APPLICATION NOTE

RZ/T2M and RZ/N2L

Rev.1.03
October 14, 2022

PROFINET IRT PLC Connection Guide

Outline

This application note describes the procedure for PROFINET IRT connection between the RZ/T2M and RZ/N2L Starter Kit board and a Siemens PLC controller by using the PLC Engineering Tool "TIA Portal".

Applicable devices

RZ/T2M

RZ/N2L

Contents

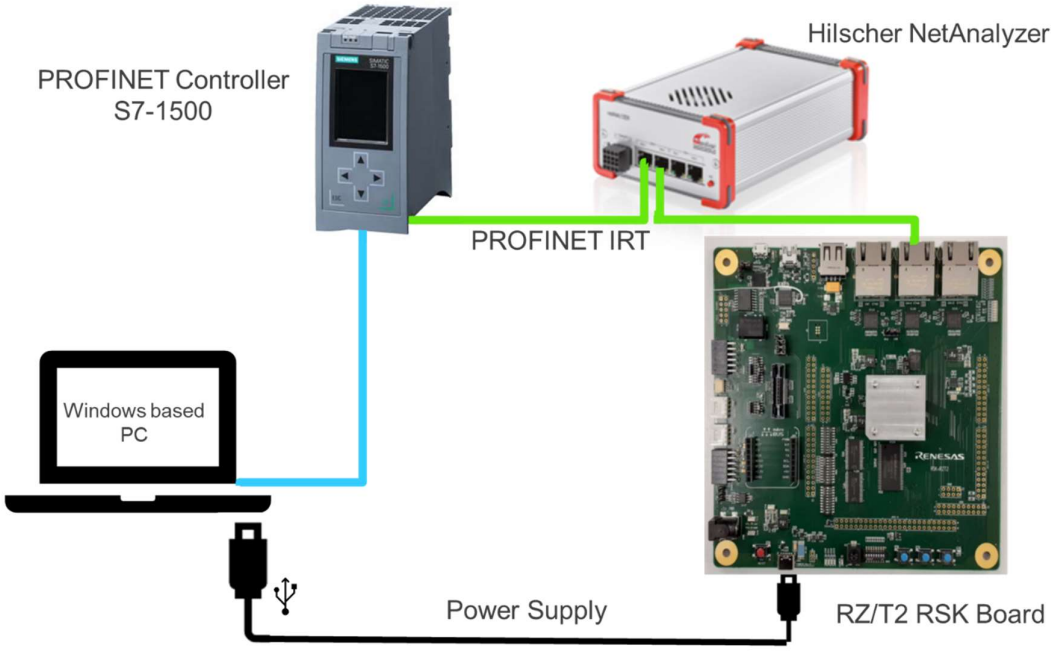
1. Start

Below a list of recommended equipment to run successful PROFINET IRT.

List of equipment for PROFINET IRT				
Name	**Pcs**	**Description**	**Order Number**	**Webpage**
PROFINET Controller	1	SIEMENS CPU 1516-3 PN/DP V2.6	6ES7 516-3AN01-0AB0	https://mall.industry.siemens.com/mall/en/WW/Catalog/Product/6ES7516-3AN01-0AB0
Hilscher Netanalyzer	1	Netanalyzer	NANL-B500G-RE	NANL-B500G-RE | netANALYZER real time Ethernet analyzer, box | hilscher.com
TIA Portal Software	1	Configuration software PLC	6ES78221AA070YA5	Product Details - Industry Mall - Siemens RC-DE

HW Setup for PROFINET IRT

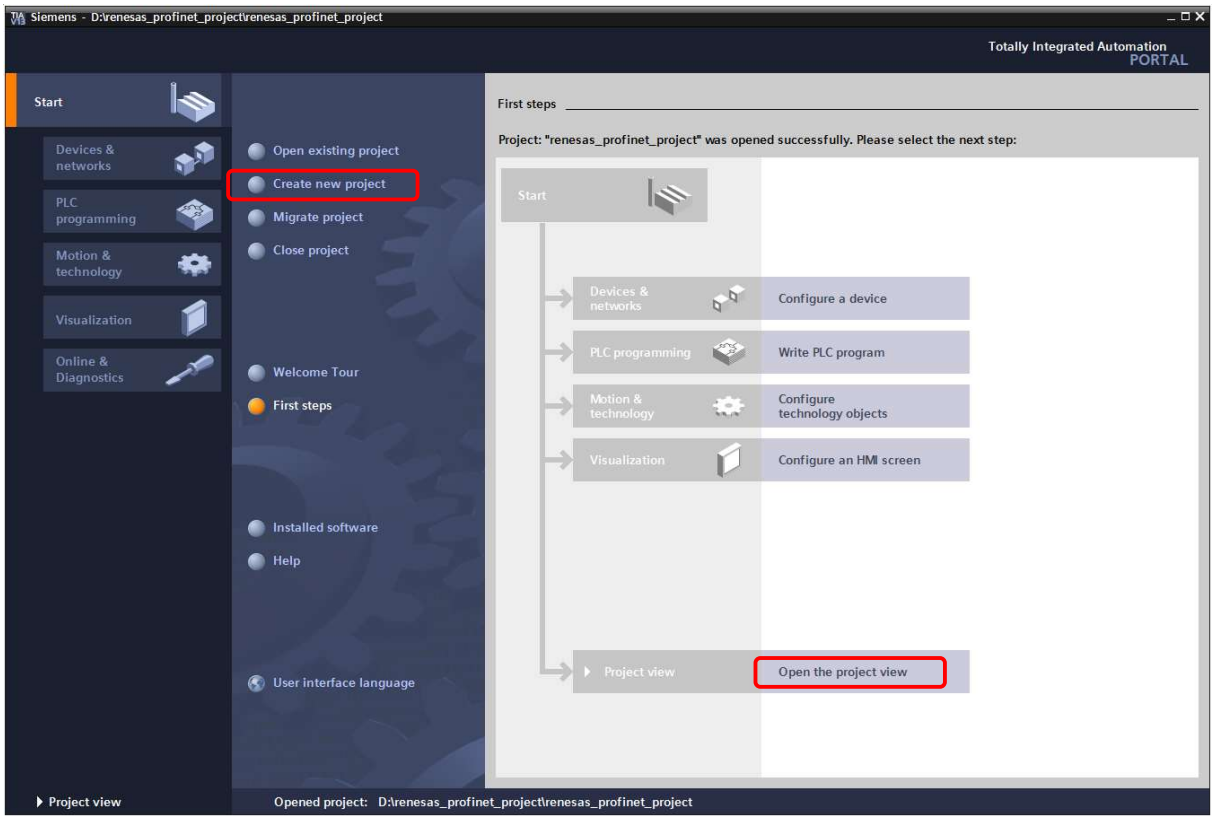
The simple HW setup can be used for an easy demo for PROFINET IRT. Basically, it is a direct connection between the controller and the device. The NetAnalyzer is necessary to capture the PROFINET frames.



After a successful hardware and software installation the TIA portal software of Siemens can be started by selecting form the Windows Start menu of clicking on the “TIA Portal” button that appears on the desktop after installation.

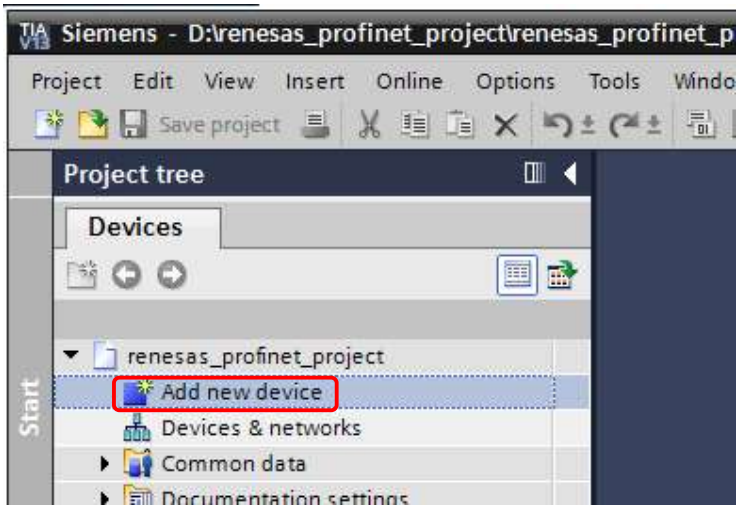
2. Creating a New Project

From the top menu, select "Create new project" and create a new project.
After a project has been created, click "Open the project view" to open the Project window.

