



Operating instruction manual
DTM for Hilscher PROFINET IO-Controller
devices
Configuration of Hilscher controller devices
V1.1100

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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.



Refer to the operator manual, "netDevice and netProject", how to create a network configuration, or in the user manual for the generic DTM, for PROFINET IO-Devices, how to configure the PROFINET IO-Device.

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
18	2022-04-25	1.1100	PNIOControllerDTM.dll, PNIOControllerGUI.ocx	Document revised. Chapter Error codes removed. See API Manual "Hilscher status and error codes" instead.
19	2022-06-13	1.1100	PNIOControllerDTM.dll, PNIOControllerGUI.ocx	Corrections.

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 17] <i>Create project configuration</i> [▶ page 21] <i>Start/stop communication</i> [▶ page 23]
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>Overview settings for driver and device assignment</i> [▶ page 24] <i>Verifying or adapting driver settings</i> [▶ page 27] <i>Configuring drivers</i> [▶ page 29] <i>Assigning device (with or without firmware)</i> [▶ page 37] <i>Selecting and downloading firmware</i> [▶ page 42]
Configuring Ethernet devices	(device name and IP address)	<i>Ethernet Devices</i> [▶ page 49]
Licensing	(licenses for master protocols)	<i>Licensing</i> [▶ page 62]
Configuring device parameters	<ul style="list-style-type: none"> • Controller network settings • Device table • IP address table • Set process data • Set device address • FSU/Port settings • Station timing • Controller settings 	<i>Overview configuring device parameters</i> [▶ page 74] <i>Controller network settings</i> [▶ page 78] <i>Device table</i> [▶ page 79] <i>IP address table</i> [▶ page 81] <i>Process data</i> [▶ page 83] <i>Address table</i> [▶ page 84] <i>FSU/port settings</i> [▶ page 86] <i>Stations timing</i> [▶ page 88] <i>Master settings</i>
Connecting/disconnecting device	Establishing online connection	<i>Connecting/disconnecting device</i> [▶ page 93]
Downloading configuration	Download to the device	<i>Download configuration</i> [▶ page 95]
Importing network structure and upload	Identifying network configuration automatically.	<i>Network scan and upload</i> [▶ page 97]
Diagnosis	<ul style="list-style-type: none"> • General diagnosis • Master diagnosis • Station diagnosis • Firmware diagnosis 	<i>Overview diagnosis</i> [▶ page 111] <i>General diagnosis</i> [▶ page 112] <i>Master diagnosis</i> [▶ page 114] <i>Station diagnosis</i> [▶ page 115] <i>Firmware diagnosis</i> [▶ page 116]
Extended diagnosis	Finding communication/configuration errors.	<i>Overview extended diagnosis</i> [▶ page 117]
Packet Monitor	Test of send and receive data.	<i>Packet monitor</i> [▶ page 134]
IO Monitor	Test of communication.	<i>I/O monitor</i> [▶ page 137]
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 138]
User rights	Definition of access rights	<i>User rights</i> [▶ page 141]

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)
- Administrator privilege required for installation
- Internet Explorer 5.5 or higher
- RAM: min. 512 MByte, recommended 1024 MByte
- Graphic resolution: min. 1024 x 768 pixel
- 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 cifX configuration file,
- Installed FDT/DTM V 1.2 compliant frame application,
- Loaded DTM in the Device Catalog of the FDT Framework.



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 composed of different areas and elements listed hereafter:

1. A header area containing the **General device information**,
2. the **Navigation area** (area on the left side),
3. The **Dialog pane** (main area on the right side),
4. **OK, Cancel, Apply, Help**,
5. The **Status line** containing information e. g. the online-state of the DTM.

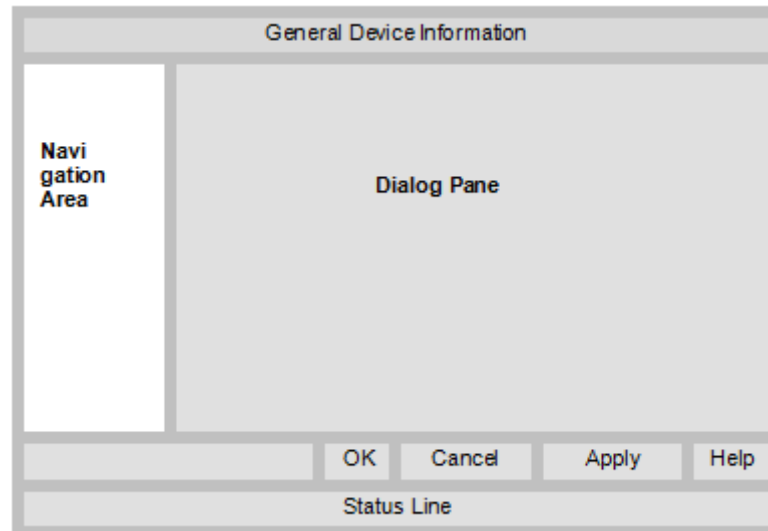


Figure 1: Dialog structure PROFINET IO-Controller DTM

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.

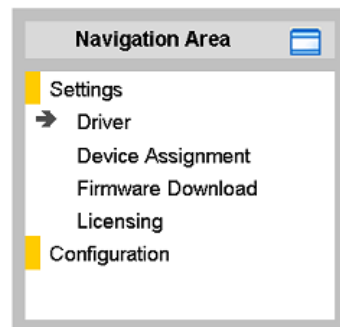



Figure 2: Navigation area

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

1.6.3 Dialog panes

At the dialog pane the Settings, Configuration, Diagnosis/Extended Diagnosis or the Tools panes are opened via the corresponding folder in the navigation area.

1.6.4 OK, Cancel, Apply, Help,

In the configuration software SYCON.net 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

The status bar displays information about the current state of the DTM. The current activity, e.g. download, is signaled graphically via icons in the status bar.

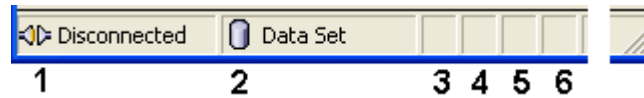
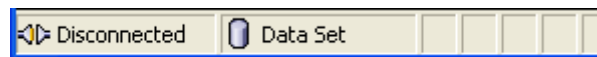


Figure 3: Status bar – status fields 1 to 6

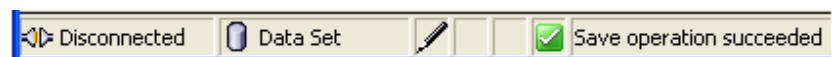
Status field	Icon / description	
1	DTM connection states	
		Connected: Icon closed = Device is online
		Disconnected: Icon opened = Device is offline
2	Data source states	
		Data set: The displayed data is read out from the instance data set (database).
		Device: The displayed data is read out from the device.
3	States of the instance data 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]

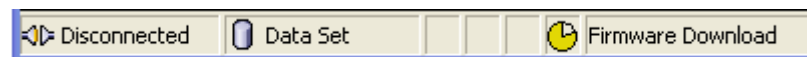
Offline state



Save operation succeeded



Firmware download



Firmware download successful



Online state and diagnosis

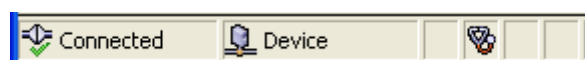


Table 6: Status bar display examples

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 configuration during bus operation, the communication between master and slaves stops.

