



**Operating instruction manual
DTM for Hilscher PROFINET IO-Controller
devices (RT/IRT)
Configuration of Hilscher controller devices
V1.200**

**Hilscher Gesellschaft für Systemautomation mbH
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1 Introduction

1.1 About this manual

This manual provides information on how to set and configure the device parameters of a netX based PROFINET IO-Controller using the PROFINET IO-Controller DTM, and what can be read from the diagnosis panes.

The configuration of the Sync domain settings for RT or IRT-capable PROFINET IO-Devices is enclosed.



Refer to the operating instruction manual “netDevice and netProject” how to create a network configuration, or to the operating instruction manual for the generic DTM, for PROFINET IO-Devices, how to configure the PROFINET IO-Device.

For information concerning the configuration of the topology of devices in domains for isochronous real-time communication (IRT), refer to the operating instruction manual Topology Editor.

Error codes



All status and error codes you find in the API manual "Hilscher status and error codes".

1.1.1 Online help

The PROFINET IO-Controller DTM contains an integrated online help.

- To open the online help, click on **Help** or press **F1**.

1.1.2 List of revisions

Index	Date	Version	Component	Changes
6	2022-04-25	1.200 (and 1.0200)	PNIOController.dll, PNIOControllerGUI.ocx	Document revised. Chapter Error codes removed. See API Manual "Hilscher status and error codes" instead.
7	2022-06-13	1.200 (and 1.0200)	PNIOController.dll, PNIOControllerGUI.ocx	Corrections.
8	2023-07-20	1.200 (and 1.0200)	PNIOController.dll, PNIOControllerGUI.ocx	Sections <i>Controller network settings</i> [▶ page 71] and <i>Address table</i> [▶ page 82] updated. Section <i>Access to online functions</i> [▶ page 20] added.

Table 1: List of revisions

1.2 Overview use cases

In the table below you find an overview of the applicable use cases.

Use case	Description	Chapter, section
Device start up	<ul style="list-style-type: none"> • Creating project configuration • Start/stop communication 	<i>Device start up</i> [▶ page 15] <i>Create project configuration</i> [▶ page 19] <i>Start/stop communication</i> [▶ page 21]
Driver and device assignment settings	<ul style="list-style-type: none"> • Verifying or adapting driver settings • Configuring drivers • Assigning device (with or without firmware) • Selecting and downloading firmware 	<i>Verifying or adapting driver settings</i> [▶ page 23] <i>Configuring drivers</i> [▶ page 25] <i>Assigning device (with or without firmware)</i> [▶ page 32] <i>Selecting and downloading firmware</i> [▶ page 37]
Configuring Ethernet devices	(device name and IP address)	<i>Ethernet devices</i> [▶ page 44]
Licensing	(licenses for master protocols)	<i>Licensing</i> [▶ page 57]
Configuring device parameters	<ul style="list-style-type: none"> • Configuring IRT communication • Controller network settings • Device table • IP address table • Set process data • Isochronous modules • Set device address • FSU/Port settings • Station timing • Controller settings 	<i>Configuring IRT communication</i> [▶ page 70] <i>Controller network settings</i> [▶ page 71] <i>Device table</i> [▶ page 74] <i>IP address table</i> [▶ page 76] <i>Process data</i> [▶ page 78] <i>Isochronous modules</i> [▶ page 79] <i>Address table</i> [▶ page 82] <i>FSU/port settings</i> [▶ page 85] <i>Stations timing</i> [▶ page 87] <i>Controller settings</i> [▶ page 104]
Connecting/disconnecting device	Establishing online connection	<i>Connecting/disconnecting device</i> [▶ page 107]
Downloading configuration	Download to the device	<i>Download configuration</i> [▶ page 109]
Importing network structure and upload	Identifying network configuration automatically.	<i>Network scan and upload</i> [▶ page 111]
Diagnosis	<ul style="list-style-type: none"> • General diagnosis • Master diagnosis • Station diagnosis • Firmware diagnosis 	<i>Overview diagnosis</i> [▶ page 125] <i>General diagnosis</i> [▶ page 126] <i>Master diagnosis</i> [▶ page 128] <i>Station diagnosis</i> [▶ page 129] <i>Firmware diagnosis</i> [▶ page 130]
Extended diagnosis	Finding communication/configuration errors.	<i>Overview extended diagnosis</i> [▶ page 131]
Packet Monitor	Test of send and receive data.	<i>Packet monitor</i> [▶ page 141]
IO Monitor	Test of communication.	<i>I/O monitor</i> [▶ page 144]
Process Image Monitor	Display fieldbus structure and data structure of the input and output data of the devices transmitted on the bus.	<i>Process image monitor</i> [▶ page 145]
User rights	Definition of access rights	<i>User rights</i> [▶ page 148]

Table 2: Overview use cases

1.3 System requirements

- PC with 1 GHz processor or higher
- Windows® XP SP3,
Windows® Vista (32-bit) SP2,
Windows® 7 (32-bit and 64-bit) SP1,
Windows® 8 (32-bit and 64-bit),
Windows® 8.1 (32-bit and 64-bit),
Windows® 10 (32-bit and 64-bit),
Windows® 11 (32-Bit and 64-Bit)
- Administrator privilege required for installation
- Internet Explorer 5.5 or higher
- RAM: min. 512 Mbyte, recommended 1024 Mbyte
- Graphic resolution: min. 1024 x 768 pixels
- Keyboard and mouse
- Restriction: Touch screen is not supported.

**Note:**

If the project file is used on a further PC,
- this PC must also comply with the above system requirements,
- the device description files of the devices used in the project must be imported into the configuration software SYCON.net on the new PC,
- and the DTMs of the devices used in the project must also be installed on that further PC.

1.4 About the PROFINET IO-Controller DTM

The PROFINET IO-Controller DTM is used to configure a PROFINET IO-Controller device. The configuration is done using the FDT frame application SYCON.net, which serves as configuration software.

1.5 Requirements PROFINET IO-Controller DTM

To configure the a PROFINET IO-Controller device with the PROFINET IO-Controller DTM the following requirements have to be accomplished:

- Completed hardware installation of a netX based DTM-compatible PROFINET IO-Controller device, including loaded firmware, license and loaded configuration file
- Installed FDT/DTM frame application (V1.2 compliant)
- Loaded DTM in the device catalog of the FDT framework
- Additional requirements for the topology editor:
Microsoft .NET Framework 4.0

**Note:**

If the PROFINET IO-Controller DTM and the PROFINET IO-Controller device are installed on the same PC, the **cifX device driver** must be installed on that PC, as you can connect the DTM to the device.



For more information to the hardware installation, please refer to the corresponding User Manual of your device. Information on how to order and to download the license to the device, you will find in this manual in the sections about the use case "Licensing".

1.6 DTM dialog structure

The graphical user interface of the DTM is divided into different areas and elements:

1. The header area with the **General device information**,
2. the **Navigation area** (on the left side),
3. the **Dialog pane** (on the right side),
4. **OK, Cancel, Apply, Help**,
5. the **Status bar** with DTM state information.

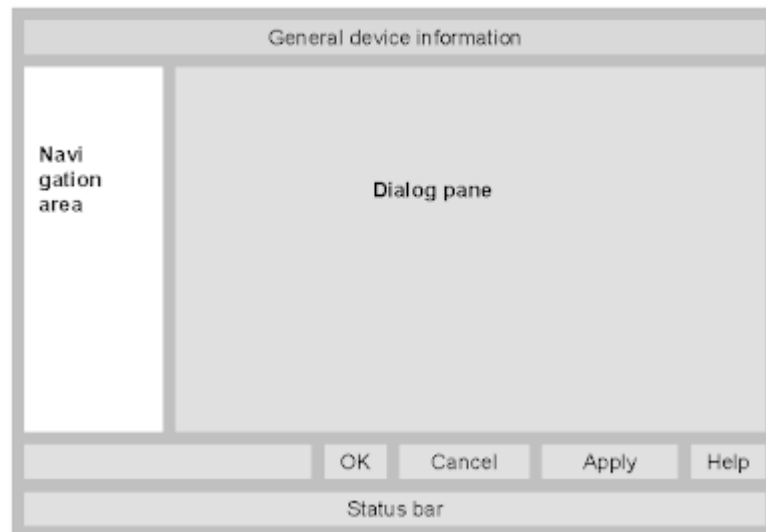


Figure 1: Dialog structure of the Device Type Manager

1.6.1 General device information

Parameter	Description
IO device	Device name
Vendor	Vendor name of the device
Device ID	Identification number of the device
Vendor ID	Identification number of the vendor

Table 3: General device information

1.6.2 Navigation area

In the navigation area, you can select the individual dialog panes via the folder structure of the DTM.

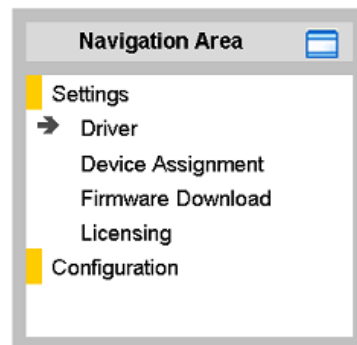



Figure 2: Navigation area

- Select the required folder and subfolder.
- ⇒ The corresponding dialog pane appears.
- Click , to hide or to open the navigation area.

1.6.3 Dialog pane

In the dialog pane area, the different windows of the DTM appear only with displayed information or for required setting steps. You call up the respective windows via the associated folder in the navigation area.

1.6.4 OK, Cancel, Apply, Help,

In the configuration software the following is valid:

	Description
OK	To confirm your latest settings, click OK . All changed values will be applied on the frame application database. The dialog then closes.
Cancel	To cancel your latest changes, click Cancel . Answer to the safety query "Configuration data has been changed. Do you want to save the data?" by Yes , No or Cancel . <ul style="list-style-type: none"> • Yes: The changes are saved or the changed values are applied on the frame application database. The dialog then closes. • No: The changes are <i>not</i> saved or the changed values are <i>not</i> applied on the frame application database. The dialog then closes. • Cancel: Back to the DTM.
Apply	To confirm your latest settings, click Apply . All changed values will be applied on the frame application database. The dialog remains opened.
Help	To open the DTM online help, click Help .

Table 4: OK, Cancel, Apply, Help

1.6.5 Status bar

In the status bar, graphical icons display the current DTM state (e. g., connection or download status, or other activities).

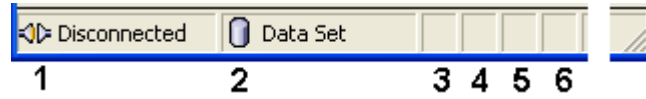


Figure 3: Status bar – status fields 1 to 6

Status field	Icon / description
1	DTM connection states
	Connected: Icon closed = Device is online Disconnected: Icon opened = Device is offline
2	Data source states
	Data set: The displayed data is read out from the instance data set (database). Device: The displayed data is read out from the device.
3	States of the instance date set
	Valid Modified: Parameter is changed (not equal to data source).
4	Changes directly made on the Device
	Load/configure diagnosis parameters: Diagnosis is activated.
6	Device diagnosis status
	Save operation succeeded: The save operation has been successful. Further messages due to successful handling of device data.
	Firmware Download: Firmware download is running
	Save operation failed: The save operation has failed. Further fail operation messages due to incorrect communication due to malfunction in the field device or its peripherals.

Table 5: Status bar icons [1]

Offline state	
Save operation succeeded	
Firmware download	
Firmware download successful	
Online state and diagnosis	

Table 6: Status bar, display examples

2 Safety

2.1 General note

The documentation in the form of a user manual, an operating instruction manual or other manual types, as well as the accompanying texts, have been created for the use of the products by qualified personnel. When using the products, all Safety Messages, Integrated Safety Messages, Property Damage Messages and all valid legal regulations must be obeyed. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

2.2 Intended use

The PROFINET IO-Controller DTM serves for configuration and diagnosis of PROFINET IO-Controller devices.

2.3 Personnel qualification

Personnel responsible for the application of the network system shall be aware of the system behavior and shall be trained in using the system.

2.4 Safety messages

2.4.1 Communication stop caused by firmware or configuration download

If you want to perform either a firmware update (as a download) or a configuration download, both via the PROFINET IO-Controller DTM, please be aware of the following:

- Together with the firmware download, an automated reset to the device is performed that will interrupt all network communication and all established connections will drop.
- If you download the firmware or the configuration during bus operation, the communication between master and slaves stops and a plant stop may occur.

Possible faulty system operation

- Unpredictable and unexpected behavior of machines and plant components due to a plant stop may result in personal injury and damage to your equipment.
- Stop the application program, before starting the firmware update or before downloading the configuration.
- Make sure that your equipment operates under conditions that prevent personal injury or property damage. All network devices should be placed in a fail-safe mode, before starting the firmware update or before downloading a configuration.

Loss of device parameters, overwriting of firmware

- A communication stop can cause device parameters to be lost and damage to the device.
- Both the firmware download and the configuration download erase the configuration database. The firmware download overwrites the existing firmware in the network device.
- To complete the firmware update and to make the device operable again, re-load the configuration after the firmware update has been finished.

Device parameters that have been saved volatile, e. g. as the temporarily set IP address parameters, are getting lost during the reset.

- In order to prevent loss of configuration data, make sure that your project configuration data are saved non-volatile, before you initiate a firmware update or download the configuration.
- In order to prevent loss of configuration data, before you initiate a firmware update or download the configuration, make sure that your project configuration data are saved non-volatile.

2.4.2 Mismatching system configuration

Mismatching system configuration loaded into the device may result in faulty data mapping in the application program. Thus, unexpected equipment operation may cause personal injury or damage to equipment.

- In the device, use only a configuration suitable for the system.

2.5 Property damage

2.5.1 Power disconnect during firmware or configuration download

If during the process of downloading a firmware or configuration,

- the power supply to a PC with the software application is interrupted,
- or the power supply to the PROFINET IO-Controller device is interrupted,
- or a reset to the device is done.

This may lead to the following consequences:

Loss of device parameters, firmware corruption

- The firmware download or the configuration download is interrupted and remains incomplete.
- The firmware or the configuration database will be corrupted and device parameters will be lost.
- Damage to the device may occur, as the device cannot be rebooted.

Whether these consequences occur depends on when the power disconnect occurs during the download.

- During firmware or configuration download process, do not interrupt the power supply to the PC or to the device, and do not perform a reset!

Otherwise, you might be forced to send in your device for repair.

Power drop during write and delete accesses in the file system

The FAT file system in the netX firmware is subject to certain limitations in its operation. Write and delete accesses in the file system (firmware update, configuration download etc.) can destroy the FAT (File Allocation Table) if the accesses cannot be completed if the power drops. Without a proper FAT, a firmware may not be found and cannot be started.

Make sure that the power supply to the device is not interrupted during write and delete accesses in the file system (firmware update, configuration download, etc.).

2.5.2 Invalid firmware

Loading invalid firmware files could render your module unusable.

- Only load firmware files to the device that are valid for this device.


Otherwise, you might be forced to send in your device for repair.

3 Device start up

3.1 Configuration steps

The following overview provides to you the step sequence on how to configure a netX based PROFINET IO-Controller device with PROFINET IO-Controller DTM as it is typical for many cases. It is assumed at this point that the hardware installation has been completed.

Step	Brief description	Further information
Add PROFINET IO-Device in the device catalog	Open configuration software SYCON.net. Add device by importing the device description file to the Device Catalog. - Network > Import device descriptions.	Section <i>Create project configuration</i> [▶ page 19], or Operating instruction manual "SYCON.net" and Operating instruction manual "netDevice and netProject"
Load device catalog	- Select Network > Device catalog, - Reload catalog.	
Create / open project	- Select File > New or File > Open.	
Insert the controller device and the Device into configuration	- In the Device catalog , select the controller device and insert the device via drag & drop to the line in the network view. - In the Device catalog , select the Device and insert the device via drag and drop to the master bus line in the network view.* <i>*This step will not be necessary if the network structure is scanned automatically.</i>	
Open controller DTM configuration dialog	- Double click to the device icon of the controller. - The DTM configuration dialog is displayed.	-
Verify or adapt driver settings	- Select Settings > Driver. Note! For PC cards cifX the cifX device driver is preset as a default driver. For all the other Hilscher devices, the netX driver is preset as a default driver. <ul style="list-style-type: none"> • Use the cifX device driver if the PROFINET IO-Controller DTM is installed on the same PC as the PROFINET IO-Controller device. • Use the netX driver to establish a USB, Serial (RS232) or TCP/IP connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device. • The 3Sgateway driver for netX (V3.x) is used only in relationship with CODESYS. To search for devices you can check one or multiple drivers simultaneously. - Verify that the default driver is checked. - If necessary, check another driver or multiple drivers.	Section <i>Verifying or adapting driver settings</i> [▶ page 23]

Step	Brief description	Further information
Configure driver	<p>If you use the netX driver, you respectively must configure it.</p> <p>For netX Driver and communication via TCP/IP set the IP address of the device.</p> <ul style="list-style-type: none"> - Select Settings > Driver > netX driver > TCP connection. - Via  add an IP range. - Under IP address enter the IP Address of the device or an IP range. - Click Save. <p>Adjust the driver parameters netX driver USB/RS232 only if they differ from the default settings.</p> <p>Note!</p> <ul style="list-style-type: none"> • The cifX device driver requires no configuration. • The configuration of the 3Sgateway driver for netX (V3.x) is carried out via the CODESYS user interface. 	<p><i>Configuring netX driver</i> [▶ page 26]</p>
Assign controller device to the driver (with or without firmware)	<ul style="list-style-type: none"> - Select Settings > Device assignment. - Under Device selection, select <i>suitable only</i> or <i>all</i> and click Scan. - In the table, check the required devices. - Click Apply. 	<p><i>Assigning device (with or without firmware)</i> [▶ page 32]</p>
Select and download firmware	<p>If not yet a firmware was loaded to the device:</p> <ul style="list-style-type: none"> - Adhere to the necessary safety precautions to prevent personnel injury and property damage. - Select Settings > Firmware download, - click Browse.., - select a firmware file, - click Open. - Click Download and Yes. 	<p>For further details, please refer to the Safety chapter.</p> <p><i>Selecting and downloading firmware</i> [▶ page 37]</p>
Assign controller device once more (with firmware and system channel) <i>For repeated download this step is omitted.</i>	<ul style="list-style-type: none"> - Select Settings > Device assignment, - click Scan, - In the table, check the required device. - Click Apply. 	<p><i>Selecting the device once more (with firmware)</i> [▶ page 35]</p>
Configuring Ethernet devices	<p>In the controller DTM configuration dialog:</p> <ul style="list-style-type: none"> - Select Settings > Ethernet devices, - click Devices online > Search devices, - under Devices online click the line for the device to be configured. - Respectively check Use configuration of and select a device, the configuration of which shall be used. - Set the device name (=Name of Station) newly or overtake it, - click Set name, - set the IP address, subnet mask and gateway address newly or overtake them, - click Set address, - click Search devices once more to display the newly adjusted current values. - Close the controller DTM configuration dialog via OK. 	<p>Section <i>Ethernet devices</i> [▶ page 44]</p>
Configure Device* <i>(*This step will not be necessary if the network structure is scanned automatically.)</i>	<ul style="list-style-type: none"> - In the slave DTM dialog select Configuration > Modules. - Configure the modules of the Device. - Select Device settings. - Set the Device settings. - Close the dialog via OK. 	<p>Operating instruction manual "Generic DTM for PROFINET IO-Devices"</p>

Step	Brief description	Further information
Configure controller device (with IRT communication) For Device: Set Name of Station and IP settings.	<ul style="list-style-type: none"> - In the controller DTM configuration dialog, select Configuration - Select Controller network settings. - Set the name of station and the IP settings of the controller, and possibly make further settings. - Select Device table. - Configure the Devices for data exchange with the controller and enter a name of station for each. - Select IP address table. - Enter the IP settings for the Devices. - Select Process data. - Assign symbolic names for the configured modules or signals. - Select Isochrone modules. - Enable isochrone mode and set parameters. - Select Address table. - Enable or disable auto addressing. - For manual addressing: Enter addresses. - Select FSU/port settings. - Check FSU for the Devices that should establish a connection via Fast-Start-up (FSU) for the cyclic data exchange. - Set the MAU type of the Devices or ports. - Select Stations timing. - Select each device station connected to the controller and make the station global and Sync domain settings. - Select Controller settings. - Check the parameters and adjust them if necessary, e.g. start of the bus communication, watchdog-time of the application monitoring, port settings. - Close the dialog via OK. 	<p><i>Configuring IRT communication</i> [▶ page 70]</p> <p><i>Controller network settings</i> [▶ page 71]</p> <p><i>Device table</i> [▶ page 74]</p> <p><i>IP address table</i> [▶ page 76]</p> <p><i>Process data</i> [▶ page 78]</p> <p><i>Isochrone modules</i> [▶ page 79]</p> <p><i>Address table</i> [▶ page 82]</p> <p><i>FSU/port settings</i> [▶ page 85]</p> <p><i>Stations timing</i> [▶ page 87]</p> <p><i>Controller settings</i> [▶ page 104]</p>
Configure topology	Settings in the topology editor to make: <ul style="list-style-type: none"> - Connect the devices. - Configure the properties for devices and ports. 	Operating instruction manual "Topology Editor"
Save project	<ul style="list-style-type: none"> - Select File > Save. 	Operating instruction manual "SYCON.net"
Connect controller device	<ul style="list-style-type: none"> - Right click to the device icon of the controller, - Select Connect. 	Section <i>Connecting/disconnecting device</i> [▶ page 107]
Download configuration	<ul style="list-style-type: none"> - Adhere to the necessary safety precautions to prevent personnel injury and property damage that may occur in consequence of a communication stop or in consequence of a mismatching system configuration. - Right click to the device icon of the controller, - Select Download. 	Section <i>Download configuration</i> [▶ page 109]
Network scan / upload	Alternative to manual configuration of the Device, you can scan the network structure (in the controller DTM) and upload the Device configuration. Proceed as follows: <ol style="list-style-type: none"> 1. Click Network scan. 2. Make the settings in the Scan response dialog. 3. Click Create devices. 4. Download the IP settings of the Device to the controller device. 5. Click Upload (in the device DTM), and create the Device module configuration. 6. Download the current Device configuration to the controller device. 	Section <i>Network scan and upload</i> [▶ page 111]

Step	Brief description	Further information
Diagnosis	<ul style="list-style-type: none"> - Right click to the device icon of the master. - Select Diagnosis. - The diagnosis dialog appears. (1.) Check whether the communication is OK: Diagnosis > General diagnosis > Device status "Communication" must be green! (2.) "Communication" is green: Open the IO monitor and test the input or output data. (3.) "Communication" is not green: Use diagnosis and extended diagnosis for troubleshooting. - Close the dialog via OK. 	<p>Section <i>Diagnosis</i> [▶ page 125]</p> <p>Section <i>Extended diagnosis</i> [▶ page 131]</p>
I/O monitor	<ul style="list-style-type: none"> - Right click to the device icon of the master, - select Diagnosis, - select Tools > I/O monitor, - check the input or output data. - Close the dialog via OK. 	Section <i>I/O monitor</i> [▶ page 144]
Disconnect	<ul style="list-style-type: none"> - Right click to the device icon of the Master, - select Disconnect. 	Section <i>Connecting/ disconnecting device</i> [▶ page 107]

Table 7: Getting started – Configuration steps

3.2 Create project configuration

1. Complete the Device in the device catalog.
 - Select **Network > Import device descriptions**.
 - Import the device description file.
2. Load device catalog.
 - Select **Network > Device catalog**.
 - Select **Reload catalog**.
3. Create or open a project.
 - Create new project / open existing project:
 - Select **File > New** or **File > Open**.
4. Insert controller device or Device to the configuration.
 - In the device catalog, click to the controller device, and insert it via drag and drop **to the line** in the network view.
 - In the device catalog, click to the Device.*
 - Or, select the correct device instance for the Device.* For more information, see operating instruction manual of the PROFINET IO-Device DTM.
 - Insert the Device via drag and drop **to the master bus line** in the network view.*

**This step will not be necessary if the network structure is scanned automatically.*



Note:

In order to select the desired device in the device catalog, note the details about the DTM and the device at the bottom of the device catalog window. When sorting by fieldbus, several devices with the same name from different vendors can be displayed.



For further information, see operating instruction manual "SYCON.net" or "netDevice and netProject".

3.3 Access to online functions

Getting access to "Network scan"

**Note:**

If under **Configuration > Master settings > Start of bus communication** the setting **Controlled by application** was selected, the master device is in 'Offline' state after 'Power on Reset'! In this state, you cannot use the SYCON.net online function **Network scan**.

- To access this online function when the master device is working together with an application program, the application program must start the communication.
- Alternatively, you can start the communication manually from the context menu of the master device via **Start communication**.

3.4 Importing network structure and "upload"

As an alternative to manually configure the Device, you can automatically scan the network structure by using the context menu **Network scan**. Then you can create the module configuration of the Device by configuration upload and download it to the controller device.

Take the following steps:

1. Start the **Network scan** (in the controller DTM).
2. Make the settings in the **Scan response** dialog.
3. Click **Create devices**.
4. Via **Download**, download the IP settings of the Device to the controller device.
5. Via **Upload** (in the device DTM), upload the device configuration of each Device to the controller DTM, and create the module configuration.
6. Via **Download** (in the controller DTM), download the current configuration of the Devices to the controller device.

For more information, refer to the section *Network scan and upload* [▶ page 111].

3.5 Start/stop communication

You can manually start or stop the communication between a PROFINET IO-Controller device and PROFINET IO-Devices.

- **Start communication** can be enabled if the communication was stopped before or if the configuration requires this (controlled release of communication).
- **Stop communication** can be enabled if the communication was started.

To start or to stop the communication, proceed as follows:

Start communication

- Connecting device:



Note:

To manually start the communication of the device at the bus, an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device is required. Further information can be found in the section *Connecting/disconnecting device* [▶ page 107].

- Select **Additional functions > Service > Start communication** from the context menu (right mouse click).
- ⇒ The device communicates at the bus.

Stop communication

⚠ WARNING **Faulty system operation possible, overwriting of firmware or loss of device parameters**

Before stopping the communication:

- Stop the application program.
- Make sure that all network devices are in a fail-safe condition.

After carrying out the security measures:

- Select **Additional functions > Service > Stop communication** from the context menu (right mouse click).
- ⇒ The communication of the device at the bus is stopped.

4 Settings

4.1 Overview settings for driver and device assignment

Under "Settings" you can make different basic settings for your device:

- To establish a connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device, check whether the default driver is hooked up in the dialog pane **Driver** and if necessary, check another or several drivers.
- In the **Device assignment** pane, select the device and assign it to the driver.
- The dialog in the **Firmware download** pane is used to load a new firmware into the device.
- The dialog in the **Licensing** or **License** pane allows you to order licenses for master protocols and utilities and transfer them to your device.
- In the **Ethernet devices** dialog, you can set the device name or IP address for Ethernet-enabled devices.

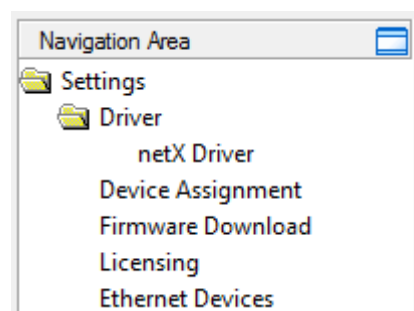


Figure 4: Navigation area - Settings (example)

There may be more drivers.



Note:

To edit the dialog panes under **Settings**, you need the user rights for "Maintenance".

4.2 Verifying or adapting driver settings

The **Driver** dialog pane displays the drivers available to establish a connection from the PROFINET IO-Controller DTM to the device.



Note:

A default driver is set in the configuration software.

Proceed as follows:

1. Select driver.
 - Select **Settings > Driver** in the navigation area.
 - ⇒ The **Driver** dialog pane is displayed. This shows the available drivers and the pre-setting of the default driver.

Driver			
	Driver	Version	ID
<input checked="" type="checkbox"/>	CIFX Device Driver	1.101.1.9801	{368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}
<input type="checkbox"/>	3SGateway Driver for netX (V3.x)	0.9.1.2	{787CD3A9-4CF6-4259-8E4D-109B6A6BEA91}
<input type="checkbox"/>	netX Driver	1.103.2.5183	{B54C8CC7-F333-4135-8405-6E12FC88EE62}

Figure 5: Default driver ‚cifX Device Driver’ for PC cards cifX (example)

Driver			
	Driver	Version	ID
<input type="checkbox"/>	CIFX Device Driver	1.101.1.9801	{368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}
<input type="checkbox"/>	3SGateway Driver for netX (V3.x)	0.9.1.2	{787CD3A9-4CF6-4259-8E4D-109B6A6BEA91}
<input checked="" type="checkbox"/>	netX Driver	1.103.2.5183	{B54C8CC7-F333-4135-8405-6E12FC88EE62}

Figure 6: Default driver ‚netX Driver’ for Hilscher devices except for PC cards cifX (example)

Parameter	Description
Driver	Name of the driver. (For further details, see the descriptions of the action steps.) Default driver (Pre-settings in the configuration software): For PC cards cifX the cifX device driver is preset as a default driver. For all the other Hilscher devices the netX driver is preset as a default driver. To search for devices you can check multiple drivers simultaneously.
Version	ODMV3 version of the respective driver
ID	ID of the driver (driver identification)

Table 8: Parameters of the driver selection list

2. Verify whether the default driver is checked.
 - To establish a connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device, check whether the default driver is hooked up in the dialog pane Driver and if necessary, check another or several drivers.
3. Respectively check another driver or multiple drivers.
 - Check the checkbox for the driver in the selection list.



Note:

The driver used for the connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device must be supported by the device and must be available for the device.

- Use the **cifX device driver** if the PROFINET IO-Controller DTM is installed on the same PC as the PROFINET IO-Controller device.
- Use the **netX driver** to establish an USB, Serial (RS232) or TCP/IP connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device.
- The **3SGateway driver for netX (V3.x)** is used only in relationship with CODESYS. The version V3.x refers to the driver version defined by 3S-Smart Software Solutions GmbH.

To search for devices on the network you can check multiple drivers simultaneously.

Driver			
	Driver	Version	ID
<input checked="" type="checkbox"/>	CIFX Device Driver	1.101.1.9801	{368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}
<input type="checkbox"/>	3SGateway Driver for netX (V3.x)	0.9.1.2	{787CD3A9-4CF6-4259-8E4D-109B6A6BEA91}
<input checked="" type="checkbox"/>	netX Driver	1.103.2.5183	{B54C8CC7-F333-4135-8405-6E12FC88EE62}

Figure 7: Manual selection of multiple drivers (example)

4.3 Configuring drivers

4.3.1 cifX device driver

In the PROFINET IO-Controller DTM for the **cifX device driver** no driver dialog pane is available, since for the cifX device driver no driver settings are required.

The cifX device driver will be used if the PROFINET IO-Controller DTM is installed in the same PC as the PROFINET IO-Controller device.

**Note:**

To establish a connection from a DTM to a controller device via the **cifX device driver**, the cifX device driver must be installed and the driver must have access to the controller device.

4.3.2 netX driver

The **netX driver** is used to connect the DTM to the device via different connection types. The DTM communicates with the device via an USB connection, a serial (RS232) connection or a TCP/IP connection. The netX Driver establishes

- via the USB interface of the device and the USB port of the PC an USB connection to the device,
- via the RS232 interface of the device and the COM port of the PC a serial connection (RS232) to the device,
- and, via Ethernet a TCP/IP connection to the device.

To connect the DTM to the physical layer of the device the netX driver software works in combination with the software components:

- “USB/COM connector” for the USB connection and for the serial connection (RS232) and,
- “TCP connector” for the Ethernet connection.



Descriptions of the netX Driver are available in the DTM user interface as online help:

- Therefore, click **Settings > Driver > netX driver** and press the **F1** key.
-

4.3.3 Configuring netX driver

The following steps are required to configure the netX driver:

USB/RS232 Connection

To set the driver parameters for an USB/RS232 connection note:

**Note:**


Adjust the driver parameters netX driver USB/RS232 only if they differ from the default settings. After saving the changed driver parameters, these parameters are used for the device assignment when scanning devices.

For setting the driver parameters for an USB connection or a serial connection:

1. Set the driver netX driver USB/RS232 parameters.
 - Open the driver dialog via **Settings > Driver > netX driver > USB/RS232 connection**.

TCP/IP connection

For setting the driver parameters for a TCP/IP connection:

2. Set IP address of the device.
 - Select **Settings > Driver > netX driver > TCP connection**.
 - Add an IP range via **Select IP range** .
 - Under **IP range configuration > IP address** enter the IP address of the device (**Use IP range** is unchecked).
3. Or set IP range:
 - Check **Use IP range**.
 - Under **IP range configuration > IP address** enter the start address (left side) and the ending address of the IP scanning range (right side).
4. Save the IP address or the IP search range.
 - Click on **Save**.
 - ⇒ After saving the changed driver parameters, these parameters are used for the device assignment when scanning devices.

4.3.4 netX driver - USB/RS232 connection

The communication from the DTM to the device via an USB/RS232 connection is used when the DTM is installed on a PC and between the PC and the device

- an USB connection,
- or a serial connection (RS232) exists.

The DTM accesses the device via the USB interface or via the RS232 interface. This requires either to connect an USB port of the PC to the USB interface of the device using an USB cable or to connect a physical COM port of the PC to the RS232 interface of the device via a serial cable.

The **netX driver / USB/RS232 connection** supports all physical and virtual COM ports available on the PC.

Via the RS232 interface or USB interface, the device is configured or diagnosis is performed.

4.3.4.1 Driver parameters for netX driver - USB/RS232 connection

The settings of the driver parameters for the USB/RS232 connection are made via the **netX driver / USB/RS232 connection** configuration dialog.

- Open the **USB/RS232 connection** dialog via navigation area **Settings > Driver > netX driver**.
- The **USB/RS232 connection** dialog is displayed:

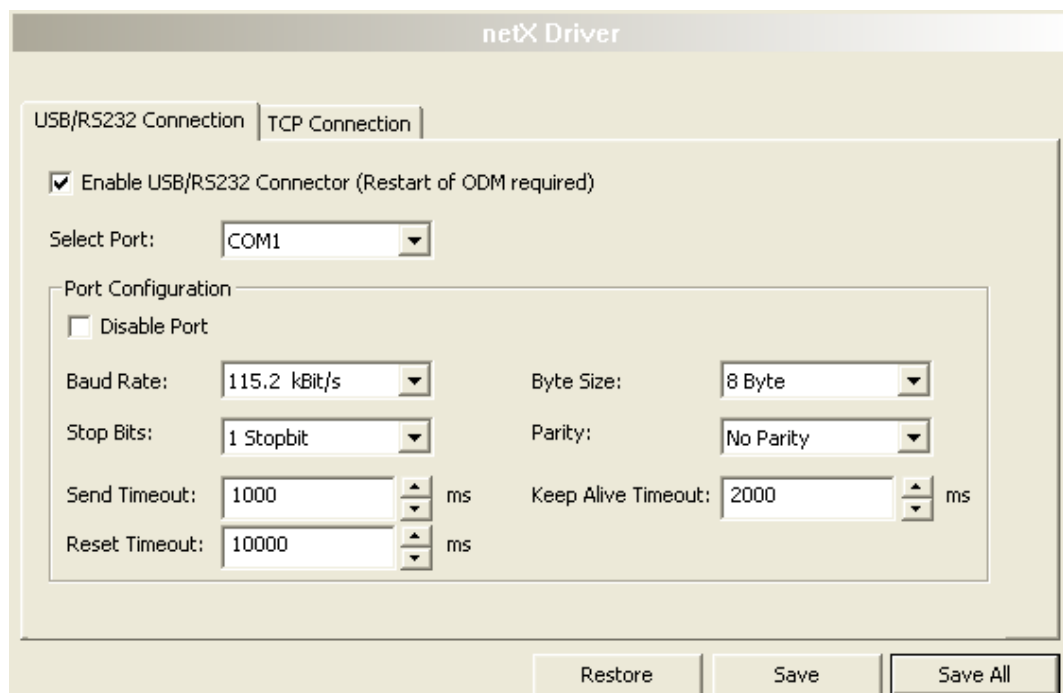


Figure 8: cifX driver > USB/RS232 connection


Parameter	Description	Range of value / value
Enable USB/RS232 connector (restart of ODM required)	<p>checked: The cifX driver can communicate via the USB/RS232 interface.</p> <p>unchecked: The cifX driver cannot communicate via the USB/RS232 interface.</p> <p>If the check mark for Enable USB/RS232 connector is set or removed, then the ODM server must be restarted¹, to make the new setting valid.</p> <p>_____</p> <p>¹ Restart the ODM server via the ODMV3 tray application:</p> <ul style="list-style-type: none"> - In the foot line click on  using the right mouse key. - In the context menu select Service > Start. 	checked, unchecked; Default: unchecked
Select port	Depending on the COM ports (interfaces) available on the PC, they will be listed under Select port .	COM 1 to COM N
Port configuration		
Disable port	<p>checked: No connection.</p> <p>unchecked: The cifX driver tries to establish a connection using the configured USB/RS232 interface.</p>	checked, unchecked (Default)
Baud rate	<p>Transfer rate: Number of bits per second.</p> <p>The device must support the baud rate.</p>	9.6, 19.2, 38.4, 57.6 bzw. 115.2 [kBit/s]; Default (RS232): 115.2 [kBit/s]
Stop bits	Number of stop bits sent after the transfer of the send data for synchronization purposes to the receiver.	Stop-Bit: 1, 1.5, 2; Default (RS232): 1
Send timeout	Maximum time before the transfer of the transmission data is canceled, when the send process fails, for example, because of the transfer buffer is full.	100 ... 60.000 [ms]; Default (RS232 and USB): 1000 ms
Reset timeout	Maximum time for a device reset, including the re-initialization of the physical interface used for the communication.	100 ... 60.000 [ms]; Default (RS232 und USB): 5000 ms
Byte size	Number of bits per byte by byte specification	7 Bit, 8 Bit; Default (RS232): 8 Bit
Parity	<p>In the error detection in data transmission using parity bits, "parity" describes the number of bits occupied with 1 in the transmitted information word.</p> <p>No Parity: no parity bit</p> <p>Odd Parity: The parity is "odd" if the number of bits occupied with 1 in the transmitted information word will be odd.</p> <p>Even parity: The parity is "even" if the number of bits occupied with 1 in the transmitted information word will be even.</p> <p>Mark Parity: if the parity bit is always 1, this will be named mark-parity (the bit does not contain any information).</p> <p>Space Parity: if the parity bit always 0, this will be named space-parity (the bit represents an empty space).</p>	No Parity, Odd Parity, Even Parity, Mark Parity, Space Parity; Default (RS232): No Parity
Keep alive timeout	The "Keep Alive" mechanism is used to monitor whether the connection to the device is active. connection errors are detected using a periodic heartbeat mechanism. The heartbeat mechanism will be initiated after the set time has elapsed if the communication has failed.	100 ... 60.000 [ms]; Default (RS232 und USB): 2000 ms
Restore	Resets all settings in the configuration dialog to the default values.	
Save	Saving all settings made in the configuration dialog cifX driver > USB/RS232 connection , i. e. only for the selected connection type.	
Save all	Saving all settings made in the configuration dialog cifX driver , i. e. for all connection types.	