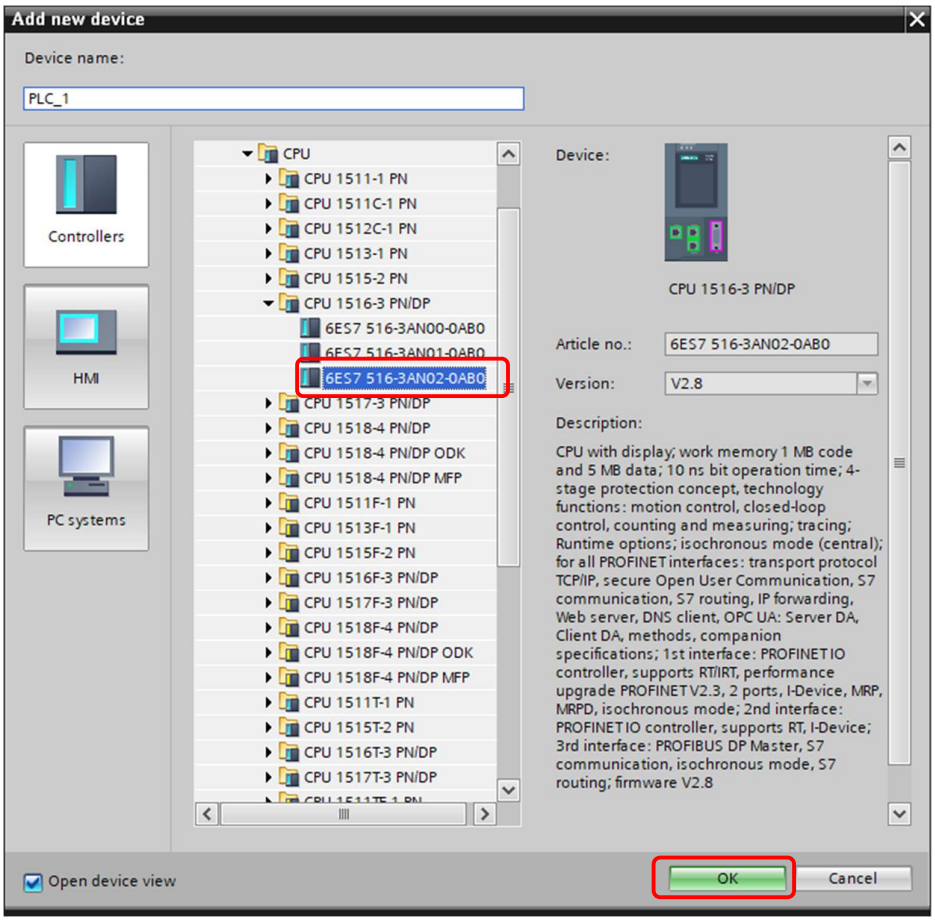


3. Registering PLC

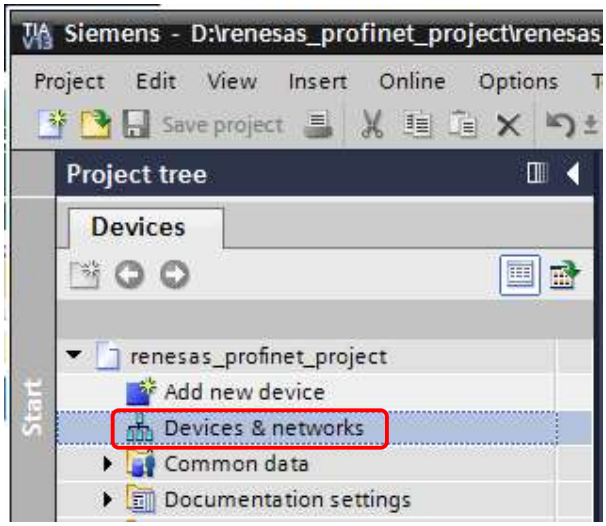
Set the PLC to be used for PROFINET communication.
On the Devices tab, double-click "Add new device".



From the tree, select the PLC to be used, and then click the [OK] button.
Confirm the model number provided on the PLC body.

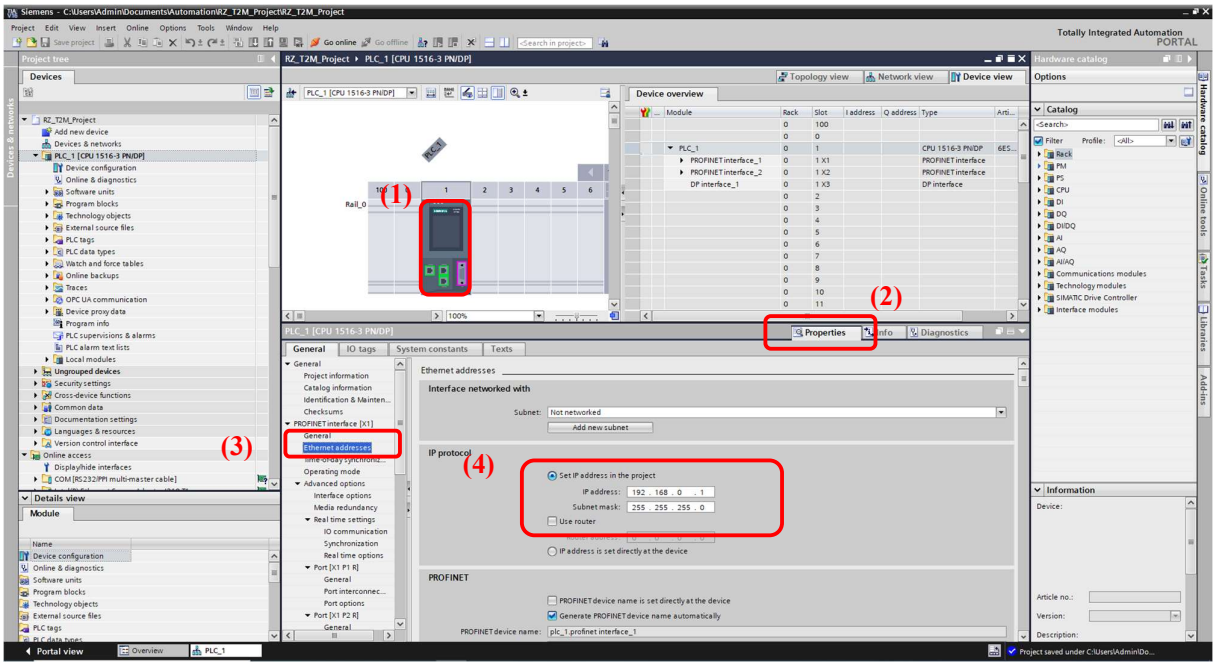


On the Devices tab, double-click "Devices & networks".



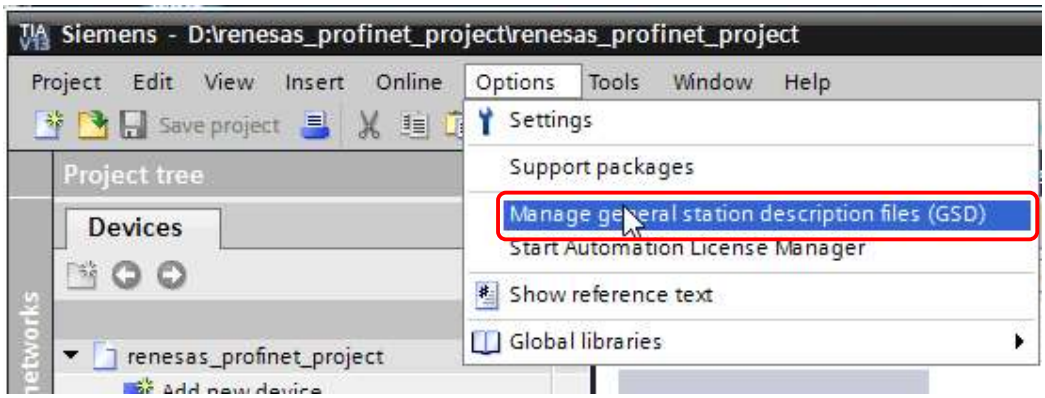
Perform the following procedure to set the PLC's IP address. (Set a unique IP address.)

1) On the Network tab, select the PLC.
2) Select the Properties tab.
3) On the General tab, select the PROFINET interface.
4) Set the IP address.