Possible faulty system operation

- An unpredictable and unexpected behavior of machines and plant components may cause personal injury and property damage.
 - 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

- 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 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.

2.6 Safety messages on firmware or configuration download

If you perform a firmware download or a configuration download via the PROFINET IO-Controller DTM, adhere to the following warnings:

WARNING

Communication stop caused by firmware or configuration download

Initiating a firmware or configuration download process during bus operation will stop the communication and a subsequent plant stop may cause unpredictable and unexpected behavior of machines and plant components, possibly resulting in personal injury and damage to your equipment.

The firmware download overwrites the existing firmware. The communication stop may cause loss of device parameters and the device may be damaged.

- Stop the application program, before you start the firmware or configuration download.
 - Make sure that all network devices are in a fail-safe condition.
-

WARNING

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.
-

NOTICE

Power disconnect while downloading firmware or configuration

If the power supply to the PC or device is interrupted while the firmware or configuration is being downloaded, the download will be aborted, the firmware may be corrupted, the device parameters may be lost, and the device may be damaged.

- 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 to the device!
-

NOTICE

Invalid firmware

Loading invalid firmware files could render your device unusable.


- Only proceed with a firmware version valid for your device.
-

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 21], or Operating instruction manual "SYCON.net" and Operating instruction manual "netDevice and netProject"
Load device catalog	- Select Network > Device catalog , - Reload catalog.	
Create new project / Open existing project	- Select File > New or File > Open.	
Insert the controller device and the Device and 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> Important! 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 window. When sorting by fieldbus, display of multiple devices with identical names by different vendors is possible.	
Open controller DTM configuration dialog	Open the controller DTM configuration dialog. - Double click to the device icon of the controller. - The controller DTM configuration dialog is displayed.	-
Verify or adapt driver settings	In the controller DTM configuration dialog: - 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>Overview settings for driver and device assignment</i> [► page 24] or <i>Verifying or adapting driver settings</i> [► page 27]

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. 	<i>Configuring netX driver</i> [► page 30]
Assign controller device (with or without firmware)	<p>Assign the controller device to this driver.</p> <p>In the controller DTM configuration dialog:</p> <ul style="list-style-type: none"> - Select Settings > Device assignment, - select a controller device (with or without firmware), - therefore check the appropriate checkbox. - Click Apply. 	<i>Assigning device (with or without firmware)</i> [► page 37]
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. <p>In the controller DTM configuration dialog:</p> <ul style="list-style-type: none"> - Select Settings > Firmware download, - click Browse.., - select a firmware file, - click Open. - Click Download and Yes. 	<p><i>Safety messages on firmware or configuration download</i> [► page 16]</p> <p><i>Selecting and downloading firmware</i> [► page 42]</p>
Assign controller device once more (with firmware and system channel) <i>For repeated download this step is omitted.</i>	<p>In the controller DTM configuration dialog:</p> <ul style="list-style-type: none"> - Select Settings > Device assignment, - click Scan, - select the controller device (with loaded and defined system channel), - therefore check the appropriate checkbox. - Click Apply. - Close the controller DTM configuration dialog via OK. 	<i>Selecting the device once more (with firmware)</i> [► page 40]
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. 	<i>Section Ethernet Devices</i> [► page 49]

Step	Brief description	Further information
Configure Device* (*This step will not be necessary if the network structure is scanned automatically.)	Configure the Device. - Double click to the device icon of the Device. - The Device DTM configuration dialog is displayed. In the Device DTM configuration dialog: - Select Configuration > Modules , - configure the modules of the Device, - select configuration > Device settings , - set the Device settings . - Close the DTM device configuration dialog via OK .	Operating instruction manual "Generic DTM for PROFINET IO-Devices"
Configure controller device For Device: Set Name of Station and IP settings.	Configure the controller device. - Double click to the device icon of the controller. - The controller DTM configuration dialog is displayed. In the controller DTM configuration dialog: - Select Configuration > Controller network settings , - set the name of station for the controller, - make the IP settings for the controller, - select Configuration > Device table , - select the PROFINET IO-Device required. - Enter the name of station of the PROFINET IO-Device, - select Configuration > IP address table , - enter the IP settings of the PROFINET IO-Device, - select Configuration > Process data , - set symbolic names for the configured modules or signals, - select Configuration > Address table , - activate or deactivate auto addressing, - for manual addressing: enter the addresses, - select Configuration > FSU/port settings , chose the FSU/port settings. Therefore, check FSU for the appropriate device(s) and for each port set the MAU-Type. - Select Configuration > Stations timing , - select the appropriate station, - make the station global settings for the PROFINET IO-Device stations, - select Configuration > Controller settings , - set the Controller settings (including the Port Settings for the controller device and IOPS interface configuration). - Close the controller DTM configuration dialog via OK .	Sections <i>Overview configuring device parameters</i> [► page 74] <i>Controller network settings</i> [► page 78] <i>Device table</i> [► page 79] <i>IP address table</i> [► page 81] <i>Process data</i> [► page 83] <i>Address table</i> [► page 84] <i>FSU/port settings</i> [► page 86] <i>Stations timing</i> [► page 88] <i>Controller settings</i> [► page 89]
Save project	- Select File > Save .	Operating instruction manual "SYCON.net"
Connect controller device	- Right click to the device icon of the controller, - select Connect .	Section <i>Connecting/disconnecting device</i> [► page 93]
Download configuration	- 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>Safety messages on firmware or configuration download</i> [► page 16] or <i>Download configuration</i> [► page 95]
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: 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 97]

Step	Brief description	Further information
Diagnosis	<ul style="list-style-type: none"> - Right click to the device icon of the master. - Select Diagnosis. - The master DTM diagnosis dialog is displayed. (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 master DTM diagnosis dialog via OK. 	<p>Section <i>Diagnosis</i> [► page 111]</p> <p>Section <i>Extended diagnosis</i> [► page 117]</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 I/O monitor dialog via OK. 	Section <i>I/O monitor</i> [► page 137]
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 93]

Table 7: Getting started – Configuration steps

3.2 Create project configuration

1. Complete the slave device in the device catalog.
 - Open configuration software SYCON.net.
 - Add the slaves in the device catalog by importing the device description file.
 - Select **Network > Import device descriptions**.
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 master or slave device in configuration.
 - In the device catalog click to the master device and insert the device via drag and drop **to the line** in the network view.
 - In the Device Catalog click to the slave device* and 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.*



Important:

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 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 97].

3.4 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-Device DTM to the PROFINET IO-Device is required. Further information can be found in the section *Connecting/disconnecting device* [▶ page 93].

- 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 box **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.

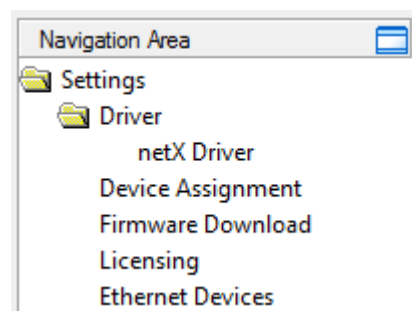


Figure 4: Navigation area - Settings (example)

There may be more drivers.



