How to download an HMI program in TIA Portal

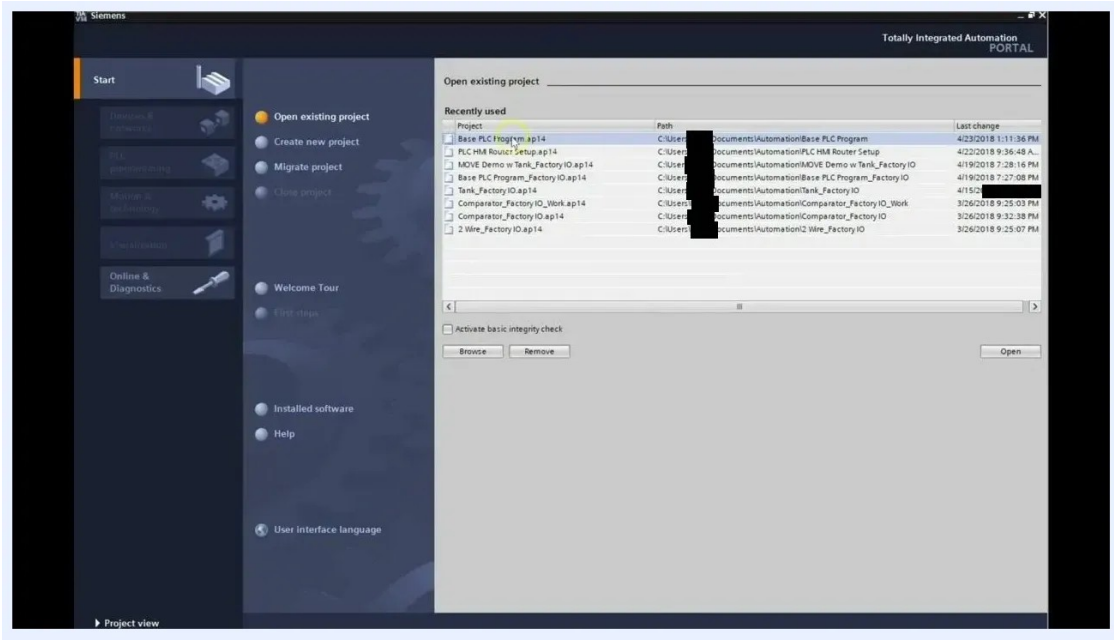
This guide shows you how to download an HMI program in TIA Portal to a KTP400 Basic panel, starting from a base PLC program for an S7-1200 PLC. You open the base project, set the PLC network address, and add the HMI device. You then set the HMI and PC IP addresses, connect the devices in the network view, download the configuration to the panel, and save the project.

Prerequisites

Before you start, make sure you have the following:

- Siemens TIA Portal installed on your computer, with your license materials ready.
- An S7-1200 PLC (CPU 1212C AC/DC/Rly in this guide) and a KTP-400 HMI panel.
- Ethernet cables. You need one from your PC to your router, and one each from the router to the PLC and the HMI panel.
- An existing project named Base PLC Program.ap14.

- A written list of the IP addresses you assign to each device on your network.



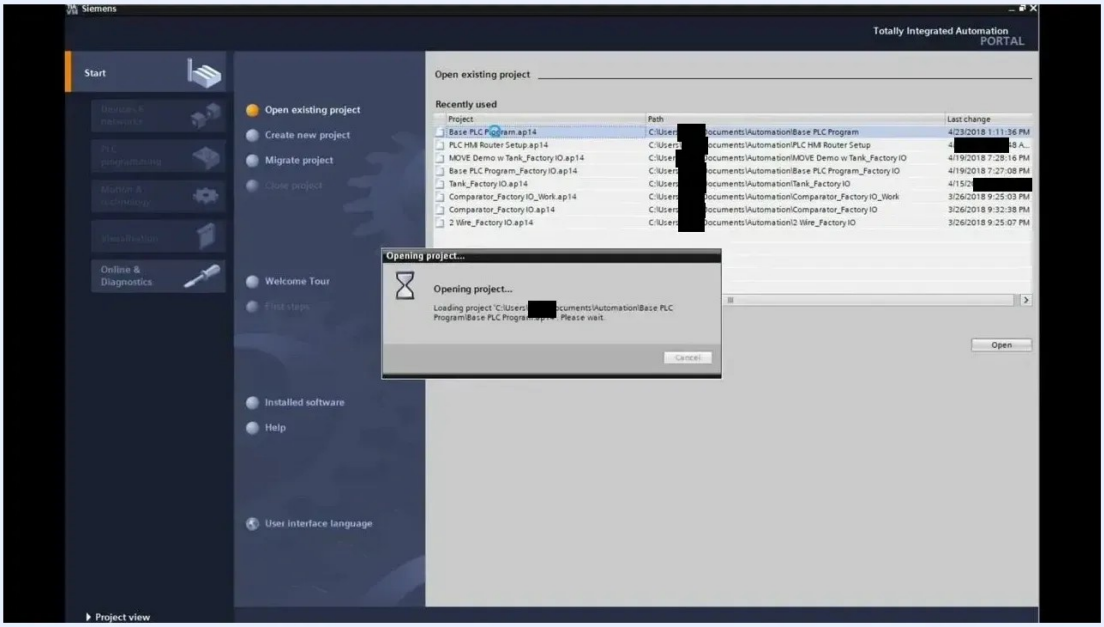
Siemens TIA Portal introduction screen showing the S7-1200 PLC, KTP-400 HMI, cables, and license materials

Open your base PLC program

Step 1. Open the base project

1. Launch Siemens TIA Portal.
2. On the start screen, select **Open existing project**.
3. In the "Recently used" list, select Base PLC Program.ap14.

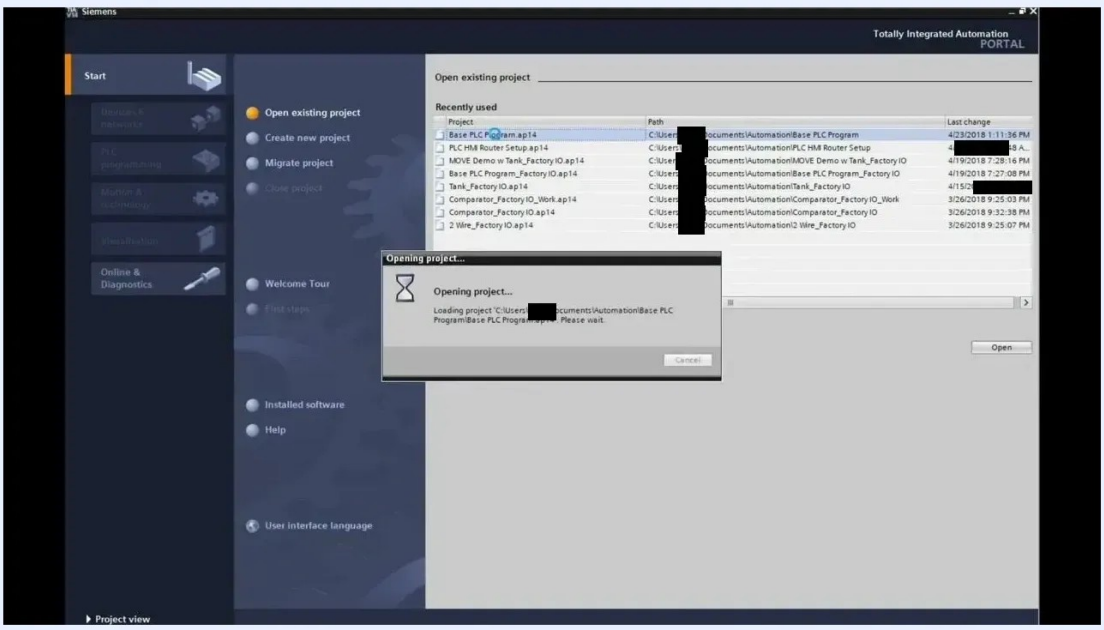
4. Click **Open**.



TIA Portal start screen with Open existing project selected and Base PLC Program.ap14 highlighted

Step 2. Wait for the project to load

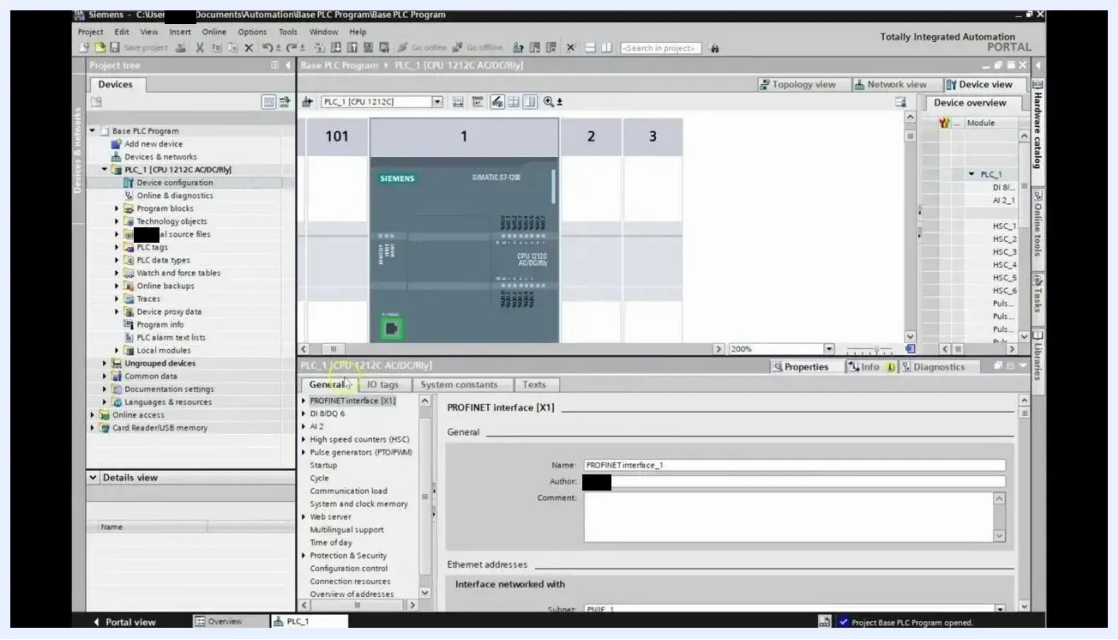
A dialog box displays "Opening project...". Wait until the project is fully loaded before you continue.



Opening project dialog showing the project file path

Step 3. Switch to the project view

When the project is open, the "First steps" screen appears. In the lower left corner, click **Project view** to access the detailed project structure.

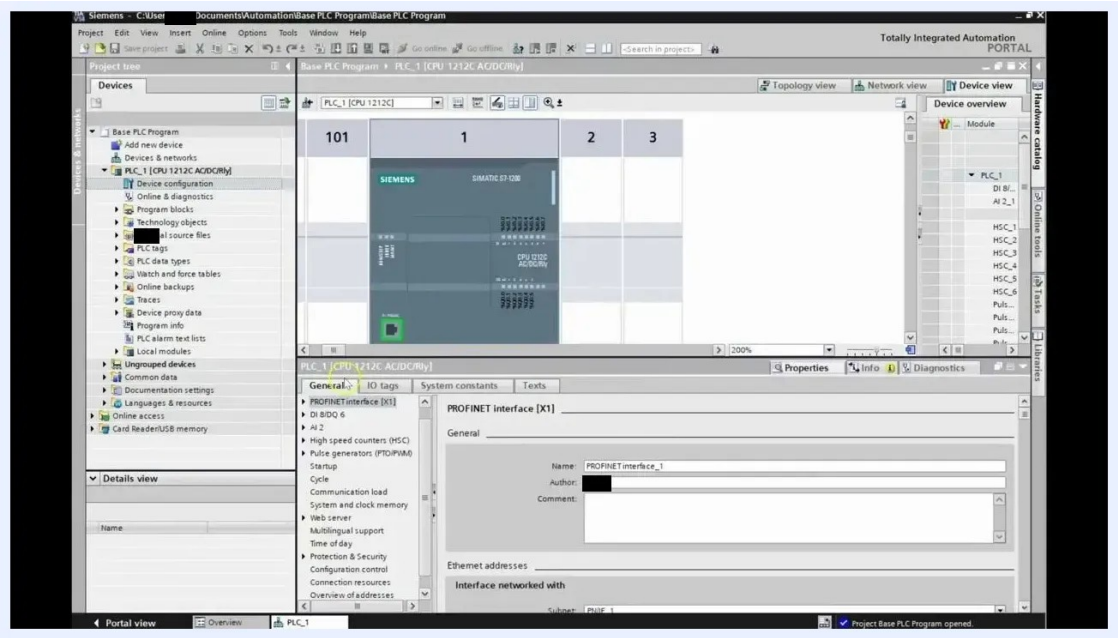


First steps screen with options to configure a device, write a PLC program, and open the project view

Step 4. Open the PLC device configuration

1. In the project tree on the left, expand the node for your project (for example, "Base PLC Program").
2. Expand **Devices & networks**, and then expand **PLC_1 [CPU 1212C AC/DC/Rly]**.