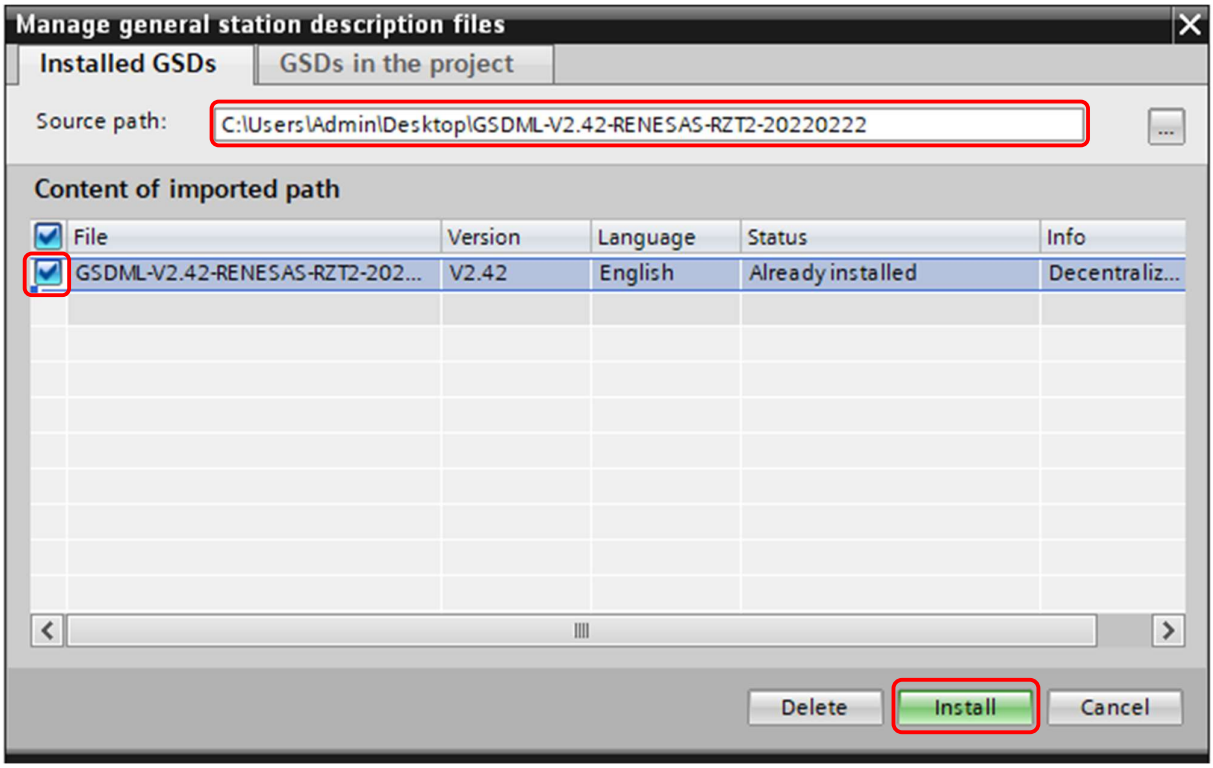


4. Registering the Device

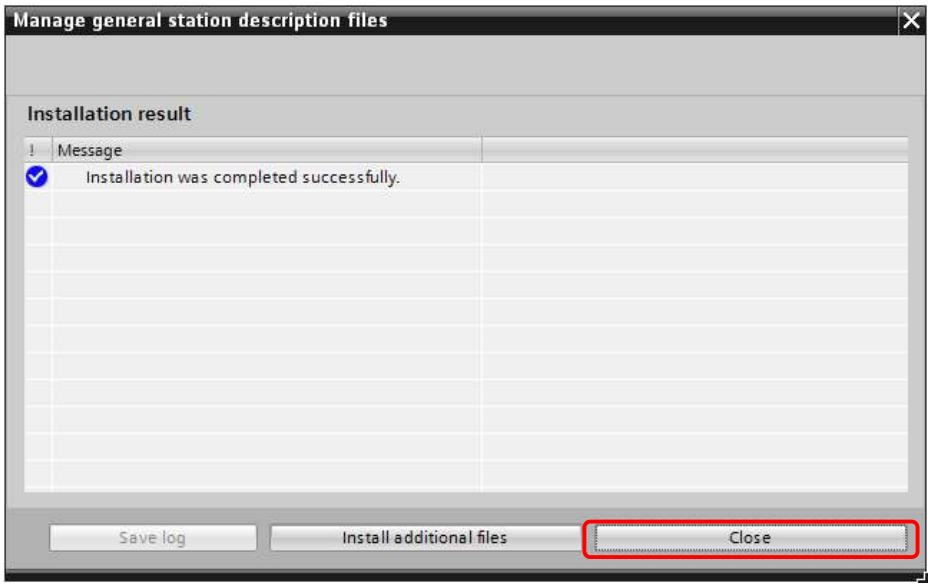
Set the device to be used for PROFINET communication.
To register a new device on the Network, install the GSDML file.
From the Options menu, select " Manage general station description files (GSD)".



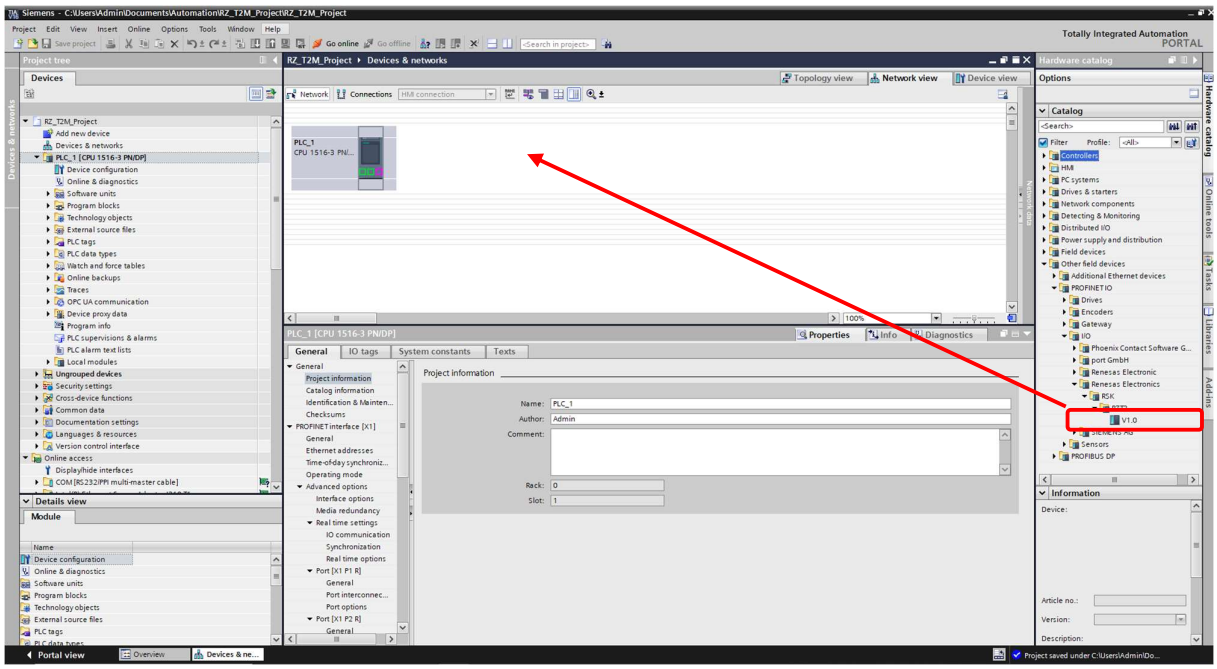
Specify the folder that contains the GSD file you want to register, select the checkbox of the file to be installed, and then click the [Install] button.



The installation result is displayed. Click the [Close] button to close the window.

