PROFINET® - Controller

PLC500, PLC500ED, PLC500MC
PLC410

Application Note

Application Note

PLC410, PLC500, PLC500ED, PLC500MC

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Version	Revision	Description
1.5.0	R00	First edition.

CONTENTS

1 INTRODUCTION

This Application Note is intended to assist in the use of the **PROFINET®** protocol in WEG PLCs, models PLC410, PLC500, PLC500ED and PLC500MC. Throughout this document, the PLC500 is used as an example. However, the information presented is applicable to the other PLC models described above. It should be noted that the data provided may change slightly due to the continuous development and updating of products and tools.

In addition to providing an overview of the PROFINET protocol, this document presents the communication interfaces, installation recommendations, network topologies, and a guide to establish PROFINET communication using a PLC500 as a Controller in **CODESYS®**.

For more information regarding the hardware, interfaces and communication protocols, refer to the User Manual of the respective product, available on the WEG website. For a deeper and more detailed description of PROFINET network operation, access the online help at CODESYS Online Help.

The text of this application note was translated from the original portuguese version using artificial intelligence, with technical review performed by WEG.

ATTENTION!

This application note is intended for professionals trained in industrial networks. The installation and configuration of the devices must be carried out according to the manufacturer's manual.

NOTE!

It is recommended to use version **CODESYS V3.5 SP19** or higher, as well as the latest version of the configuration libraries for PROFINET.

1.1 TERMS AND DEFINITIONS USED

CODESYS: Programming platform that allows developing, configuring and monitoring solutions for industrial automation and system integration.

DAP: Ethernet interface of the PROFINET Device used as an access point for communication (*Device Access Point*).

TCP: Connection-oriented protocol that performs flow control, error checking and retransmission of data packets between network devices (*Transmission Control Protocol*).

UDP: Connectionless protocol that sends data independently, without flow control, retransmission or order checking, enabling low-latency communication between devices (*User Datagram Protocol*).

LLDP: PROFINET network protocol that facilitates topology discovery, commissioning and replacement of failed devices on the network without the need for specific software.

MRP: Redundancy protocol used in PROFINET ring network topologies (*Media Redundancy Protocol*).

PNO: Industry association dedicated to the development, standardization and promotion of industrial communication and automation technologies, such as PROFIBUS and PROFINET (PROFIBUS Nutzerorganisation e.V.).

Jitter: Term used to describe variation in delay or instability in the data transmission time in a network or system.

MAC: Unique identifier assigned to network devices to ensure correct communication between them in a local network (*Media Access Control*).

RT: Real time.

IRT: Isochronous real time.

GSDML: XML file used in PROFINET networks to describe Devices, including identification, configuration parameters, modules and diagnostic information.

1.2 THE PROFINET PROTOCOL

PROFINET (**Pro**cess **Fi**eld **Net**work) is an industrial communication protocol based on Ethernet, widely used in manufacturing and process automation. It is managed by PROFIBUS & PROFINET International and is considered the successor of PROFIBUS.

In a PROFINET network, Controllers manage communication and control of Devices. Devices, in turn, execute tasks according to the Controllers' instructions and also provide status and diagnostic data. Both Controllers and Devices can act as providers, the role of sending data, and as consumers, the role of receiving data.

PROFINET uses the TCP and UDP protocols for tasks that are not time-critical, such as configuration, parameterization and diagnostics. The RT communication mode is used for cyclic and deterministic communication, essential for applications that require real-time data transfer. The IRT mode is an extension of RT mode that enables time synchronization of devices for applications that require high precision, such as softmotion motion control.

1.3 REFERENCE DOCUMENTS

It is recommended to consult the documents related to the PROFINET network presented in Table 1.1.

Table 1.1: *Reference documents.*

Document	Version	Source
PROFINET System Decription Technology and Application	11/2018	PNO
PROFINET Design Guideline	1.59	PNO
PROFINET Assembling Guideline	2.12	PNO
PROFINET Commissioning	1.53	PNO

1.4 IMPORTANT NOTICE ABOUT CYBERSECURITY AND COMMUNICATIONS

WEG PLCs, models PLC410, PLC500, PLC500ED and PLC500MC, have the capability to connect and exchange information through communication networks and protocols. Although they have been designed and tested to ensure proper operation with other automation systems using the protocols mentioned in this manual, it is essential that the customer understands the responsibilities associated with information and cybersecurity when using this equipment.

Therefore, it is entirely the customer's responsibility to adopt defense-in-depth strategies and implement policies and measures to ensure the security of the system as a whole, including communications sent and received by the equipment. These measures include, but are not limited to, installing firewalls, antivirus and antimalware programs, data encryption, authentication control, and physical user access control.

WEG and its affiliates are not responsible for damage or losses resulting from cybersecurity breaches, including, but not limited to, unauthorized access, intrusion, leakage and/or theft of data or information, denial of service, or any other form of security breach. The use of this product under conditions for which it was not specifically designed is not recommended and may result in damage to the product, the network and the automation system.

In this sense, it is essential that the customer understands that external interventions through third-party programs, such as sniffers or programs with similar actions, have the potential to cause interruptions or restrictions in the equipment's functionality.

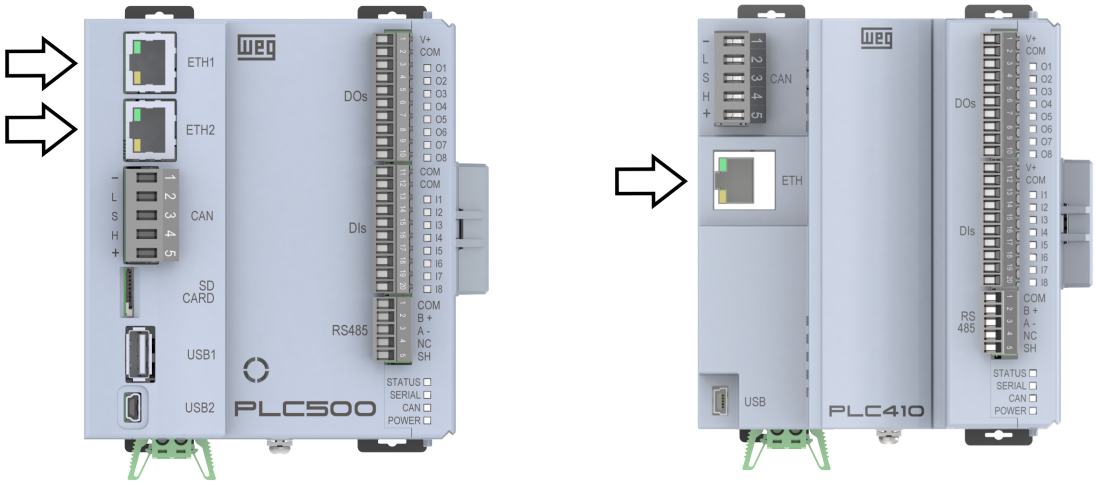
1.5 TRADEMARKS

PROFINET® is a registered trademark of PROFIBUS Nutzerorganisation e.V.

All other trademarks are the property of their respective owners.

2 ETHERNET INTERFACE

PROFINET communication is performed through the Ethernet interfaces, indicated in Figure 2.1 for the PLC500 and PLC410. Initially, each Ethernet port has the IP address indicated in Table 2.1, which can be changed through the application in the CODESYS software.



(a) (b)

Figure 2.1: *Indication of the Ethernet interfaces of the PLCs. (a) PLC500 and (b) PLC410.*

Table 2.1: *Default addresses for the Ethernet interfaces.*

PLC410	PLC500	Default IP address
ETH	ETH1	192.168.1.10
-	ETH2	192.168.2.10

The pinout of the connector follows the Ethernet 1000BASE-TX standard. The PLC410 Ethernet interface supports speeds up to 100 Mbps, while the PLC500 Ethernet interfaces reach up to 1000 Mbps.

The interface is compatible with several communication protocols, including PROFINET. For instructions on how to configure these networks, refer to the product Application Notes available on the WEG website.

2.1 INDICATION LEDS

The Ethernet ports have LEDs to indicate speed and network link/activity, as indicated in Figure 2.2. These LEDs have the behavior described in Table 2.2 and Table 2.3.

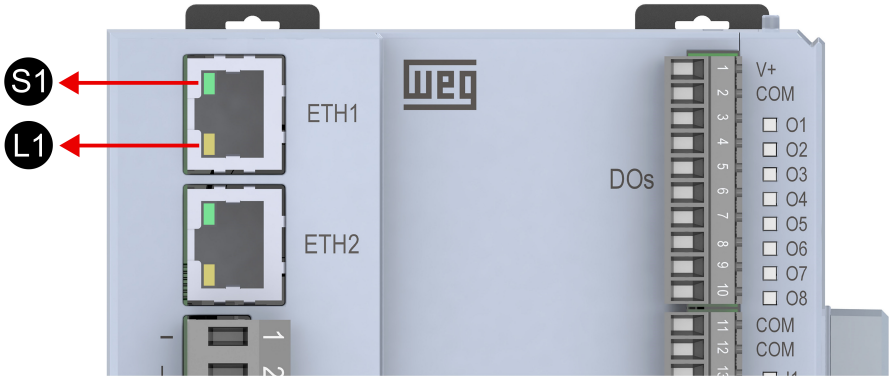


Figure 2.2: *Speed and link/activity LEDs of the PLC500 Ethernet interface.*

Table 2.2: *S1 LED - Speed.*

State	Description
Off	Equipment powered off or 10 Mbps link
Green, steady	100 Mbps link

Table 2.3: L1 LED - Link/Activity.

State	Description
Off	Equipment powered off or no link
Amber, steady	With link and no network activity
Amber, blinking	With link and with network activity

2.2 PROFINET NETWORK INSTALLATION

The PROFINET network, like many industrial communication networks, because it is often applied in harsh environments with high exposure to electromagnetic interference, requires certain precautions to ensure a low communication error rate during its operation.

ATTENTION!

It is recommended to use passive components (cables, connectors, switches) certified for industrial applications.

The recommended characteristics for the cable used in the installation are:

- Standard Ethernet cable, 100Base-TX, CAT 6 or higher.
- Shielded cable.
- Maximum length of 100 m for connections between equipment.

Switches can be used in PROFINET networks together with other TCP/UDP network protocols, as demonstrated in Figure 2.3. Switches that are compatible with the LLDP protocol offer more advanced PROFINET diagnostics, and also enable integration with devices that do not support MRP.

NOTE!

To ensure reliable network management and advanced diagnostic capabilities, it is recommended to use devices and switches compatible with PROFINET.