Table 9: Parameters cifX driver > USB/RS232 connection

4.3.5 netX driver - TCP/IP connection

The communication from the DTM to the device via a **TCP/IP connection** is used in the following two typical applications:

Application 1: The device has its own Ethernet interface. The DTM is installed on a PC and the TCP/IP connection is established from this PC to the stand-alone device. The IP address of the device is used.

Application 2: The device is installed in a remote PC. The DTM is installed on an additional PC and the TCP/IP connection is established from this PC to the remote PC. The IP address of the remote PC is used. For the TCP/IP connection is made, on the remote PC the cifX TCP/IP server must be started. The cifX TCP/IP server allows the remote access to the device via a TCP/IP connection.

**Note:**

An exe file for the cifXTCP/IP server is provided on the product CD in the Tools directory.

Via the TCP/IP interface of the device or of the remote PC, the device is configured or diagnosis is performed.

4.3.5.1 Driver parameters for cifX driver - TCP/IP connection

The settings for the driver parameters for the TCP/IP connection are made via the **netX driver / TCP connection** configuration dialog.

- Open the **TCP connection** dialog via navigation area **Settings > Driver > netX driver**.
- The dialog **netX driver** is displayed:
- Select **TCP connection**.

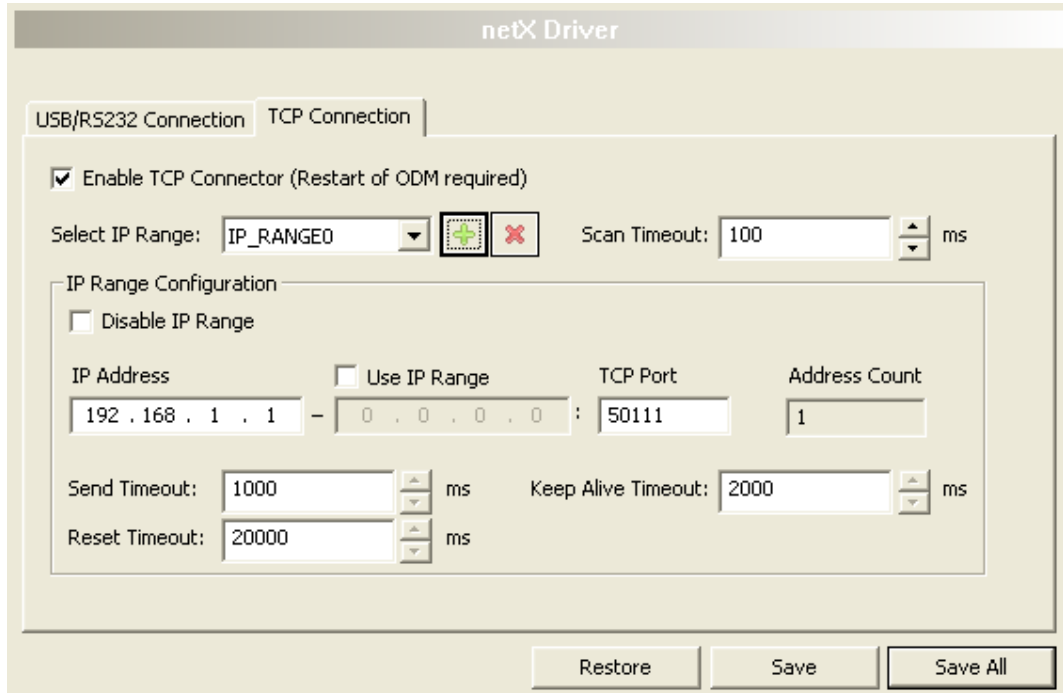





Figure 9: netX driver > TCP connection

Parameter	Description	Range of value / value
Enable TCP connector (restart of ODM required)	checked: The cifX driver can communicate via the TCP/IP interface. unchecked: The cifX driver cannot communicate via the TCP/IP interface. If the check mark for Enable TCP connector is set or removed, then the ODM server must be restarted ¹ , to make the new setting valid. ¹ Restart the ODM server via the ODMV3 tray application : - In the foot line click on  using the right mouse key. - In the context menu select Service > Start .	checked, unchecked; Default: unchecked
Select IP range	Via Select IP range already created IP ranges can be selected. Via  an additional IP range can be added. Via  an IP range can be deleted.	
Scan timeout [ms]	With Scan timeout can be set, how long to wait for a response while a connection is established.	10 ... 10.000 [ms]; Default: 100 ms
IP range configuration		
Disable IP range	checked: No connection. unchecked: The cifX driver tries to establish a connection using the configured TCP/IP interface.	checked, unchecked (Default)

Parameter	Description	Range of value / value
IP address (links)	Enter the IP address of the device, (if Use IP range is not checked). Enter the IP address of the device, (if Use IP range is not checked).	valid IP address; Default: 192.168.1.1
Use IP range	checked: An IP address range is used. unchecked: Only one IP address is used.	checked, unchecked; Default: unchecked
IP address (right)	Enter the end address of the IP scanning range, (only if Use IP range is checked).	valid IP address; Default: 0.0.0.0
Address count	Displays the scanning range address count, depending on the selected IP-start or IP-end address. (For this read the note given below.)	recommended: 10
TCP Port	Identifies the endpoint of a logical connection or addresses a specific endpoint on the device or PC.	0 – 65535; Default Hilscher device: 50111
Send timeout	Maximum time before the transfer of the transmission data is canceled if the send process fails, for example, because of the transfer buffer is full.	100 ... 60.000 [ms]; Default (TCP/IP): 1000 ms
Reset timeout	Maximum time for a device reset, including the re-initialization of the physical interface used for the communication.	100 ... 99.999 [ms]; Default (TCP/IP): 20.000 ms
Keep alive timeout	The "Keep Alive" mechanism is used to monitor whether the connection to the device is active. Connection errors are detected using a periodic heartbeat mechanism. The heartbeat mechanism will be initiated after the set time has elapsed if the communication has failed.	100 ... 60.000 [ms]; Default (TCP/IP): 2000 ms
Restore	Resets all settings in the configuration dialog to the default values.	
Save	Saving all settings made in the configuration dialog cifX driver > TCP/IP connection , i. e. only for the selected connection type.	
Save all	Saving all settings made in the configuration dialog cifX driver , i. e. for all connection types.	

Table 10: Parameters netX driver > TCP connection



Note:

Do not use large IP ranges in combination with a low scan timeout. Microsoft introduced in Windows® XP SP2 a limit of concurrent half-open outbound TCP/IP connections (connection attempts), to slow the spread of virus and malware from system to system. This limit makes it impossible to have more than 10 concurrent half-open outbound connections. Every further connection attempt is put in a queue and forced to wait. Due to this limitation, a large IP range used in combination with a low scan timeout could prevent the connection establishment to a device.

4.4 Assigning device (with or without firmware)



Note:

In the **Device assignment** dialog pane, you first must assign the PROFINET IO-Controller device to the PROFINET IO-Controller DTM by checking the check box. This is essential to establish an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device later, as described in section *Connecting/disconnecting device* [▶ page 107].

Therefore, in the **Device assignment** dialog pane you scan for the PROFINET IO-Controller device and select it.

If the device did not get a firmware or shall get a new firmware:

1. First you scan for the device (with or without firmware) and select the device,
2. then you download a firmware to the device, and
3. subsequently you scan for the device (with firmware) once more and select the device again.
 - Proceed in the order mentioned.

4.4.1 Scanning for devices

- Select **Settings > Device assignment** in the navigation area.
- ⇒ The dialog pane Device assignment is displayed.
- Under **Device selection**, select *suitable only*.
- Select **Scan**, to start the scanning process.
- ⇒ In the table all devices are displayed, which can be connected to the PROFINET IO-Controller DTM via the preselected driver.

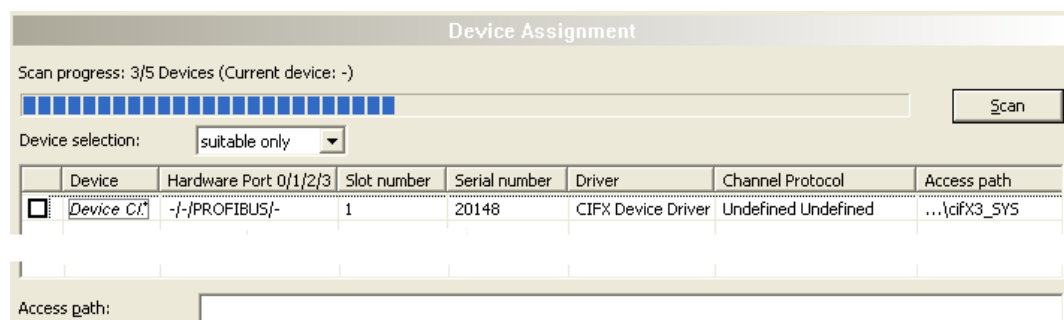


Figure 10: Device Assignment - detected devices (example: device without firmware)



Note:

For devices, which have been found via the **cifX device driver** in the column **Access path** the indication ...\\cifX[0toN]_SYS is displayed. This is correct, as long as a device did not get a firmware. After the firmware download has been completed, in the column Access path the indication ...\\cifX[0toN]_Ch[0to3] is displayed.

Parameter	Description	Range of value / value
Device selection	Selecting <i>suitable only</i> or <i>all</i> devices.	suitable only, all
Device	*The device name (= name of the device class) of the PROFINET IO-Controller device appears.	
Hardware Port 0/1/2/3	Shows, which hardware is assigned to which communication interface.	
Slot number	Shows the Slot number (card ID) , preset at the PC card cifX via the Rotary switch slot number (card ID) . The indication <i>n/a</i> means, that no Slot number (card ID) exists. This will occur if the PC card cifX is not equipped with a Rotary switch slot number (card ID) or for PC cards cifX equipped with a Rotary switch slot number (card ID) if the rotary switch is set to the value 0 (zero).	1 to 9, n/a
Serial number	Serial number of the device	
Driver	Name of the driver.	
Channel Protocol	Shows, which firmware is loaded to which device channel. The data for the used channel consists of the protocol class and the communication class. a.) For devices without firmware: Undefined Undefined, b.) For devices with firmware: Protocol name corresponding to the used Firmware	
Access path (last column on the right)	Depending on the used driver in the column Access path different data to the device is displayed. For the cifX device driver the following data is displayed: a.) For devices without firmware: ...\ <code>cifX[0toN]_SYS</code> , b.) For devices with firmware: ...\ <code>cifX[0toN]_Ch[0to3]</code> . <code>cifX[0toN]</code> = Board number 0 to N <code>Ch[0to3]</code> = Channel number 0 to 3	Depending on the device and on the driver: board or channel number, IP address or COM interface
Access path (at the lower side of the dialog pane)	If in the table a device is checked, under Access path (at the lower side of the dialog pane) the driver identification or depending on the used driver additional data to the device will be displayed. For the cifX device driver the following data is displayed: a.) For devices without firmware: ...\ <code>cifX[0toN]_SYS</code> , b.) For devices with firmware: ...\ <code>cifX[0toN]_Ch[0to3]</code> . <code>cifX[0toN]</code> = Board number 0 to N <code>Ch[0to3]</code> = Channel number 0 to 3	Driver identification (ID) Depending on the device and on the driver: board or channel number, IP address or COM interface

Table 11: Parameters of the Device Assignment

4.4.1.1 Selecting suitable only or all devices

All

- Under **Device selection** select *all*.
- Select **Scan**.

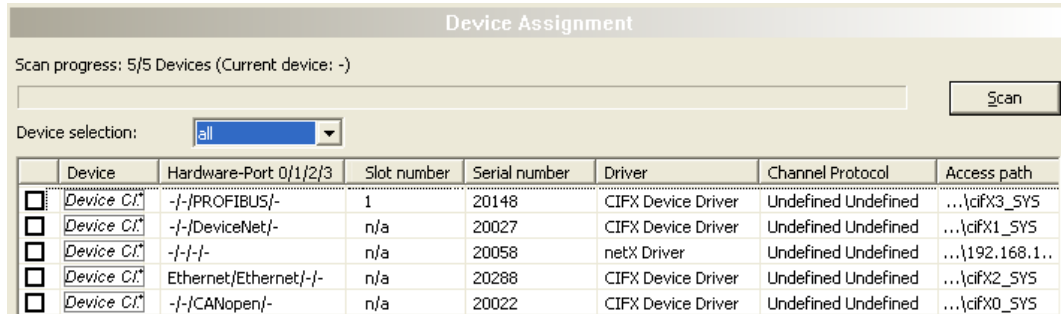


Figure 11: Device Assignment - detected devices (example: device without firmware)

- In the table all devices are displayed, which are attainable in the network and which can be connected to a single DTM each via the preselected drivers.



Note:

During a subsequent firmware download in the selection window **Select firmware file** all files from the selected folder are displayed, under **Files of type** „All Files (*.*)“ is displayed and the check box **Validate the selected firmware file.** is unchecked.

suitable only

- Under **Device selection** select suitable only.
- Select **Scan**.
- In the table all devices are displayed, which can be connected to the PROFINET IO-Controller DTM via the preselected driver.



Note:

During a subsequent firmware download in the selection window **Select firmware file** only firmware files from the selected folder are displayed, under **Files of type** „Firmware Files (*.nxm)“ or „Firmware Files (*.nxf)“ is displayed and the check box **Validate the selected firmware file.** is checked.

4.4.2 Selecting the device (with or without firmware)



Note:

A connection with the PROFINET IO-Controller DTM can only be established with *one* PROFINET IO-Controller device.

To select the physical PROFINET IO-Controller device (with or without firmware):

- Check the appropriate device.
- Under **Access path** (below in the dialog pane) the access path to the device, e. g. the driver identification, or depending on the used driver additional access data of the device is displayed.
- Select **Apply**, to apply the selection.

Device	Hardware Port 0/1/2/3	Slot number	Serial number	Driver	Channel Protocol	Access path
<input checked="" type="checkbox"/> Device C1	-/PROFIBUS/-	1	20148	CIFX Device Driver	PROFIBUS Master	... \cifX3_SYS

Figure 12: Device Assignment - selecting device (example: device without firmware / one device selected)



Note:

Before an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device can be established, a firmware must be loaded to the device and the device must be selected once more.

For further information refer to section *Selecting and downloading firmware* [▶ page 37] or to section *Selecting the device once more (with firmware)* [▶ page 35].

4.4.3 Selecting the device once more (with firmware)



Note:

For repeated download this step is omitted.

To select the PROFINET IO-Controller device (with firmware and defined system channel) once more, proceed as described hereafter:

- Under **Device selection** select *all* or *suitable only*.
- Select **Scan**.
- For selection *All*: The table shows all devices which can be reached in the network and which can be connected to a DTM via the preselected drivers.

- For selection *suitable only*: In the table all devices are displayed, which can be connected to the PROFINET IO-Controller DTM via the preselected drivers.
- Check the appropriate device.
- Select **Apply**, to apply the selection.
- Or select **OK**, to apply the selection and to close the DTM interface dialog.
- Connect the DTM to the device using the context menu (right mouse click).

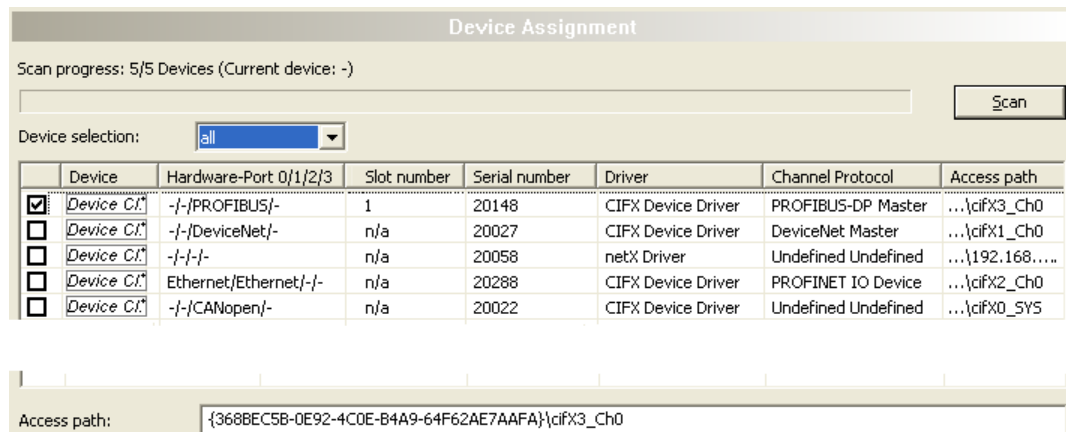


Figure 13: Device Assignment - selecting device (example: devices with and without firmware / one device selected)



Note:

After the firmware download has been completed, for the devices which have been detected via the cifX Device Driver the following data is displayed:

In the column **Channel protocol**: The data for the firmware for the used channel

In the column **Access path** or under **Access path** (below in the dialog pane): The data: ...\\cifX[0toN]_Ch[0to3].

cifX[0toN] = board number 0 to N

Ch[0to3] = channel number 0 to 3

For further information how to establish an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device, refer to section *Connecting/disconnecting device* [▶ page 107].

4.5 Selecting and downloading firmware

Requirements



Note:

Before downloading the firmware, you must select the driver and the master device (with or without firmware) and assign the hardware to the device. For more information, see sections on driver settings and device assignment.

How to proceed

You can use the dialog **Firmware download** to transfer a firmware to the device. Load the firmware into the device as described below:

1. Select the firmware file.
 - In the navigation area, select **Settings > Firmware download**
 - The dialog pane **Firmware download** is displayed.

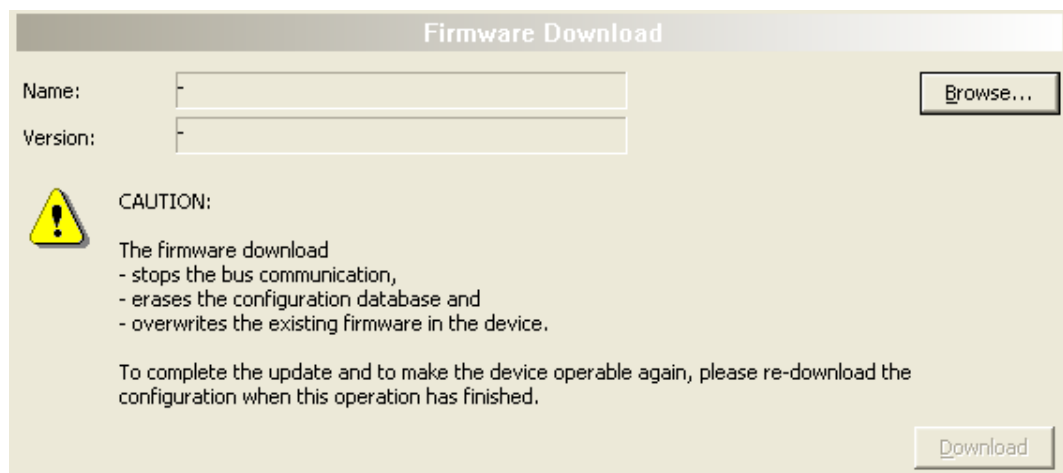


Figure 14: Firmware download

Element	Description
Name	The path and name of the selected firmware file are displayed.
Version	The version and build version of the selected firmware file are displayed.
Browse...	Via "Browse..." you can select the firmware file to download. Note! If the device is not assigned to the hardware, the error message "The device is not assigned to the hardware!" is displayed.
Download	Via "Download" you can download the firmware to the device.

Table 12: Firmware download parameters

- Select **Browse....**
- If the device is not assigned to the hardware, the error message "The device is not assigned to the hardware!" is displayed.

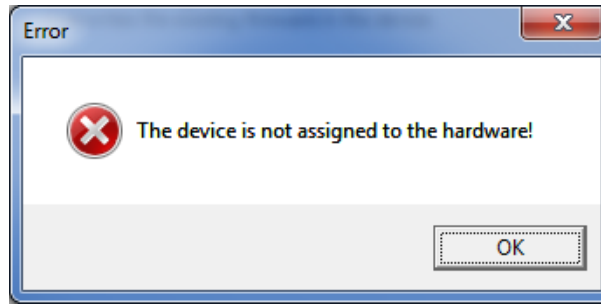


Figure 15: Error Message "The device is not assigned to the hardware!"

- Click **OK** and select and assign the master device as described in section *Assigning device (with or without firmware)* [▶ page 32].
- If a hardware has been assigned to the device, the selection window **Select firmware file** opens.
- Enlarge the selection window to view the columns **Hardware** and **Version**.

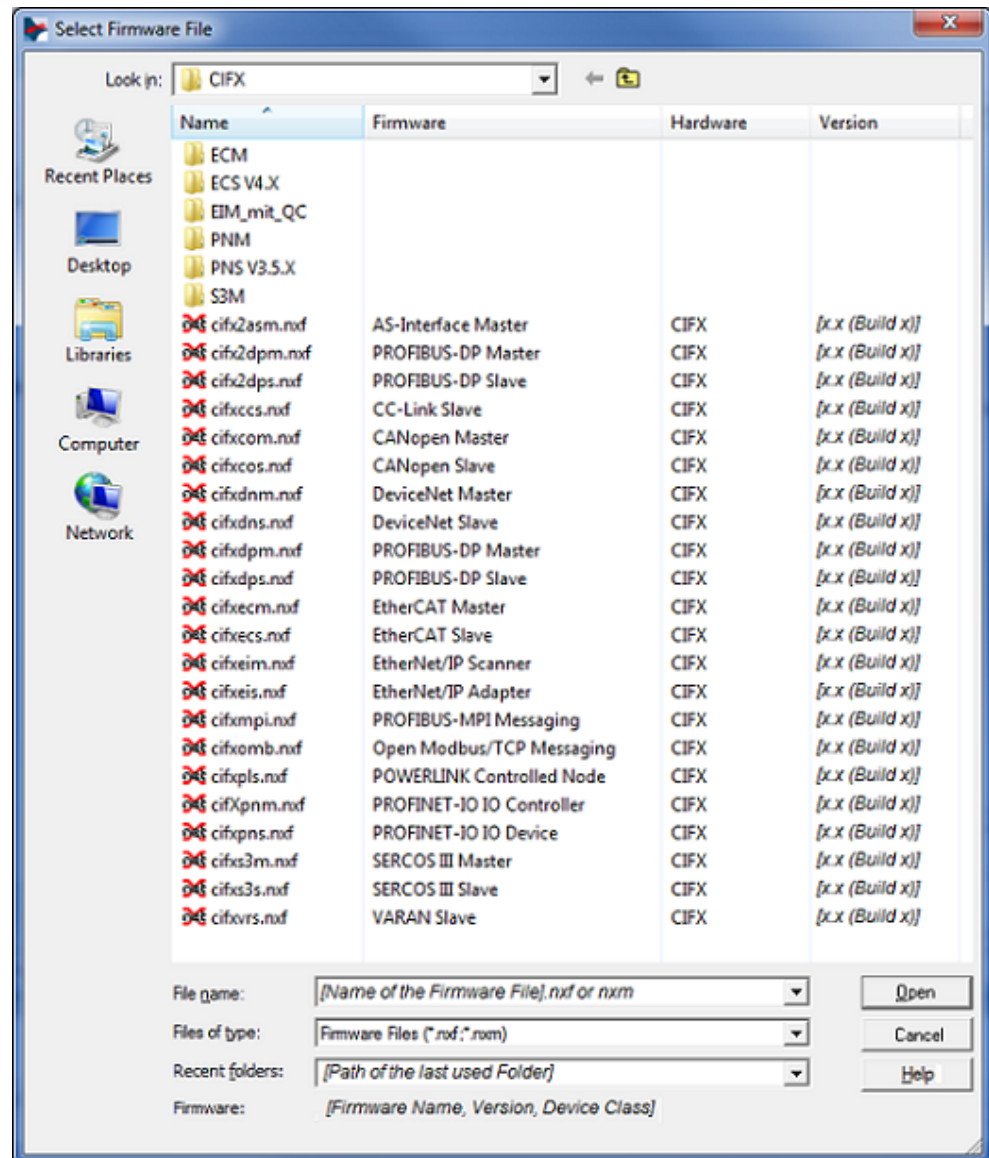


Figure 16: "Select firmware file" selection window (example CIFX)

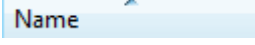
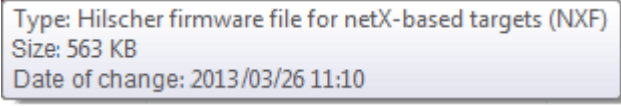
Parameter	Description	Range of value / value
Column Name	File name of the firmware file To sort the entries of the window Select firmware file by name click to the column head 	nxf, nxm
Column Firmware	Name of the firmware (consisting of the protocol name and the protocol class)	
Column Hardware	Device class of the assigned hardware	e. g. CIFX, COMX, COMX 51, NETJACK 10, NETJACK 50, NETJACK 51, NETJACK 100, NETTAP 50 (Gateway), NETTAP 100 (Gateway), NETBRICK 100 (Gateway)
Column Version	Firmware version	x.x (build x)
Tooltip	To view the tooltip display, move the mouse pointer over the selected firmware line. 	
File of Type	"All Files (*.*)" if before in the Device assignment pane the list entry all was selected. "Firmware Files (*.nxm)" or "Firmware Files (*.nxf)" if before in the Device assignment pane under Device selection - suitable only was selected.	All Files (*.*), Firmware Files (*.nxm), Firmware Files (*.nxf)
Recent folders	Path of the recently opened folder	
Firmware	As soon as the firmware file has been selected, under Firmware the name, the version and the build version as well as the device class for the selected firmware is displayed.	Name, Version, Build Version, Device Class for the selected firmware
Help	Button to open the online help of the DTM.	

Table 13: Parameters "Select firmware file"



Further descriptions to the selection window **Select firmware file** are included in the context sensitive help (**F1** key) of the Microsoft Corporation.

**Note:**

After in the **Device assignment** pane under **Device selection - all** or **suitable only** has been set, during a subsequent firmware download in the selection window **Select firmware file** the following data is displayed or set:

(for the list box entry ->)	all	suitable only
In the selection window Select firmware file :	all files from the selected folder	only firmware files from the selected folder
Under File of type* :	"All Files (*.*)"	"Firmware files (*.nxm)", "Firmware Files (*.nxf)"
Validation:	A restricted validation will be performed if the selected firmware is applied for the download.	A validation is made whether the firmware file is suitable for the PROFINET IO-Controller DTM.
These settings in the selection window Select firmware file can also be changed manually.		

Table 14: In the selection window "Select firmware file"

- In the selection window mark the firmware file to be loaded using the mouse.
- In the selection window under **Firmware** the name and the version of the firmware are displayed.
- In the selection window select the **Open** button.
- A validation is made, whether the selected firmware file is suitable for the PROFINET IO-Controller device.
- If a firmware file has been selected that is valid for the selected device, the selection window closes immediately (without dialog).
- If a firmware file has been selected that is not valid for the selected device, the query **Select firmware file** appears:
 "Invalid firmware for assigned device!
 [detailed explanation]
 Should the firmware file nevertheless be applied for the download?"



Figure 17: Request Select firmware file - Example Invalid Firmware

NOTICE Invalid firmware

Loading invalid firmware files could render your device unusable.

- Only proceed with a firmware version valid for your device.
 - Answer to the request with **No** and select a valid firmware.
 - The selection window closes.
2. Transmit firmware to the device.
- Note the following safety information:

WARNING Communication stop caused by firmware update, faulty system operation possible, overwriting of firmware or loss of device parameters

Before you initiate a firmware download process, while the bus is still in operation status:

- Stop the application program.
- Make sure that all network devices are in a fail-safe condition.

NOTICE Firmware corruption or loss of parameters caused by power disconnect during firmware download

- During firmware download process, do not interrupt the power supply to the PC or to the device, and do not perform a reset to the device!
- In the dialog pane **Firmware download** click to the **Download** button, to download the firmware.
- The request **Do you really want to download the firmware?** is displayed.

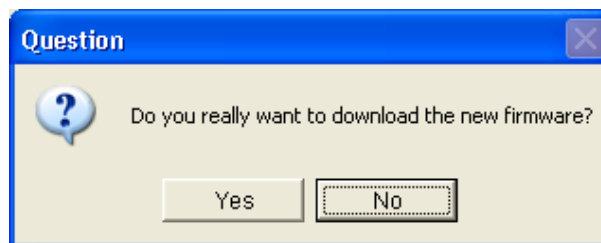


Figure 18: Request - Do you really want to download the firmware?

- Click **Yes**.
- If you are sure, that you have selected the appropriate firmware file answer to the request with **Yes** otherwise with **No**.
- During the download, a progress bar is displayed ("Download active, device performs initialization..."), in the status line a clock / green hook symbol is displayed and in the dialog pane **Firmware download** the button **Download** is grayed out.
- In the **Firmware download** dialog pane the path and name as well as the version of the selected firmware file are displayed.

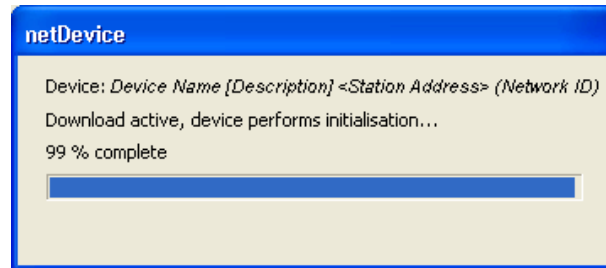


Figure 19: Firmware download - progress bar

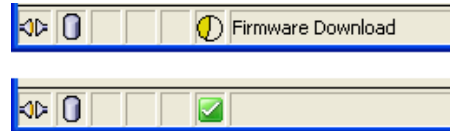


Figure 20: Clock symbol and hook symbol green

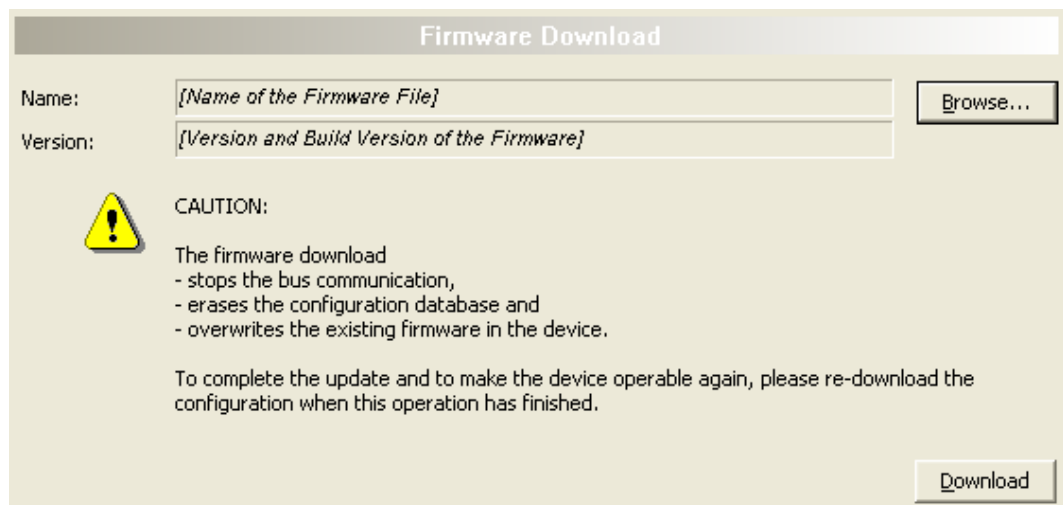


Figure 21: Firmware download - download

4.6 Licensing

To open the Licensing pane:

- In the navigation area select **Settings > Licensing**.
- The dialog pane **Licensing** is displayed.

The screenshot shows the 'Licensing' dialog box. It is divided into several sections:

- License Type:** A table with columns 'Existing' and 'Order'. The 'Master protocols' section is expanded, showing:

License Type	Existing	Order
One General Master License	NO	<input type="checkbox"/>
Two General Master Licenses	NO	<input type="checkbox"/>
PROFIBUS Master	YES	<input type="checkbox"/>
CANopen Master	YES	<input type="checkbox"/>
DeviceNet Master	YES	<input type="checkbox"/>
AS-Interface Master	YES	<input type="checkbox"/>
PROFINET IO RT Controller	YES	<input type="checkbox"/>
- Request Form, please fill out:** A table with columns 'Name' and 'Value':

Name	Value
License type	User Single Device License
Manufacturer*	00000001
Article number*	01250510
Serial number*	00020086
Chiptype*	00000002
Step*	00000000
Romcode revision*	00000002
- Fields marked with '*' are mandatory.**
- Contact Information:**
 - Company: Hilscher Germany
 - E-mail: license@hilscher.com
 - Print Fax Form: +49 6190 9907-50
 - Telephone: +49 6190 9907-0
 - Buttons: E-mail..., Print Fax Form..., Telephone..., Export License Request..., Download License

Figure 22: Licensing

Using the license dialog, you can order licenses for **Master protocols** and **Utilities** and transfer them to your device. Further information on the license dialog is described in the section *Licensing* [▶ page 57].

4.7 Ethernet devices

In the **Ethernet devices** dialog you can set the **device name** or **IP address** for Ethernet-enabled devices. The device name must match to the PROFINET IO specification [3] for the “Name of Station”.

Alternatively a **Device name** or **IP address** can be used that was set in the configuration under **Configuration > Device table > Name of station** or under **Configuration > IP address table > IP address** for a different device.



For more information, see the section *Device table* [▶ page 74] and the section *IP address table* [▶ page 76]

The identification of devices is done via the DCP protocol, which is supported by PROFINET compatible devices.

4.7.1 Overview Ethernet devices

- Select **Settings > Ethernet devices**.

