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S7-1200: Basic Controller with Advanced Functions

Efficient Engineering

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TIA Portal: Getting Started

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Getting Started

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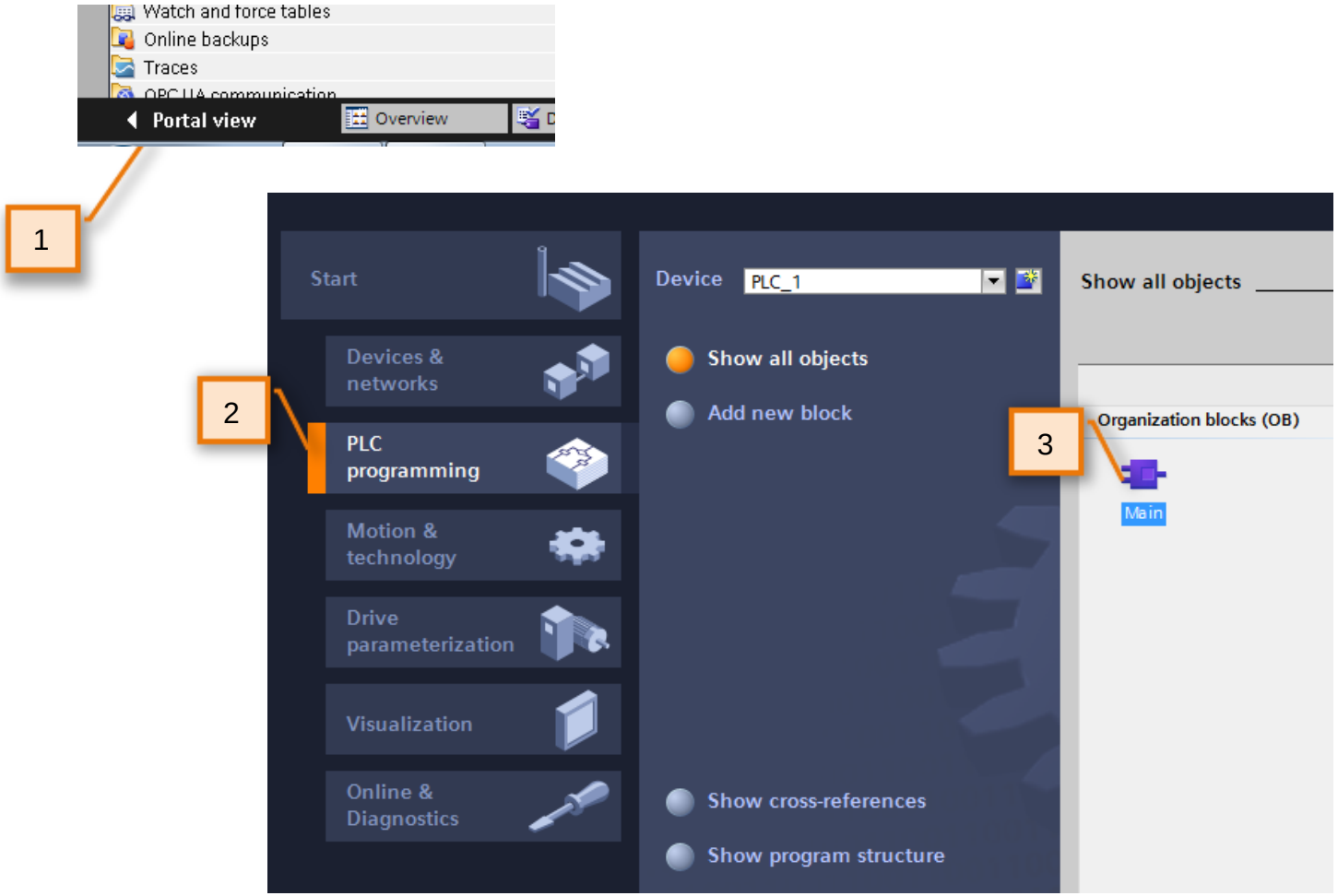

1. Change to the *Portal view*
2. Click on 'PLC Programming'.
3. Double-click on 'Main [OB1]'.

'Main [OB1]' is the primary running program block.

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Editor Layout

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Taskbar

Task cards (editor-specific)

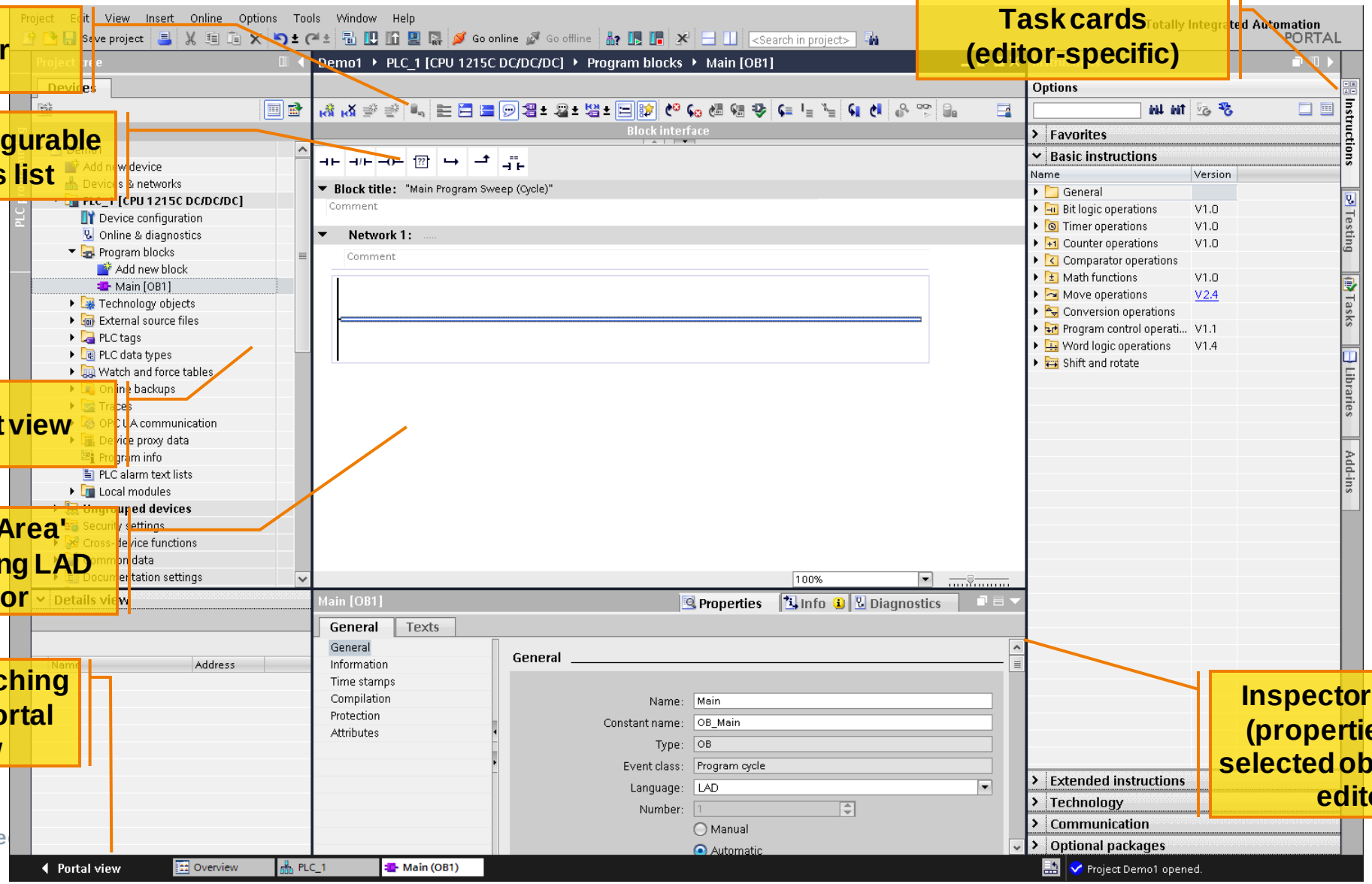
Freely configurable favorites list

Project view

'Work Area' displaying LAD editor

Fast switching to the portal view

Inspector window (properties of the selected object in the editor)



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Drag and drop

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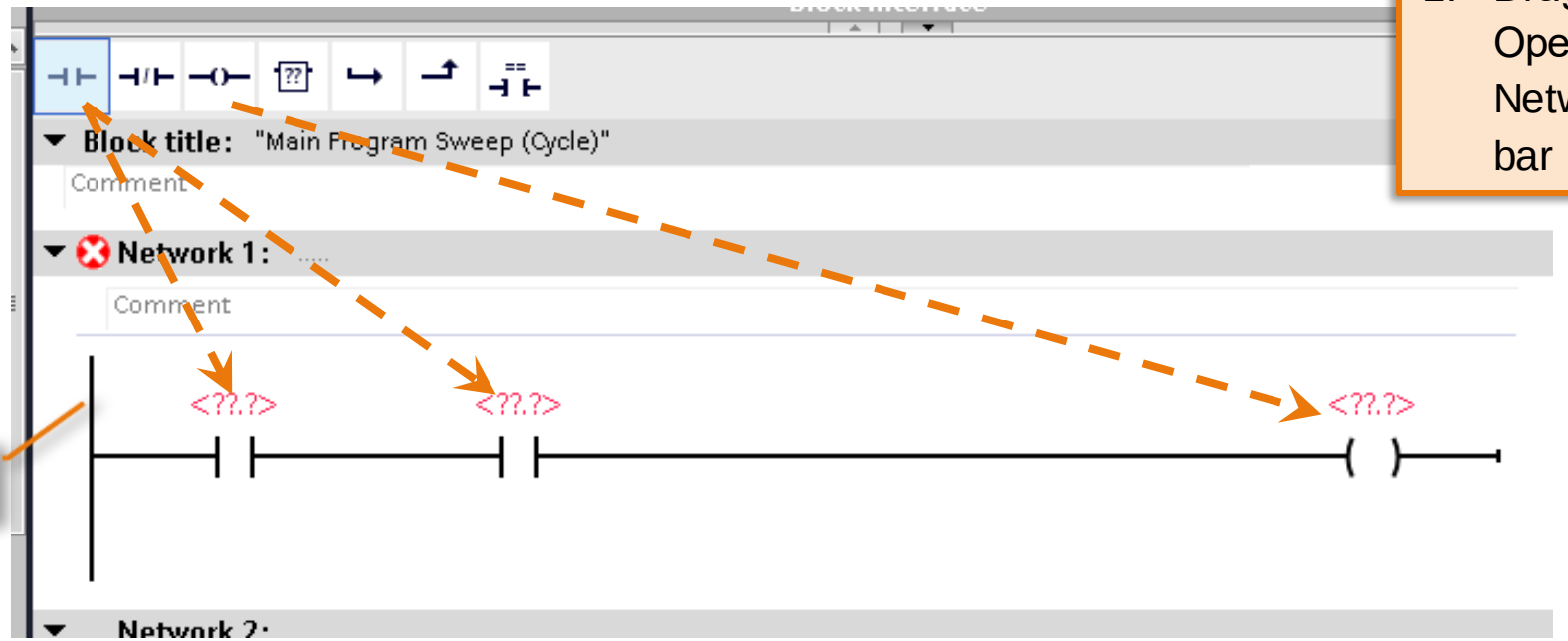