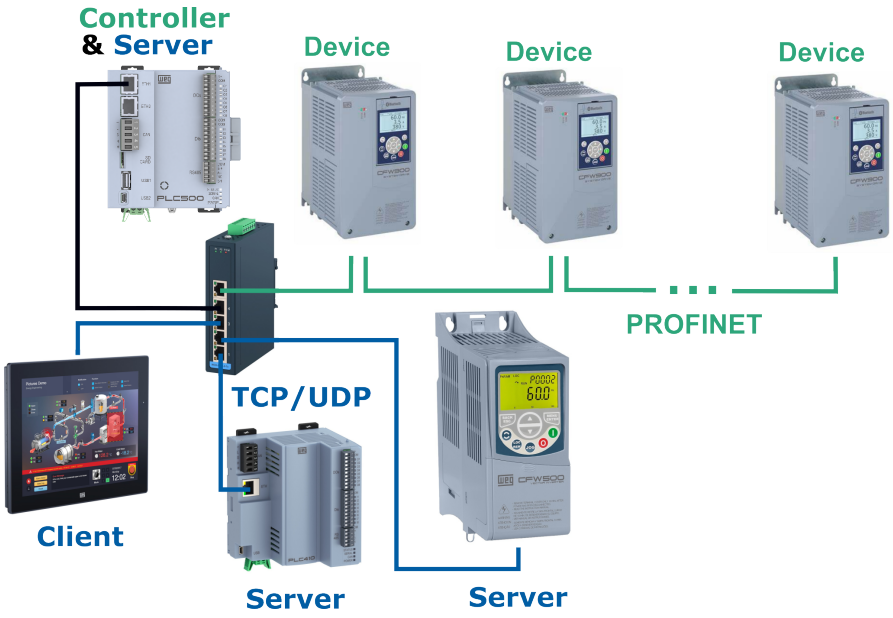


Figure 2.3: PROFINET network topology with other TCP/UDP protocols on Ethernet port 1 of the PLC500 using a switch.

ATTENTION!

The PROFINET and EtherCAT protocols do not work using the same Ethernet port. In the PLC500, PLC500MC and PLC500ED models it is necessary for each protocol to use a separate interface, as demonstrated in Figure 2.4.

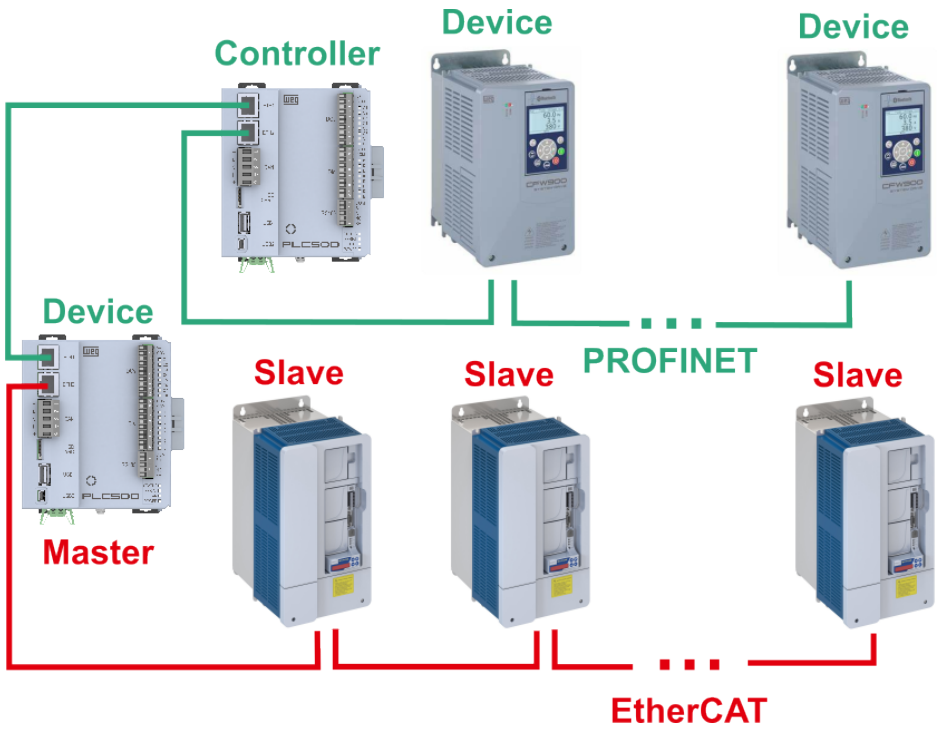


Figure 2.4: *PROFINET and EtherCAT network topology using distinct Ethernet interfaces.*

A proper connection to the grounding system is essential to minimize electromagnetic interference problems in industrial environments. It is important to avoid connecting the cable at multiple grounding points, especially in locations where there are potential differences between ground points. In addition, it is recommended that signal and communication cables be installed in dedicated routes, keeping distance from power cables.

DANGER!

Improper grounding installations may cause failures in the PROFINET network and represent a risk of fatal electric shock.

2.3 PROFINET NETWORK TOPOLOGIES

Network topologies in a PROFINET system may vary according to project needs and installation architecture. The protocol has network scanning functionality and is able to automatically detect the installed topology. Noteworthy are the star topology, in which a central switch connects all

devices, as illustrated in Figure 2.5; the daisy-chain topology, which enables sequential connection of devices, as shown in Figure 2.6; and the combination of both topologies, as exemplified in Figure 2.7.

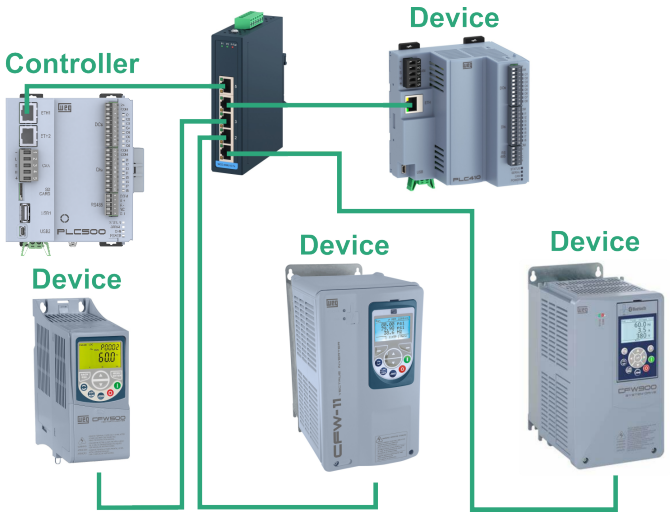


Figure 2.5: *PROFINET star topology.*

Figure 2.6: *PROFINET daisy-chain topology (daisy-chain).*

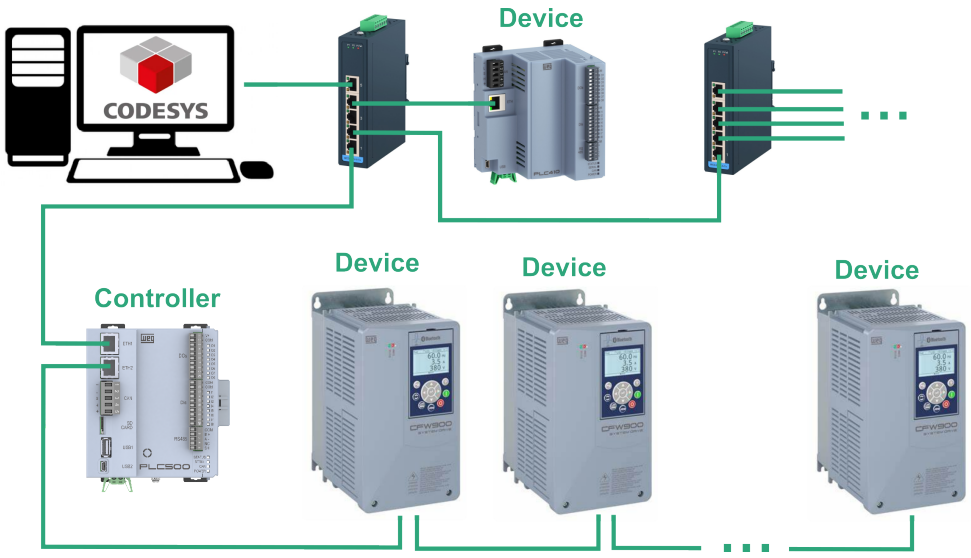


Figure 2.7: *Mixed PROFINET topology.*

3 CODESYS PROJECT

In this chapter, the steps to create a project and add the PROFINET Controller and Device in CODESYS are presented.

3.1 PROJECT CREATION

In the CODESYS software, create a new project using the Standard project template, choose the directory and the application name. Then, select the PLC500 device and the desired programming language, as shown in Figure 3.1.

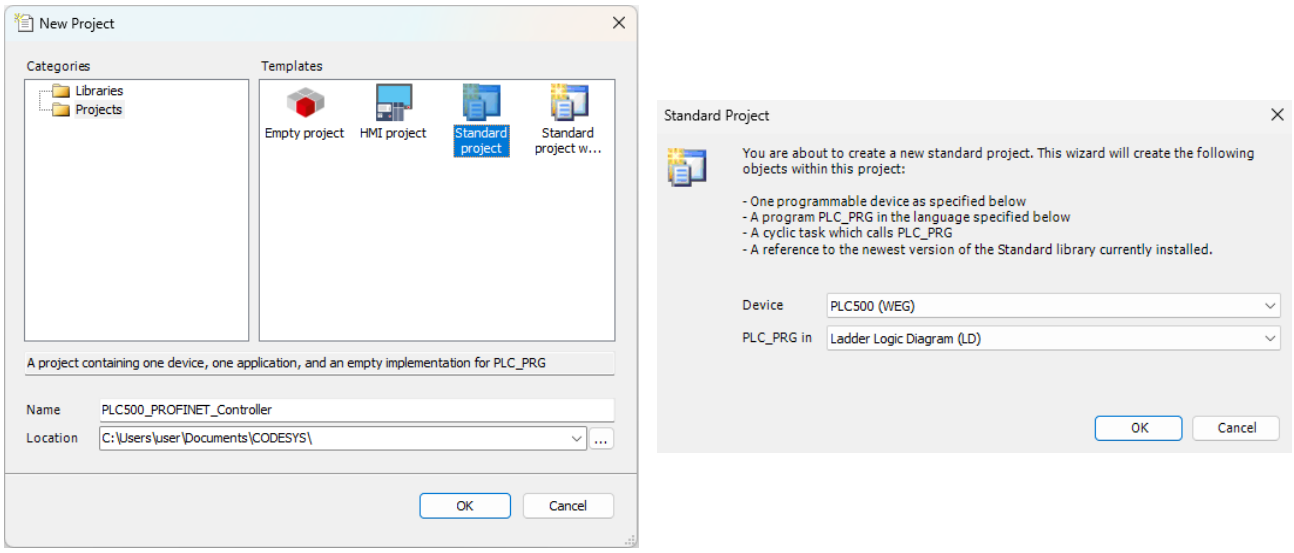


Figure 3.1: *Project configuration in CODESYS.*

NOTE!

If the PLC410, PLC500, PLC500ED or PLC500MC device is not yet available among the options, you must download and install the **WEG package** for CODESYS. Check the **Product Manual** available on the WEG website to find the necessary steps and settings.

When creating an application for the PLC500, the standard network interfaces will be automatically pre-configured, as shown in Figure 3.2.