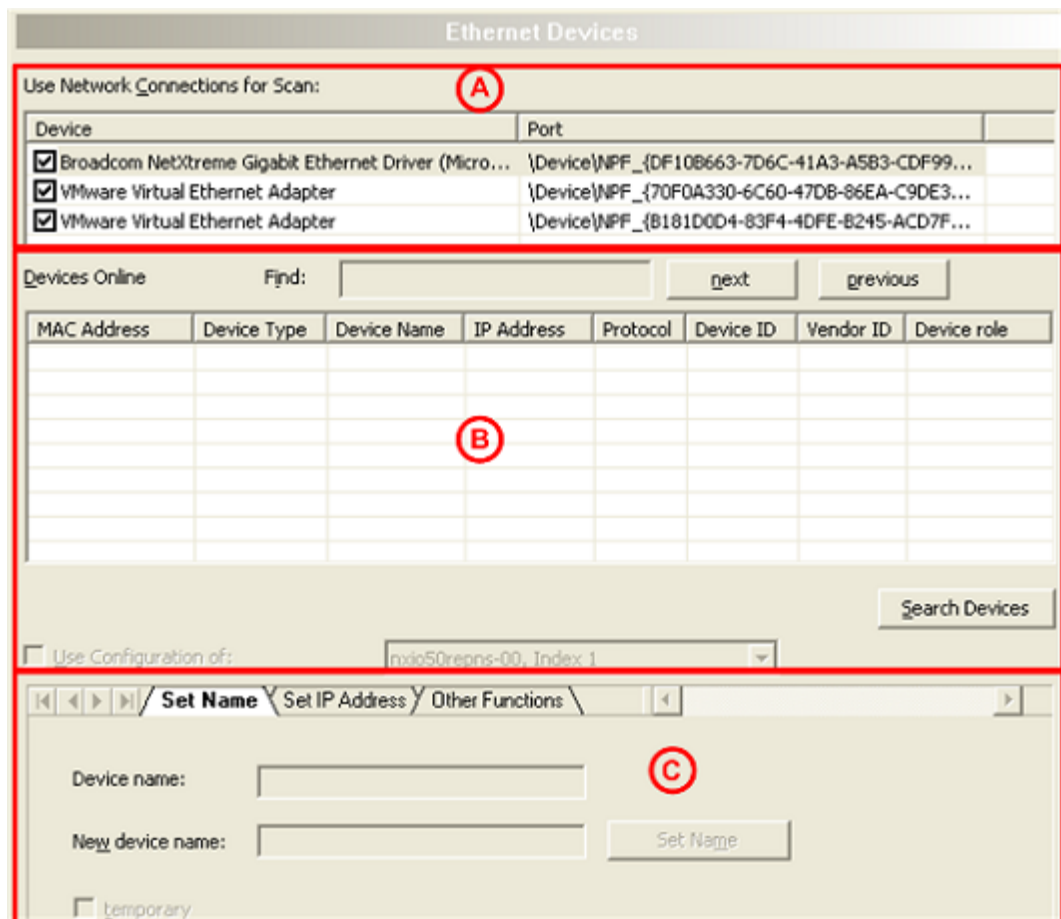


Figure 23: Ethernet devices pane (example)

In the dialog pane **Ethernet devices** you can:

1. Select network devices

Under **Use network connections for scan (A)** the network devices at the PC are displayed. Here you must select the network devices at the PC are to be used at the scan.

2. Search and select devices

Under **Devices online (B)** the devices are displayed, which are found in the Ethernet network connected to the PC via the DCP protocol. The device to be configured must be selected here.

3. Configure devices

The selected device is to be configured in the area below **(C)**. Therefore the configuration for the device can be performed here or a configuration of another device can be used.

4.7.2 Selecting network devices for scan



Note:

Using the *DCP protocol* to scan for devices, the network devices to be used for the scan must be selected manually.

Under **Use network connections for scan** the network devices at the PC are displayed.

Use Network Connections for Scan:	
Device	Port
<input checked="" type="checkbox"/> Broadcom NetXtreme Gigabit Ethernet Driver (Microso...	\Device\NPF_{DF10B663-7D6C-41A3-A5B3-CDF99A833D82}
<input checked="" type="checkbox"/> VMware Virtual Ethernet Adapter	\Device\NPF_{70F0A330-6C60-47DB-86EA-C9DE362F3D5F}
<input checked="" type="checkbox"/> VMware Virtual Ethernet Adapter	\Device\NPF_{B181D0D4-83F4-4DFE-B245-ACD7F20DE72A}

Figure 24: Ethernet Devices pane - Selection of the Ethernet connection (example)

Here you must select the network devices to be used at the scan via the *DCP protocol*.

- Under **Device (1)** check the network devices to be used with the DCP protocol at the scan.
- ⇒ Under **Device (2)** the name and under **Port (3)** the port number of the network devices of your PC are displayed.

4.7.3 Searching and selecting devices

- To find devices, **Devices online**> **Search devices** (refer to position (12) in the following figure).
- ⇒ The Ethernet network connected to the PC is scanned for devices that respond to *the DCP protocol*. If devices are found, they are listed as follows:

MAC Address	Device Type	Device Name	IP Address	Protocol	Device ID	Vendor ID	Device role
00-02-A2-20-91...	NXIO 50	nxio50reprn...	0.0.0.0	DCP	0x010C	0x011E	Device
00-02-A2-20-91...	NXIO 50	nxio50reprn...	0.0.0.0	DCP	0x010C	0x011E	Device
00-02-A2-20-91...	NXIO 50	nxio50reprn...	0.0.0.0	DCP	0x010C	0x011E	Device
00-02-A2-20-71...	cifx /pnm	controller	192.168.0.1	DCP	0x0203	0x011E	Controller

Figure 25: Ethernet devices pane - Searching and selecting devices (example)

Refer to the table in the figure above for the following information:

Name	Position in figure	Description	Value/range of values
MAC address	(4)	The MAC address (=MAC-ID) is the unique (physical) Ethernet address of the device assigned by the manufacturer on delivery.	
Device type	(5)	Name for the device stored in the device in a non-volatile fashion.	
Device name	(6)	Device name that can be set in the Ethernet devices pane. The device name must comply with the specifications of the PROFINET IO specification [3] for the name of station.	Character string, 1 ... 240 characters
IP address	(7)	The IP address of the device can be set in the Ethernet device pane. The IP address must be unique and match the network being used. The IP address 0.0.0.0 indicates that no IP address has been set yet.	Valid IP address
Protocol	(8)	Protocol by which the device was found.	DCP
Device ID	(9)	Identification number of the device, is defined uniquely by the manufacturer for each device.	0x00000000 ... 0xFFFFFFFF (hex)
Vendor ID	(10)	Identification number of the manufacturer, assigned by the PROFIBUS Nutzerorganisation e.V.	0x00000000 ... 0xFFFFFFFF (hex)
Device role	(11)	Textual description of the function of the device in the network.	"Device", "Controller", "Multidevice", "Supervisor"

Table 15: Parameters of found devices

4.7.3.1 Search device within table

How to proceed:

- Put in the string to be searched at **Find (1)**.

If the table is large, you can search the table for any string within a column.

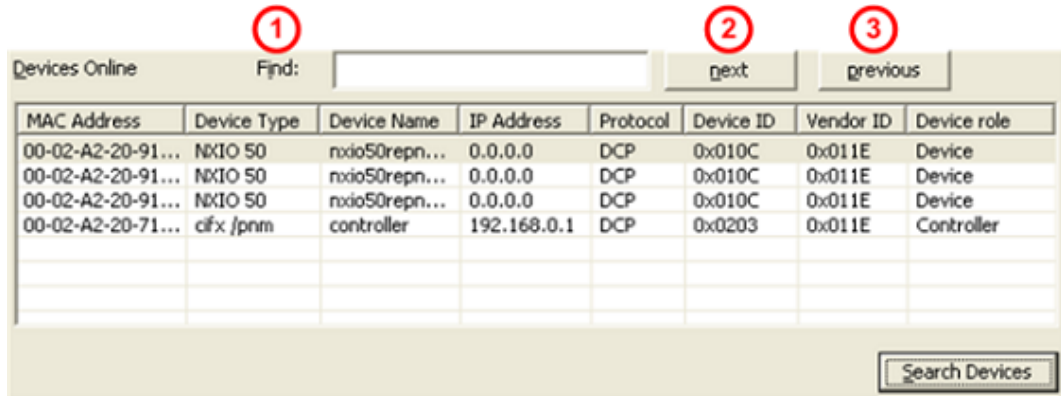


Figure 26: Ethernet Devices pane - Search device in the table (example)

- Using **Next (2)**, the next entry (search direction down) is found in the table that corresponds to the search string.
- **previous (3)** searches the table for the next entry (search direction up) that corresponds to the search criterion.

Sorting the table

By clicking on a field in the header of the table, you can sort the rows by the entries in the column, ascending alphanumeric ascending or descending.

4.7.3.2 Selecting device

- To select a device to be configured click the corresponding line in the table **Devices online**.

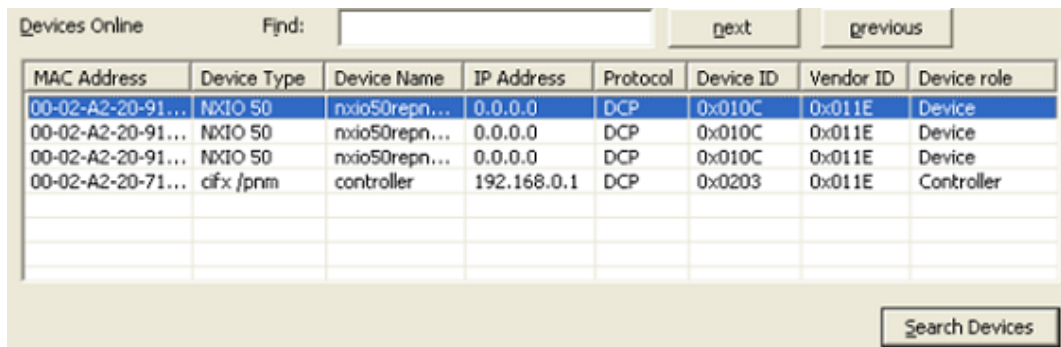


Figure 27: Ethernet devices pane - selecting device (example)

4.7.4 Configuring device

Using the *DCP protocol* you can newly assign the **Device name** or the **IP address** of a device or you can change an already configured device name or IP address. For configuring a device there are the two possibilities:

- The configuration for the device can be created newly.
- Alternatively a configuration already existing can be used, which has been created / set at another place in the configuration software for another device.

4.7.4.1 Overview on configuration

To configure Ethernet-capable devices when using the *DCP protocol*, the **Ethernet devices** dialog provides the following options:

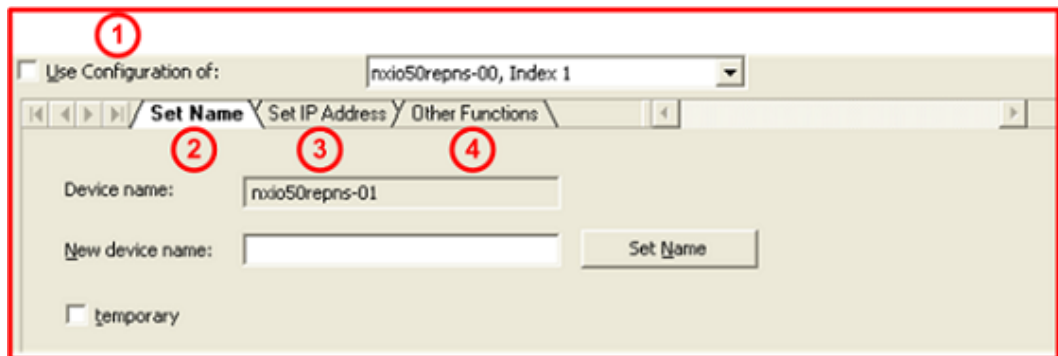


Figure 28: Ethernet Devices pane - Overview on configuration (example)

- Under **Use configuration of** (1) you can specify whether the configuration for a device should be created again or whether a configuration should be applied that has already been made / set for another device in the configuration software at another location.
- Under **Set name** (2), the device name read out can be displayed and, if necessary, changed or set here again. The device name must comply with the specifications of the PROFINET IO specification [3] for the name of station.
- Under **Set IP address** (3), the IP address can be set or changed.
- **Other functions** (4) include for Ethernet capable devices the configuration options **Signal** and **Reset to factory defaults**.



Note:

For PROFINET IO-Controller devices, it is possible that they reject a change in the device name or IP address. In this case, an error message appears.

4.7.4.2 Creating new configuration or using from device



Important:

In order for a configuration that has been made elsewhere in the configuration software for a PROFINET IO device (Controller or Device) to be applied to another device, the already configured PROFINET IO-Device in the FDT container (in this case netDevice) must be configured as a PROFINET IO DTM.

Under **Use configuration of**, you can specify whether

- the configuration for a device must be recreated,
- or for the configuration of a device, a configuration is to be applied that was made elsewhere in the configuration software for another device. This existing configuration can be used for the selected device and must be sent to this device.

How to proceed

If you want to recreate the configuration:

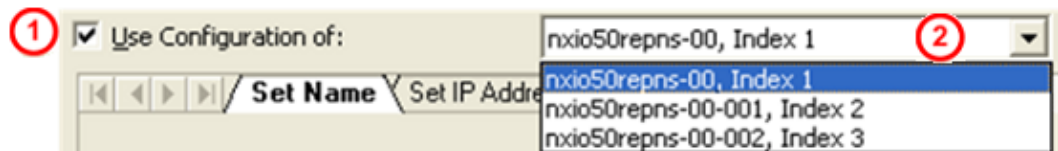


Figure 29: Ethernet Devices pane - Use configuration of (example)

- Uncheck **Use configuration of (1)**.
- Alternatively, check **Use configuration of (1)** if you want to apply a configuration that has already been created.
- Select the device **(2)** whose configuration is to be applied to the new device to be configured.
- Then configure the device name and IP address as described below.
- When finished, click **Devices online > Search devices** again.
- ⇒ Only now the values that have been applied are displayed as current values.

4.7.4.3 Creating new configuration / Setting new device name

**Note:**

The device name must comply with the PROFINET IO specification [3]. Forbidden signs (e. g. blanks) must not be used in the name.

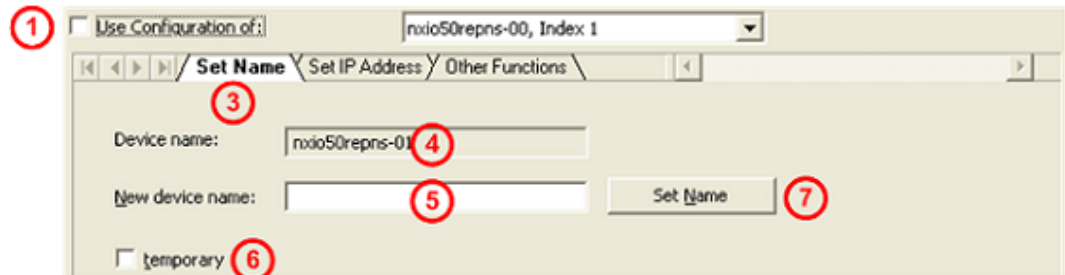
How to proceed

Figure 30: Ethernet Devices pane - setting new device name (example)

- Do *not* check **Use configuration of** (1).
- Click the **Set name** (3) tab.
- ⇒ For the PROFINET IO device (Controller or Device): The current device name is displayed under **Device name** (4).
- To **New device name** (5) type a new device name according to the PROFINET IO specification [3].

To set the device name "temporary" or "permanent":

- Check **temporary** (6) if the device name is to be saved only temporarily (as far as the used device supports this functionality).
- Or do *not* check **temporary** (6) if the device name should be set permanently (if the device supports this choice).

Set Device Name:

- Click **Set name** (7).

The new device name will be transferred to the used device.

- Click **Devices online** > **Search devices** once more.
- ⇒ The newly set device name is displayed under **Device name** (4) as the current device name.

**Note:**

For PROFINET IO-Controller devices a change of the device name can be rejected. Then an error message is displayed.

4.7.4.4 Device name according to PROFINET „Name of station“ specification

The device name must match the specifications in the following extract from the PROFINET IO specification [3] for the "Name of Station".

A Name of station:

- has a **length** of 1 ... 240 characters.
- may consist of one or more **labels**, which are 1 ... 63 characters long and which are separated by dots.
- must contain only **valid characters**:
a – z lower case letters,
0 – 9 digits,
-Minus sign,
. Point.

The *point* is the separator between labels.

The *minus sign* must not be used as the start or end character.

The *minus sign* must not be used before or after a dot.

The *Name of Station* must not begin or end with a point.

Invalid characters are, for example, capital letters, underline and spaces.

Source [3] (see section *References* [▶ page 147]): *PNO document 2722*, section 4.3.1.4.15.1, on page 10073f.

4.7.4.5 Use configuration / Use device name

How to proceed

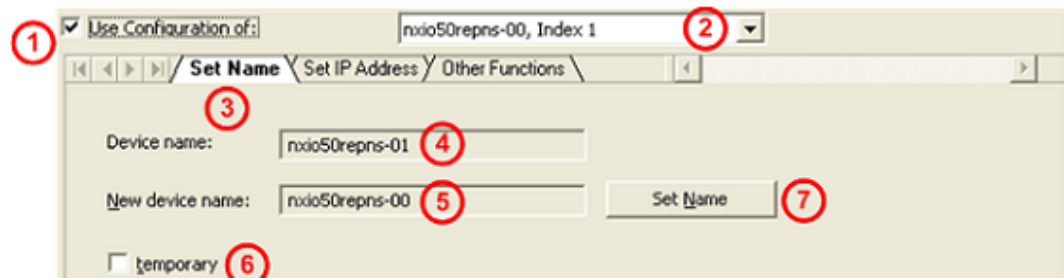


Figure 31: Ethernet Devices pane - Use name of station (example)

- Uncheck **Use configuration of** (1).
- Select the device (2) whose configuration will be used for the device to be configured newly.
- Click the **Set name** (3) tab.
- For the PROFINET IO device (Controller or Device): The current device name is displayed under **Device name** (4).
- Under **New device name** (5) the device name is displayed that was already entered in the configuration software as the „Name of Station“. This one must not be entered again, but can be sent as a new device name to the used device.

To set the device name "temporary" or "permanent":

- Check **temporary** (6) if the device name is to be saved only temporarily (as far as the used device supports this functionality).
- Or do *not* check **temporary** if the device name should be set permanently (if the device supports this choice).

Set Device Name:

- Click **Set name** (7).
- The device name to be used will be transferred to the used device and is displayed under **Device name** (4) as the current device name.
- Click **Devices online** > **Search devices** once more.
- ⇒ The used device name is displayed under **Device name** as the current device name.



Note:

For PROFINET IO-Controller devices a change of the device name can be rejected. Then an error message is displayed.

4.7.4.6 Creating new configuration / setting new IP address

The IP address is set statically during configuration. Later, the PROFINET IO-Controller assigns an IP address to the device via the name of station. If the device used supports the assignment of the IP address via a DHCP server (*if available*), you can choose between the static IP address assignment and the IP address transfer from a DHCP server.

How to proceed

- Do *not* check **Use configuration of** (1).
- Click the **Set IP address** (3) tab.

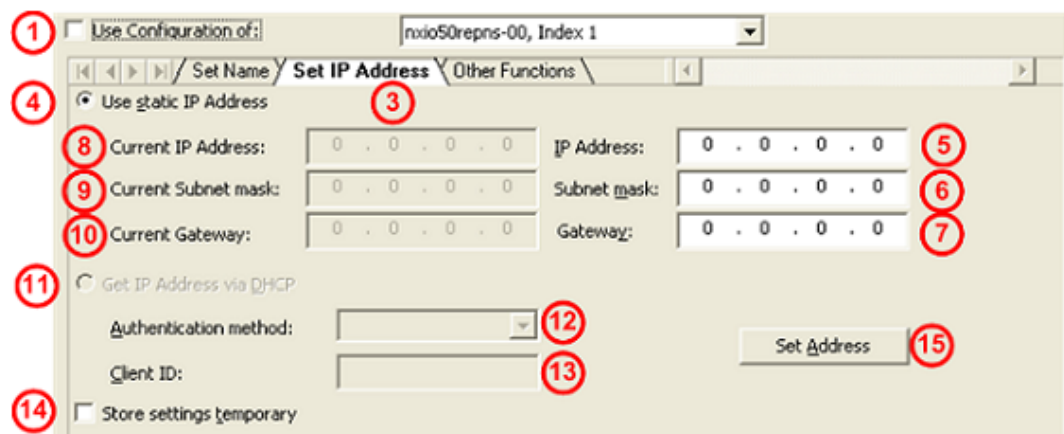


Figure 32: Ethernet Devices - Reset IP Address pane (example)

- Select **Use static IP address** (4) (*default setting*).
- Or select **Get IP Address via DHCP** (11).

If **Use static IP address** was selected, proceed as follows:

For the PROFINET IO device (Controller or Device):

- Under **IP address (5)**, enter the IP address.
- Under **Subnet mask (6)**, enter the subnet mask.
- Under **Gateway (7)**, enter the gateway address.

Figure 33: Ethernet Devices pane – Enter new IP address, subnet mask, and gateway address

If **Get IP address via DHCP** is selected, proceed as follows:

- The area to specify the static IP address is grayed out.
- Under **Authentication method (12)**, select how the device is to be identified, via *MAC address*, *Name of Station* or *Client ID*.
- For the *Client ID* authentication method: set the Client ID under **Client ID (13)**.

For both options (**Use static IP Address** or **Get IP address via DHCP**), proceed as follows:

- To set the IP address, subnet mask and gateway address "temporary" or "permanent", check **Store settings temporary (14)**.



Note:

If the IP address, subnet mask and gateway address are set "temporarily", the settings made are no longer stored in the device after a device reset.

- Or do *not* check **Store settings temporary (14)**, to permanently set the IP address, subnet mask, and gateway address (if the device supports this selection).



Note:

The PROFINET IO-Controller can assign a new IP address to the PROFINET IO-Device when the PROFINET network starts up.

Set address:

- Click **Set address (15)**.
- The newly created IP address, subnet mask, and gateway address are transferred to the device in use. The transmission may take up to 40 seconds depending on the device.
- Click **Devices online > Search devices** again.
- The current IP address, subnet mask and gateway address are displayed under **Current IP address (8)**, **Current subnet mask (9)** or **Current gateway (10)**.

Figure 34: Ethernet Devices pane - displays new current IP address, subnet mask, and gateway address



Note:

For PROFINET IO-Controller devices, it is possible that they reject a change in the IP address. In this case, an error message appears.

4.7.4.7 Use configuration / Use IP address

The IP address is set statically during configuration. Later, the PROFINET IO-Controller assigns an IP address to the device via the name of station. If the device you are using supports IP address assignment via a DHCP server (*if available*), you can choose between static IP address assignment and IP address assignment from a DHCP server.

How to proceed

- Check **Use configuration of** (1).
- Select the device (2) whose configuration is to be applied to the new device to be configured.
- Click the **Set IP address** tab (3).

Figure 35: Ethernet Devices pane - apply IP Address (example)

- Select **Use static IP address** (4) (*default setting*). Or select **Get IP address via DHCP** (11).

If **Use static IP address** was selected, proceed as follows:

- For the PROFINET IO device (Controller or Device) under **IP address** (5), **Subnet mask** (6) or **Gateway** (7), the IP address, subnet mask and gateway address to be applied are displayed that have already been entered in the configuration software. They do not need to be re-entered, but can be sent to the device being used as a new IP address, subnet mask, and gateway address.

If **Get IP address via DHCP** is selected, proceed as follows:

The area to specify the static IP address is grayed out.

- Under **Authentication (12)** method, select how to identify the device, by *MAC Address*, *Name of Station*, or *Client ID*.
- For the *Client ID* authentication method, enter the Client ID under **Client ID (13)**.

For both options (**Use static IP address** or **Get IP address via DHCP**), proceed as follows:

- To set the IP address, the subnet mask and the gateway address "temporarily" or "permanent", check **Store settings temporary (14)**.



Note:

If the IP address, subnet mask and gateway address are set "temporarily", the settings made are no longer stored in the device after a device reset.

- Or do *not* check **Store settings temporary (14)**, to permanently set the IP address, subnet mask, and gateway address (if the device supports this selection).



Note:

The PROFINET IO-Controller can assign a new IP address to the PROFINET IO-Device when the PROFINET network starts up.

Set address:

- Click **Set Address (15)**.
- ⇒ The IP address, subnet mask, and gateway address to be applied are transmitted to the device being used. The transmission may take up to 40 seconds depending on the device.
- Click **Devices online > Search devices** again.
- ⇒ The new current values are displayed under **Current IP address (8)**, **Current subnet mask (9)** or **Current gateway (10)**.

Use static IP Address			
8	Current IP Address:	192 . 168 . 0 . 2	5
9	Current Subnet mask:	255 . 255 . 255 . 0	6
10	Current Gateway:	0 . 0 . 0 . 0	7

Figure 36: Ethernet Devices pane - displays new current IP address, subnet mask, and gateway address



Note:

For PROFINET IO-Controller devices, it is possible that they reject a change of the IP address. In this case, an error message appears.

4.7.4.8 Signal, factory defaults

The tab **Other Functions** provides the functions **Signal** and **Reset to factory defaults**.

How to proceed

- Do *not* check **Use configuration of (1)**.
- Click **Other functions (2)**.

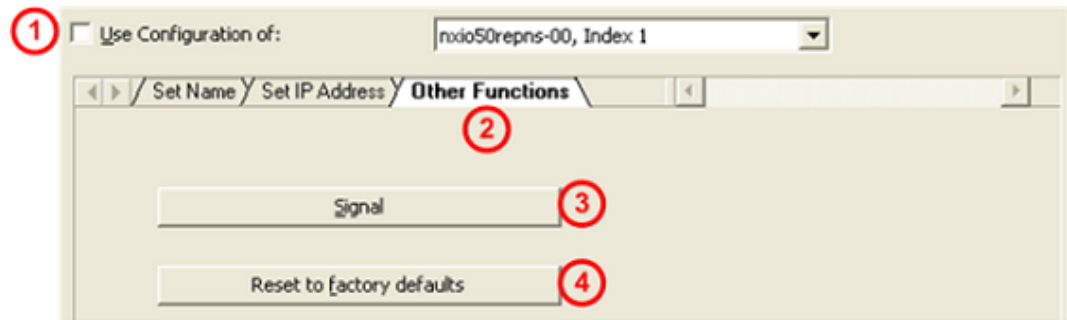


Figure 37: Ethernet Devices pane - Signal, factory defaults (example)

For the PROFINET IO device (Controller or Device):

- Click **Signal (3)**.
- ⇒ The LED on the selected device blinks. This allows to clearly identifying the device among others.
- Click **Reset to factory defaults (4)**.
- ⇒ Adjustments made at the device are reset to the factory default.

5 Licensing

Using the license dialog, you can order licenses for **Master protocols** and **Utilities** and transfer them to your device.

5.1 Opening license dialog

You first open the **License** window.



Note:

You first need to assign the master device to the DTM. Only then the device data and the licenses already present in the device are displayed in the **License** dialog.

How to proceed:

1. Assign the master device to the DTM.
 - In the FDT container **netDevice**, double click to the device icon.
 - Select **Settings > Driver**.
 - Select one or several drivers (checking).
 - **Select Settings > Driver > [Name of the assigned driver]**.
 - Configure the driver settings if necessary.
 - Select **Settings > Device assignment**.
 - Under **Device selection**, select *suitable only* or *all* and click **Scan**.
 - In the table, check the required device.
 - Click **Apply**.
 - Close the DTM configuration dialog via **OK**.

For details to the device assignment, refer to section *Settings* [▶ page 22].

2. Open the **License** pane.
 - Right-click on the device icon in the FDT container **netDevice**.
 - From the context menu, select **Additional functions > License**.
 - ⇒ The **License** window opens.
 - ⇒ The title bar contains the notation of the device description: *Symbolic Name [Device Description] <Station Address > (#Network ID)*.

5.2 License dialog

In the **License** pane, you can:

- check, which licenses for Master protocols or Utilities are present in the device (Position (1) in the figure below),
- order licenses (Positions (2) to (11)),
- transfer license to the device (12),

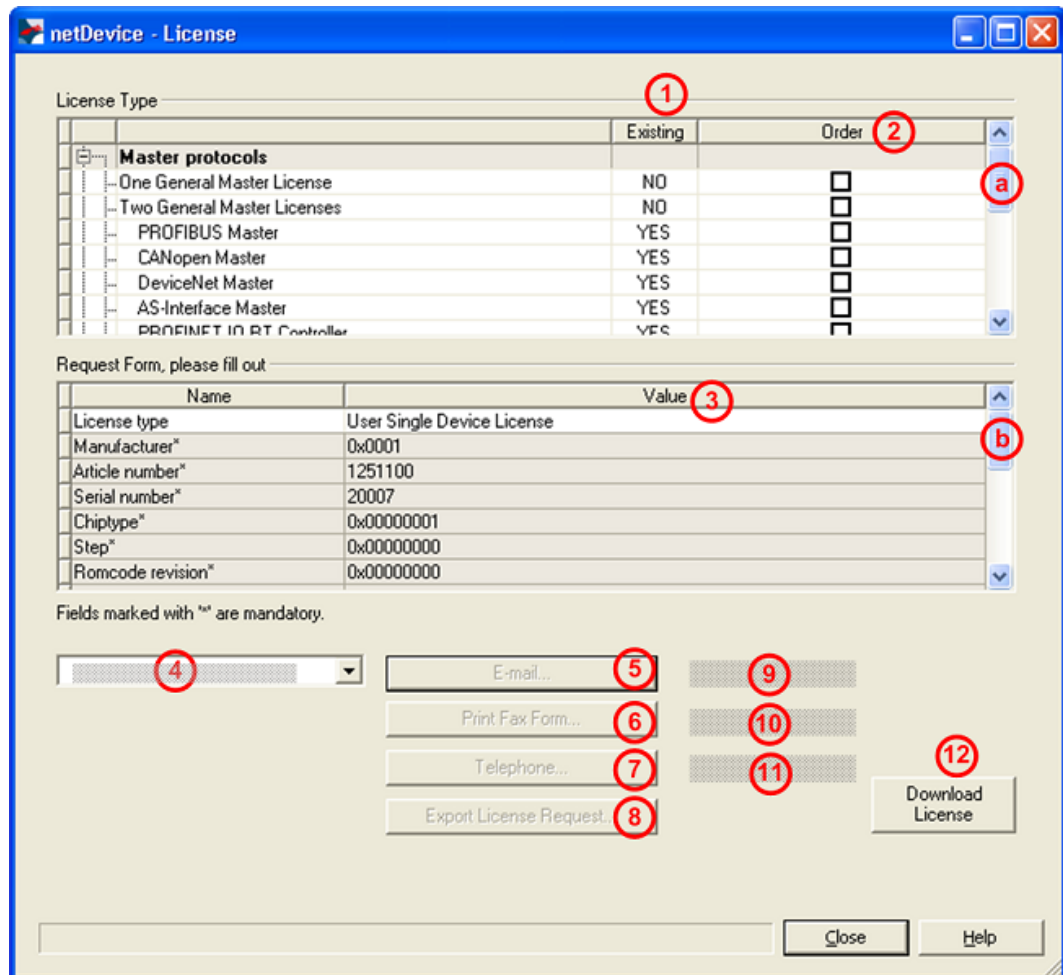


Figure 38: License pane



Note:

To display further entries under License Type, move the scroll box (a) downwards or upwards. To display further entries under **Request form, please fill out**, move the scroll box (b) downwards or upwards.

5.3 Which licenses are present in the device?

Check, which licenses are present in the device.

How to proceed:

- Open the **License** pane as described under section *Opening license dialog* [▶ page 57].



Figure 39: License pane - License Type

- Under **License type** click **+** at **Master protocols**.
- The **Master protocols** overview opens:

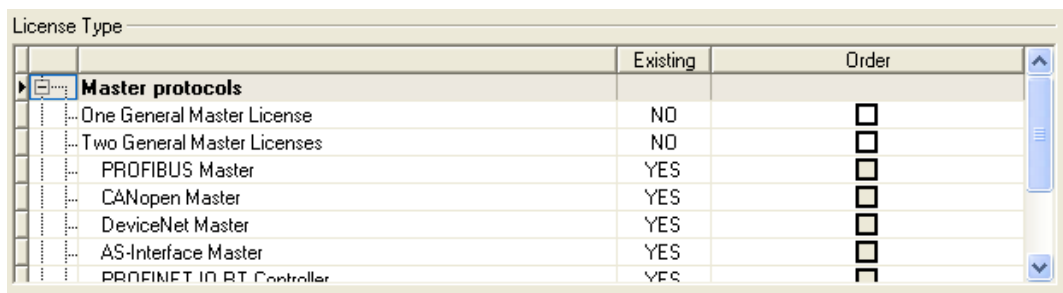


Figure 40: License pane – License Type / Master protocols

- Or click **+** at **Utilities**.
- The **Utilities** overview opens:

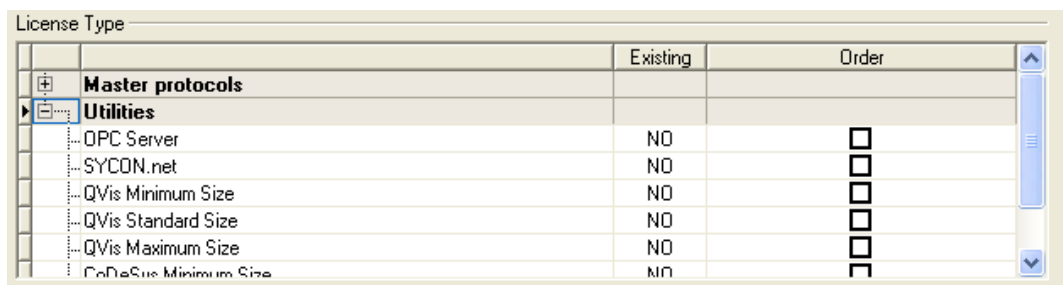


Figure 41: License pane – License Type / Utilities

- The column **Existing** indicates which licenses are present in the device.

Yes = License is present in the device.

No = License is not present in the device.



Note:

In newer versions of the present configuration software, under **License type** may be displayed additional licenses or other protocols that can be ordered later.

5.3.1 License for master protocols

One General Master License:

On the device maximally 1 communication protocol with master function can be implemented.

Two General Master Licenses:

On the device maximally 2 communication protocols with master function can be implemented.

The license includes the following master protocols:

- AS-Interface Master
- CANopen Master
- DeviceNet Master
- EtherCat Master
- EtherNet/IP Scanner
- PROFIBUS Master
- PROFINET IO RT Controller
- Sercos Master

5.3.2 Licenses for utilities

SYCON.net

OPC Server

QVis Minimum Size

- QVis Standard Size
- QVis Maximum Size
- CoDeSys Minimum Size
- CoDeSys Standard Size
- CoDeSys Maximum Size

For the Utilities QVis and CoDeSys only one license can be selected alternatively:

- *Minimum Size,*
- *Standard Size* or
- *Maximum Size.*

5.4 How to order a license?

To order a license, proceed as follows:

1. Open the license dialog.
 - Refer to Section *Opening license dialog* [▶ page 57].
2. Select the required licenses.
 - Refer to Section *Selecting license(s)* [▶ page 61].
3. Enter the ordering data.
 - Refer to Section *Ordering data* [▶ page 62].
4. Place your order.
 - Refer to Section *Ordering the license* [▶ page 64].

5.5 Selecting license(s)

You can select licenses for Master protocols and / or Utilities.

1. Selecting license(s) for Master protocol(s):
 - In the **License** pane under **License type** click **+** at **Master protocols**.
 - Under **Order** check as many licenses must run simultaneously on your device:
One General Master License or
Two General Master Licenses.
2. And/or select license(s) for utility(utilities):
 - In the **License** pane under **License type** click **+** at **Utilities**.
 - Under **Order** check the required utility(utilities)
(*single or several*):
 - SYCON.net
 - OPC Server
 - QVis Minimum Size*
 - QVis Standard Size*
 - QVis Maximum Size*
 - CoDeSys Minimum Size**
 - CoDeSys Standard Size**
 - CoDeSys Maximum Size**

For *) and **) minimum size, standard size or maximum size can be selected only as an alternative.

5.6 Ordering data

- Device information

The "Device Information" required for the order are read from the device and automatically filled in the order.

- Ordering Data

➤ Enter the Ordering Data into the **License** pane.

➤ Enter the **Data to manage the Order** (therefore refer to section *Data to manage the order (license information)* [▶ page 63]).

5.6.1 Device information (ordering data read from the device)

The following ordering data is read from the device and displayed in the **License** pane:

- Manufacturer
- Article number
- Serial number
- Chip type
- Step (chip revision)
- Romcode revision
- Checksum (checksum of the device data)

The gray fields under **Request Form, please fill out > Value** contain the ordering data read from the device:

Request Form, please fill out	
Name	Value
Manufacturer*	0x0001
Article number*	1251100
Serial number*	20007
Chiptype*	0x00000001
Step*	0x00000000
Romcode revision*	0x00000000
Checksum*	G

Fields marked with '*' are mandatory.

Figure 42: License pane - request form, please fill out / device information

These ordering data read out from the device are displayed automatically from the device.

5.6.2 Data to manage the order (license information)

For your order, you must enter the following data to the **License** pane:

- License type (User Single Device License).

Name	Value
License type	User Single Device License

Figure 43: License pane - Request form, please fill out / License type

- Select the license type under **Request form, please fill out > Value**, (for future application, currently only *User Single Device License* can be selected).
- Mandatory data to the order request (editable fields):
 - First name
 - Surname
 - E Mail (address, to which the license download link shall be send.)
 - Telephone
 - Company
 - Address
 - Country
 - City, State, Zip

Name	Value
First name*	John
Surname*	Doe
E-Mail*	License@doe.com
Telephone*	0011223344-55
Fax	0011223344-100
Customer number	123456789
Company*	Doe Example LTD

Fields marked with "*" are mandatory.

Figure 44: License pane - request form, please fill out / mandatory data

- Enter all mandatory fields under **Request form, please fill out > Value** (marked with*).
- Additional order data, not mandatory (editable fields):
 - Fax
 - Customer number
 - Order number
 - Value added tax identification number
- Under **Request form, please fill out > Value** enter all fields for the additional data, which is not mandatory.