Note:

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

Overview on steps

To establish a connection between the PROFINET IO-Controller DTM and the PROFINET IO-Controller device, the following steps are required:

1. Verifying or adapting driver settings
 - In the FDT container, **netDevice** double-click on the PROFINET IO-Controller icon.
 - The DTM configuration dialog opens.
 - Check whether the default driver is checked and if necessary, tick another or several drivers.
 - 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.

- 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 one or more drivers at the same time.

- Check if the default driver for your device is checked.
- Respectively check another driver or multiple drivers.

2. Configuring drivers

- If you use the **netX driver**, you respectively must configure it.

**Note:**

The **cifX device driver** requires no configuration.

The configuration of the **3Sgateway driver for netX (V3.x)** is carried out via the CODESYS surface.

- Go to **Settings > Driver > netX driver** to open the driver dialog box for the **netX driver** and if necessary, press **F1**, so that the separate help for the **netX driver** appears.
- For **netX Driver** and communication via TCP/IP set the IP address of the device.

Adjust the driver parameters **netX driver USB/RS232** only if they differ from the default settings.

3. Assigning the controller device to the DTM

- First, you scan for the device (with or without firmware) and select the device.
- Select **Settings > Device assignment**.
- Under **Device selection**, select *suitable only* or *all* and click **Scan**.
- In the table, check the required devices.
- Select **Apply**.

4. Selecting and downloading the firmware

- If not yet a firmware was loaded to the device, select and download the firmware.
- Select **Settings > Firmware download**.
- Select and download the firmware via **Download**.
- Click **Apply**.
- Scan for and select the devices (with firmware and defined system channel) once more. *For repeated download this step is omitted.*
- Select **Settings > Device assignment**.
- Select **Scan**.
- In the table, check the required device.
- Close the DTM configuration dialog via **OK**.

5. Connecting the device

- In **netDevice** put a right-click on the PROFINET IO-Controller icon.
- Select the **Connect** command from the context menu.
- ⇒ In the network view, the device description at the device icon of the controller is displayed with a green colored background. The PROFINET IO-Controller device now is connected to the PROFINET IO-Controller DTM via an online connection.

For more information on the required settings, see sections *Verifying or adapting driver settings* [▶ page 27], *Assigning device (with or without firmware)* [▶ page 37], *Selecting and downloading firmware* [▶ page 42] or *Licensing* [▶ page 48].



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.
-

4.2 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 box 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-109B6A68EA91}
<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/IP connector” for the Ethernet connection.

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)	checked: The cifX driver can communicate via the USB/RS232 interface. unchecked: The cifX driver cannot communicate via the USB/RS232 interface. If the check mark for Enable USB/RS232 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 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	checked: No connection. unchecked: The cifX driver tries to establish a connection using the configured USB/RS232 interface.	checked, unchecked (Default)
Baud rate	Transfer rate: Number of bits per second. The device must support the baud rate.	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

Parameter	Description	Range of value / value
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**.

The screenshot shows the 'netX Driver' configuration window with the 'TCP Connection' tab selected. The 'Enable TCP Connector (Restart of ODM required)' checkbox is checked. Below it, the 'Select IP Range' dropdown is set to 'IP_RANGED', accompanied by '+' and '-' icons. The 'Scan Timeout' is set to 100 ms. The 'IP Range Configuration' section contains a 'Disable IP Range' checkbox (unchecked), a 'Use IP Range' checkbox (unchecked), and fields for 'IP Address' (192.168.1.1), 'TCP Port' (50111), and 'Address Count' (1). At the bottom of this section, 'Send Timeout' is 1000 ms, 'Reset Timeout' is 20000 ms, and 'Keep Alive Timeout' is 2000 ms. The bottom of the window has 'Restore', 'Save', and 'Save All' buttons.

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 93].

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.

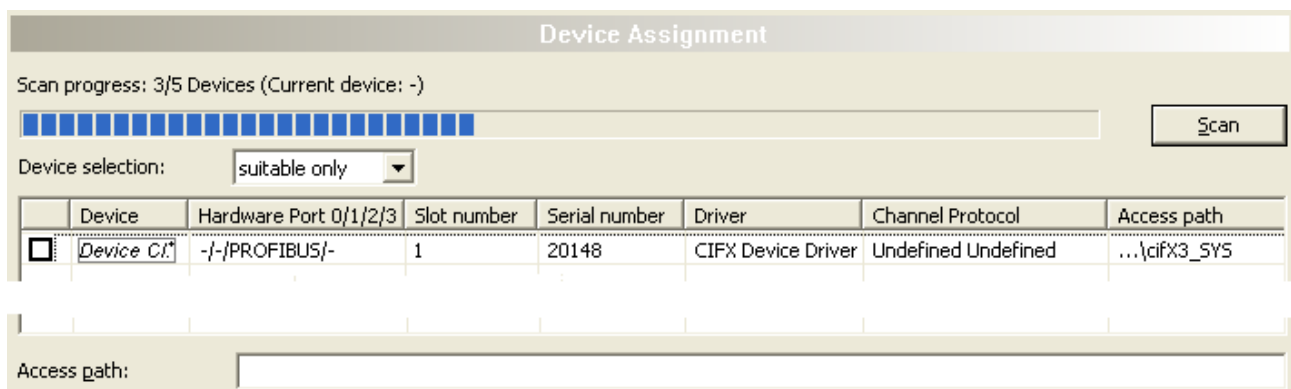


Figure 10: Device Assignment - detected devices (example: device without firmware)



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 n/a means, that no Slot nummer (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: ... \cifX[0toN]_SYS, b.) For devices with firmware: ... \cifX[0toN]_Ch[0to3]. cifX[0toN] = Board number 0 to N Ch[0to3] = 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: ... \cifX[0toN]_SYS, b.) For devices with firmware: ... \cifX[0toN]_Ch[0to3]. cifX[0toN] = Board number 0 to N Ch[0to3] = 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**.

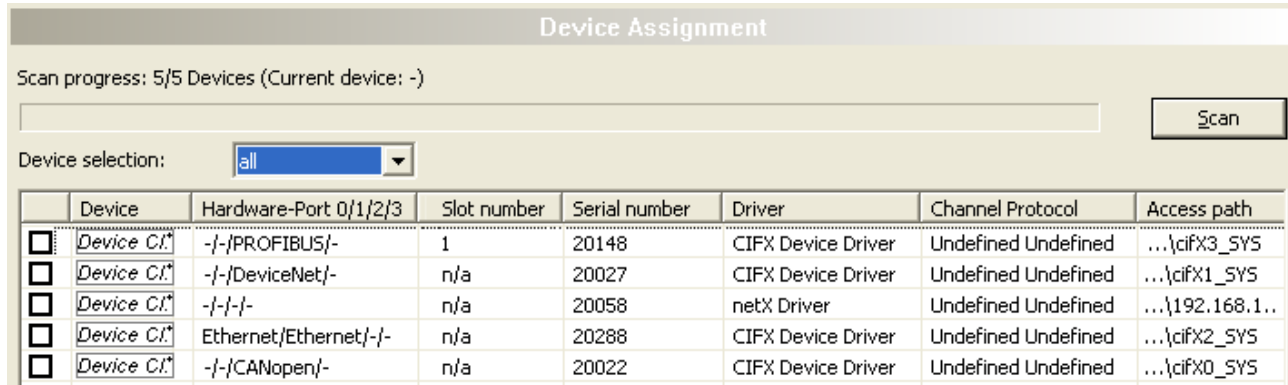


Figure 11: Device Assignment - detected devices (example: device without firmware)

- 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 Assignment

Scan progress: 5/5 Devices (Current device: -)

Device selection: suitable only Scan

	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

Access path: {368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}{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 42] or to section *Selecting the device once more (with firmware)* [▶ page 40].