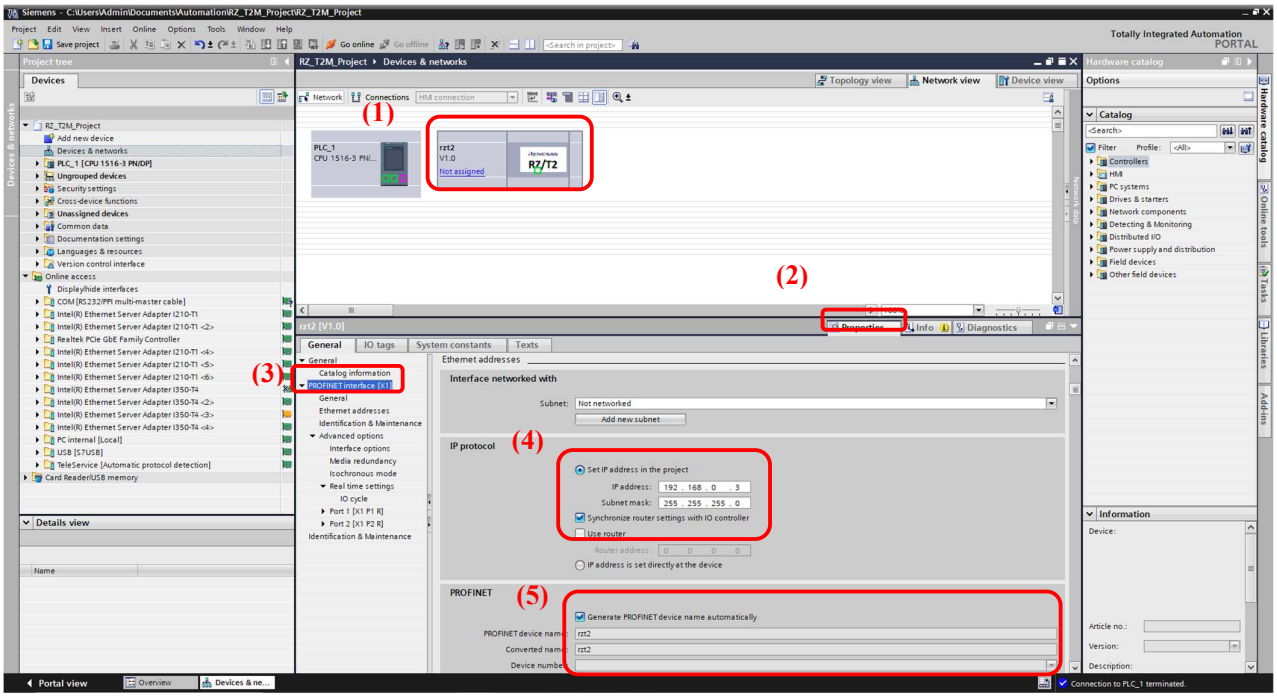


The catalog information is updated, and the device is added to the Catalog window.
Select the device and drag and drop it on the Network view tab.



Perform the following procedure to set the device's IP address. (Set a unique IP address.)

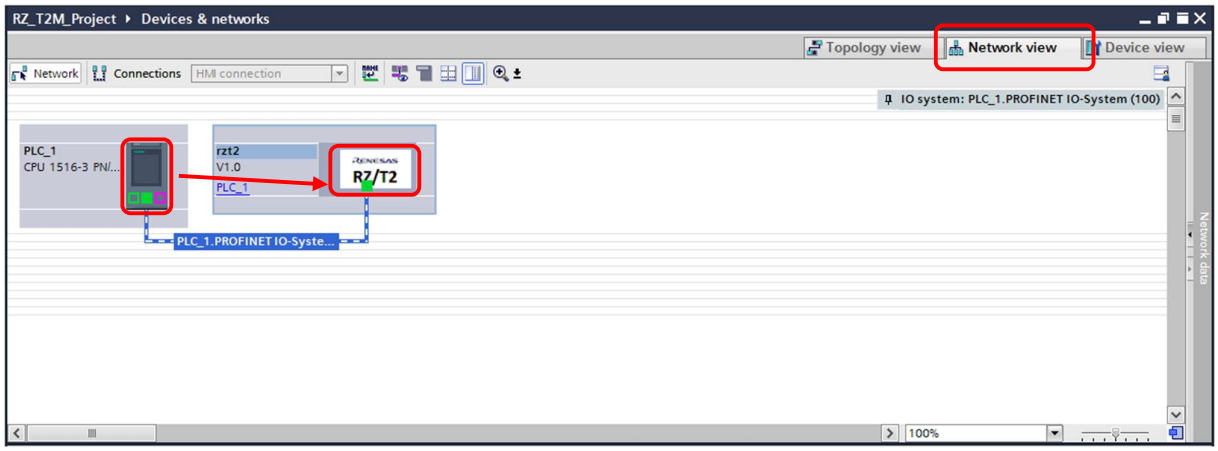
1) On the Network view tab, select a device.
2) Select the Properties tab.
3) On the General tab, select the PROFINET interface.
4) Set the IP address of the device.
5) The PROFINET identifies devices with the PROFINET device name. Set the device name that is set for the device to be used as a PROFINET device name by clearing the check in the box. The device name setting field is provided under the IP address setting field. (A device name is automatically set by default.)



5. Making a Connection between PLC and Device

Connect the PLC to a device.

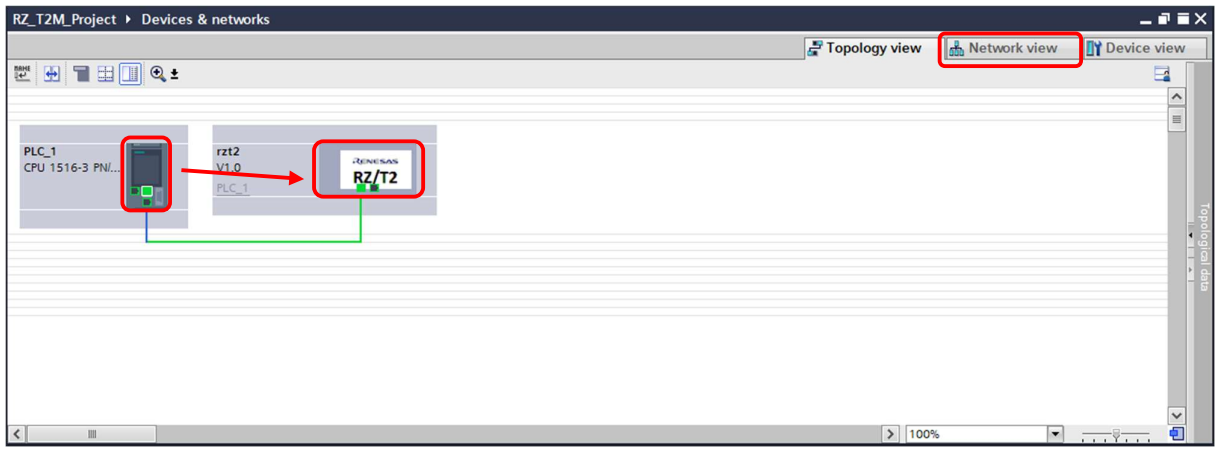
Select the Network view tab, select the PCL's Ethernet port and then drag and drop the selected port to the device's Ethernet port to make a connection between PLC and device.



Ports that allow connection can be restricted by the topology setting.

Select the Topology view tab, and then select connectable Ethernet ports of the PLC and the device.

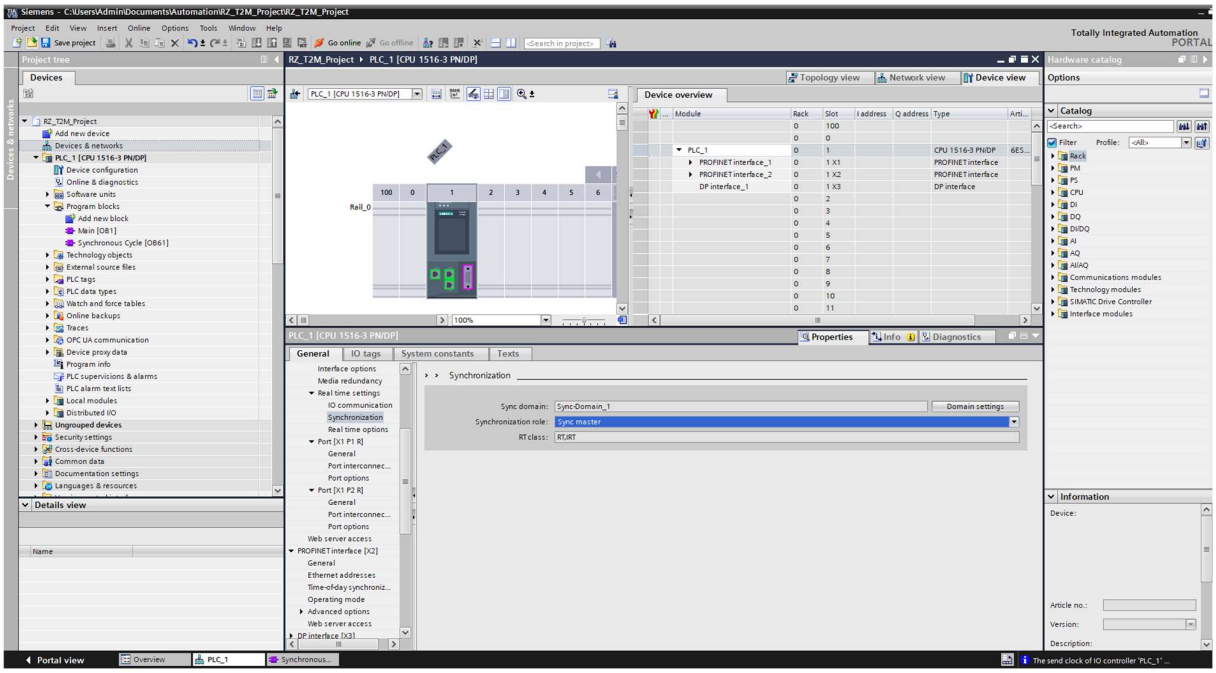
The following example shows that the device has two ports and the PLC is connected to port 1 (Connection to port 2 is not allowed.)



