

Configuration Instructions for the LB/FB Remote I/O System

Commissioning with Siemens TIA Portal

Manual



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Worldwide

Pepperl+Fuchs Group
Lilienthalstr. 200
68307 Mannheim
Germany
Phone: +49 621 776 - 0
E-mail: info@de.pepperl-fuchs.com

North American Headquarters

Pepperl+Fuchs Inc.
1600 Enterprise Parkway
Twinsburg, Ohio 44087
USA
Phone: +1 330 425-3555
E-mail: sales@us.pepperl-fuchs.com

Asia Headquarters

Pepperl+Fuchs Pte. Ltd.
P+F Building
18 Ayer Rajah Crescent
Singapore 139942
Phone: +65 6779-9091
E-mail: sales@sg.pepperl-fuchs.com
<https://www.pepperl-fuchs.com>

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1 Introduction

1.1 Purpose of the Instructions

These instructions describe the key TIA Portal functions that help you commission an LB/FB remote I/O system. Customer-specific adaptations are not described.

Commissioning involves the integration of an LB/FB remote I/O system into a PROFINET network and its configuration.

After configuration and parameterization, the project configuration is transferred to the control panel in a form that the control panel can understand.

Data transfer can be tested in the configured PROFINET network using watch and force tables.

1.2 Technical Basics

The plant operator is responsible for planning, commissioning, and operation.

Only trained and qualified personnel may commission and operate the product. The trained and qualified personnel must have read and understood the instructions and the other documentation.

The documentation comprises the following parts:

- These instructions
- Datasheets
- LB/FB remote I/O system hardware manual

The documentation may also comprise the following parts, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Instruction manual
- Other documents

1.3 Registered Trademarks

PROFINET®: trademark of PROFIBUS Nutzerorganisation e.V. (PNO)

SIMATIC, TIA Portal: trademarks of SIEMENS AG

1.4 Symbols Used

This document contains information that you must observe to prevent faults.

Warning messages



Caution!

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

Information messages



Note

This symbol brings important information to your attention.



Action

This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

1.5 Graphical Conventions



Note

The graphical illustrations in these instructions are provided to aid basic understanding, and may deviate from the actual design.



Note

The graphical illustrations in these instructions have been created using TIA Portal V13. You can also use later versions of the TIA Portal for commissioning.

2 User Interface Basics

Several views are available in the TIA Portal for your automation project. The views relevant for commissioning are:

- Portal view
- Project view

For further information on the views, refer to the Siemens AG user documentation.

2.1 Portal View

The portal view provides a task-oriented and object-oriented view of your project. The portal view displays the tasks (2) and objects (3) that are available for the selected portal (1). For example, the **Devices & networks** portal has a task for adding a new device. Various device types such as **Controllers** or **HMIs** are displayed in the object area (3) for this task.

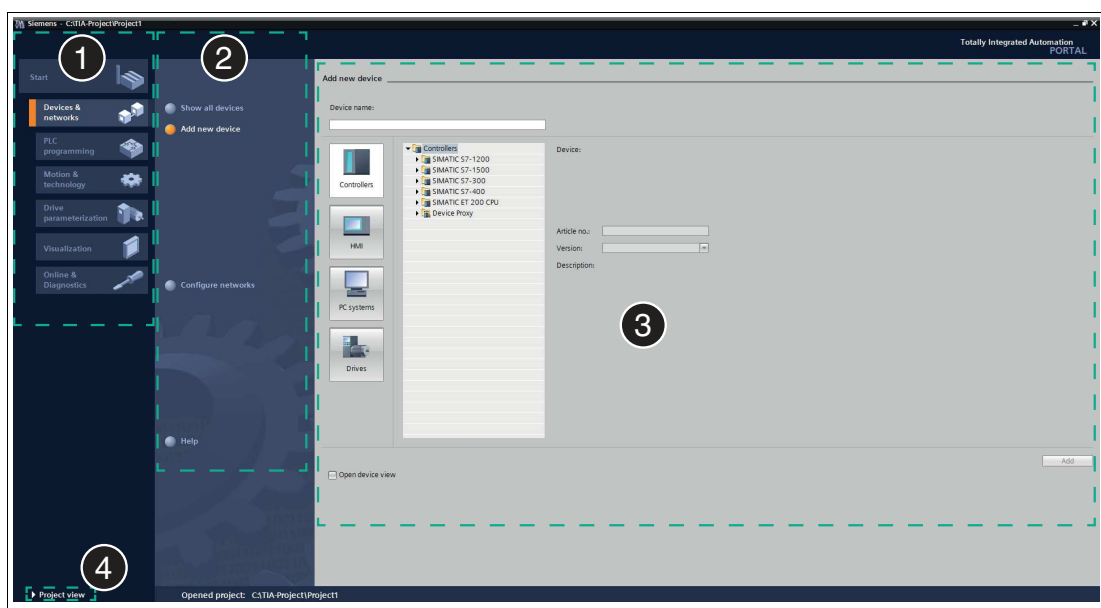


Figure 2.1 Layout of the portal view

Item	Description
1	Portal area: various tasks are available for each portal.
2	Task area: the task area shows the actions available for the selected portal.
3	Object area: the objects that can be processed using the selected action are displayed in the object area.
4	View switching area: in this area, you can switch between the portal view and the project view. So if you are in the portal view, you can click on the Project view hyperlink to switch to the project view.

2.2 Project View

The project view is an object-oriented view with several windows.

The figure below shows the project-view windows in a sample project. Different content is displayed in the different windows, as explained below.

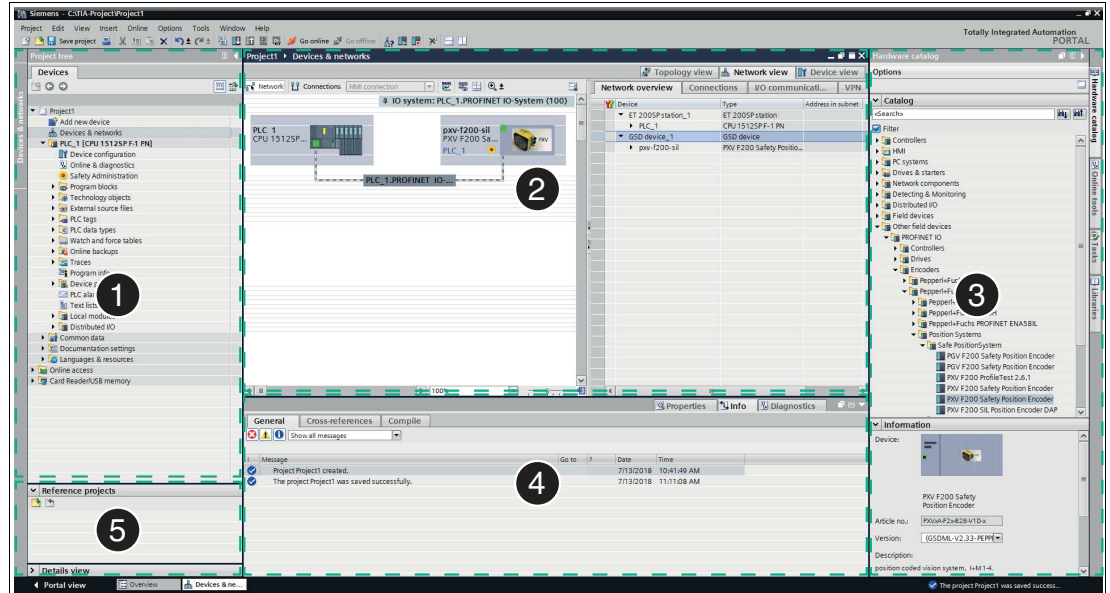


Figure 2.2 Layout of the project view

Item	Description
1	Project tree: the project tree displays the rack with the modules that have already been positioned.
2	Work area: the work area is used to configure the automation-system hardware, create the user program, and carry out project planning for the hardware.
3	Hardware catalog: the hardware catalog shows the available modules.
4	Inspection window: the inspection window displays additional information about the object selected in the work area or an action that has been performed.
5	Details window: the details window displays the contents of a selected object.

3 Commissioning the LB/FB Remote I/O System

Commissioning involves the integration of an LB/FB remote I/O system into a PROFINET network and its configuration. Commissioning also involves compiling the project configuration and transferring it to the control panel.

The following hardware components of the LB/FB remote I/O system are relevant to commissioning with the TIA Portal:

- Gateway
- I/O modules

The hardware components must be replicated in the project to configure the LB/FB remote I/O system.

The gateway is the component that communicates with the control panel. The properties must be defined to be able to configure the gateway. These properties include the device name and the IP address.

During parameterization of the channels, the measurement behavior of the I/O modules that process input signals is defined. At the same time, the behavior of the I/O modules that emit output signals is defined. In the TIA Portal, the channels are the submodules. They are available in the hardware catalog.

To commission the LB/FB remote I/O system, perform the following steps:

- Plan commissioning
- Create the project
- Integrate the control panel
- Install the GSDML file
- Configure the LB/FB remote I/O system
- Compile a project configuration
- Transfer a project configuration
- Check the connection

A description of how to perform the individual steps is provided on the following pages.

3.1 Planning of Commissioning

It is necessary to plan the commissioning of an LB/FB remote I/O system beforehand. Planning ensures that all files and information are available to enable efficient commissioning.

You will need the following files and information for commissioning:

- GSDML file
- IP address of the gateway
- Unique device name for the gateway if you do not wish to use the default name

The GSDML file is a device description file and contains all the data required for configuration in the TIA Portal and for data exchange. This makes it possible to replicate the gateway and the I/O modules in the project.

The gateway is part of the LB/FB remote I/O system and communicates with the control panel. Before it can communicate with the control panel, the gateway must be assigned an IP address and a device name. You will define the device name and IP address at a later stage of the commissioning.

3.2 Creating a New Project

After you have planned the commissioning, create a project. The control panel and hardware components of the LB/FB remote I/O system are replicated in the project.



Create the project

To create a project, proceed as follows:

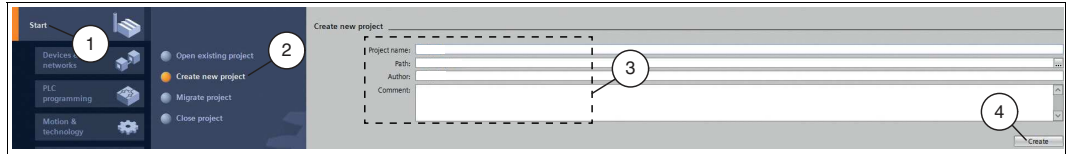


Figure 3.1 Create the project

1. Launch the TIA Portal.
2. In the portal view, select **Start** (1) > **Create new project** (2).
3. Define fields for the project (3), e.g., by entering a name for the project in the **Project name** field.
4. Use the **Create** button (4) to confirm your entry.

3.3 Adding the Control Panel to the Project

A control panel is an electronic assembly used in automation technology for open-loop and closed-loop control tasks. Using its outputs, the control panel controls the input data for an industrial process and is programmable for this purpose.

The control panel communicates with the gateway and is required for commissioning.



Integrate the control panel

To integrate the control panel, proceed as follows:

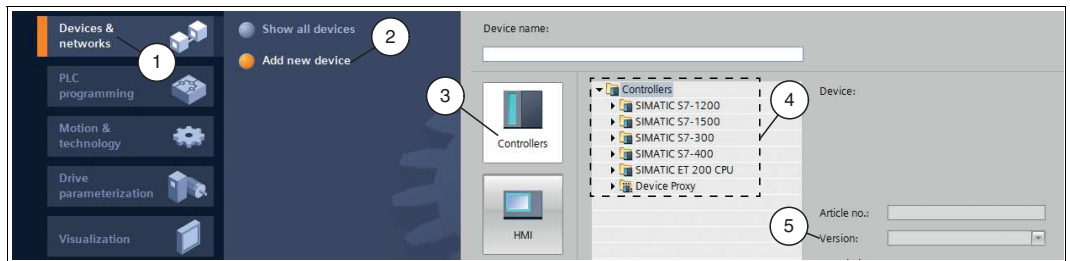


Figure 3.2 Integrate the control panel

1. In the portal view, select **Device & networks** (1) > **Add new device** (2).
2. Click the **Controllers** button (3).
3. Select your control panel from the hardware catalog (4). Make sure that you select the right firmware version of the control panel in the **Version** field (5).
4. Double-click on **Add** to add the control panel to the project.

↳ The project view opens.



Note

Now configure the control panel as required. For example, define settings for the PROFINET interface or startup/cycle behavior. Additional information can be found in the Siemens AG user documentation.

3.4 Installing the GSDML File

A device description file (GSDML file) is required to use the LB/FB remote I/O system. The GSDML file can be downloaded from our website: www.pepperl-fuchs.com. Enter the product name or item number in the **Product/Keyword** search box and click on **Search**. Select your product from the list of search results and click on the **Software** tab in the product information list. A list of all available downloads is displayed.



Install the GSDML file

To install the GSDML file, proceed as follows:

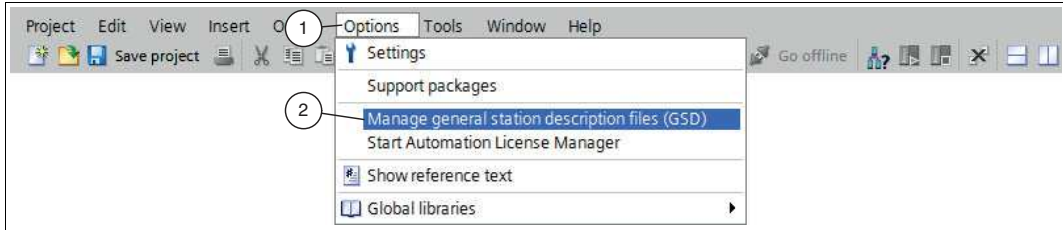


Figure 3.3 GSDML file

1. Select **Options** (1) > **Manage general station description files (GSD)** (2).

↳ The **Manage general station description files** window opens.