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).

Device Assignment

Scan progress: 5/5 Devices (Current device: -)

Device selection: all Scan

	Device	Hardware-Port 0/1/2/3	Slot number	Serial number	Driver	Channel Protocol	Access path
<input checked="" type="checkbox"/>	Device Cl.*	-/-/PROFIBUS/-	1	20148	CIFX Device Driver	PROFIBUS-DP Master	...\cifX3_Ch0
<input type="checkbox"/>	Device Cl.*	-/-/DeviceNet/-	n/a	20027	CIFX Device Driver	DeviceNet Master	...\cifX1_Ch0
<input type="checkbox"/>	Device Cl.*	-/-/-/-	n/a	20058	netX Driver	Undefined Undefined	...\192.168....
<input type="checkbox"/>	Device Cl.*	Ethernet/Ethernet/-/-	n/a	20288	CIFX Device Driver	PROFINET IO Device	...\cifX2_Ch0
<input type="checkbox"/>	Device Cl.*	-/-/CANopen/-	n/a	20022	CIFX Device Driver	Undefined Undefined	...\cifX0_SYS

Access path: {368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}\cifX3_Ch0

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 93].

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 section *Overview settings for driver and device assignment* [► page 24].

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.

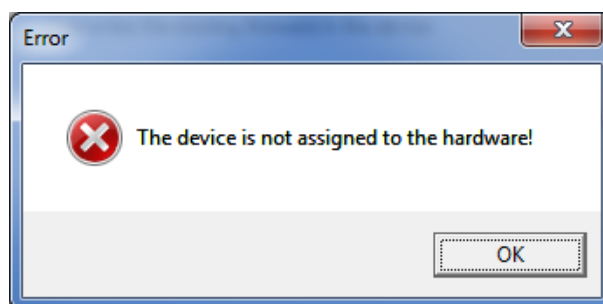


Figure 15: Error Message "The device is not assigned to the hardware!"

- Click **OK** and select and assign the master device as described in section *Assigning device (with or without firmware)* [▶ page 37].
- 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**.

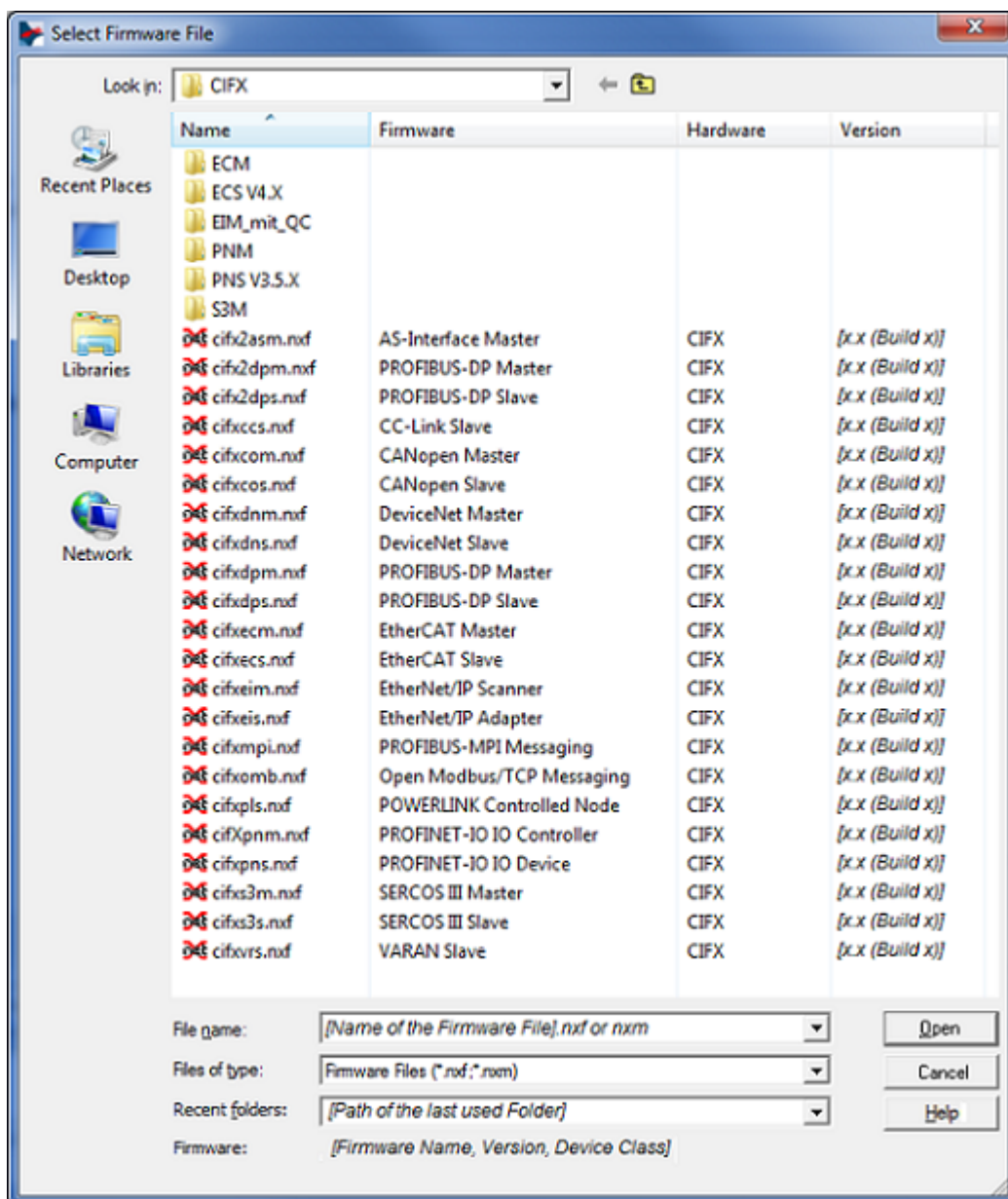


Figure 16: "Select firmware file" selection window (example CIFX)

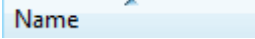
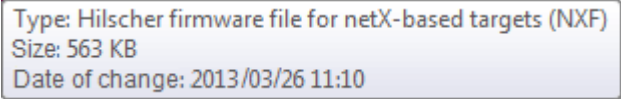
Parameter	Description	Range of value / value
Column Name	File name of the firmware file To sort the entries of the window Select firmware file by name click to the column head  .	nxf, nxm
Column Firmware	Name of the firmware (consisting of the protocol name and the protocol class)	
Column Hardware	Device 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)"

(for the list box entry ->)	all	suitable only
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.

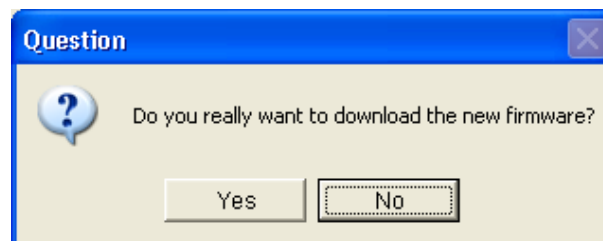


Figure 18: Request - Do you really want to download the firmware?