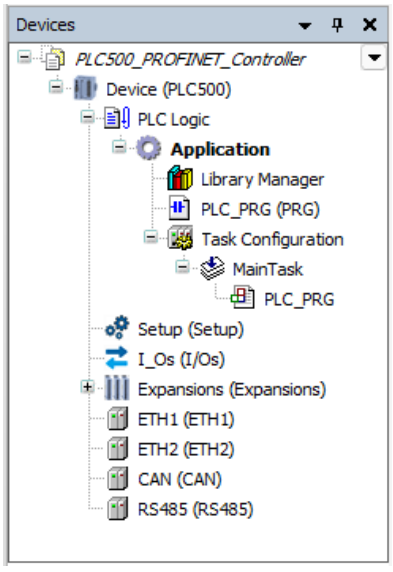


Figure 3.2: *PLC500 initial project tree.*

3.2 ADDING THE PROFINET CONTROLLER

Right-click on the Ethernet interface chosen for communication and select **Add Device**. A new window will open. Expand the **Fieldbuses**, **PROFINET IO** and **PROFINET IO Master** icons using the **+** symbol until the **PN-Controller** device appears, as shown in Figure 3.3. With the device selected, click **Add Device**.

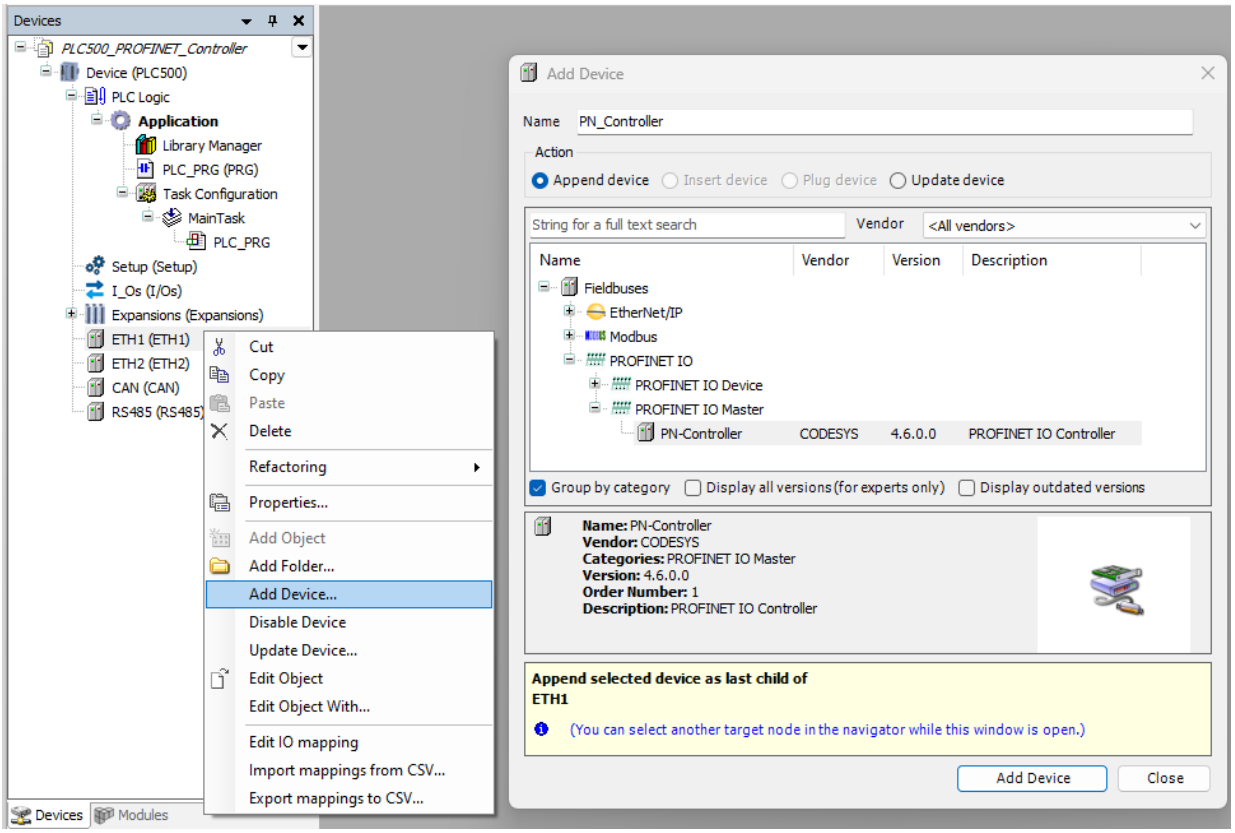


Figure 3.3: *Adding the PROFINET Controller.*

The **PN-Controller** device will be incorporated into the project tree and the **Profinet_CommunicationTask** and **Profinet_IOTask** tasks will be automatically added, as illustrated in Figure 3.4.

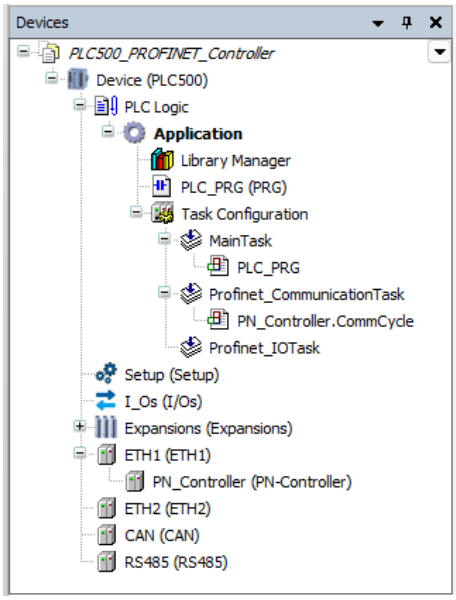


Figure 3.4: *PN-Controller added to the project tree.*

NOTE!

Profinet_IOTask is the task used for cyclic communication of PROFINET RT packets. **Profinet_CommunicationTask** is the task used for acyclic communication in the PROFINET network, having low priority because it is not critical.

3.3 ADDING THE PROFINET DEVICE USING THE GSDML FILE

Right-click on the **PN-Controller** and select **Add Device**. A new window will open. Devices that already have their GSDML file installed in the CODESYS repository will be displayed. Select the desired Device with its corresponding firmware version and click **Add Device**, as demonstrated in Figure 3.5.

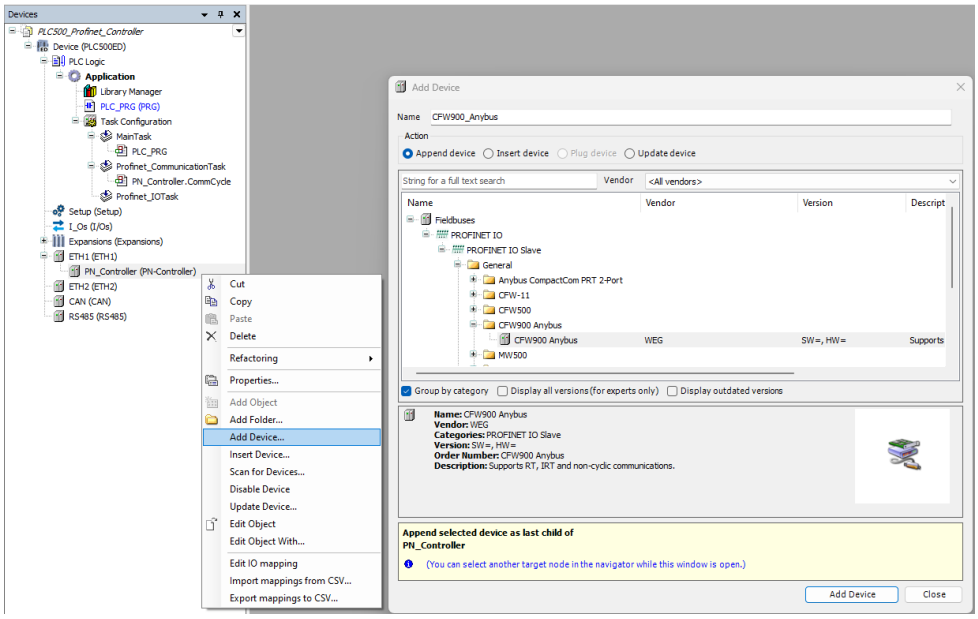


Figure 3.5: *Adding a PROFINET Device using the repository.*

3.4 IMPORTING A GSDML FILE INTO CODESYS

If the equipment is not found in the previous window, you must obtain its GSDML file from the manufacturer and import it into CODESYS. Next, the GSDML file of the CFW900 will be installed as an example, which is available on the product page on the WEG website. The GSDML file installation must be done in **Tools** → **Device Repository**, as demonstrated in Figure 3.6.

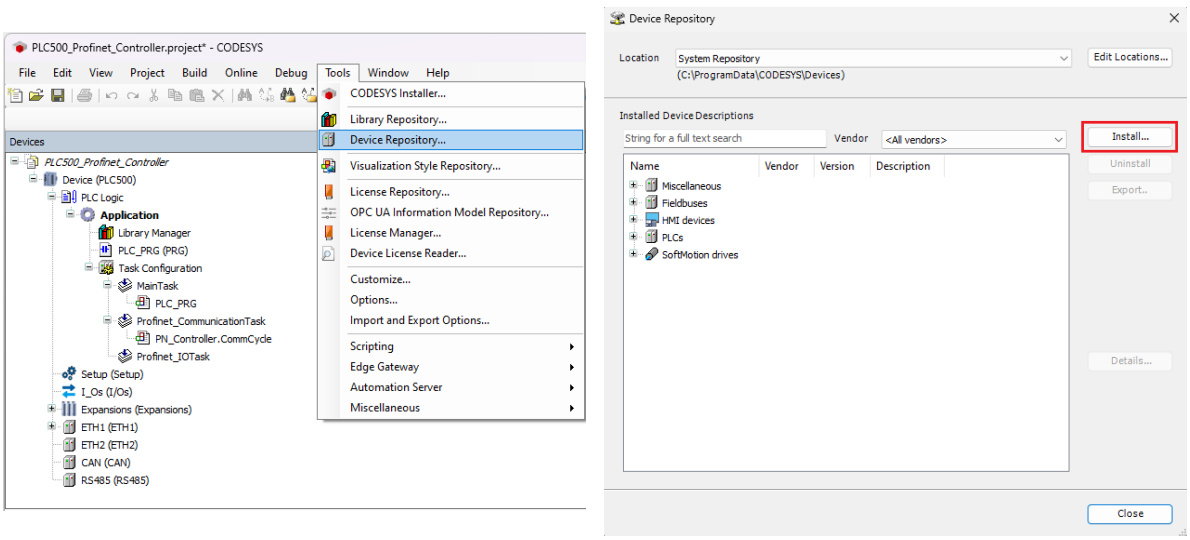


Figure 3.6: *Installing a new device in Device Repository in CODESYS.*

NOTE!