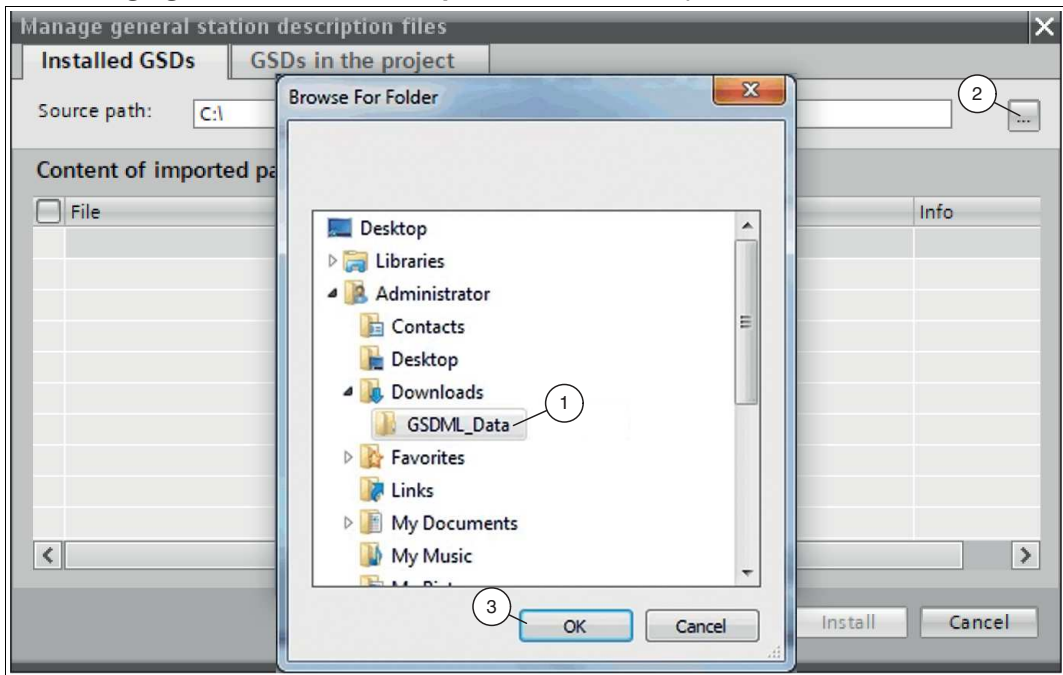


Figure 3.4 Search for GSDML file

2. Click on the **Browse** button (2) to search for the GSDML file on your computer.
3. Select the folder containing the GSDML file (1).
4. Click on **OK** (3) to confirm your selection.

↳ All the GSDML files in the selected folder are displayed in the list.

5. Select the relevant GSDML file by checking the box to the left of the file name.
6. Click the **Install** button.

↳ The installation process starts automatically and may take a few minutes.

↳ Once the file is installed successfully, the system issues a notification that installation was successful. Close this window. The device data—such as gateway and I/O modules—is loaded into the hardware catalog. The project view opens in the work area without a selection being made.

3.5 Configuring the LB/FB Remote I/O System

The hardware components of the LB/FB remote I/O system are replicated in the project to guarantee communication between the control panel and the LB/FB remote I/O system.



Note

Ensure that the project is in offline mode. Otherwise, it will not be possible to replicate the hardware components.

3.5.1 Gateway Integration

The gateway forms part of the LB/FB remote I/O system and handles communication with the control panel. Establish a connection with the control panel to enable this communication.



Integrating the gateway

To integrate the gateway and connect it to the control panel, proceed as follows:

1. In the project tree, right-click on the control panel and select **Go to network view**.

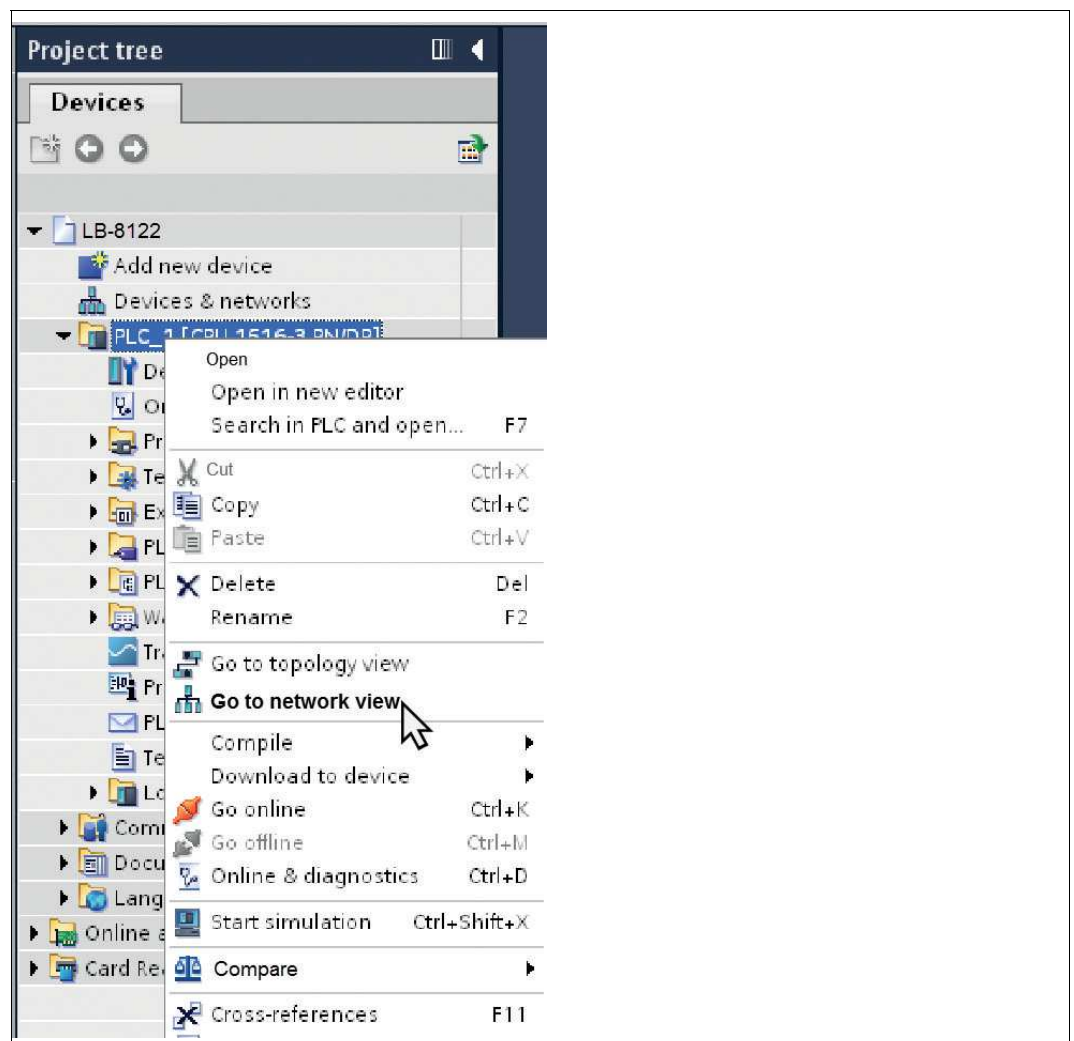


Figure 3.5 Select network view

- ↳ The **Network view** opens in the work area.
2. Open the hardware catalog and navigate through the tree structure (1) to your gateway.
 3. Select the gateway (2 or 3) from the hardware catalog (1) and drag and drop it into the network view (4).

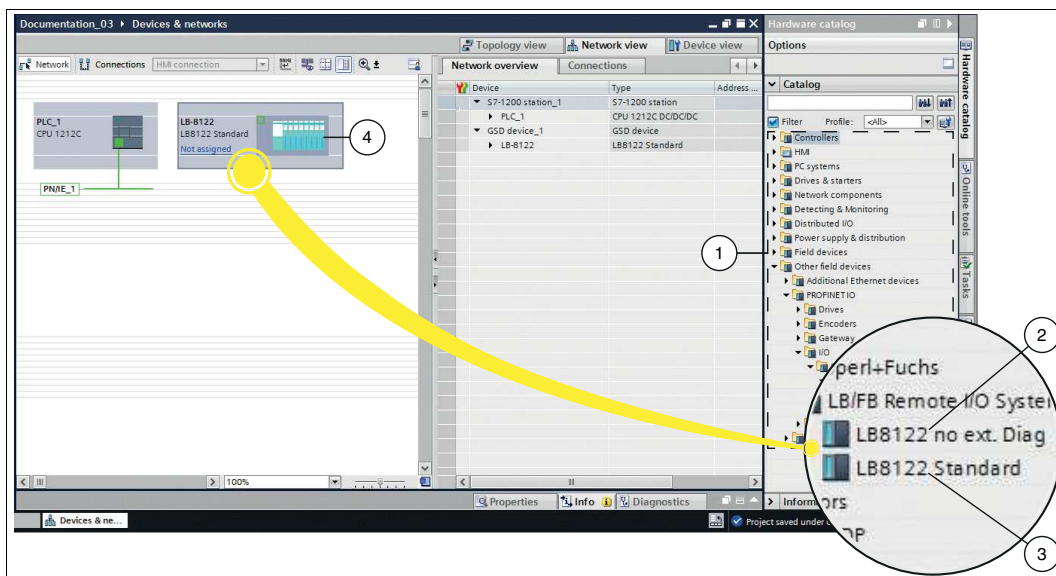


Figure 3.6 Integrate gateway



Note

Does your control panel support extended PROFINET diagnostics?

Some older control panels do not support "extended diagnostics." There are two modules in the GSDML file to enable you to work with all control panels:

- **LB8122 no ext. Diag (2):** Use this module for your project planning if you are using older control panels that do not support "extended PROFINET diagnostics."
- **LB8122 Standard (3):** Use this module for your project planning if you are using control panels that support "extended PROFINET diagnostics."

An overview of which PROFINET control panels support extended PROFINET diagnostics can be found on the respective website of the manufacturer.

- ↳ Your gateway is displayed in the network view window (4).

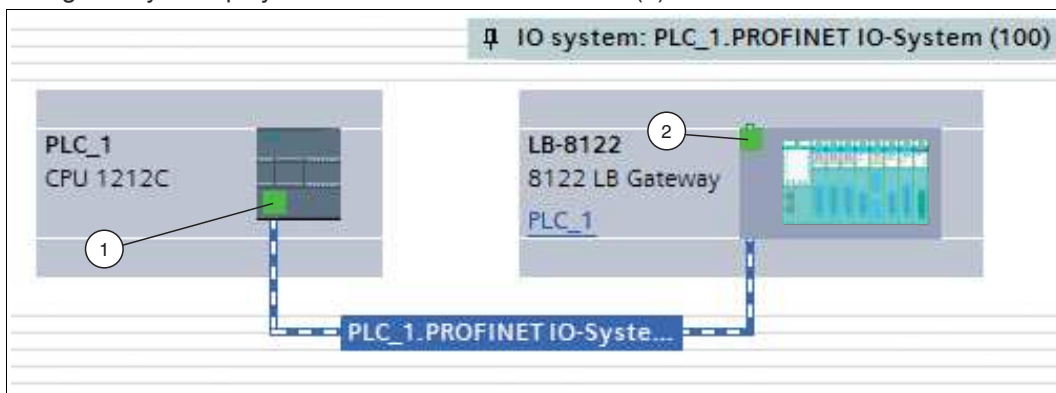


Figure 3.7 Connect gateway to control panel

4. To connect the gateway to the control panel, proceed as follows:
 1. Click the green PROFINET interface (1) for the control panel and do not let go of the mouse

button.

2. Drag the line to the PROFINET interface (2) on the gateway.
3. Release the mouse button.

↳ The gateway is now connected to the control panel.

3.5.2 Gateway Configuration

For the gateway to be addressed as a participant in the PROFINET network, the following parameters are required:

Gateway name

In the PROFINET IO system, each device has a unique device name (symbolic name). In the configuration program, the device name can be automatically assigned using the device name from the GSDML file and a sequential number.

IP addresses

Each PROFINET device must have an IP network address to establish an application relationship. There are a number of ways to manage these network IP addresses:

- **Configuration during project planning**
During project planning of the LB/FB remote I/O system, a range of network addresses is made available to the configuration program. The configuration program assigns an IP address to the control panel and the gateway. During system configuration, the control panel receives a list of IP addresses and assigns these to the individual gateways during initialization of the application relationships.
- **Management by a DHCP server**
If the IP addresses are managed by a DHCP server, the IP addresses are requested independently by the individual gateways. When the application relationship is established, the control panel addresses the gateway using its name to access the IP address assigned to it.
- **Fixed setting**
In principle, the network administrator can manage IP addresses manually using the DCP (Dynamic Configuration Protocol) or a local interface on the field device. This approach makes it difficult to replace devices as the IP addresses always have to be reentered.

Media Redundancy Protocol (MRP)

You can create a redundant PROFINET communication with the gateways by using a ring topology. An MRP redundancy manager closes and opens the ring when needed, detects individual failures and, in the case of a fault, sends the data packets via the redundant path.

The following requirements must be met in order to use MRP:

- All devices must support MRP.
- MRP must be configured on all devices.
- All devices must have MRP-capable switches.
- One device (e.g., SPS) must be configured as the ring manager.
- The gateways must be configured as clients.
- The watchdog time for the cyclic data traffic must at least cover the time that the MRP function requires for troubleshooting (watchdog time \geq 256 ms).



Configuring the gateway

To configure the gateway, proceed as follows:

1. In the **Devices and networks** window, switch to the **Device view** tab (1).
2. Select your gateway from the drop-down list (3). In this example, the gateway is called "gateway" (2).