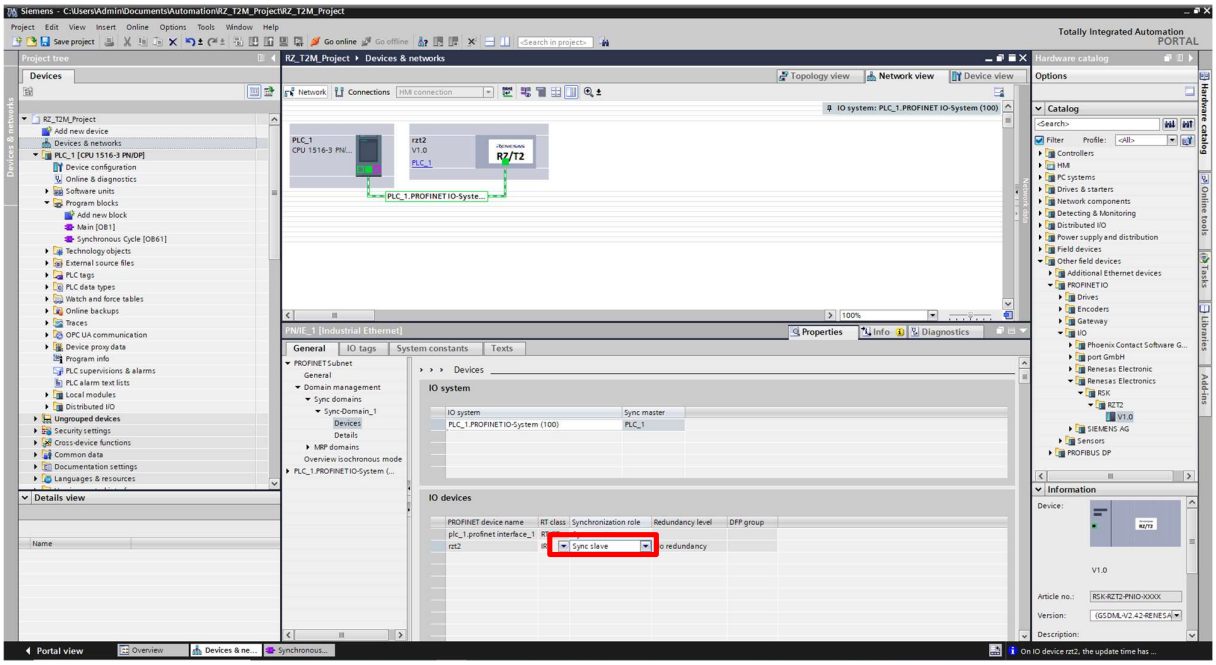
6. Configuration of PROFINET IRT

This chapter describes the configuration of PROFINET IRT.

The first step is the configuration of the PLC. In our case the PLC should be the Sync Master.

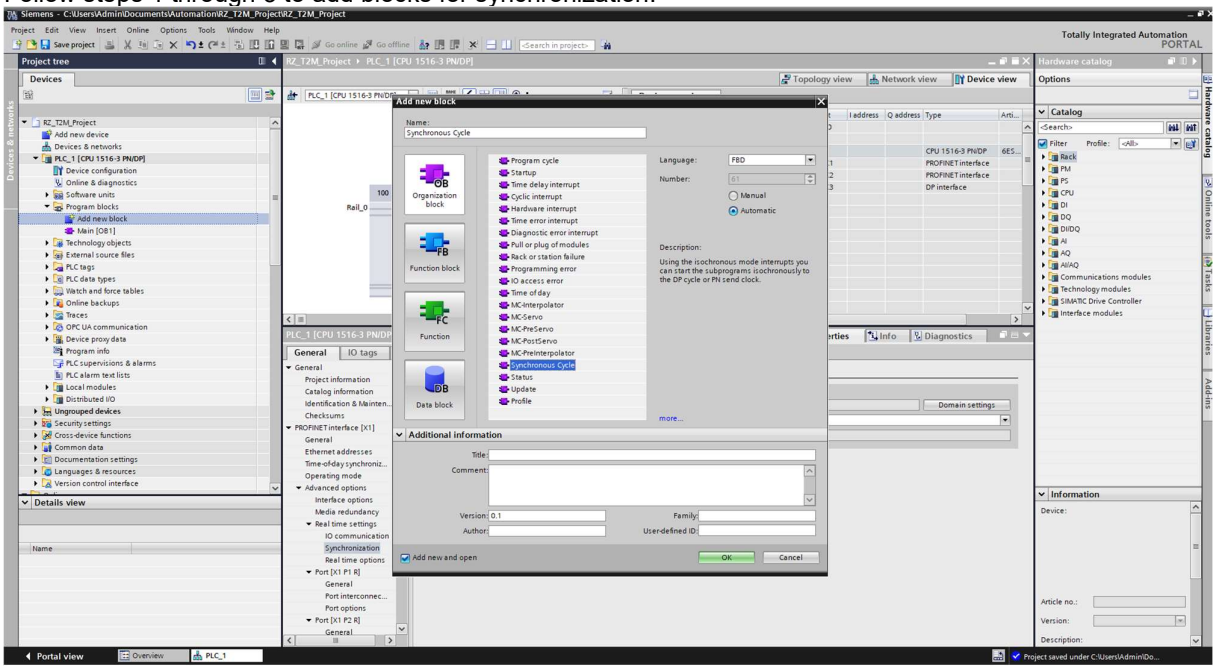


For the configuration of the time domain (click on “Domain settings”) and configure the RT Class of the device (“rzt2”) to “IRT” and the synchronization role to “Sync Slave”.



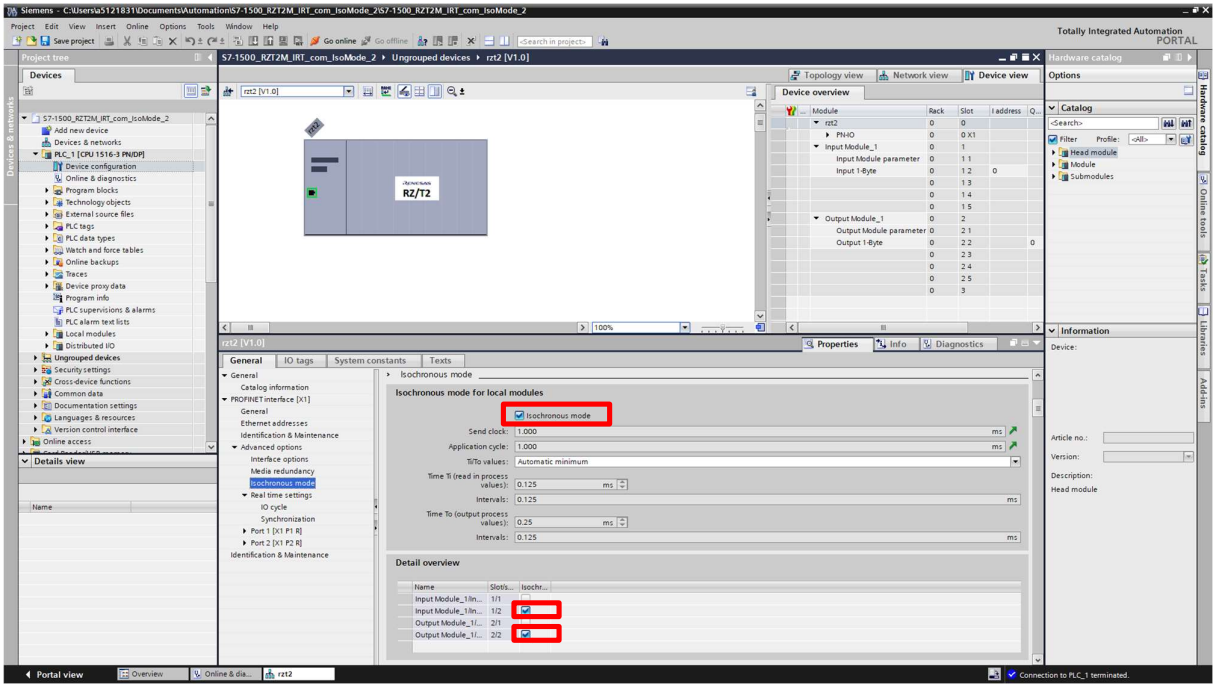
If isochronous mode is required, implement the following settings.