1

1. Drag and drop two ‘Normally Open’ contacts and a coil onto Network 1 from the favorites bar as shown.

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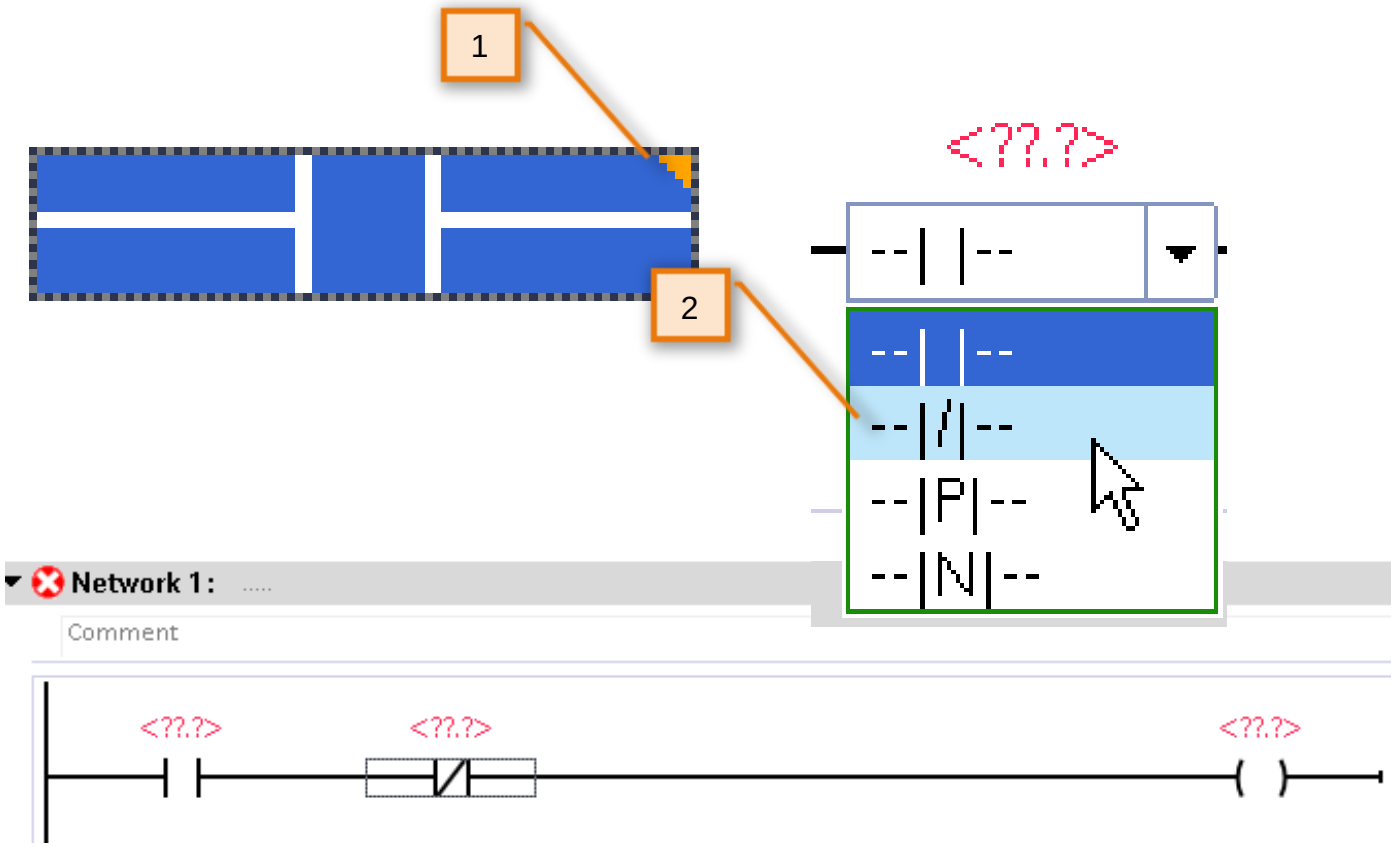

Oops - we made a mistake! The second normally open contact is actually supposed to be normally closed.

1. Click on the second Normally Open contact and click on the orange triangle in the upper-right corner of the instruction
2. Select the Normally closed instruction from the drop-down to change the instruction.

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Intuitive Programming

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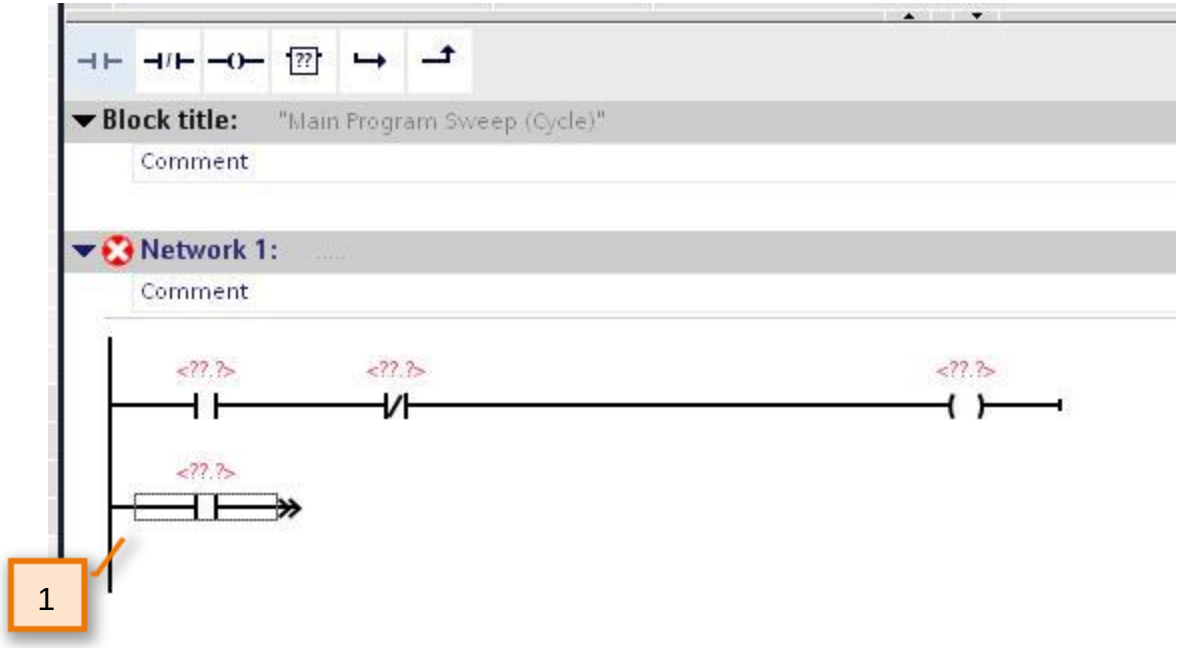

1. Drag and drop another 'Normally Open' contact underneath the first contact.

Notice the different junction suggestions STEP 7 Basic offers you. The green highlights the position.

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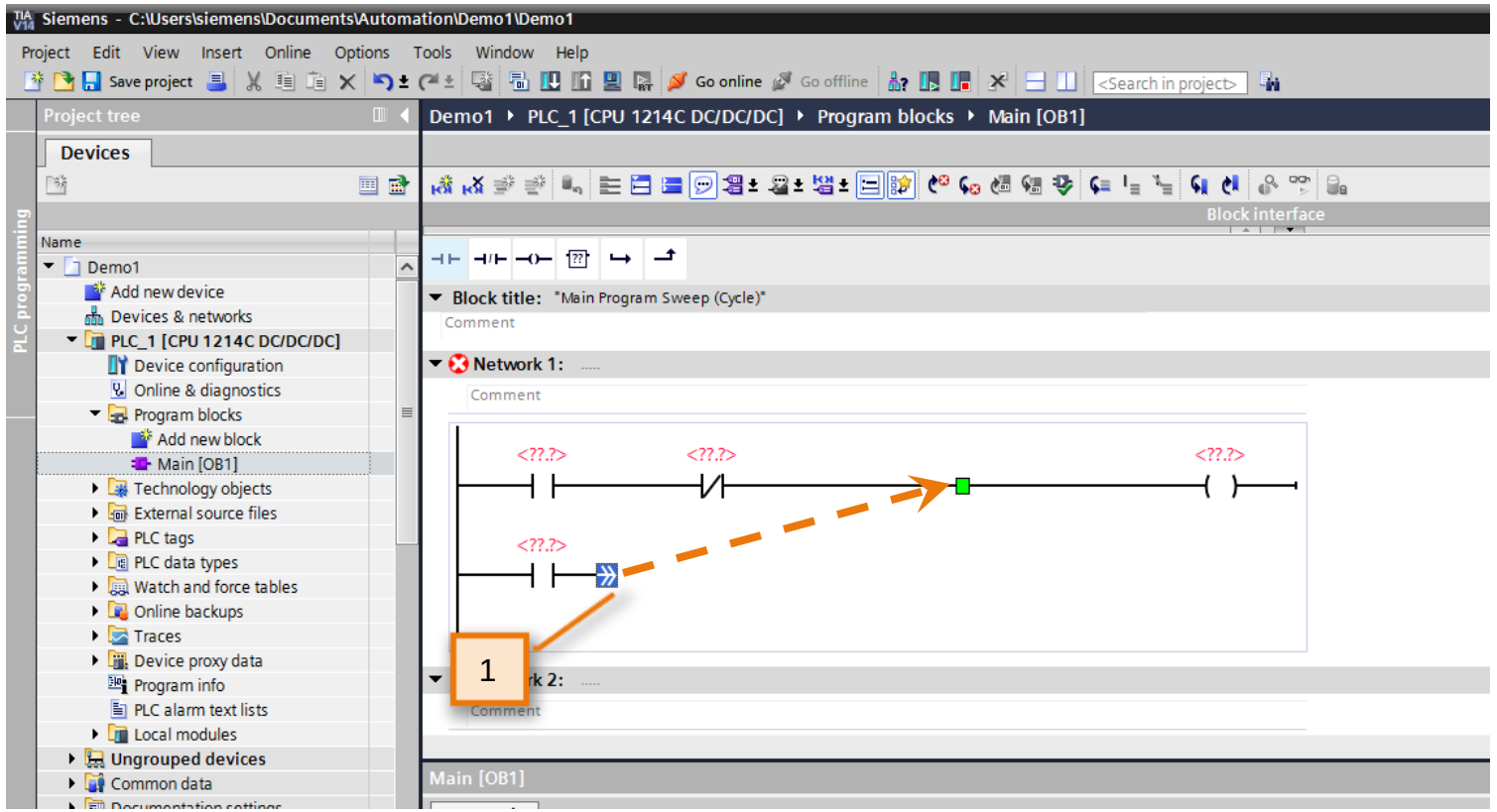