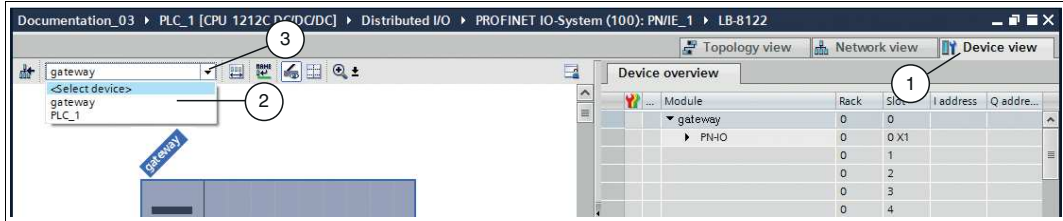


Figure 3.8 Select gateway

↳ The gateway properties appear in the inspection window.

3. Open the tabs **Properties** (1) > **General** (5).
4. Click on the **General** tree node (4).

↳ The **General** input screen opens.

5. In the **Name** input field (2), define a unique gateway name.
6. Click on the **Ethernet addresses** subtree node (3).

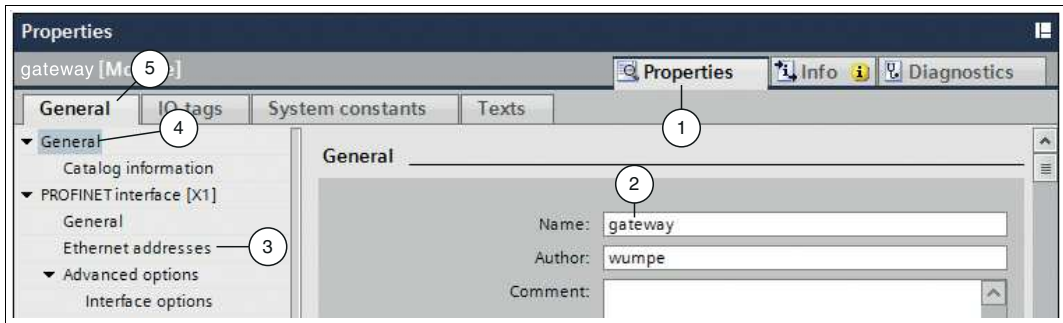


Figure 3.9 Gateway properties in the inspection window

7. Select the **Use IP protocol** check box (4) then click on one of the following options:
 - **IP address is set directly at the device** (3): the control panel uses the same IP address as the gateway. The gateway receives an IP address in one of two ways:
 - An external DHCP server assigns an IP address to the gateway.
 - A user assigns an IP address to the gateway via the user display.
 - **Set IP address in the project** (1): you define the IP address in the project. Make an entry in the **IP address** field (2).

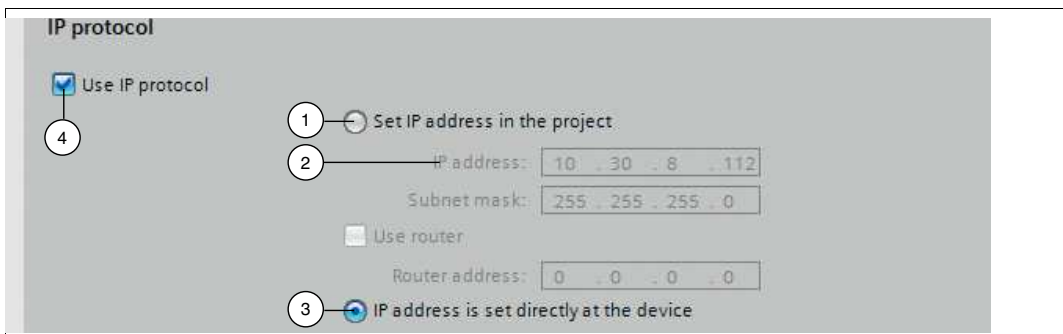


Figure 3.10 Assign IP address

8. Right-click on the gateway (1) in the device view.
↳ The context menu opens.
9. Select **Assign device name** (2).

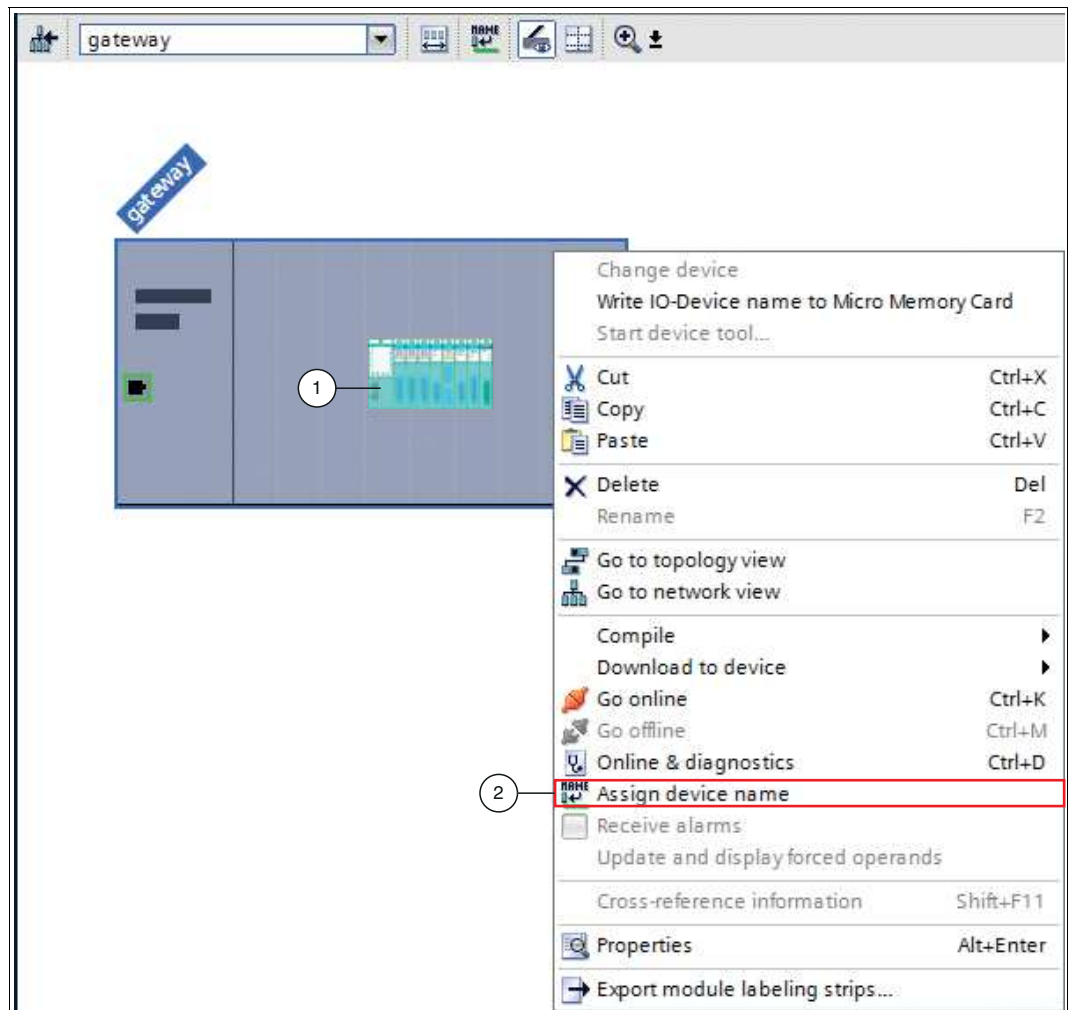


Figure 3.11 Assign gateway name

↳ The **Assign PROFINET device name** window opens.

10. Select the altered gateway name from the **PROFINET device name** drop-down list (1).
11. Connect to the PROFINET network using the two drop-down lists (2) under **Online access**.
12. Confirm your entry by clicking on **Update list** (3).

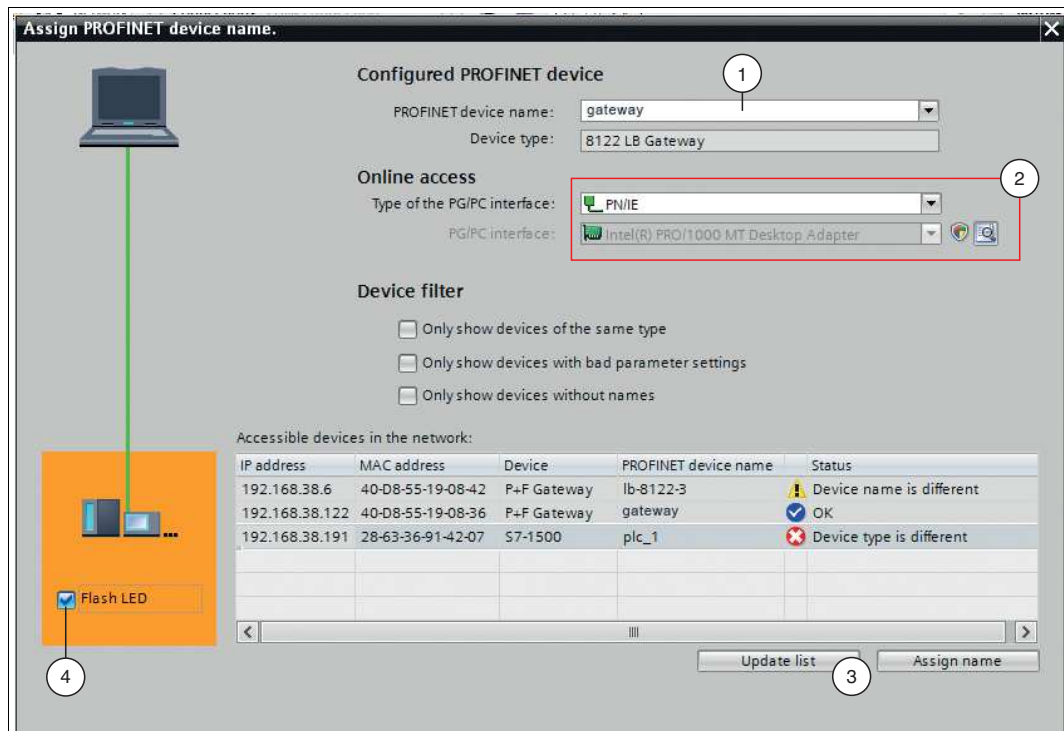


Figure 3.12 Gateway name settings

↳ All devices available on the network are displayed.



Tip

Performing an LED flash test

To perform a flash test for the selected control panel in the PROFINET network, activate the **Flash LED** check box (4). This feature is useful if, for example, multiple control panels are connected to the PROFINET network. It allows you to ensure that you have selected the right control panel.

13. In the network list (**Accessible devices in the network**), click on the gateway with the assigned gateway name (4). Doing so assigns the gateway in the project to the gateway found in the network.
14. Confirm your selection by clicking **Assign name** (2).
 - ↳ A blue check mark (1) appears in the network list next to the assigned gateway name.
15. Close the window by clicking on **Close** (3).

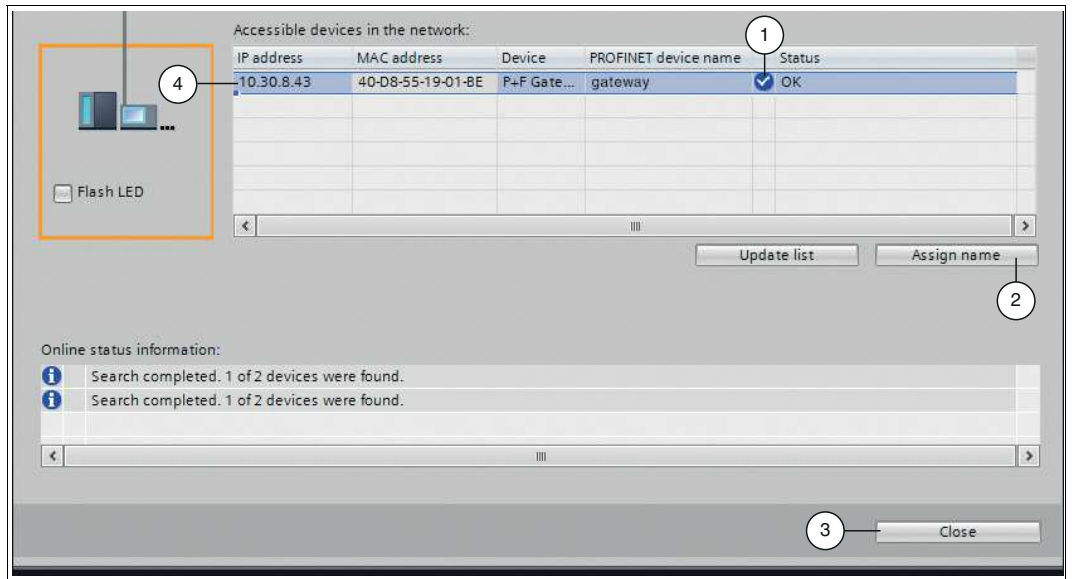


Figure 3.13 Confirm gateway name



MRP ring configuration

The following figures show how to set up an LB/FB remote I/O system for MRP ring configuration.

1. Select "Device view" and the desired module.
2. In the "General" (1) tab, select "Advanced options > Media redundancy" (2). Set the "Media redundancy role" option to "Client" (3).

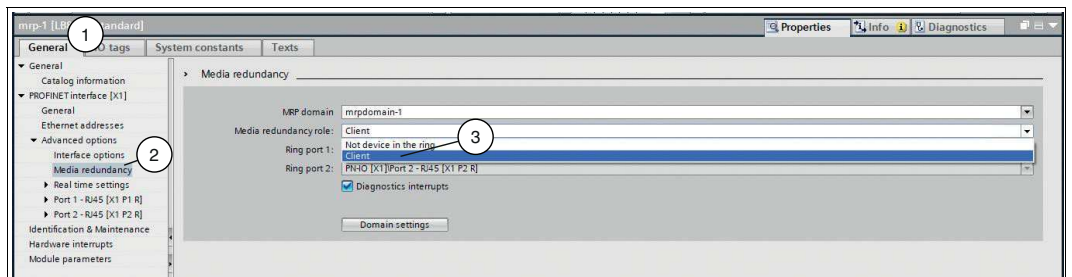


Figure 3.14 Media redundancy

3. Select the "Topology view" tab (1). Here, you can plan the ring topology in accordance with your plant. To do so, use the mouse to connect the corresponding Ethernet ports, by clicking on the desired port x, holding down the left mouse button, and moving the cursor to port y. Release the mouse button.