Follow steps 1 through 3 to add blocks for synchronization.

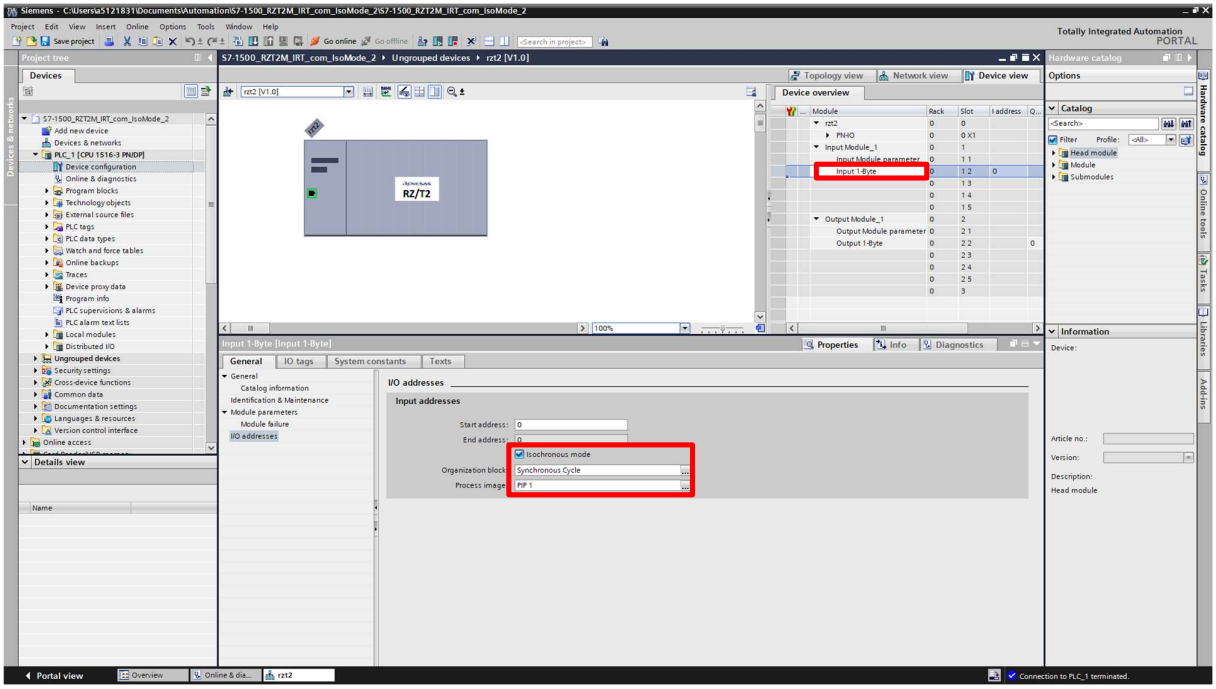


1) Click on “Add new block”
2) Select the block “Synchronous Cycle”
3) Finish the configuration by click on “OK”

Now the device itself has to be configured for IRT. Open the device properties and click on “Isochronous Mode”. Here the check boxes “Isochronous Mode” as well as for the Input Submodule and Output Submodule have to be enabled.



The final step the configuration of the submodule. Make a double- click on the Input- submodule and click on “I/O addresses”. Choose “Synchronous Cycle” for the Organization block. Set output-submodule in the same way.



7. Downloading a Project

7.1 Configuration of PC Networking Card

This section describes the procedure to download a project file to the PLC.

Connect the PLC to a PC through the Ethernet port.

Open the Ethernet port properties window of the PC and set the PC's IP address with TCP/IPv4.

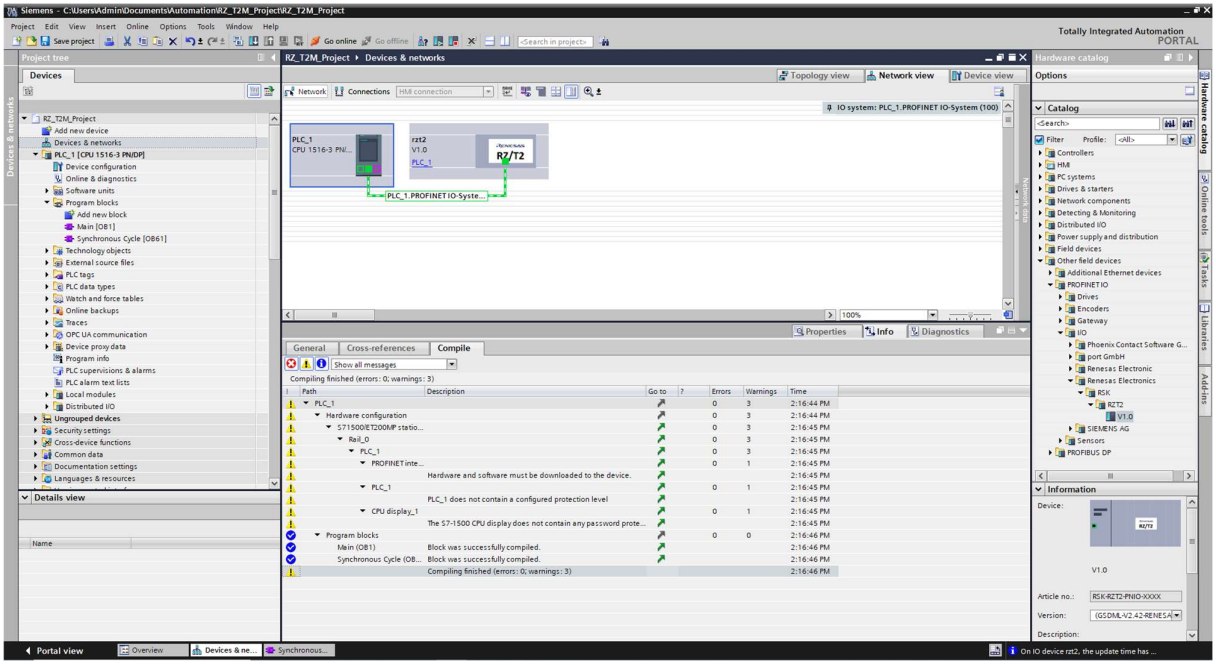
Set a network address equal to the IP address set in the PLC.

