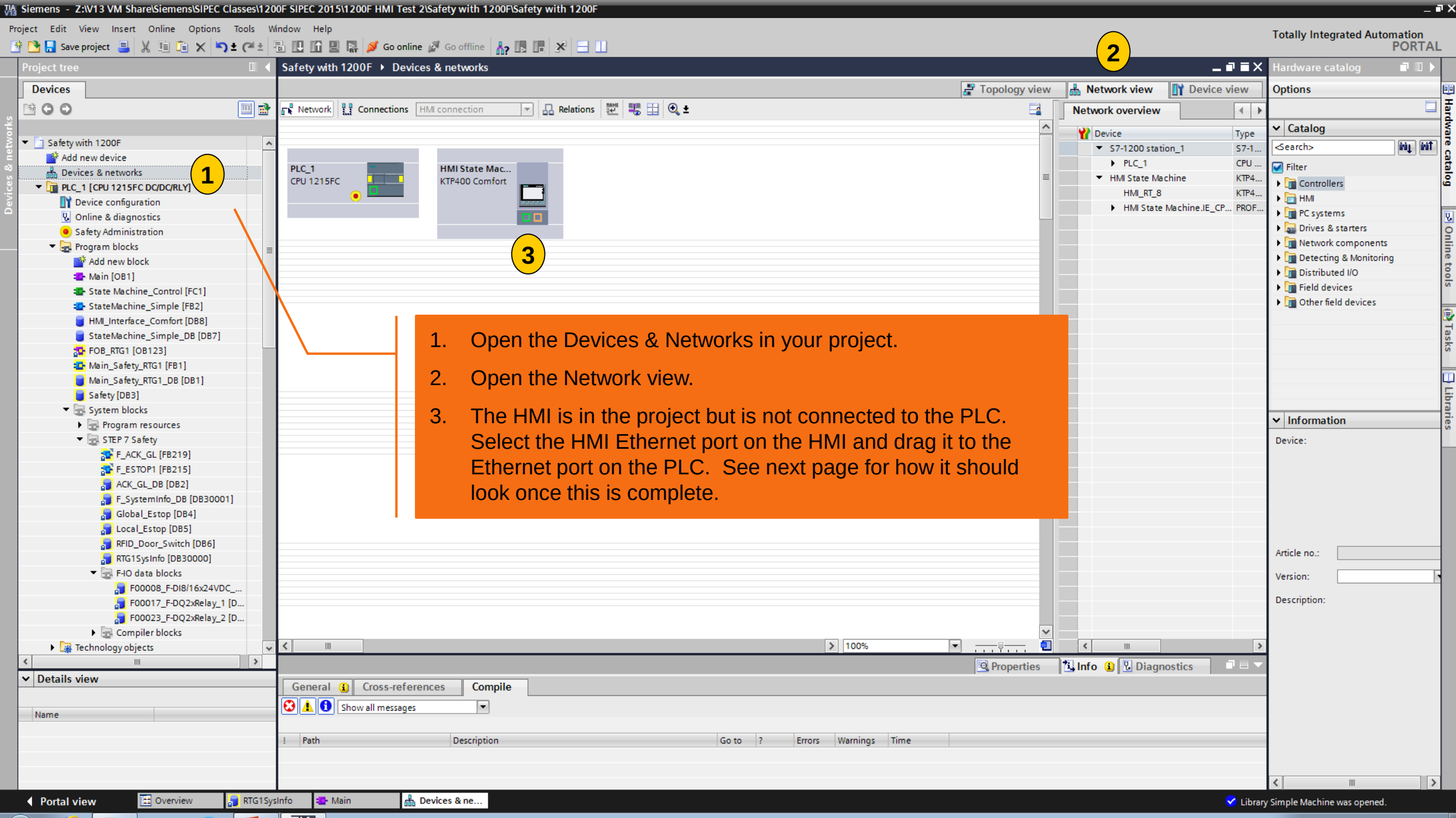


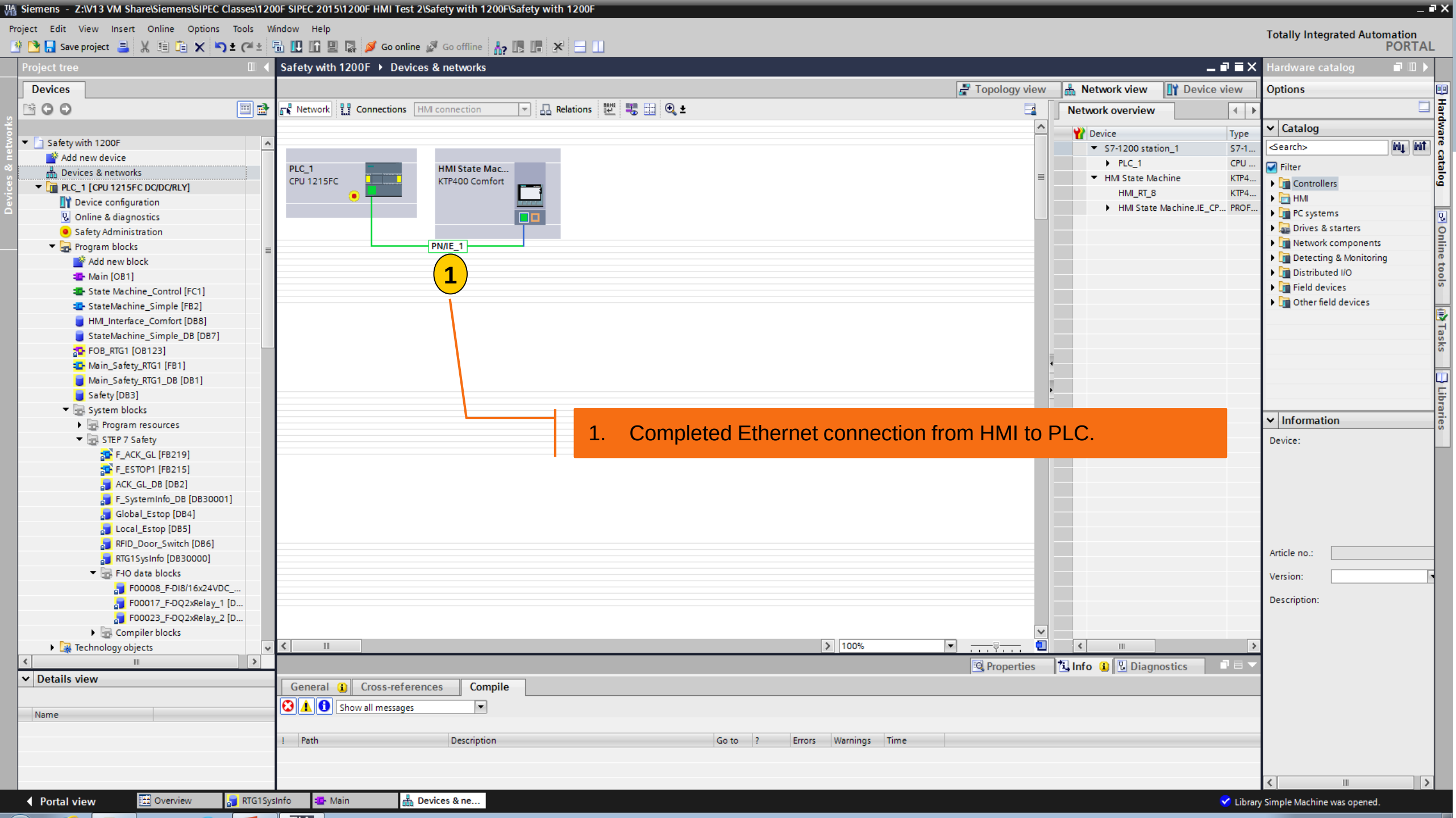
1. Program your network 6 as shown. Be sure to make sure you have the correct items on each input and output to the block.