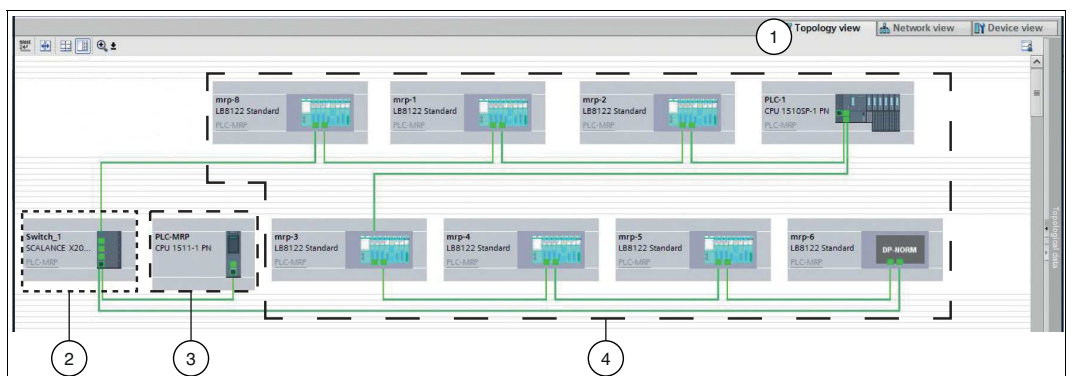


Figure 3.15 Ring topology example

- 1 "Topology view" tab
 - 2 MRP ring manager
 - 3 PROFINET control panel (not in the MRP ring)
 - 4 PROFINET devices that are configured as MRP clients
4. Check the "Watchdog time" (3) by going to the "General" (1) tab and selecting "Advanced options > Real time settings" (2).
 5. Reset the "Watchdog time" (3) if necessary (to at least 256 ms).

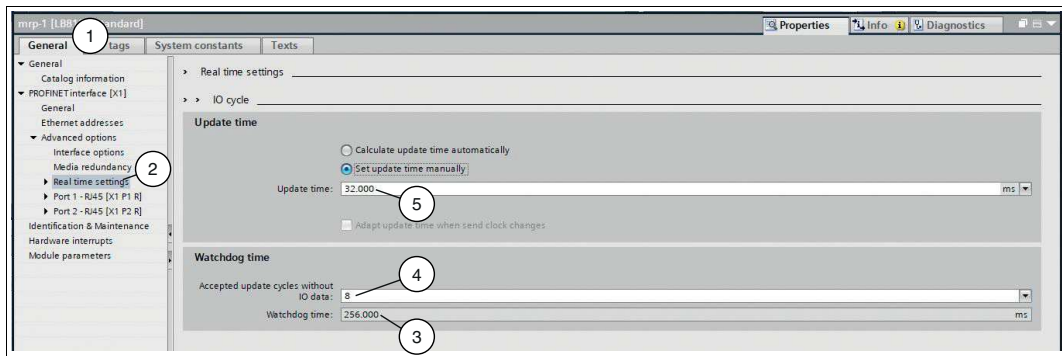


Figure 3.16 "Watchdog time"



Note

The "**Watchdog time**" (3) is calculated from the "**Update time**" (5) multiplied by "**Accepted update cycles without IO data**" (4).

If, as in this example, eight cycles are accepted without IO data, the resulting watchdog time is 256 ms.



Note

MRP ring manager

One device must be configured as the ring manager. For instructions, refer to the documentation of the relevant manufacturer.

3.5.3 Integrating the I/O Modules

The I/O modules form part of the LB/FB remote I/O system. I/O modules are used to record measured values and to output signals for process intervention purposes.

The configuration example in these instructions replicates the following hardware arrangement of an LB/FB remote I/O system:

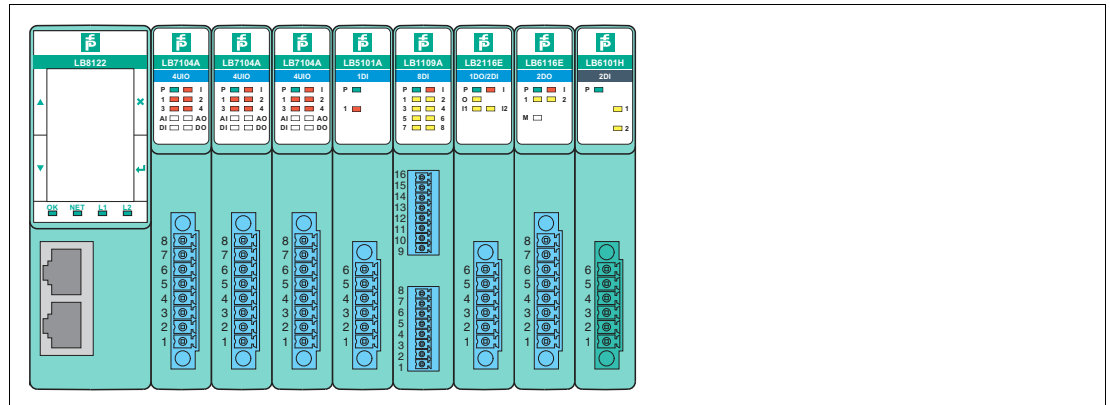


Figure 3.17 Sample hardware configuration with LB Remote I/O System (FB Remote I/O System analog)

- LB8122*/FB8222* Gateway
- LB7104*/FB7204* Universal input/output (HART)
- LB7104*/FB7204* Universal input/output (HART)
- LB7104*/FB7204* Universal input/output (HART)
- LB5102*/FB5202* RTD signal converter input
- LB1109*/FB1209* Digital input
- LB2116*/FB2216* Digital output with position feedback
- LB6116*/FB6216* Digital output with shutdown input
- LB6101*/FB6301* Relay output

To integrate the I/O modules into the project, drag and drop them into the table in the project **Device overview**.

The following rules apply when integrating the I/O modules:

- When you drag an I/O module into the table, the TIA Portal automatically assigns an address range to the I/O module. The address assignment size (e.g., 2 bytes) is determined by the TIA Portal using the GSDML file.
- The **Slot** column in the **Device overview** represents the physical slot on the backplane. The **I address** column represents the address assignment of the input channel, and the **Q address** column represents the address assignment of the output channel.
- One channel of an I/O module is represented by one submodule in the TIA Portal. The functions of an I/O module can be specified by subordinating one or more submodules to an I/O module. For example, if the I/O module is to process 5x05 millivolt signals, assign the submodule **MV user defined** to it.
- The I/O modules are organized by type in the hardware catalog in the **Module** section. The channels of the I/O modules are organized in the hardware catalog in the **Submodules** section.

A distinction is made between two different I/O module groups:

- I/O modules with fixed preassigned input channels or output channels, e.g., 6x01 relay output. The channels (submodules) of these I/O modules cannot be removed from the device overview. The submodules of this I/O module group are not listed in the hardware catalog.

- I/O modules without fixed default input channels or output channels, e.g., 5x05 thermocouple signal converter. These I/O modules are not assigned predefined channels (submodules). The preassigned submodules can be removed from the device overview and other submodules from the hardware catalog suitable for the I/O module can be used.
- Wide I/O modules take up two slots on the backplane. The TIA Portal does not identify wide I/O modules by itself. If you drag a wide I/O module into the project, leave the slot below empty.



Integrate I/O modules

To integrate the I/O modules, proceed as follows:

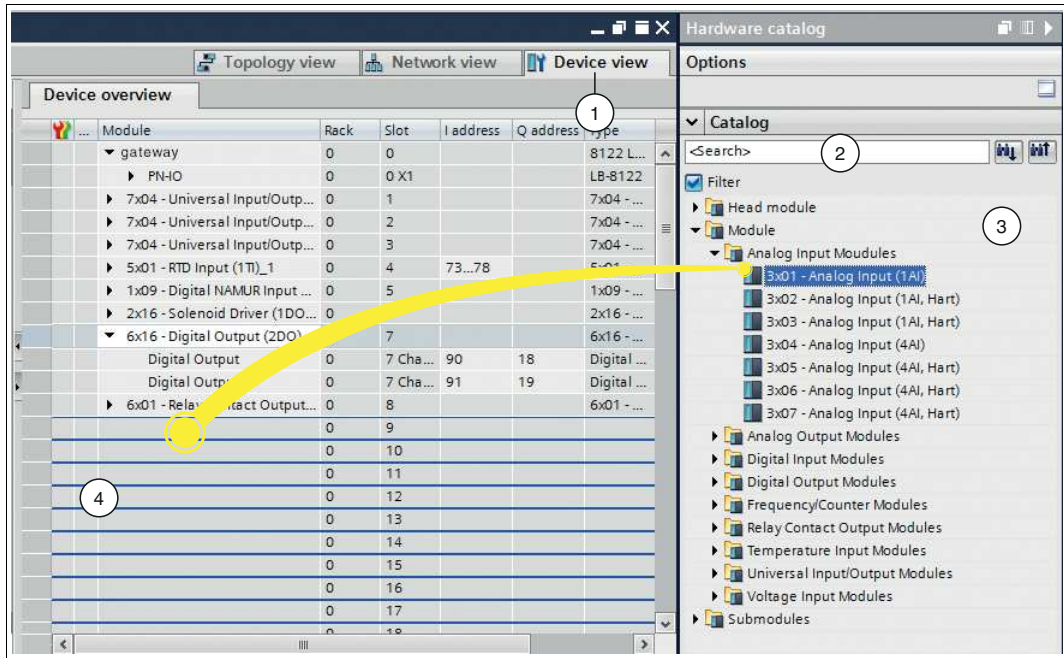


Figure 3.18 Integrate I/O modules

1. Switch to the **Devices and networks** window on the **Device view** tab (1).
2. Select your I/O module from the hardware catalog (3) and drag and drop the module into the device overview (4).



Note

Important information for the integration

Integrate the I/O modules in exactly the same order as on the backplane. The 1st I/O module is located on the right-hand side of the backplane next to the gateway slot/gateway slots. Drag the 1st I/O module in the **Device overview** for the project to the 1st position below the gateway(s) in the table (to Slot 1).



Note

In the search field (2) of the hardware catalog, you can enter the name of the I/O module instead of navigating to the I/O module.

↳ The I/O module is automatically assigned an address range.

3.5.4 Parameterizing Submodules

A submodule represents a channel in an I/O module and determines the function performed by an I/O module.

During parameterization of the submodules, you define the measuring behavior of the I/O modules that process input signals. Measurement limits are also specified during parameterization. If values exceed or fail to reach these measurement limits, the gateway sends an alarm to the control panel.

During parameterization, you also define the behavior of I/O modules that emit output signals. These output signals affect the process.



Parameterize submodules

To parameterize a submodule, proceed as follows:

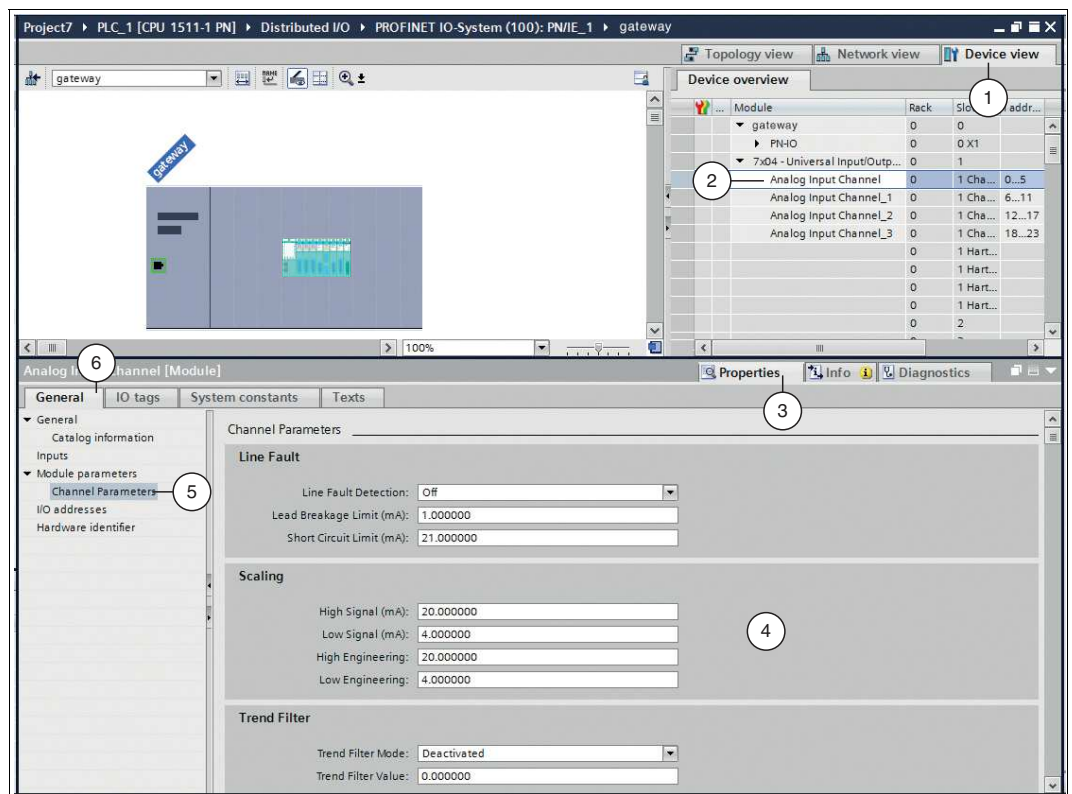


Figure 3.19 Parameterize submodules

1. In the **Devices and networks** window of the project view, select the **Device view** tab (1).
2. Within an I/O module, click on a submodule (2) that you want to parameterize.
3. In the inspection window, click on the tabs **Properties** (3) > **General** (6).
4. Click on the **Channel Parameters** subtree node (5).
5. Define the parameters on the right-hand side of the window (4).