5.7 Ordering the license

Place your order in the **License** pane. Therefore:



Figure 45: License pane – selecting the subsidiary / ordering / contacts

- Select the subsidiary (4), to which the order shall be send.
- Place the order:
 - by **E-Mail** (5),
 - or by **Fax** (6) or by **Telephone** (7),
 - or in a **file** (8).

The **Contact data** of the selected subsidiary is displayed under the positions (9), (10) and (11).

5.7.1 Ordering the license by e-mail

You can place your order by e-mail.

- In the **License** pane, click **e-mail...** (5).
- ⇒ The order e-mail **License request** opens:

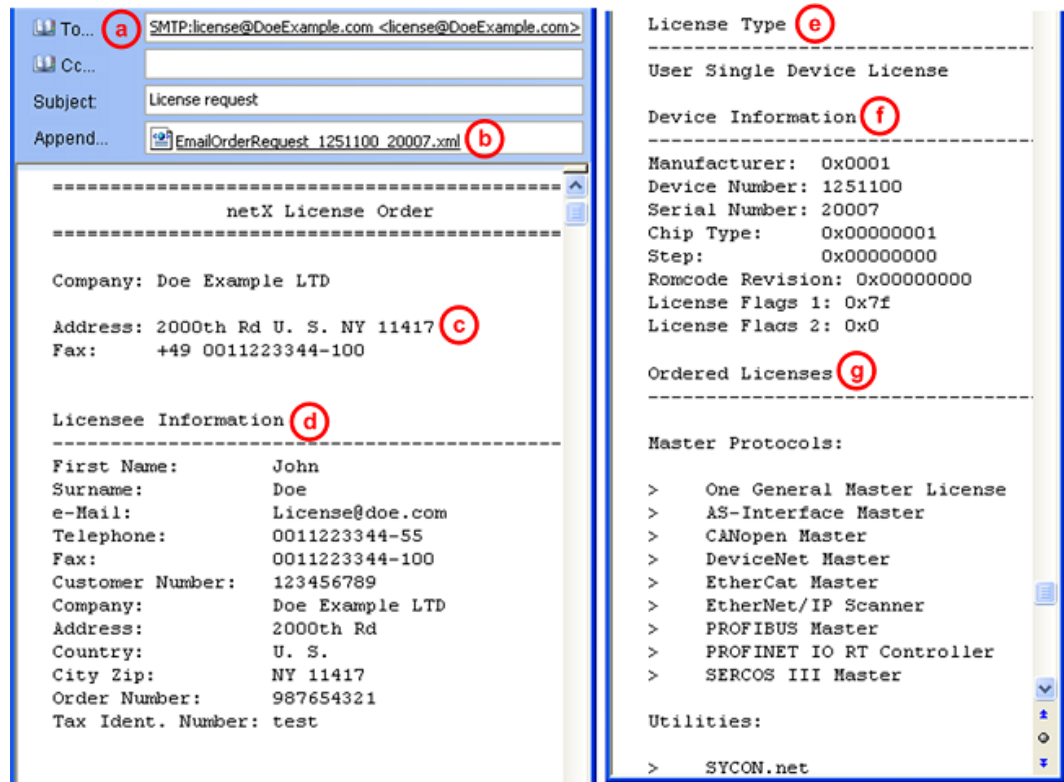


Figure 46: Example: Order e-mail License request

The order e-mail **License request** contains:

- the **E-mail...** of the selected subsidiary (a),
- the automatically generated XML **file** (b) *EmailOrderRequest_
[Devicenumber]_[Serialnumber].xml* with a summary info of the **order information**,
- the **Order address** (c),
- the **License information** (d),
- the **License type** (e),
- the **Device information** (f),
- the **ordered licenses** (g).
- Send the order e-mail **License request**.
- ⇒ The order process is complete.

5.7.2 Ordering the license by fax or by telephone

You can place your order by fax or by telephone.

- In the **License** pane, click **Print fax form (6)** or **Telephone... (7)**.
- The summary of the ordering data *PrintOrderRequest_[Devicenum-ber]_[Serialnumber].html* is opened in a browser window.



Note:

If your browser does not display the order data or the window **Move element** or **Copy element** is displayed, check the safety settings of your system.

netX License Order Form

Doe Example LTD
2000th Rd
NY 11417
U. S.
fax: +11223344-100



Licensee Information



First Name: John
Surname: Doe
e-Mail: License@doe.com
Telephone: 0011223344-55
Fax: 0011223344-100
Customer No: 123456789
Company: Doe Example LTD
Address: 2000th Rd
Country: U. S.
City Zip: NY 11417
Order Number: 987654321
Tax Ident. Number: test

License Type



User Single Device License

Device Information



Manufacturer: 0x0001
Device Number: 1251100
Serial Number: 20007
Chip Type: 0x00000001
Step: 0x00000000
Romcode Revision: 0x00000000
License Flags 1: 0x7f
License Flags 2: 0x0

Ordered Licenses



Master Protocols

- One General Master License
- AS-Interface Master
- CANopen Master
- DeviceNet Master
- EtherCat Master
- EtherNet/IP Scanner
- PROFIBUS Master
- PROFINET IO RT Controller
- SERCOS III Master
- Sercos III Master

Utilities

- SYCON.net

Date: _____

Signature: _____

Figure 47: Example: Order data form PrintOrderRequest

The order data form contains:

- the **Order address (c)** ,
 - the **License information (c)**,
 - the **License type (e)**,
 - the **Device information (f)**,
 - the **ordered Licenses (g)**.
- Print the order data form, sign it and send it by fax.
- In the **License** pane, use the Fax number **(10)**, which is displayed after the subsidiary, was selected.

Or:

- Keep ready the data form and communicate the order data via telephone.
- In the **License** pane, use the telephone number **(11)**, which is displayed after the subsidiary, was selected.
- ⇒ The order process is complete.

5.7.3 Exporting license request to a file

If you are working on a process computer without an e-mail client, you can export your order information to a file, save the file to a removable disk and place your order manually via e-mail from a different PC.

- In the **License** pane, click **Export license request... (8)**.
- ⇒ The window **Browse for folder** is displayed.
- Choose for or create a new folder on a removable disk.
- Save the automatically generated **XML file** *EmailOrderRequest_- [Devicenumber]_[Serialnumber].xml* with a summary info of the **order information** to this folder.
- Send this file from a PC with an e-mail client manually via e-mail.
- Therefore use an e-mail address, which is displayed after the subsidiary was selected in the **License** pane (see Position **(9)**, figure *License pane* [▶ page 58]).
- ⇒ The order process is complete.

5.8 How to get the license and transfer it to the device

**Note:**

License files can only be delivered via e-mail. The e-mail contains a link to download the license file.

According to the license you ordered, you will receive an e-mail containing a **Link to download the license file**. This leads to a server PC on which the license file is provided. Using the received link you will have to save the license file on your PC and then transfer the license to your device. If your e-mail client is on another PC as your device, you must save your license file e. g. to an USB stick.

Steps on how to proceed

1. Save the license file to a PC or a disk.
 - Click to the **Link to download the license file** in the e-mail.
 - Save the license file **.nxi* to a PC or a removable disk.
2. Download the license file to the device.
 - Respectively connect the removable disk with the license file to the PC, which is connected to your device.
 - In the **License** pane, click **Download license (12)** in the **License** pane in the configuration software.
 - ↻ The file selection window **Open** is displayed.
 - Therein select the license file *netX License Files (*.nxi)*.
 - Click **Open**.
 - ↻ The license file is transferred to the device.
 - ↻ After this the license is present in the device and is activated with the next device reset.

**Note:**

To activate the license in the device for the first time, a device reset is required.

3. Activate device reset
 - To check whether the license has been activated, follow the steps in section *Which licenses are present in the device?* [▶ page 59].

6 Configuration

6.1 Overview configuring device parameters

Under "Configuration" you can configure the configuration for your device.

- The **Controller network settings** include the current name of station of the PROFINET IO-Controller, as well as the description and the IP settings.
- The **Device table** dialog pane shows all PROFINET IO-Devices that are available in the PROFINET IO-Controller configuration.
- The **IP address table** dialog pane displays the name of station and the IP settings for PROFINET IO-Devices connected to the PROFINET IO-Controller.
- The dialog pane **Process data** serves as an external process data interface for the PROFINET IO-Controller DTM.
- In the **Isochronous modules** dialog pane, IRT-enabled (isochronous) devices and modules, or isochronously supported submodules, are displayed that have the isochronous mode.
- The **Address table** shows a list of all addresses used in the process image memory.
- The **FSU/port settings** dialog pane is used in the PROFINET IO-Controller to set whether a PROFINET IO-Device should establish a connection via fast-start-up for cyclic user data exchange.
- The **Station timing** dialog pane shows the timing of the station.
- At the **Controller settings** pane, device related settings can be made.

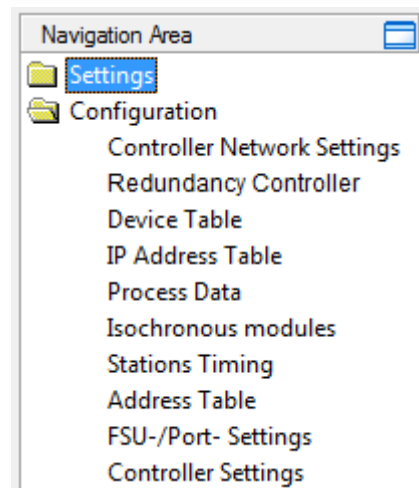


Figure 48: Navigation area - Configuration



Note:

To edit the dialog panes under **Configuration**, you need the user rights for "Maintenance".

For **further information** about the configuration, see sections.

- *Controller network settings* [▶ page 71],
- *Device table* [▶ page 74],
- *IP address table* [▶ page 76],
- *Process data* [▶ page 78],
- *Isochronous modules* [▶ page 79],
- *Address table* [▶ page 82],
- *FSU/port settings* [▶ page 85]
- *Stations timing* [▶ page 87] and
- *Controller settings* [▶ page 104].

6.2 Configuring IRT communication

To configure devices for the isochronous real-time communication (IRT)

- the configuration of the **Stations timing** settings in the PROFINET IO-Controller DTM for IRT is required. For this, the sync domain settings must be made for IRT-capable PROFINET IO-Devices. For more information, see section *Stations timing* [▶ page 87].
- Furthermore the planning and configuration of the device topology and the configuration of the properties of the device, port and connection must be done in the **Topology editor**.



For information concerning the configuration of the topology of devices in domains for isochronous real-time communication (IRT), refer to the Operating instruction manual **Topology editor**.

6.3 Controller network settings

The **Controller network settings** dialog pane shows the current **Name of station** and the IP settings of the PROFINET IO-Controller, which can be changed here.

By using the **Accept DCP set via network** option, the controller network settings can be set via the DCP protocol (if necessary by using an external tool). By using the **Overwrite name of station of devices based on topology information** option, station names can be subsequently assigned to devices.

- Select **Configuration > Controller network settings** in the navigation area.
- ⇒ The **Controller network settings** pane is displayed.

Figure 49: Configuration > Controller network settings

Parameter	Description	Range of value / value
Name of station	Network name of the PROFINET IO-Controller station (editable). The Name of station must be DNS compatible. For further information, see section <i>Device name according to PROFINET „Name of station“ specification</i> [▶ page 51]. Invalid entries will display a red exclamation point and an error message. The name of station of the PROFINET IO-Controller station can also be edited in the 'Topology editor' under 'Device properties'. For information on the permitted signs, see section <i>Name encoding</i> [▶ page 149].	Name according to the PROFINET specification (PNO document 2722) 1 - 240 characters
Description	Symbolic name of the PROFINET IO-Controller DTM (editable).	Character string
Device type name	Name of the physical PROFINET IO Controller device. This is a non-volatile stored name for the PROFINET IO Controller device in the PROFINET IO Controller device, which is shown here only.	Character string

Parameter	Description	Range of value / value
Accept DCP set via network	<p>Case 1: If Accept DCP set via network is checked, the settings for the name of station and the IP settings of the PROFINET IO-Controller device are made via the DCP protocol. This can be done in the Ethernet devices pane (see section <i>Ethernet devices</i> [▶ page 44]), or via an external tool that can send DCP commands. When a DCP command is sent in <i>case 1</i>, any settings made in the Controller network settings pane are overwritten.</p> <p>Important! The name of station and the IP settings of the PROFINET IO-Controller device can only be set using the DCP protocol if the PROFINET IO-Controller device is in the 'NetworkUp' operating state.</p> <p>If the name of station is set using an external tool ("Name baptism" for PROFINET devices), it must be synchronized manually with the device. This means that the "name baptism" is not performed via the configuration download in the configuration software SYCON.net.</p> <p>Case 2: If Accept DCP set via network is unchecked, the settings made in the Controller Network Settings pane for the name of station and IP settings will be used.</p> <p>In <i>case 2</i>, the name of station and the IP settings cannot be set in the Ethernet devices pane or these settings are rejected by the PROFINET IO-Controller.</p>	checked, unchecked, default: unchecked
IP settings of the PROFINET IO-Controller station (editable)		
IP address	IP address of the PROFINET IO-Controller station.	Valid IP address
Network mask	Network mask of the PROFINET IO-Controller station.	Valid network mask
Gateway address	Gateway address of the PROFINET IO-Controller station.	Valid gateway address
Device settings		
Overwrite name of station of devices based on topology information	<p>The option Overwrite name of station of devices based on topology information can be used to assign a name of station from the PROFINET IO-Controller device to a PROFINET IO-Device. Names for devices are subsequently assigned in the Device table pane (see section <i>Device table</i> [▶ page 74]) in the Name of station column.</p> <p>The prerequisite for using the option is that the corresponding topology information is available in the firmware for the PROFINET IO-Device. These are set in the Topology editor. This means that a connection to the device must be configured in the Topology editor. For more information on connecting devices in the Topology editor, refer to the operation instruction manual <i>Topology Editor</i>.</p> <p>Effect of this option:</p> <p>If the PROFINET IO-Controller firmware does not find a PROFINET IO-Device in the network under the name of station specified in the Device table pane, the PROFINET IO-Controller device will address the PROFINET IO-Device via topology information.</p> <p>If the PROFINET IO-Controller device then finds a PROFINET IO-Device that is located at the position in the topology, there are two options:</p> <ol style="list-style-type: none"> 1) Overwrite name of station of devices based on topology information is checked: In this case, the PROFINET IO-Controller device will perform the "name baptism", even if the device found already has a name of station. 2) Overwrite name of station of devices based on topology information is unchecked: In this case, the PROFINET IO-Controller device will perform the "name baptism", provided that the PROFINET IO-Device does not have a name of station at all. An incorrect name of station name of station has no consequences. 	checked, unchecked, default: unchecked

Table 16: Parameters of the controller network settings dialog pane

- Set the name of station and the IP settings for the PROFINET IO-Controller.

- Check **DCP set is activated via the network** if the settings for the Name of Station and the IP settings are to be made via the DCP protocol (if necessary via an external tool).

**Important:**

The Name of Station and the IP settings of the PROFINET IO-Controller device can be set via the DCP protocol only if the PROFINET IO-Controller device is in operating mode 'Network Up'.

- Check **Overwrite name of station of devices based on topology information** if name of station settings are to be set to devices subsequently.

6.4 Device table

The **Device table** dialog pane shows the list of all PROFINET IO-Devices configured in the PROFINET IO-Controller configuration.

Follow the steps described hereafter:

1. Activate the required device/s:
 - Select **Configuration > Device table** in the navigation area.
 - Select the required device/s.
 - In the column **Activate** check the corresponding checkbox.
2. Set the Name of station of the PROFINET IO-Device station.



Note:

The **Name of station** displayed here must match with the name of station stored in the PROFINET IO-Device. The name of station must be explicit in the PROFINET network. It must be a DNS compatible name.

- In the column, **Name of station** set the network name of the PROFINET IO-Device station.

Device Table					
Activate	Index	Name of station	Device	Description	Vendor
<input checked="" type="checkbox"/>	1	Device*-00	Device*	Device*	[Vendor Name]
<input checked="" type="checkbox"/>	2	Device*-00-001	Device*	Device*	[Vendor Name]
<input checked="" type="checkbox"/>	3	Device*-00-002	Device*	Device*	[Vendor Name]

Figure 50: Configuration > Device Table

*The name of the PROFINET IO-Device appears.

Parameter	Description	Range of value / value
Activate	<p>If Activate is checked, process memory in the controller is reserved for this device and the controller makes a data exchange on the bus to this device.</p> <p>If Activate is deactivated, the controller reserves memory in the process data image for this device, but no data exchange to this device is made on the bus.</p>	Default: checked Checked, unchecked
Index	Via the index (editable) you can define an user-defined sequence for the devices configured in the PROFINET IO-Controller.	1 ... n
Name of station	<p>Network name of the PROFINET IO-Device station (editable).</p> <p>The name of station is set here. In the PROFINET IO-Device-DTM device it is only displayed or otherwise it must be set directly in the configuration tool of the PROFINET IO-Device.</p> <p>The name of station set here must match with the name of station set in the PROFINET IO-Device. The PROFINET IO-Controller uses the name of station to identify the PROFINET IO-Device via the PROFINET network and to build up communication.</p> <p>The name of station must be explicit in the PROFINET network. It must be a DNS compatible name. For further information refer to section <i>Device name according to PROFINET „Name of station“ specification</i> [▶ page 51]. For invalid inputs a red exclamation mark and an error message will appear.</p> <p>The name of station of the PROFINET IO-Device station can be edited in the 'Device properties' of the 'Topology Editor' too.</p>	Unique network name of the device according to the PROFINET specification (PNO document 2722). 1 - 240 characters

Parameter	Description	Range of value / value
Device	The name of the physical device. Name for the device that is stored non-volatile on the device.	
Description	The symbolic name of the device.	
Vendor	Name of the vendor of the device.	

Table 17: Parameters of the Device table dialog pane

6.5 IP address table

The **IP address table** dialog pane displays the name of the station and the IP settings of the PROFINET IO-Device stations connected to the PROFINET IO-Controller.

The IP settings (IP address, network mask and gateway address) of the PROFINET IO-Device station can be set here. You can configure whether the IP address is to be set manually and the network mask and gateway address are to be taken from the PROFINET IO-Controller (default), or whether the IP settings are to be set manually or to be taken from the network.

The PROFINET IO-Controller device transmits the IP settings of the PROFINET IO-Device station during startup via the PROFINET network to the PROFINET IO-Device and configures the PROFINET IO-Device. In the PROFINET IO Device DTM, the name of station and the IP settings of the PROFINET IO-Device are only displayed.

The figure shows three sequential screenshots of the 'IP Address Table' dialog pane. Each screenshot displays a table with five columns: 'Name of station', 'Mode', 'IP address /', 'Network mask', and 'Gateway address'.
 - The first screenshot shows the station 'cifxreps' with 'Mode' set to 'inherit(Standard)', 'IP address /' set to '192.168.0.2', 'Network mask' set to '255.255.255.0', and 'Gateway address' set to '0.0.0.0'.
 - The second screenshot shows the same station 'cifxreps' with 'Mode' set to 'Assign manually', 'IP address /' set to '192.168.0.2', 'Network mask' set to '255.255.255.0', and 'Gateway address' set to '0.0.0.0'.
 - The third screenshot shows the station 'cifxreps' with 'Mode' set to 'Assume from network' (indicated by a dropdown arrow), and the other fields are empty.

Figure 51: Configuration > IP Address Table

Parameter	Description	Range of value / value
Name of Station	Network name of the PROFINET IO-Device station (not editable). The name of station is set in the Device table in the PROFINET IO-Controller DTM (refer to section <i>Device table</i> [▶ page 74]). Otherwise, it must be set directly in the configuration tool of the PROFINET IO-Device.	1 - 240 characters
IP settings of the PROFINET IO-Device station (editable)		
Mode	Inherit (Standard): The IP address is set manually. The network mask and the gateway address are taken from the controller network settings. Assign manually: The IP address, network mask and the gateway address can be set or changed manually. Assume from network: The IP address, network mask and gateway address are taken from the network settings (e.g. from the DHCP server).	Inherit(Standard), Assign manually, Assume from network
IP address	IP address of the PROFINET IO-Device station.	valid IP address
Network mask	Network mask of the PROFINET IO-Device station.	valid network mask
Gateway address	Gateway Address of the PROFINET IO-Device station.	valid gateway address

Table 18: IP address table pane parameters

6.5.1 Set the IP settings of the PROFINET IO-Device station

The IP settings for the PROFINET IO-Device station can be inherited. In this case, the IP address is set manually and the network mask or gateway address are applied from the Controller Network Settings of the PROFINET IO-Controller device, to which the PROFINET IO-Device is connected. Alternatively, the IP settings can be set manually or can be applied from the network settings. Proceed as follows:

- Select **Configuration > IP address table** in the navigation area.

Inherit

- Select the **Inherit (Standard)** mode.
- Set the IP address manually.
- ↻ The manually set IP address is applied to the PROFINET IO-Device. Also, the network mask and gateway address from the Controller Network Settings are applied.

Assign manually

- Alternatively select the **Assign manually** mode.
- Then set the IP address, network mask and gateway address manually.
- ↻ The manually set values are applied to the PROFINET IO-Device station.



Note:

The fields **Network mask** and **Gateway address** are only editable if **Assign manually** is selected.

Assume from network.

- Or select the **Assume from network** mode.
- ↻ The IP address, network mask and gateway address are applied from the network settings (e.g. from the DHCP server) to the PROFINET IO-Device station.

6.6 Process data

For the PROFINET IO-Controller DTM the **Process data** pane serves as an external process data interface, e. g. for data transfer to a PLC unit. The process data pane lists the Slave devices connected to the Master, as well as the configured modules or input or output signals of the devices. This makes the fieldbus structure visible.

For the configured modules, submodules or measuring signals names (tags) can be set (column "Tag").

In addition, it can be specified which signal data are to be made available on the OPC server (column SCADA).

Process Data			
	Type	Tag	SCADA
[-]	CIFX RE/PNS V3.5.35 - V3.x <cifxrepns>	CIFX_RE_PNS_V3.5.35_-V3.x	<input checked="" type="checkbox"/>
[+]	1 Byte Eingang <Slot 1>	1 Byte Eingang <Slot 1>	<input checked="" type="checkbox"/>
[+]	1 Byte Eingang <Subslot 1>	1 Byte Eingang <Subslot 1>	<input checked="" type="checkbox"/>
[+]	(1 bytes) OctetString input	Inputs	<input checked="" type="checkbox"/>
[+]	1 Byte Eingang <Slot 2>	1 Byte Eingang <Slot 2>	<input checked="" type="checkbox"/>
[+]	1 Byte Eingang <Subslot 1>	1 Byte Eingang <Subslot 1>	<input checked="" type="checkbox"/>
[+]	(1 bytes) OctetString input	Inputs	<input checked="" type="checkbox"/>
[+]	1 Byte Eingang <Slot 3>	1 Byte Eingang <Slot 3>	<input type="checkbox"/>
[+]	1 Byte Eingang <Subslot 1>	1 Byte Eingang <Subslot 1>	<input type="checkbox"/>
[+]	(1 bytes) OctetString input	Inputs	<input type="checkbox"/>
[-]	CIFX RE/PNS V3.5.35 - V3.x <cifxrepns-001>	CIFX_RE_PNS_V3.5.35_-V3.x	<input checked="" type="checkbox"/>
[+]	1 Byte Eingang <Slot 1>	1 Byte Eingang <Slot 1>	<input checked="" type="checkbox"/>
[+]	1 Byte Eingang <Subslot 1>	1 Byte Eingang <Subslot 1>	<input checked="" type="checkbox"/>
[+]	(1 bytes) OctetString input	Inputs	<input checked="" type="checkbox"/>
[+]	1 Byte Eingang <Slot 2>	1 Byte Eingang <Slot 2>	<input type="checkbox"/>
[+]	1 Byte Eingang <Subslot 1>	1 Byte Eingang <Subslot 1>	<input type="checkbox"/>
[+]	(1 bytes) OctetString input	Inputs	<input type="checkbox"/>

Figure 52: Process data

Column	Symbol	Description
Type	Device	Device labeling* provided by the hardware followed by the device's name of station in pointy brackets
	module, submodule	Description of the modules, submodules or input or output signals configured on the device (not editable)
	I/O signal	
Tag	Device	Device name or the symbolic name of the device
	module, submodule	Symbolic name for the modules, submodules or input or output signals configured on the device (editable)
	I/O signal	
	warning	Duplicate Tag at the same level can cause errors by use of OPC!
SCADA	Selection option which module, submodule or signal data should be made available on the OPC server. „SCADA“ (= Supervisory Control and Data Acquisition), here used with the meaning „to provide for visualizing purposes“.	

Table 19: Process data

6.7 Isochronous modules

The **Isochronous modules** dialog pane displays IRT capable (isochronous) devices or modules, or isochronously supported submodules, which provide the isochronous mode. If not enabled or disabled by default (fixed setting), the isochronous mode can be enabled or disabled in the **Isochronous** column. It serves to determine for which isochronous devices or modules or isochronously supported submodules the configured timing parameters

- **Options for calculation,**
- **Input time,**
- **Output time,**
- **Input interval steps,**
- or **Output interval steps** will apply.

If the **Automatic** setting is selected (recommended), the automatically in the background calculated timing parameters applies. In the expert mode **Manual**, you can set the timing parameters yourself. These values applies each for the entire selection.

Isochronous modules

Image	Type	Tag	Isochronous
▲	SINAMICS_S120_S150_CU320-2_PN_V4.7 <Add>	SINAMICS_S120_S150_CU320-2_PN_V4.7	<input checked="" type="checkbox"/>
▲	DO SERVO <Slot 2>	DO SERVO <Slot 2>	<input checked="" type="checkbox"/>
	Standard telegram 9, PZD-10/5; SERVO <Subsc	Standard telegram 9, PZD-10/5; SERVO <Subsc	<input checked="" type="checkbox"/>
▲	DO ENCODER <Slot 3>	DO ENCODER <Slot 3>	<input checked="" type="checkbox"/>
	Standard telegram 83, PZD-2/8 <Subslot 3>	Standard telegram 83, PZD-2/8 <Subslot 3>	<input checked="" type="checkbox"/>

Options for calculation: Automatic ▾

Input time: 0 ms Output time: 0 ms

Input interval steps: 0.00005 ms Output interval steps: 0.000025 ms

Figure 53: Configuration > Isochronous modules (Example isochronous device and configured modules and submodules)




Parameter	Description	Range of value / value
Image	 Icon for an isochronous device with isochronous mode	
	 Icon for an isochronous module with isochronous mode	
	 Icon (indented) for an isochronously supported sub module with isochronous mode. In this case the GSDML file includes an "IsochroneMode" node.	
Type	Name of an isochronous device or module or of an isochronously supported submodule of a device with isochronous mode.	String
Tag	Description of an isochronous device or module or of an isochronously supported submodule of a device with isochronous mode.	String
Isochronous	Indicates whether an isochronous device or module or an isochronously supported submodule is in isochronous mode from application view. Within a subnet (domain), the same clock time must be set for all IRT devices or for all devices that contain isochronous modules or isochronously supported submodules. If Isochronous is checked for an IRT device within a subnet, the same clock time is automatically used for all IRT devices in the corresponding subnet. The same applies to devices with isochronous modules or isochronously supported submodules.	
	<input checked="" type="checkbox"/> Isochronous mode is enabled by default if GSDML attribute IsochroneModeRequired="true" is present.	<input checked="" type="checkbox"/>
	<input checked="" type="checkbox"/> Isochronous mode can be enabled or disabled by the user for a single submodule, for all submodules in a module or for all submodules of a device.	<input checked="" type="checkbox"/> <input type="checkbox"/>
Timing parameters for Isochronous mode:		
Options for calculation	Manual or automatically calculation Note! By default, use the Automatic setting! Use the Manual setting only if you know exactly how to make the configuration. Manual: Expert mode (refer also to [2]) Automatic: Automatically calculation in the background (recommended)	Manual, Automatic, Default: Automatic
Input time	Bus-related input time In isochronous applications, the time before the next network cycle begins or when the isochronous PROFINET IO-Devices or input modules or the isochronously supported sub-input modules should read in the input values.	Editable only for selection "Manual"
Output time	Bus-related output time In isochronous applications, the time before the next network cycle begins or when the isochronous PROFINET IO-Devices or output modules or the isochronously supported sub output modules should set the output values towards the output.	Editable only for selection "Manual"
Input interval steps	The time pattern or isochronous interval steps specified in the GSDML file for the input time or for receiving the input data.	0 ... Default (typically): 125 µs
Output interval steps	The time pattern or isochronous interval steps specified in the GSDML file for the output time or for sending the output data.	0 ... Default (typically): 125 µs

Table 20: Isochronous Modules pane parameters

For isochronous real-time communication within a subnet (domain), the process data is sent in a fixed order, in equidistant (isochronous) time intervals and isochronously to the other nodes. For IRT communication the cyclic data transmission is deterministic and based on the clock of the network master (sync master). The maximum allowed deviation from the synchronization clock is 1 µs (jitter accuracy).

Procedure for configuration:

1. Select the isochronous devices or modules or isochronous supported submodules (if can be enabled*) for which the timing parameters configured automatically or manually in this pane should apply by activating the **Isochronous** option.

➤ Check **isochronous**.

*For isochronous supported submodules with the attribute IsochroneModeRequired="true" in their GSDML file, **Isochronous** is permanently checked.

2. Set isochronous mode parameters.

The isochronous mode parameters are configured on the device level.

**Note:**

By default, use the **Automatic** setting! Use the **Manual** (expert mode) setting only if you know exactly how to make the configuration.

➤ Under **Options for calculation** select **Automatic** (recommended).

⇒ The timing parameters are automatically configured in the background. The calculated times apply to the entire selection, i. e. to all selected devices, modules or submodules.

If **Manual** is selected, the input time or the output time for an isochronous device or module or an isochronous supported submodule can be set manually. The selected times apply to the entire selection. If a set value for the input time or the output time at the device, an associated module or submodule is changed again, a value previously set at another module or submodule is overwritten for the device, all its modules and submodules.

6.8 Address table

The **Address table** dialog pane shows a list of all addresses used in the process data image. The displayed addresses refer to the used PROFINET IO-Controller.

To configure the address data:

- Select **Configuration > Address table** in the navigation area.

Address Table

Auto addressing View mode: Submodules Display mode: Decimal CSV Export

Inputs:

Name of station	Module	Submodule	Type	Length	Address
cifxrepns	CIFX RE/PNS V4.6.0.0 - V4.x	CIFX RE/PNS V4.6.0.0 - V4.x <Sub	Provider sta	1	0
cifxrepns	CIFX RE/PNS V4.6.0.0 - V4.x	PN-IO [X1]	Provider sta	1	1
cifxrepns	CIFX RE/PNS V4.6.0.0 - V4.x	Port 1 [X1 P1]	Provider sta	1	2
cifxrepns	CIFX RE/PNS V4.6.0.0 - V4.x	Port 2 [X1 P2]	Provider sta	1	3
cifxrepns	8 Bytes Ausgang <Slot 1>	8 Bytes Ausgang <Subslot 1>	Consumer s	1	4
cifxrepns	8 Bytes Eingang <Slot 2>	8 Bytes Eingang <Subslot 1>	Process da	8	5
cifxrepns	8 Bytes Eingang <Slot 2>	8 Bytes Eingang <Subslot 1>	Provider sta	1	13

Outputs:

Name of station	Module	Submodule	Type	Length	Address
cifxrepns	CIFX RE/PNS V4.6.0.0 - V4.x	CIFX RE/PNS V4.6.0.0 - V4.x <Sub	Consumer s	1	0
cifxrepns	CIFX RE/PNS V4.6.0.0 - V4.x	PN-IO [X1]	Consumer s	1	1
cifxrepns	CIFX RE/PNS V4.6.0.0 - V4.x	Port 1 [X1 P1]	Consumer s	1	2
cifxrepns	CIFX RE/PNS V4.6.0.0 - V4.x	Port 2 [X1 P2]	Consumer s	1	3
cifxrepns	8 Bytes Ausgang <Slot 1>	8 Bytes Ausgang <Subslot 1>	Process da	8	4
cifxrepns	8 Bytes Ausgang <Slot 1>	8 Bytes Ausgang <Subslot 1>	Provider sta	1	12
cifxrepns	8 Bytes Eingang <Slot 2>	8 Bytes Eingang <Subslot 1>	Consumer s	1	13

Figure 54: Configuration > Address Table

Parameter	Description	Value range / value
Name of station	Network name of the PROFINET IO device station. The station name is only displayed here and can be edited in the Device Table in the PROFINET IO Controller DTM (see section <i>Device table</i> [▶ page 74]) or can be set directly in the PROFINET IO Device configuration tool if necessary.	1 - 240 characters
Module	Module name	String
Submodule	Submodule name	String
Type	Module or submodule data type	Provider status, Process data, Consumer status
Length	Length of the module / submodule in bytes	
Address	Data offset address	

Table 21: Address table pane parameters - inputs / outputs

The **Auto addressing** **Auto addressing** is used by default. For manual addressing the check-box must be unchecked.

Via **View mode** you can select the views **Submodules** (default) or **Devices**.

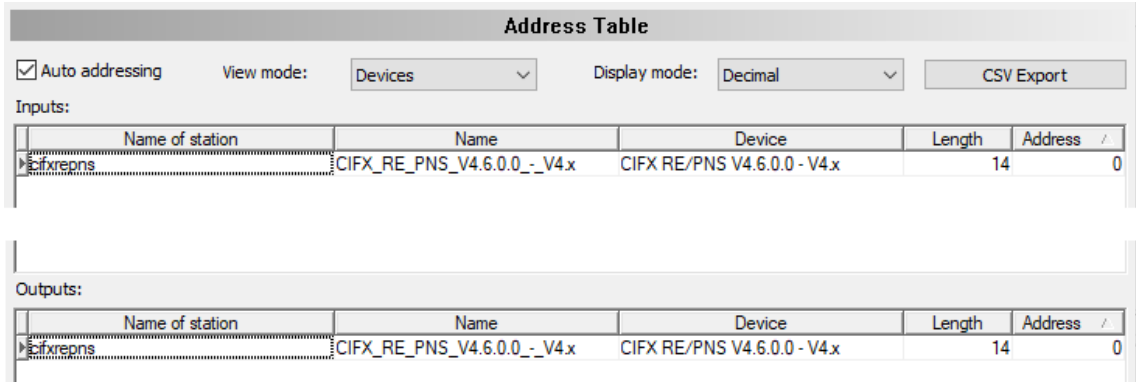


Figure 55: Address table, view mode Devices (example)

Parameter	Description	Value range / value
Symbolic name	Device description of the PROFINET IO-Device configured in the PROFINET IO-Controller DTM.	Character string
Device	Device name of the PROFINET IO-Device configured in the PROFINET IO-Controller DTM.	Character string

Table 22: Address table dialog pane, additional parameters in the Devices view mode

Use **Display mode** to select data display mode decimal or hexadecimal.

The **CSV export** option allows to export input and output addresses as CSV file (CSV = comma separated value). Therefore:

- Click to the **CSV export** button.
- A file saving dialog opens.
- Save the data as *.CSV file.

You can open the generated data by means of a spreadsheet application.

Inputs, outputs

If manual addressing is allowed, you assign the input or output addresses of the modules manually:

- Click on an address of a module.
- Edit the field and type in a new address.
- Confirm your modifications by clicking on the **OK** button.
- ⇒ The manually changed address is now set.

Address overlap

The configuration software reports an error if an address overlapping in the process data image was detected. The configuration software reports the first address overlapping, which was detected. The display includes the Name of Station, the module, the submodule and especially the start address and the length of the overlapping modules.

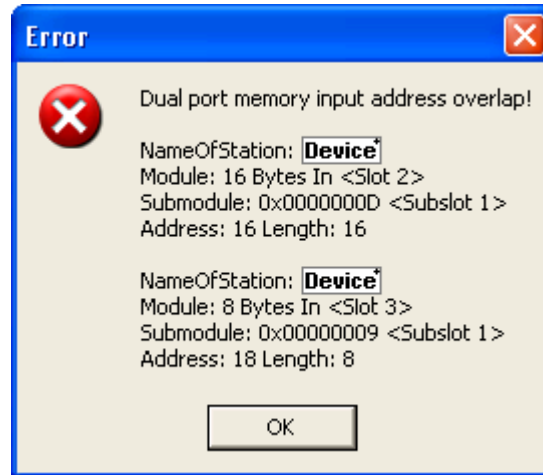


Figure 56: Configuration > Address table – address overlap

*The name of the PROFINET IO-Device is displayed.

- Correct the address for one of the two modules and enter an unused address.
- Confirm your modifications by clicking on the **OK** respectively **Apply button**.

Sort addresses

- To sort the address data, click on the respective column header.

6.9 FSU/port settings

The **FSU/port settings** pane is used to set in the PROFINET IO-Controller device whether a PROFINET IO-Device must use a fast start up (FSU) connection to establish the cyclic data exchange. For this, all existing Ethernet connections from the PROFINET IO-Controller to PROFINET IO-Devices are displayed, including all existing ports at each Device.