1. Drag the connection from the contact to the position as shown.

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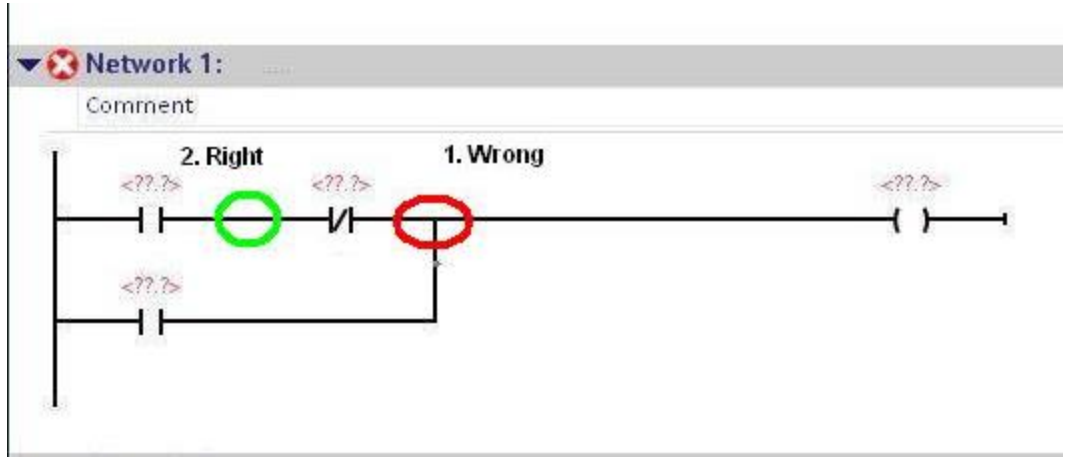

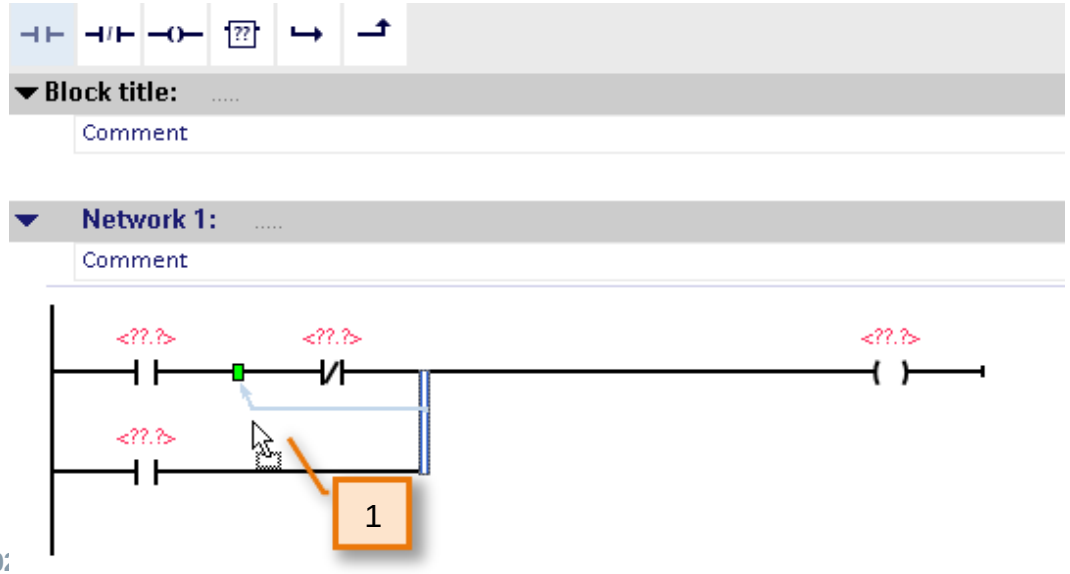

Oops! we actually meant to place the connection in the correct position *behind* the NC contact.

1. Drag and drop the connection to the correct point as shown

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Intuitive Tag Definition

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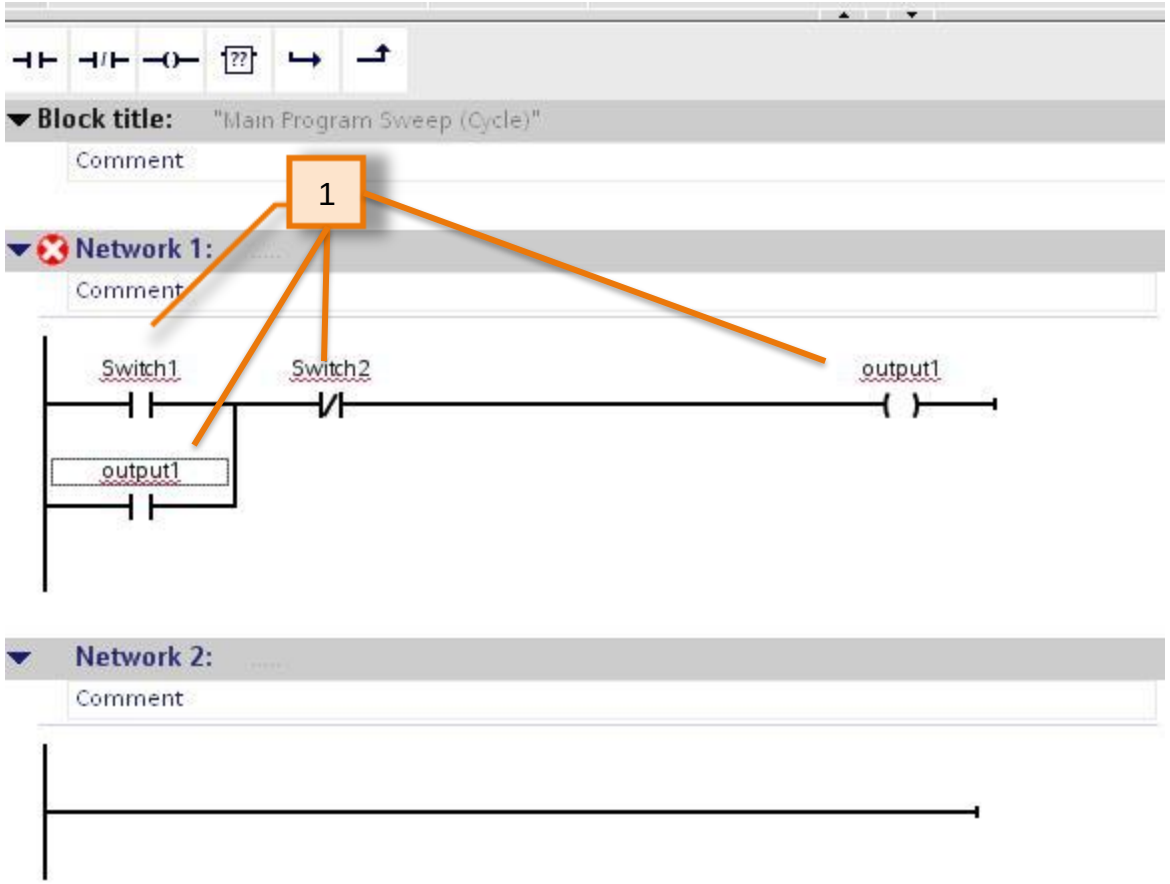

1. Type in the symbol names as shown: Switch1, Switch2, and Output1 (for both coil and “seal”).

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Intuitive tag definition

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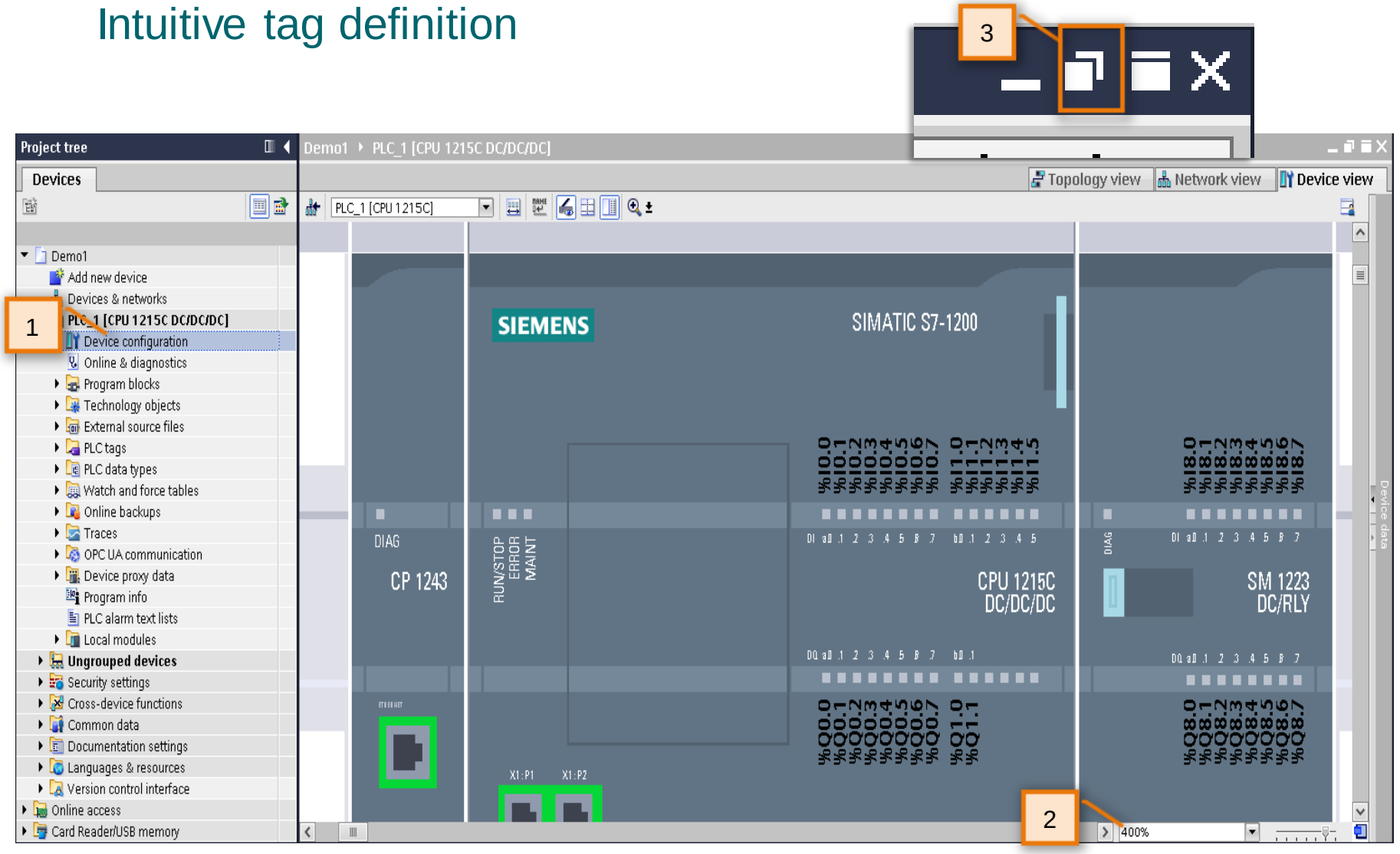

1. Double-click on ‘Device configuration’ to switch to the Device view.
2. Now zoom the view of the PLC hardware to 400%.