3.6 Compiling the Project Configuration

The project configuration must be compiled before it is transferred to the control panel. During compilation, the project configuration is converted such that it can be read by the control panel.



Compile a project configuration

To compile the project configuration, proceed as follows:

1. Click in the project tree on the left-hand side of your project.
2. Select **Edit (1) > Compile (2)**.

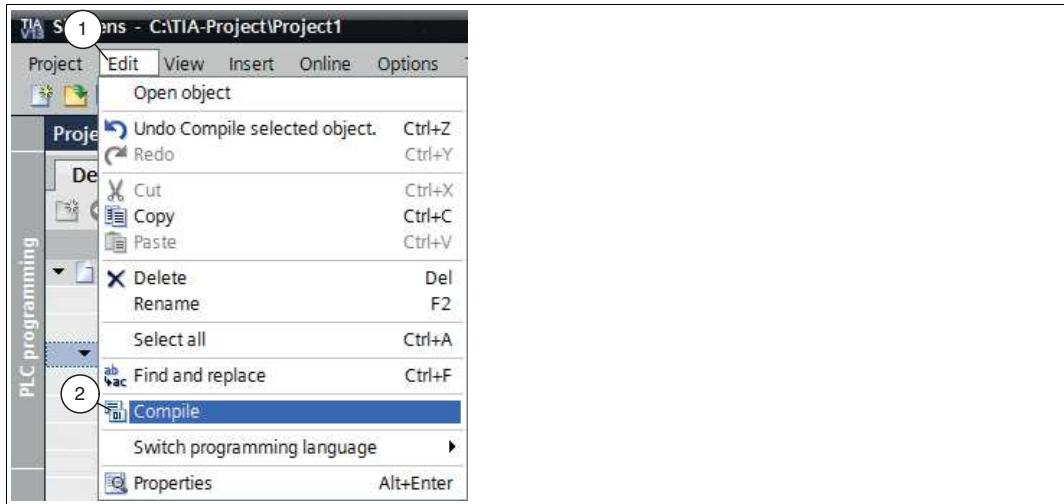


Figure 3.20 Compile a project configuration

↳ The compilation process starts and can be monitored in the inspection window via tabs **Info > Compile**. The compilation must be completed without errors to be able to transfer a functional program to the control panel.

3.7 Loading the Project Configuration

Once you have configured the control panel and the LB/FB remote I/O system in the project and you have compiled the project configuration, you can transfer the product configuration to the control panel. This provides the control panel with all the settings and data for data exchange.



Transfer a project configuration

To transfer the project configuration to the control panel, proceed as follows:

1. Open your project from the project tree.
2. Select **Online (1) > Download to device (2)**.

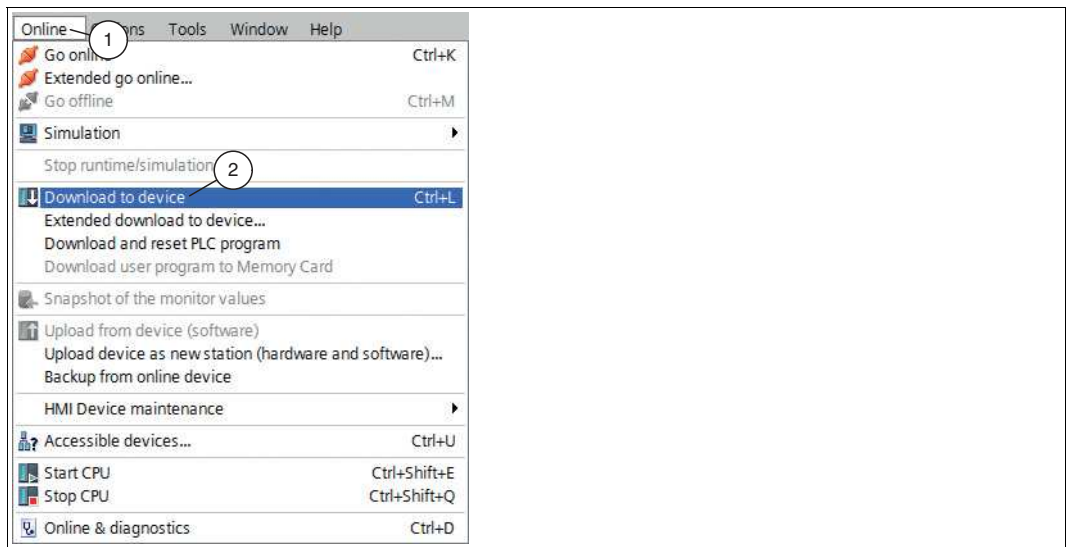


Figure 3.21 Transfer a project configuration

↳ The **Load preview** dialog box opens.

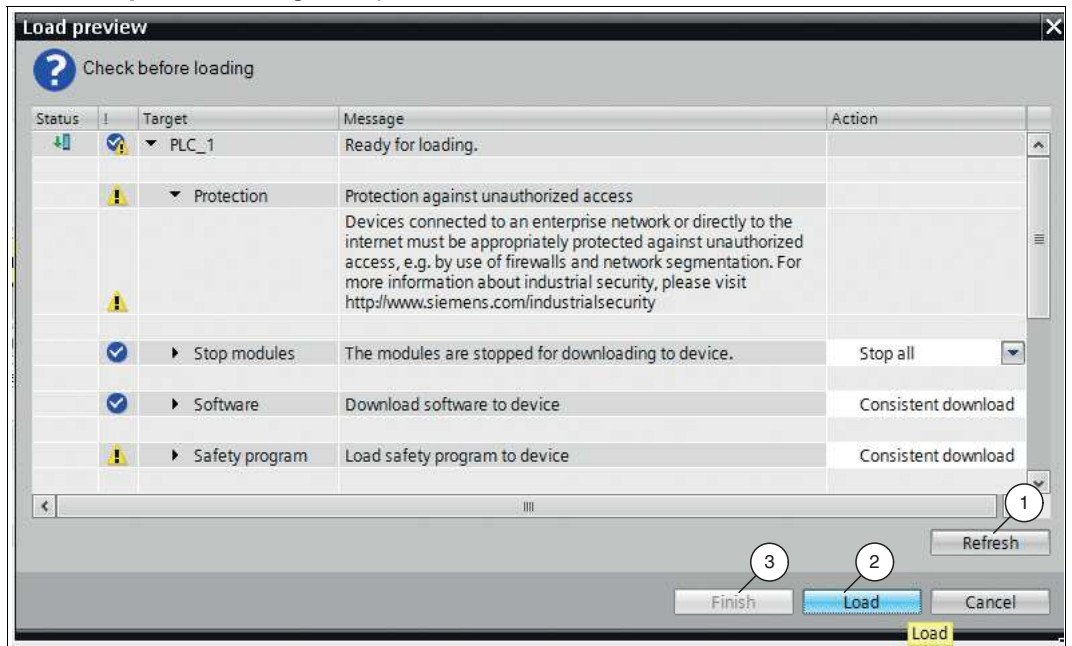


Figure 3.22 Load preview dialog box

3. Check the messages in the dialog box. If all the conditions are met, proceed to the next step. If not, correct the errors and repeat the loading procedure by clicking the **Refresh** button (1).

4. Click the **Load** button (2).
↳ The project configuration is transferred to the control panel.
5. When the transfer is complete, click the **Finish** button (3).

3.8 Checking the Connection

It is possible to check the connection between the control panel and the LB/FB remote I/O system to guarantee fault-free communications between the two.

Check the connection

To check the connection, proceed as follows:

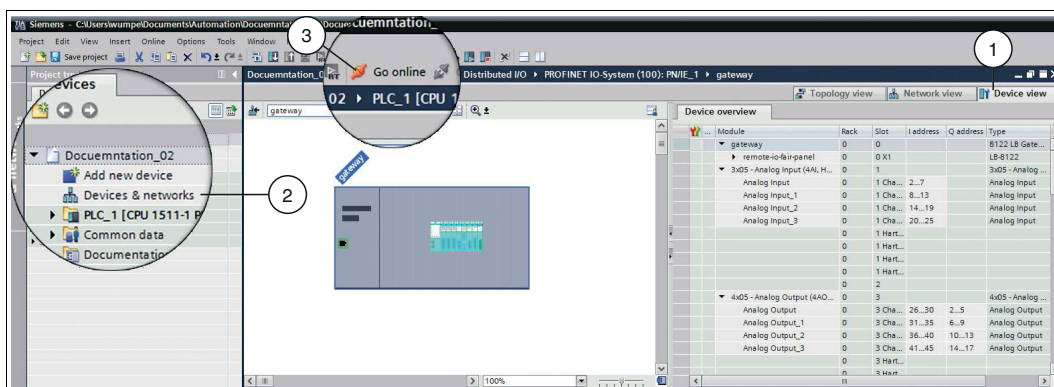


Figure 3.23 Check the connection

1. In the project tree, double-click on **Devices & networks** (2).
2. In the project view, click on the **Device view** tab (1).
3. Click on the **Go online** button (3).

↳ A connection to the control panel is established.

If the TIA Portal detects one or more faults in the PROFINET network or in the project, the TIA Portal displays the faults in the inspection window under **Diagnostics > Diagnostics information**. Further information on diagnostics can be found in the next chapter (see chapter 4).

If no fault has occurred, the connection is working properly and it is possible to exchange data. The transfer of data can be tested in the next step (see chapter 5).

4 Diagnosis

You can use the integrated diagnostics in the TIA Portal to detect faults. The diagnostics can only be accessed in online mode.

The gateway detects faults on the following components:

- Backplane
- Gateway
- I/O module
- Channel
- Power supply

Cyclic and acyclic data traffic

If the gateway detects a fault, it transmits fault data and diagnostic data via cyclic and acyclic data traffic. The gateway transmits fault bits and alarm bits via cyclic data traffic. The gateway uses the PROFINET alarm function via acyclic data traffic. Alarms are reported when events in the LB/FB remote I/O system or in the process occur and disappear again.

The following alarm types are sent via acyclic data traffic:

- **Diagnostic alarms**

Diagnostic alarms relate to faults in LB/FB remote I/O system components, e.g., wire break on one of the channels.

Diagnostic alarms are transmitted with one of the following priorities: "Fault," "Maintenance required," or "Maintenance demanded." "Fault" has the highest priority.

- **Process alarms**

Process alarms relate to measured values in the process. The limits of measuring ranges are defined during parameterization of the channels (submodules) in the TIA Portal. For example, it is possible to define that the gateway should report a process alarm to the control panel if the measured value of a temperature sensor exceeds 30 °C. For more information about the parameterization of I/O modules, see chapter 3.5.4.

- **Pull alarms**

The gateway transmits pull alarms when an I/O module is pulled out of the backplane.

- **Plug alarms**

The gateway transmits plug alarms if an I/O module is plugged into the backplane.

Alarms are generated by the gateway and reported to the control panel. If the gateway reports an alarm, the alarm is always acknowledged by the control panel. Organization blocks (OB) are available in the TIA Portal for further processing of alarms. The organization blocks are triggered by alarms. For more information about organization blocks, refer to the Siemens AG user documentation.

If you are connecting the TIA Portal to the PROFINET network, you can access diagnostic information about faults online.

The following figure illustrates cyclic and acyclic data traffic.

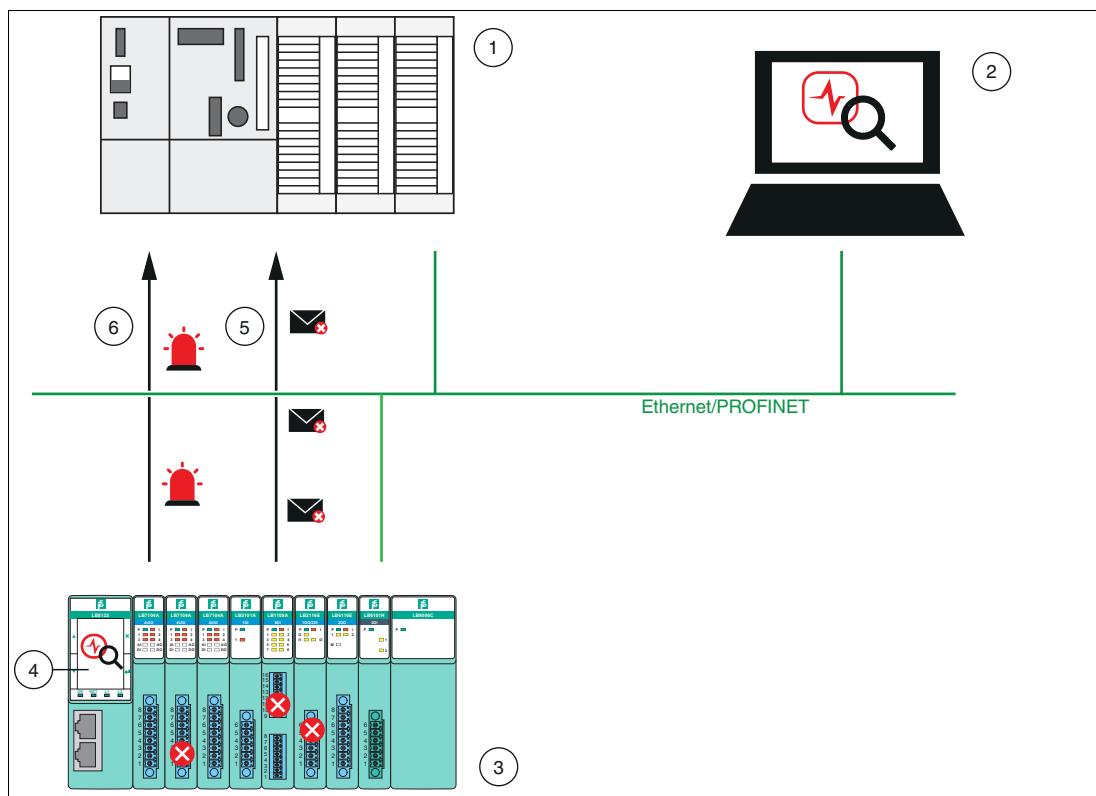


Figure 4.1 Diagnostic information

Item	Description
1	Control panel
2	TIA Portal
3	LB/FB remote I/O system
4	Gateway diagnosis
5	Cyclic data: fault bits and alarm bits
6	Acyclic data: alarms

This chapter describes only the diagnostics that are available in the TIA Portal.