PROFINET Devices that use CODESYS, such as the PLC500, PLC500MC, PLC500ED and PLC410, do not require a GSDML file to be imported. They use the **CODESYS PROFINET Device** that is already included in the CODESYS PROFINET library.

Click **Install...** and select the GSDML file, as in Figure 3.7. After the GSDML is selected, the **Device Repository** window will display a message that the device has been installed and its icon will be shown in the device list.

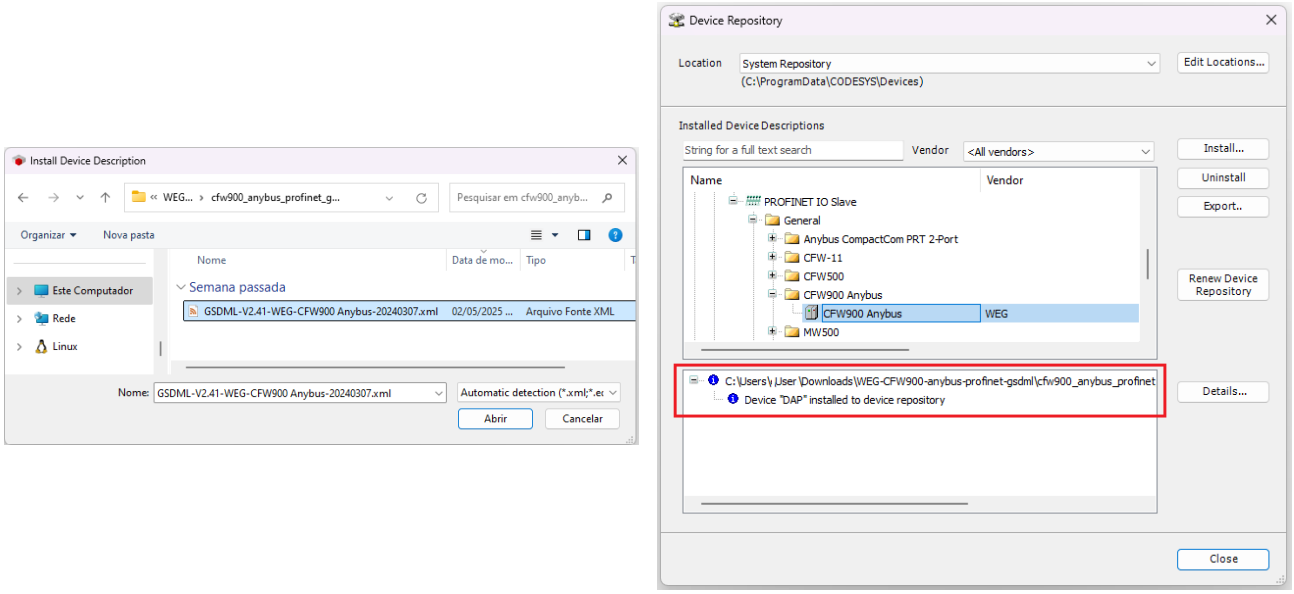


Figure 3.7: *Selecting the GSDML file and successful device installation.*

3.5 ADDING A PROFINET DEVICE USING NETWORK SCANNING

Another way to add a PROFINET Device in CODESYS is through network scanning. For this, the PROFINET Device GSDML file must be installed in CODESYS, and the Device must be previously configured and connected to the network. In the following example, a PLC500 already configured as a PROFINET Device will be added; for more information on how the configuration was performed, consult the PROFINET Device application guide on the product page available on the WEG website.

NOTE!

Depending on the device, it may be necessary to perform a pre-configuration for it to operate correctly on the PROFINET network. Consult the documentation of the respective device on the manufacturer's website.

Right-click on the **PN-Controller** and select **Scan for Devices...**; devices already configured as a PROFINET Device and connected via Ethernet within the same IP address range will be displayed, as in the example shown in Figure 3.8.

NOTE!

The **Scan for Devices** option works only if the PLC500 is already configured as a PROFINET Controller. Otherwise, it is necessary to download the program to perform the configuration. Details of the PROFINET Controller configuration can be seen in Section 4.1 ETHERNET INTERFACE CONFIGURATION.

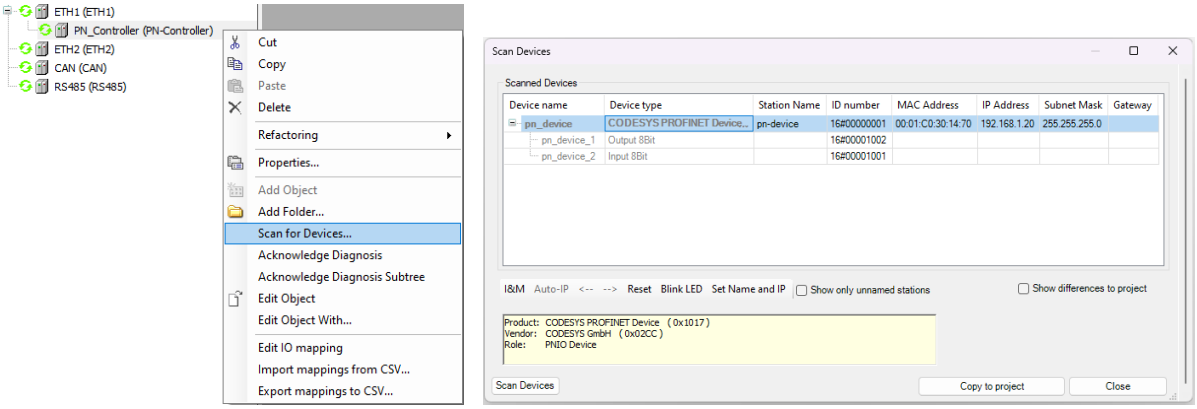


Figure 3.8: *PROFINET Device detected through network scanning.*

To add the detected devices individually, select them and click **Copy to Project**. It is also possible to copy all detected devices to the project using the **Copy All Devices to Project** option. To finalize the configuration, a new download to the PLC must be performed.

ATTENTION!

If there is already a PROFINET Device configured in the project tree, when selecting the **Copy All Devices to Project** option to add new devices, the **Process data** and **I/O Mapping** data of the previously configured PROFINET Devices may be overwritten. To ensure that the settings of existing devices are not changed, use the **Copy to Project** option and copy only the new devices you want to add to the project.

NOTE!

If the GSDML file of the detected device is not installed, the message "**Attention! The device was not found in the repository**", will be displayed, and it will not be possible to add it to the project. Obtain the GSDML file from the manufacturer and follow the installation steps presented previously.

At this point, the **PN-Controller** interface must have the devices added, as shown in the example in Figure 3.9.

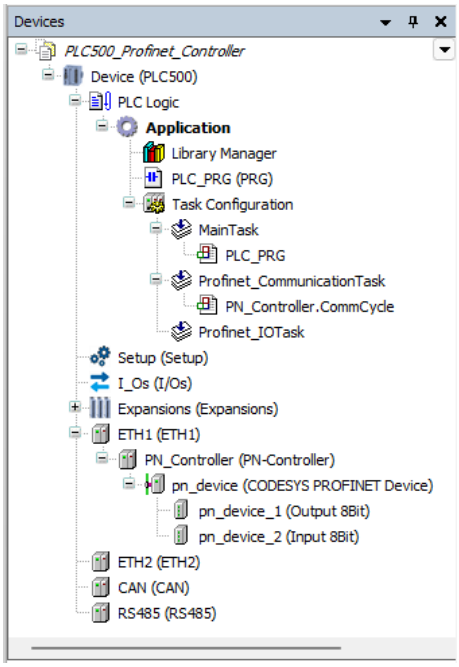


Figure 3.9: *Devices added for PROFINET communication.*

4 PROFINET NETWORK CONFIGURATION

In this chapter, the steps on how to configure a PROFINET network with the PLC500 acting as a Controller in CODESYS are presented.

4.1 ETHERNET INTERFACE CONFIGURATION

The configuration of the PLC500 Ethernet interfaces can be done through the **Setup** tab in CODESYS, as indicated in Figure 4.1.

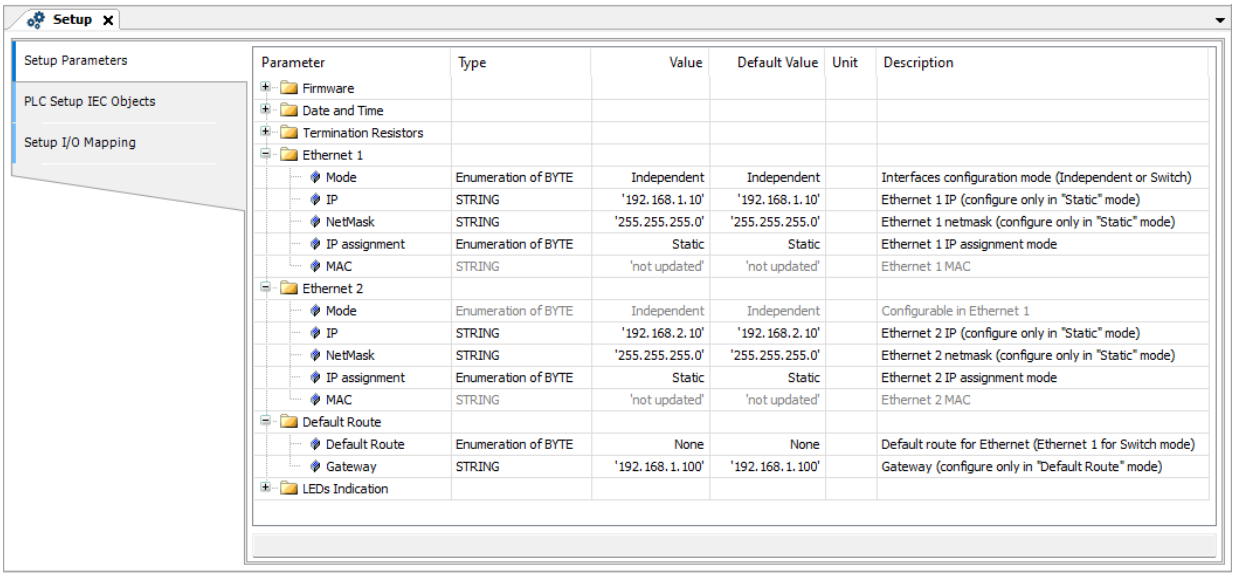


Figure 4.1: *Network interface configuration for the PLC500.*

To obtain the IP address of an interface automatically on the network, change the **IP assigment** field to **DHCP**. When selecting this option, the interface will request an IP address from a DHCP server available on the network, which will assign a valid IP and other settings, such as subnet mask and default gateway.

ATTENTION!

The Ethernet ports, when configured in **Independent** mode, must operate on **distinct networks**. Do not use the **192.168.234.XXX** address range, as it is reserved for access to the PLC500 through the USB2 interface. **Incorrectly configuring these ports may result in loss of access to the PLC**, making it unreachable via Ethernet until the settings are corrected.