Notice the I/O addresses can actually be seen live.

3. 'Float' the device window

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Customize layout with 'floating' windows

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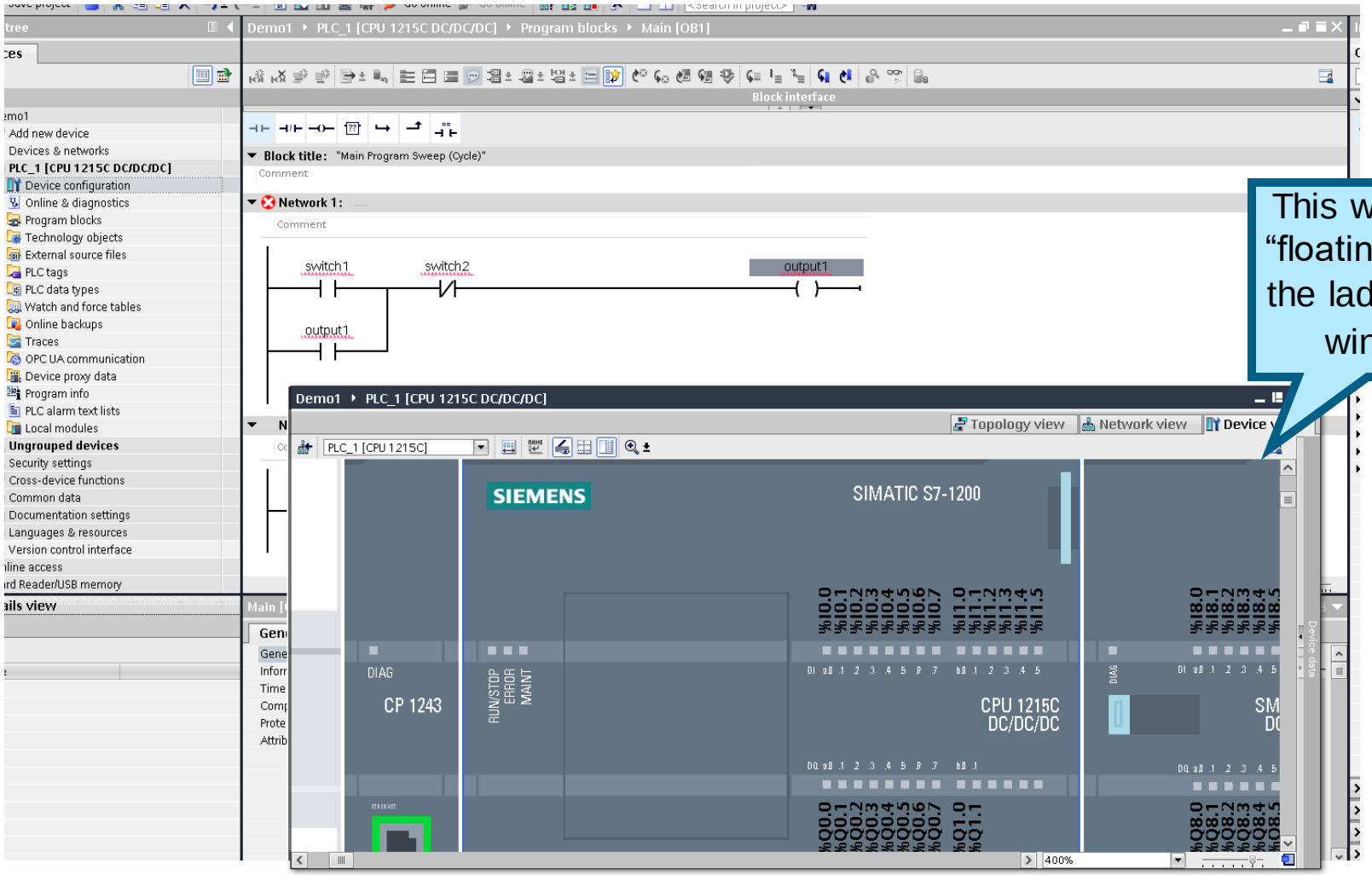

This window is "floating" above the ladder logic window.

Make sure that the zoomed in PLC hardware window floats above the ladder logic window as shown. You might have to resize the floating window.

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Intuitive tag definition

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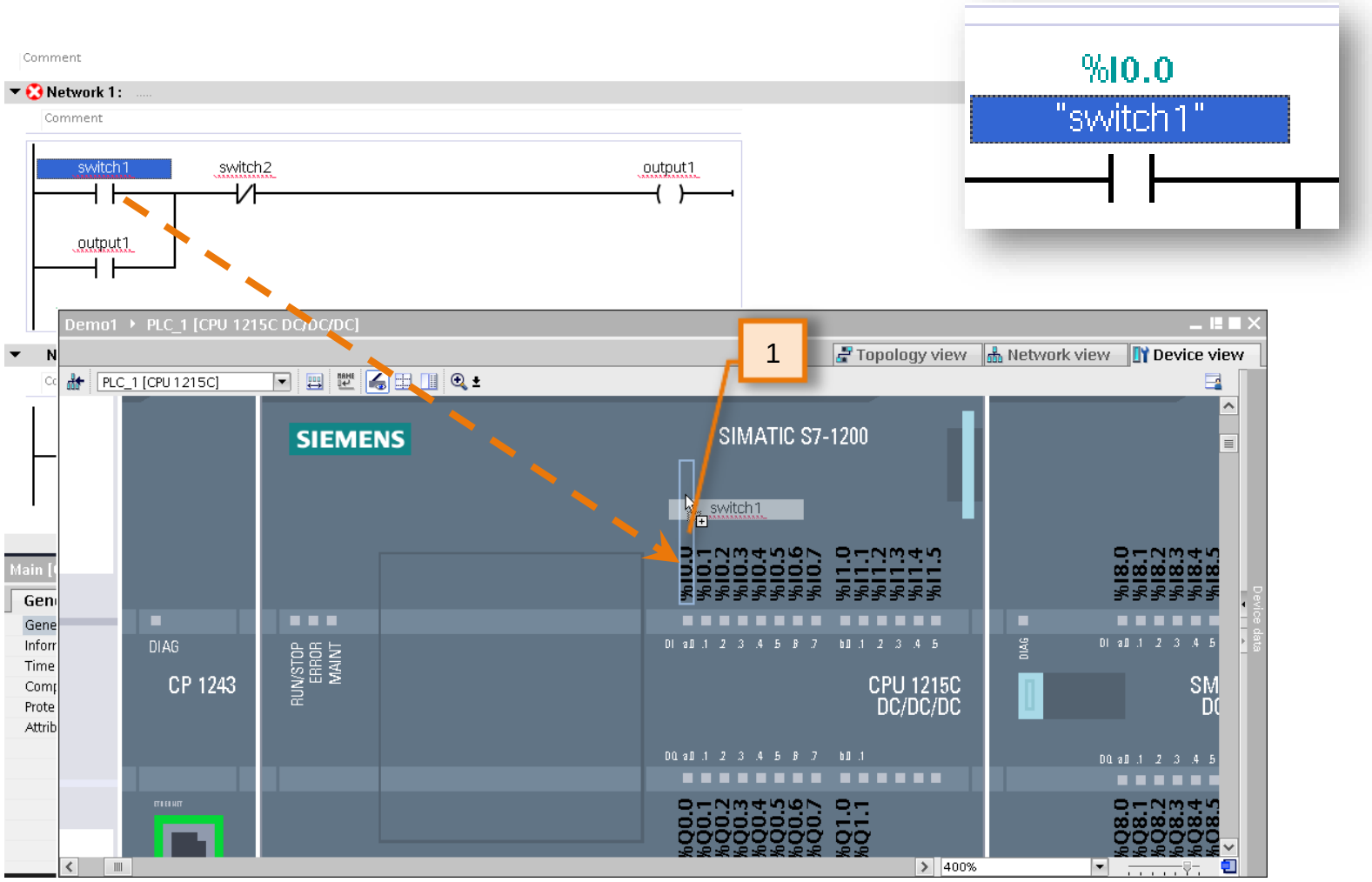

1. Drag and drop the text ‘Switch1’ directly on top of input address ‘I0.0’ on the PLC hardware.

   Notice the symbolic tag ‘Switch1’ which represents ‘I0.0’, is now the same in the ladder logic and on the hardware.