For further information about fault bits and alarm bits in the cyclic data and the diagnostic data that you can access in the gateway, refer to the software manual for the PROFINET gateway.

4.1 Device View

In online mode, the device view provides a quick overview of the structure and status of the LB/FB remote I/O system. The colors and symbols indicate the severity of a fault. For example, serious faults are displayed as a white wrench on a red background. A white check mark on a green background indicates that no fault has occurred.

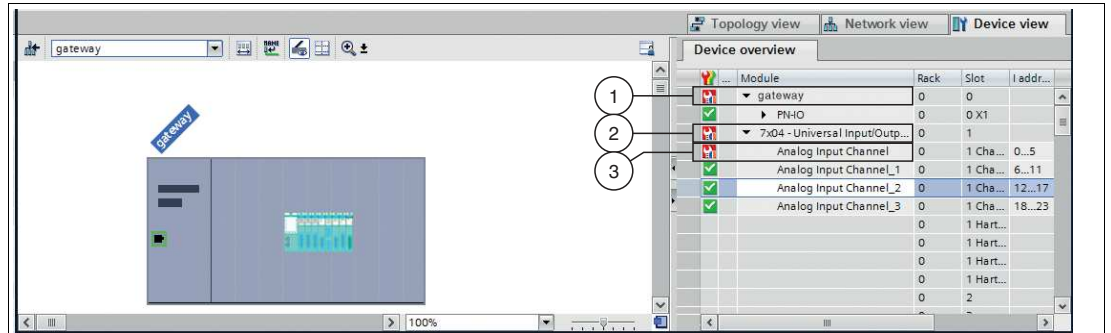


Figure 4.2 Device view

Item	Fault
1	Fault at gateway level
2	Fault at module level
3	Fault at channel level

Further information about the faults can be obtained from the diagnostic status and alarms. Further information about the diagnostic status and alarms can be found on the following pages.

4.2 Diagnostic Status

If diagnostic information is available, it is displayed in the diagnostic status. The diagnostic status can indicate faults on the backplane, the gateway, or a power supply.



Access diagnostic status

To access the diagnostic status, proceed as follows:

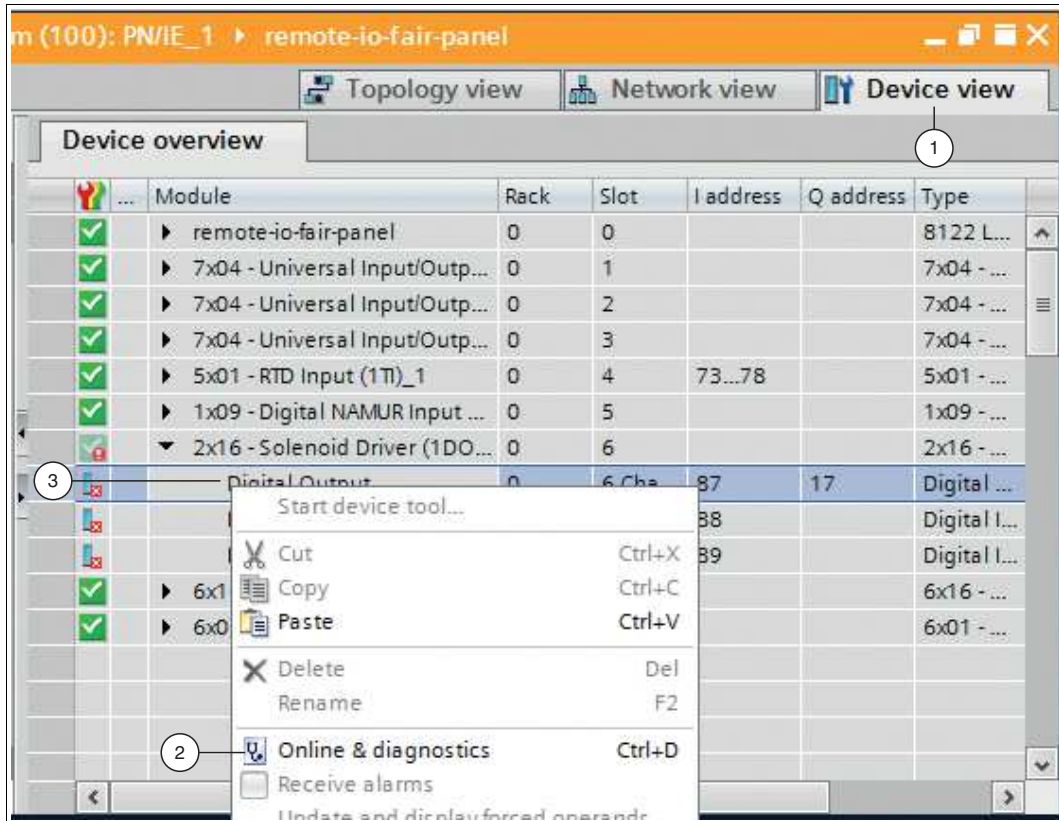


Figure 4.3 Access diagnostic status

1. Ensure that you are in the project view.
2. Switch to the device view by clicking on the **Device view** tab (1).
3. Right-click on the component where the fault has occurred (3).
↳ The context menu opens.
4. From the context menu, select **Online & Diagnostics** (2).
↳ The diagnostics dialog box opens.

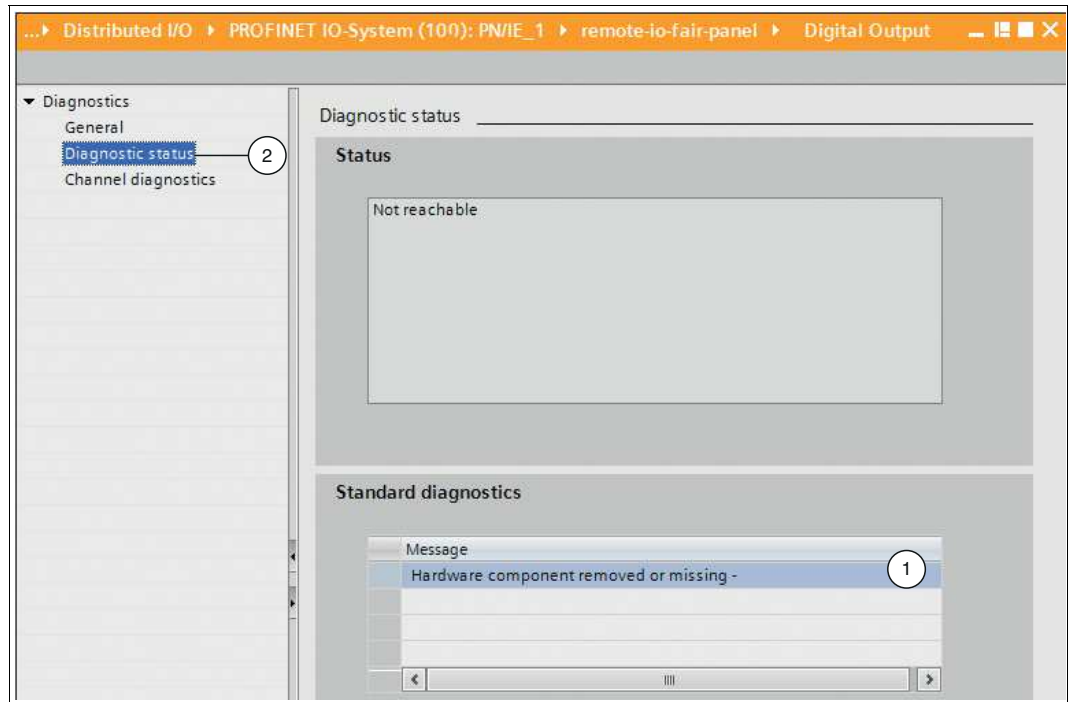


Figure 4.4 Diagnostics dialog box

5. On the left-hand side of the dialog box window, click on the **Diagnostic status** subtree node (2).
↳ Details of the fault are displayed in the message box (1) below the **Standard diagnostics** heading.

4.3 Alarms

Alarms are part of the acyclic data traffic and are used to report events in the process or in the LB/FB remote I/O system. A distinction is made between the following alarm types: diagnostic, process, pull, and plug. Diagnostic alarms are transmitted with different priorities.

The following table includes all the alarms supported by the LB/FB remote I/O system. Refer to the software manual for the PROFINET gateway for comprehensive information on which alarms are supported by the relevant I/O module.

Alarm	Alarm type	Priority	Description
Line fault (Error type 257)	Diagnostic alarm	Fault	A lead breakage or a short circuit is present.
Open wire (Error type 6)	Diagnostic alarm	Fault	A lead breakage is present.
Short circuit (Error type 1)	Diagnostic alarm	Fault	A short circuit is present.
Roll over (Error type 259)	Process alarm	–	The counter limit has been reached and the counter is automatically reset.
Roll under (Error type 260)	Process alarm	–	Zero crossing of the counter value has taken place.
Over range (Error type 7)	<ul style="list-style-type: none"> Analog output: process alarm Analog input: diagnostic alarm 	Maintenance demanded	The measured value has exceeded the upper limit of the permitted measuring range.
Under range (Error type 8)	<ul style="list-style-type: none"> Analog output: process alarm Analog input: diagnostic alarm 	Maintenance demanded	The measured value has fallen below the lower limit of the permitted measuring range.
Low low alarm (Error type 264)	Process alarm	–	The measured value has fallen below the limit defined in the Low Low Alarm Limit parameter.
Low alarm (Error type 263)	Process alarm	–	The measured value has fallen below the limit defined in the Low Alarm Limit parameter.
High alarm (Error type 262)	Process alarm	–	The measured value has exceeded the limit defined in the High Alarm Limit parameter.
High high alarm (Error type 261)	Process alarm	–	The measured value has exceeded the limit defined in the High High Alarm Limit parameter.
Backplane error (Error type 280)	Diagnostic alarm	Fault	A fault is present on the backplane.
Invalid (Error type 265)	Diagnostic alarm	Maintenance required	The output data from the control panel is invalid.
Done (counter) (Error type 258)	Process alarm	–	The counter has reached the cyclic output value that the commissioning engineer defined during parameterization of the I/O modules.

Alarm	Alarm type	Priority	Description
Configuration fault (parameter fault) (Error type 10)	Diagnostic alarm	Fault	A fault is present in the parameters of one of the following components: <ul style="list-style-type: none"> • Gateway • I/O module • Channel
Power supply 1...6 (Error types 273-278)	Diagnostic alarm	Maintenance required	A fault is present on one of the power supplies.
Gateway over temperature (Error type 5)	Diagnostic alarm	Maintenance required	The gateway temperature has exceeded the permissible value.
Pull	Pull alarm	–	An I/O module has been pulled out of the backplane.
Plug	Plug alarm	–	An I/O module has been plugged into the backplane.

Table 4.1 Alarms

4.3.1 Structure of Alarm Signals

Alarm signals in the TIA Portal indicate faults that have occurred in the LB/FB remote I/O system or in the process.

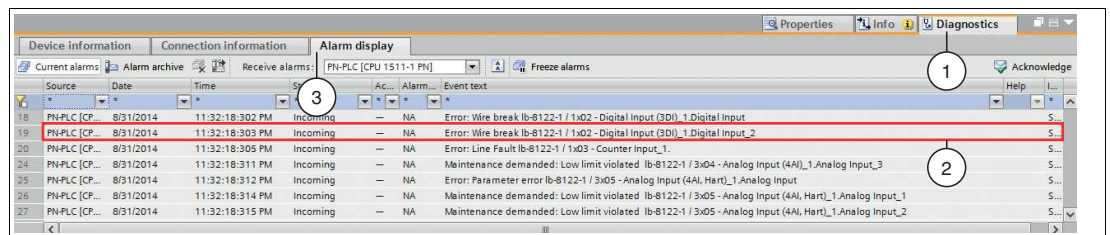


Figure 4.5 Structure of alarm signals

You can access alarm signals (2) in the inspection window by clicking on the tabs **Diagnostics** (1) > **Alarm display** (3). The alarm signals in the **Event text** column are structured as follows:

[alarm priority]: [alarm signal text] [name of LB/FB remote I/O system] / [name of I/O module_(numbering)].[name of channel (submodule)_(numbering)]

Here is an example of an alarm signal:

Error (Fault): Wire break lb-8122-1 / 1x02 - Digital Input (3DI)_1.Digital Input_2

4.3.2 Activating the Alarm Signals

Alarm signals must be activated in order for them to be displayed in the TIA Portal.