4.2 SWITCH MODE

The PLC500 can operate in **Switch** mode, in which a new network interface called **br1** is created to virtually interconnect Ethernet 1 and Ethernet 2 interfaces, allowing both to share the same IP address configured on Ethernet 1. The user can change the operating mode of the interfaces from **Independent** to **Switch** in the **Mode** parameter of Ethernet interface 1, as demonstrated in Figure 4.2.

ATTENTION!

If the PLC500, PLC500MC or PLC500ED are configured in **Switch** mode, PROFINET communication is established only through the ETH1 interface. ETH2 can be used to expand the PROFINET network in a daisy-chain topology (*daisy-chain*) or for other TCP/UDP protocols.

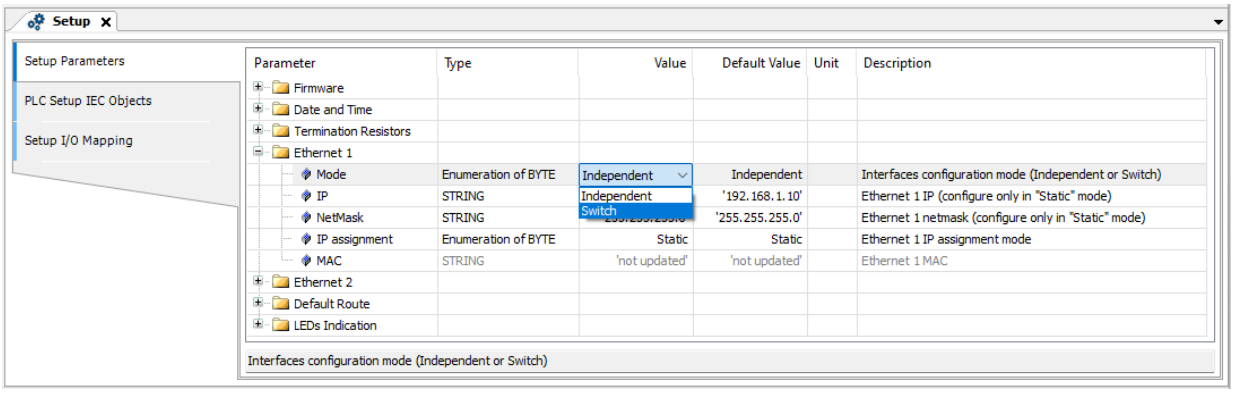


Figure 4.2: *Configuration of the switch mode for the Ethernet interfaces.*

NOTE!

When changing to **Switch** operating mode, it is recommended to restart the product, as this action is necessary to ensure the proper operation of some communication protocols.

4.3 NETWORK CONFIGURATION

Every device on an Ethernet network requires an IP address and a subnet mask. The network must be configured with valid addresses for each PROFINET Controller and PROFINET Device, ensuring that the addresses are unique and within the allowed IPv4 address range. Otherwise, connectivity problems may occur.

By double-clicking the Ethernet interface that has the PROFINET Controller, a window opens, as shown in Figure 4.3. The **Browse** box is used to select the Ethernet port. Below this box, the device IP, network mask and gateway can be changed.

NOTE!

To use the **Browse** box, the PLC500 must be correctly connected and identified on the computer. Otherwise, a network communication error will be generated.

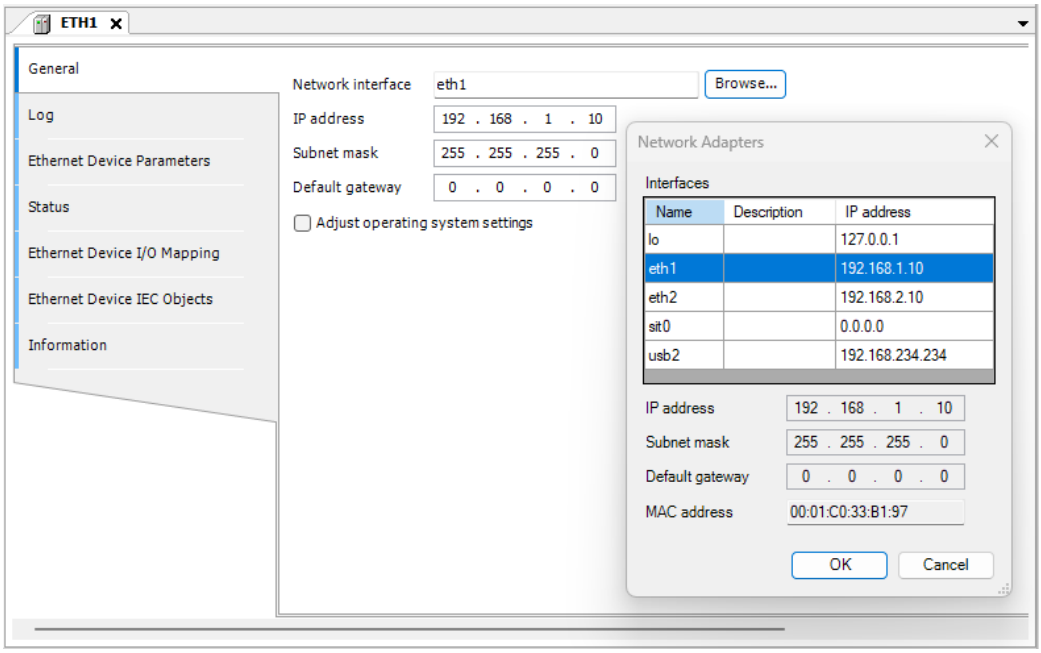


Figure 4.3: *Network configuration for the PLC500 using ETH1 in independent mode.*

NOTE!

In the **Network interface** field, enter the name of the interface that will be used by the PLC500 for PROFINET communication. If this field remains empty, communication will not function properly.

If the PLC500 is configured in **Switch** mode, the **br1** interface must be used for PROFINET communication, as demonstrated in Figure 4.4. If the interface is not yet configured in this mode, it will not appear in the **Browse** option, and it must be typed manually. Make sure the IP address is the same as configured on Ethernet port 1 in the PLC500 **Setup**.

NOTE!

The **br1** interface appears after downloading the program to the PLC500 configured in **Switch** mode. Again, it is important to ensure that the product is restarted when this is the first time the Ethernet interface is being configured in this mode.

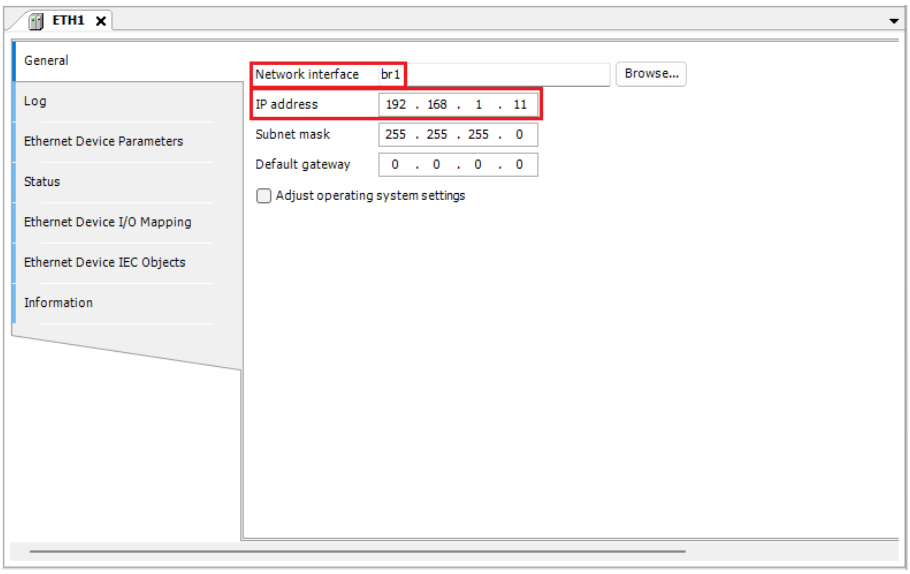


Figure 4.4: *Network configuration for the PLC500 in switch mode.*

4.4 PROFINET CONTROLLER CONFIGURATION

Double-click on the **PN-Controller** to open the general configuration window of the PROFINET Controller. The **Station Name** parameter is the unique name of the Controller on the network; when added for the first time, by default it comes with the name **controller**. If another Controller is on the network, the name must be changed so that they are different.

First IP Address and **Last IP Address** define the IP address range of the PROFINET Devices on the network. **Subnet mask** and **Default gateway** can be configured to access the devices' subnets. The address range must be compatible with the IP configured on the Ethernet interface used for PROFINET communication.

The **Application stop** → **Substitute values** option allows that, if the Controller enters STOP mode, the output values of the PROFINET Devices on the network are substituted by the values previously defined by each device. The **Add to I/O mapping** option configures provider status variables for input data and consumer status variables for output data.

NOTE!

The **Application stop** → **Substitute values** and **Add to I/O mapping** options are enabled by default and are generally recommended for the configuration.

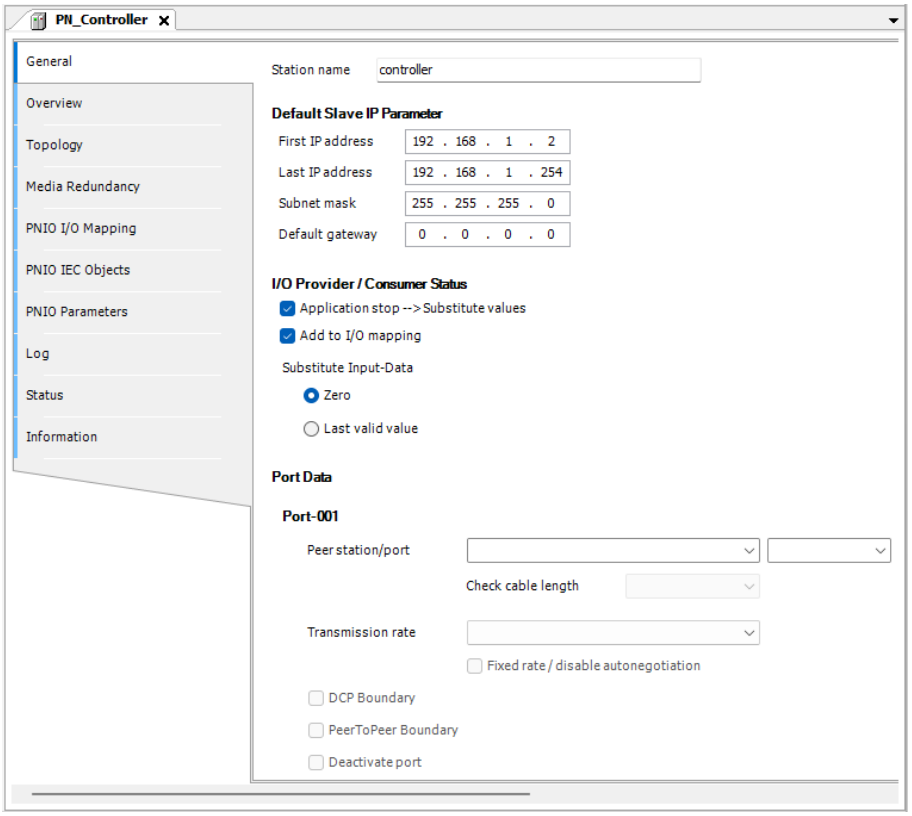


Figure 4.5: *PROFINET Controller general settings.*

4.5 PROFINET DEVICE CONFIGURATION

Double-click on the PROFINET Device icon to open the general configuration window. Similar to the Controller, the PROFINET Device has a **Station Name** that must be unique on the network. In the **IP parameter** fields it is possible to edit the IP address, subnet mask and gateway of the device.