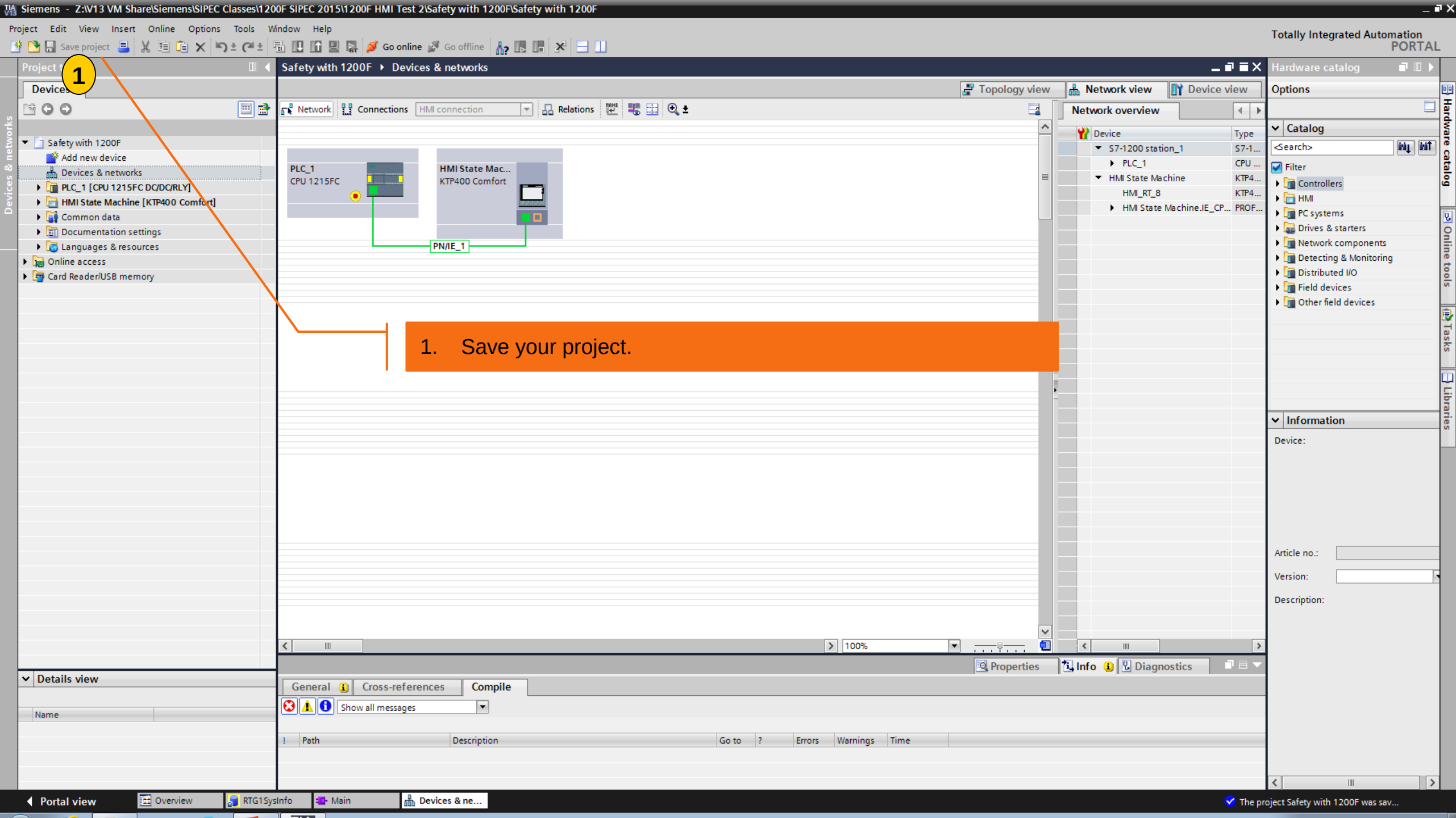
Network 7:

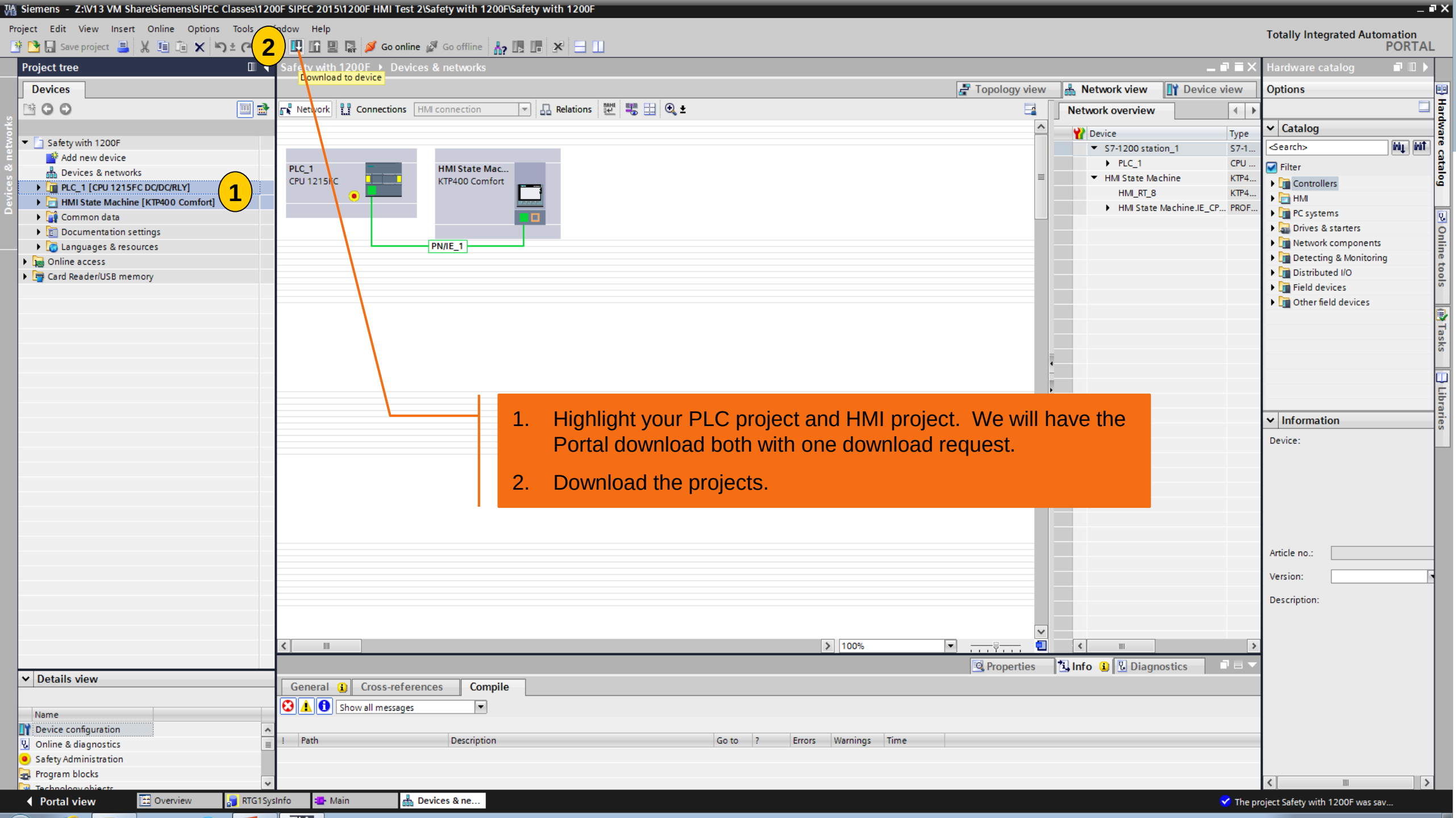
100%


Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30001]
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24VDC_...
F00017_F-DQ2xRelay_1 [D...
F00023_F-DQ2xRelay_2 [D...
Compiler blocks
Technology objects
External source files
PLC tags
PLC data types
Watch and force tables
Online backups
Traces
Device proxy data
Program info
Text lists
Local modules
HMI State Machine [KTP400 Comfort]
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Details view
Name
Device configuration
Online & diagnostics
Runtime settings
Screens
Safety with 1200F ▸ PLC_1 [CPU 1215FC DC/DC/RLY] ▸ Program blocks ▸ Main [OB1]
Main
Name
Input
Initial_Call
Remanence
Temp
Constant
<Add new>
1. From the Simple Machine library, drag the “HMI State Machine” into your project as shown.
Network 6:
Comment
%FC1
"State Machine_Control"
EN
ENO
%I0.3
"Selector Switch Input 2"
Service
Running
%Q0.2
"Green PB LED"
Service Mode
%Q1.1
"Top LED Blue"
%I0.0
"Start PB"
Start
"Global_Estop".Q
Estop
%M0.4
"Clock_1.25Hz"
Flasher
"RFID_Door_Switch".Q
Safety Door
Network 7:
100%
Properties
Info
Diagnostics
General
Cross-references
Compile
Syntax
Show all messages
! Path Description Go to ? Errors Warnings Time
Libraries
Options
Library view
Project library
All
Project library
Global libraries
Buttons-and-Switches
DriveLib_S71200_V13
DriveLib_S71200_V4_V13
DriveLib_S71500_V13
DriveLib_S7300-S7400_V13
Long Functions
Monitoring-and-control-objects
Documentation templates
WinAC_MP
Library1
Safety
Library1
SITEC 2015 1200F Library
Simple Machine
Types
Master copies
HMI_Interface_Comfort
State Machine_Control
StateMachine_Simple
StateMachine_Simple_DB
HMI State Machine
Common data
Info (Global libraries)
Instructions
Testing
Tasks
Libraries
PLC programming
2
1
Portal view
Overview
RTG1SysInfo
Main
Library Simple Machine was opened.


Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project Go online Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
State Machine_Control [FC1]
StateMachine_Simple [FB2]
HMI_Interface_Comfort [DB8]
StateMachine_Simple_DB [DB7]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30001]
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24VDC_...
F00017_F-DQ2xRelay_1 [D...
F00023_F-DQ2xRelay_2 [D...
Compiler blocks
Technology objects
1
Safety with 1200F ▸ Devices & networks
2
Topology view
Network view
Device view
Network
Connections
HMI connection
Relations
PLC_1
CPU 1215FC
HMI State Mac...
KTP400 Comfort
3
Network overview
Device
Type
S7-1200 station_1
PLC_1
HMI State Machine
HMI_RT_8
HMI State Machine.IE_CP...
1. Open the Devices & Networks in your project.
2. Open the Network view.
3. The HMI is in the project but is not connected to the PLC. Select the HMI Ethernet port on the HMI and drag it to the Ethernet port on the PLC. See next page for how it should look once this is complete.
100%
Hardware catalog
Options
Catalog
<Search>
Filter
Controllers
HMI
PC systems
Drives & starters
Network components
Detecting & Monitoring
Distributed I/O
Field devices
Other field devices
Information
Device:
Article no.:
Version:
Description:
Details view
Name
Properties
Info
Diagnostics
General
Cross-references
Compile
Show all messages
! Path Description Go to ? Errors Warnings Time
Portal view
Overview
RTG1SysInfo
Main
Devices & ne...
Library Simple Machine was opened.


Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Add new block
Main [OB1]
State Machine_Control [FC1]
StateMachine_Simple [FB2]
HMI_Interface_Comfort [DB8]
StateMachine_Simple_DB [DB7]
FOB_RTG1 [OB123]
Main_Safety_RTG1 [FB1]
Main_Safety_RTG1_DB [DB1]
Safety [DB3]
System blocks
Program resources
STEP 7 Safety
F_ACK_GL [FB219]
F_ESTOP1 [FB215]
ACK_GL_DB [DB2]
F_SystemInfo_DB [DB30001]
Global_Estop [DB4]
Local_Estop [DB5]
RFID_Door_Switch [DB6]
RTG1SysInfo [DB30000]
F-IO data blocks
F00008_F-DI8/16x24VDC_...
F00017_F-DQ2xRelay_1 [D...
F00023_F-DQ2xRelay_2 [D...
Compiler blocks
Technology objects
Details view
Name
Safety with 1200F ▸ Devices & networks
Topology view
Network view
Device view
Network
Connections
HMI connection
Relations
PLC_1
CPU 1215FC
HMI State Mac...
KTP400 Comfort
PN/IE_1
1
1. Completed Ethernet connection from HMI to PLC.
100%
Network overview
Device
Type
S7-1200 station_1
S7-1...
PLC_1
CPU ...
HMI State Machine
KTP4...
HMI_RT_8
KTP4...
HMI State Machine.IE_CP...
PROF...
Properties
Info
Diagnostics
General
Cross-references
Compile
Show all messages
! Path Description Go to ? Errors Warnings Time
Hardware catalog
Options
Catalog
<Search>
Filter
Controllers
HMI
PC systems
Drives & starters
Network components
Detecting & Monitoring
Distributed I/O
Field devices
Other field devices
Information
Device:
Article no.:
Version:
Description:
Hardware catalog
Online tools
Tasks
Libraries
Devices & networks
Portal view
Overview
RTG1SysInfo
Main
Devices & ne...
Library Simple Machine was opened.