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Intuitive tag definition

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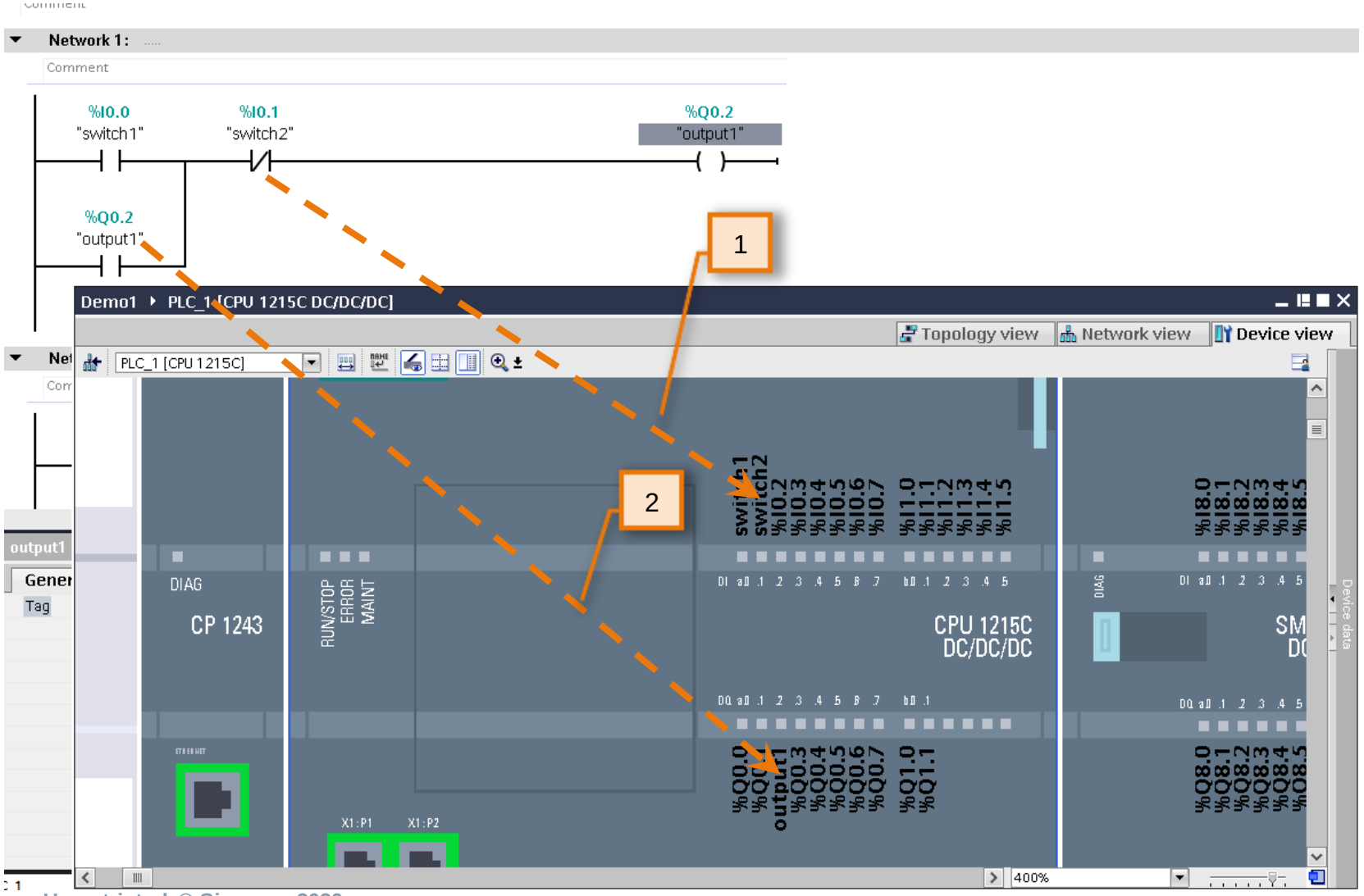

1. Assign 'switch2' to I0.1
2. Assign 'output1' to Q0.2

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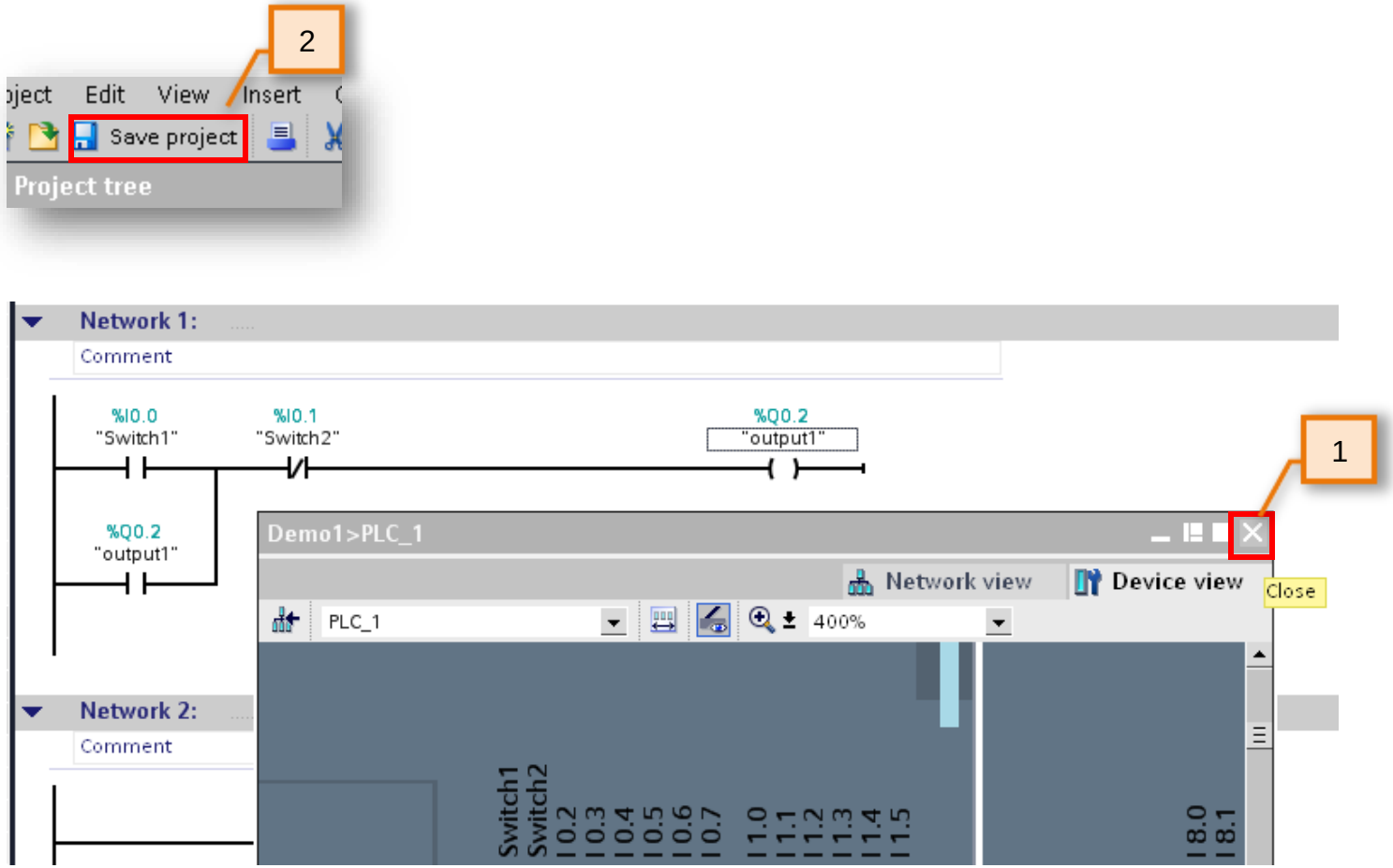

1. Close the Device view of the PLC hardware so that only the ladder logic remains.
2. Save your project.

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Integrating with an HMI

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Adding an HMI

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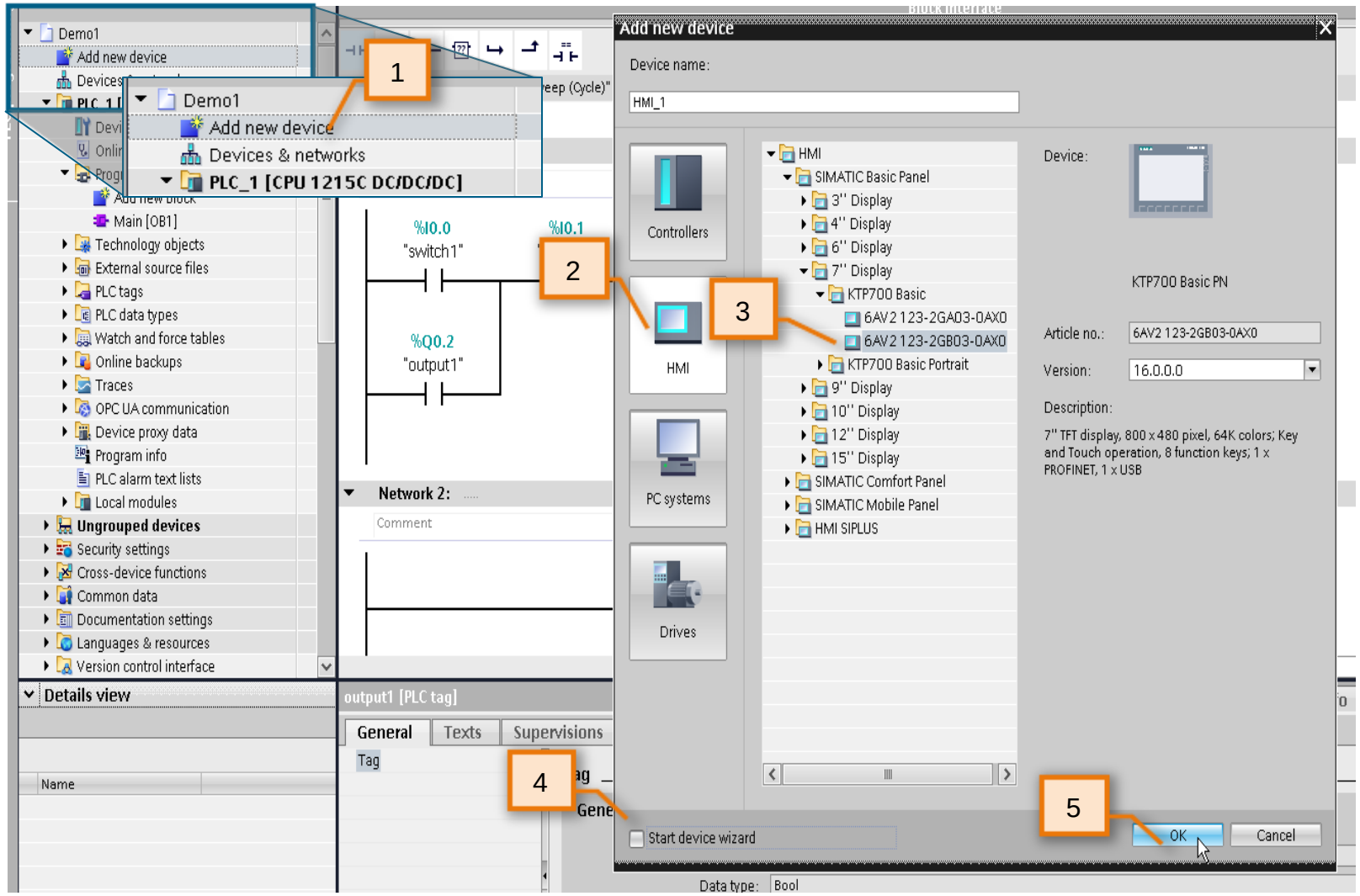

1. Double-click ‘Add new device’ under the Project tree.
   The 'Add new device' dialog appears
2. Select HMI
3. Select KTP700 as shown ***SIMATIC HMI Basic Panel > 7" Display > KTP700 Basic > 6AV2 123-2GB03-0AX0***
4. **<u>Uncheck</u>** the box "Start device wizard"
5. Click 'OK'