- 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.

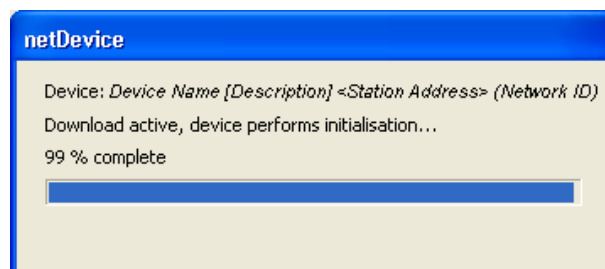


Figure 19: Firmware download - progress bar

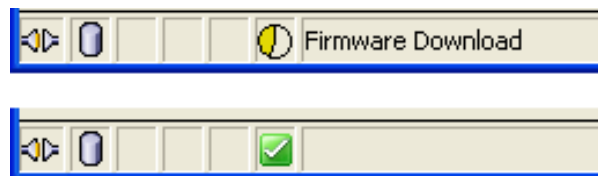


Figure 20: Clock symbol and hook symbol green

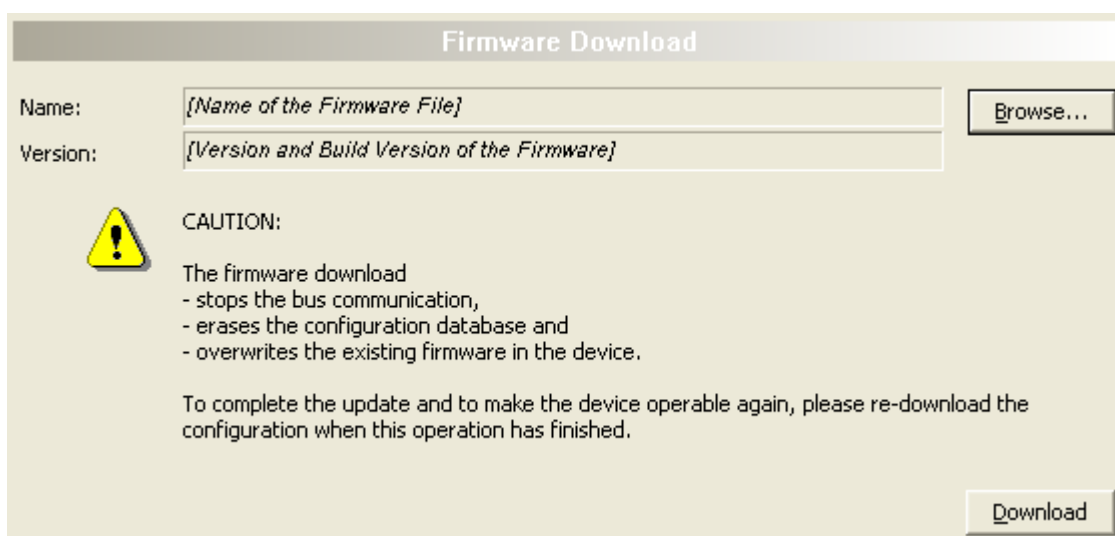


Figure 21: Firmware download - download

4.6 Licensing

To open the Licensing pane:

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

Licensing

License Type

	Existing	Order
Master protocols		
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

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.

Hilscher Germany

E-mail... license@hilscher.com

Print Fax Form... +49 6190 9907-50

Telephone... +49 6190 9907-0

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 62].

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 79] and the section *IP address table* [▶ page 81]

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**.

The screenshot shows the 'Ethernet Devices' dialog box. It has a title bar 'Ethernet Devices'. Below the title bar, there is a section 'Use Network Connections for Scan:' with a red circle 'A' around it. This section contains a table with columns 'Device' and 'Port'. The table lists three devices: 'Broadcom NetXtreme Gigabit Ethernet Driver (Micro...', 'VMware Virtual Ethernet Adapter', and 'VMware Virtual Ethernet Adapter'. Below this table is a 'Devices Online' section with a 'Find:' input field and 'next' and 'previous' buttons. A red circle 'B' is around the 'Devices Online' table, which has columns: 'MAC Address', 'Device Type', 'Device Name', 'IP Address', 'Protocol', 'Device ID', 'Vendor ID', and 'Device role'. The table is currently empty. Below the table is a 'Search Devices' button. At the bottom, there is a section 'Use Configuration of:' with a dropdown menu showing 'nxio50repps-00, Index: 1'. Below this is a tabbed interface with tabs 'Set Name', 'Set IP Address', and 'Other Functions'. The 'Set Name' tab is selected, and it contains a 'Device name:' input field, a 'New device name:' input field, and a 'Set Name' button. A red circle 'C' is around the 'Set Name' button. There is also a 'temporary' checkbox at the bottom left.

Figure 23: Ethernet Devices pane (The figure shows example devices.)

In the window **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.

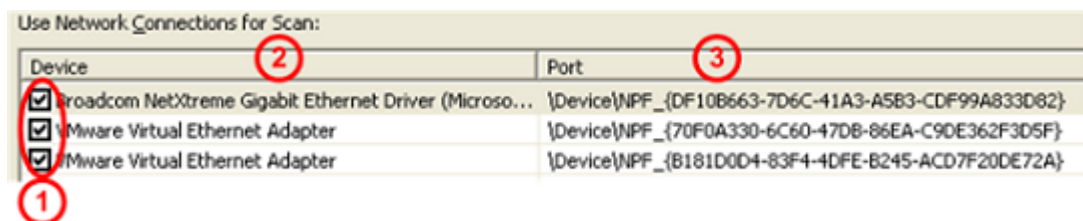


Figure 24: Ethernet Devices pane - Selection of the Ethernet connection (The figure shows example devices.)

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 (the figure shows example devices)

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

Name	Position in figure	Description	Value/range of values
MAC addresse	(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 window. 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 addresse	(7)	The IP address of the device can be set in the Ethernet Device window. 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.

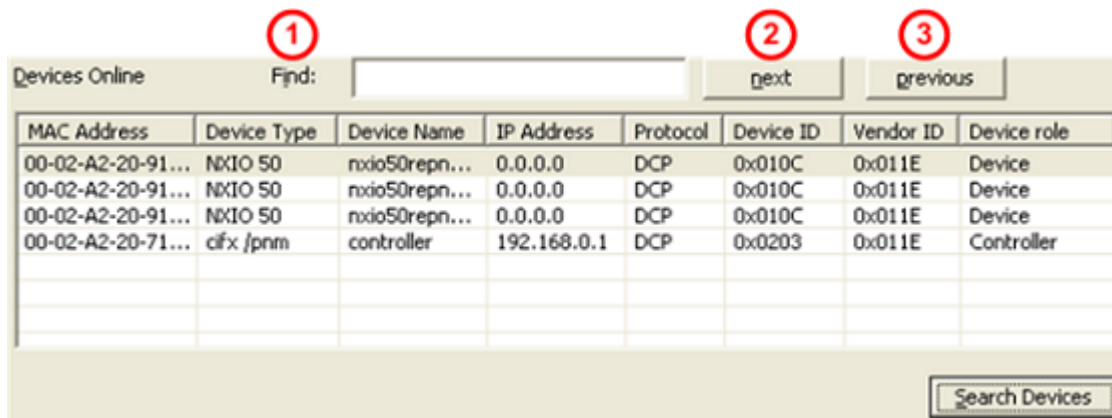


Figure 26: Ethernet Devices pane - Search device in the table (the figure shows example devices)

- 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**.