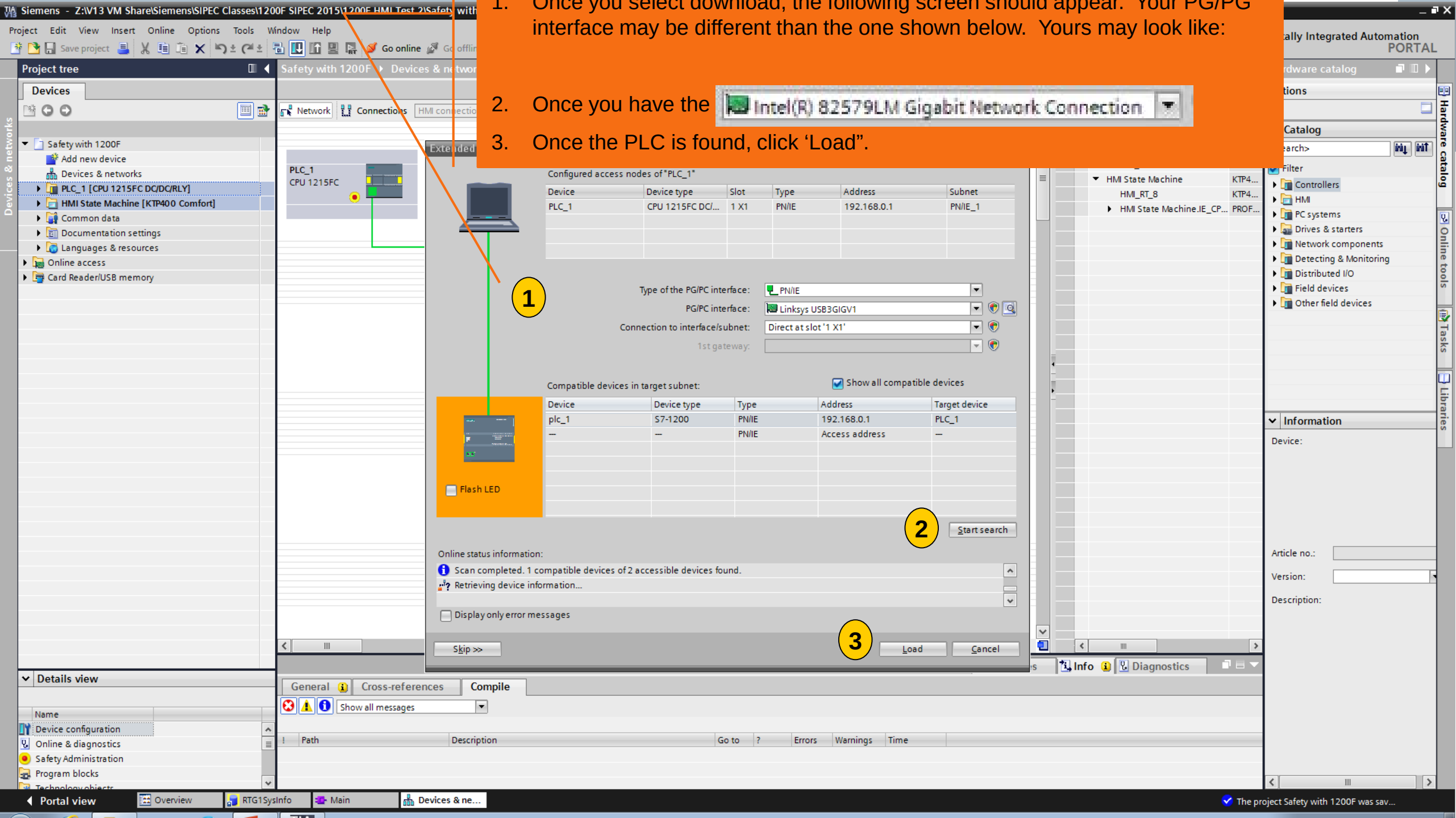

Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
1
Project
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
HMI State Machine [KTP400 Comfort]
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Safety with 1200F ▸ Devices & networks
Topology view
Network view
Device view
Network
Connections
HMI connection
Relations
PLC_1
CPU 1215FC
HMI State Mac...
KTP400 Comfort
PN/IE_1
Network overview
Device
Type
S7-1200 station_1
PLC_1
HMI State Machine
HMI_RT_8
HMI State Machine.IE_CP...
1. Save your project.
100%
Hardware catalog
Options
Catalog
<Search>
Filter
Controllers
HMI
PC systems
Drives & starters
Network components
Detecting & Monitoring
Distributed I/O
Field devices
Other field devices
Information
Device:
Article no.:
Version:
Description:
Properties
Info
Diagnostics
General
Cross-references
Compile
Show all messages
Path
Description
Go to
Errors
Warnings
Time
Details view
Name
Portal view
Overview
RTG1SysInfo
Main
Devices & ne...
The project Safety with 1200F was sav...