3. Double left-click **Device configuration** to open the device configuration window.

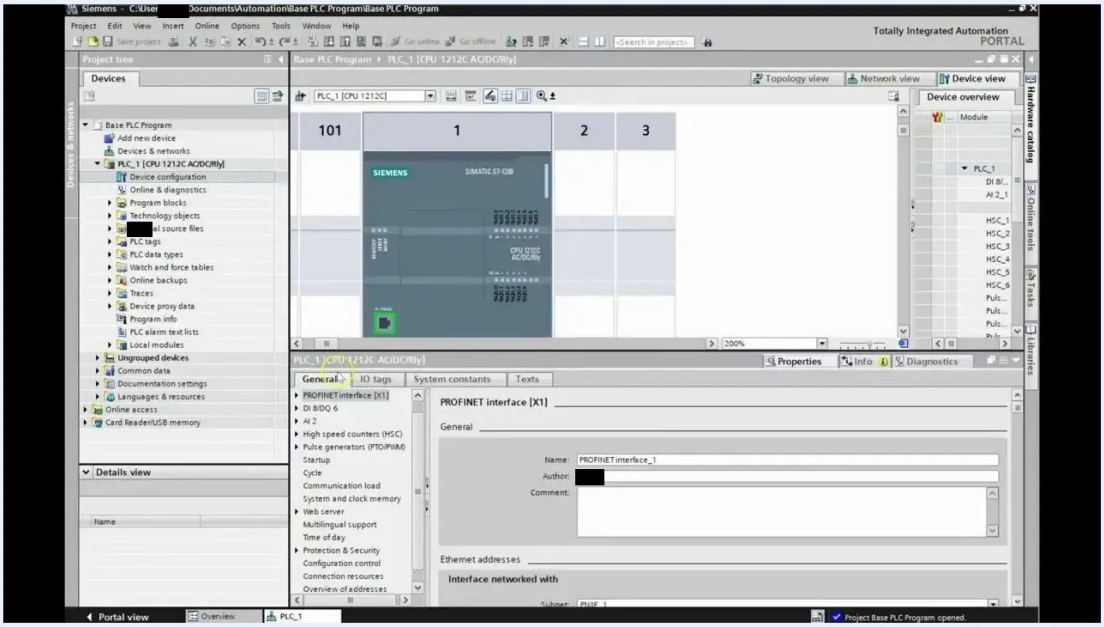


Project tree expanded to show Device configuration under PLC_1

Step 5. Select the PLC image and show the Properties pane

1. In the device configuration window, click the image of the PLC (SIMATIC S7-1200).
2. If the Properties pane does not appear, check whether it is minimized at the bottom of the screen.

3. Drag the minimized Properties pane upward to make it visible.



Device configuration window with the PLC image selected and the Properties pane visible

Step 6. Open the PROFINET interface settings

In the Properties pane, select the **PROFINET interface [X1]** tab. You can review or edit these fields:

- **Name:** PROFINET interface_1
- **Author:** Peter
- **Comment:** Leave blank or add a comment as needed.

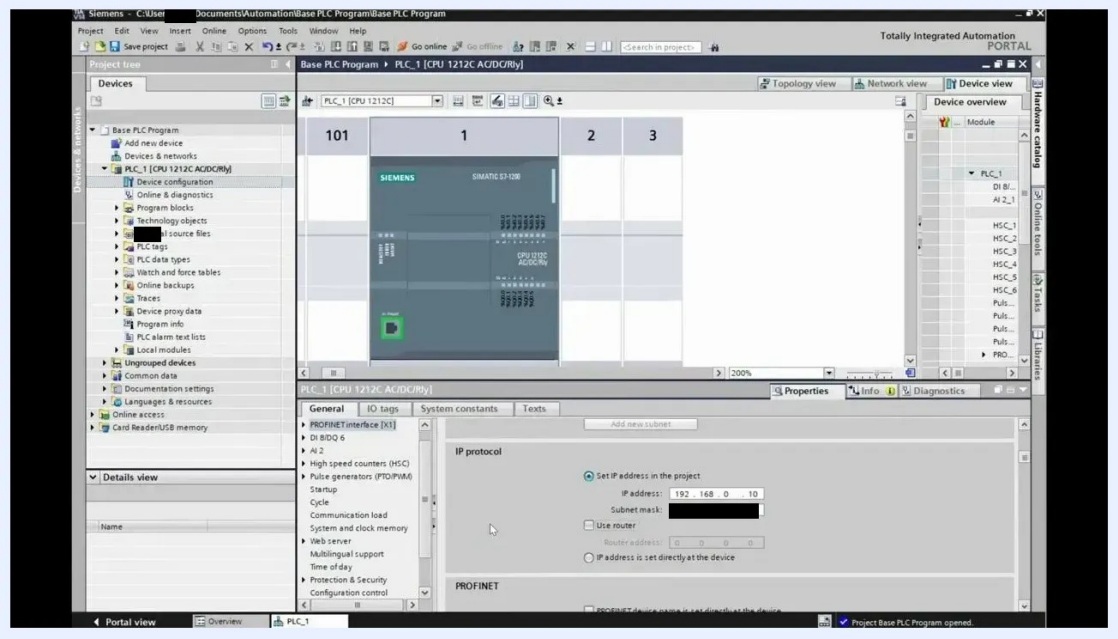
Scroll down to view additional settings.

Step 7. Configure the IP protocol and router settings

Under **IP protocol**, make sure the following settings are in place:

- **Set IP address in the project** is selected.
- **IP address:** 192.168.0.10
- **Subnet mask:** 255.255.255.0

If you work from home, select **Use router** and enter the router address. If you work in a school environment with a switch, leave the router option cleared.

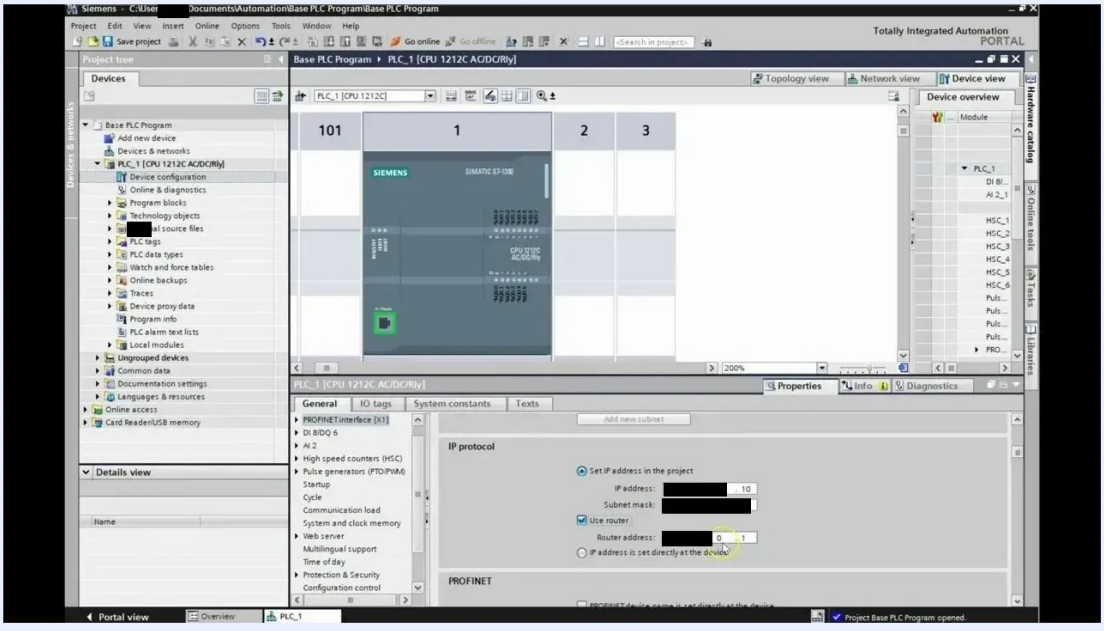


IP protocol settings showing the IP address, subnet mask, and router options

Step 8. Enable router usage for a home setup

1. In the **IP protocol** section of the PROFINET interface settings, select **Use router**.
2. Enter the router address. Most default router IP addresses are 192.168.0.1.
3. Make sure the PLC's IP address is in the same subnet as the router (for example, 192.168.0.10 for the PLC and 192.168.0.1 for the router).

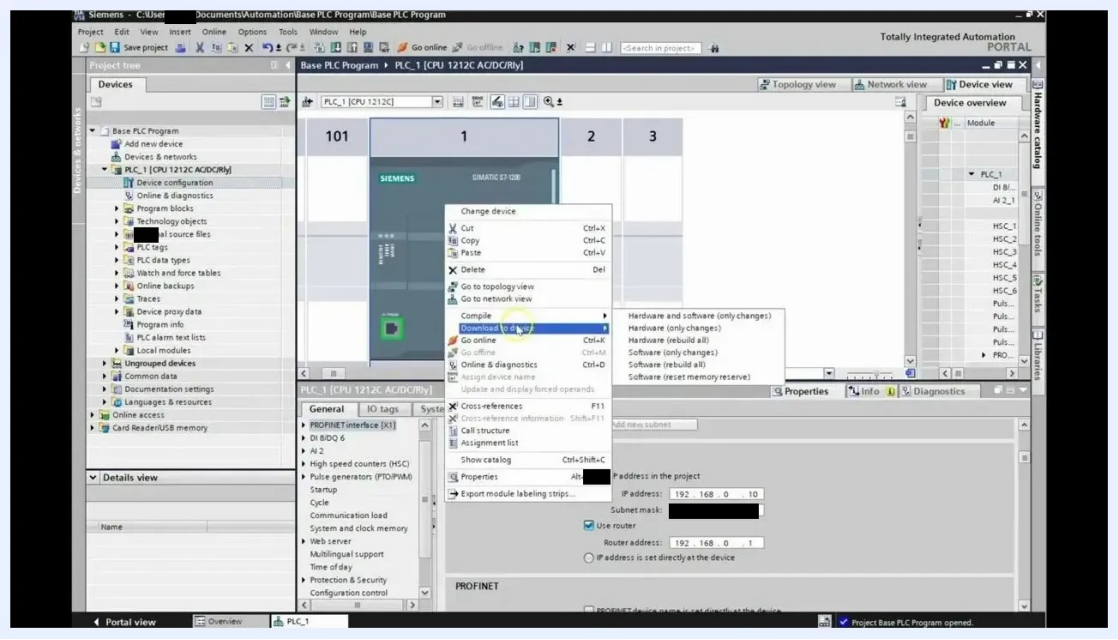
You can assign other devices, such as the HMI, addresses like 192.168.0.2 or 192.168.0.3. Keep a written list of all the IP addresses you assign to the devices in your network.



PROFINET interface settings with Use router selected and the router address set to 192.168.0.1

Step 9. Select the PLC for download

Click the PLC image in the device configuration window to make sure it is selected.



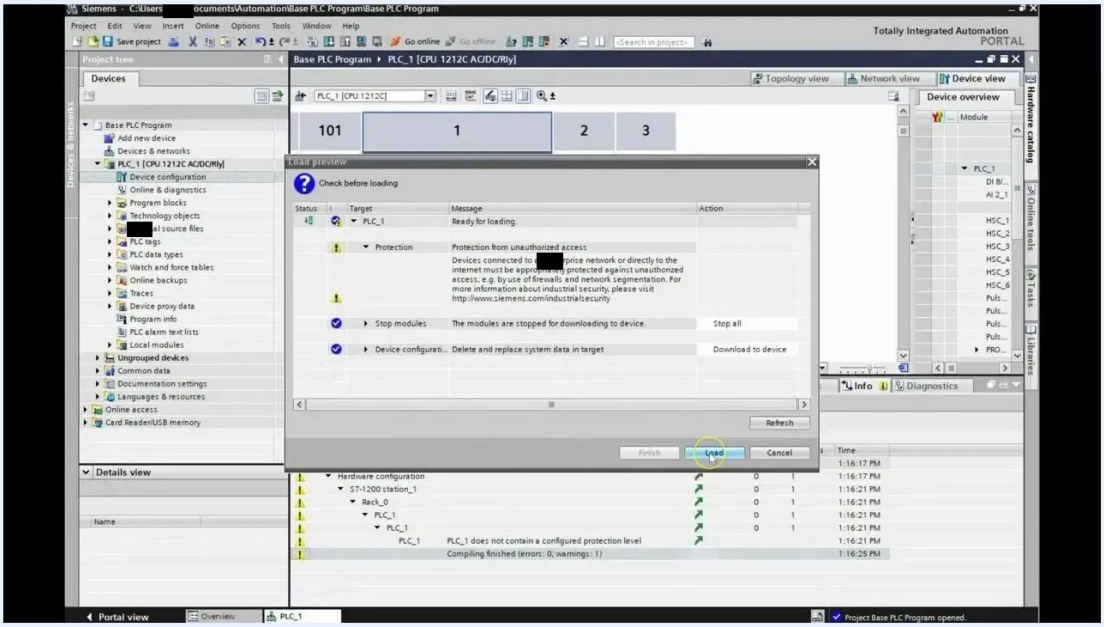
PLC image selected in the device configuration window, ready for a right-click

Right-click the PLC image, and then select **Download to device** from the context menu.