7.2 Compile the project.

To compile the project, please click on the icon "Compile"

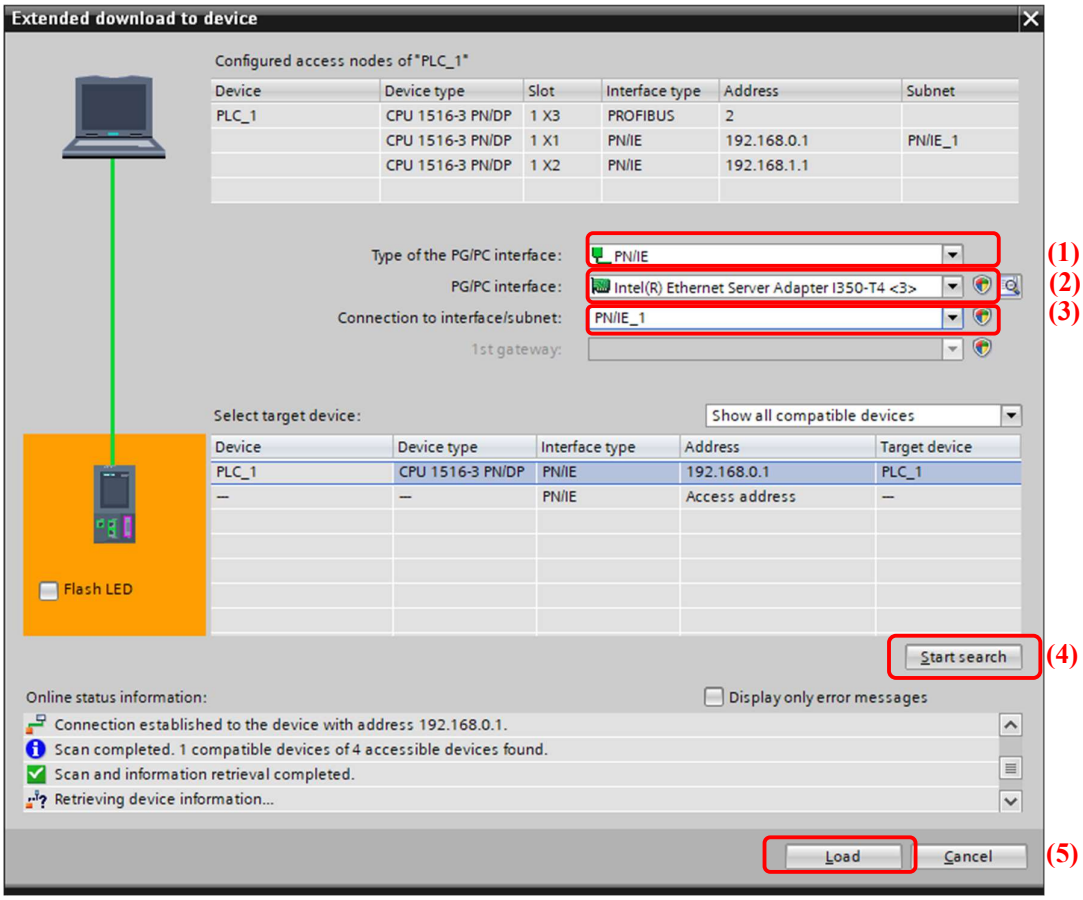
After the project has been compiled, the compilation result is displayed on the Compile tab at the lower part of the window.

Make sure that the compilation has been successfully completed.



7.3 Download the project to the PLC

On the Device tab, right-click PLC in the tree and select Download to device > Hardware configuration.



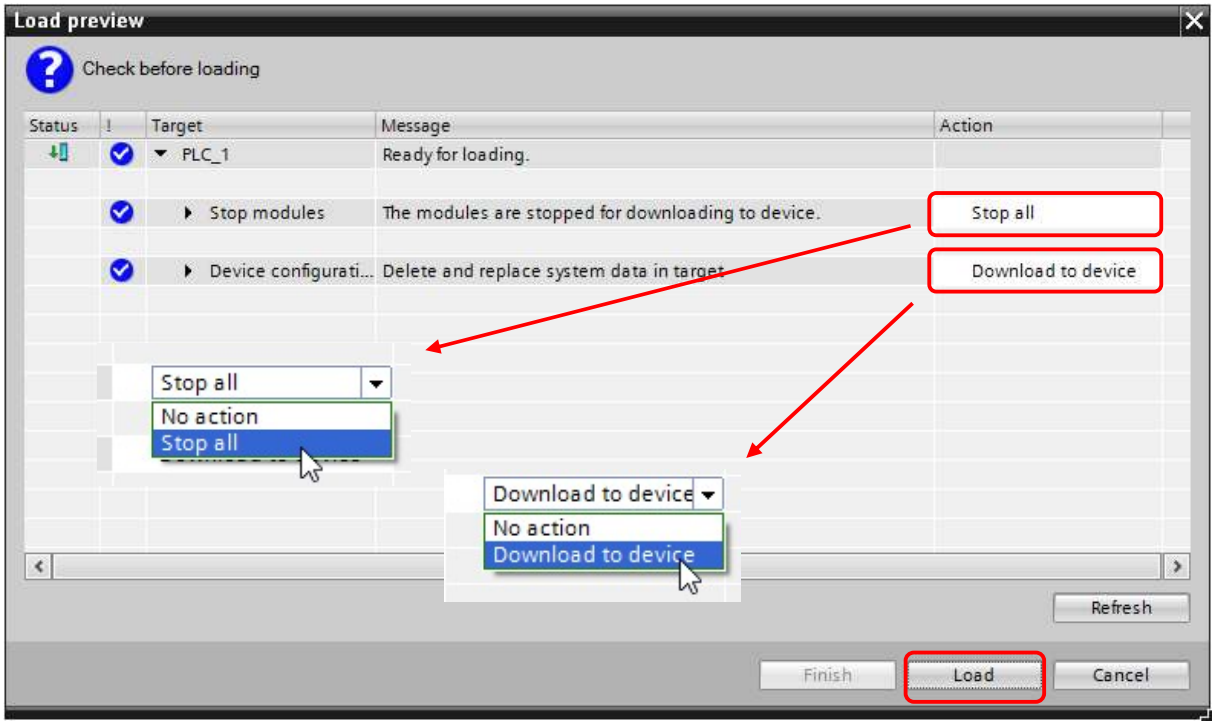
Search the PLC to which the project is downloaded.

1) In the "Type of the PG/PC interface" field, select "PN/IE".
2) In the "PG/PC interface" field, select the network connected to the PLC.
3) In the "Connection to subnet" field, select "PN/IE_1".
4) Click the [Refresh] button to search PLCs and select the target PLC.
5) Click the [Load] button.

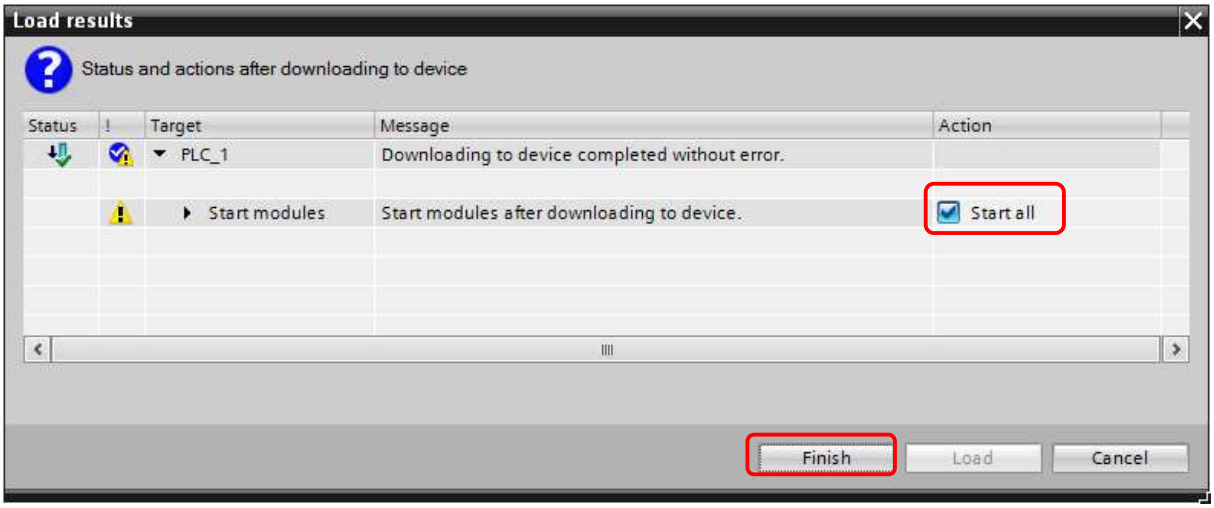
The Load Preview window opens.

If the action status of "Stop modules" and "Device configuration" indicates "No action", select "Stop all" for "Stop modules" and select "Download to device" for "Device configuration" from each drop-down list.