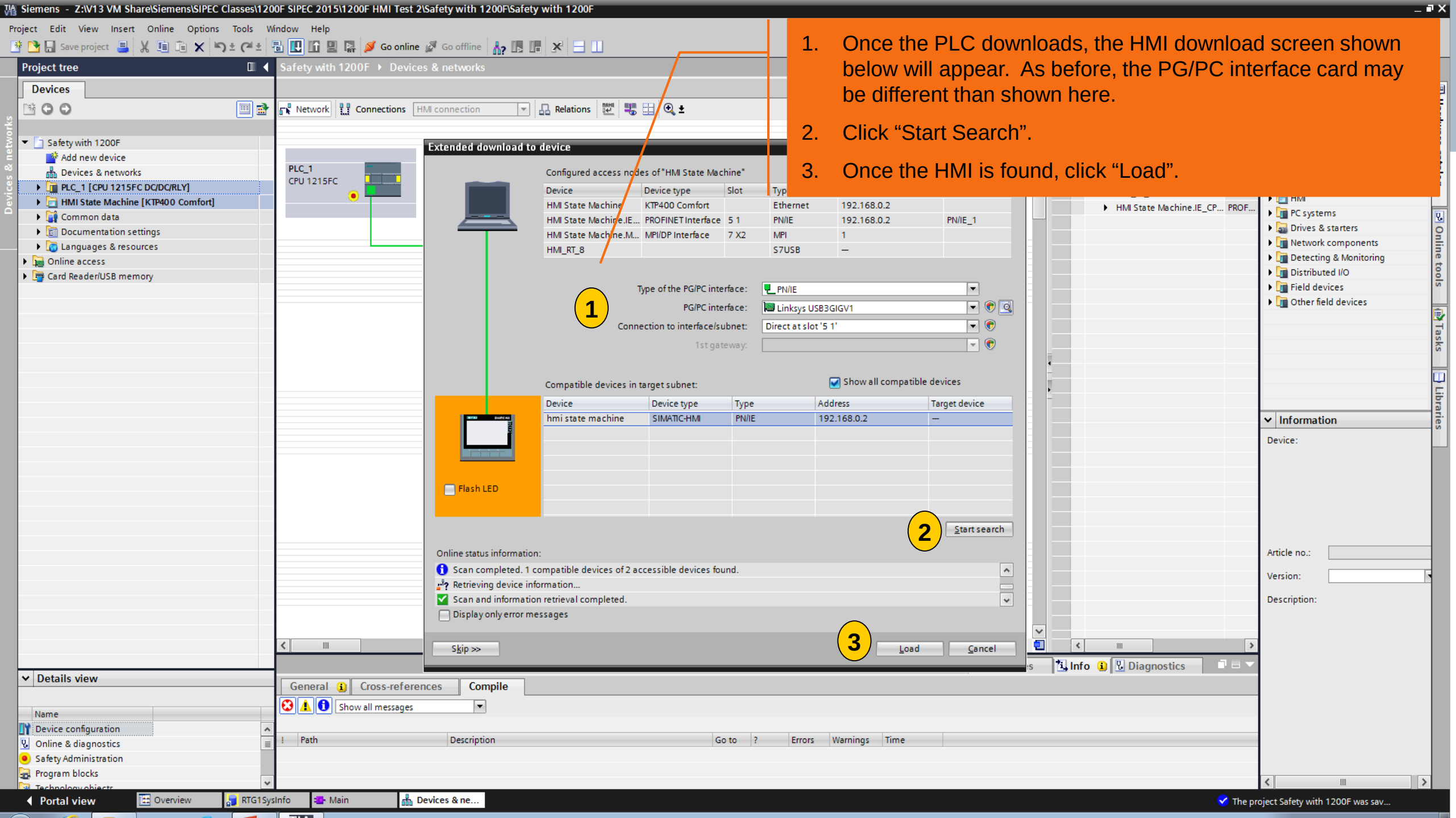

Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project Edit View Insert Online Options Tools Window Help
Save project
Go online
Go offline
Totally Integrated Automation PORTAL
2
Download to device
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
HMI State Machine [KTP400 Comfort]
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
1
Details view
Name
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Safety with 1200F ▸ Devices & networks
Topology view
Network view
Device view
Network
Connections
HMI connection
Relations
PLC_1
CPU 1215FC
HMI State Mac...
KTP400 Comfort
PN/IE_1
100%
Network overview
Device
Type
S7-1200 station_1
PLC_1
HMI State Machine
HMI_RT_8
HMI State Machine.IE_CP...
1. Highlight your PLC project and HMI project. We will have the Portal download both with one download request.
2. Download the projects.
Properties
Info
Diagnostics
General
Cross-references
Compile
Show all messages
! Path Description Go to ? Errors Warnings Time
Hardware catalog
Options
Catalog
<Search>
Filter
Controllers
HMI
PC systems
Drives & starters
Network components
Detecting & Monitoring
Distributed I/O
Field devices
Other field devices
Information
Device:
Article no.:
Version:
Description:
Hardware catalog
Online tools
Tasks
Libraries
Devices & networks
Portal view
Overview
RTG1SysInfo
Main
Devices & ne...
The project Safety with 1200F was sav...

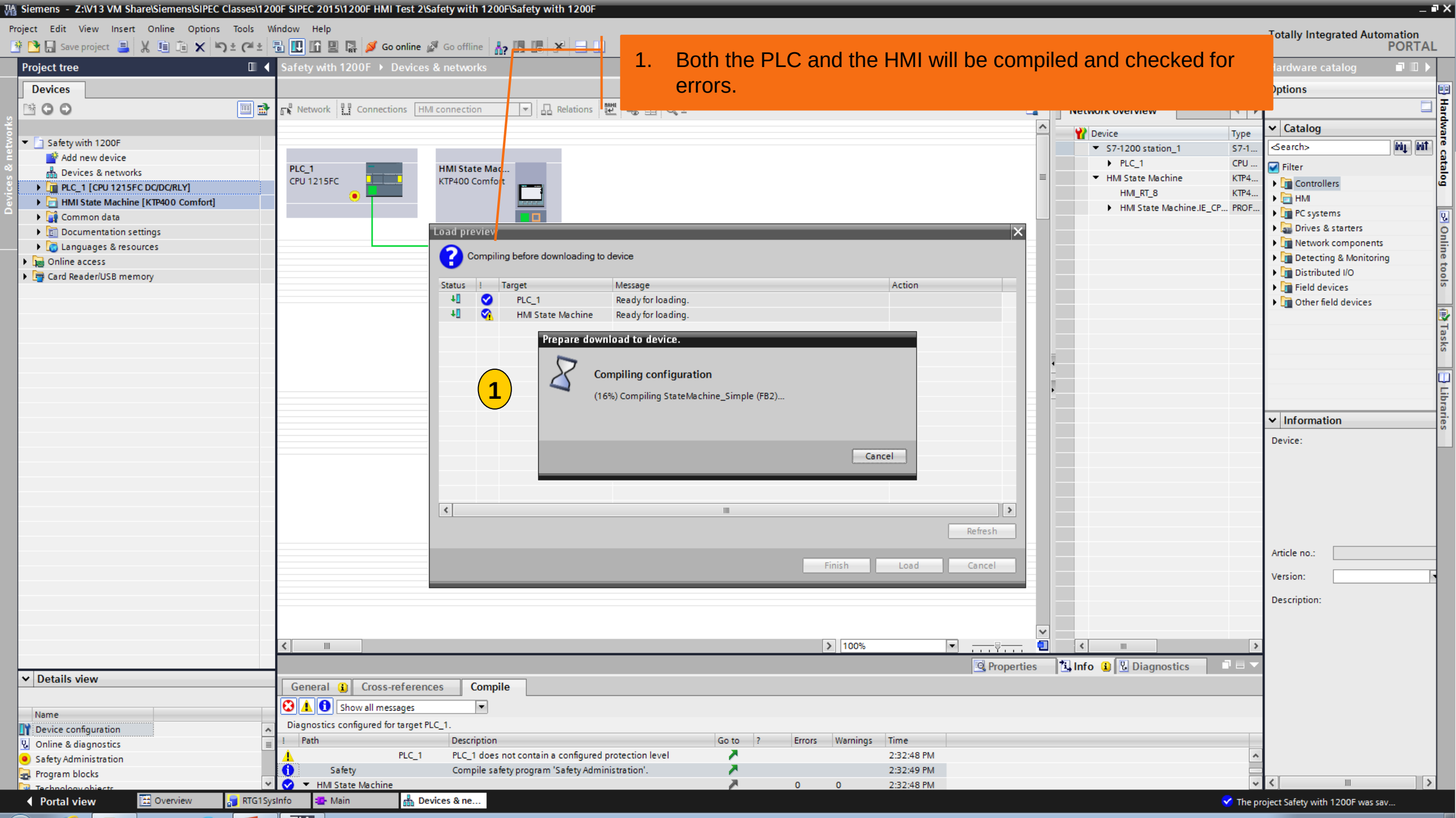
1. Once you select download, the following screen should appear. Your PG/PG interface may be different than the one shown below. Yours may look like:

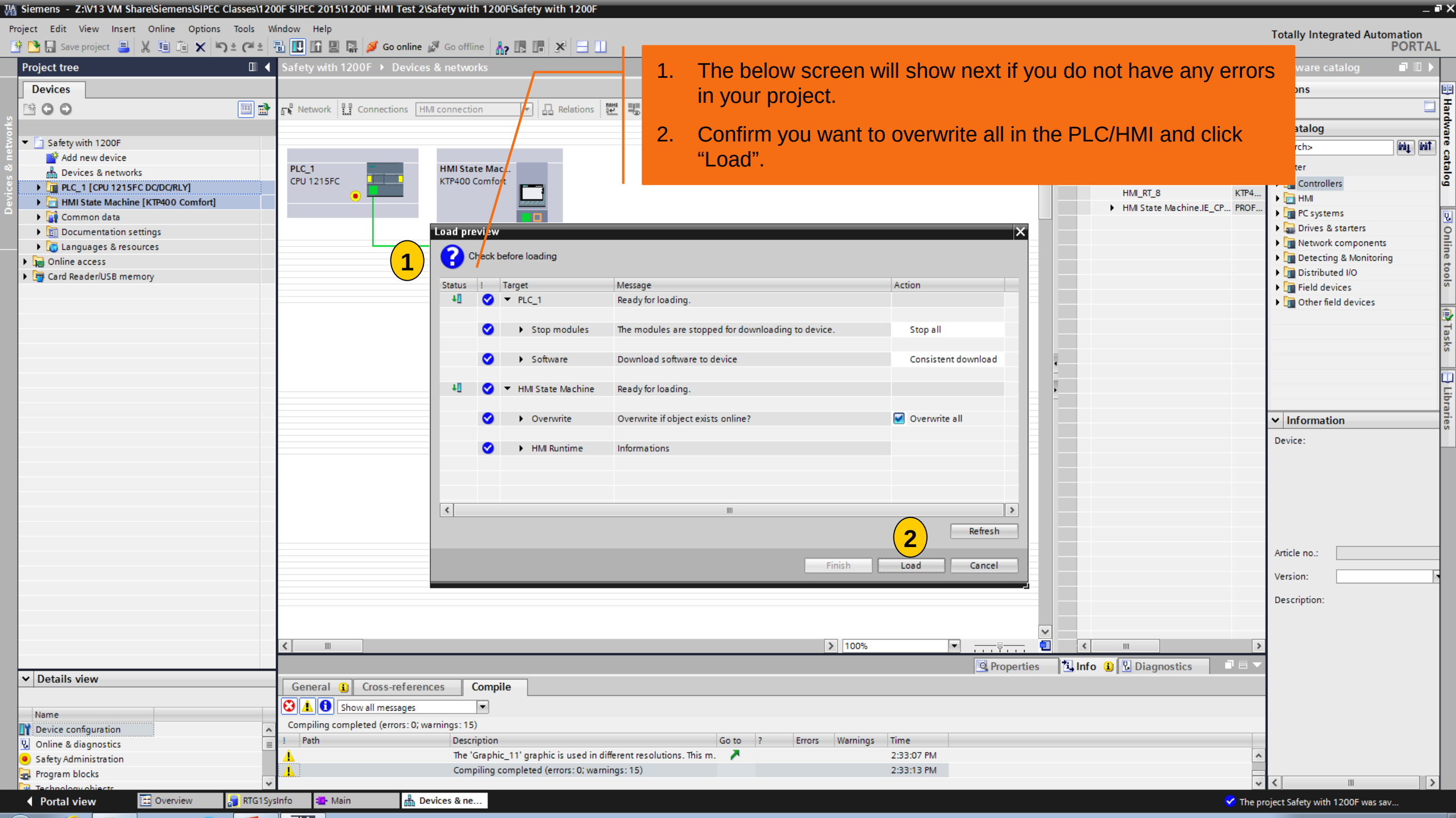
2. Once you have the Intel(R) 82579LM Gigabit Network Connection

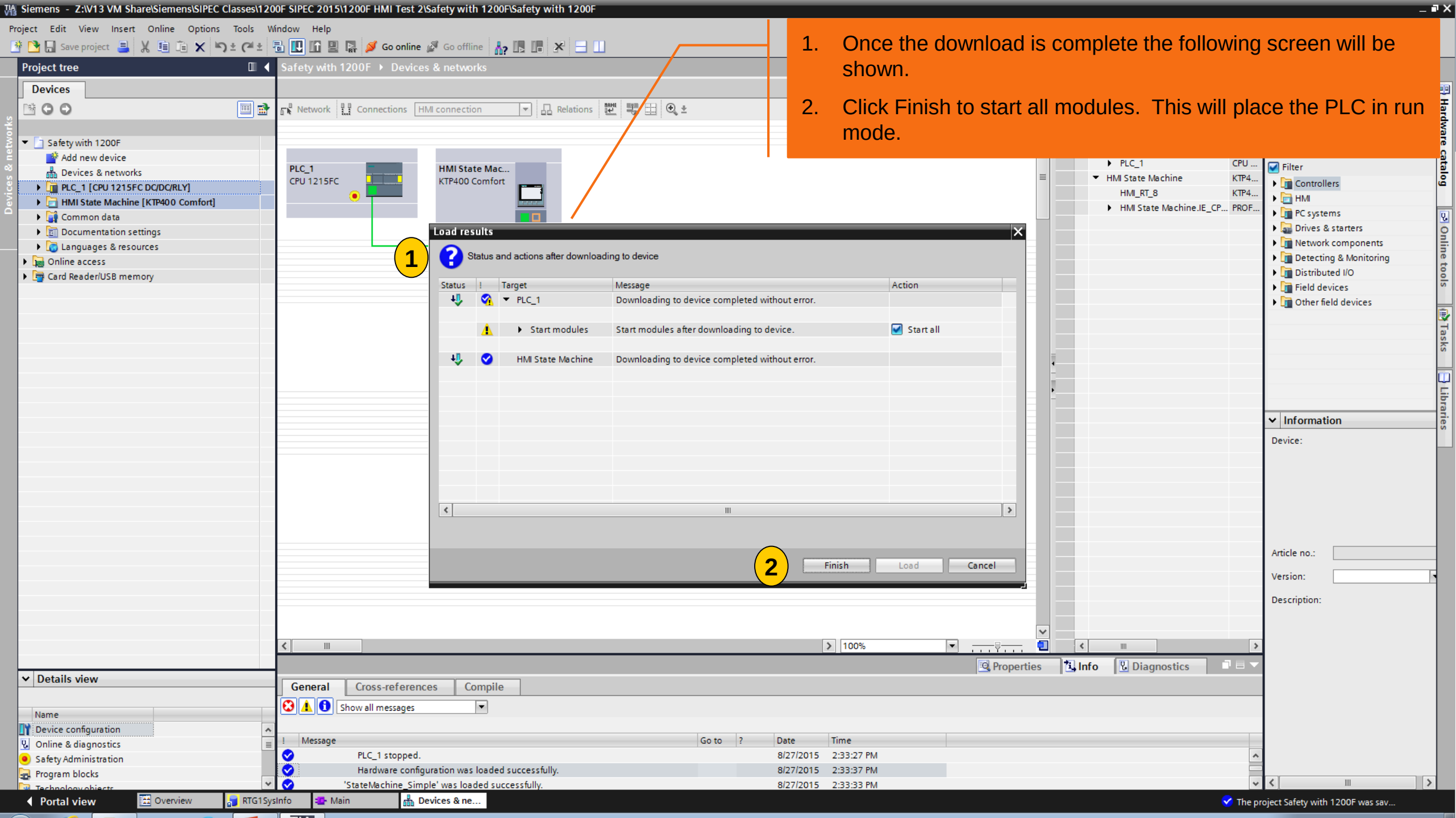
3. Once the PLC is found, click ‘Load”.