Step 10. Download the hardware configuration to the PLC

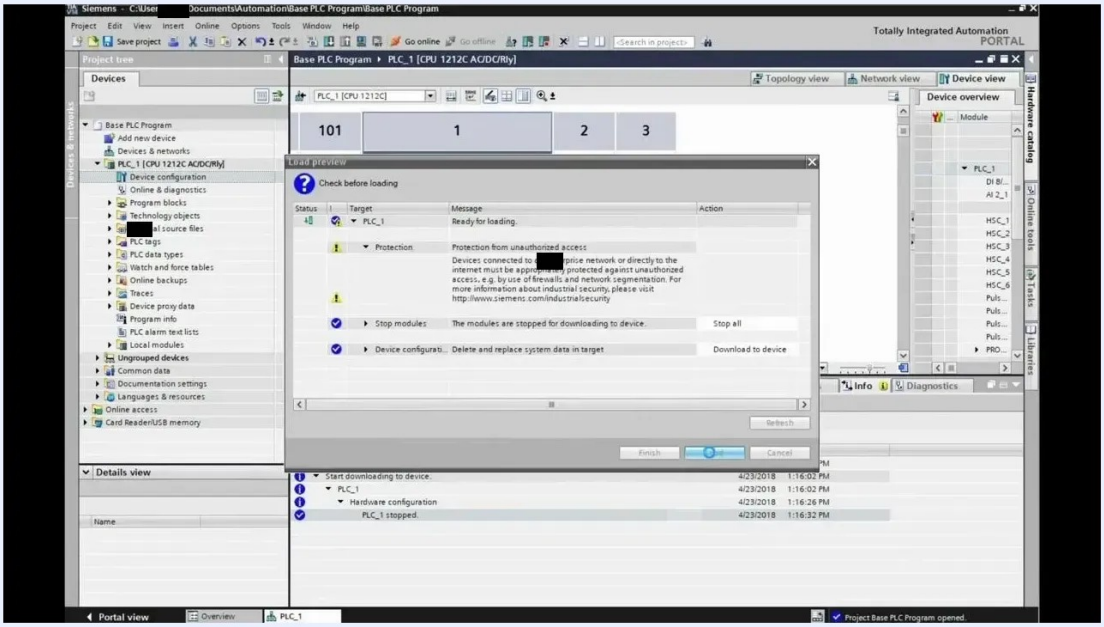
1. If TIA Portal searches for the PLC on the network, wait for the search to complete.
2. In the **Load preview** dialog, make sure the status for your PLC is "Ready for loading."
3. Review any warnings or informational messages, such as those about protection, stop modules, or device configuration.

4. Click **Load** to begin downloading the configuration to the PLC.



Load preview dialog with the Load button highlighted and status messages shown

If a dialog prompts you to "Start all" or "Finish," select **Start all** to activate the configuration. Then click **Finish** to complete the process.

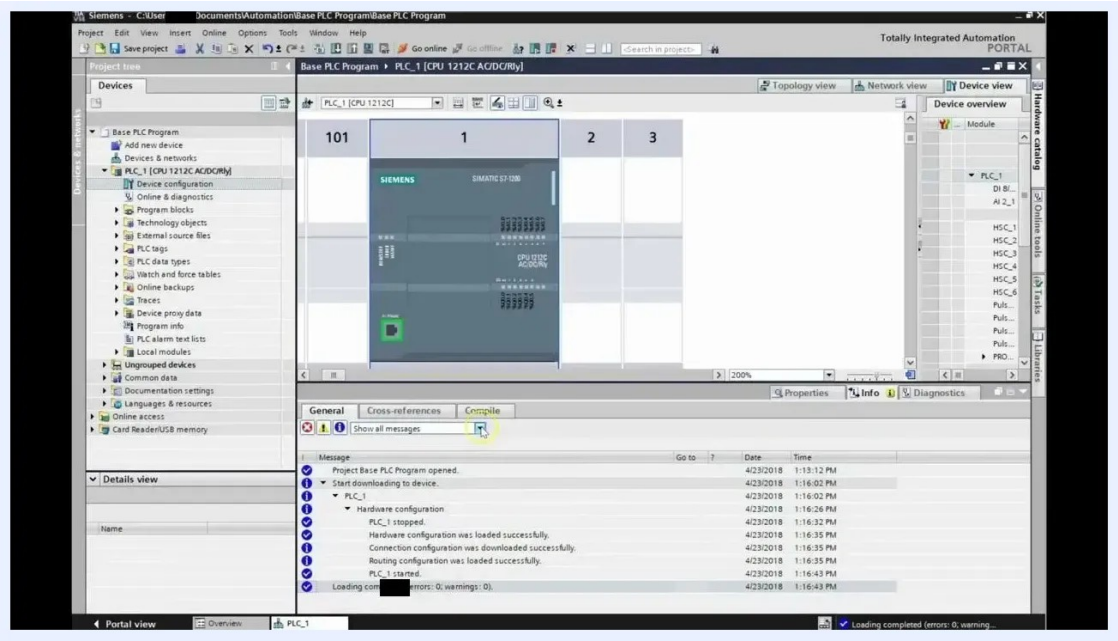


Dialog offering Start all and Finish after the configuration is loaded

Add a new HMI device

Step 11. Go to Devices & networks

1. On the main project screen, click **Devices & networks** in the left navigation pane.
2. Confirm that only the PLC is currently connected.



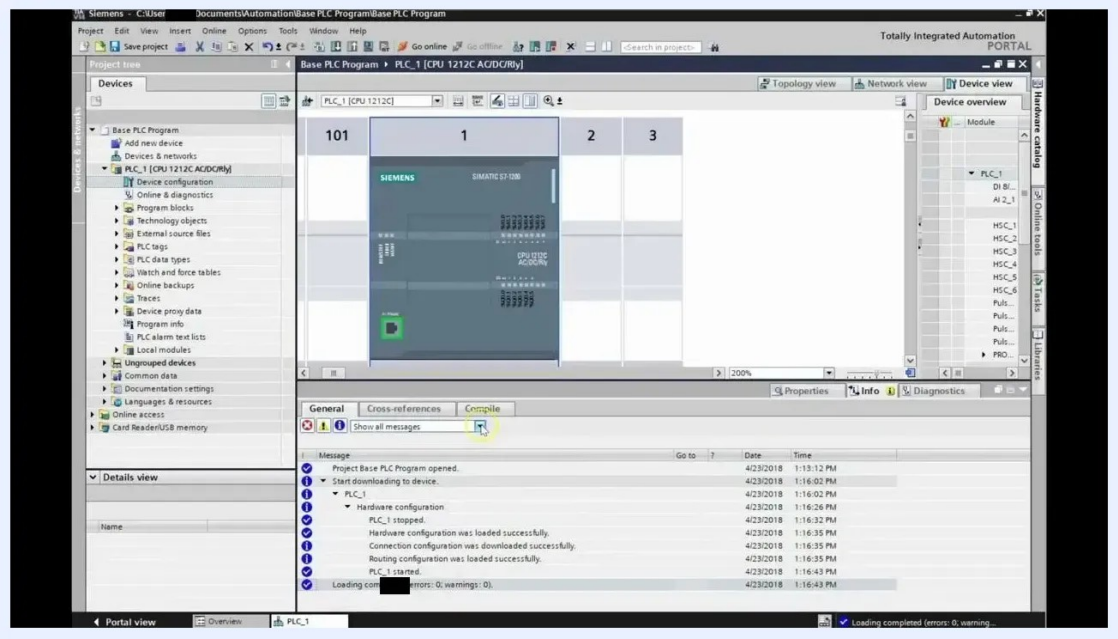
Devices & networks view showing only the PLC

Step 12. Choose the HMI panel size

1. Click **Add new device**.
2. In the Add new device dialog, select **HMI** (Human Machine Interface).
3. Expand the **SIMATIC Basic Panel** section.
4. Choose the display size that matches your hardware.

- For a 4-inch display, select **4" Display** > **KTP400 Basic**.
- For a 7-inch display (common in schools), select **7" Display** and then the appropriate model.

The main difference between display sizes is the physical size and the number of function buttons. A 4-inch panel has 4 buttons, and a 7-inch panel has 7 buttons.

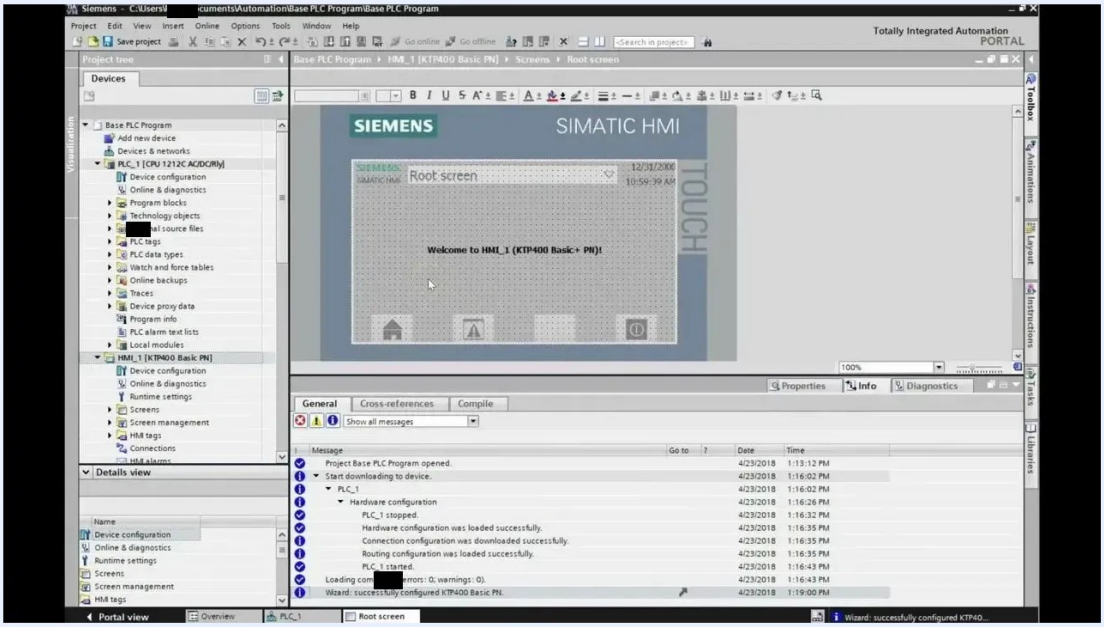


Add new device dialog listing HMI panel sizes and models

Step 13. Select the correct HMI model

1. For the KTP400 Basic, select the model number **6AV2 123-2DB03-0AX0**.
2. Make sure the **Start device wizard** checkbox is selected.
3. Enter a device name, for example HMI_1.

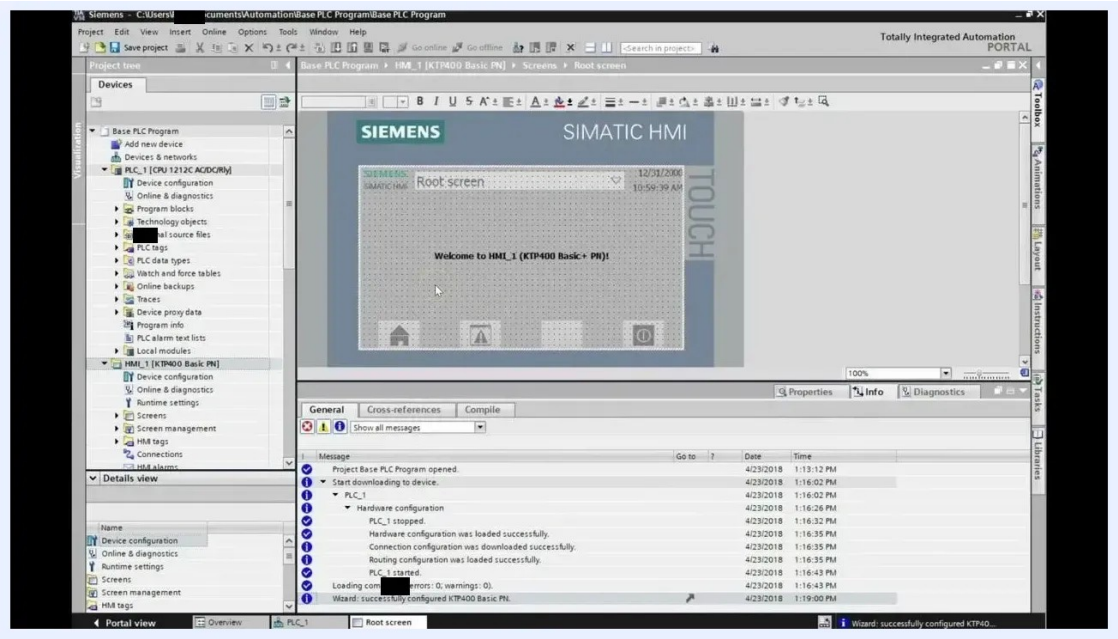
4. Click **Add**.



KTP400 Basic model selected with the article number and Add button highlighted

Step 14. Complete the HMI Device Wizard

The HMI Device Wizard opens. It may show options for PLC connections, screen layout, alarms, screens, system screens, and buttons. For this initial setup, do not change any options. Click **Finish** to complete the wizard and add the HMI device to your project.