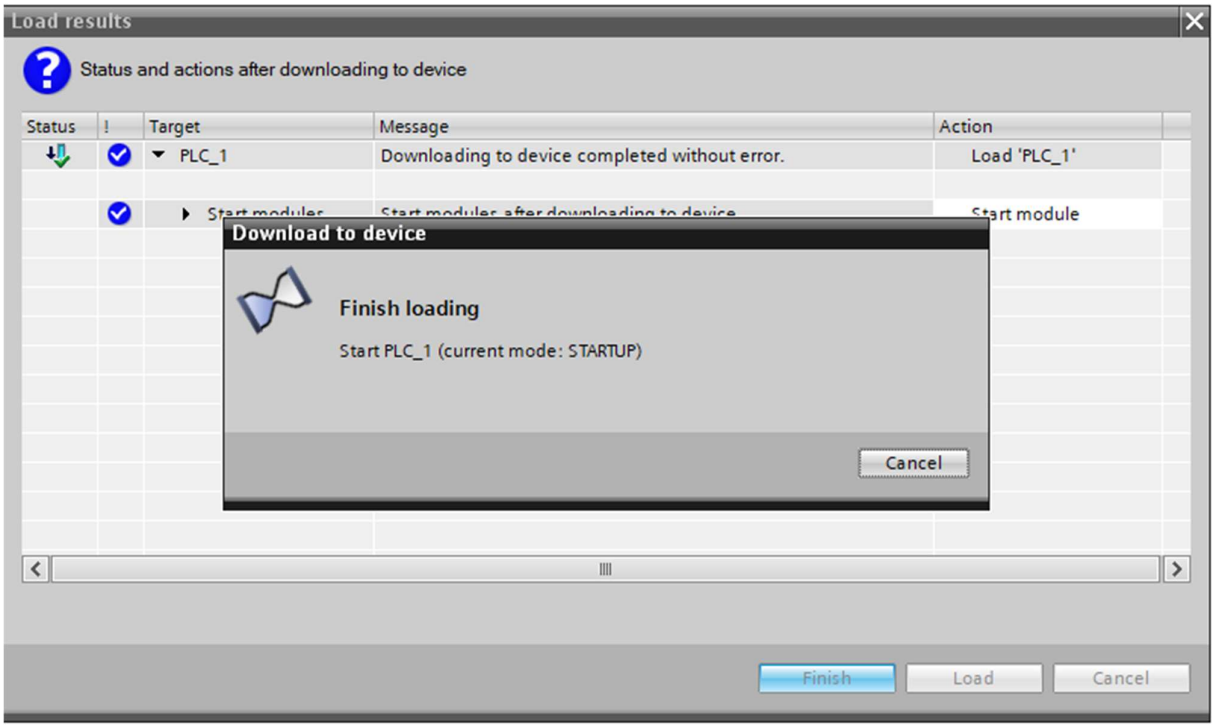
When no error is present, click the [Load] button.



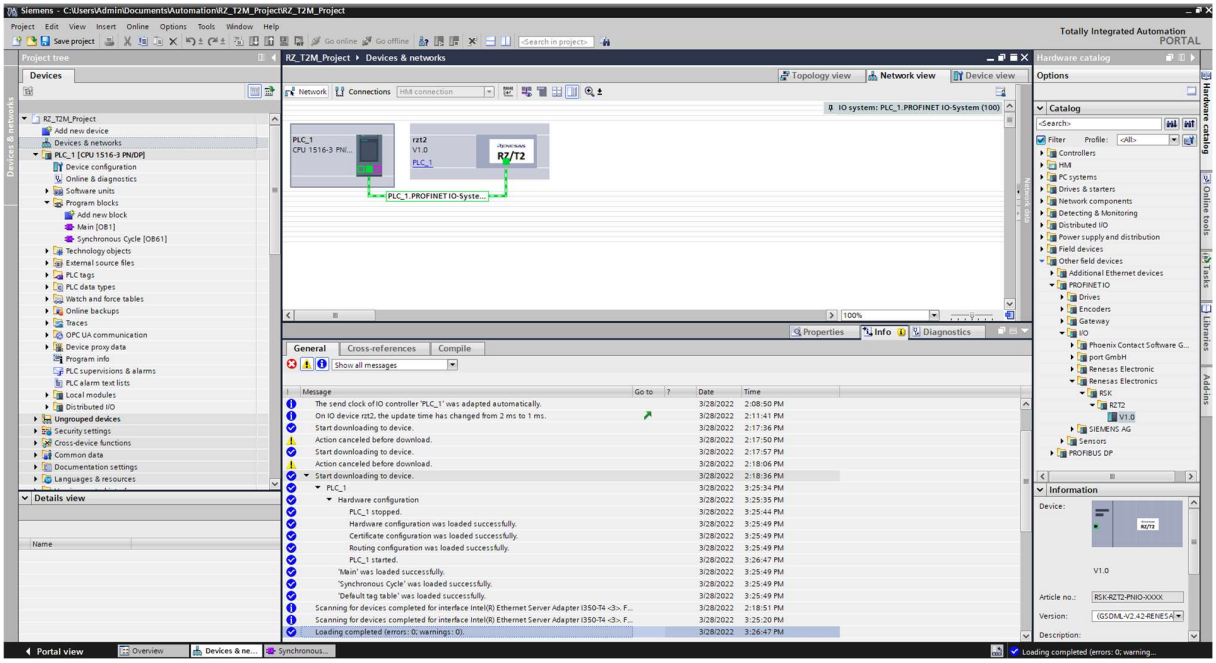
Select the "Start all" checkbox of Start modules, and then click the [Finish] button.



Connect the real PLC to the real device in accordance with the topology configuration.



When the ERROR indicator on the real PLC does not light and the RUN/STOP indicator lights green, the PROFINET connection has been successfully established.



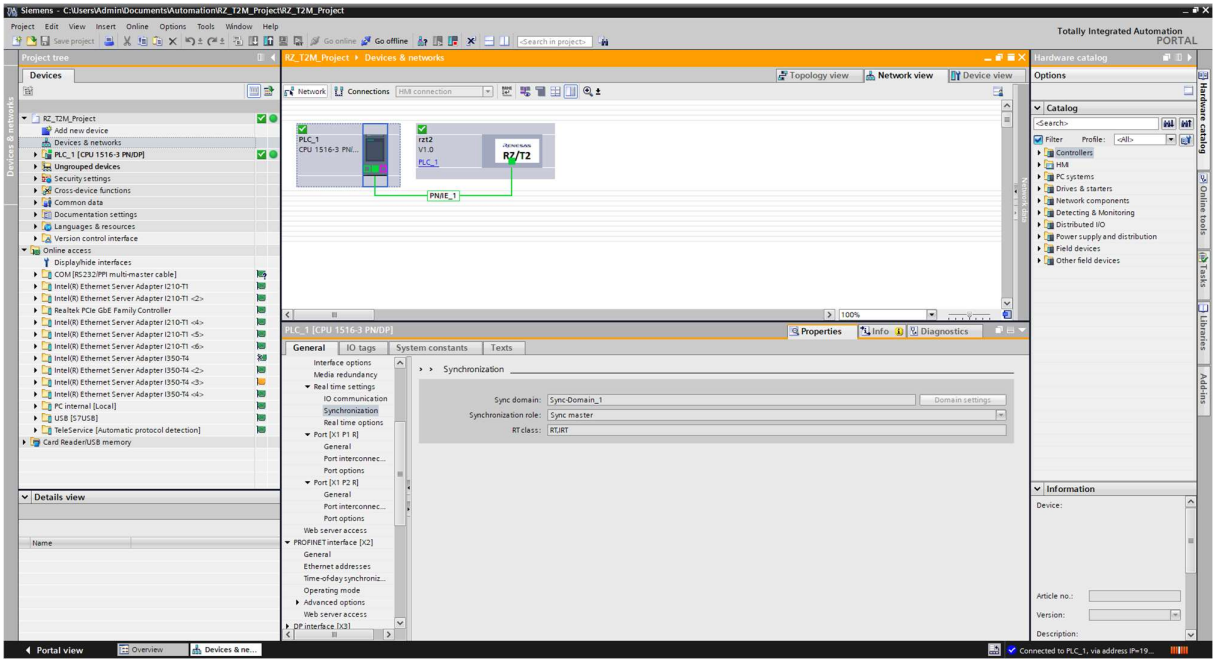
For checking online connection, see section

Checking Online Connection.

7.4 Checking Online Connection

The network connection status and the status of device's modules can be monitored on the TIA portal by connecting a PC to the same network using a switching hub.

Select "Go online" from the menu.



When the connection is successfully established, the icon is indicated as "".

When an error is present, the icon is indicated as "".
The example below shows an error if a PC is connected to a port that is not set in the topology.
Check other icons from Help on the TIA portal.

Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	March 29, 2022	-	First version
1.01	July 19, 2022	11	Corrected Chapter 6.
1.02	August 25, 2022	12	Added isochronous mode setting to Chapter 6.
1.03	October 14,2022	12	Added description to add synchronization block

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(Rev.4.0-1 November 2017)

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