1. Once the PLC downloads, the HMI download screen shown below will appear. As before, the PG/PC interface card may be different than shown here.
2. Click “Start Search”.
3. Once the HMI is found, click “Load”.
Extended download to device
Configured access nodes of "HMI State Machine"
Device
Device type
Slot
Type
HMI State Machine
KTP400 Comfort
Ethernet
192.168.0.2
HMI State Machine.IE...
PROFINET Interface
5 1
PN/IE
192.168.0.2
PN/IE_1
HMI State Machine.M...
MPI/DP Interface
7 X2
MPI
1
HMI_RT_8
S7USB
Type of the PG/PC interface:
PN/IE
PG/PC interface:
Linksys USB3GIGV1
Connection to interface/subnet:
Direct at slot '5 1'
1st gateway:
1
Compatible devices in target subnet:
Show all compatible devices
Device
Device type
Type
Address
Target device
hmi state machine
SIMATIC-HMI
PN/IE
192.168.0.2
Flash LED
2
Start search
Online status information:
Scan completed. 1 compatible devices of 2 accessible devices found.
Retrieving device information...
Scan and information retrieval completed.
Display only error messages
Skip >>
3
Load
Cancel
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
HMI State Machine [KTP400 Comfort]
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Details view
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Network
Connections
HMI connection
Relations
PLC_1
CPU 1215FC
Information
Device:
Article no.:
Version:
Description:
Portal view
Overview
RTG1SysInfo
Main
Devices & ne...
The project Safety with 1200F was sav...


1. Both the PLC and the HMI will be compiled and checked for errors.
Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
HMI State Machine [KTP400 Comfort]
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Safety with 1200F ▸ Devices & networks
PLC_1
CPU 1215FC
HMI State Mac...
KTP400 Comfort
Load preview
Compiling before downloading to device
Status
Target
Message
Action
PLC_1
Ready for loading.
HMI State Machine
Ready for loading.
Prepare download to device.
Compiling configuration
(16%) Compiling StateMachine_Simple (FB2)...
Cancel
1
Refresh
Finish
Load
Cancel
Device
Type
S7-1200 station_1
PLC_1
HMI State Machine
HMI_RT_8
HMI State Machine.IE_CP...
Catalog
Controllers
HMI
PC systems
Drives & starters
Network components
Detecting & Monitoring
Distributed I/O
Field devices
Other field devices
Information
Device:
Article no.:
Version:
Description:
Details view
Device configuration
Online & diagnostics
Safety Administration
Program blocks
General
Cross-references
Compile
Show all messages
Diagnostics configured for target PLC_1.
Path
Description
Go to
Errors
Warnings
Time
PLC_1 does not contain a configured protection level
2:32:48 PM
Safety
Compile safety program 'Safety Administration'.
2:32:49 PM
HMI State Machine
2:32:48 PM
Portal view
Overview
RTG1SysInfo
Main
Devices & ne...
The project Safety with 1200F was sav...