ATTENTION!

If the PROFINET Device was added manually through **Add Device**, its **Station Name** and **IP Parameter** must be the same as configured in the device.

The options under **Communication** configure how cyclic PROFINET communication between the Controller and the Device will behave.

NOTE!

Acyclic PROFINET communication can be performed using the **CommFB** library. It is automatically added to the **Library manager** when a PROFINET Controller is present in the project tree. Check the library documentation for more information in the **Library manager** or in the CODESYS Online Help.

Reduction time is a multiplicative factor of **Send Clock**, defining the time for cyclic sending of data from the Device to the Controller. For example, if **Send Clock** is 2ms and **Reduction time** is 4, then 2ms×4=8ms, so cyclic data sending will be 8ms. **Phase** is a parameter to split data packets into stages for better distribution of network traffic among PROFINET Devices.

NOTE!

To establish a basic PROFINET communication, it is recommended to keep the default values of **Send Clock**, **Reduction time**, **Phase** and **Data hold time (ms)** that are imported individually from PROFINET Devices through network scanning.

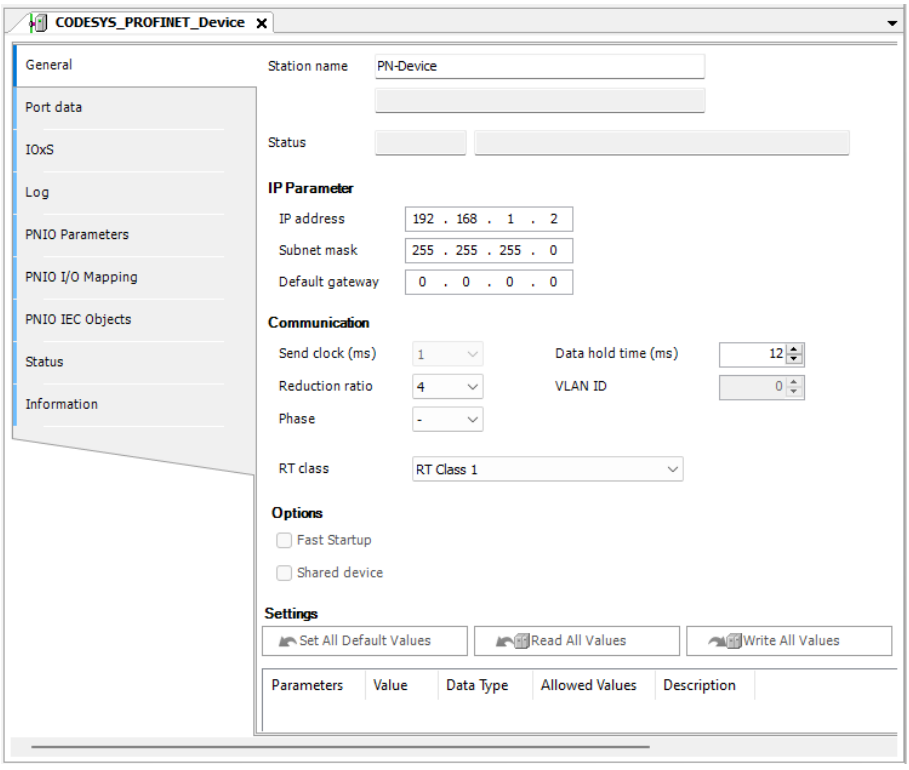


Figure 4.6: PROFINET Device general settings.

If the PROFINET Device was added through **Scan for Devices**, its submodules will already be configured in the project tree. Depending on the device, the data types in each submodule may be different. In the example, there is a PLC500 configured as a PROFINET Device with 2 submodules: **InOut_8bit** for 8 input variables and 8 output variables of type BOOL, and **InOut_Float32** for 1 input variable and 1 output variable of type FLOAT. The variables present in the submodules can be mapped to application variables as needed.

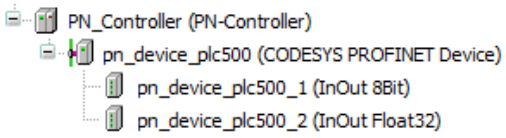


Figure 4.7: *PLC500 as a PROFINET Device in the project tree with its submodules.*

NOTE!

The submodules of the PLC410, PLC500, PLC500MC and PLC500ED as a PROFINET Device can be fully customized according to the application. For more details, check the PROFINET Device application guide on the product page available on the WEG website.

If the PROFINET Device is added manually to the project tree, it may be necessary to configure it. To do so, right-click on **PN-Controller** and select **Add Device...**. Then, choose the desired PROFINET Device.

The PLC410, PLC500, PLC500MC and PLC500ED controllers can be added as **CODESYS PROFINET Device**.

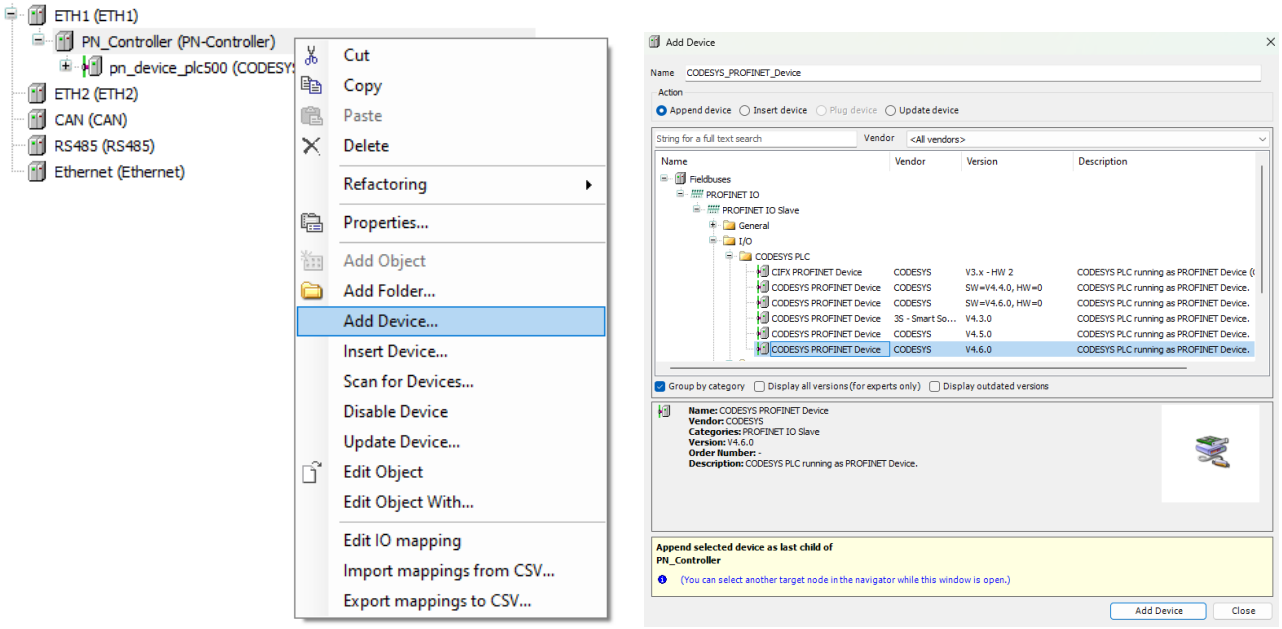


Figure 4.8: *Adding a PROFINET Device manually.*

To add the submodules, right-click on **PN_Controller** and click **Add Device...**. The window will show the variable types available for the device.

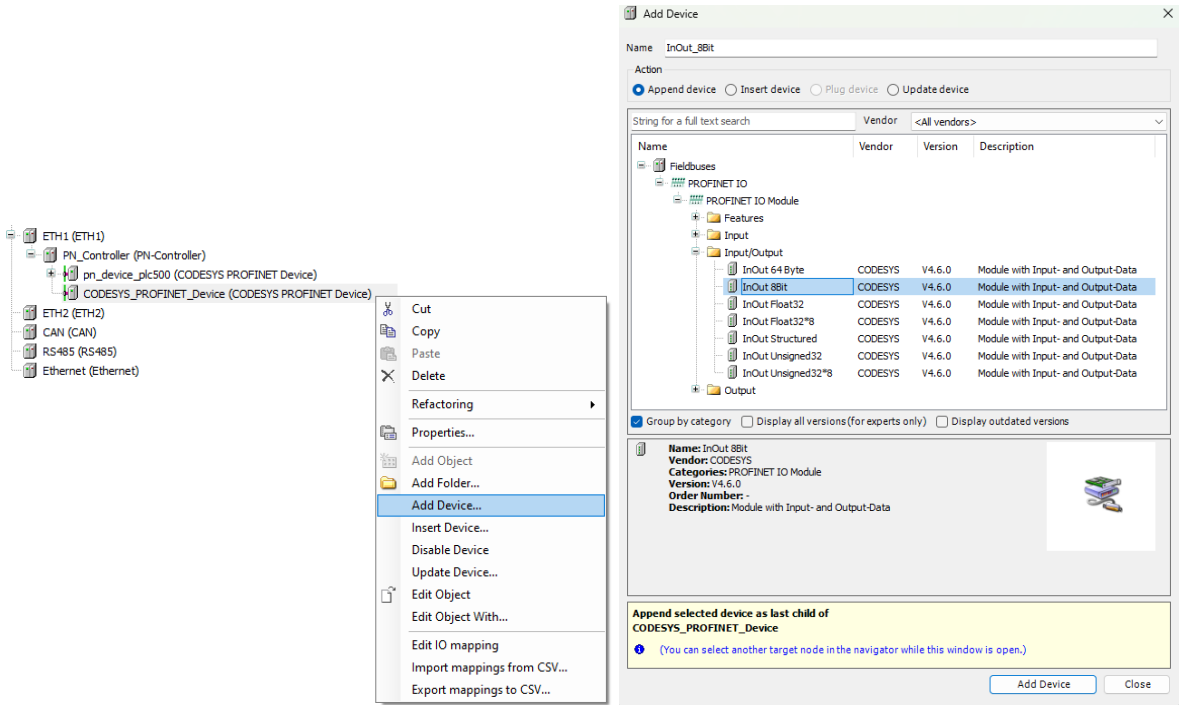


Figure 4.9: *Manually adding a submodule to the PROFINET Device.*

ATTENTION!