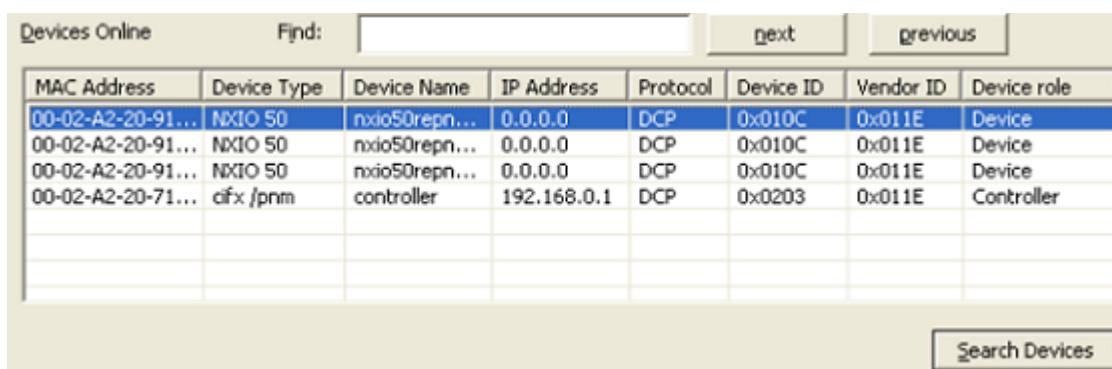


Figure 27: Ethernet Devices pane - Selecting device (the figure shows example devices)

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:

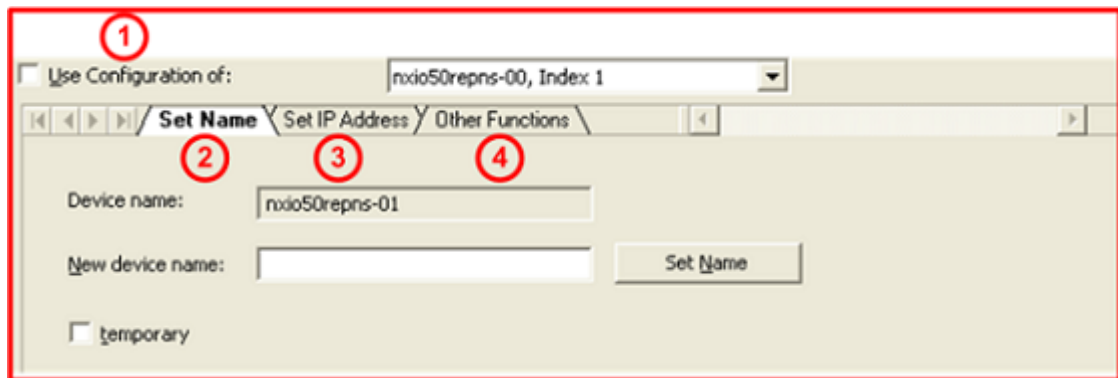


Figure 28: Ethernet Devices pane - Overview on configuration (the figure shows example devices)

- 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 (the figure shows example devices)

- 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.

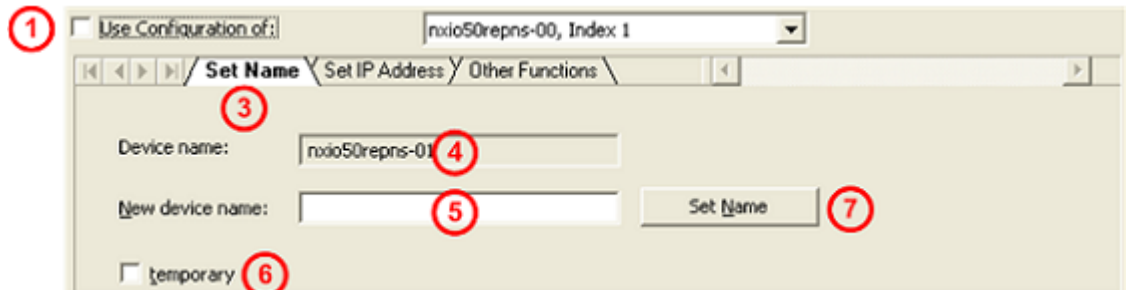
How to proceed

Figure 30: Ethernet Devices pane - Setting new Device Name (The figure shows example devices.)

- 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 and spaces.

Source [3] (see section *References* [► page 140]): *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

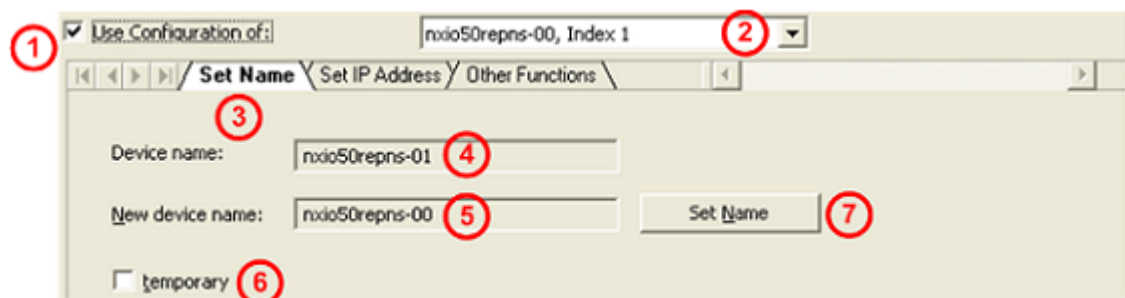


Figure 31: Ethernet Devices pane - Use name of station (The figure shows example devices.)

- 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 window (the figure shown shows sample devices).

- 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 (the figure shows example devices)

- 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	IP Address:	192 . 168 . 0 . 2 (5)
(9) Current Subnet mask:	255 . 255 . 255 . 0	Subnet mask:	255 . 255 . 255 . 0 (6)
(10) Current Gateway:	0 . 0 . 0 . 0	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 (The figure shows example devices.)

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 24].

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),

License Type

	Existing	Order
Master protocols		
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

Name	Value
License type	User Single Device License
Manufacturer*	0x0001
Article number*	1251100
Serial number*	20007
Chiptype*	0x00000001
Step*	0x00000000
Romcode revision*	0x00000000

Fields marked with "*" are mandatory.

4: [Dropdown menu]

5: E-mail...

6: Print Fax Form...

7: Telephone...

8: Export License Request...

9: [Text field]

10: [Text field]

11: [Text field]

12: Download License

Close Help

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 62].