For each PROFINET IO-Device and for each device port, a setting is required via the MAU **type** whether the Device should automatically negotiate the parameters for establishing the connection to the opposite port on the Controller device or whether the parameters for this are fixed.



Important:

If you check FSU (fast start up) to establish a fast connection for a port, use only the **MAU type** "100BASETXFD". For the "AUTO" setting the *Auto negotiation* and *Auto crossover* effects will prevent establishing a fast Ethernet connection.

- Select **Configuration > FSU/port settings**.
- Check **FSU** for those PROFINET IO-Devices, which must use a fast start up (FSU) connection to establish the cyclic data exchange.

FSU-/Port- Settings					
		Name	Name of station	MAU Type	FSU
		Device name*	Station name Device**		<input type="checkbox"/>
		Interface 1 - Port1		AUTO	
		Interface 1 - Port2		AUTO	
		Device name*	Station name Device**		<input type="checkbox"/>
		Interface 1 - Port1		AUTO	
		Interface - Port2		AUTO	

Figure 57: FSU/port settings

*The name /**Name of Station of the Device is displayed.

Parameter	Description	Range of value / value
Name	The symbolic name of the PROFINET IO-Device station.	
Name of Station	Network name of the PROFINET IO-Device station. The name of station is only displayed here and can be edited in the Device table in the PROFINET IO-Controller DTM (see section <i>Device table</i> [▶ page 74]) or can be set directly in the configuration tool for the PROFINET IO-Device, if necessary.	1 - 240 characters

Parameter	Description	Range of value / value
MAU type	<p>The MAU-Type (MAU = Medium Attachment Unit) defines the physical settings (PHY) on the PROFINET IO-Device. For each port at the device the MAU type must be set separately.</p> <p>„<i>AUTO</i>“: For this setting, the connection between adjacent Devices is negotiated automatically. It may take 2-3 seconds for the physical connection is established.</p> <p>„<i>100BASETXFD</i>“ [4]: For this setting, the connection between adjacent Devices is fixed with 100 MBit /Full duplex.</p> <p>Important for hardware wiring!</p> <p>(1) Make wiring only between ports with the same port setting (MAU-Type configuration). Otherwise, no connection can be established between the Devices or only in half duplex mode.</p> <p>(2) Connect only ports with each other, which have different cross-over settings. Otherwise, a connection between the devices can not be established. Refer to the manual of the end device manufacturer to get information which crossover settings are set on the used device. Respectively use crossover cables.</p>	<p><i>AUTO</i>, <i>100BASETXFD</i></p>
FSU	<p>In the PROFINET IO-Controller device must be configured for each PROFINET IO-Device, whether the Device must use a fast start up (FSU) connection to establish the cyclic data exchange.</p>	<p>checked, unchecked</p>

Table 23: FSU/port settings

6.10 Stations timing

- Select **Configuration > Stations timing** in the navigation area.

In the **Stations timing** dialog pane for each selected PROFINET IO-Device station you can make the following stations timing settings:

Not IRT capable devices:

- Station global settings 'Updating time' and 'Watchdog time'.

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
cifxrepns	<input type="checkbox"/>	Unsynchronized (RT)	16.0	48.0
cifxrepns-001	<input type="checkbox"/>	Unsynchronized (RT)	16.0	48.0
cifxrepns-002	<input type="checkbox"/>	Unsynchronized (RT)	16.0	48.0
cifxrepns-003	<input type="checkbox"/>	Unsynchronized (RT)	16.0	48.0

Station global settings

Sync domain settings

Sync domain name:

Basic send-clock: ms

Adjust

Figure 58: Configuration > Stations timing, example 'Unsynchronized (RT)' by default

IRT capable devices or IRT capable devices with isochronous mode:

- Unsynchronized (RT) or synchronized (isochronous) real-time communication (IRT),
- station global settings 'Updating time' and 'Watchdog time',
- or sync domain settings ,Name' and ,Basic send-clock'.

,Basic send-clock' is only valid for IRT. In a sync domain for all IRT participants globally an identical value for ,Basic send-clock' is valid. This is the basic clock of all IRT participants.

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
comx100repns	<input type="checkbox"/>	Unsynchronized (RT)	16.0	48.0
comx100repns-001	<input type="checkbox"/>	Unsynchronized (RT)	16.0	48.0
comx100repns-002	<input type="checkbox"/>	Unsynchronized (RT)	16.0	48.0
comx100repns-003	<input type="checkbox"/>	Unsynchronized (RT)	16.0	48.0

[Adjust](#)

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 59: Configuration > Stations timing, example 'Synchronized (IRT)' (editable)

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
sinamics-s120-cu320-2pn	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s120-cu320-2pn-001	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s120-cu320-2pn-002	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s120-cu320-2pn-003	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0

[Adjust](#)

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 60: Configuration > Stations timing, example 'Synchronized (IRT)', isochronous mode

6.10.1 Parameters in the ‘Stations Timing’ pane

The following table shows the parameters description of the **Station Timing** pane:

Parameter	Description	Range of value / value
Station global Settings		
Name of station	<p>Network name of the PROFINET IO-Device station. Under Name of station all devices are displayed, which are connected to the PROFINET IO-Controller.</p> <p>The corresponding name of station is set in the Device Table in the PROFINET IO Controller DTM (refer to section Device Table on page 80) or otherwise it must be set directly in the configuration tool of the PROFINET IO-Device.</p>	1 - 240 characters
Isochronous (not editable)	<p>Indicates whether the isochronous mode is used or not.</p> <p>Note: The selection, whether the isochronous mode is to be used or not, for devices module or submodules, is made in the Isochronous Modules pane, in the Isochronous column (see section <i>Isochronous modules</i> [▶ page 79]).</p> <p>Meaning if checked</p> <ul style="list-style-type: none"> • Device is IRT-capable (isochronous), or contains isochronous modules or isochronously supported submodules, provides isochronous mode and uses isochronous mode. <p>Meaning if not checked:</p> <ul style="list-style-type: none"> • Device is RT capable (not IRT capable), or does not contain isochronous modules or isochronously supported submodules. • OR: Device is IRT-capable (isochronous), or contains isochronous modules or isochronously supported submodules, does not provide isochronous mode. • OR: Device is IRT-capable (isochronous), or contains isochronous modules or isochronously supported submodules, provides isochronous mode, does not use isochronous mode. 	checked, unchecked
RT mode	<ul style="list-style-type: none"> • Unsynchronized (RT): The setting involves that RT (= Real-Time) is used. The data exchange from the PROFINET IO-Controller with this PROFINET IO-Device is not synchronized. ‘Unsynchronized (RT)’ as a fixed setting means that this device does not support a synchronized (isochronous) real-time communication. • Synchronized (IRT): The setting involves that IRT (=Isochronous Real-Time) is used. The data exchange from the PROFINET IO-Controller with this PROFINET IO-Device is synchronized. ‘Synchronized (IRT)’ as a fixed setting means that this device supports a synchronized (isochronous) real-time communication and provides the isochronous mode. ‘Synchronized (IRT)’ as a selectable setting involves that the values ‘Updating time’, ‘Watchdog time’ and ‘Basic send-clock’ are adjusted to each other. <p>Note: The isochronous mode is to be enabled in the Isochronous Modules pane, in the Isochronous column (see section <i>Isochronous modules</i> [▶ page 79]).</p> <p>For synchronized real-time communication (IRT communication), the process data is send in a fixed order, in equidistant (isochronous) time intervals and isochronously to the other participants on the bus.</p> <p>If you select IRT mode, the PROFINET IO-Controller is automatically assigned as the sync Master, as well, the assignment of the sync domain name is done.</p> <p>Note that the settings made here are taken over for ‘Synchronization role’ in the Topology Editor and vice versa. For more information, refer to the operation instruction manual <i>Topology Editor</i>.</p>	<i>Fixed or selectable:</i> Unsynchronized (RT), Synchronized (IRT)

Parameter	Description	Range of value / value
Updating Time [ms]	<p>Eligible (total) cycle time of the device to exchange data.</p> <p>RT mode = RT: For each unsynchronized device, a value for 'Updating time' can be chosen. There is no dependence on other variables.</p> <p>RT mode= IRT: For each synchronized device only those values for 'Updating time' can be selected which are permissible, in dependence to the value selected for 'Basic send-clock'.</p> <p>Important! Values for 'Updating time', which after a change of 'Basic send-clock' are marked with a red exclamation mark, result in an invalid configuration and must be adjusted manually or via Adjust, before the configuration is completed.</p>	<p>RT mode RT: All values that are defined in the GSDML file are selectable.</p> <p>RT mode IRT: Only permissible values can be selected.</p>
Watchdog Time [ms]	Time, after which a device reports the absence of cyclic telegrams and passes over to the error state. The value must be an integer multiple of the cycle time (updating time), (with restrictions from the GSDML file).	Integer multiple of 'Updating time'
Adjust	<p>Serves in 'IRT' mode as auto-correction of invalid values for 'Updating time'. For any invalid values for 'Updating time' the closest valid values are set automatically.</p> <p>Alternatively, the values can be corrected manually.</p>	
Sync domain settings		
Sync domain name	<p>DNS compatible name in accordance with the "Name of Station" naming convention. For further information refer to section <i>Device name according to PROFINET „Name of station“ specification</i> [▶ page 51]. For invalid inputs a red exclamation mark and an error message will appear.</p> <p>The sync domain includes all devices that are controlled by one sync Master. In the 'Topology Editor' currently only one sync domain is supported.</p> <p>The packet synchronization for the IRT communication (synchronized real-time communication) is controlled by a sync Master. For each sync domain exactly one sync Master is determined. The Hilscher PROFINET IO-Controller device takes over the role as sync Master. The sync Master sets the synchronization clock for data exchange with the sync Slaves.</p>	<p>All devices in RT mode RT: disabled (grayed out)</p> <p>At least one device in the RT mode IRT: Name acc. to PROFINET specification (PNO document 2722)</p> <p>1 - 240 characters</p>
Basic send-clock	<p>Basic clock of all IRT participants of the sync domain. Thus, no PROFINET IO-Device is capable to exchange cyclical data faster than any other participant.</p> <p>RT mode = RT: For unsynchronized devices 'Basic send-clock' is disabled (grayed out).</p> <p>RT mode= IRT: For synchronized devices the value selected for 'Basic send-clock' decides about the values selectable for 'Updating time'.</p> <p>Note: By changing the 'Basic send-clock' factor invalid values for the cycle time ('Updating time) of PROFINET IO-Devices can be generated.</p>	<p>All devices in RT mode RT: disabled (grayed out)</p> <p>At least one device in the RT mode IRT: All values that are defined in the GSDML file are selectable.</p>

Table 24: Parameters in the 'Stations Timing' pane

6.10.2 Configuration steps Stations Timing

6.10.2.1 Example 'Unsynchronized (RT)'

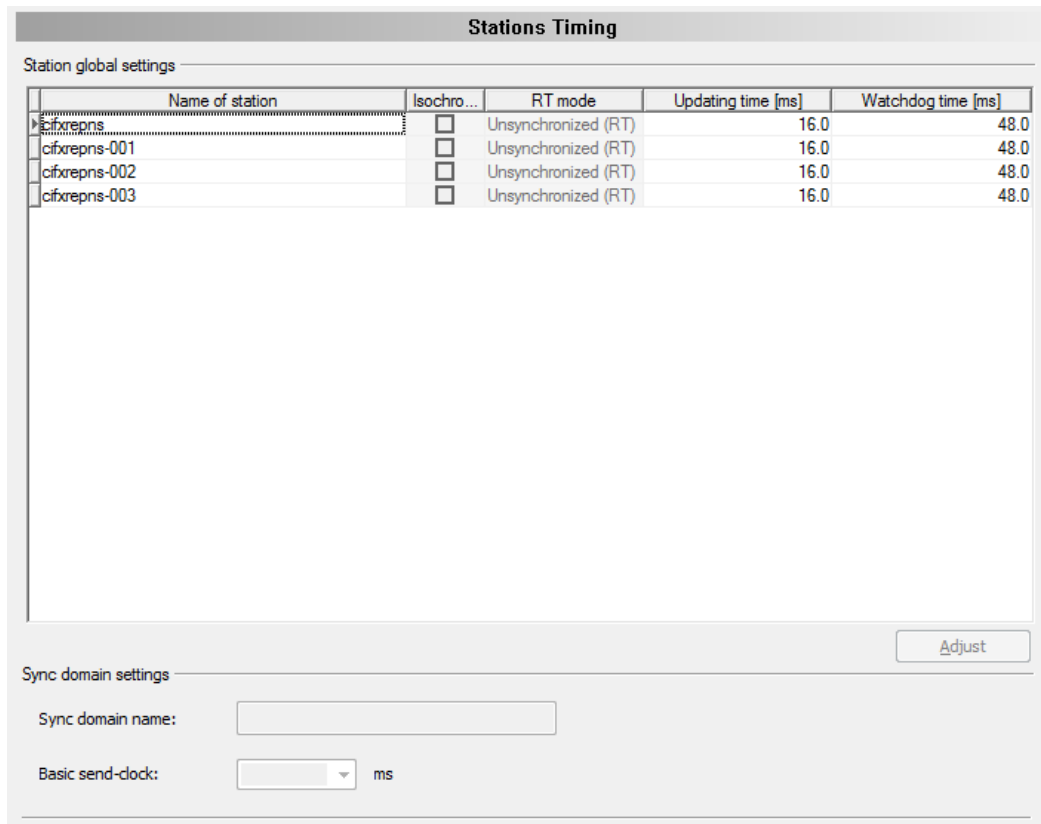


Figure 61: Configuration > Stations Timing, Example 'Unsynchronized (RT)' by default

- Adjust the values for **Updating** time manually or via **Adjust**.

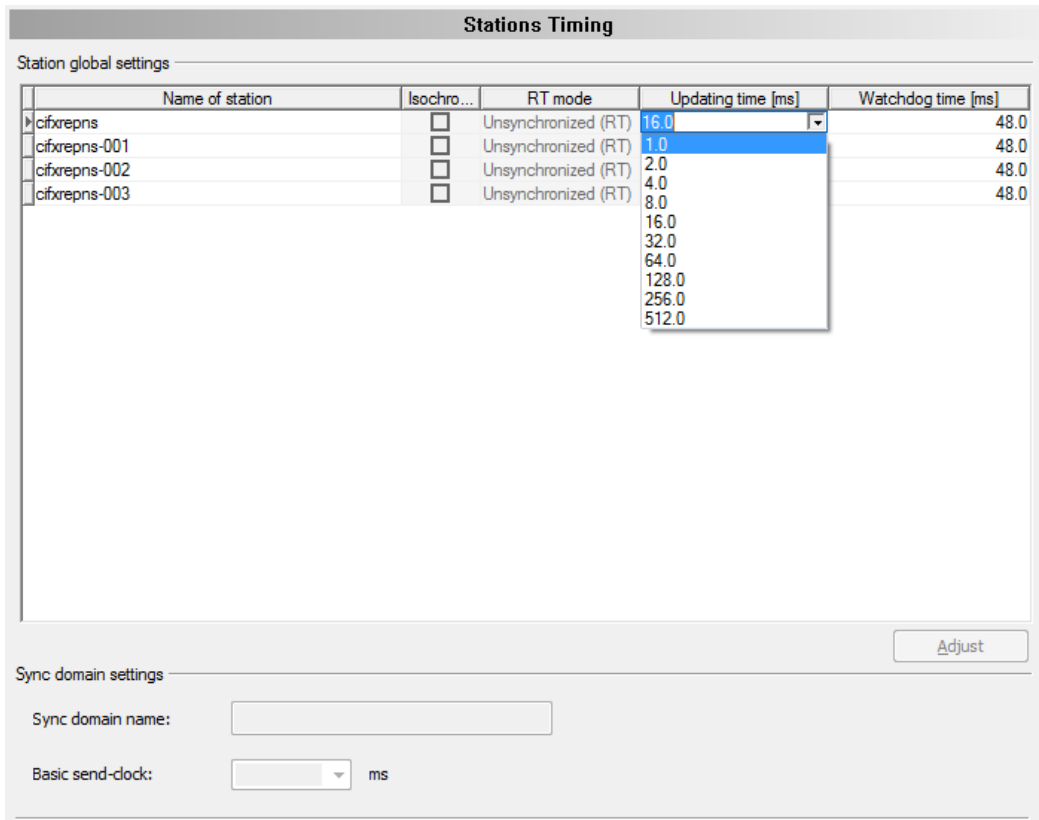


Figure 62: Configuration > Stations Timing > ,Updating time' to be adjusted, Example ,Unsynchronized (RT)'

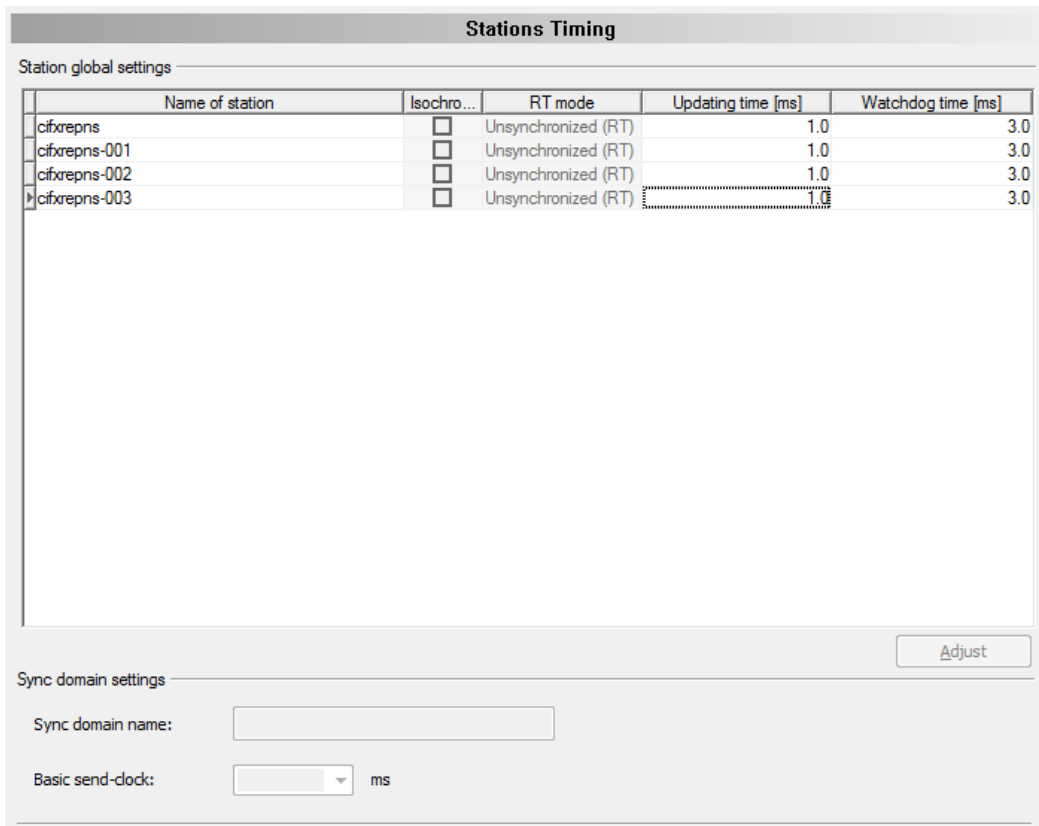


Figure 63: Configuration > Stations-Timing > ,Updating time' adjusted, Example ,Unsynchronized (RT)'

- Adjust the values for **Watchdog time** manually.

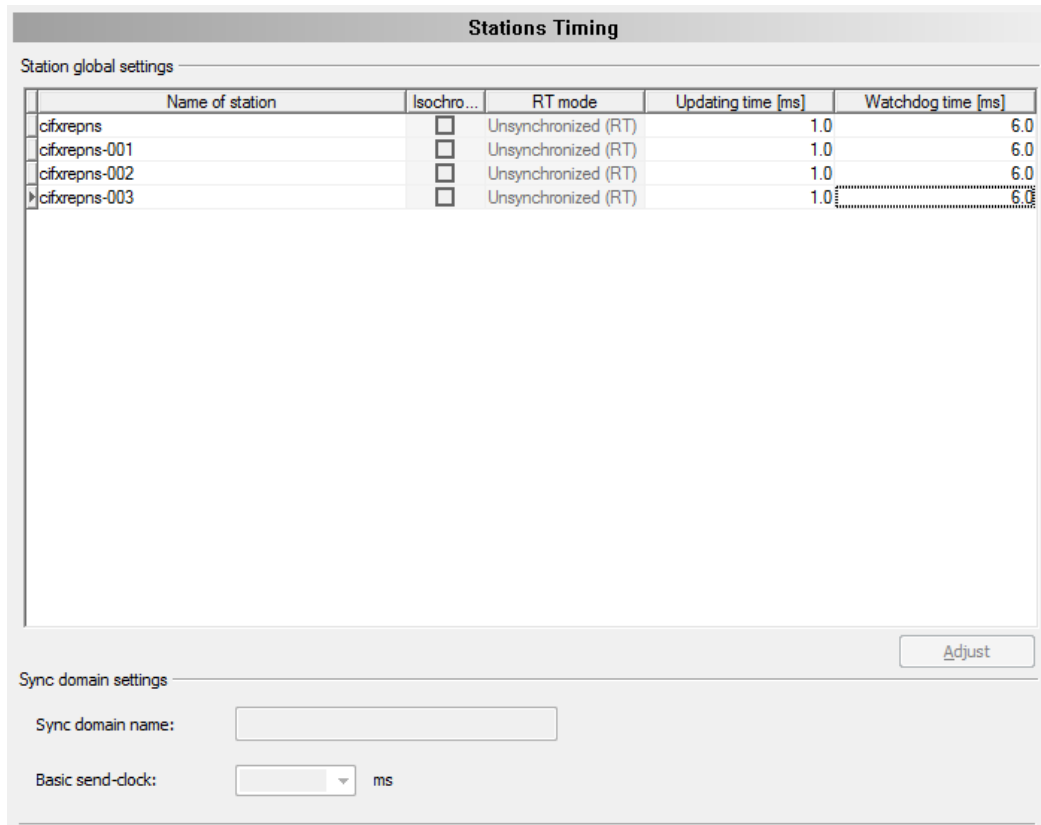


Figure 64: Configuration > Stations-Timing > ,Watchdog' to be adjusted, Example ,Unsynchronized (RT)'

- Apply all settings or complete the configuration via **OK**.

6.10.2.2 Example ‚Synchronized (IRT)‘

- For each PROFINET IO-Device station select the station **RT mode**.

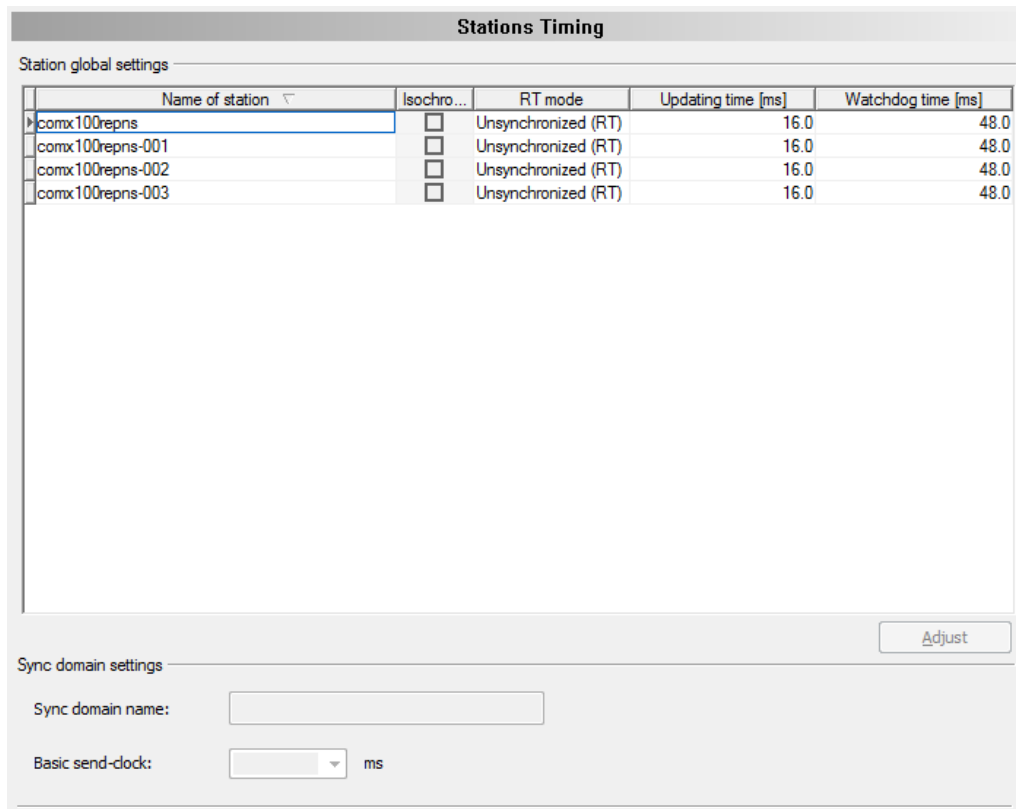


Figure 65: Configuration > Stations Timing, Example ‚Synchronized (IRT)‘

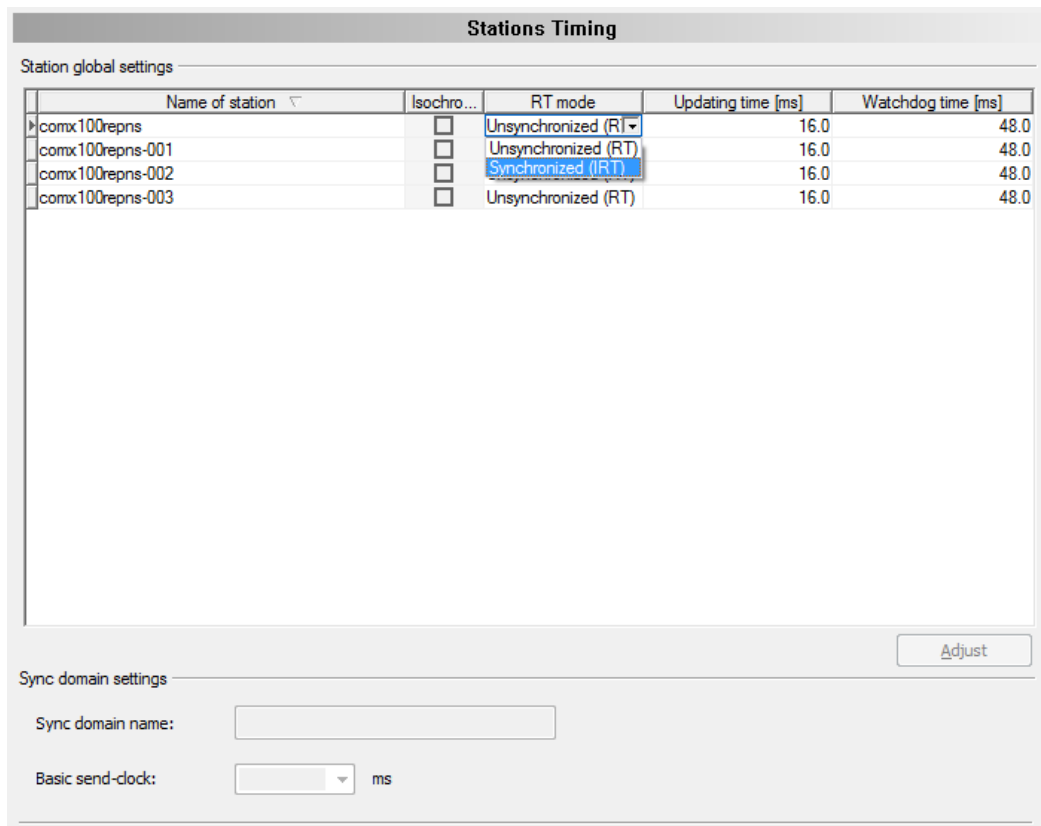


Figure 66: Configuration > Stations-Timing > RT mode to be selected, Example ‚Synchronized (IRT)‘

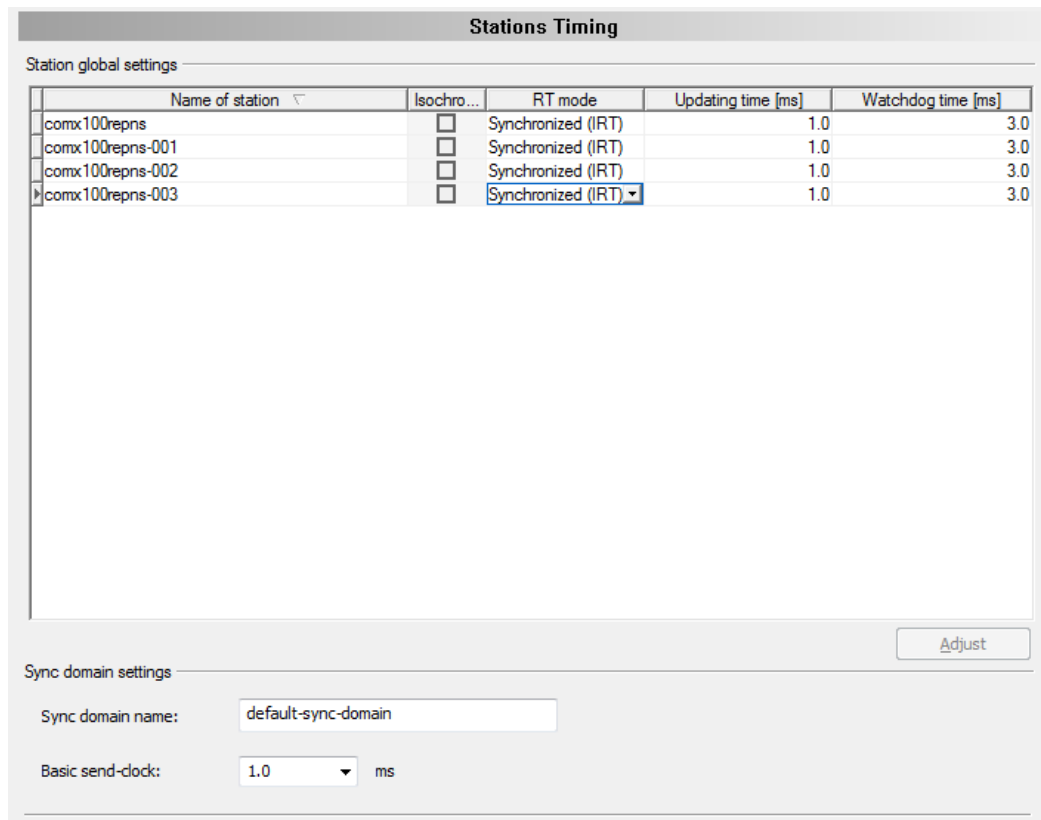


Figure 67: Configuration > Stations-Timing > RT mode selected, Example ,Synchronized (IRT)'

- For each PROFINET IO-Device station select the **Basic send-clock factor**.

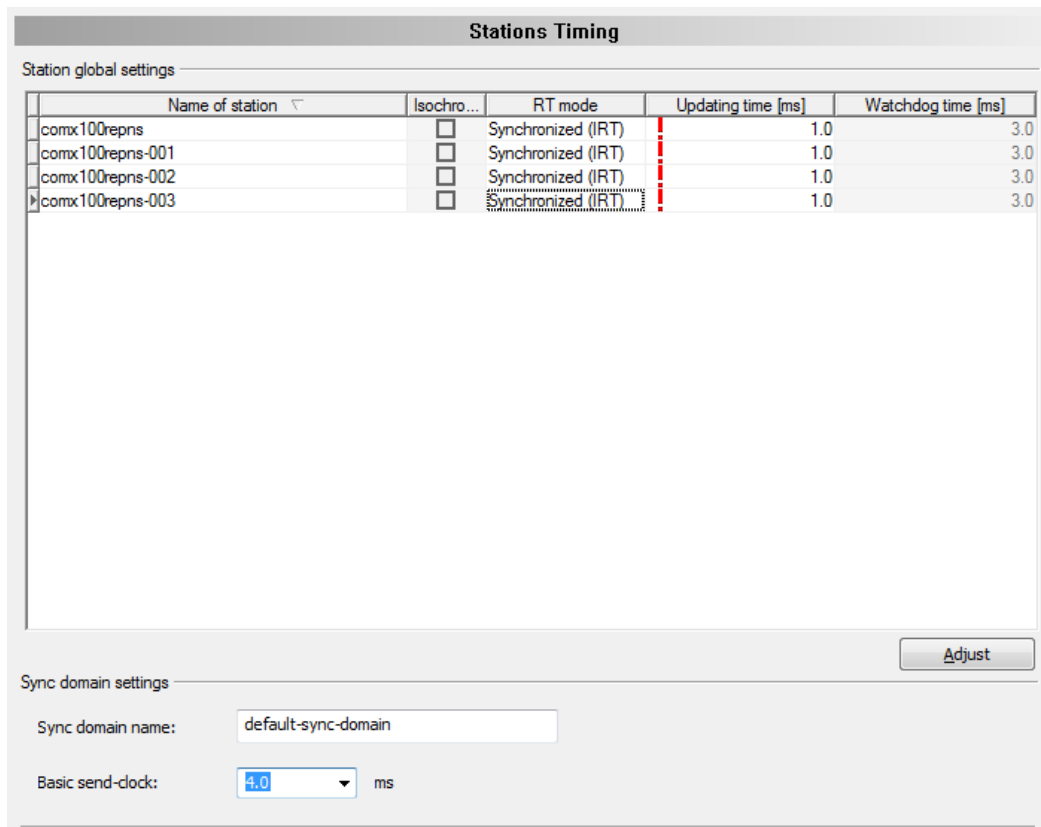


Figure 68: Configuration > Stations-Timing > Send-Clock, Example ,Synchronized (IRT)'



Important:

By changing the ‚Basic send-clock‘ factor invalid values for the cycle time (‘Updating time) of PROFINET IO-Devices can be generated. Values, which are marked with a red exclamation mark, result in an invalid configuration and must be adjusted before the configuration is complete.

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
comx100repns	<input type="checkbox"/>	Synchronized (IRT)	1.0	3.0
comx100repns-001	<input type="checkbox"/>	Synchronized (IRT)	4.0	3.0
comx100repns-002	<input type="checkbox"/>	Synchronized (IRT)	8.0	3.0
comx100repns-003	<input type="checkbox"/>	Synchronized (IRT)	16.0	3.0
			32.0	
			64.0	

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 69: Configuration > Stations-Timing > ‚Updating time‘ to be adjusted, Example ‚Synchronized (IRT)‘

- Adjust the values for **Updating time** manually or via **Adjust**.

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
comx100repns	<input type="checkbox"/>	Synchronized (IRT)	4.0	12.0
comx100repns-001	<input type="checkbox"/>	Synchronized (IRT)	4.0	12.0
comx100repns-002	<input type="checkbox"/>	Synchronized (IRT)	4.0	12.0
comx100repns-003	<input type="checkbox"/>	Synchronized (IRT)	4.0	12.0

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 70: Configuration > Stations-Timing > ,Updating time' adjusted, ,Synchronized (IRT)'

- Adjust the values for **Watchdog time** manually.

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
comx100repns	<input type="checkbox"/>	Synchronized (IRT)	4.0	24.0
comx100repns-001	<input type="checkbox"/>	Synchronized (IRT)	4.0	12.0
comx100repns-002	<input type="checkbox"/>	Synchronized (IRT)	4.0	12.0
comx100repns-003	<input type="checkbox"/>	Synchronized (IRT)	4.0	12.0

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 71: Configuration > Stations-Timing > ,Watchdog' to be adjusted, Example ,Synchronized (IRT)'

Stations Timing

Station global settings

Name of station ▾	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
comx100repls	<input type="checkbox"/>	Synchronized (IRT)	4.0	24.0
comx100repls-001	<input type="checkbox"/>	Synchronized (IRT)	4.0	24.0
comx100repls-002	<input type="checkbox"/>	Synchronized (IRT)	4.0	24.0
comx100repls-003	<input type="checkbox"/>	Synchronized (IRT)	4.0	24.0

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 72: Configuration > Stations-Timing > ,Watchdog' to be adjusted, Example ,Synchronized (IRT)'

- Apply all settings or complete the configuration via **OK**.

6.10.2.3 Example ,Synchronized (IRT)', Isochronous mode

Stations Timing				
Station global settings				
Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
sinamics-s 120-cu320-2pn	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s 120-cu320-2pn-001	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s 120-cu320-2pn-002	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s 120-cu320-2pn-003	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0

Adjust

Sync domain settings

Sync domain name: default-sync-domain

Basic send-clock: 0.25 ms

Figure 73: Configuration > Stations Timing, Example ,Synchronized (IRT)', Isochronous mode

- For each PROFINET IO-Device station select the **Basic send-clock** factor.

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
sinamics-s120-cu320-2pn	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s120-cu320-2pn-001	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s120-cu320-2pn-002	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s120-cu320-2pn-003	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 74: Configuration > Stations-Timing > Send-Clock, Example ,Synchronized (IRT)', Isochronous mode



Important:

By changing the ,Basic send-clock' factor invalid values for the cycle time ('Updating time) of PROFINET IO-Devices can be generated. Values, which are marked with a red exclamation mark, result in an invalid configuration and must be adjusted before the configuration is complete.