The composition of the submodules of a PROFINET Device inserted manually must correspond exactly to how it is configured in the device for communication to be established. Therefore, it is recommended to use the **Scan for Devices** function so that the PROFINET Device found on the network is already added to the project with its submodules configured.

Depending on the PROFINET Device, it is possible to add several submodules with different data types. Consult the manual or specific application guide of your device for more information.

NOTE!

For WEG PLCs with CODESYS, the maximum number of supported data is 1440 bytes for output variables and 1440 bytes for input variables.

The figure below shows an example of a PLC500 configured as a PROFINET Device, with three types of submodules added.

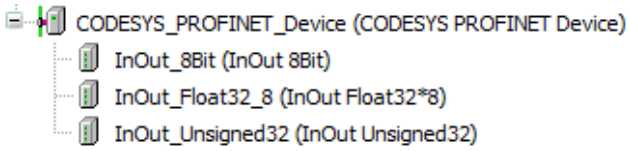


Figure 4.10: *CODESYS PROFINET Device with 3 submodules.*

NOTE!

To facilitate identification, you can change the name of the device and its submodules by right-clicking **Refactoring** → **Rename** or through **Properties**.

5 MONITORING

In this chapter, some methods for monitoring PROFINET network variables and diagnosing communication errors in CODESYS are presented.

5.1 VARIABLE MONITORING

The variables declared on the network can be monitored through two methods: the first possibility is to add them to the CODESYS program and monitor the variable values online. The second method only requires enabling **Always Update Variables** → **Enabled 1 (use bus cycle task if not used in any task)** at the bottom of the **PNIO Module I/O Mapping** tab for each submodule, as indicated by the red arrow in Figure 5.1.

NOTE!

The **bus cycle task** used by default for PROFINET I/O variables is **Profinet_IOTask**.

ATTENTION!

Using PROFINET I/O input and output variables in multiple tasks may lead to unexpected behavior. It is recommended to use the variables in the default task **Profinet_IOTask**, or in another exclusive task configured in **PN-Controller** → **PNIO I/O Mapping** → **Bus Cycle Options**.

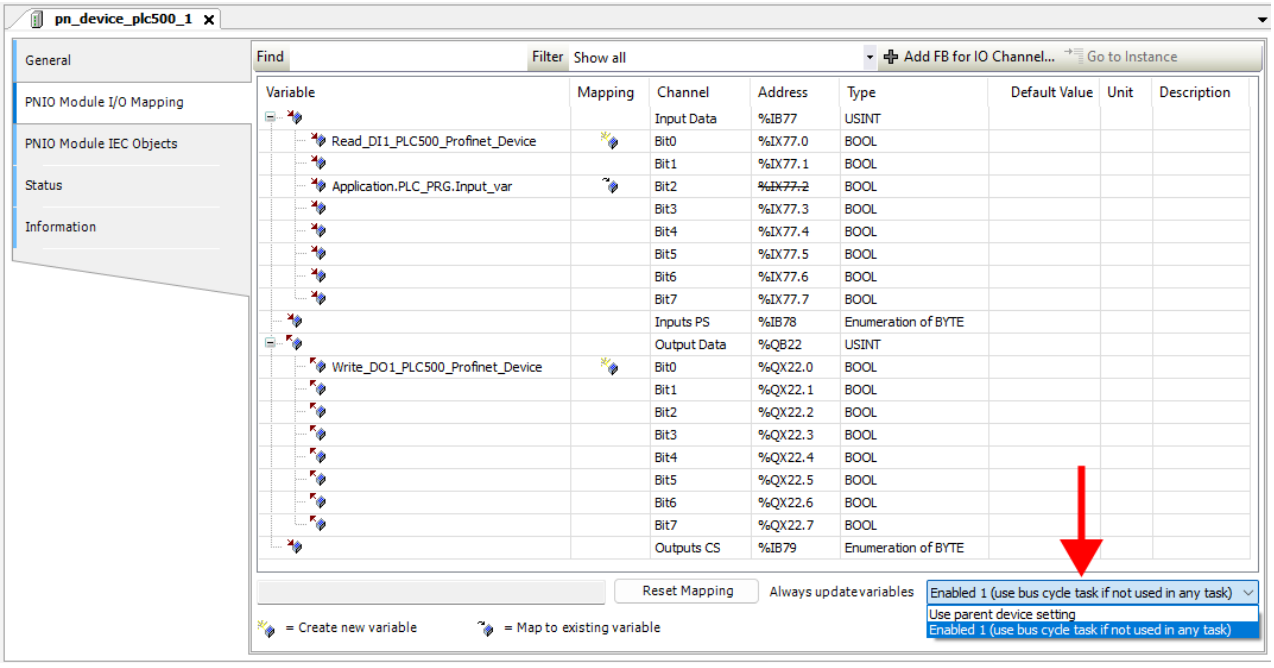


Figure 5.1: *PROFINET variable update option.*

Figure 5.7 shows the CODESYS variable visualization screen for two submodules of a PLC500 as a PROFINET Device through online monitoring.

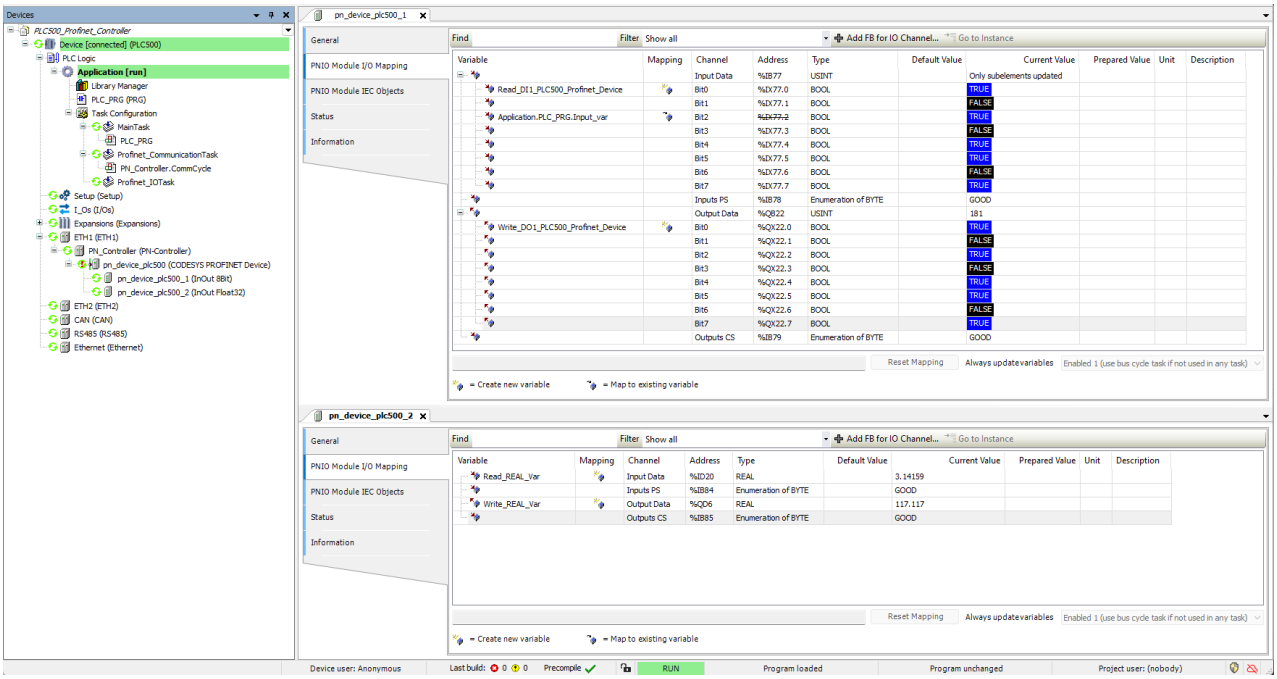


Figure 5.2: *Monitoring PROFINET variables in online mode in CODESYS.*

NOTE!

The PLC410, PLC500, PLC500MC and PLC500ED as a PROFINET Device do not have the functionality for a PROFINET Controller to configure the IP address via the network. Thus, the symbol on the **CODESYS PROFINET Device** is normally shown when the connection is established with the device. In the **Status** tab of the **CODESYS PROFINET Device** a message will appear indicating that this functionality is not enabled; however, PROFINET communication works normally.

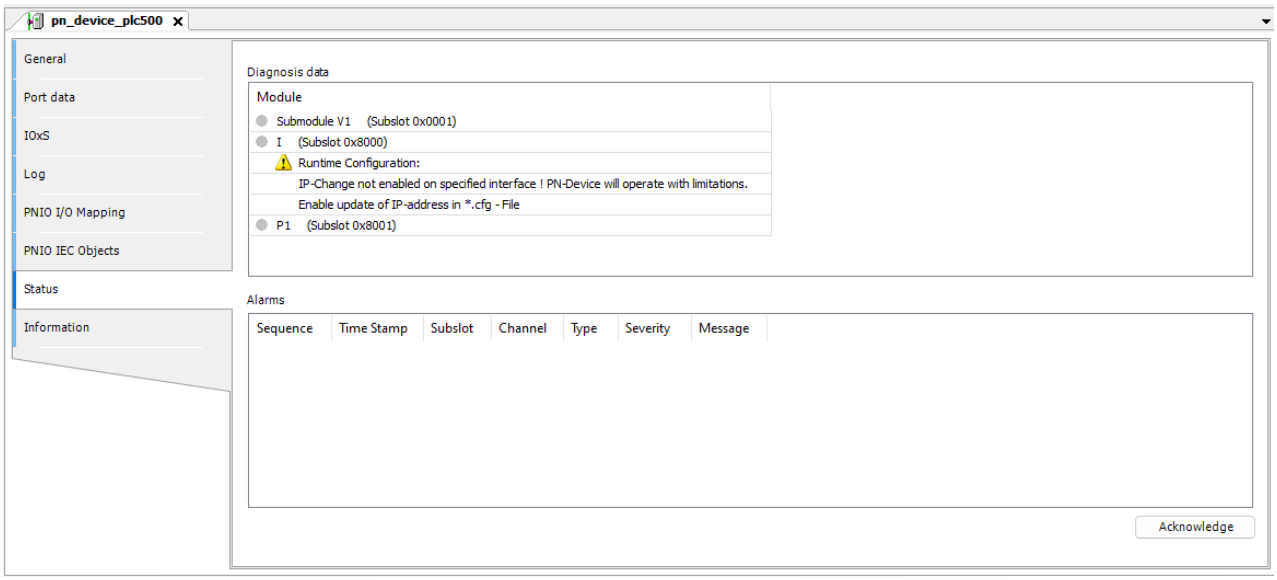


Figure 5.3: *Warning: IP change via the PROFINET network functionality is not enabled.*

5.2 COMMUNICATION ERRORS

When communication problems are found, as shown in Figure 5.4, analyze the **Status** and **Logs** information of the devices, check whether the cables are properly connected, the state of the LED on the Ethernet port used

on the PLC, and review the performed settings. Red icons or exclamation marks may represent communication or configuration failures.