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HMI visualization

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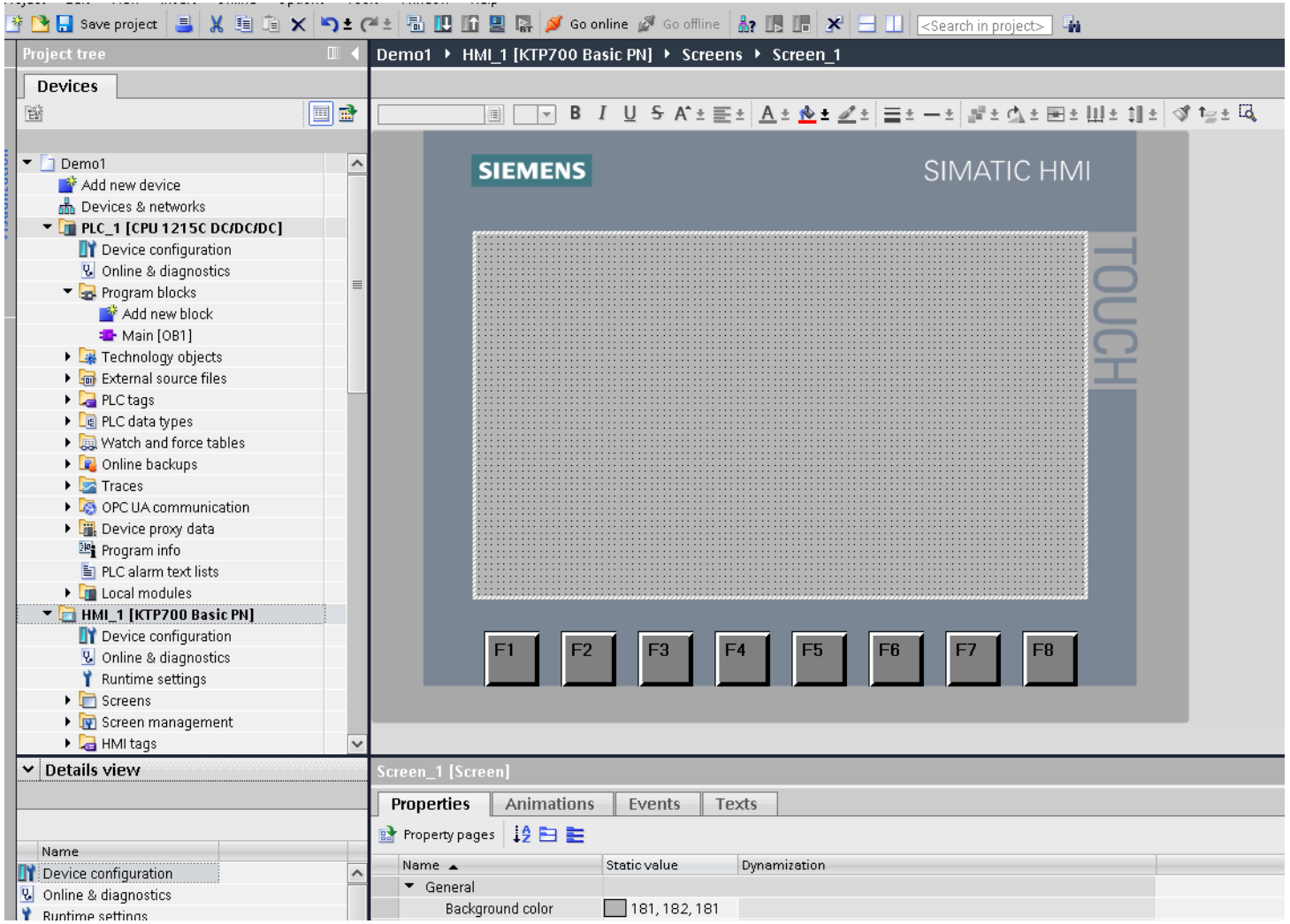

TIA Portal opens the newly added HMI to the default screen.

Note: Since we did not go through the "Device Wizard", this HMI has no tags configured, no screen objects, no connections to PLC(s) or even IP address settings. It is simply "blank".

When typically configuring an HMI in any automation project, there are more/less these 5 fundamental steps that must occur to engineer a user screen:

1. A connection/relation to a PLC must be defined
2. HMI tag(s) must be defined
3. We must associate those HMI tags to a corresponding PLC tag
4. We must add an object(s) to the screen
5. We must tie this object to the respective HMI/PLC tag.

We will now demonstrate engineering efficiency of TIA Portal by conducting all 5 steps above with a single action.

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HMI visualization

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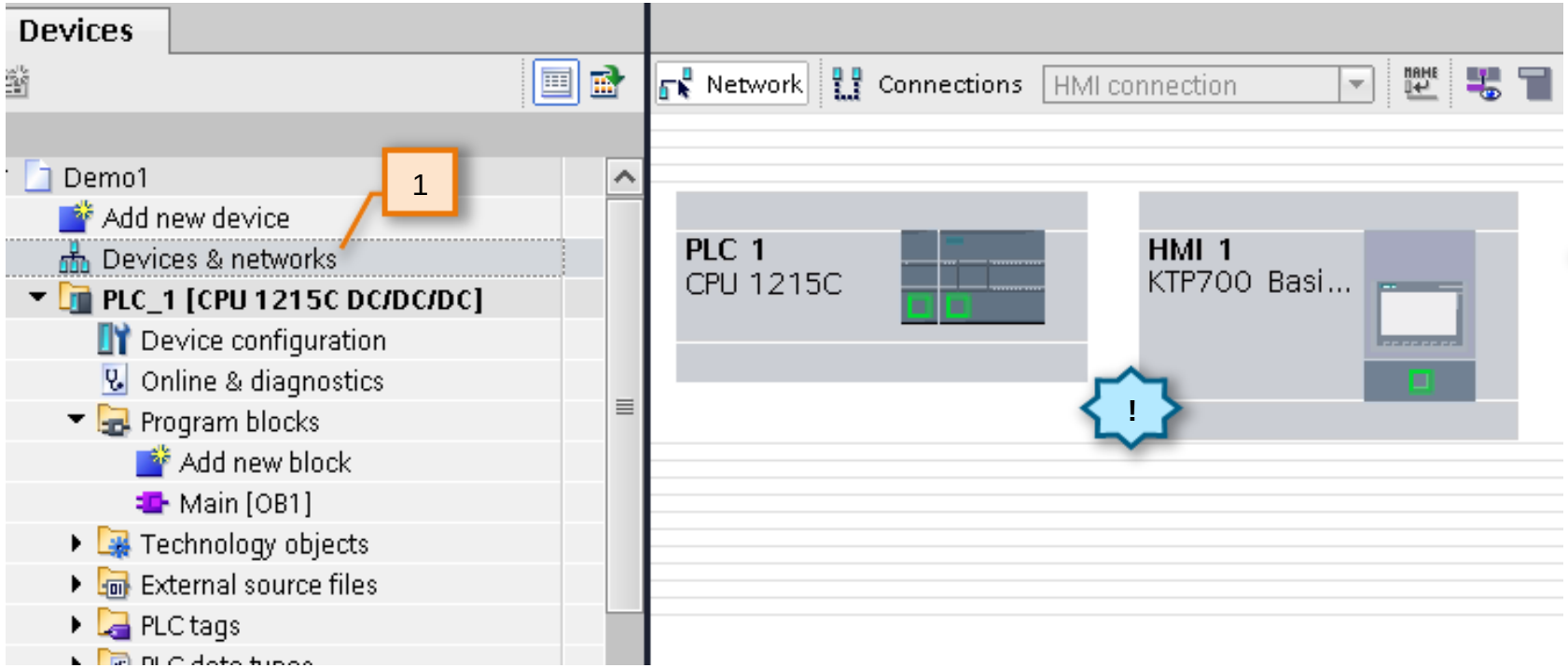

1. Double-click on 'Devices & networks' under the project tree

Notice there is no connection between the PLC and HMI defined yet.

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HMI visualization

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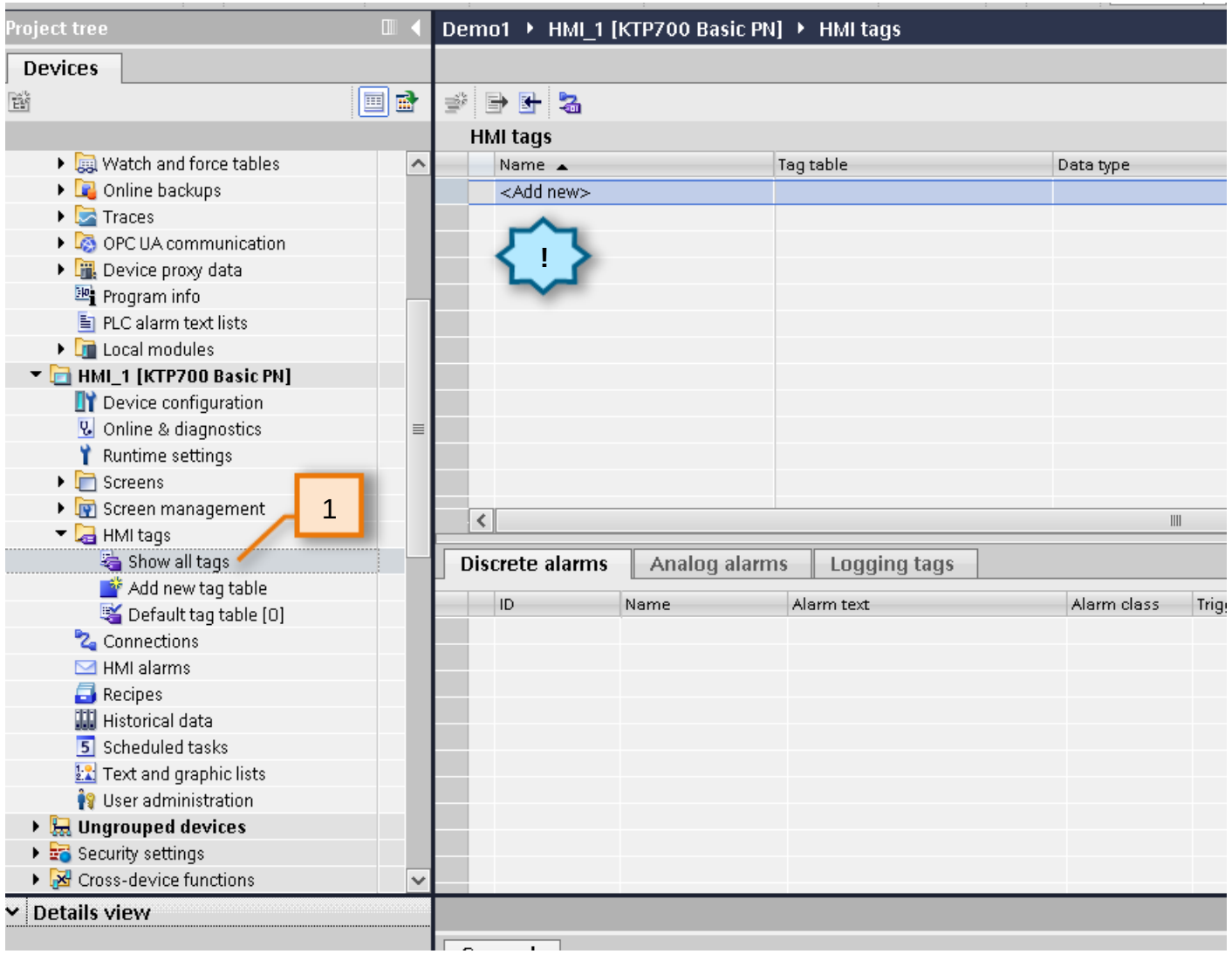

1. In the project tree, navigate to HMI_1, expand and double-click "Show all tags" under the 'HMI tags' folder.

!