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
sinamics-s120-cu320-2pn	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s120-cu320-2pn-001	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	3.0
sinamics-s120-cu320-2pn-002	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0
sinamics-s120-cu320-2pn-003	<input checked="" type="checkbox"/>	Synchronized (IRT)	1.0	3.0

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 75: Configuration > Stations-Timing > ,Updating time' to be adjusted, Example ,Synchronized (IRT)', Isochronous mode

- Adjust the values for **Updating time** manually or via **Adjust**.

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
sinamics-s120-cu320-2pn	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	12.0
sinamics-s120-cu320-2pn-001	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	12.0
sinamics-s120-cu320-2pn-002	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	12.0
sinamics-s120-cu320-2pn-003	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	12.0

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 76: Configuration > Stations-Timing > ,Updating time' adjusted, Example ,Synchronized (IRT)', Isochronous mode

➤ Adjust the values for **Watchdog time** manually.

Stations Timing

Station global settings

Name of station	Isochro...	RT mode	Updating time [ms]	Watchdog time [ms]
sinamics-s120-cu320-2pn	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	24.0
sinamics-s120-cu320-2pn-001	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	12.0
sinamics-s120-cu320-2pn-002	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	12.0
sinamics-s120-cu320-2pn-003	<input checked="" type="checkbox"/>	Synchronized (IRT)	4.0	12.0

Sync domain settings

Sync domain name:

Basic send-clock: ms

Figure 77: Configuration > Stations-Timing > ,Watchdog' to be adjusted, Example ,Synchronized (IRT)', Isochronous mode

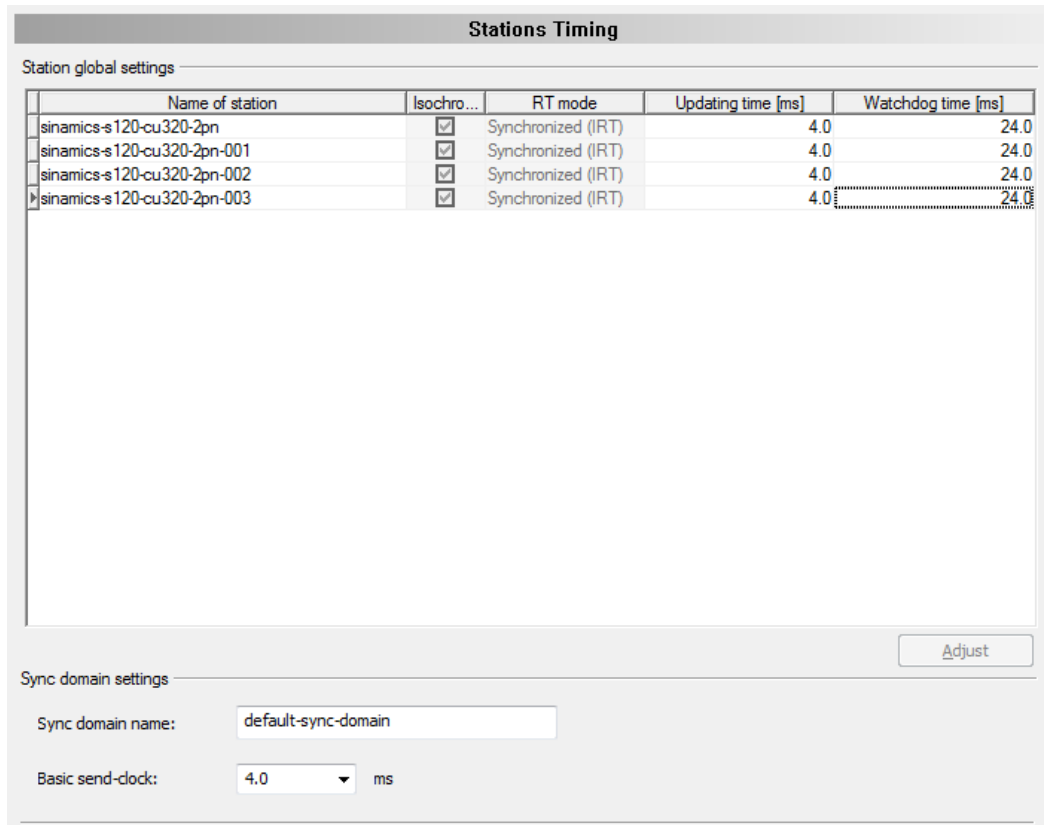


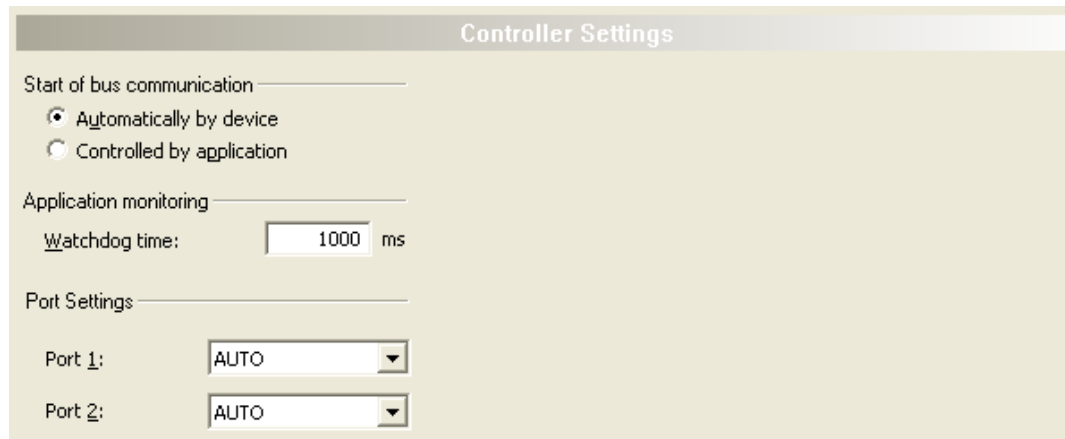
Figure 78: Configuration > Stations-Timing > ,Watchdog' adjusted, Example ,Synchronized (IRT)', Isochronous mode

- Apply all settings or complete the configuration via **OK**.

6.11 Controller settings

At the **Controller settings** pane device related settings can be made. These settings only become active after the configuration was downloaded to the device. Information about the download you find in section *Download configuration* [▶ page 109].

➤ Open **Configuration > Controller settings**.



The screenshot shows the 'Controller Settings' dialog box. It is divided into three sections:

- Start of bus communication:** Two radio buttons are present. The first, 'Automatically by device', is selected. The second, 'Controlled by application', is unselected.
- Application monitoring:** A label 'Watchdog time:' is followed by a text input field containing '1000' and a unit label 'ms'.
- Port Settings:** Two dropdown menus are shown. The first is labeled 'Port 1:' and the second is labeled 'Port 2:'. Both dropdown menus have 'AUTO' selected.

Figure 79: Configuration > Controller settings



Note:

The setting options at the dialog pane **Controller settings** for client specific variants of the configuration software can differ from the setting options displayed here.

6.11.1 Start of bus communication

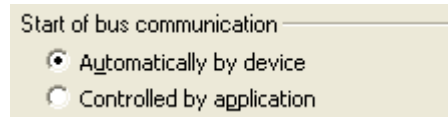


Figure 80: PROFINET IO-Controller settings > Start of bus communication

If **Automatically by device** is selected, the PROFINET IO-Controller device will start with the data exchange on the bus after the initialization has been finished.

When **Controlled by application** is selected, the application program must activate the data exchange on the bus.

6.11.2 Application monitoring

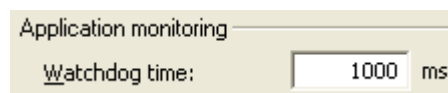


Figure 81: Controller settings > Application monitoring

The **Watchdog time** determines the time within which the device watchdog must be re-triggered from the application program while the application program monitoring is activated. When the watchdog time value is equal to 0 the watchdog is deactivated and the application program monitoring is deactivated too.

The permissible range of values of the watchdog time is 20 to 65535. By default the watchdog time value equals to 1000 ms.

Watchdog time	Range of value / value
Permissible range of values	20 ... 65535 ms
Default	1000 ms
The software watchdog is deactivated.	0 ms

Table 25: Range of value / Value for the watchdog time

6.11.3 Port settings

For each port must be configured, whether the PROFINET IO-Controller device should establish the connection automatically (setting: „*AUTO*“) or whether fixed parameters are to be used (setting: „*100BASETXFD*“).

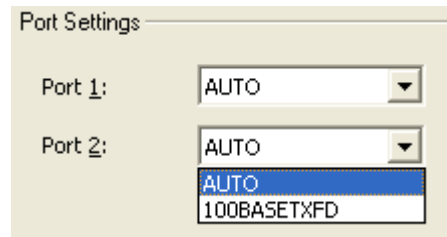


Figure 82: Controller settings > Port settings

Parameter	Description	Range of value / value
Port settings Port 1, Port 2	<p>Port settings is to be set for each port (port 1, port 2) of the PROFINET IO-Controller separately.</p> <p>„<i>AUTO</i>“: For this setting, the connection between adjacent Devices is negotiated automatically. It may take 2-3 seconds for the physical connection is established.</p> <p>„<i>100BASETXFD</i>“ [4]: For this setting, the connection between adjacent Devices is fixed with 100 MBit /full duplex.</p>	<i>AUTO</i> , <i>100BASETXFD</i>

Table 26: Parameters port settings



Important:

- (1) Make wiring only between ports with the same port setting. Otherwise, no connection can be established between the Devices or only in half duplex mode.
- (2) Connect only ports with each other, which have different cross-over settings. Otherwise, a connection between the devices cannot be established. Refer to the manual of the end device manufacturer to get information which crossover settings are set on the used device. Respectively use crossover cables.



Note:

The setting options under Port Settings for client specific variants of the configuration software can differ from the setting options displayed here.

6.12 Connecting/disconnecting device

**Note:**

Several PROFINET IO-Controller DTM functions, e. g. diagnosis or the configuration download in SYCON.net, require an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device.

Connecting device

To establish an online connection from the PROFINET IO-Controller device to the PROFINET IO-Controller DTM, take the following steps:

Under **Settings** in the **Driver** pane:

- Verify that the default driver is checked and respectively check another or multiple drivers.
- Configure the driver if necessary.

Under **Settings** in the **Device assignment** pane:

- Scan for the devices (with or without firmware).
- Select the device (with or without firmware) and apply the selection.

Before you download the firmware, adhere to the necessary safety precautions to prevent personnel injury and property damage that may occur in consequence of a communication stop. For further details, please refer to the Safety chapter.

Under **Settings** in the **Firmware download** pane, if not yet a firmware was loaded to the device:

- Selecting and downloading the firmware.

Under **Settings** in the **Device assignment** pane, if not yet a firmware was loaded to the device:

- Scan for the device (with firmware) once more.
- Select the device (with firmware) once more.

For more information, see sections on driver settings and device assignment.

- In the DTM interface dialog, select the **OK** button, to apply the selection and to close the DTM interface dialog.
- Right-click on the PROFINET IO-Controller icon.
- Select **Connect** from the context menu.
- The PROFINET IO-Controller device now is connected to the PROFINET IO-Controller DTM via an online connection. In the network view, the device description at the device icon is displayed with a green colored background.

Disconnecting device

To disconnect an online connection from the PROFINET IO-Controller device to the PROFINET IO-Controller DTM, take the following steps:

- Right-click on the PROFINET IO-Controller icon.
- Select **Disconnect** from the context menu.
- ⇒ In the network view, the device description is not any more displayed with a green colored background. Now the online connection from PROFINET IO-Controller device to the PROFINET IO-Controller DTM.

6.13 Download configuration

The device configuration is created "offline" in the DTM (application program). A download to the device is required, to transfer the configuration with the parameter data to the device.

**Note:**

To download configuration parameter data to the PROFINET IO-Controller device an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device is required. Further information can be found in *Connecting/disconnecting device* [▶ page 107].

**WARNING Communication stop caused by configuration download, faulty system operation possible or loss of device parameters**

Before you initiate a configuration download process, while the bus is still in operation status:

- Stop the application program.
- Make sure that all network devices are in a fail-safe condition.

**WARNING Mismatching system configuration, faulty system or device operation possible**

- In the device, use only a configuration suitable for the system.

**NOTICE Loss of device parameters caused by power disconnect during configuration download**

- During configuration download process, do not interrupt the power supply to the PC or to the device, and do not perform a reset to the device!

Download steps

In order to transfer the configuration with the corresponding data of the configuration parameters to the PROFINET IO-Controller device, download the data via **Device > Download** or context menu **Download**.

- Select **Download** in the context menu of the device.
- ⇒ If the download is started as long as the slave devices are connected to the master device, the following message is displayed: "If you attempt to download during bus operation, communication between master and slaves is stopped. Do you really want to download?"

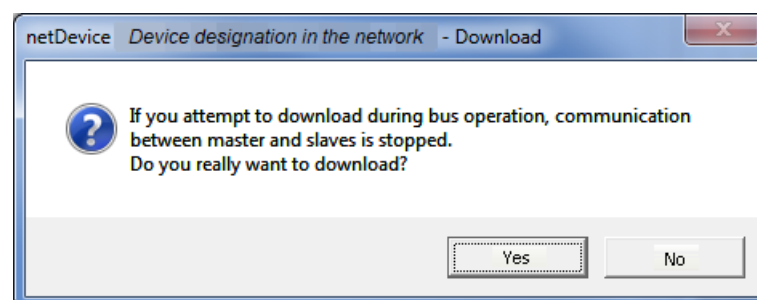


Figure 83: netDevice Message: Download

**Important:**

If the communication between the controller device and the Devices is stopped, the data exchange between the controller device and the Devices is stopped.

- Click **Yes** if you intend to download the configuration.
- Then the current configuration in the application program is downloaded to the device.
- Otherwise click to **No**.

6.14 Network scan and upload

With the function **Network scan...** of the PROFINET IO-Controller DTM you can find out automatically, which PROFINET IO-Device are attached to the PROFINET IO-Controller device and how these devices are configured. During the network scan the controller device requests the ident codes of the Devices found at the bus. For each connected PROFINET IO-Device its ident code is read out.

In the **Scan response** dialog of the controller DTM the assigned device description files or DTM devices appear. Each device description file and each DTM device is assigned exactly one ident code. Different versions (also language versions) of the same device description file are defined by the same ident code. For each identified device, you can select the assigned DTM device according to the firmware loaded in that Device. Via **Create devices** for each Device the selected DTM device is created.

The IP settings of the Device can be set manually in the controller if necessary.

**Note:**

The IP settings of the Device must be downloaded to the controller device, before the module configuration upload is started.

The **upload** of the configuration is proceeded subsequent to a network scan procedure. The upload function of the PROFINET IO-Device DTM allows to upload module configuration data from all PROFINET IO-Devices via the PROFINET IO-Controller device and the PROFINET IO-Controller DTM to the PROFINET IO-Device DTMs.

6.14.1 Requirements

The PROFINET IO-Controller device must be configured.

**Important:**

The configuration of the controller device must be downloaded to the controller device. For further details refer to section *Configuration steps* [▶ page 15].

6.14.2 Overview on steps

1. Start the **Network scan** (in the controller DTM).
2. Make the settings in the **Scan response** dialog.
3. Click **Create devices**.
4. Via **Download**, download the IP settings of the Device to the controller device.
5. Via **Upload** (in the device DTM), upload the device configuration of each Device to the controller DTM, and create the module configuration.
6. Via **Download** (in the controller DTM), download the current configuration of the Devices to the controller device.

6.14.3 Starting network scan

- In netDevice: Right-click on the device symbol of controller DTM.
- Select **Network scan...** from the context menu.

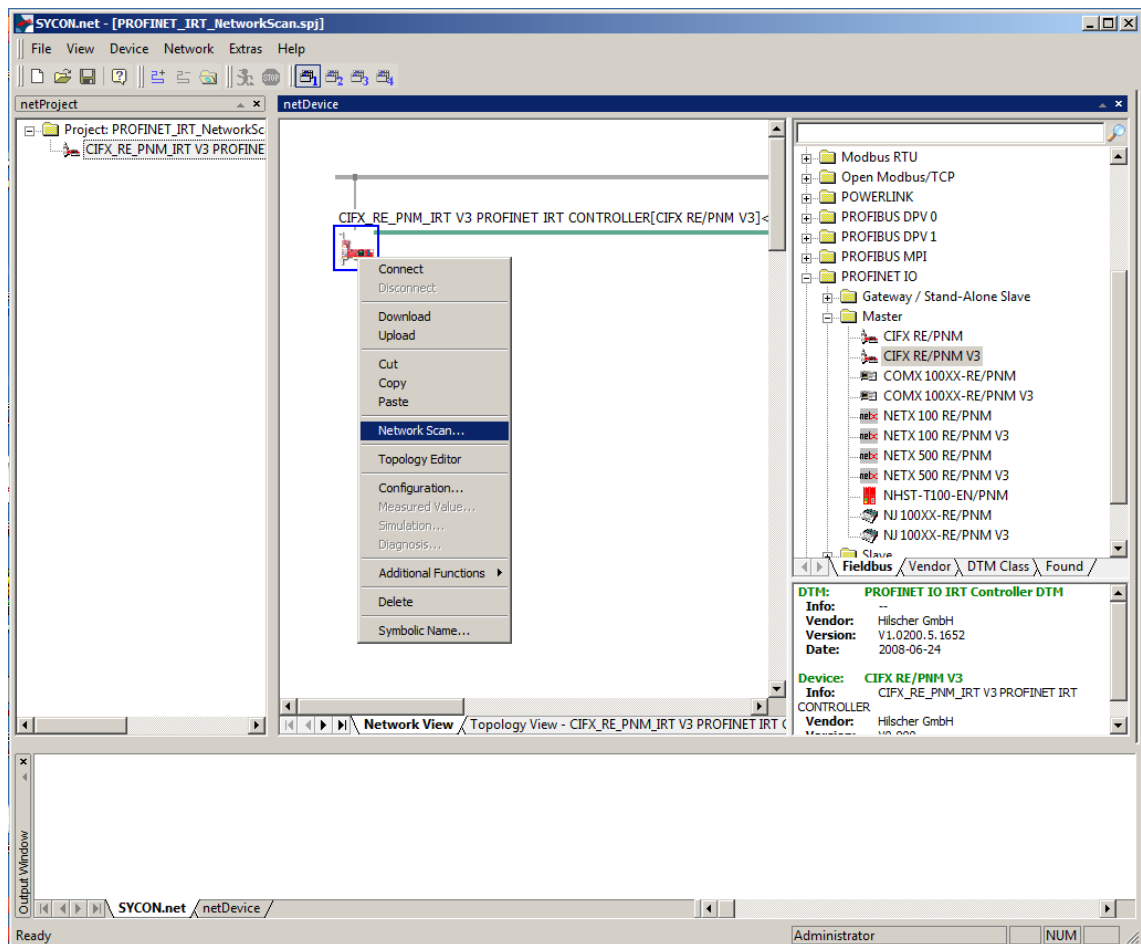


Figure 84: Starting 'Network scan' (example)

- Wait for a moment.



Note:

It may take a few seconds to display the **Scan response** dialog of the PROFINET IO-Controller DTM.

- Via **Network scan...** an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device is established. SYCON.net scans, which PROFINET IO-Devices are connected to the network or the PROFINET IO-Controller device.
- ⇒ The Scan response dialog of the controller DTM appears.

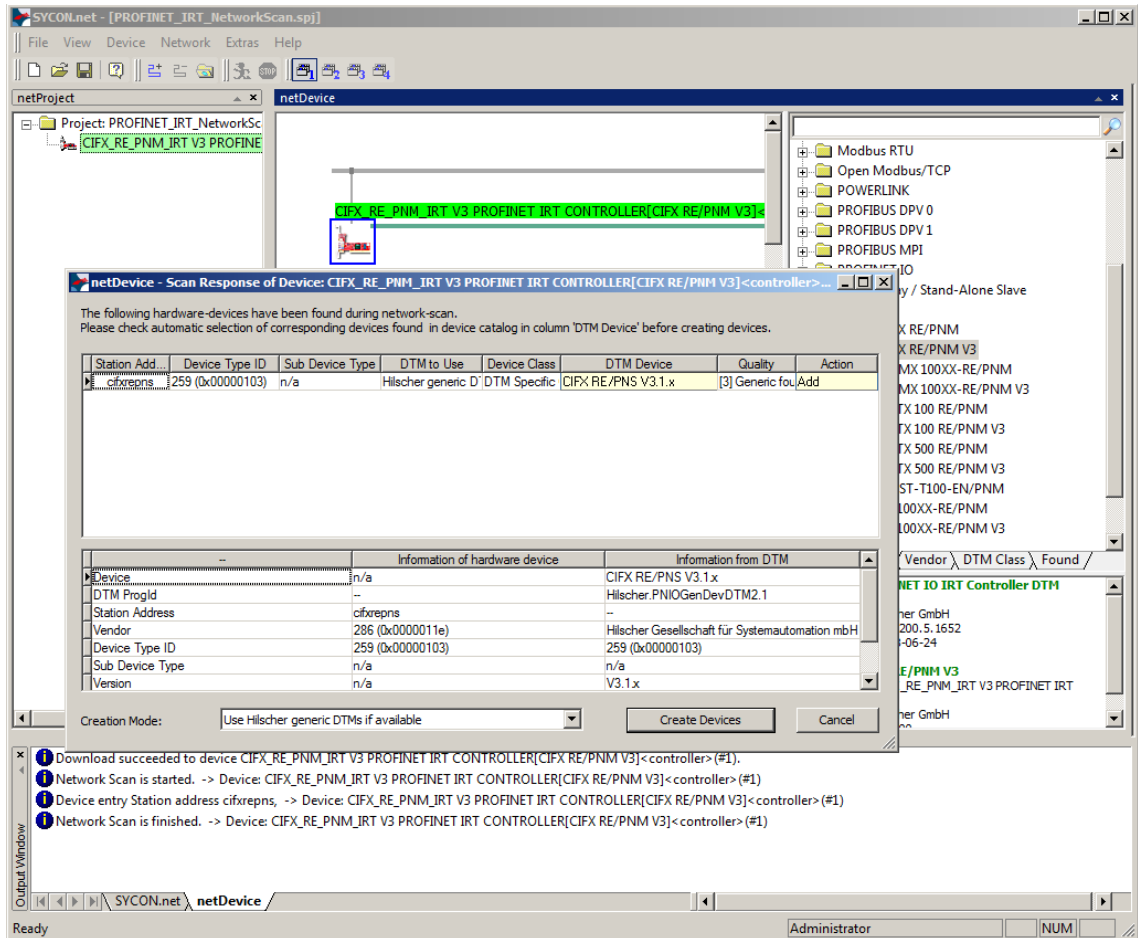


Figure 85: Scan response dialog of the controller DTM (example)

6.14.4 Scan response dialog settings

- Make the settings in the **Scan response** dialog of the PROFINET IO-Controller DTM.
- In the **DTM device** column the DTM devices assigned to the found ident codes appear.

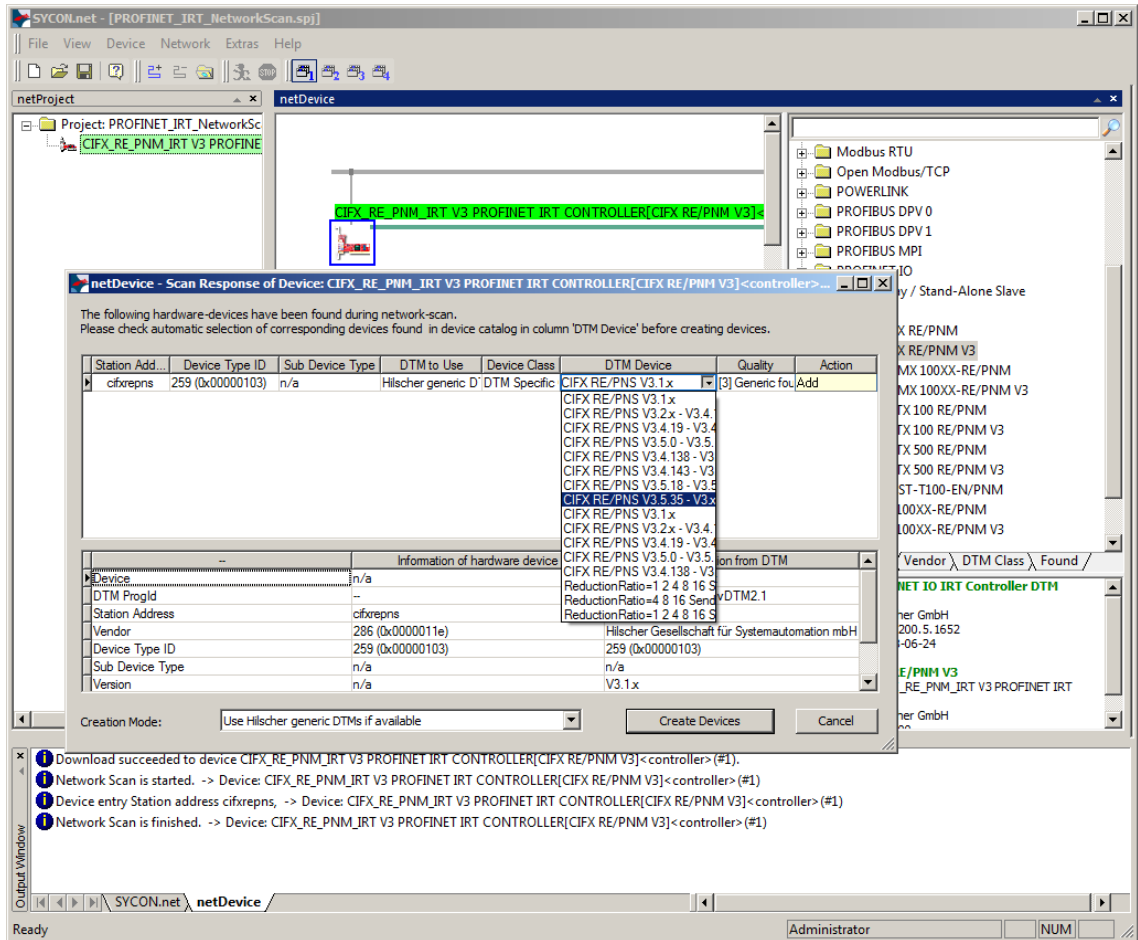


Figure 86: Scan response dialog of the PROFINET IO-Controller DTM (example)

- In the **DTM device** column, select for every identified device the DTM device corresponding to the firmware loaded in this PROFINET IO-Device.
 - If in the **DTM device** column no DTM device or a DTM device not desired is displayed, add the required DTM devices to the device catalog.
 - Or adapt the creation mode under **Creation mode**.
- In the **Action** column select, whether the found DTM device shall be:
 - *added or skipped* (if a device is not yet present in the project),
 - *or replaced or skipped* (if a device is already present in the project).

6.14.5 Scan response dialog

In the following table, you find a description about the **Scan response** dialog of the PROFINET IO-Controller Master DTM.

Column	Description						
Title bar	With the text: " <i>Symbolic Name [Device description] (#Network ID) channel[/Name of the network]</i> ". It is the symbolic name of the PROFINET IO PROFINET IO-Controller device.						
Instruction	In the Network Scan window, the instruction text is displayed: The following hardware-devices have been found during network scan. Please check automatic selection of corresponding devices found in device catalog in column 'DTM devices' before creating devices.						
Station address	PROFINET IO station address, which displays the logical sequence of the devices within a PROFINET IO network.						
Colors	Meaning of colors in the Scan response dialog of the PROFINET IO-Controller DTM:						
	<table border="1"> <tr> <td style="background-color: red; color: white; text-align: center;">Red</td> <td>If a field marked in red appears in column Station address, the respective DTM device is already present on the network.</td> </tr> <tr> <td style="background-color: yellow; text-align: center;">Yellow</td> <td>If a field appears marked in yellow, a selection can be made by a combo box.</td> </tr> </table>	Red	If a field marked in red appears in column Station address , the respective DTM device is already present on the network.	Yellow	If a field appears marked in yellow, a selection can be made by a combo box.		
Red	If a field marked in red appears in column Station address , the respective DTM device is already present on the network.						
Yellow	If a field appears marked in yellow, a selection can be made by a combo box.						
Device type ID	Identification (ID): Ident code read out from each device (Unique Identifier)						
Sub device type	Sub-device type of the device type, if applicable (not used in PROFIBUS).						
DTM to use	<p>Display of the DTM devices, which are assigned to the ident codes found during scanning:</p> <p>If Use Hilscher generic DTMs if available is displayed without color marking, there is no selection possibility.</p> <p>If Use Hilscher generic DTMs if available is displayed marked in yellow, the following selection can be made:</p> <div style="border: 1px solid black; padding: 2px; margin: 5px 0;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Use Hilscher generic DTMs if available</td> <td style="text-align: right; padding: 2px;">▼</td> </tr> <tr style="background-color: #e0e0e0;"> <td style="padding: 2px;">Use Hilscher generic DTMs if available</td> <td></td> </tr> <tr> <td style="padding: 2px;">Use vendors DTMs if available</td> <td></td> </tr> </table> </div> <p>(In the figure shown example DTMs are displayed.) A selection will only be displayed if under Creation Mode > Choose for each device was selected and if another DTM has been found for the respective device.</p> <p>A selection will only be displayed if under Creation mode > Choose for each device was selected and if another DTM has been found for the respective device.</p>	Use Hilscher generic DTMs if available	▼	Use Hilscher generic DTMs if available		Use vendors DTMs if available	
Use Hilscher generic DTMs if available	▼						
Use Hilscher generic DTMs if available							
Use vendors DTMs if available							
Device class	Device class of the PROFINET IO-Device.						
DTM device	<p>Found DTM device (the device name as taken from the DTM).</p> <p>Only the device description files or DTM devices can be displayed within the column DTM devices:</p> <ul style="list-style-type: none"> • Which are available in the device catalog for the scanned ident code, • Respectively, which belong to the selection made under Creation mode • and which belong to the selection made under Creation mode > Choose for each device under DTM to create. 						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> <p>For each device type ID in the column DTM device the following is displayed:</p> <ul style="list-style-type: none"> • <i>no</i> device, • <i>one</i> single device • or <i>multiple</i> devices (within a combobox). </td> <td style="width: 50%; padding: 5px;"> <p>This means, within the device catalog of netDevice for the found ident code and the selected Creation mode these alternatives are available:</p> <ul style="list-style-type: none"> • no DTM, • a device description file respectively a DTM device of a manufacturer, • or one or more device description files respectively a DTM devices of a manufacturer. </td> </tr> </table>	<p>For each device type ID in the column DTM device the following is displayed:</p> <ul style="list-style-type: none"> • <i>no</i> device, • <i>one</i> single device • or <i>multiple</i> devices (within a combobox). 	<p>This means, within the device catalog of netDevice for the found ident code and the selected Creation mode these alternatives are available:</p> <ul style="list-style-type: none"> • no DTM, • a device description file respectively a DTM device of a manufacturer, • or one or more device description files respectively a DTM devices of a manufacturer. 				
<p>For each device type ID in the column DTM device the following is displayed:</p> <ul style="list-style-type: none"> • <i>no</i> device, • <i>one</i> single device • or <i>multiple</i> devices (within a combobox). 	<p>This means, within the device catalog of netDevice for the found ident code and the selected Creation mode these alternatives are available:</p> <ul style="list-style-type: none"> • no DTM, • a device description file respectively a DTM device of a manufacturer, • or one or more device description files respectively a DTM devices of a manufacturer. 						
Quality	<p>Associated quality information</p> <p>Display: [1] DTM found, [3] Generic found</p>						

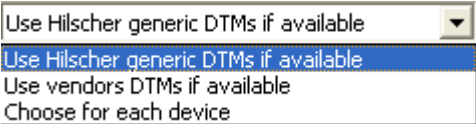
Column	Description
Action	<p>The action to be performed with the corresponding device during the process of device creation.</p> <ul style="list-style-type: none"> • If no device is present within the current project, the selection Add/Skip will appear. • If there is already a device present within the current project, the selection Replace/Skip will appear. <p>Add adds during the device creation process a new instance for the selected DTM to the newly found device address.</p> <p>Skip skips the device creation process for the respective device address.</p> <p>Replace erases the instance of the DTM currently located at this address during the device creation process, and replaces it with the instance of the chosen DTM.</p>
Table below	
	<p>The lower table in the Scan response dialog of the PROFINET IO-Controller DTM shows a comparison of possible differences in device information taken from:</p> <ul style="list-style-type: none"> • The hardware device (displayed in central column of 3) • and the DTM (displayed in right column of 3) <p>The left column contains which information is compared between the information sources "Hardware Device" and "DTM".</p> <p>Note! If a field contains the text 'n/a', the corresponding information is not applicable in the current context (fieldbus).</p>
Creation mode	<p>Under Creation mode one of the following options can be selected:</p> <ul style="list-style-type: none"> • Use Hilscher generic DTM if available • Use vendors DTMs if available • Choose for each device <p>Scan response dialog of the PROFINET IO-Controller DTM > "Creation mode"</p> 
Create devices	<p>About Create devices...</p> <ul style="list-style-type: none"> • for each PROFINET IO-Device the previously selected DTM device is created. • the PROFINET IO-Device configuration is uploaded to the created PROFINET IO-Device DTM and thereby the module configuration is generated. <p>In case a conflict occurs between a device description file and a device, the Upload dialog appears where conflicts are displayed in red.</p>
Cancel	Click Cancel to leave the dialog without creating a device.

Table 27: Description on the Scan response dialog of the PROFINET IO-Controller DTM

6.14.6 Creating devices

- In the **Scan response** dialog of the PROFINET IO-Controller DTM click **Create devices**.
- The **Device Network scan - Creating devices** dialog opens. The dialog shows the progress of the device creation process



Note:

Depending on the device manufacturer, a dialog that differs from this can also be displayed.

- The question appears: "The current module and submodule configuration of the connected device will be read out now. Do you want to apply the read-out module and submodule configuration?" "Yes"/"No"

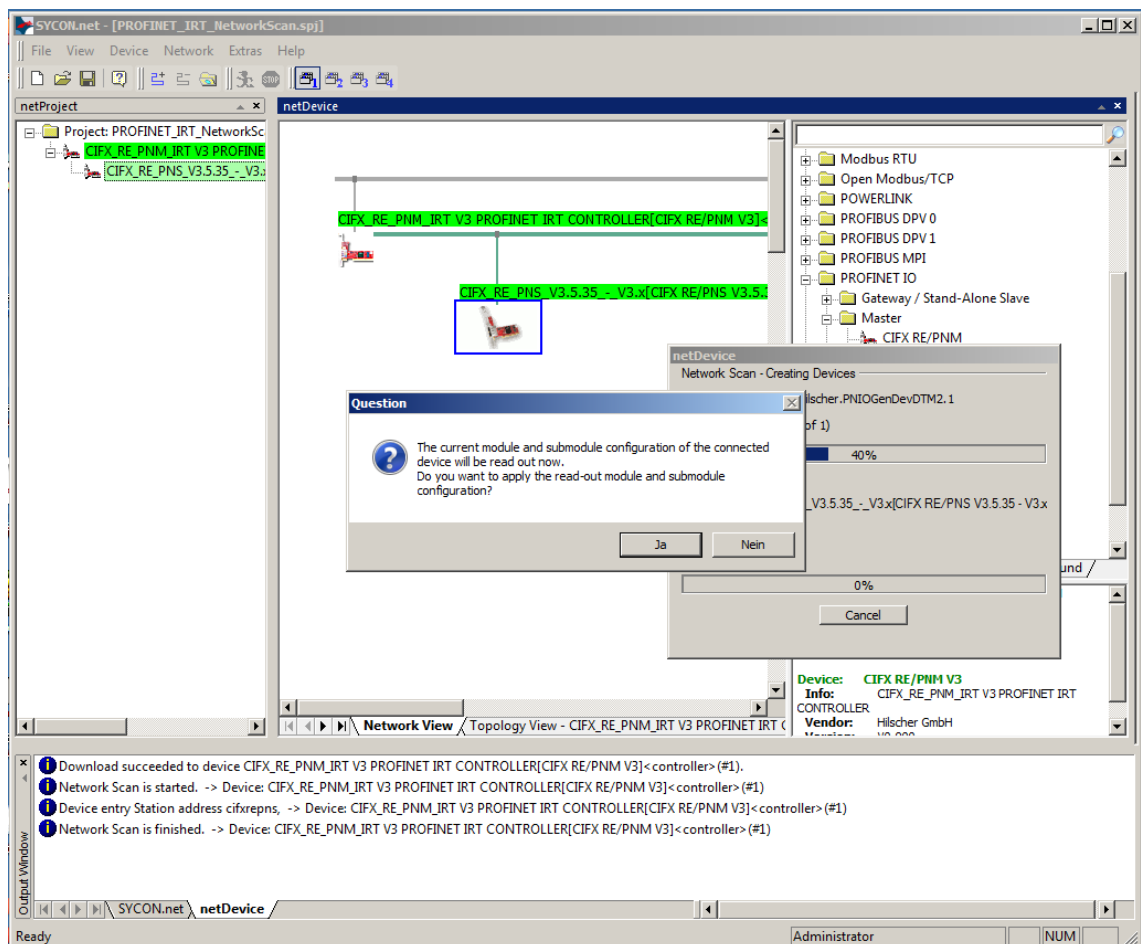


Figure 87: Query to create the module configuration (example)

- Click **No**.
- ⇒ The selected DTM device is created for each device.