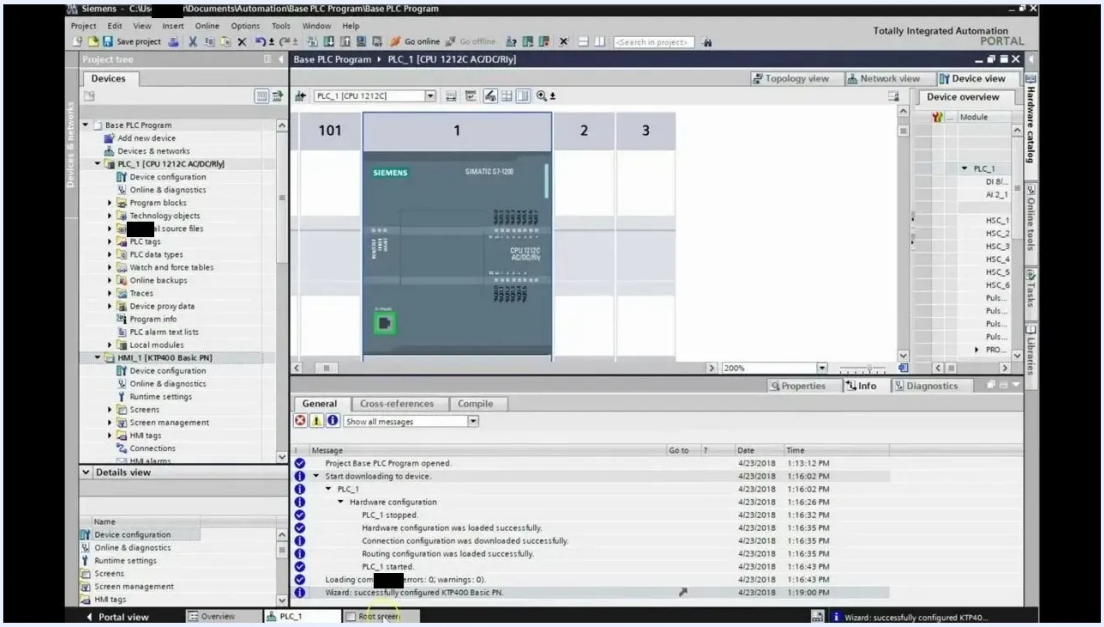


HMI Device Wizard for the KTP400 Basic PN showing PLC connections and the Finish button

Step 15. Locate the Root screen tab

1. Look at the bottom of the TIA Portal workspace for a row of tabs.
2. Find the tab labeled **Root screen**. This tab gives you access to the main HMI screen for editing and configuration.
3. If the root screen is not displayed, click the **Root screen** tab to bring it into focus.

The workspace above updates to show the HMI root screen layout.



TIA Portal workspace with the Root screen tab highlighted at the bottom

Step 16. Verify the HMI device is listed

In the project tree on the left, confirm that **HMI_1 [KTP400 Basic PN]** is listed under **Local modules**. Expand the HMI device node to see configuration options such as Device configuration, Online & diagnostics, Runtime settings, Screens, Screen management, HMI tags, and New alarms.

Step 17. Review the message log

At the bottom of the screen, check the message log for confirmation messages such as:

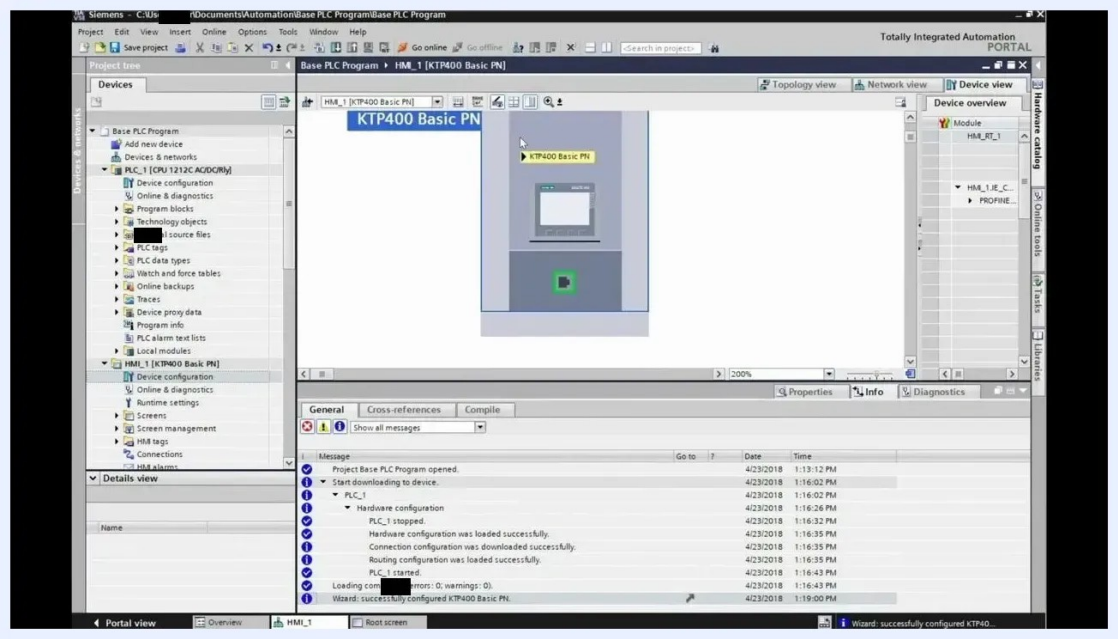
- "Wizard: successfully configured KTP400 Basic PN."
- "Loading completed (errors: 0, warnings: 0)."

Make sure there are no errors or warnings before you continue.

Set the HMI network address

Step 18. Open the HMI device configuration

In the project tree, under **HMI_1 [KTP400 Basic PN]**, click **Device configuration**. The device view shows a graphical representation of the KTP400 Basic PN HMI panel.



Device view showing the KTP400 Basic PN HMI panel selected

Step 19. Open the HMI PROFINET interface settings

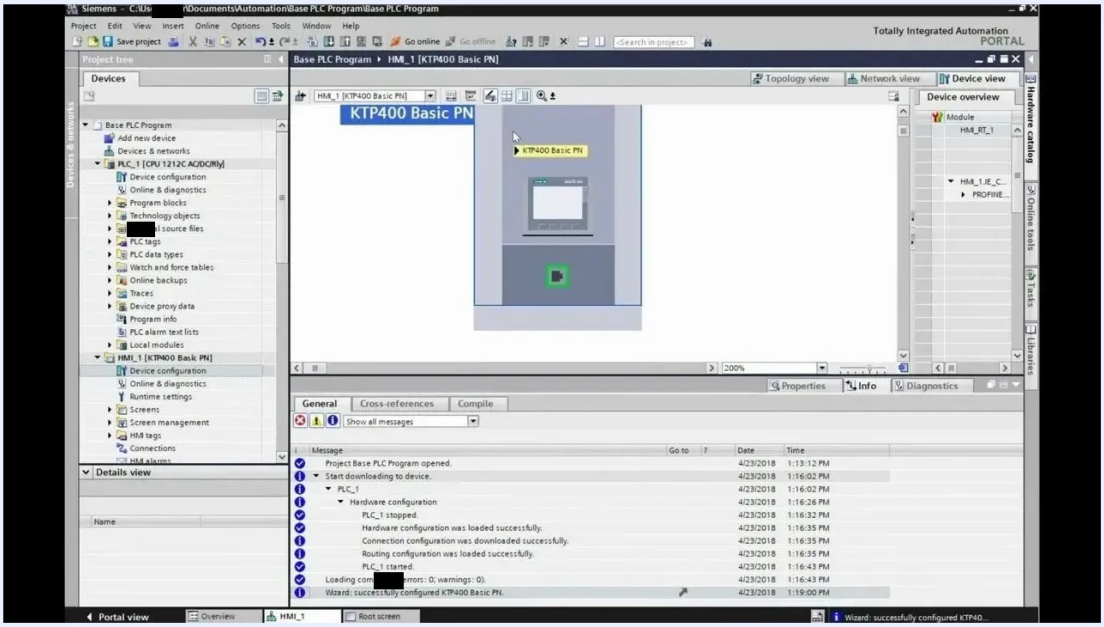
1. With the HMI device selected, find the Properties pane at the bottom.
2. Scroll down in the properties until you find the **PROFINET Interface [X1]** section.
3. Click **PROFINET Interface [X1]** to display its settings.

The right pane shows fields for Name, Author, and Comment.

Step 20. Set the HMI IP address

1. In the **IP protocol** section, make sure **Set IP address in the project** is selected.
2. Enter **192.168.0.12** as the IP address.
3. Enter **255.255.255.0** as the subnet mask.

These values assign the HMI panel a unique IP address on your network.

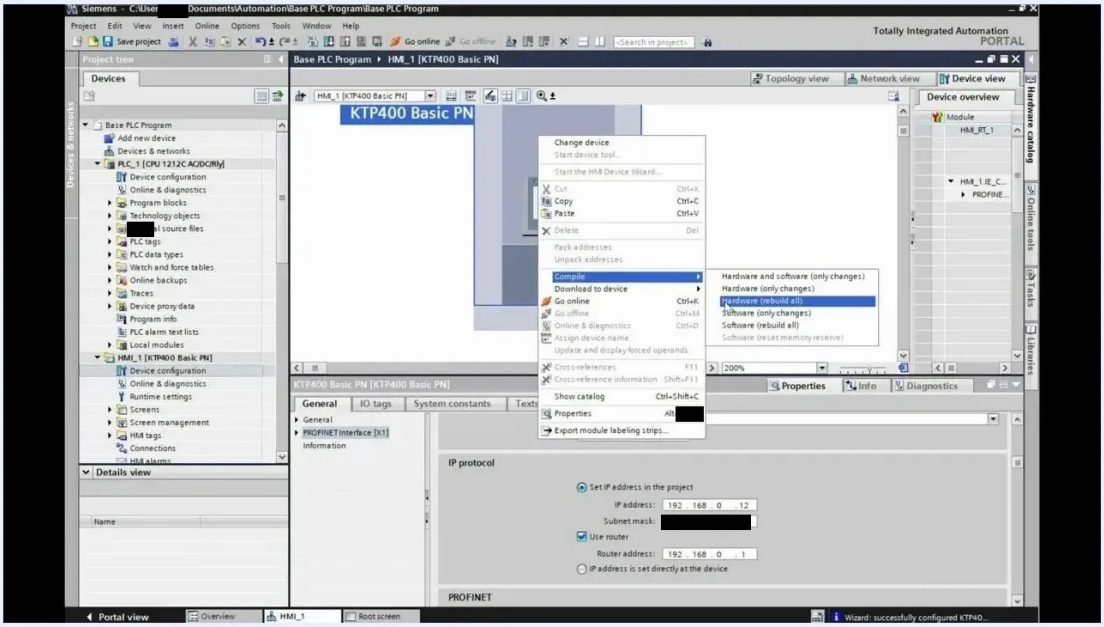


IP protocol section with IP address 192.168.0.12 and subnet mask 255.255.255.0 entered

Step 21. Enable the router and set its address

1. Select **Use router**.
2. Enter **192.168.0.1** as the router address.

This allows the HMI to communicate through the specified router.

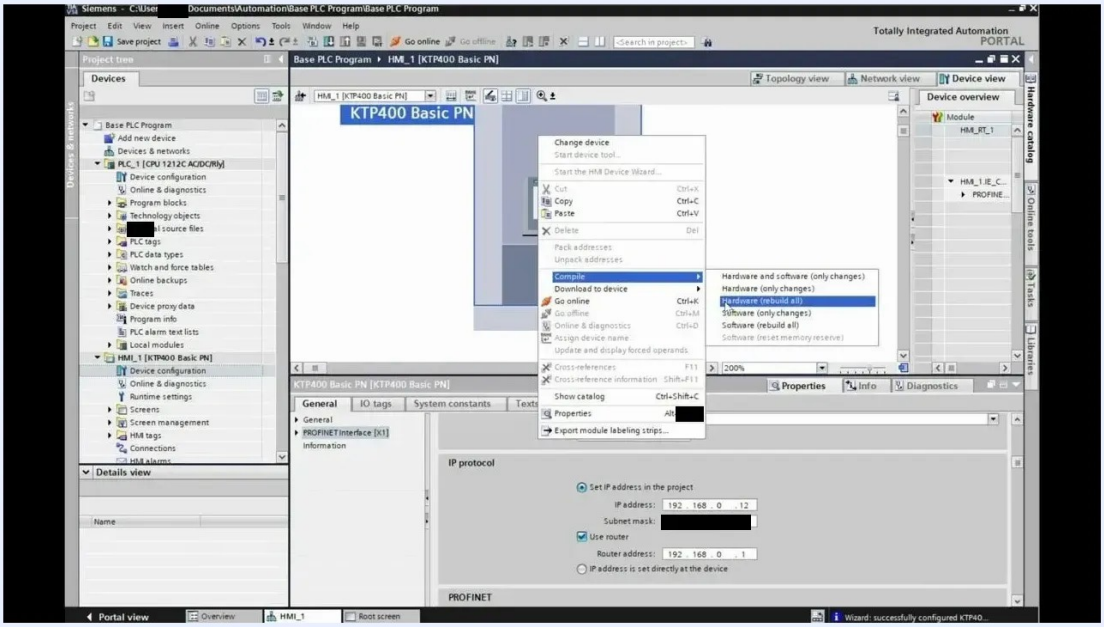


Router usage enabled with the router address 192.168.0.1

Step 22. Compile the HMI configuration

1. Right-click the HMI device (KTP400 Basic PN) in the device view.
2. Select **Compile** from the context menu.
3. Choose **Hardware (rebuild all)** to compile all hardware settings.