Notice no internal/external HMI tags are defined yet

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HMI visualization

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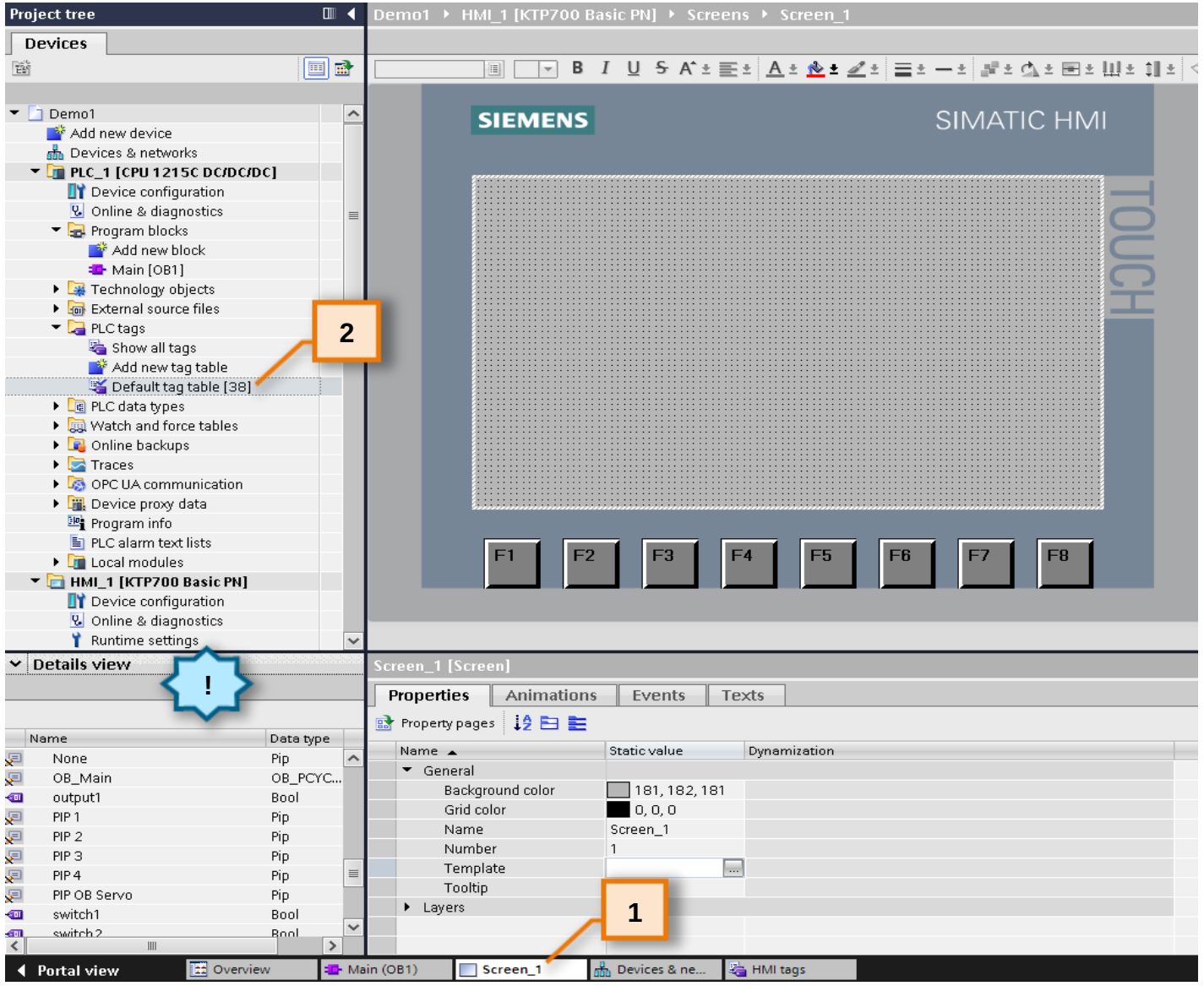

1. Open "Screen_1" via the tabs at the bottom of the project. If you already closed this editor previously, you can navigate to it via the project tree ***HMI_1 > Screens > Screen_1***
2. Scroll up in the project tree and navigate and **<u>single-click</u>** the PLC tag table "Default tags"

! Notice details of this tag table contents appear in the "Details view" below, including predefined system tags.

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HMI visualization

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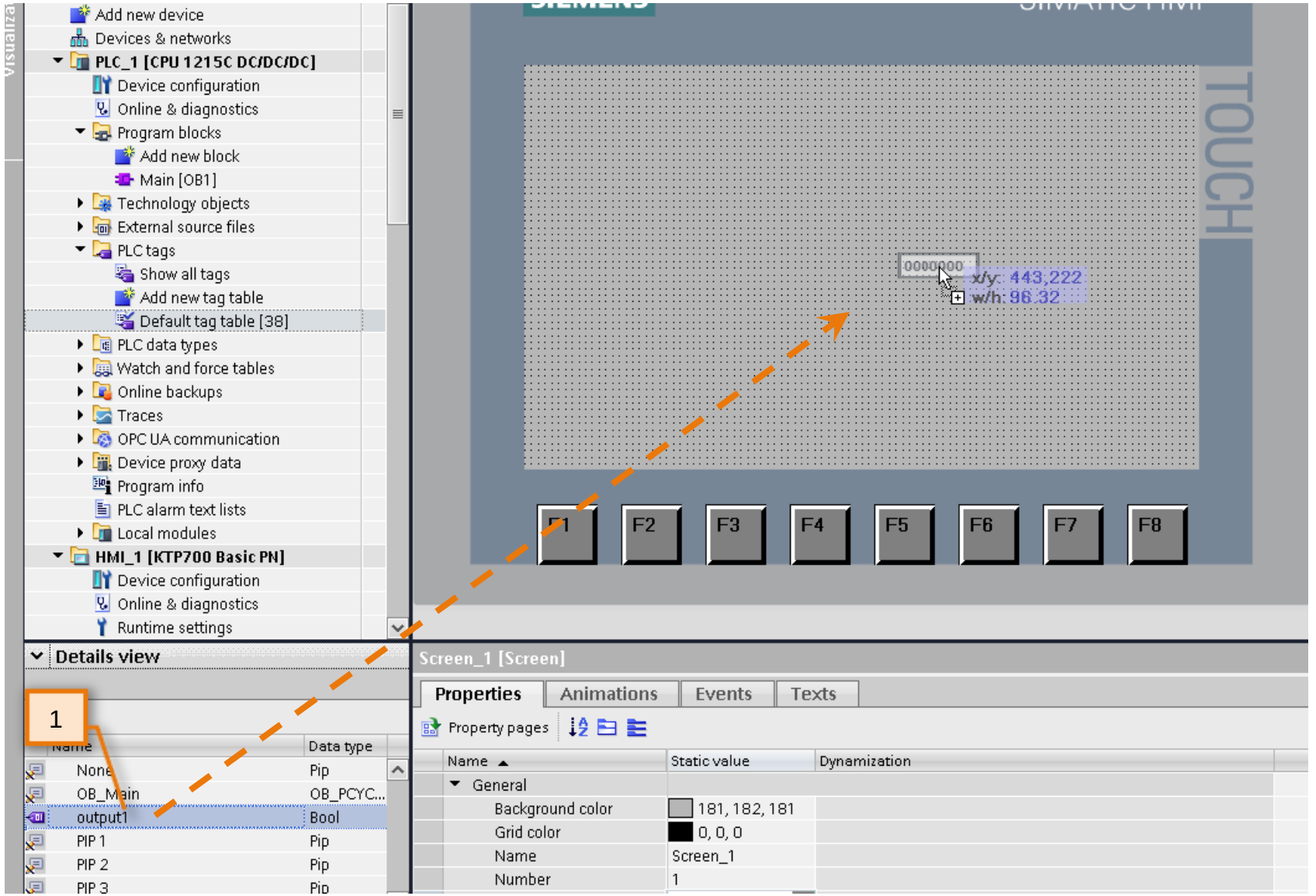

1. Drag and drop PLC tag 'output1' from the 'Details view' into "Screen_1" as shown.
2. Save your project.

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HMI visualization

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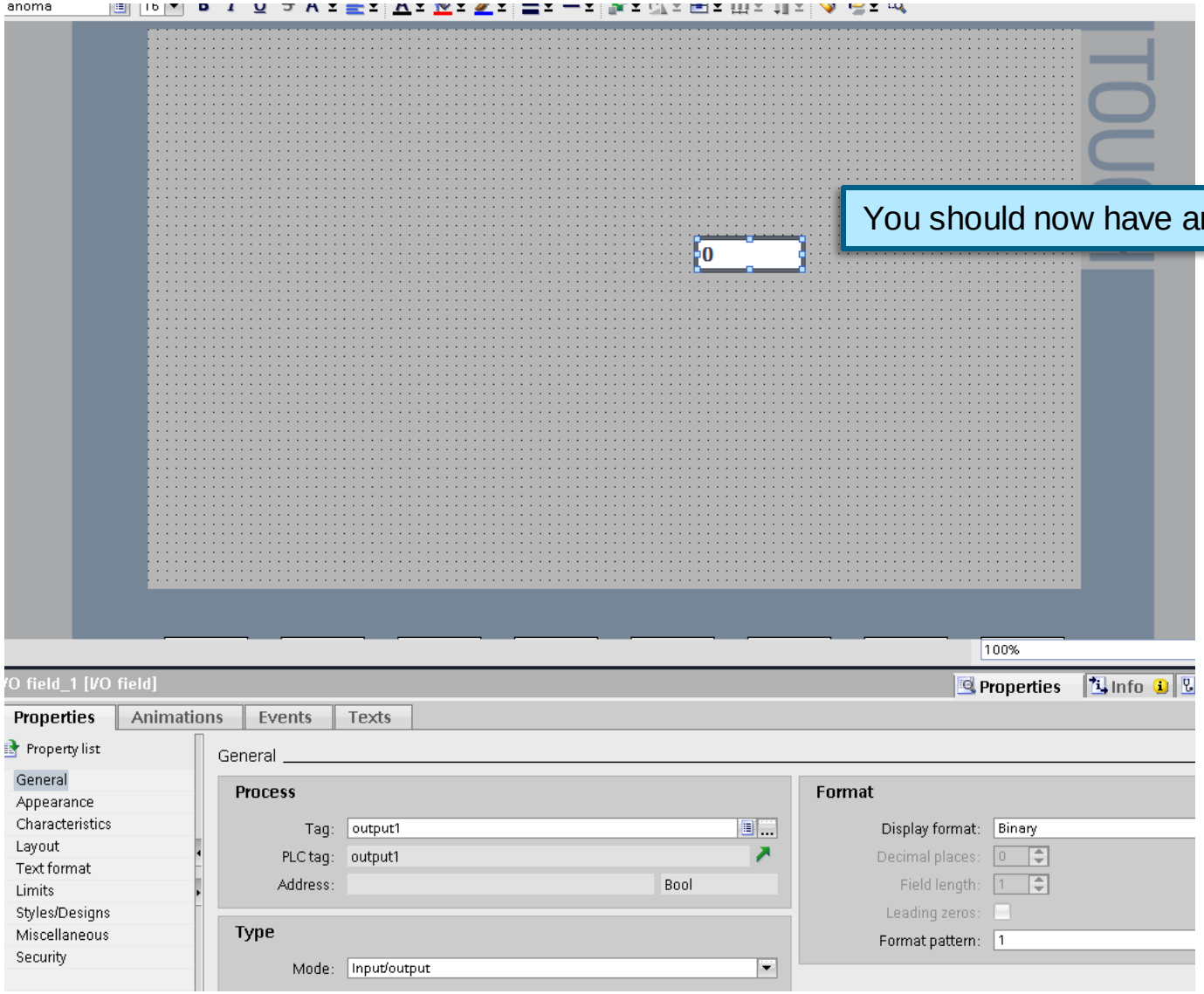

You should now have an I/O field object on your screen.