Activate alarm signals

To activate the alarm signals, proceed as follows:

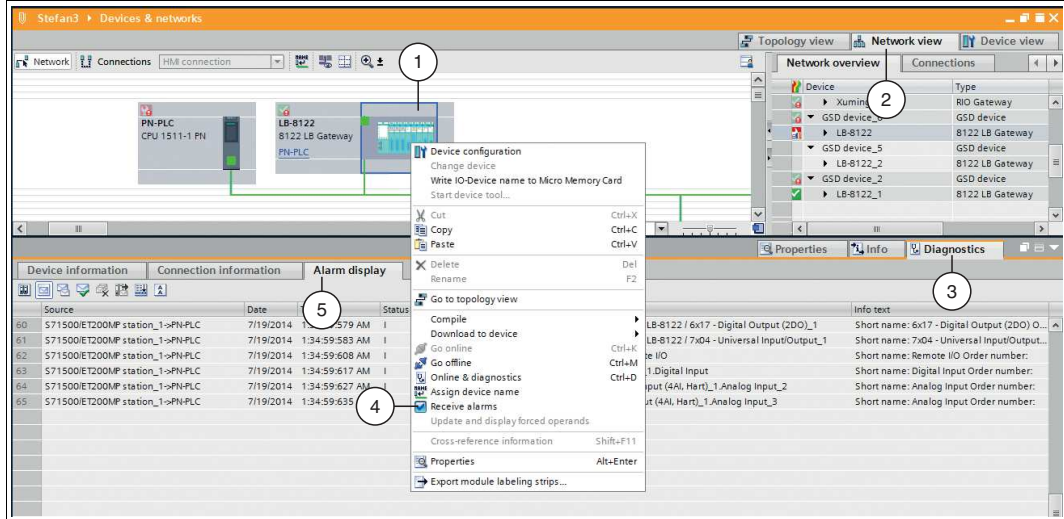


Figure 4.6 Activate alarm signals

1. Switch to the network view by clicking on the **Network view** tab (2).
2. Right-click on the gateway (1).
↳ The context menu opens.
3. In the context menu, click on the **Receive alarms** check box (4).
4. In the inspection window, select the tabs **Diagnostics** (3) > **Alarm display** (5) so that alarm signals are displayed.

5 Data Transfer Test

It is possible to test the transfer of data between the field devices and the control panel. You can assign tags to individual channels of I/O modules then monitor measured values. It is also possible to preassign values to the tags to enable simulations of defined data transfer situations.

The following functions are available for data transfer testing purposes:

- Watch and control tags in watch tables
- Watch and overwrite tags in force tables

5.1 Creating a Tag Table

A tag table must be created to be able to watch or control measured values. In the tag table, you can assign tags to input channels or output channels and enter tag names. The names are valid throughout the control panel. The tags can be used in the control-panel program or in force tables and watch tables for test purposes.



Define tags in tag tables

To define tags in tag tables, proceed as follows:

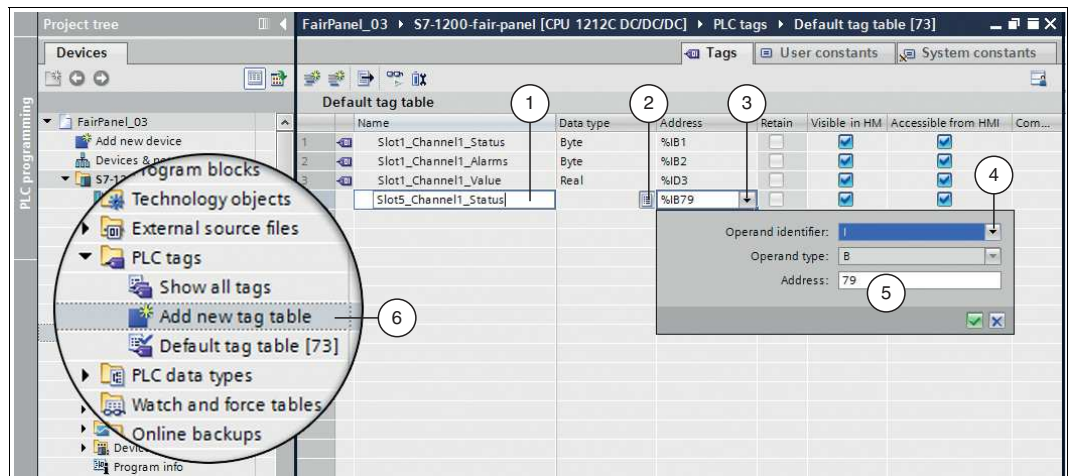


Figure 5.1 Create tag table

1. In the project tree, click on **PLC tags** and double-click on **Add new tag table** (6).
2. Enter a tag name in the field in the **Name** column (1).



Note

Valid characters

The name may contain letters, digits, and special characters (except for quotation marks). No distinction is made between uppercase and lowercase letters when checking the name.

3. Select the appropriate data type for the tag from the drop-down list in the **Data type** column (2).
4. Click on the drop-down list (3) in the field in the **Address** column.
 - ↳ A dialog box opens in which you can define the properties and the address range for the tag.
5. From the drop-down list in the **Operand identifier** field (4), select whether it is an input channel, an output channel, or a marker:
 - I: input channel
 - Q: output channel

- M: marker
6. From the drop-down list in the **Operand type** field, select the data type for address assignment:
 - X: 1 bit
 - B: 1 byte (8 bits)
 - W: 1 word (16 bits)
 - D: 1 double word (32 bits)
 7. Select an address range for the tag by entering a value in the **Address** field (5).



Note

Assign addresses

Module	Rack	Slot	I address	Q address
gateway	0	0		
7x04 - Universal Input/Out...	0	1		
7x04 - Universal Input/Out...	0	2		
7x04 - Universal Input/Out...	0	3		
5x01 - RTD Input (1TI)_1	0	4	73...78	
1x09 - Digital NAMUR Inpu...	0	5		
Digital Input	0	5 Channel 1	79	
Digital Input_1	0	5 Channel 2	80	
Digital Input_2	0	5 Channel 3	81	
Digital Input_3	0	5 Channel 4	82	
Digital Input_4	0	5 Channel 5	83	
Digital Input_5	0	5 Channel 6	84	
Digital Input_6	0	5 Channel 7	85	
Digital Input_7	0	5 Channel 8	86	
2x16 - Solenoid Driver (1D...	0	6		
6x16 - Digital Output (2DO...	0	7		
6x01 - Relay Contact Outp...	0	8		
	0	14		

The addresses in this example are project-dependent and may differ from your address assignment. The memory range is automatically assigned by the TIA Portal when the I/O modules are integrated into the project. This memory range determines the address range in the tag table. The memory range can also be altered manually.

Switch to the device configuration then to the gateway **Device view** (1) to copy the address range of the channels (submodules) (2) to the address range (**Address**) field of the tag table.

5.2 Controlling Tags using Watch and Force Tables

You can use watch tables to watch measured values and prescribe other values. This makes it possible to simulate a test case, for example. By way of contrast, you can use force tables to force values. You can also use force tables to simulate test cases. Force tables differ from watch tables in that values that are forced in a force table are retained even after stopping or exiting the control panel.

The advantage of watch and force tables is that they can be saved for a variety of test environments. You can therefore reproduce the tests during commissioning or for service and maintenance purposes.



Note

Ensure that the project is in online mode before using these tables.



Create a watch table and watch and control tags

To create a watch table and watch and control measured values, proceed as follows:

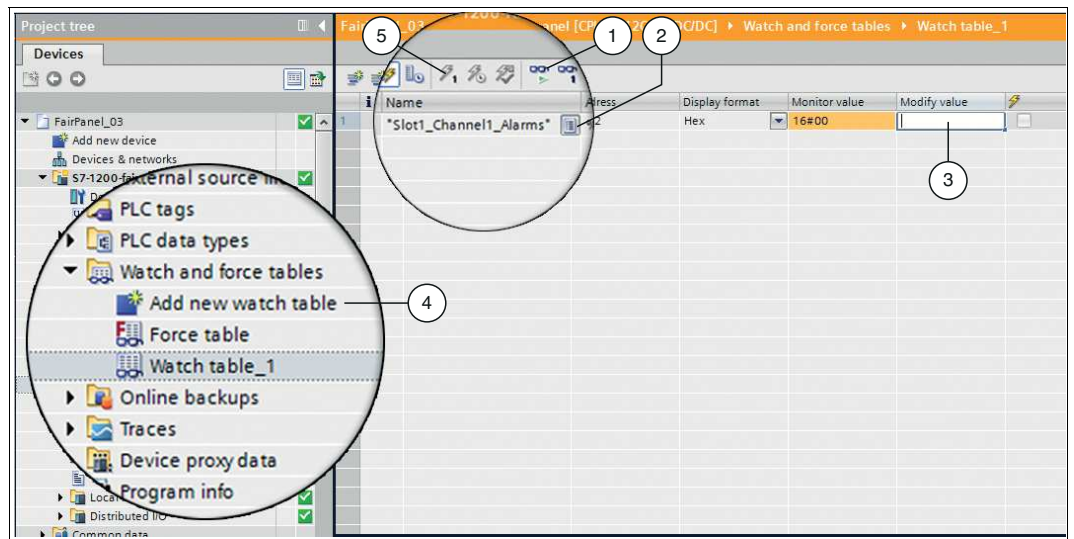


Figure 5.2 Create watch table

1. In the project tree, click on **Watch and force tables** and double-click on **Add new watch table** (4).
2. Click on the list icon (2) in the field in the **Name** column.
↳ A list of tags that you have defined in the tag table is displayed.
3. From the list, select the tag that you want to watch.
4. Click on the watch icon (1) to watch the values.



Note

The current measured value is displayed in the relevant field in the **Monitor value** column.

5. To stipulate a value other than the measured value, enter a value in the relevant field in the **Modify value** column (3).
6. Click on the lightning icon with the number "1" (5) to control the changed values of all tags. The values are controlled immediately and on a one-off basis.



Create a force table and watch and overwrite tags

To create a force table and watch and overwrite measured values, proceed as follows:

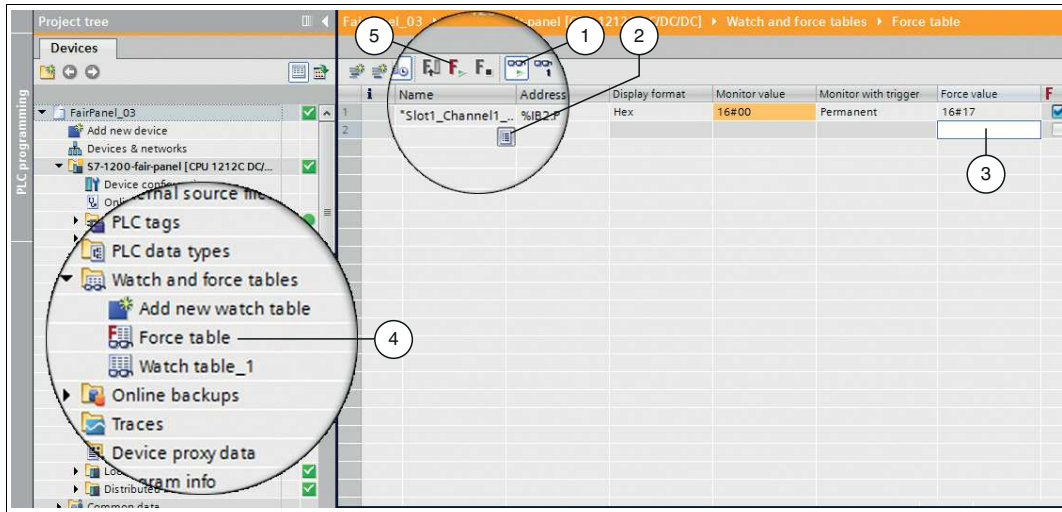


Figure 5.3 Create force table

1. In the project tree, click on **Watch and force tables** and double-click on **Force table** (4).
2. Click on the list icon (2) in the field in the **Name** column.
↳ A list of tags that you have defined in the tag table is displayed.
3. From the list, select the tag whose value you want to force.
4. In the window menu, select **Online > Expanded Mode**.
5. Click on the watch icon (1) to watch the measured values.
6. Enter a value in the relevant field in the **Force value** column (3) to force a value different than the measured value.
7. Click on the force icon with the green triangle (5) to force the changed values of all tags.
↳ A dialog box opens.
8. Confirm the dialog box by clicking on **Yes**.

6 Frequently Asked Questions

How can accessible devices be displayed?

All active devices that are connected to the TIA Portal are accessible devices. The computer hosting the TIA Portal is named "PG/PC interface" in the TIA Portal.



Display accessible devices

To display accessible devices, proceed as follows:

1. In the window menu, select **Online > Accessible Devices**.

↳ The **Accessible devices** dialog box opens.

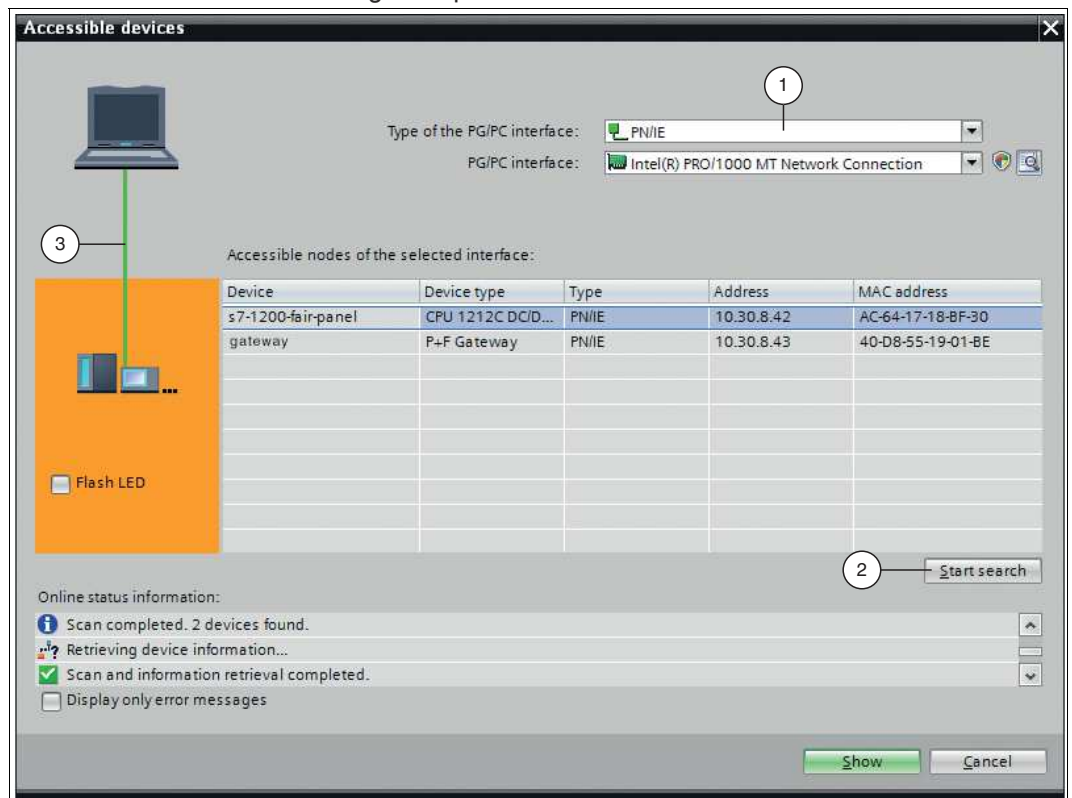


Figure 6.1 Accessible devices

2. From the **Type of the PG/PC interface** drop-down list (1), select the interface type.

3. Click on **Start search** (2).

↳ The accessible devices are displayed in the **Accessible nodes of the selected interface** list. In the figure, the connecting line between the TIA Portal and the PROFINET network is continuous and shown in green (3).