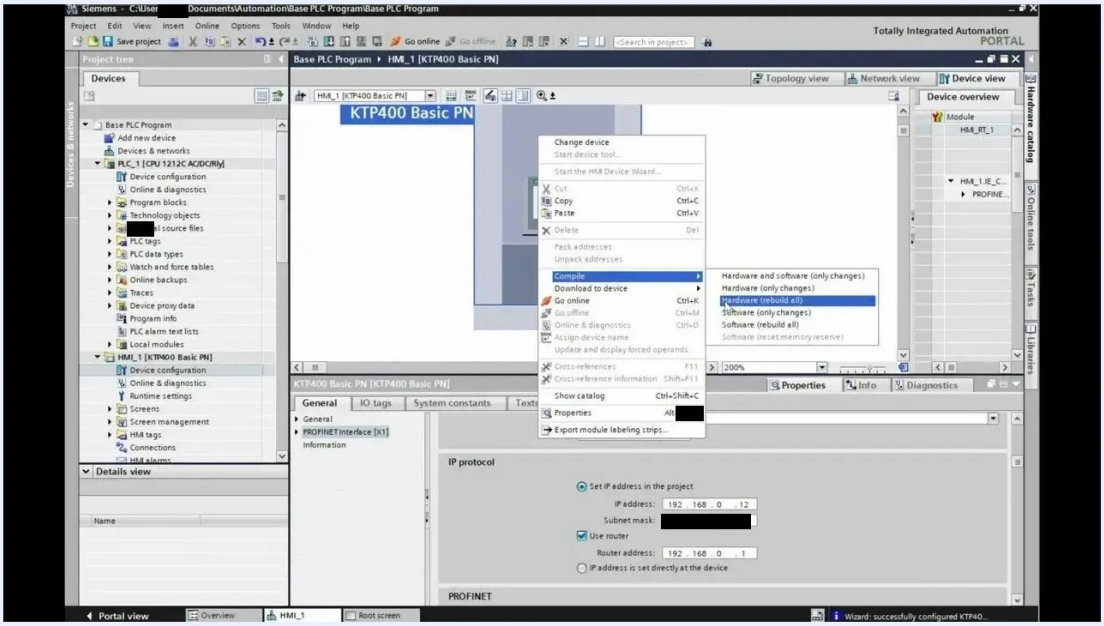
4. Wait for the compilation to complete.



Context menu on the HMI device with Compile > Hardware (rebuild all) selected

Step 23. Verify the compilation

After compiling, check the **Compile** tab at the bottom of the screen. The message "Compiling finished (errors: 0; warnings: 0)" confirms a successful build.



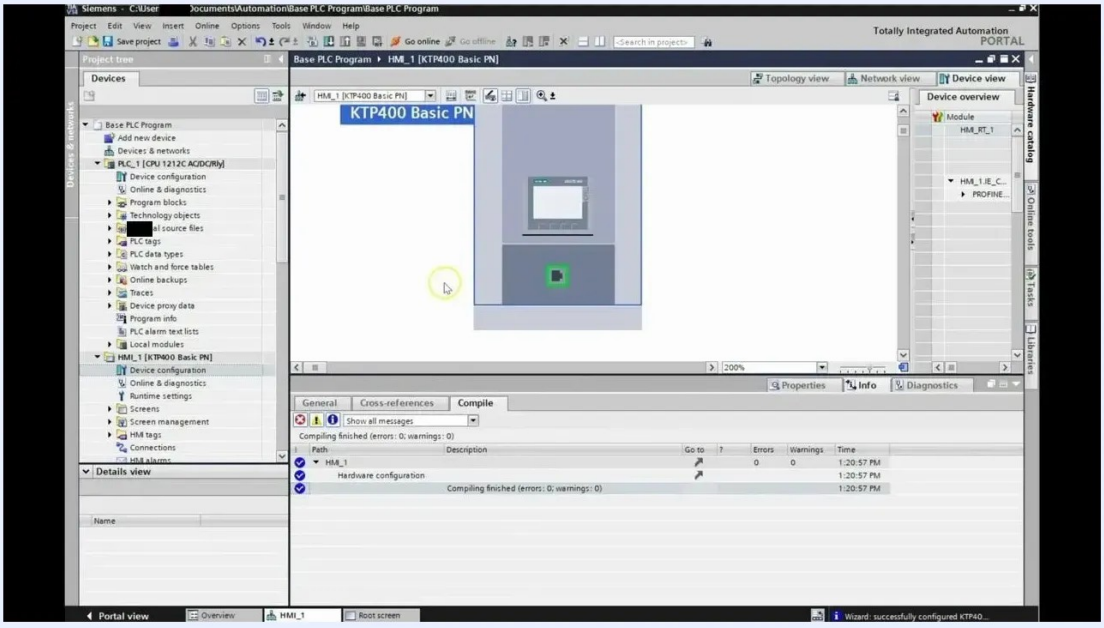
Compile tab showing that compiling finished with no errors or warnings

Match your PC's IP address to the HMI and PLC network

Your PC's IP address must be in the same subnet as the HMI and PLC for communication to work. The HMI is set to **192.168.0.12**, with subnet mask **255.255.255.0** and router/gateway **192.168.0.1**.

Step 24. Open the Windows Control Panel

Open the Windows Control Panel on your PC. It shows categories such as "System and Security," "Network and Internet," "Hardware and Sound," and "Programs."

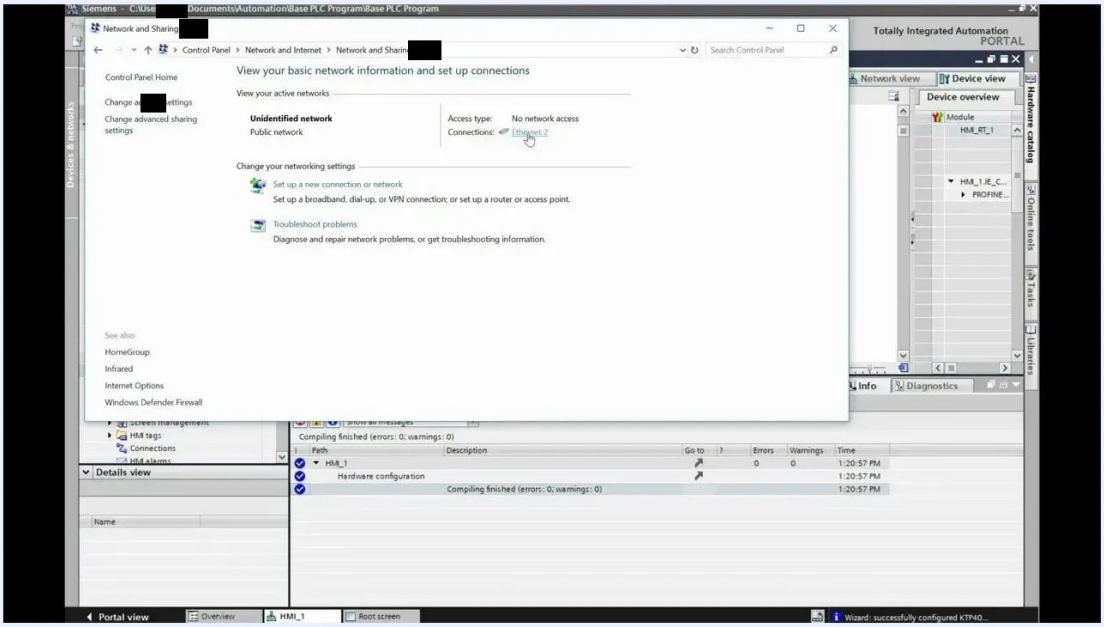


Windows Control Panel with the main categories visible

Step 25. Open the Network and Sharing Center

1. In the Control Panel, click **Network and Internet**.
2. Select **Network and Sharing Center**. The window shows your active networks and connections.

3. Locate your Ethernet connection (for example, "Ethernet 2").



Network and Sharing Center with the Ethernet 2 connection visible

Step 26. Verify the physical network connections

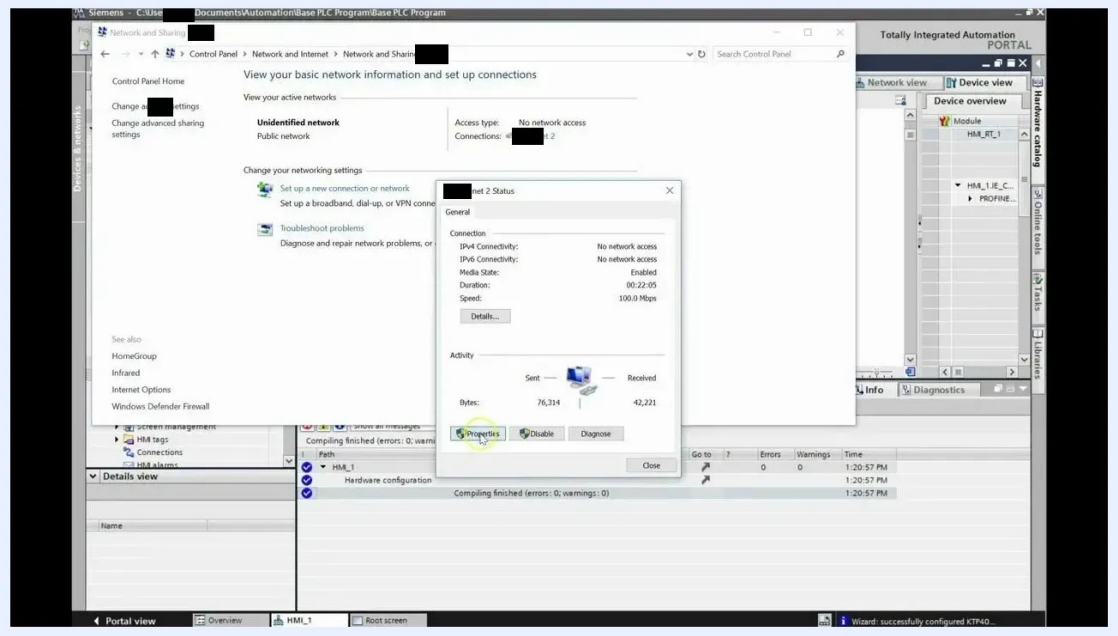
1. Connect your PC to your router with an Ethernet cable.
2. From the router, connect additional Ethernet cables to both the PLC and the HMI panel.

This creates a local network that lets all devices communicate.

Step 27. Open the Ethernet adapter properties

1. In the Network and Sharing Center, click the blue link for your Ethernet connection (for example, "Ethernet 2"). The "Ethernet 2 Status" window appears.

2. Click **Properties** at the bottom of the window.

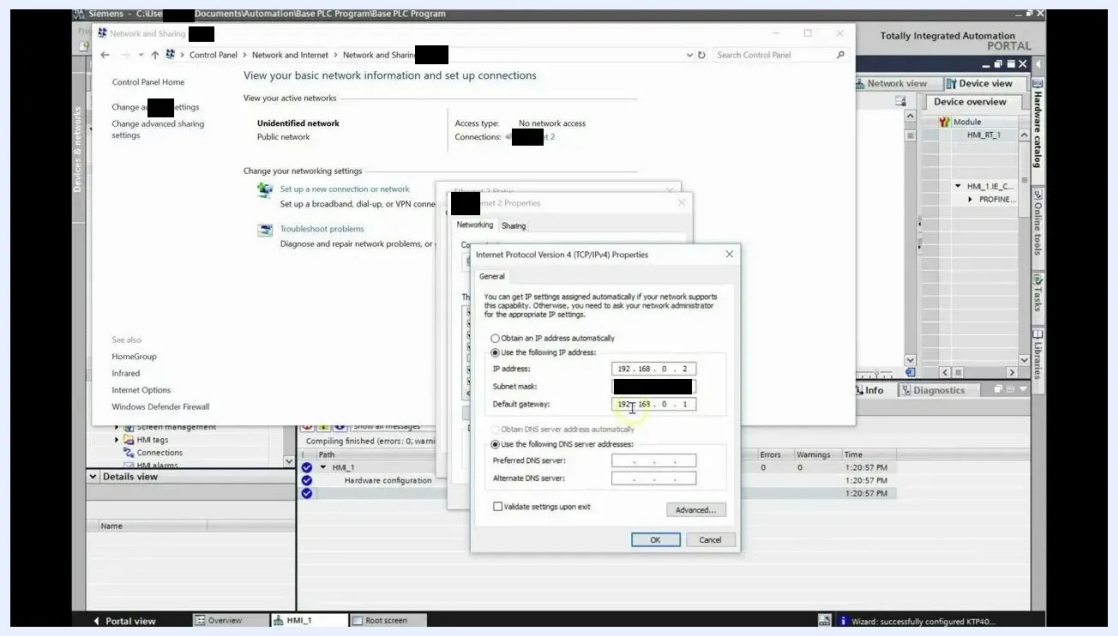


Ethernet 2 Status window with the Properties button highlighted

Step 28. Configure the IPv4 settings

1. In the Ethernet Properties window, select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.
2. Select **Use the following IP address:**.
3. Enter **192.168.0.2** as the IP address.
4. Enter **255.255.255.0** as the subnet mask.
5. Enter **192.168.0.1** as the default gateway.

These settings place your PC on the same subnet as the HMI and PLC, with a unique address.