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HMI visualization

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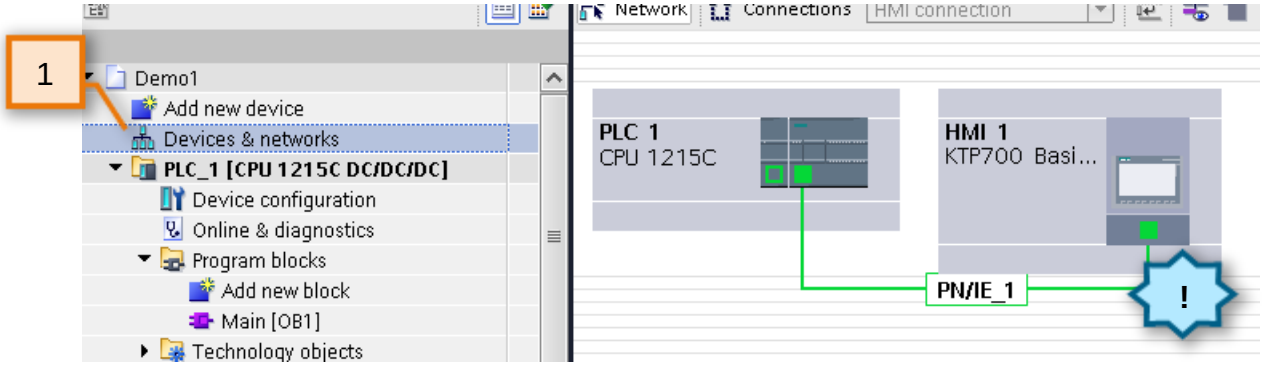

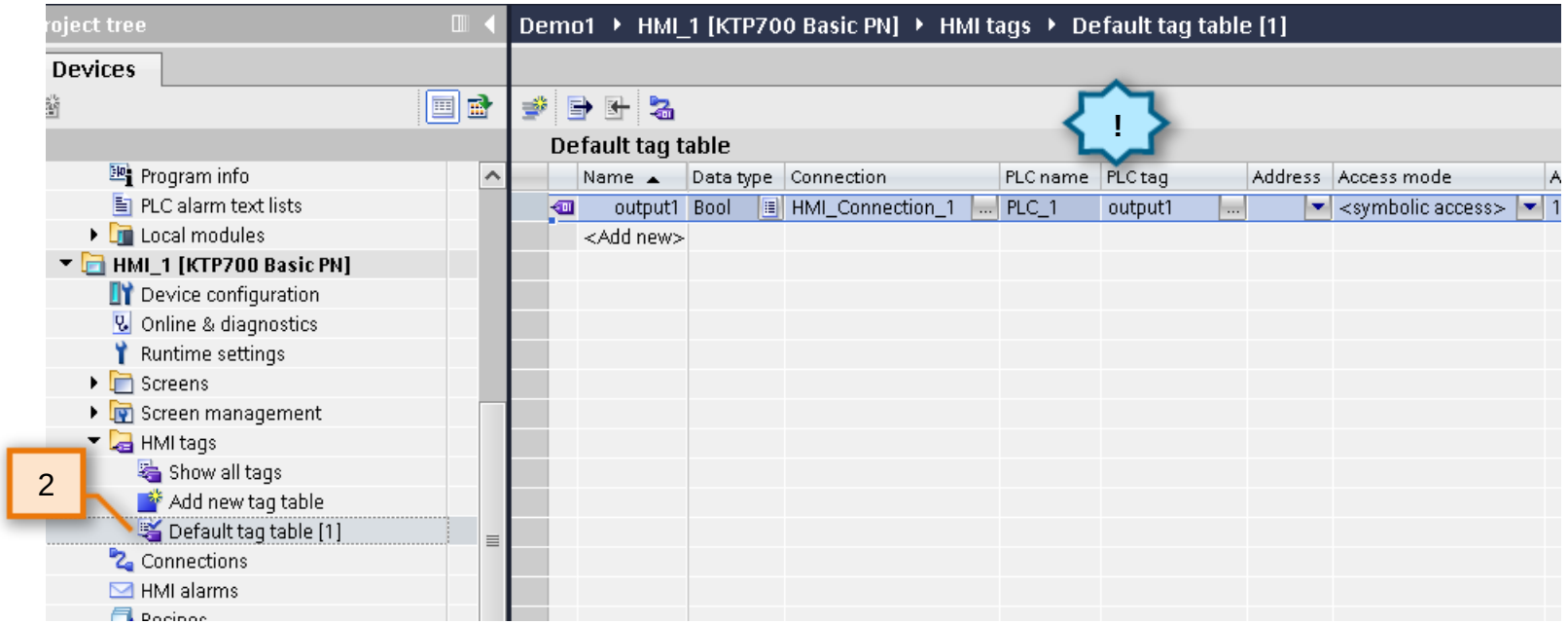

1. Go back to "Devices & networks"

! Notice a physical and logical connection to the PLC has been made and the HMIs IP address has automatically been assigned.

2. Go back to your HMI Tag table "Default tag table"

! Notice an HMI tag was defined/named and automatically associated with the PLC_1 tag "output1" via "connection1"

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HMI visualization – common tag database across editors

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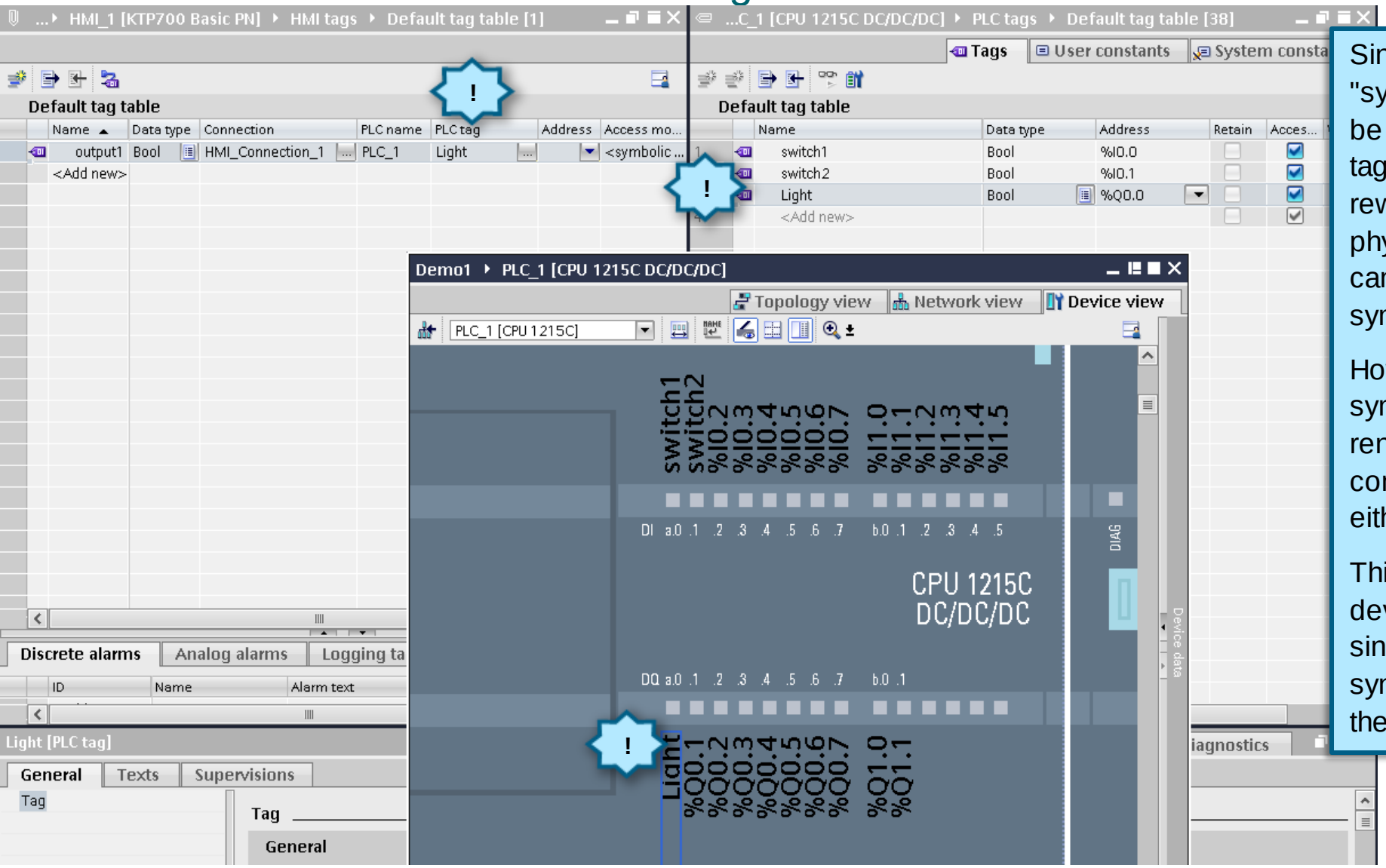

Since the HMI access to the PLC tag is "symbolic" (this is default setting, but can be changed), the physical address of this tag is irrelevant for the HMI. So if you rewire the tag "Output1" to a different physical address (e.g. Q0.0), the HMI can still read its value as long as the symbolic name remains true.

However, the same applies for the symbolic name of the PLC tag. If we rename the tag in the PLC, the HMI connection to that tag does not break either!

This is one advantage of having all devices "totally integrated" into one single engineering framework. Manual synchronization of tags is not required therefore reducing engineering efforts.

End of 'Efficient Engineering'

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