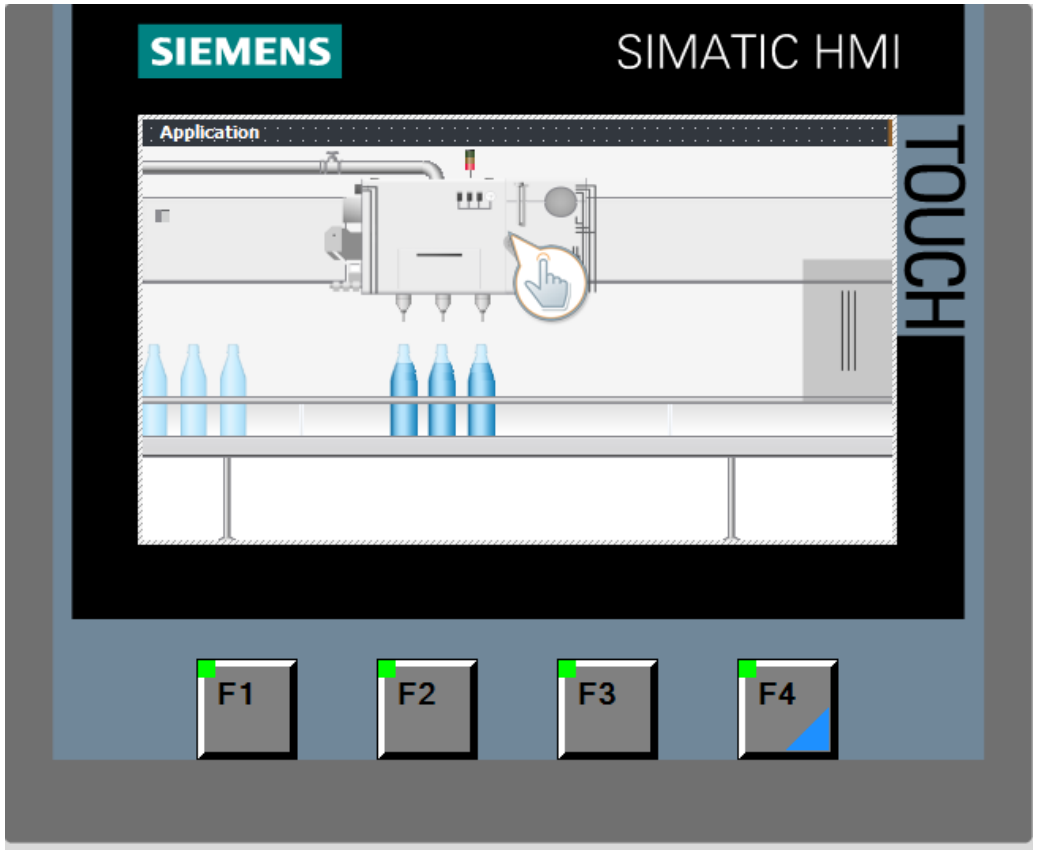

1. The below screen will show next if you do not have any errors in your project.
2. Confirm you want to overwrite all in the PLC/HMI and click “Load”.
Load preview
Check before loading
Status
Target
Message
Action
PLC_1
Ready for loading.
Stop modules
The modules are stopped for downloading to device.
Stop all
Software
Download software to device
Consistent download
HMI State Machine
Ready for loading.
Overwrite
Overwrite if object exists online?
Overwrite all
HMI Runtime
Informations
Refresh
Finish
Load
Cancel
1
2


1. Once the download is complete the following screen will be shown.
2. Click Finish to start all modules. This will place the PLC in run mode.
Siemens - Z:\V13 VM Share\Siemens\SIPEC Classes\1200F SIPEC 2015\1200F HMI Test 2\Safety with 1200F\Safety with 1200F
Project tree
Devices
Safety with 1200F
Add new device
Devices & networks
PLC_1 [CPU 1215FC DC/DC/RLY]
HMI State Machine [KTP400 Comfort]
Common data
Documentation settings
Languages & resources
Online access
Card Reader/USB memory
Safety with 1200F ▸ Devices & networks
Network
Connections
HMI connection
Relations
PLC_1
CPU 1215FC
HMI State Mac...
KTP400 Comfort
Load results
Status and actions after downloading to device
Status
Target
Message
Action
PLC_1
Downloading to device completed without error.
Start modules
Start modules after downloading to device.
Start all
HMI State Machine
Downloading to device completed without error.
1
2
Finish
Load
Cancel
Filter
Controllers
HMI
PC systems
Drives & starters
Network components
Detecting & Monitoring
Distributed I/O
Field devices
Other field devices
Information
Device:
Article no.:
Version:
Description:
Details view
Device configuration
Online & diagnostics
Safety Administration
Program blocks
Properties
Info
Diagnostics
General
Cross-references
Compile
Show all messages
Message
Go to
Date
Time
PLC_1 stopped.
8/27/2015
2:33:27 PM
Hardware configuration was loaded successfully.
8/27/2015
2:33:37 PM
'StateMachine_Simple' was loaded successfully.
8/27/2015
2:33:33 PM
Portal view
Overview
RTG1SysInfo
Main
Devices & ne...
The project Safety with 1200F was sav...

The PLC code and HMI project should now be downloaded with the PLC in run mode. Use the F4 button to bring up the screen menu. The Green push button and the selector switch have been added to the PLC code. They will perform the following functions:

Fill Start Button – This will start the bottle filler on the HMI only.

Service Mode Selector – This will place the motor behind the safety door and the bottle filler on the HMI in service mode when in the right position.



The bottle filler should run once the global Estop is cleared and acknowledged and the safety door is closed. To make the filler run, press the Green pushbutton or select the bottle filler on the screen (this will make a screen appear with a start/stop button on it). With the service selector switch in the left positon the filler should run until a global Estop is pressed or the safety door is opened. When the service switch is in the right position the bottle filler will run normally until the safety door is opened. Once the door is opened the bottle filler will slow down representing a Safe Limited Speed (SLS). When the door is closed the filler will resume a normal speed. Check to ensure your unit is working correctly.

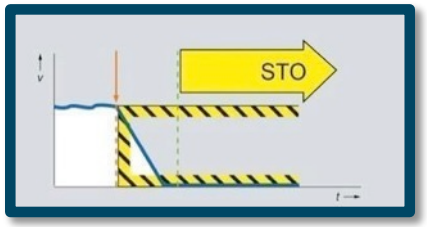
The next page will describe safety features in a drive like SLS.

Overview of Safety Functions in the Drive
According to EN 61800-5-2 functional safety

Functions for Safe Shutdown

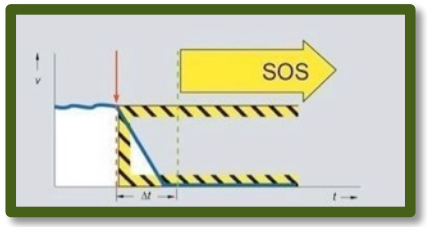
Safe Torque Off

Safe Stop 1

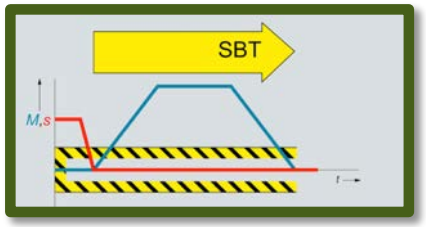


Safe Brake Control

Safe Stop 2

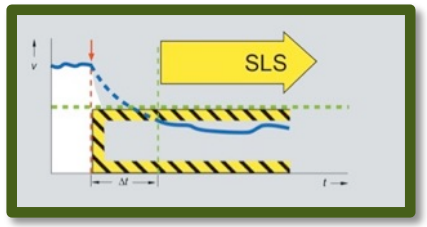


Safe Brake Test

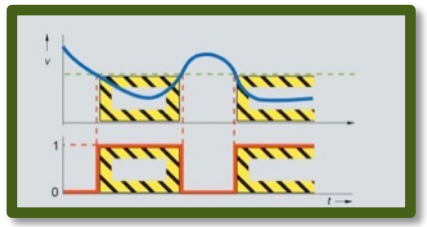


Functions for Safely Monitoring Motion

Safely Limited Speed



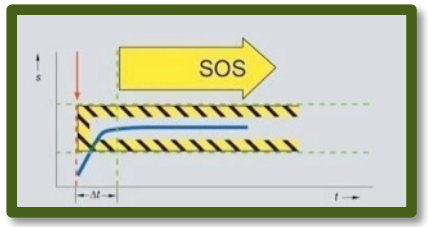
Safe Speed Monitor



Safe Direction

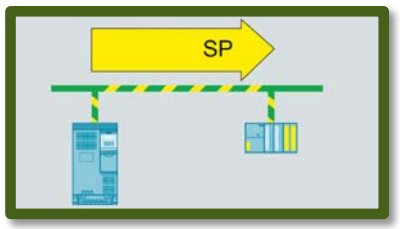
Functions for Safely Monitoring Position

Safe Operating Stop



Safely Limited Position

Safe Position



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SIMATIC Safety Workshop

Thank You !