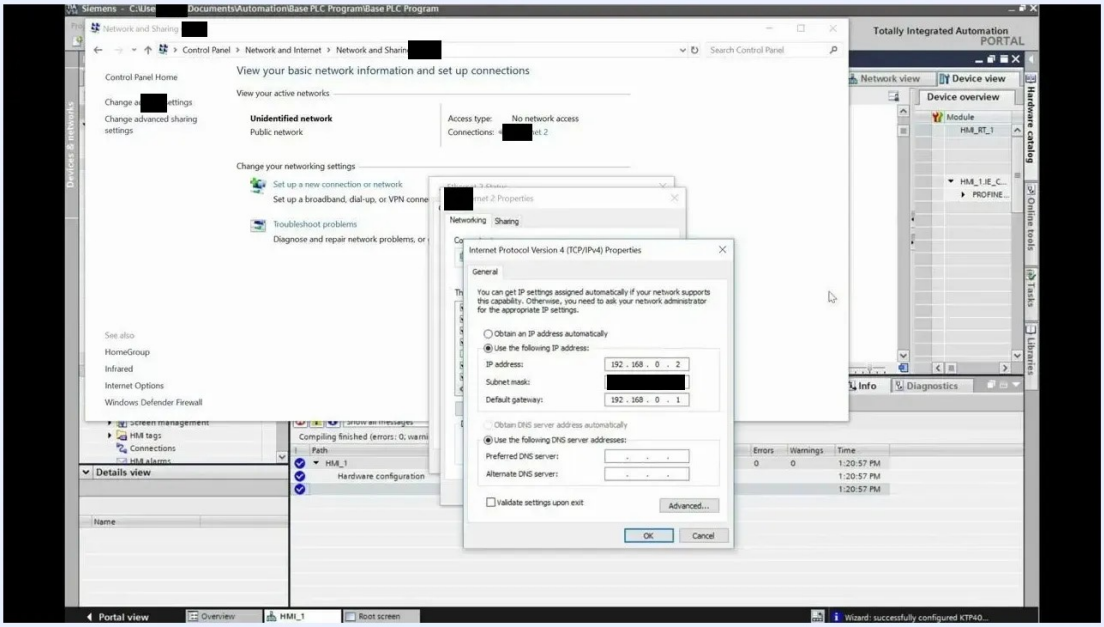


IPv4 Properties window with IP address 192.168.0.2, subnet mask 255.255.255.0, and default gateway 192.168.0.1 entered

Step 29. Apply and close the network settings

1. Click **OK** to save the IPv4 settings.
2. Click **OK** again in the Ethernet Properties window.
3. Click **Close** in the Ethernet Status window.

Your PC's network configuration now matches the HMI and PLC subnet.

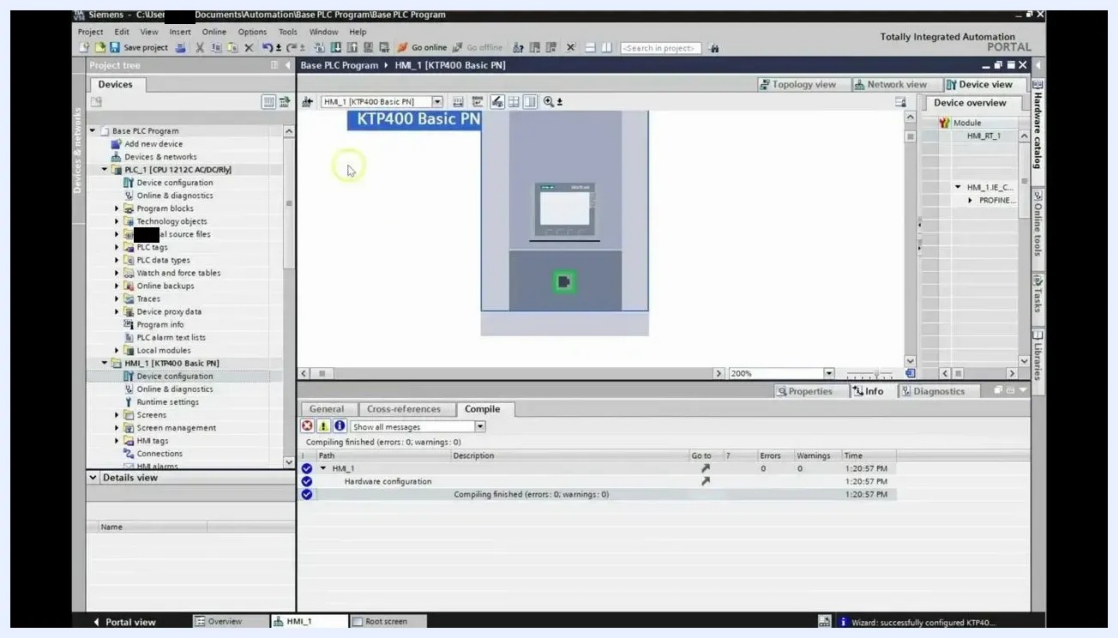


IPv4 settings ready for confirmation before you click OK

Create an Ethernet connection between the PLC and HMI

Step 30. Return to Devices & networks in TIA Portal

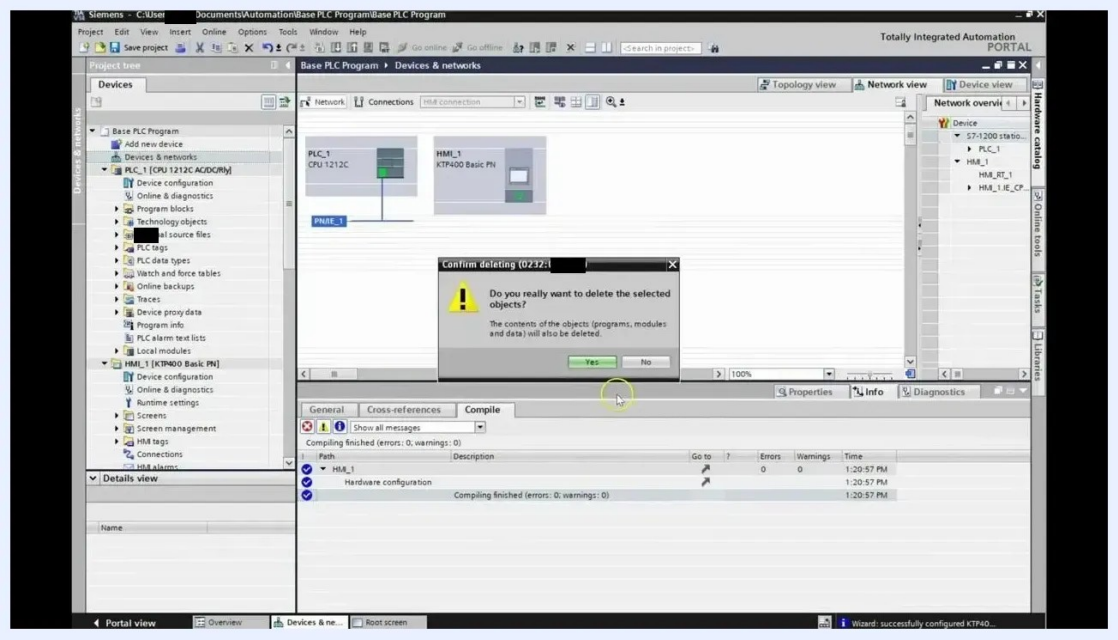
In TIA Portal, double left-click **Devices & networks** in the project tree on the left to open the network configuration view. The workspace shows graphical representations of your PLC (CPU 1212C) and HMI (KTP400 Basic PN).



Devices & networks view showing the PLC and HMI

Step 31. Confirm or cancel a deletion prompt (optional)

If a "Confirm deleting" dialog appears, read the message: "Do you really want to delete the selected objects? The contents of the objects (programs, modules and data) will also be deleted." Click **Yes** to remove a previous configuration, or **No** to cancel. This ensures you are working with a clean network setup.

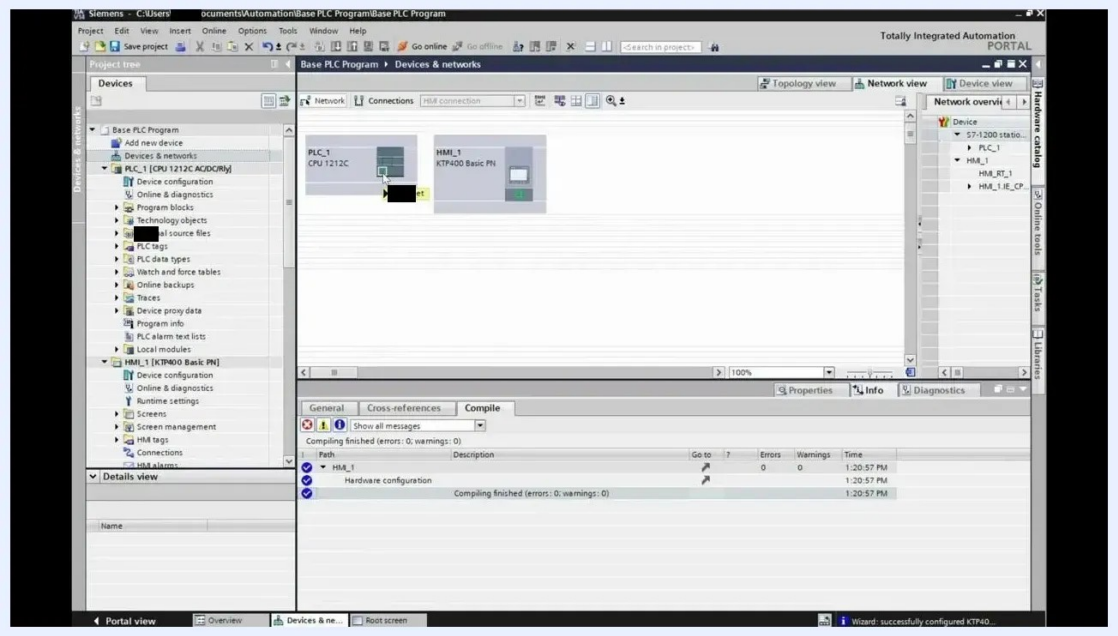


Confirm deleting dialog in the TIA Portal network view

Step 32. Connect the PLC and HMI

1. In the network view, locate the green Ethernet port on the PLC (CPU 1212C).
2. Hold down the left mouse button on the Ethernet port labeled "Ethernet."
3. Drag the connection line to the green Ethernet port on the HMI (KTP400 Basic PN).
4. Release the mouse button to establish the connection.

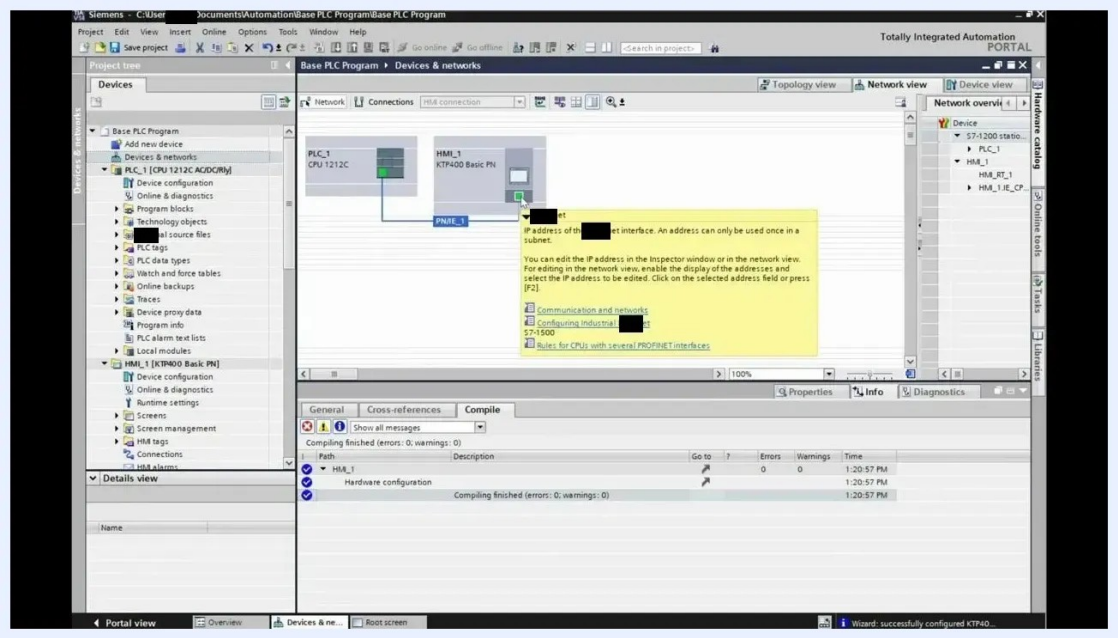
The connection visually links the PLC and HMI and indicates network communication.



Dragging an Ethernet connection from the PLC to the HMI

Step 33. Verify the network link

Make sure a blue line now connects the PLC and HMI, labeled with the network name (for example, PN/IE_1). Both devices should show green Ethernet ports, which confirms the connection.



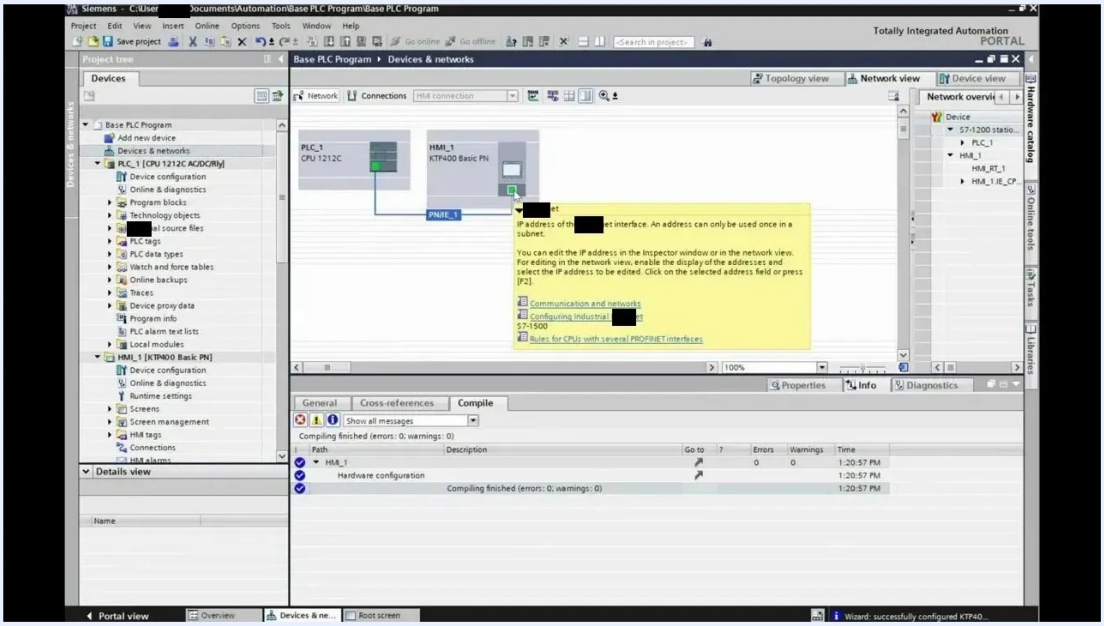
PLC and HMI connected by a blue Ethernet line

Download the HMI program in TIA Portal

Step 34. Open the HMI device configuration and select the panel

1. In the project tree under your HMI (for example, **HMI_1 [KTP400 Basic PN]**), double left-click **Device configuration**. Alternatively, double left-click the HMI device in the network view.
2. Click the graphical image of the HMI (KTP400 Basic PN) in the main workspace to make sure it is selected.