How can I find out which control panel in the PROFINET network corresponds to the device selected in the TIA portal?

You can perform an LED flash test for the selected control panel in the PROFINET network. This feature is useful if, for example, multiple control panels are connected to the PROFINET network. It allows you to ensure that you have selected the right control panel.

Perform an LED flash test

To perform an LED flash test, proceed as follows:

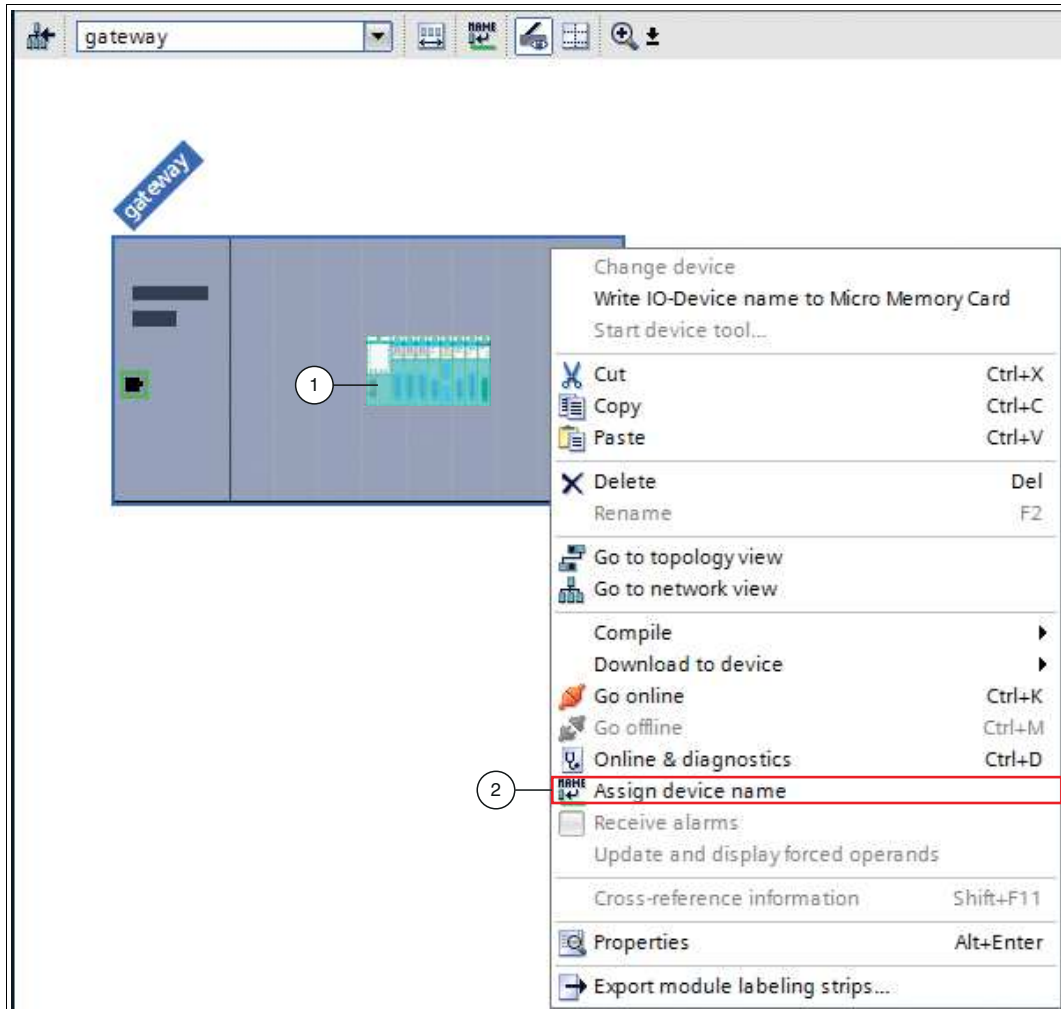


Figure 6.2 Assign gateway name

1. Right-click on the gateway (1) in **Device view**.
2. From the context menu, select **Assign device name** (2).

↳ The **Assign PROFINET device name** dialog box opens.

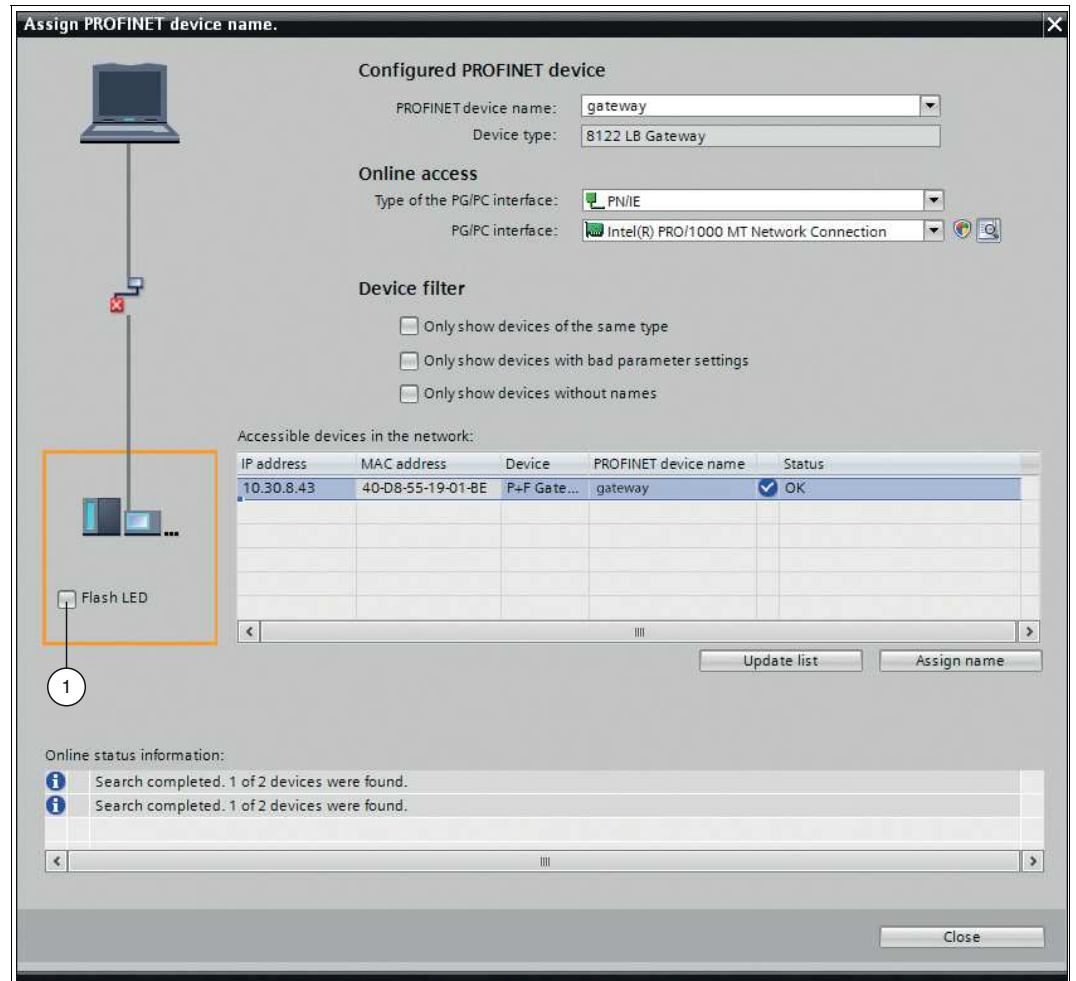


Figure 6.3 Assign PROFINET device name dialog box

3. In the orange square on the left-hand side of the dialog box, activate the **Flash LED** check box (1).

Why can't I find the gateway as a device on the PROFINET network?

The gateway must have a name before it can be addressed by the control panel. The gateway can only be addressed by a control panel after the name has been assigned via the TIA Portal. It is then possible to transmit project data, etc. The control panel can only find the gateway in a PROFINET network if it can access the PROFINET network.

Make sure that:

- The gateway has a unique name.
- The control panel can access the PROFINET network of the gateway.

How can I find out the IP address of the gateway?

The control panel uses the same IP address as the gateway. The gateway can receive an IP address in one of two ways:

- An external DHCP server assigns an IP address to the gateway.
- A user assigns an IP address to the gateway via the user display.

When a user assigns an IP address to the gateway via the display, the IP address can be accessed from the display of the gateway. You can also find out an IP address by viewing all accessible devices in the PROFINET network. For more information on accessible devices in a PROFINET network, see "How can accessible devices be displayed?" in chapter 6.

How do I change the IP address of the gateway?

Change the IP address of the gateway

To change the IP address of the gateway, proceed as follows:

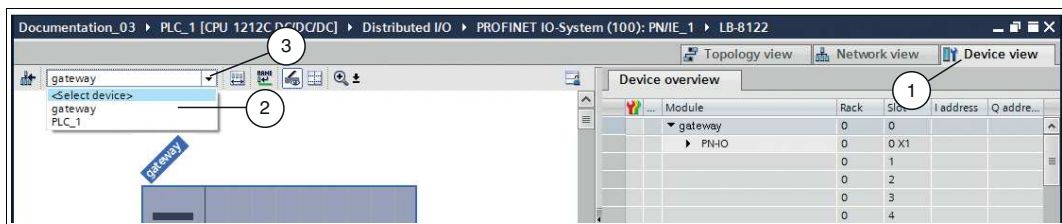


Figure 6.4 Select gateway

1. Switch to the **Devices and networks** window on the **Device view** tab (1).
2. Select your gateway from the drop-down list (3). In this example, the gateway is called "gateway" (2).

↳ The gateway properties appear in the inspection window.

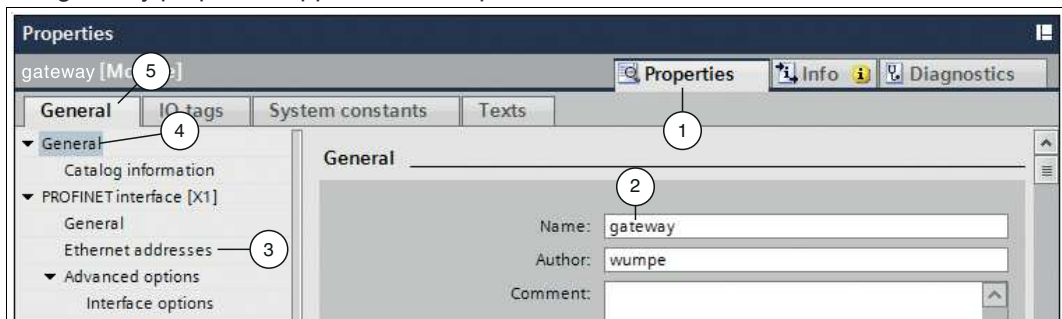


Figure 6.5 Gateway properties in the inspection window

3. Open the tabs **Properties** (1) > **General** (5).
4. Click on the **General** tree node (4).
↳ The "General" input screen opens.
5. Click on the **Ethernet addresses** subtree node (3).

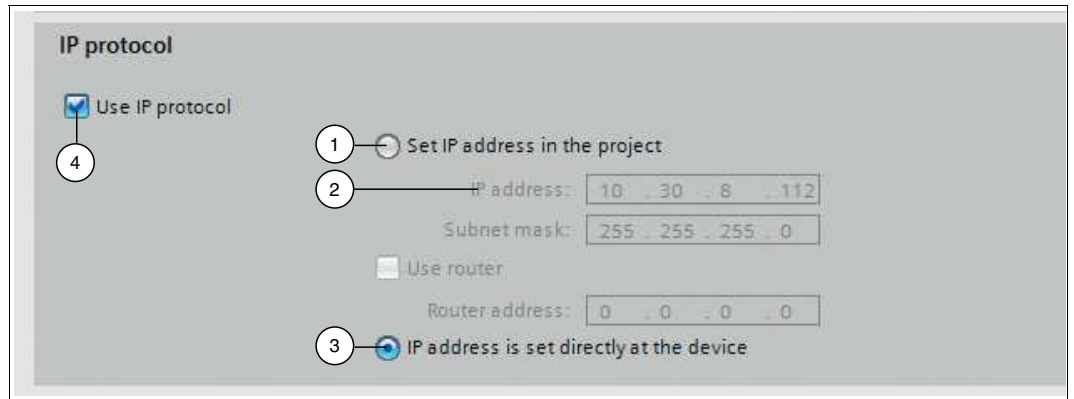


Figure 6.6 Change IP address

6. Select the **Use IP protocol** check box (4) then click on one of the following options:
 - **IP address is set directly at the device** (3): the control panel uses the same IP address as the gateway. The gateway can receive an IP address in one of two ways:
 - An external DHCP server assigns an IP address to the gateway.
 - A user assigns an IP address to the gateway via the user display.
 - **Set IP address in the project** (1): you define the IP address in the project. Make an entry in the **IP address** field (2).

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