6.14.7 Downloading IP settings

Safety precautions

Adhere to the necessary safety precautions to prevent personnel injury and property damage. For further details, please refer to the Safety chapter.

How to proceed

Use the **Download** function of the PROFINET IO-Controller DTM to download the IP settings of the PROFINET IO-Device to the PROFINET IO-Controller device:

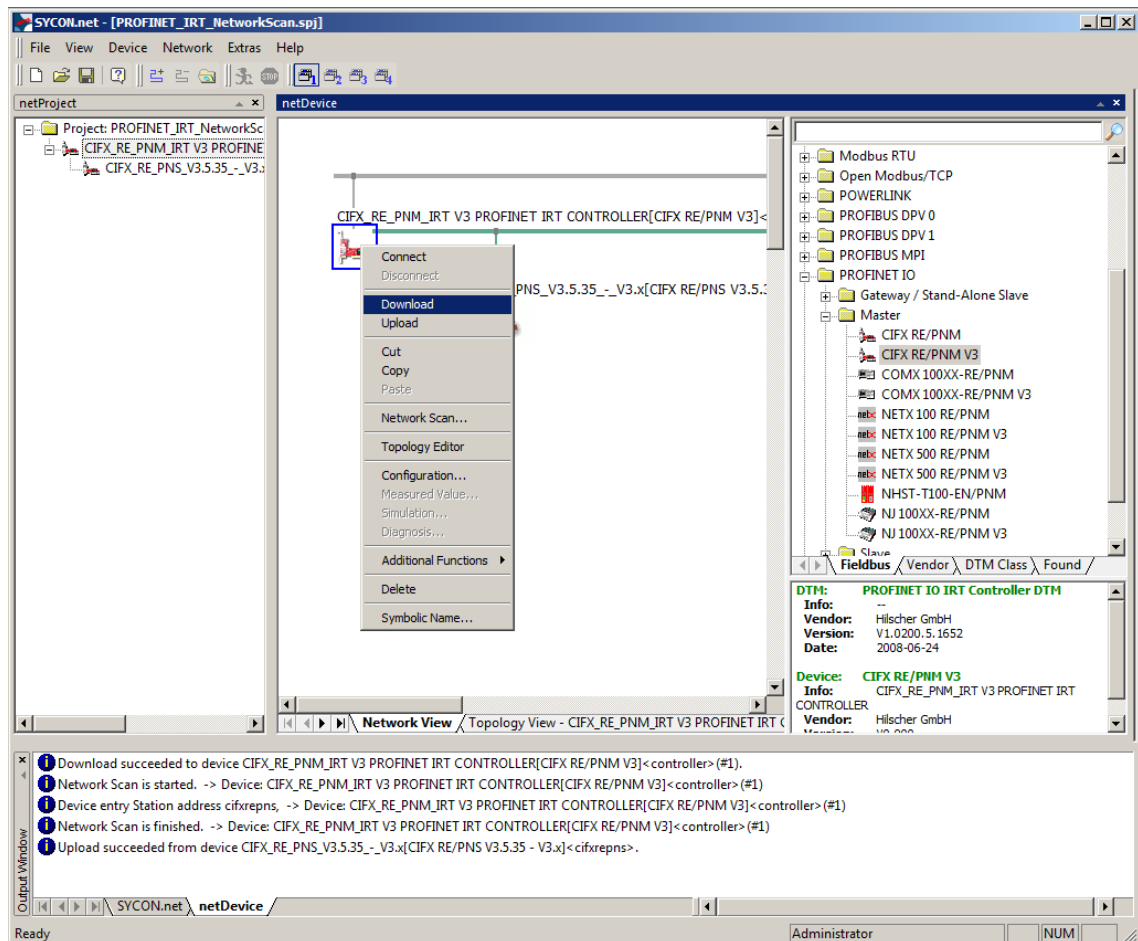


Figure 88: 'Download' - download the modified configuration to the PROFINET IO-Controller device (example)

- In netDevice: Right-click on the device symbol of the PROFINET IO-Controller DTM.
- Select **Download** from the context menu.
- The **netDevice - Download** dialog appears: “If you attempt to download during bus operation, communication between master and slaves is stopped. Do you really want to download?”
- Click **Yes**.
- The **netDevice** dialog appears, with the progress bar **Download active, device performances initialization...**
- The **netDevice** window displays the message (example): “Download succeeded to device CIFX_RE_PNM[CIFX RE/PNM]<=>(# 1).”

6.14.8 Upload and module configuration

Use the Upload function to upload the device configuration of each Device (physical device) to the Device DTM.

- In **netDevice**: Right-click on the device symbol of the PROFINET IO-Device DTM.

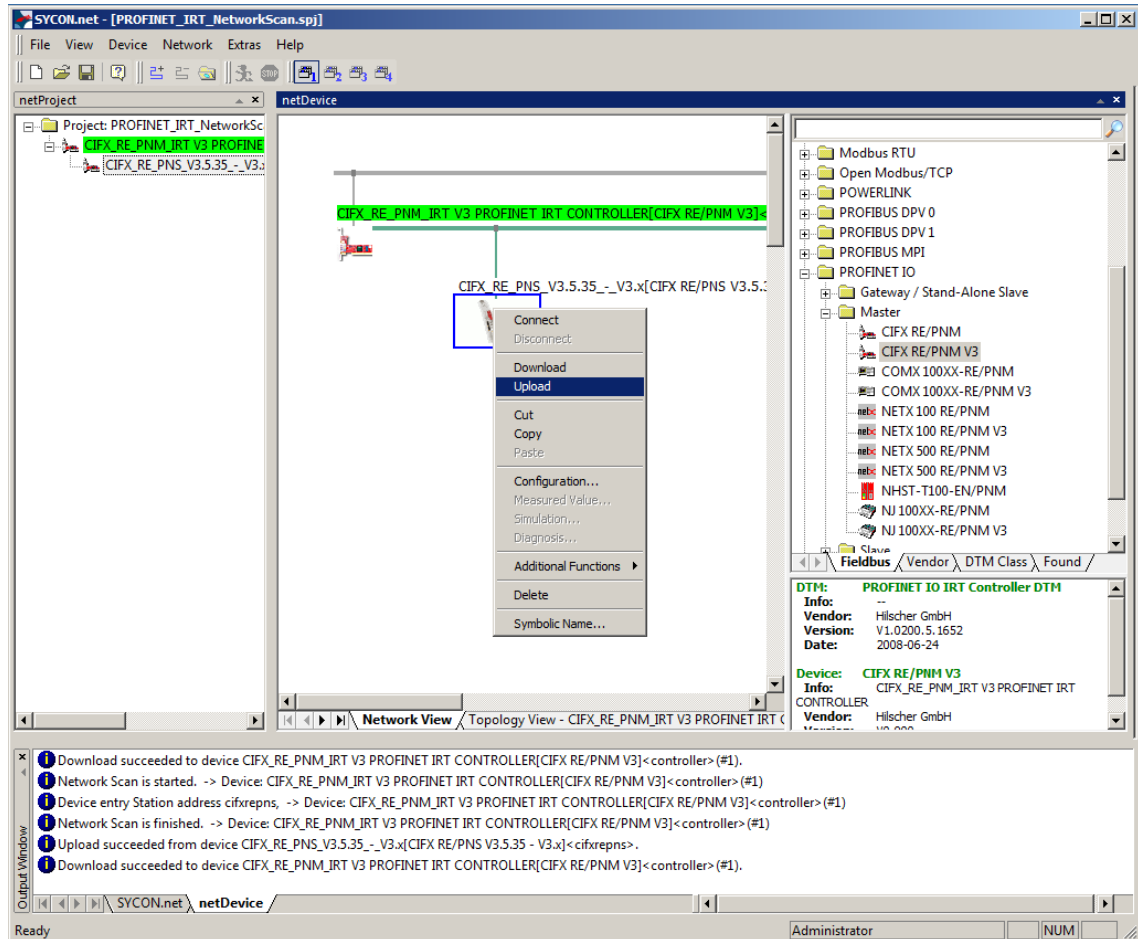


Figure 89: 'Upload' the configuration of the device (example)

- Select **Upload** from the context menu.
- The dialog **Device Symbolic Name of the Controller Device [Device Description] <Device Address> Starting Upload ...** appears. The dialog shows the progress of the upload process.



Note:

Depending on the device manufacturer, a dialog that differs from this can also be displayed.

- The question appears: "The current module and submodule configuration of the connected device will be read out now. Do you want to apply the read-out module and submodule configuration?" "Yes"/"No"

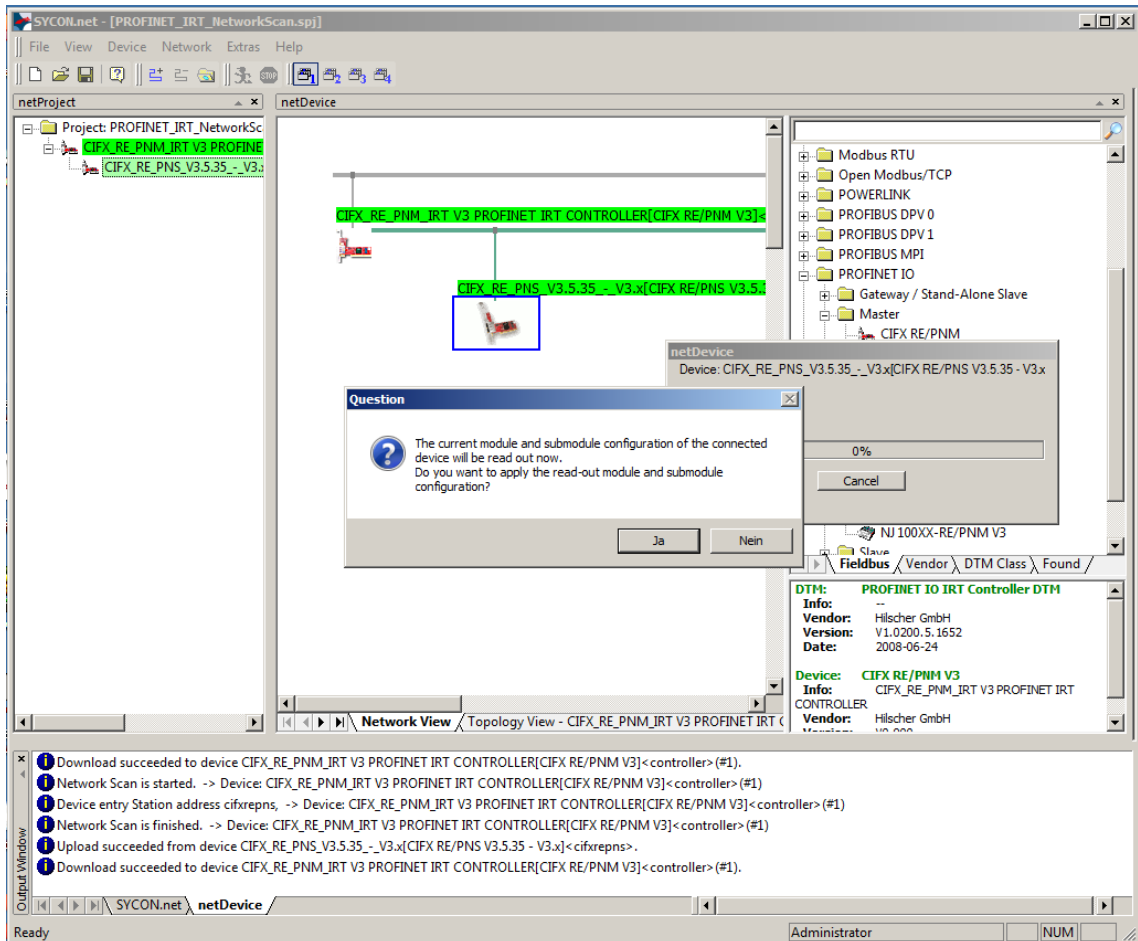


Figure 90: Query to create the module configuration (example)

- Click **Yes**.
- For the Device, its current configuration is uploaded to the Device DTM via the Controller device and the Controller DTM.
- The successful progress of the upload procedure is reported in the output window.



Note:

If you start the **Upload** function and have not yet assigned an IP address for the Device during a new installation, you receive the error message: **Upload failed from device**. For more information, see *Upload failed from device* [▶ page 124].

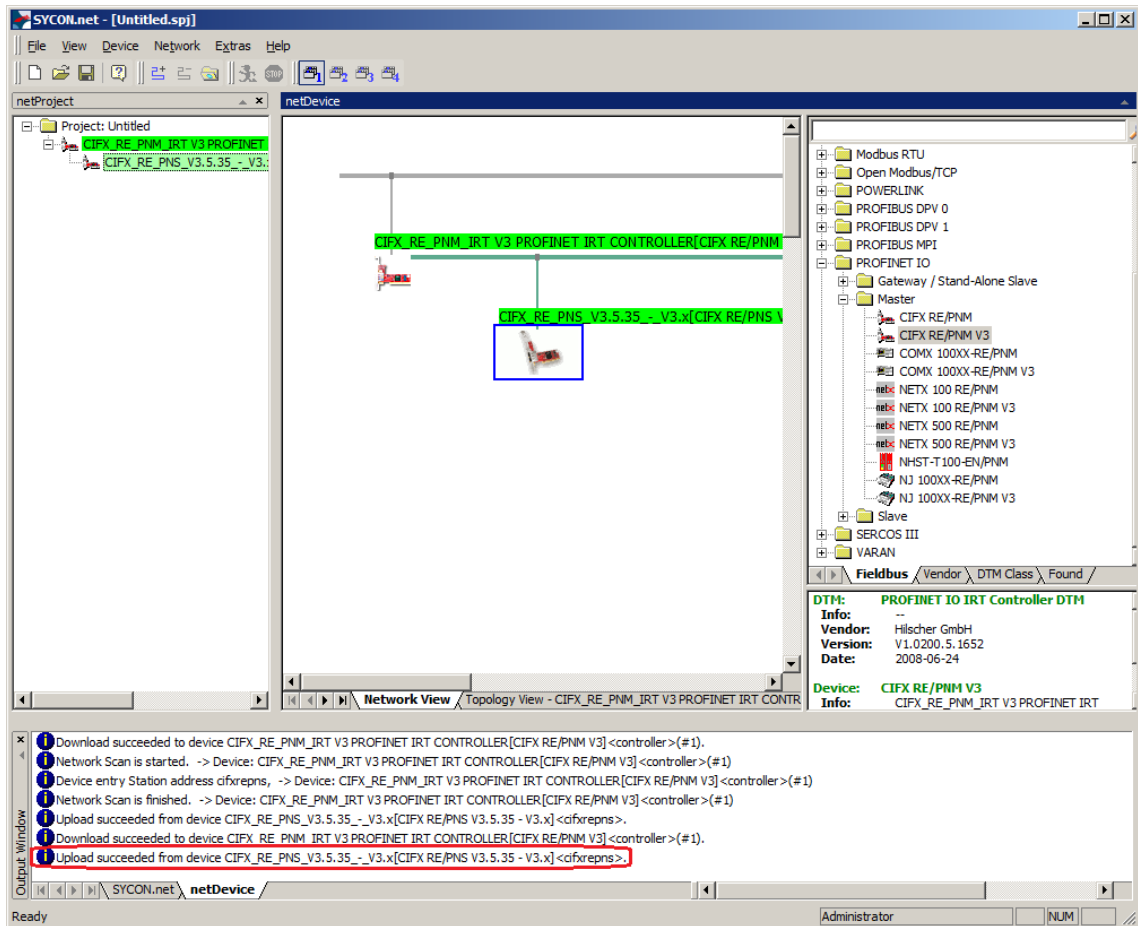


Figure 91: Upload successful (example)

After the module configuration of the PROFINET IO-Device has been created, you can display the uploaded modules by double-clicking the Device symbol.

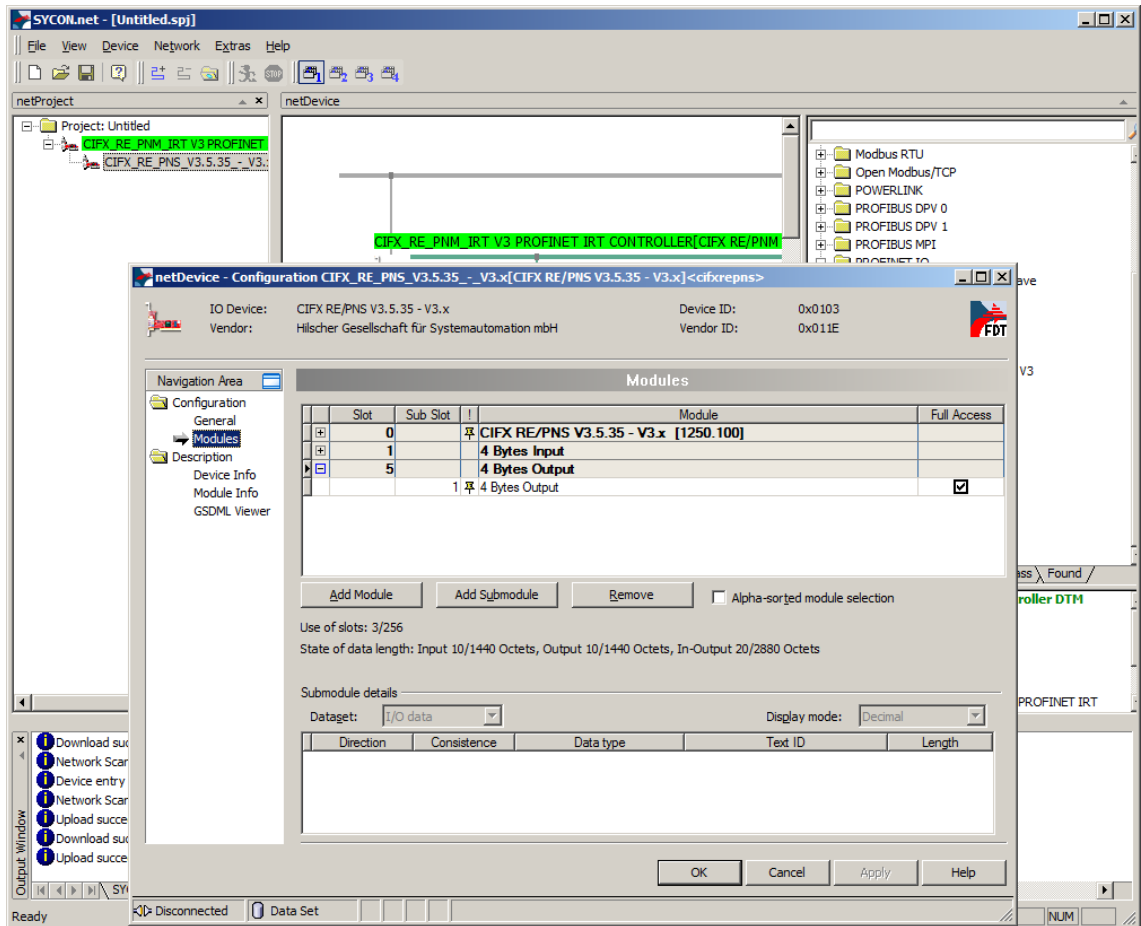


Figure 92: Uploaded modules (example)

6.14.9 Downloading configuration

Safety precautions

Adhere to the necessary safety precautions to prevent personnel injury and property damage. For further details, please refer to the Safety chapter.

How to proceed

Use the **Download** function of the PROFINET IO-Controller DTM to download the device configuration of the PROFINET IO-Devices to the PROFINET IO-Controller device:

- In netDevice: Right-click on the device symbol of the PROFINET IO-Controller DTM.
- Select **Download** from the context menu.
- ⇒ The **netDevice - Download** dialog appears: “If you attempt to download during bus operation, communication between master and slaves is stopped. Do you really want to download?”
- Click **Yes**.
- ⇒ The **netDevice** dialog appears, with the progress bar **Download active, device performances initialization...**
- ⇒ The **netDevice** window displays the message (example): “Download succeeded to device CFX_RE_PNM[CFX RE/PNM]<>(# 1).”

6.14.10 Upload failed from device

If you start the **Upload** function and you have not yet assigned the IP address to a reinstalled Device, you receive the following error message: **Upload failed from device Symbolic Name of the Device [Device Description] <Device Address>! You might find additional information in the output window.**

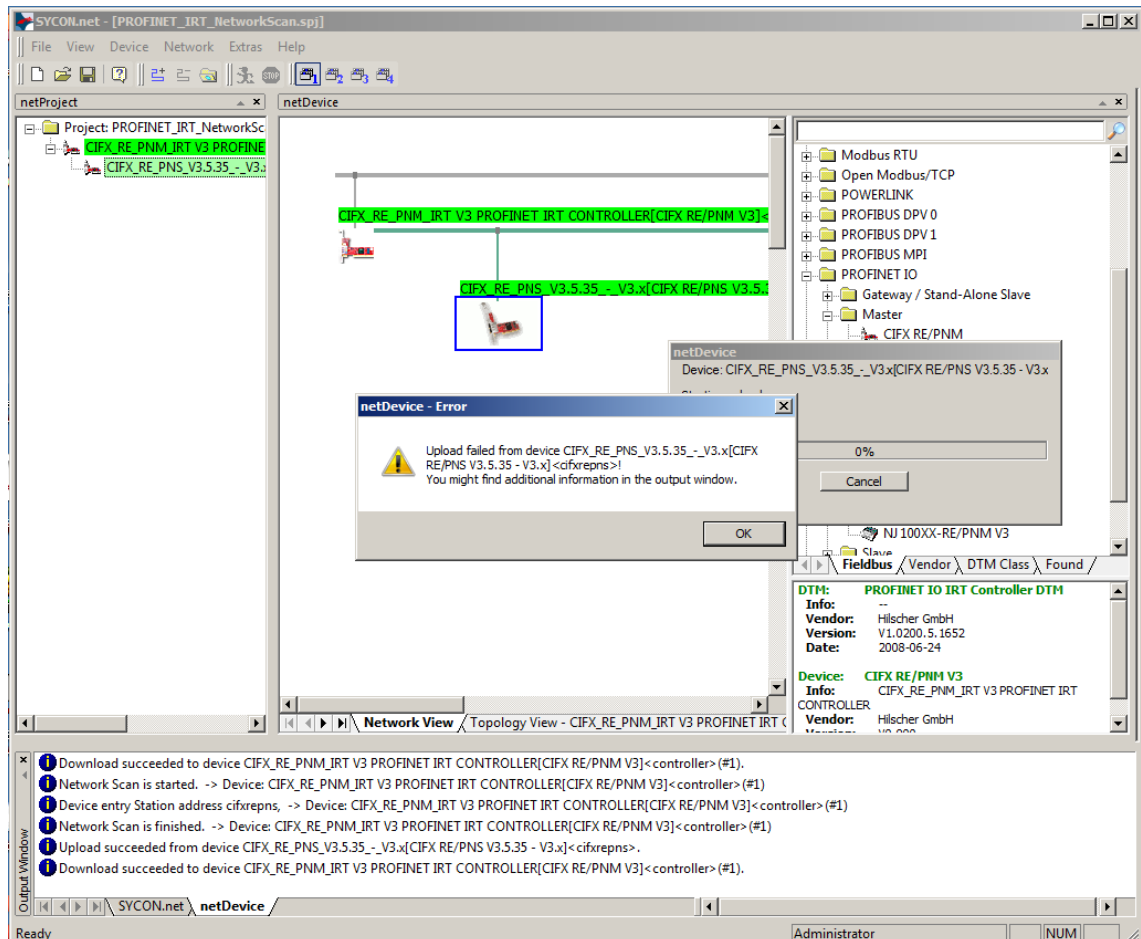


Figure 93: Upload failed from device (example)

- In this case, assign the IP settings.
- Then load the changed configuration into the Controller device.
- Then start the **Upload** function again.

7 Diagnosis

7.1 Overview diagnosis

The dialog Diagnosis serves to diagnose the device behavior and communication errors. For diagnosis, the device must be in online state.

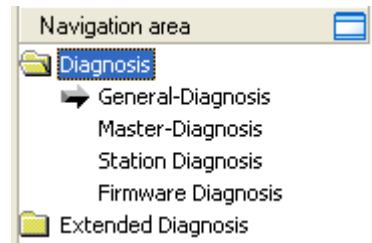


Figure 94: Navigation area - Diagnosis

Online connection to the device



Note:

Accessing the **Diagnosis** panes of the PROFINET IO-Controller DTM requires an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device. For further information refer to section *Connecting/disconnecting device* [▶ page 107].

How to proceed

- In the diagnosis dialog, check whether the communication is OK: **Diagnosis > General diagnosis > Device status "Communication"** must be green!
- **"Communication"** is green: Open the **IO monitor** and test the input or output data.
- **"Communication"** is not green: Use **Diagnosis** and **Extended diagnosis** for troubleshooting.

Extended diagnosis

The **Extended diagnosis** helps to find communication and configuration errors, when default diagnosis fails.

For further information, refer to chapter *Extended diagnosis* [▶ page 131].

7.2 General diagnosis

Information regarding the Device State and other general diagnosis parameters are displayed in the **General Diagnosis** dialog.

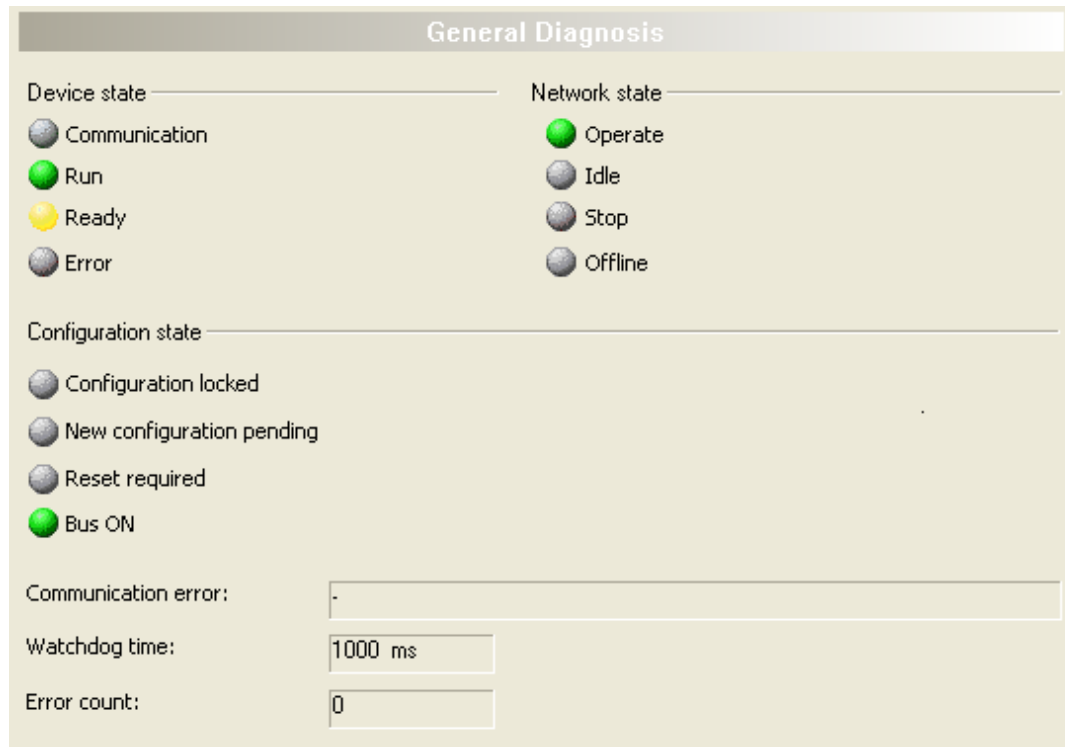


Figure 95: General diagnosis

LED	Description	Color	State
Device state			
Communication	Shows whether the PROFINET IO device executes the network communication.	(green)	In COMMUNICATION state
		(gray)	Not in COMMUNICATION state
Run	Shows whether the PROFINET IO device has been configured correctly.	(green)	Configuration OK
		(gray)	Configuration not OK
Ready	Shows whether the PROFINET IO device has been started correctly. The PROFINET IO device waits for a configuration.	(yellow)	Device READY
		(gray)	Device not READY
Error	Shows whether the PROFINET IO device records a device status error. For further information about the error characteristics and the number of counted errors refer to the extended diagnosis.	(red)	ERROR
		(gray)	No ERROR
Network state			
Operate	Shows whether the PROFINET IO device is in data exchange. In a cyclic data exchange the input data or the output data of the PROFINET IO-Controller is transmitted to the PROFINET IO-Device.	(green)	In OPERATION state
		(gray)	Not in OPERATION state
Idle	Shows whether the PROFINET IO device is in data exchange. The connection establishment between PROFINET IO-Controller and PROFINET IO-Device is in progress.	(yellow)	In IDLE state
		(gray)	Not in IDLE state
Stop	Shows whether the PROFINET IO device is in Stop state: There is no cyclic data exchange at the PROFINET IO network. The PROFINET IO device was stopped by the application program or it changed to the Stop state because of a bus error.	(red)	In STOP state
		(gray)	Not in STOP state









LED	Description	Color	State
Offline	The PROFINET IO-Controller is offline as long as it does not have a valid configuration. The PROFINET IO-Device does not have a valid configuration.	 (yellow)	In OFFLINE state
		 (gray)	Not in OFFLINE state
Configuration state			
Configuration locked	Shows whether the PROFINET IO device configuration is locked, to avoid the configuration data is typed over.	 (yellow)	Configuration not LOCKED
		 (gray)	Configuration not LOCKED
New Configuration pending	Shows whether a new PROFINET IO device configuration is available.	yellow	New configuration pending
		 (gray)	No new Configuration pending
Reset required	Shows whether a firmware reset is required as a new PROFINET IO device configuration has been loaded into the device.	yellow	RESET required
		 (gray)	No RESET required
Bus ON	Shows whether the bus communication was started or stopped. I. e., whether the device is active on the bus or no bus communication to the device is possible and no response telegrams are sent.	 (green)	Bus ON
		 (gray)	Bus OFF

Table 28: Indication general diagnosis

Parameter	Description
Communication error	Shows the name of the communication error. If the cause of error is resolved, the value will be set to zero again.
Watchdog time	Shows the watchdog time in ms.
Error count	This field holds the total number of errors detected since power-up, respectively after reset. The protocol stack counts all sorts of errors in this field no matter whether they were network related or caused internally.

Table 29: Indication general diagnosis

7.3 Master diagnosis

Information regarding the slave state, slave errors and slaves configured, active or in diagnostic is displayed in the **Master Diagnosis** dialog.

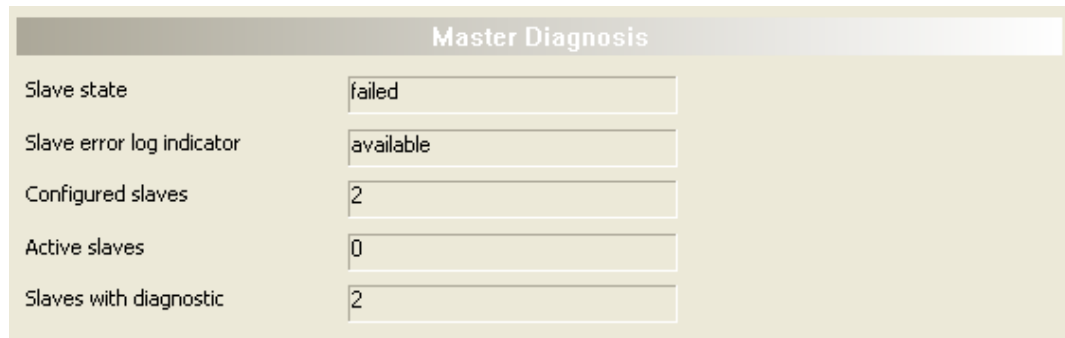


Figure 96: Master diagnosis

Parameter	Description	Range of value / value
Slave state	Shows whether slave state is ok or not. The slave state field for master diagnosis shows whether the master is in cyclic data exchange to all configured slaves. In case there is at least one slave missing or if the slave has a diagnostic request pending, the status will be set to FAILED. For protocols that support non-cyclic communication only, the slave state is set to OK as soon as a valid configuration is found.	UNDEFINED, OK, FAILED
Slave error log indicator	Shows whether the slave error log indicator is available. The error log indicator field holds the number of entries in the internal error log. If all entries are read from the log, the field will be set to zero.	EMPTY, AVAILABLE
Configured slaves	Shows the number of configured slaves. Number of configured slaves in the network according to the slave list derived from the configuration database created by the configuration software. The list includes the slaves to which the master has to open a connection.	
Active slaves	Shows number of active slaves. Number of slaves in data exchange mode. The list includes the slaves to which the Master has successfully opened a connection	
Slaves with diagnostic	Shows number of slaves with diagnostic. Number of slaves with diagnosis or error slaves.	

Table 30: Parameters Master diagnosis

7.4 Station diagnosis

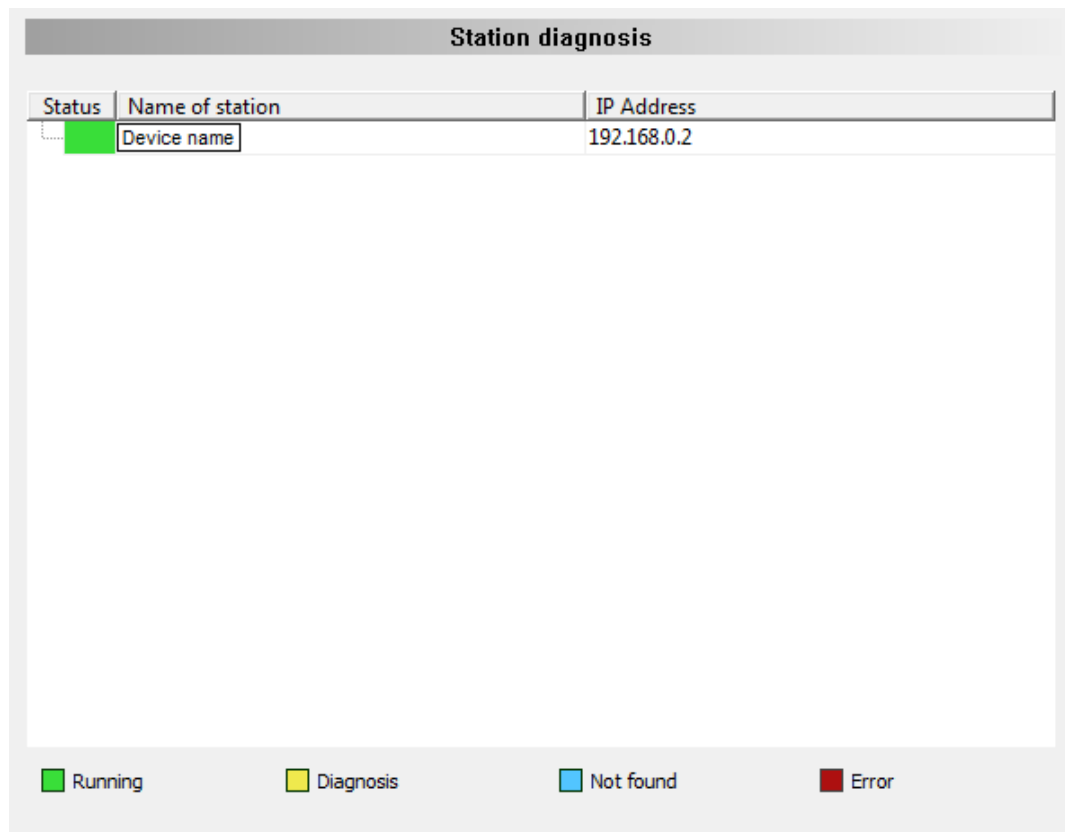


Figure 97: Station diagnosis

The **Station diagnosis** shows the status for all PROFINET IO-Device, which are configured in the PROFINET IO-Controller. The PROFINET IO-Controller DTM updates this display cyclically.

Column	Description	Value range / value
Status	The status of the device addressed under the displayed IP address.	Running, Diagnosis, Not found, Error
Station name	Network name of the PROFINET IO device station.	1 - 240 characters
IP address	IP address of the PROFINET IO-Device station under which the device is addressed. If the device was not found or if there is a diagnostic or error message for the device, no IP address appears.	Valid IP address

Table 31: Columns of the Station diagnosis table

The legend below describes the possible values for the state of a device, which is assigned to a station address.

Color	Name	Description
green	Running	The device associated with this station address is running.
yellow	Diagnosis	Diagnosis is available for the device associated with this station address.
blue	Not found	The device associated with this station address was parameterized, but not found.
red	Error	An error message is available for the device associated with this station address. For the status ,error' additionally a textual error messages can appear.