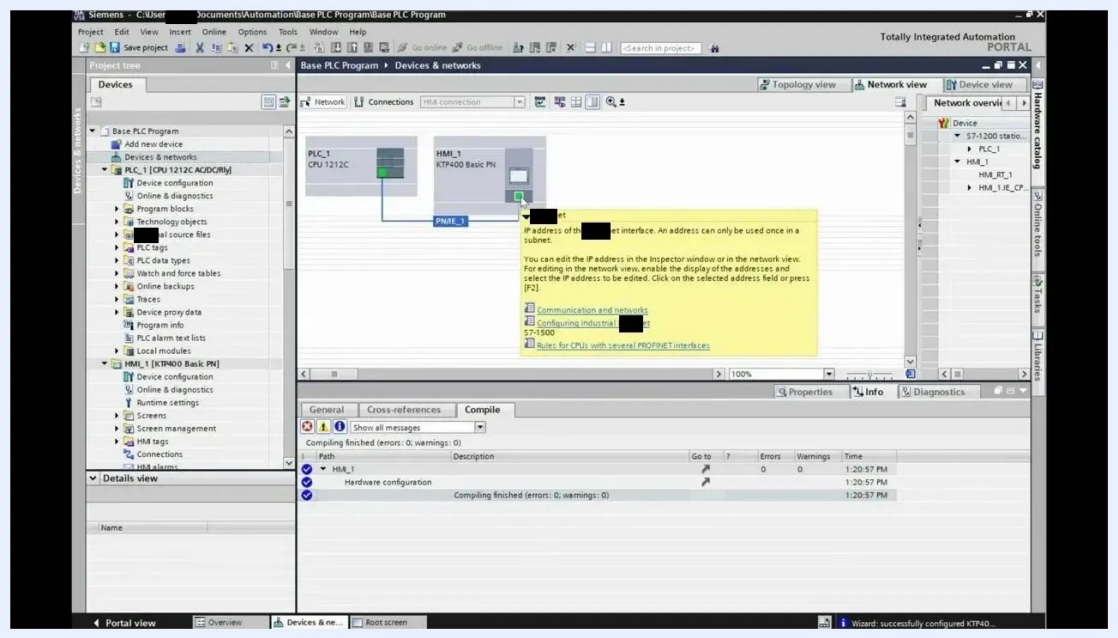
You must select the HMI before you download the configuration to the device.



HMI device configuration view showing the HMI hardware layout

Step 35. Start the HMI program download

With the HMI device selected, click the **Download to device** button (downward arrow icon) in the toolbar at the top of the TIA Portal window. This starts the process of transferring your configuration to the HMI panel.

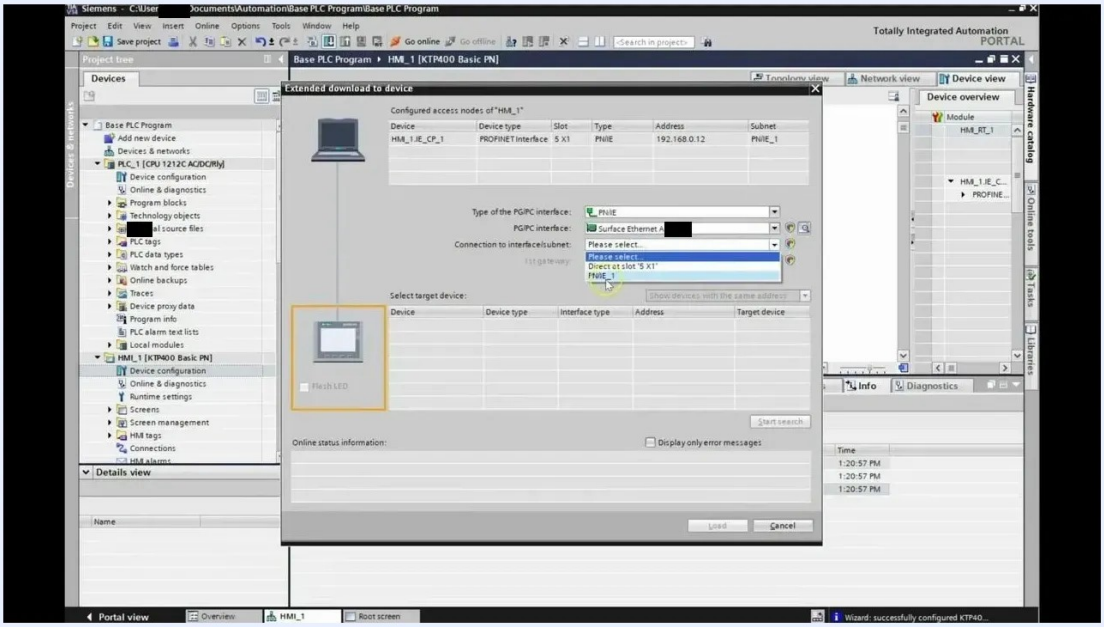


Download to device button highlighted in the TIA Portal toolbar

Step 36. Search for the HMI on the network

1. In the "Extended download to device" dialog, set **Type of PG/PC interface** to PN/IE.
2. Set **PG/PC interface** to Surface Ethernet Adapter, or to your PC's Ethernet adapter.
3. Set **Connection to interface/subnet** to PN/IE_1.

4. Click **Start search** to scan for connected devices.

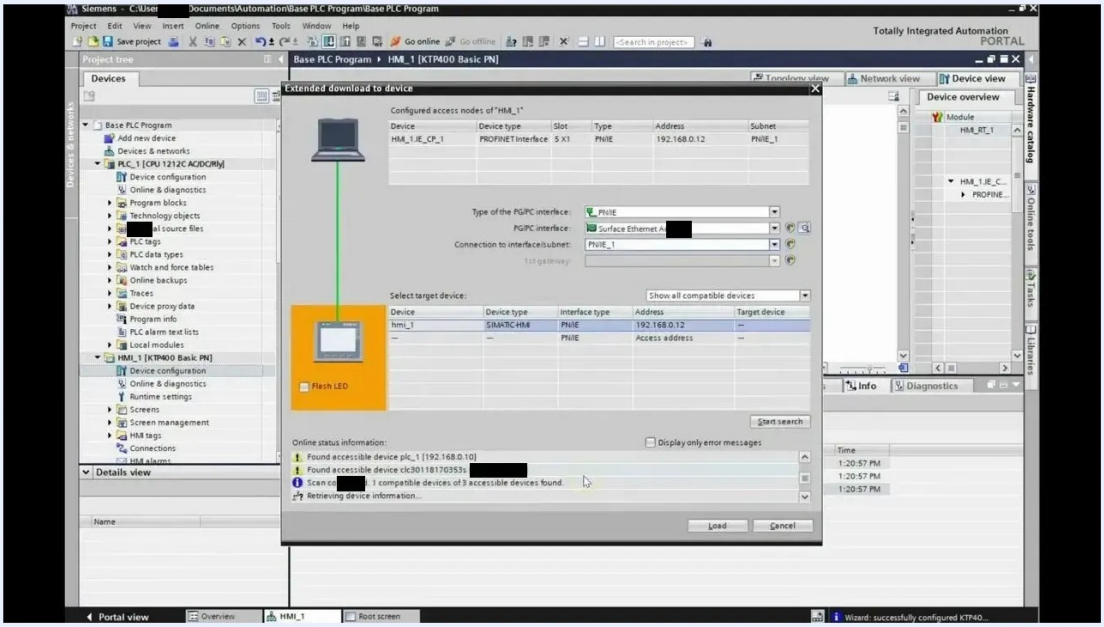


Extended download to device dialog with the search options

Step 37. Select the detected HMI device

1. When the search completes, find your HMI device in the results list (for example, hmi_1, SIMATIC-HMI, PN/IE, 192.168.0.12).
2. Confirm that the IP address **192.168.0.12** is shown for the HMI.
3. Check that the online status information at the bottom says "Found accessible device HMI 192.168.0.12."

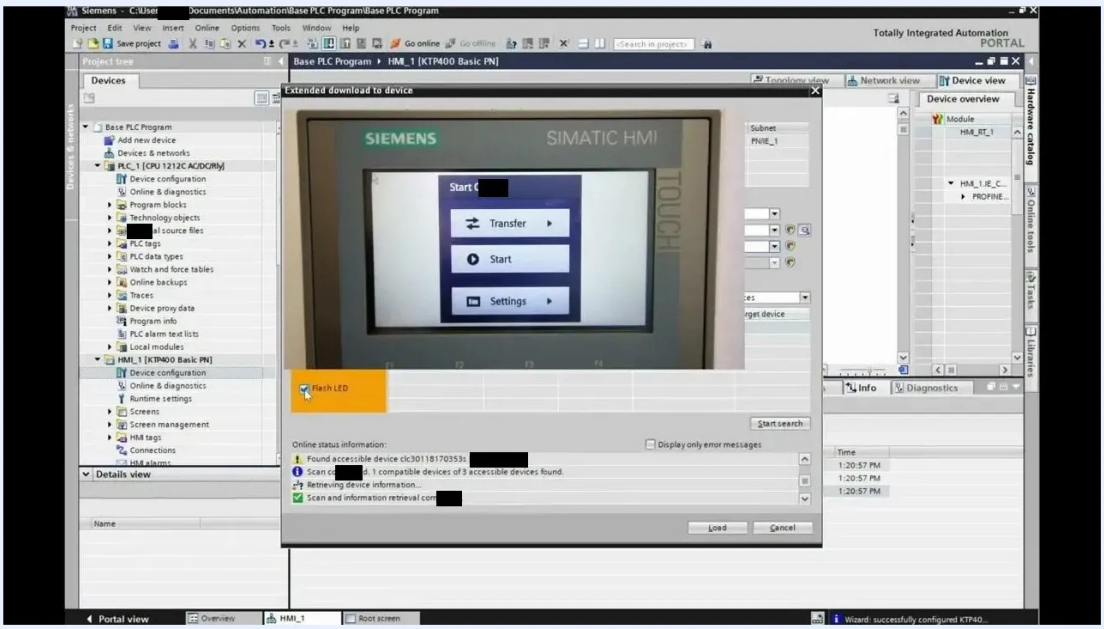
4. Select the HMI device from the list to prepare for download.



HMI device found at 192.168.0.12 in the download dialog

Step 38. Flash the HMI LED to confirm communication

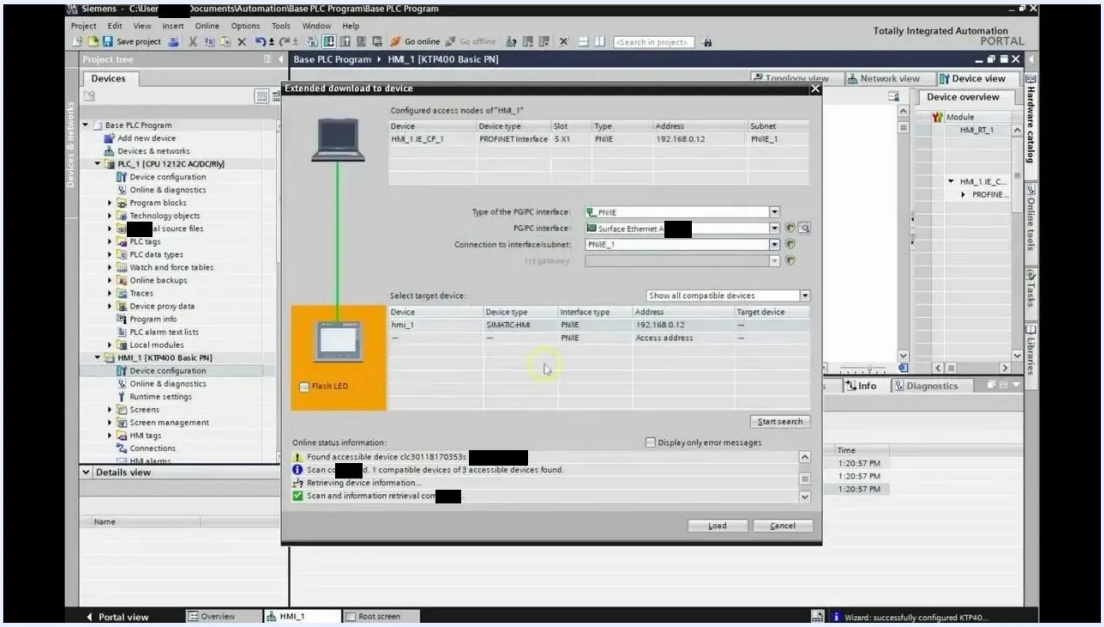
Click **Flash LED** in the dialog. Watch the physical HMI screen. It begins flashing, which indicates successful communication.