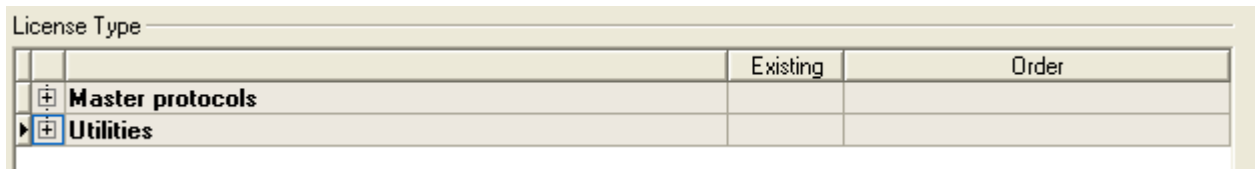


Figure 39: License pane - License Type

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

	Existing	Order
Master protocols		
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"/>

Figure 40: License pane – License Type / Master protocols

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

	Existing	Order
Master protocols		
Utilities		
OPC Server	NO	<input type="checkbox"/>
SYCON.net	NO	<input type="checkbox"/>
QVis Minimum Size	NO	<input type="checkbox"/>
QVis Standard Size	NO	<input type="checkbox"/>
QVis Maximum Size	NO	<input type="checkbox"/>
CoDeSys Minimum Size	NO	<input type="checkbox"/>

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 62].
2. Select the required licenses.
 - Refer to Section *Selecting license(s)* [▶ page 66].
3. Enter the ordering data.
 - Refer to Section *Ordering data* [▶ page 67].
4. Place your order.
 - Refer to Section *Ordering the license* [▶ page 69].

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 68]).

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.

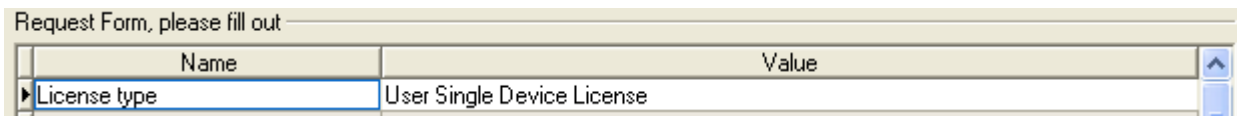
Figure 42: License pane - request form, please fill out / device information

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:

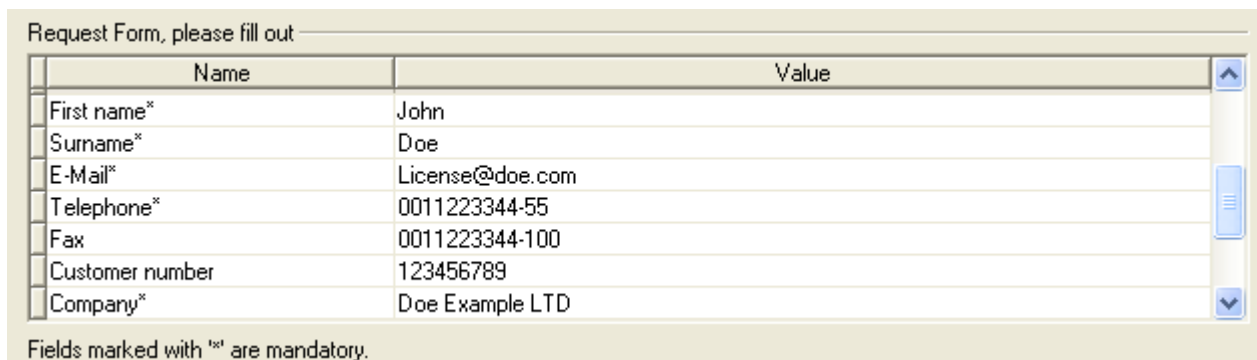
- License type (User Single Device License).



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:

The screenshot shows an email client interface. The 'To' field is set to 'SMTP:license@DoeExample.com <license@DoeExample.com>' (a). The 'Subject' is 'License request'. The 'Append...' field shows an XML file 'EmailOrderRequest_1251100_20007.xml' (b). The email body contains the following text:

```

=====
netX License Order
=====

Company: Doe Example LTD

Address: 2000th Rd U. S. NY 11417 (c)
Fax: +49 0011223344-100

Licensee Information (d)
-----
First Name: John
Surname: Doe
e-Mail: License@doe.com
Telephone: 0011223344-55
Fax: 0011223344-100
Customer Number: 123456789
Company: Doe Example LTD
Address: 2000th Rd
Country: U. S.
City Zip: NY 11417
Order Number: 987654321
Tax Ident. Number: test

License Type (e)
-----
User Single Device License

Device Information (f)
-----
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 (g)
-----

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

Utilities:
> SYCON.net
  
```

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_[Devicenumbrer]_[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 63]).
- ⇒ 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 64].

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 window shows all PROFINET IO-Devices that are available in the PROFINET IO-Controller configuration.
- The **IP address table** dialog box displays the name of station and the IP settings for PROFINET IO-Devices connected to the PROFINET IO-Controller.
- The dialog window **Process data** serves as an external process data interface for the PROFINET IO-Controller DTM.
- The **Address table** shows a list of all addresses used in the process image memory.
- The **FSU/port settings** dialog window 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 box shows the timing of the station.
- At the **Controller settings** pane, device related settings can be made.

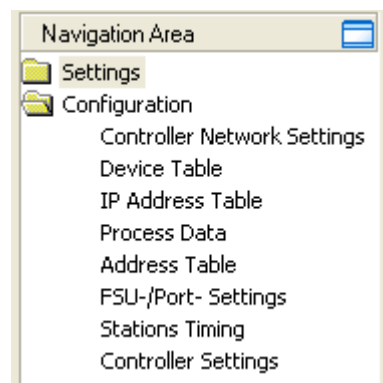


Figure 48: Navigation area - Configuration

Configuring device parameters

The following steps are required to configure the parameters of the PROFINET IO-Controller device using the PROFINET IO-Controller DTM:

1. Make controller network settings.
 - Set the name of station and the IP settings for the PROFINET IO-Controller.
 - Select **Configuration > Controller network settings** in the navigation area.
 - Set the name of station and the IP settings for the PROFINET IO-Controller.
 - Apply all settings.

2. In the device table, select the PROFINET IO-Devices to be used for communication.
 - In the navigation area, select **Configuration > Device table**.
 - Select the required devices.
 - In the column **Activate** check the corresponding checkbox.
 - 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 set 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 **Name of station** column set the network name of the PROFINET IO-Device station.
 - Apply all settings.
3. Make the IP settings of the PROFINET IO-Device station.
 - First set the **IP address** of the PROFINET IO-Device Station:
 - Select **Configuration > IP address table** in the navigation area.
 - In the column **IP address** set the IP address of the PROFINET IO-Device station.
 - Then set the **Network mask** and the **Gateway address** of the PROFINET IO-Device station:
 - Uncheck the checkbox **Inherit**.

**Note:**

The fields **Network mask** and **Gateway address** are only editable if the checkbox **Inherit** is unchecked.

- In the column **Network mask** set the network mask of the PROFINET IO-Device station.
 - In the column **Gateway address** set the gateway address of the PROFINET IO-Device station.
 - Or check the checkbox **Inherit**.
 - ↗ The **Network mask** and the **Gateway address** of the PROFINET IO-Controller Station are taken also for the PROFINET IO-Device associated.
 - Apply all settings.
4. Setting process data
 - In the navigation area, select **Configuration > Process data**.
 - Set symbolic names for the configured modules or measuring signals.
 - Apply all settings.
 5. If necessary, set the device address.
 - In the navigation area, select **Configuration > Address table**.