Table 32: Possible values for the status

7.5 Firmware diagnosis

In the dialog **Firmware Diagnosis**, the current task information of the firmware is displayed.

Under **Firmware** or **Version** the name of the firmware and version (including the date) are indicated.

Firmware Diagnosis					
Firmware:	PROFINET IO Controller				
Version:	3.4.3 (Build 0)				
Date:	20.5.2021				
Task information:					
Task	Name of task	Version	Priority	Description	State
0	RX_IDLE	1.0	63	RX IDLE Task.	Operation succeeded. (0x00000000)
1	RX_TIMER	1.0	21	rcX Timer.	Operation succeeded. (0x00000000)
2	LWIP	4.6	42	LWIP Task.	Operation succeeded. (0x00000000)
3	PNM_HIGH	1.0	27	OSAL Worker Thread.	Operation succeeded. (0x00000000)
4	PNM_MED	1.0	28	OSAL Worker Thread.	Operation succeeded. (0x00000000)
5	PNM_LOW	1.0	57	OSAL Worker Thread.	Operation succeeded. (0x00000000)
6	PNC	1.12	19	PROFINET IO HAL interrupt Task.	Operation succeeded. (0x00000000)
7	RX_SYSTEM	1.16	37	Middleware System Task.	Operation succeeded. (0x00000000)
8	DPM_COMO_S...	1.0	32	TLR-Router DPM.	Operation succeeded. (0x00000000)
9	DPM_COMO_R...	1.0	34	TLR-Router DPM.	Operation succeeded. (0x00000000)
10	PNM_AP	3.4	29	PROFINET IO Controller V3 AP Task.	Operation succeeded. (0x00000000)
11	MARSHALLER	2.0	47	Marshaller: Main Task.	Operation succeeded. (0x00000000)
12	PN_RTC	1.12	18	PROFINET IO RTC Task.	Operation succeeded. (0x00000000)
13	PACKET_ROUTER	2.0	47	Marshaller: Packet Router Task.	Operation succeeded. (0x00000000)

Figure 98: Firmware Diagnosis

Task information:

The table **Task Information** is listing the task information of the single firmware tasks.

Task	Description
Task	Name of task
Name of task	Name of the task
Version	Version number of the task
Prio	Priority of the task
Description	Description of the task
Status	Current status of the task

Table 33: Description table task information

8 Extended diagnosis

8.1 Overview extended diagnosis

The "Extended Diagnosis" of the PROFINET IO-Controller DTM helps to find communication and configuration errors, when default diagnosis fails. Therefore, it contains a list of diagnosis structures as online counter, states and parameters.

The table below gives an overview for the extended diagnosis dialog panes descriptions of the PROFINET IO-Controller DTM:

Folder name / Section	Subsection
different folders	<i>Task information</i> [▶ page 132]
RX-SYSTEM	<i>IniBatch status</i> [▶ page 133]
PNM_AP	<i>Configuration state</i> [▶ page 134]
	<i>Network state</i> [▶ page 135]
	<i>Communication state</i> [▶ page 136]
	<i>Most recent logbook entries</i> [▶ page 137]
	<i>PROFINET interface state</i> [▶ page 138]
	<i>PROFINET switch diagnosis</i> [▶ page 139]
	<i>System state</i> [▶ page 139]

Table 34: Descriptions of the dialog panes extended diagnosis



Note:

Accessing the **Extended Diagnosis** dialog panes of the PROFINET IO-Controller DTM requires an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device. For further information refer to section *Connecting/ disconnecting device* [▶ page 107].

8.2 Task information

Task Information	
Task states	
Name	Value
Identifier	
Major version	
Minor version	<i>{The displayed values depend from the corresponding task}</i>
Maximum Packet size	
Default Que	
Unique identifier	
Init result	

Figure 99: Extended Diagnosis > [Folder Name] > Task Information Example Display

Name	Description
Identifier	Identification number of the task
Major version	Task version, contains incompatible changes
Minor version	Task version, contains compatible changes
Maximum packet size	Maximum packet size, which the task sends
Default Queue	Queue handle, which is accessible via DPM by mailbox.
UUID	Unique user ID, 16 Byte indicator used for task identification and its affiliation e. g. to a stack (therein different identification data is coded in).
Init result	Error Code, 0= no Error The description of the error codes can be found in this manual or in the corresponding software reference manuals.

Table 35: Extended Diagnosis > [Folder Name] > Task Information

8.3 IniBatch status

IniBatch-Status	
Task states	
Name	Value
Communication Channel	0
Current State	Error
IniBatch Result	No DBM file
OpenDbm Result	24975
SendPacket Result	0
Confirmation Result	0
Last Packet Number	0
Last Packet Command	0
Last Packet Length	0
Last Packet Destination	0

Figure 100: Extended Diagnosis > [Folder name] > IniBatch Status example display

Name	Description
Communication Channel	Number of the communication channel used by the device.
Current State	Idle; IniBatch packets in progress; Retrying to send last packet; Error
IniBatch Result	Ok; No DBM file; No Packet table; No data set available; Data set is shorter than packet length; Packet Buffer is shorter than Packet length; Invalid packet destination; Logical queue not defined Send packet failed; Too many retries; Error in confirmation packet status
OpenDbm Result	Error when opening the IniBatch database Under "OpenDbm Result" the error code is typed in, when "IniBatch Result" == "No DBM file" (1) is.
SendPacket Result	Error when sending a packet Under "SendPacket Result" the error code is typed in, when "IniBatch Result" == "send packet failed" (8) is.
Confirmation Result	Confirmation error when sending packets Under "Confirmation Result" the packet specific error code from the ulSta is typed in, when "IniBatch Result" == "Error in confirmation packet status" (10) is.
Last Packet Number	Value depends by the communication system.
Last Packet Command	Value depends by the communication system.
Last Packet Length	Value depends by the communication system.
Last Packet Destination	Value depends by the communication system.

Table 36: Extended Diagnosis > [Folder name] > IniBatch Status

The task status "Confirmation Result" is bus specific. The other task status are rcx-related error codes.

8.4 PNM_AP

8.4.1 Configuration state

Configuration state	
Task states	
Name	Value
Last configuration error code	0x00000000
Handle of element with configuration error	0
Configuration state of device handle 1	Configured for RT
Configuration state of device handle 2	Not configured
Configuration state of device handle 3	Not configured
Configuration state of device handle 4	Not configured
Configuration state of device handle 5	Not configured
Configuration state of device handle 6	Not configured
Configuration state of device handle 7	Not configured
Configuration state of device handle 8	Not configured
Configuration state of device handle 9	Not configured
Configuration state of device handle 10	Not configured
Configuration state of device handle 11	Not configured
Configuration state of device handle 12	Not configured
Configuration state of device handle 13	Not configured
Configuration state of device handle 14	Not configured
Configuration state of device handle 15	Not configured
Configuration state of device handle 16	Not configured
Configuration state of device handle 17	Not configured
Configuration state of device handle 18	Not configured
Configuration state of device handle 19	Not configured
Configuration state of device handle 20	Not configured
Configuration state of device handle 21	Not configured
Configuration state of device handle 22	Not configured
Configuration state of device handle 23	Not configured
Configuration state of device handle 24	Not configured
Configuration state of device handle 25	Not configured
Configuration state of device handle 26	Not configured
Configuration state of device handle 27	Not configured
Configuration state of device handle 28	Not configured
Configuration state of device handle 29	Not configured

Figure 101: Extended diagnosis > PNM_AP > Configuration state

For each Slave device (1 to 128) possible in the PROFINET network, a device handle is passed to the firmware, including information about the Slave configuration status.

Name	Description	Range of value/value
Last configuration error code	Error code indicating which error occurred in the last misconfigured device handle.	See API manual Hilscher status and error codes, Firmware and driver
Handle of element with configuration error	Displays the station address of the PROFINET IO-Device for the operating mode IRT, which was last detected as faulty configured.	1 ... 128
Configuration state of device handle [1 ... 128]	Each device handle passes, the information to the firmware, whether a slave is configured for RT or IRT. Furthermore, an information is passed if a slave is not available or if no slave has been configured (not configured) or if the slave has been switched off. 'Switched off' means that no connection to this slave is established during operation.	Not available, Not configured, Deactivated, Configured for RT, Configured for IRT

Table 37: Extended diagnosis > PNM_AP > Configuration state

The displayed device handles match to the file handles of the acyclic services. A file handle is an addressing of file operations.

8.4.2 Network state

Network state	
Task states	
Name	Value
Name of station	controller
IP address	192.168.0.1
IP network mask	255.255.255.0
IP gateway address	0.0.0.0
Bus state	On
Address conflict detection	No conflict
Conflicting Name of station MAC address	00-00-00-00-00-00
Conflicting IP MAC address	00-00-00-00-00-00

Figure 102: Extended diagnosis > PNM_AP > Network state

Name	Description	Range of value/value
Name of station	Network name of the PROFINET IO-Device station.	1 - 240 characters
IP address	IP address of the PROFINET IO-Device station.	Valid IP address
IP network mask	Network mask of the PROFINET IO-Device station.	Valid IP network mask
IP gateway address	Gateway address of the PROFINET IO-Device station.	Valid IP gateway address
Bus state	Shows the current state on the bus (DPM bus state) for the states if the bus is not in operation (Off), if the communication is started on the bus (Startup), if the bus is in operation (On) and if the communication is stopped and the bus is shut down (shutdown).	Off, Startup, On, Shutdown
Address conflict detection	The firmware checks in cyclic intervals if a conflict exists and displays the result. Address conflicts can occur for the name of station or the IP address or for both.	No conflict, Name of station conflict, IP address conflict, Name of station conflict, IP address conflict
Conflicting name of station MAC address	If a name of station conflict is detected, the MAC address of the station with the same name of station is displayed.	00-00-00-00-00-00 ... FF-FF-FF-FF-FF-FF
Conflicting IP MAC address	If an IP address conflict is detected, the MAC address of the station with the same IP address is displayed.	00-00-00-00-00-00 ... FF-FF-FF-FF-FF-FF

Table 38: Extended diagnosis > PNM_AP > Network state

8.4.3 Communication state

Communication state	
Task states	
Name	Value
Communication state of device handle 1	In data exchange
Communication state of device handle 2	Not configured
Communication state of device handle 3	Not configured
Communication state of device handle 4	Not configured
Communication state of device handle 5	Not configured
Communication state of device handle 6	Not configured
Communication state of device handle 7	Not configured
Communication state of device handle 8	Not configured
Communication state of device handle 9	Not configured
Communication state of device handle 10	Not configured
Communication state of device handle 11	Not configured
Communication state of device handle 12	Not configured
Communication state of device handle 13	Not configured
Communication state of device handle 14	Not configured
Communication state of device handle 15	Not configured
Communication state of device handle 16	Not configured
Communication state of device handle 17	Not configured
Communication state of device handle 18	Not configured
Communication state of device handle 19	Not configured
Communication state of device handle 20	Not configured
Communication state of device handle 21	Not configured
Communication state of device handle 22	Not configured
Communication state of device handle 23	Not configured
Communication state of device handle 24	Not configured
Communication state of device handle 25	Not configured
Communication state of device handle 26	Not configured
Communication state of device handle 27	Not configured
Communication state of device handle 28	Not configured
Communication state of device handle 29	Not configured
Communication state of device handle 30	Not configured
Communication state of device handle 31	Not configured

Figure 103: Extended diagnosis > PNM_AP > Communication state

Name	Description	Range of value/value
Communication state of device handle [1 ... 128]	Each device handle passes the information to the firmware in which communication state, the respective Slave is.	Not available Not configured Deactivated No link Connecting - Startup Connecting - Parameterization Connecting - Waiting for ready In data exchange In data exchange, Configuration mismatch In data exchange, Diagnosis available In data exchange, Configuration mismatch, Diagnosis available

Table 39: Extended diagnosis > PNM_AP > Communication state

8.4.4 Most recent logbook entries

Most recent logbook entries	
Task states	
Name	Value
Time since device start	4458 seconds
Entry 0 time	4191 seconds
Entry 0 device handle	0x0001
Entry 0 event	Connection established
Entry 0 detail	0x00000000
Entry 1 time	4148 seconds
Entry 1 device handle	0x0000
Entry 1 event	Bus state changed
Entry 1 detail	0x00000002
Entry 2 time	4143 seconds
Entry 2 device handle	0x0000
Entry 2 event	Memory usage
Entry 2 detail	0x002D248C
Entry 3 time	4143 seconds
Entry 3 device handle	0x0000
Entry 3 event	Bus state changed
Entry 3 detail	0x00000001
Entry 4 time	4143 seconds
Entry 4 device handle	0x0000
Entry 4 event	Configuration changed
Entry 4 detail	0x00000002
Entry 5 time	4143 seconds
Entry 5 device handle	0x0000
Entry 5 event	Configuration changed
Entry 5 detail	0x00000001
Entry 6 time	4143 seconds
Entry 6 device handle	0x0000
Entry 6 event	Configuration changed
Entry 6 detail	0x00000000
Entry 7 time	4143 seconds
Entry 7 device handle	0x0000
Entry 7 event	Memory usage
Entry 7 detail	0x00000144

Figure 104: Extended diagnosis > PNM_AP > Most recent logbook entries

Name	Description	Range of value/value
Time since device start	Time since boot in seconds.	0 ...
Entry [0 ... 23] time	Intelligent timestamp: Same events are detected. The time stamp is updated.	0 ...
Entry [0 ... 23] device Handle	Affected device handle	0x0001 to 0x0128
Entry [0 ... 23] event	Possible event type	Unused, Configuration changed, Configuration locked, Low priority alarm, High priority alarm, RPC read failed, Connection not established, Connection established, Memory usage, Connection aborted, Host interface watchdog error, RPC write failed, Bus state changed

Name	Description	Range of value/value
Entry [0 ... 23] detail	Error code indicating which error occurred respectively for the events in the logbook.	See API manual Hilscher status and error codes, Firmware and driver. In addition, error codes can be displayed which come directly from the bus. These are 32-bit values described in the PROFINET specification.

Table 40: Extended diagnosis > PNM_AP > Most recent logbook entries

8.4.5 PROFINET interface state

PROFINET interface state	
Task states	
Name	Value
Local port diagnosis port 1	OK
Remote port diagnosis port 1	OK
RTC3 port state port 1	Off
Local port diagnosis port 2	OK
Remote port diagnosis port 2	OK
RTC3 port state port 2	Off

Figure 105: Extended diagnosis > PNM_AP > PROFINET interface state

If the firmware gets neighborhood information by a topology configuration, the PROFINET interface status shows the evaluation of the checks carried out by the PROFINET IO IRT Controller for proximity detection.

Name	Description	Range of value/value
Local port diagnosis port 1 (or 2)	Indicates whether to the appropriate port - an error was detected or - that the port is not connected, - the wrong MAUType or - the wrong cable delay.	OK, No link, Wrong MAUType, Wrong cable delay
Remote port diagnosis port 1 (or 2)	Indicates whether to the corresponding neighboring port - an error was detected or - no or a wrong neighbor station, - the incorrect port or - the wrong MAUType, - the wrong media redundancy domain or - the wrong cable delay.	OK, No peer detected, Wrong peer, Wrong peer port, Wrong MAUType, Wrong MRP domain, Wrong cable delay
RTC3 port state port 1 (or 2)	Displays the RTC3 port state for IRT configurations. In the 'Startup' state, the PROFINET IO-Devices still send their frames unsynchronized to the PROFINET IO-Controller device.	Off, Up (sending in red), Run (sending and receiving in red)

Table 41: Extended diagnosis > PNM_AP > PROFINET interface state

8.4.6 PROFINET switch diagnosis

PROFINET switch diagnosis	
Task states	
Name	Value
Received data port 1	92422270 Byte
Sent data port 1	92037674 Byte
Discarded receive data port 1	10 Packets
Discarded send data port 1	0 Packets
Receive errors port 1	0 Packets
Send errors port 1	0 Packets
Received data port 2	0 Byte
Sent data port 2	0 Byte
Discarded receive data port 2	0 Packets
Discarded send data port 2	1402 Packets
Receive errors port 2	0 Packets
Send errors port 2	0 Packets

Figure 106: Extended diagnosis > PNM_AP > PROFINET switch diagnosis

Name	Description
[Service]	Diagnosis counter. Indicates the services processed. (The services of the single packets are described in the API manual.)

Table 42: Extended diagnosis > PNM_AP > PROFINET switch diagnosis

8.4.7 System state

System state	
Task states	
Name	Value
Available RAM memory	6938292 Bytes
Used RAM memory	2957796 Bytes
CPU load	6 %

Figure 107: Extended diagnosis > PNM_AP > System state

The diagnostic system status shows the total available RAM memory and the currently used RAM in bytes as well as the CPU usage in %.

9 Tools

9.1 Overview tools

Under "Tools", the Packet monitor and the IO monitor are provided for test and diagnosis purposes.

- In the "Packet Monitor", data packets are used to communicate with the firmware and are exchanged between the application (configuration software) and the firmware in the device.
- The "I/O Monitor" offers an easy way to display data of the process image and to change the output data.

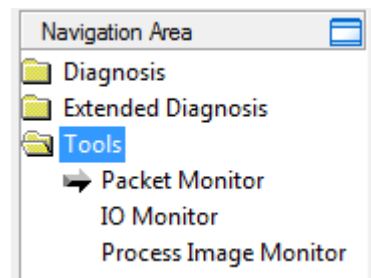


Figure 108: Navigation area - Tools (example)

Online connection to the device



Note:

Accessing the **Tools** dialog panes of the PROFINET IO-Controller DTM requires an online connection from the PROFINET IO-Controller DTM to the PROFINET IO-Controller device. For further information refer to section *Connecting/disconnecting device* [▶ page 107].

9.2 Packet monitor

The Packet monitor serves for test and diagnosis purposes.

Data packets, i. e. messages are self-contained blocks of defined data length. The packets are used to communicate with the firmware and they are exchanged between the application (configuration software) and the firmware in the device. Packets can be sent once or cyclically to the connected device controlled by the user and packets received can be displayed.

Data packets comprise from a **Packet header** and the **Send data** or from a **Packet header** and the **Receive data**. The packet header can be evaluated by the receiver of the packet and contain the sender and receiver address, the data length, an ID number, status and error messages and the command or response code. The minimum packet size amounts 40 Byte for the packet header. The sending and receiving data is added.



For further information to the packet description, refer to the Protocol API Manual.

➤ Open the **Packet monitor** via **Tools > Packet monitor**.

Figure 109: Packet monitor

Display mode switches the representation of the send and reception data between decimal and hexadecimal.

➤ Select **Reset counter** to reset the packet counter.

9.2.1 Sending packet

The screenshot shows a software interface for sending packets. It is divided into two main sections: 'Packet header' and 'Send data'.

Packet header: This section contains several input fields for configuring the packet's metadata:

- Dest:** 00000001 (dropdown menu)
- Src:** 00000000
- State:** 00000000
- Dest ID:** 00000000
- Cmd:** 00002F00
- Src ID:** 00000000
- Ext:** 00000000
- Len:** 00000012
- Rout:** 00000000
- ID:** 00000001
- Auto Increment ID:**

Send data: This section features a grid for entering data bytes. The columns are labeled 0 through 9, and the rows are labeled 0 through 60. A 'Counter: 0' is displayed above the grid. Below the grid are two buttons: 'Put cyclic' and 'Put packet'.

Figure 110: Send > Packet header and Send data

Packet header

Under **Send > Packet header** the elements of the packet header of the sending packet are displayed, which is transmitted from the application (configuration software) to the device. The packet header of the sending packets contain the elements described in the following table.

Element		Description
Dest	Destination Queue Handle	Contains the identifier of the receiver for the packet (<i>destination task queue</i> of the firmware).
Src	Source Queue Handle	Contains the identifier of the sender of the packet (sending task).
Dest ID	Destination Queue Reference	Contains an identifier for the receiver of unsolicited sent packets from the firmware to the application (configuration software).
Src ID	Source Queue Reference	Contains an identifier of the sender.
Len	Packet Data Length (in bytes)	Length of the send respectively receive data.
ID	Packet Identification As Unique Number	Identifies identical data packets among each other.
State	Status / Error Code	Transmits status or error codes to the packet sender.
Cmd	Command / Response Code	Command or respond code.
Ext	Extension	Field for extensions (reserved).
Rout	Routing Information	Internal value of the firmware.

Table 43: Descriptions Packet header

- Under **Dest** select the receiver (destination task queue).
- Under **Cmd** select the command identification (Request).

Auto Increment ID is an increment for the identifier of the data packets and increments the ID by 1 for each newly sent packet.

Send data

- Under **Send > Send data** enter the send data of the packet, which shall be transmitted from the application (configuration software) to the mailbox of the device. The meaning of the transmitted data depends on the command or response code.

Sending packets once or cyclic

- To send packet "once", select **Put packet**.
- To send packet "cyclic", select **Put cyclic**.

9.2.2 Receiving packet

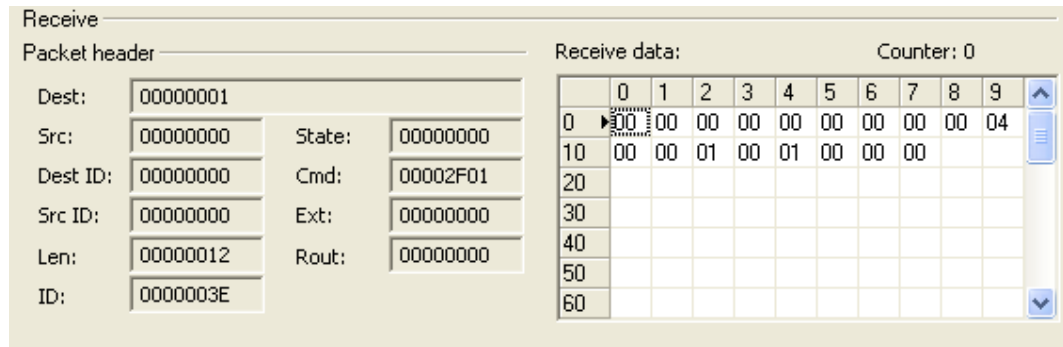


Figure 111: Packet header and Receive data

Packet header

Under **Receive > Packet header** the elements of the packet header of the receiving packet are displayed, which are transmitted back from the device to the application (configuration software). The packet header of the receiving packets contain the elements described in the following table.

Element	Description	
Dest	Destination Queue Handle	Contains the identifier of the receiver for the packet (<i>destination task queue</i> of the firmware).
Src	Source Queue Handle	Contains the identifier of the sender of the packet (sending task).
Dest ID	Destination Queue Reference	Contains an identifier for the receiver of unsolicited sent packets from the firmware to the application (configuration software).
Src ID	Source Queue Reference	Contains an identifier of the sender.
Len	Packet Data Length (in bytes)	Length of the send respectively receive data.
ID	Packet Identification As Unique Number	Identifies identical data packets among each other.
State	Status / Error Code	Transmits status or error codes to the packet sender.
Cmd	Command / Response Code	Command or respond code.
Ext	Extension	Field for extensions (reserved).
Rout	Routing Information	Internal value of the firmware.

Table 44: Descriptions Packet header

Receive data

Under **Receive > Receive data** the receiving data of the packet, which is transmitted back from the device to the application (configuration software) is displayed.

9.3 I/O monitor

The IO monitor serves for test and diagnosis purposes. It provides to view data of the process data image and to change output data easily. The display is always in a Byte manner.



Note:

Only change and write output data if you know that no plant disturbances are caused by this. All output data written by the IO monitor is transmitted at the bus and have effect on subordinate drives, IO etc.

The screenshot shows the IO Monitor interface with the following data:

	0	1	2	3	4	5	6	7	8	9
0	227	207	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0

Figure 112: IO monitor

Columns switches the number of columns.

Display mode switches the representation of the input and output data between decimal and hexadecimal.

Offset / Go moves the indication of the data to the entered offset value.

- Enter the output value and select **Update**.
- ⇒ The data of the process image are always displayed, even if these bytes are not reserved by the configuration.

9.4 Process image monitor

The **Process image monitor** pane lists the Devices connected to the controller, as well as the configured modules or input or output signals of the devices. This makes visible the fieldbus structure and the data structure of the device's input and output data transmitted at the bus. Furthermore, the values of the signal data provided to the OPC server are displayed here.

➤ Open **Tools > Process image monitor**.

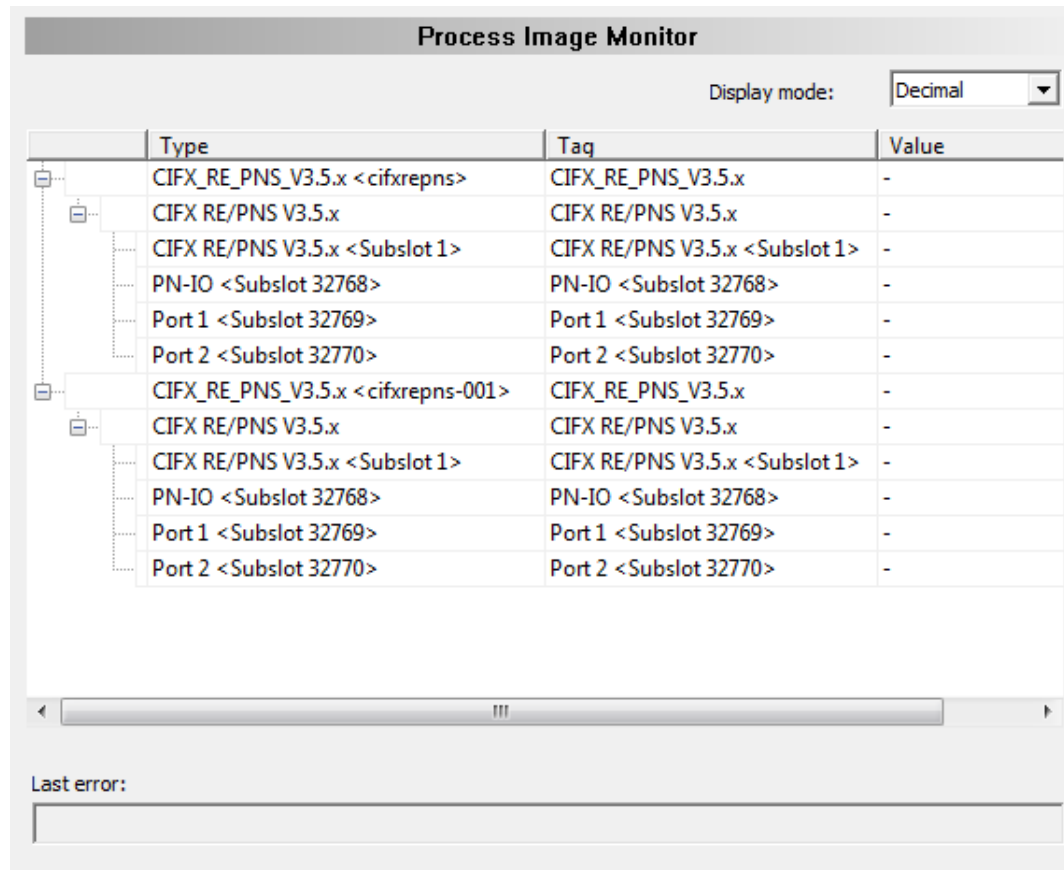


Figure 113: "Process image monitor" pane

Parameter	Description	Range of value/ value
Display mode	Display of the values in the column Value in decimal or hexadecimal mode.	Decimal (Default), Hexadecimal
	The tree shows the structure of the devices (1), modules (2) and the input data (3) and output data (4).	
	Display when the input and output data is not completely read and analyzed.	
	Display when the input and output data is not valid.	
	Display when the input and output data is valid.	
Type	Device labeling provided by the hardware: Also description of the modules or input or output signals configured to the device.	

Parameter	Description	Range of value/ value
TAG	Device name provided by the hardware (not changeable in the FDT container) or symbolic name for the modules configured to the device or for the input or output signals (changeable in the Configuration > Process data pane).	
Value	Display of the valid input and output data values.	
Last error	Last occurred error (Description see appropriate Application Programming Manual)	

Table 45: Notes to the "Process image monitor" pane

10 Appendix

10.1 References

- [1] FDT Joint Interest Group (www.fdt-jig.org, FDT-JIG Working Group): Device Type Manager (DTM) Style Guide, Version 1.0; FDT-JIG - Order No. <0001-0008-000>, English, 2005.
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- [4] Network Working Group, E. Beili: Standards Track, Request for Comments: 4836, Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs), (<http://tools.ietf.org/rfc/rfc4836.txt>), English, April 2007.
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- [6] Hilscher Gesellschaft für Systemautomation mbH: Operating instruction manual, SYCON.net, Frame application, Revision 14, DOC040402OI14EN, English, 2018-03.
- [7] Hilscher Gesellschaft für Systemautomation mbH: API, Hilscher status and error codes, Firmware and driver, Revision 5, DOC100802API05EN, English, 2019-11.

10.2 User rights

User-rights are set within the FDT-container. Depending on the level, the configuration is accessible by the user or read-only.

To access the **Settings**, **Configuration** and **Diagnosis** panes of the PROFINET IO-Controller DTM you do not need special user rights. Also all users can select the decimal or hexadecimal Display mode or sort table entries.



Note:

To edit, set or configure the parameters of the **Settings** and **Configuration** panes, you need user rights for "Maintenance", for "Planning Engineer" or for "Administrator".

The following tables give an overview of the user right groups and which user rights you need to configure the single parameters.

10.2.1 Settings

Settings		Observer	Operator	Maintenance	Planning engineer	Administrator
Driver	Verifying or adapting driver settings [▶ page 23]	D	D	X	X	X
	Configuring netX driver [▶ page 26]	D	D	X	X	X
Device Assignment	Scanning for devices [▶ page 32]	D	D	X	X	X
	Selecting the device (with or without firmware) [▶ page 35]	D	D	X	X	X
	Selecting the device once more (with firmware) [▶ page 35]	D	D	X	X	X
	Selecting and downloading firmware [▶ page 37]	D	D	X	X	X
Licensing	Licensing [▶ page 43]	D	D	X	X	X

Table 46: User rights settings (D = displaying, X = editing, configuring)

10.2.2 Configuration

Configuration parameters	Observer	Operator	Maintenance	Planning engineer	Administrator
Controller network settings [▶ page 71]	D	D	X	X	X
Device table [▶ page 74]	D	D	X	X	X
IP address table [▶ page 76]	D	D	X	X	X
Process data [▶ page 78]	D	D	X	X	X
Isochronous modules [▶ page 79]	D	D	X	X	X
Address table [▶ page 82]	D	D	X	X	X
FSU/port settings [▶ page 85]	D	D	X	X	X
Stations timing [▶ page 87]	D	D	X	X	X
Master settings	D	D	X	X	X

Table 47: User rights configuration (D = displaying, X = editing, configuring)

10.3 Name encoding

The name is an OctetString with 1 to 240 octets. A name can contain one or more labels separated by a dot [.].

The definition of the IETF RFC 5890 and the following syntax apply:

- 1 or more labels, separated by [.].
- The total length is 1 to 240.
- The label length is 1 to 63.
- Labels consist of [a-z0-9-].
- Labels do not start with [-].
- Labels do not end with [-].
- Labels do not use multiple concatenated [-] except IETF RFC 5890.
- The first label does not have the form "port-xyz" or "port-xyz-abcde" with a, b, c, d, e, X, y, z = 0...9 to avoid a false similarity to the AliasNameValue field.
- Name of Stations do not have the form a.b.c.d with a, b, c, d = 0...999.

10.4 Conventions in this document

Instructions

1. Operation purpose
2. Operation purpose
 - Instruction

Results

- ↻ Intermediate result
- ⇒ Final result

Signs




Sign	Note
	General note
	Important note that must be followed to prevent malfunctions.
	Reference to further information

Table 48: Signs

Signal words

Signal word	Description
DANGER	Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation, which if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation, which if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a property damage message.

Table 49: Signal words

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Glossary

CODESYS	COntroller DEvelopment SYStem: Development environment for programming controller applications (PLC) according to the international industrial standard IEC 61131-3
Controller	Type of device that initiates and controls the communication on the bus
Data packet	Data packets, i. e. messages are self-contained blocks of defined data length. The packets are used to communicate with the firmware and they are exchanged between the application (configuration software) and the firmware in the device.
DCP	Discovery and basic configuration protocol: Protocol for identifying and configuring devices, which is defined within the PROFINET specification
Device	Type of device that is configured by the controller and which then performs the communication
DNS	Domain Name System: hierarchical distributed naming system for computers, services, or any resource connected to the Internet or a private network
DTM	Device Type Manager: Software module with graphical user interface for the configuration and/or for diagnosis of devices
Ethernet	Network technology used both for office and industrial communication via electrical or optical connections. It has been developed and specified by the Intel, DEC and XEROX, provides data transmission with collision control and allows various protocols. As Ethernet is not necessarily capable for real-time application, various real-time extensions have been developed (industrial Ethernet, real-time Ethernet).
FDT	Field Device Tool: FDT specifies an interface, in order to be able to use DTM (Device Type Manager) in different applications of different manufacturers
Gateway address	IP address of a gateway
GSDML file	A special kind of XML-based Device Description File used by PROFINET. (GSDML = General Station Description Markup Language).
IP	Internet Protocol: Belongs to the TCP/IP family of protocols and is defined in RFC791 (available on http://www.ietf.org/rfc/rfc791.txt). It is based on layer 3 of the ISO/OSI 7 layer model of networking and is a connectionless protocol, i. e. you do not need to open a connection to a computer before sending an IP data packet to it. Therefore, IP is not able to guarantee that the IP data packets really arrive at the recipient. On IP level, neither the correctness of data nor the consistence and completeness are checked. IP defines special addressing mechanisms; see IP address.

IP address	Identifies a device or a computer within an IP-based network and is defined in the Internet Protocol Version 4 (IPv4) as a 32-bit number. For ease of notation, the address is usually divided into four 8-bit numbers represented in decimal notation and separated by points: a.b.c.d. Each letter stands for an integer value between 0 and 255, e.g. 192.168.30.16. However, not all combinations are allowed, some are reserved for special purposes. The IP address 0.0.0.0 is defined as invalid.
IRT	Isochronous Real-Time: The application uses a time control unit for the synchronized setting of the output data or for the capturing of the input data.
MAC-ID	Media Access Control-ID: unique (physical) Ethernet address of the device on delivery, defined as 48 bit number; for ease of notation it is divided into six 8 bit numbers which are represented in hexadecimal notation and separated by "minus"-signs (-): A-B-C-D-E-F (A-B-C-D-E-F each are integer values between 0 and 0XFF=255), Example:00-02-A2-20-91-18
MAU	Medium Access Unit: Transmitting and receiving device for signals (for feeding signals into and extracting them from the media). On the side of the network medium (cable), the device is the interface for connecting network stations.
Module	Hardware or logical component of a physical device
Name of station	Network name of a PROFINET Device or Controller, set in the Controller application. The name must comply to the PROFINET specification and must be unique across the communication network.
Network mask	Bit mask for separation between network part and device part in IP addresses in the network protocol IPv4. The network part must be the identical for all devices of the corresponding network, while the device part is different. This is used to specify whether the device searches for a given IP address in its own network (device part) or can reach the IP address in other networks via router (network part). See also https://en.wikipedia.org/wiki/IPv4_subnetting_reference Example: 255.255.255.0 (network part 255 255 255, device part 0)
netX	networX on chip, Hilscher network communication controller. High integrated network controller with optimized system architecture for communication and maximum data transfer.
ODMV3	Online-Data-Manager Version 3: Application interface, respectively works as a server, which can be run as an out-proc server or system service. Its task is to provide different applications (e. g. SYCON.net), access to multiple devices and even share one device amongst several applications.
PROFINET	Communication system for Industrial Ethernet, designed and developed by PROFIBUS & PROFINET International (PI), which uses some mechanisms similar to those of the PROFIBUS field bus
PROFINET IO	PROFINET IO (Input - Output) has been created for the connection of remote peripheral to a controller

PROFINET IO-Controller	PROFINET control unit responsible for the defined run-up of an I/O subsystem and the cyclic or acyclic data exchange
PROFINET IO-Device	PROFINET field device that cyclically receives output data from its IO-Controller and responds with its input data
PROFINET IRT	PROFINET protocol level for PROFINET IO applications in drive systems with cycles times of less than 1 ms; IRT = Isochronous real-time
RPC	Remote Procedure Call: Mechanism to call a code on another computer in the network (standard used by PROFINET)
RT	Real-Time: PROFINET protocol level for PROFINET CBA and PROFINET IO applications up to 10 ms cycle times
SCADA	Supervisory Control and Data Acquisition: A concept for the control and data acquisition of technical processes
Submodule	Hardware or logical component of a physical device.
SYCON.net	Multiprotocol-capable Hilscher configuration and diagnosis software (FDT frame application), that can be used to configure communication-capable fieldbus devices of different manufacturers in one project
TCP/IP	Transport Control Protocol/Internet Protocol connection-orientated, secure transfer protocol as basis for the Internet-protocols
USB	Universal Serial Bus
XML	Extended Markup Language: symbolic language for structuring data systematically which is maintained as a standard by the W3C (World-wide web consortium). Device Description Files often use XML-based formats for storing the device-related data appropriately.

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