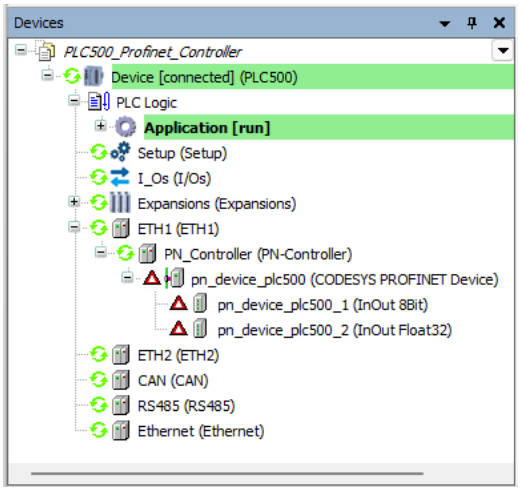


Figure 5.4: *Indication of communication failures.*

In the **Status** tab of the **PN-Controller**, network diagnostic information is displayed, such as the number of established connections, number of sent and received frames, average time for sending and receiving data, among others.

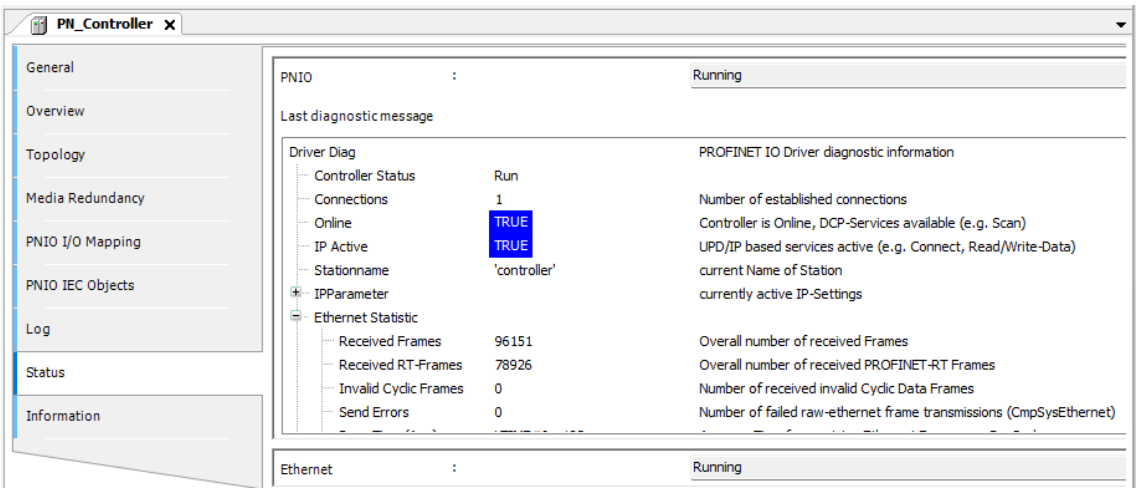


Figure 5.5: *PROFINET Controller Status window.*

The **Logs** tab of the **PN-Controller** provides more detailed information about the PROFINET communication performed by the PLC500.

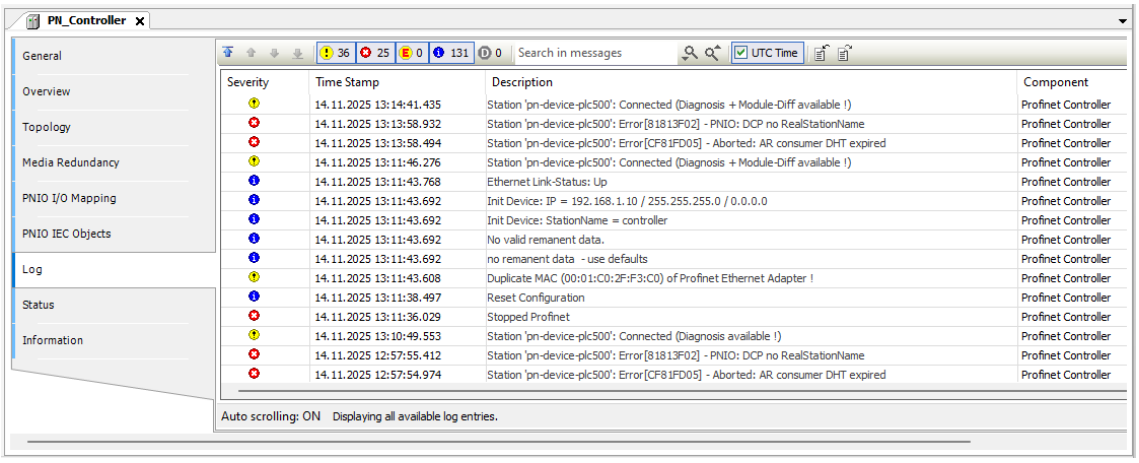


Figure 5.6: *PROFINET Controller logs.*

The PROFINET Device also has **Status** and **Log** tabs that can be used for network diagnosis. Each of its submodules has a **Status** tab in which the **Diagnosis data** and **Alarms** fields may indicate new information about communication or configuration errors. In the example below, the submodule is indicating a configuration failure, as a result of an incorrect manual configuration of one or more of its submodules (Submodule-State: Wrong submodule).

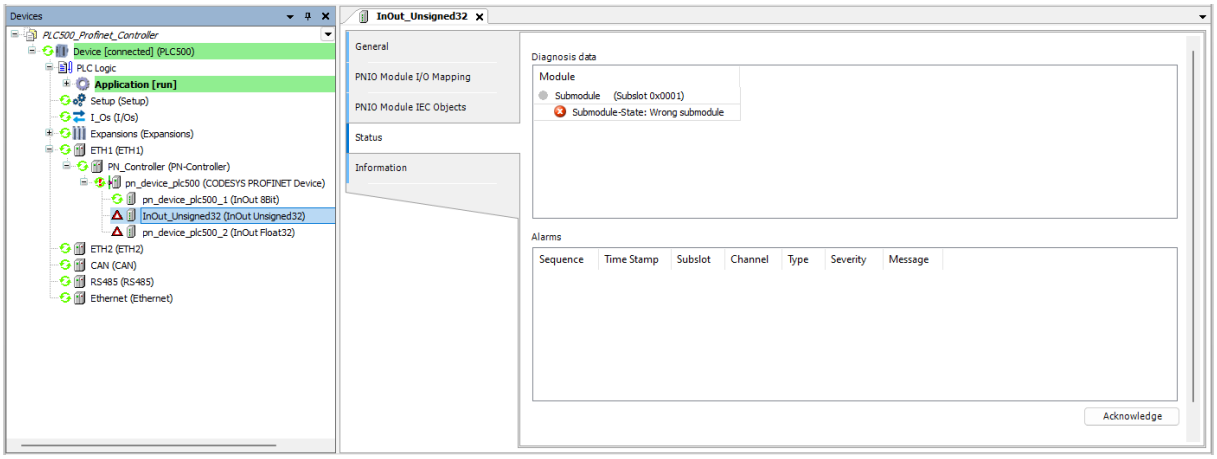


Figure 5.7: *PROFINET Device submodule indicating a configuration failure.*

After communication is re-established following an error, the symbol will appear. To clear the indication, right-click the device and select **Acknowledge Diagnosis** or go to the **Status** tab and click the **Acknowledge** button.

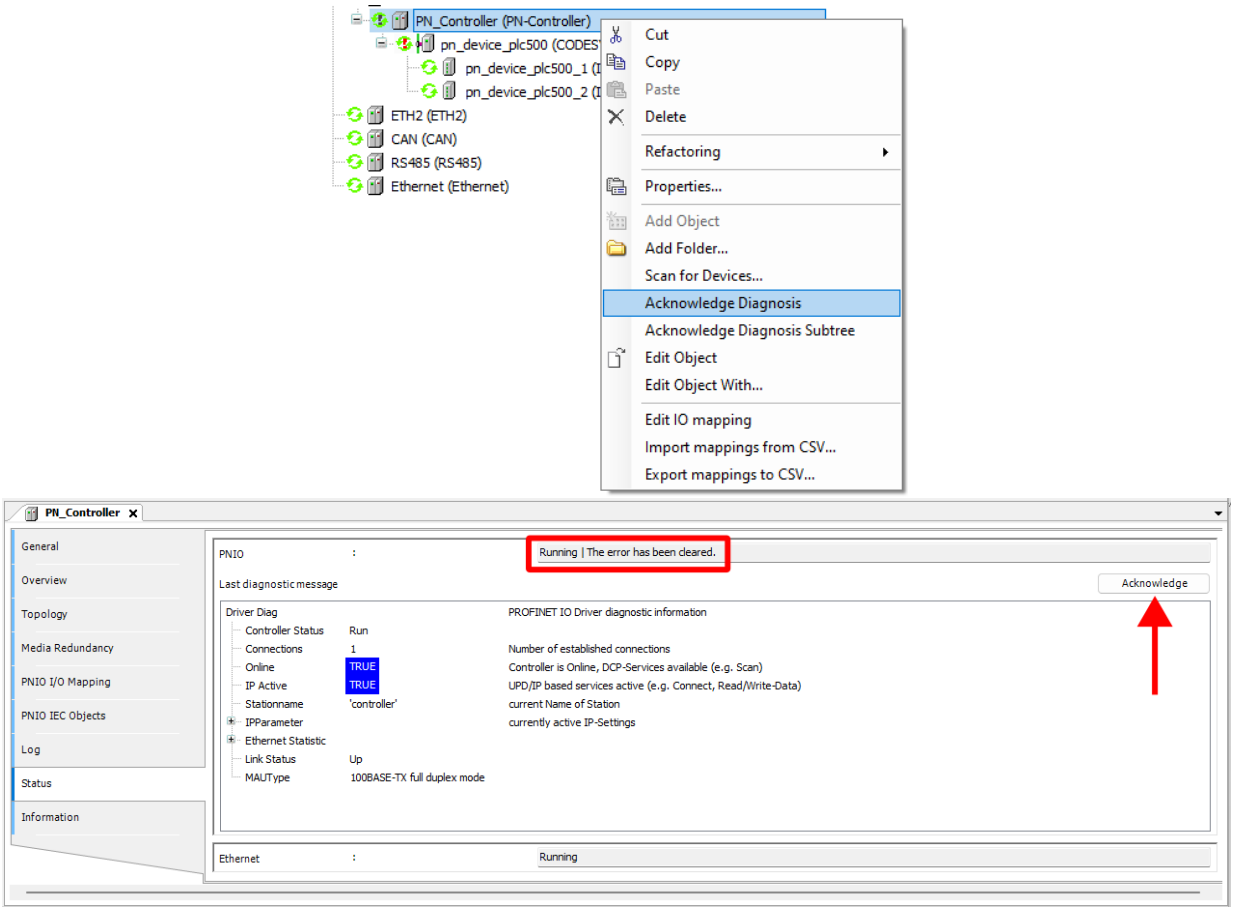


Figure 5.8: *Clearing the PROFINET communication error indication.*

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