Physical SIMATIC HMI panel showing the Start Center menu while the device flashes

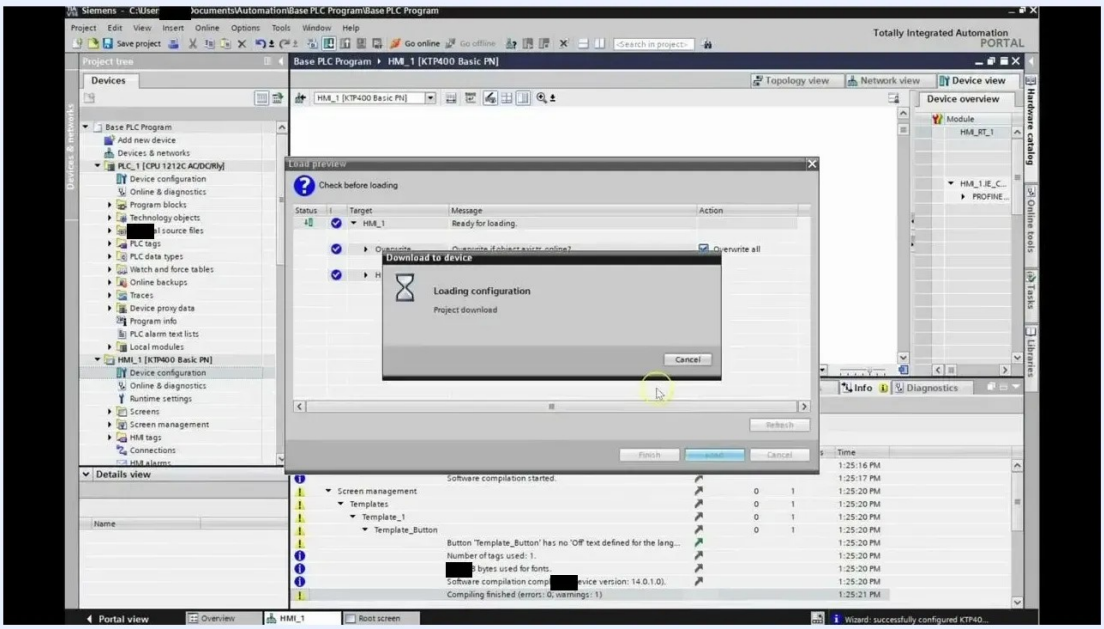
Step 39. Load the configuration to the HMI

Click **Load** to start the download.



Extended download to device dialog with the Load button highlighted

If a window asks whether to overwrite objects that exist online, select **Overwrite all**, and then click **Load** again to proceed.

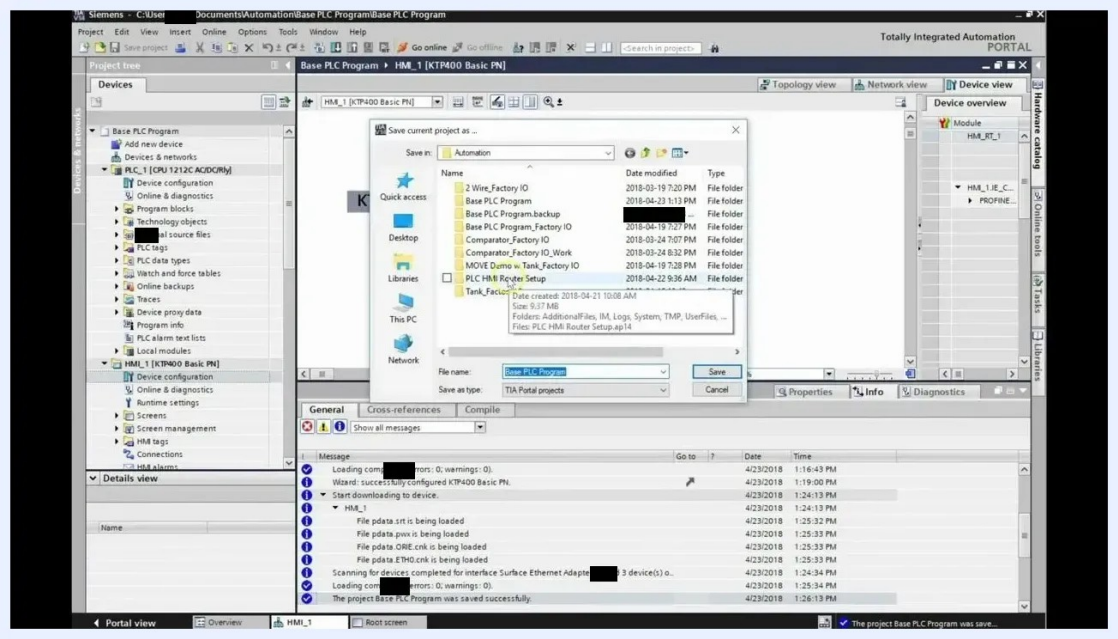


Overwrite confirmation and loading dialog showing the project download in progress

Monitor the progress dialog, which shows "Loading configuration" and "Project download," until the configuration finishes loading to the HMI device.

Step 40. Confirm the HMI shows the welcome message

The HMI shows "Root screen" and a message such as "Welcome to HMI_1 (KTP400 Basic+ PN)!" No push buttons or other controls are present yet. This result confirms only that communication is set up.

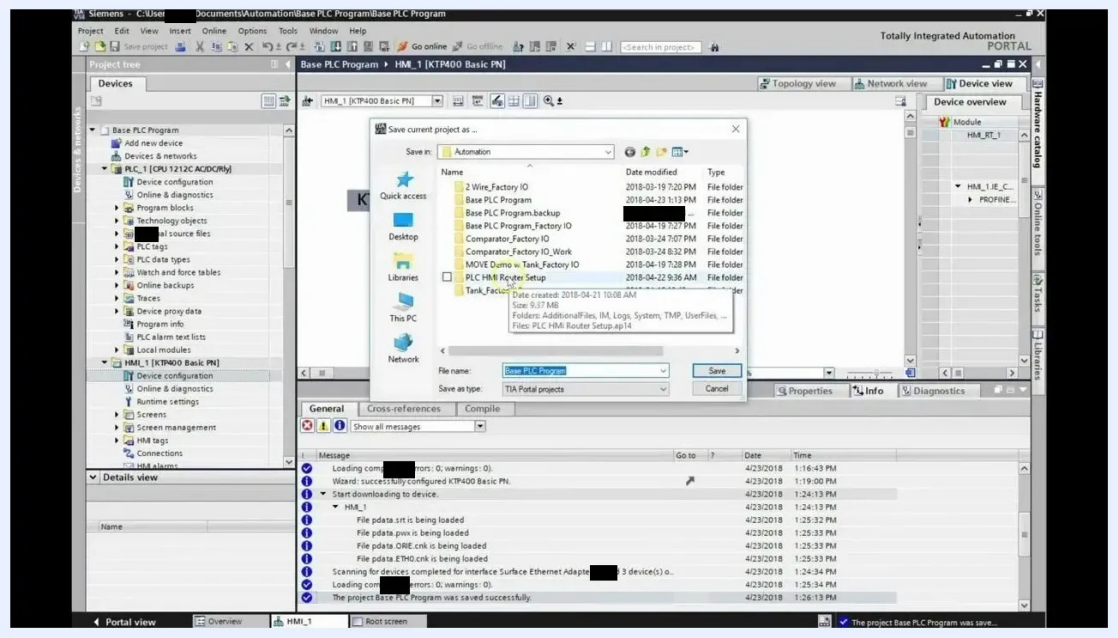


Physical SIMATIC HMI panel displaying the root screen and welcome message

Save the project in TIA Portal

Step 41. Save the project under a new name

Open the **Project** menu and select **Save as**.

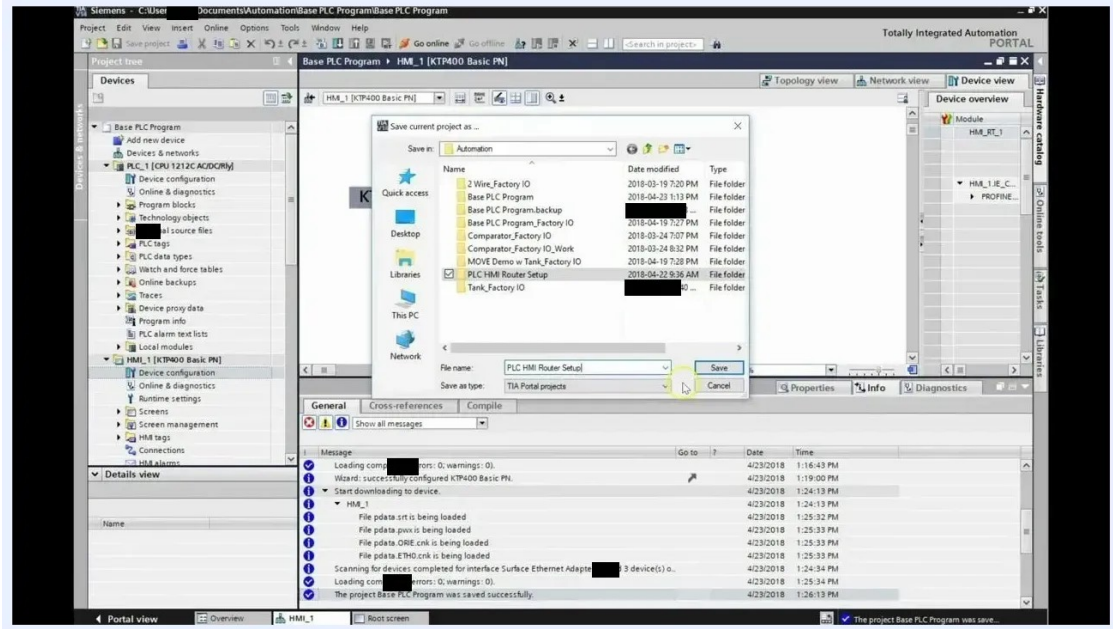


TIA Portal with the Project menu open and the Save as option highlighted

In the "Save current project as..." dialog, set the following:

- Set the file name to "PLC HMI Router Setup."
- Set the save location to the "Automation" folder.
- Make sure the file type is "TIA Portal projects."

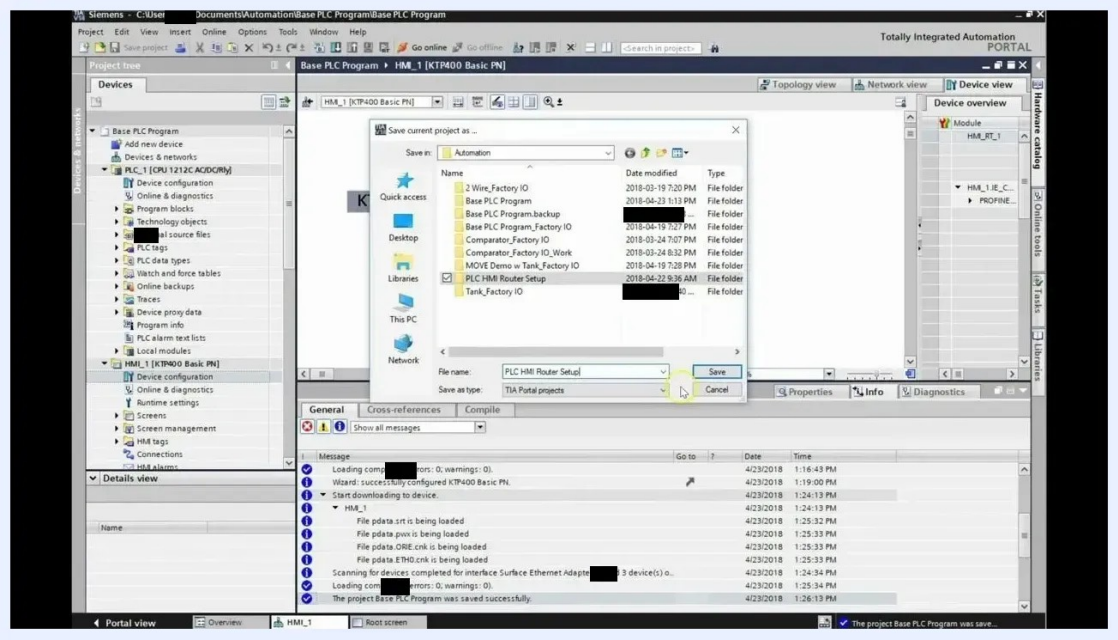
Click **Save** to complete the save.



Save current project as dialog with the file name PLC HMI Router Setup and the Save button highlighted

Step 42. Check the message log for confirmation

Check the message window at the bottom of the TIA Portal interface for status updates. Look for a message such as "The project Base PLC Program was saved..." to confirm the save. The project tree, device overview, and details view remain visible for further configuration or review.



TIA Portal message log confirming the project save, with the project tree visible

Summary

You opened your base PLC project and set the PLC's PROFINET interface and router settings. You downloaded the hardware configuration to the PLC, and added a KTP400 Basic HMI with its own IP address. You matched your PC's IPv4 settings to the same subnet and connected the PLC and HMI in the network view. Then you downloaded the HMI program in TIA Portal, confirmed the welcome message on the panel, and saved the project.

What's next

The HMI currently shows only the root screen and a welcome message, with no push buttons or other controls. Your hardware and network setup is now ready for you to edit the HMI screens or continue with further project setup.