6. Choose the FSU-Port settings.
 - Select **Configuration > FSU/port settings** in the navigation area.
 - Check **FSU** for those PROFINET IO-Devices, which must use a fast start up (FSU) connection to establish the cyclic data exchange.
 - Apply all settings.
7. Under **Station timing**, set the **Module settings** for the PROFINET IO-Device station:
 - Select **Configuration > Stations timing** in the navigation area.
 - Under **Name of Station**:
 - Select the appropriate station associated with the PROFINET IO-Controller.
 - Double-click on the **Name of Station** list to edit it and select the station.
 - Apply all settings.
8. Set the controller settings.
 - Select **Configuration > Controller settings** in the navigation area.
 - Under **Start of bus communication** select **Automatically by device** or **Controlled by application** option.
 - Under **Application monitoring** set the **Watchdog time**.
 - Under **Module alignment** set the options **Byte boundaries** or **2 Byte boundaries**.
 - Under **Port settings**: Make the required port settings under **Port 1** or **Port 2**.
 - Under **IO state information**: Configure the IOPS interface. Therefore select under **Input provider** or **Output provider** the mode 'Disabled', 'Bit' or 'Byte'.
9. Close the master DTM configuration dialog.
 - Click **OK** to close the master DTM configuration dialog and save the configuration.
10. Download configuration parameters to the PROFINET IO-Controller device.
 - 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. You find the corresponding safety information in section *Safety messages on firmware or configuration download* [► page 16].

**Note:**

To transfer the configuration to the PROFINET IO-Controller device, download the data of the configuration parameters into the PROFINET IO-Controller device. See also section *Download configuration* [► page 95].

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

- *Controller network settings* [▶ page 78],
- *Device table* [▶ page 79],
- *IP address table* [▶ page 81],
- *Process data* [▶ page 83],
- *Address table* [▶ page 84],
- *FSU/port settings* [▶ page 86],
- *Stations timing* [▶ page 88] and
- *Controller settings* [▶ page 89].

6.2 Controller network settings

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

To edit the current controller network settings:

- Select **Configuration > Controller network settings** in the navigation area.
- Set the name of station and the IP settings for the PROFINET IO-Controller.

The screenshot shows the 'Controller Network Settings' dialog box. It has a title bar 'Controller Network Settings'. Inside, there are two text input fields: 'Name of Station:' and 'Description:', both containing the text 'Controller*'. Below these is a section titled 'IP Settings' which contains three text input fields: 'IP Address:' (192 . 168 . 10 . 10), 'Network Mask:' (255 . 255 . 255 . 0), and 'Gateway Address:' (192 . 168 . 10 . 100).

Figure 49: Configuration > Controller network settings

*The name of the PROFINET IO-Device appears.

Parameter	Description	Range of value / value
Name of station (editable)	Network name of the PROFINET IO-Controller station. The Name of station can be edited here. It must be DNS compatible. For further information, see section <i>Device name according to PROFINET „Name of station“ specification</i> [▶ page 56]. 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 142].	Name according to the PROFINET specification (PNO document 2722) 1 - 240 characters
Description (editable)	Symbolic name of the PROFINET IO-Controller DTM.	
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

Table 16: Parameters of the controller network settings dialog pane

6.3 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>Checkbox, to activate / deactivate a station.</p> <p>If the Activate checkbox 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 the Activate checkbox 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>	<p>Default: checked</p> <p>Checked, unchecked</p>
Index (editable)	About the index it is possible to set an user-defined sequence for the devices configured in the PROFINET IO-Controller.	1 ... n

Parameter	Description	Range of value / value
Name of station (editable)	<p>Network name of the PROFINET IO-Device station.</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 56]. 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>	<p>Unique network name of the device according to the PROFINET specification (PNO document 2722).</p> <p>1 - 240 characters</p>
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 box

6.4 IP address table

The **IP address table** dialog box displays the name of station and the IP settings for PROFINET IO-Devices connected to the PROFINET IO-Controller.

The IP settings of the PROFINET IO-Devices can be edited or set here.

IP Address Table				
Name of station	IP address ▲	Inherit	Network mask	Gateway address
▶ Device *-00	192.168.0.2	<input checked="" type="checkbox"/>	255.255.255.0	0.0.0.0
Device *-00-001	192.168.0.3	<input checked="" type="checkbox"/>	255.255.255.0	0.0.0.0
Device *-00-002	192.168.0.4	<input checked="" type="checkbox"/>	255.255.255.0	0.0.0.0

Figure 51: Configuration > IP Address Table

*The name of the PROFINET IO-Device appears.

Parameter	Description	Range of value / value
Name of Station	Network name of the PROFINET IO-Device station. The name of station is set in the Device table in the PROFINET IO-Controller DTM. Here it is only displayed (refer to section <i>Device table</i> [▶ page 79]) or 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		
IP address (editable)	IP address of the PROFINET IO-Device station The IP address of the PROFINET IO-Device station is set here in the IP address table . In the PROFINET IO-Device DTM it is only displayed. The PROFINET IO-Controller device transmits the IP address of the PROFINET IO-Device during startup via the PROFINET network to the PROFINET IO-Device and thereby configures the PROFINET IO-Device.	valid IP address
Inherit	Shows whether the network mask and gateway address are taken over by the controller.	Checked, unchecked Default: checked
Network mask (editable)	Network mask of the PROFINET IO-Device station The network mask of the PROFINET IO-Device station is set here in the IP address table . In the PROFINET IO-Device DTM, it is only displayed. The PROFINET IO-Controller device transmits the Network mask of the PROFINET IO-Device during startup via the PROFINET network to the PROFINET IO-Device and thereby configures the PROFINET IO-Device.	valid network mask
Gateway address (editable)	Gateway address of the PROFINET IO-Device station The Gateway address of the PROFINET IO-Device station is set here in the IP address table . In the PROFINET IO-Device DTM, it is only displayed. The PROFINET IO-Controller device transmits the Gateway address of the PROFINET IO-Device during startup via the PROFINET network to the PROFINET IO-Device and thereby configures the PROFINET IO-Device.	valid gateway address

Table 18: IP address table pane parameters

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

To set the IP settings of the PROFINET IO-Device station follow the steps described hereafter:

1. Set the **IP address** of the PROFINET IO-Device station.

- Select **Configuration > IP address table** in the navigation area.
- In the column **IP address** set the IP address of the PROFINET IO-Device station.

2. Set the **Network mask** and the **Gateway address** of the PROFINET IO-Device station.



Note:

The fields **Network mask** and **Gateway address** are only editable if the checkbox **Inherit** is unchecked.

- Uncheck the checkbox **Inherit**.
- In the column **Network mask** set the network mask of the PROFINET IO-Device station.
- In the column **Gateway address** set the gateway address of the PROFINET IO-Device station.

Or

- Or check the checkbox **Inherit**.
- ⇒ The **Network mask** and the **Gateway address** of the PROFINET IO-Controller Station are taken also for the PROFINET IO-Device associated.

6.5 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	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“.	

*Depending on the protocol, either the device name or the symbolic name can be edited via the device symbol context menu.

Table 19: Process data

6.6 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 Display mode: Hexadecimal CSV Export

Inputs:

Name of station	Module	Submodule	Type	Length	Address
▶ Device*	4 Bit Input	0x00000002	IB	0x0001	0x0000
Device*	4 Bit Input	0x00000002	IB	0x0001	0x0001
Device*	4 Bit Input	0x00000002	IB	0x0001	0x0002

Outputs:

Name of station	Module	Submodule	Type	Length	Address
▶ Device*	4 Bit Output	0x00000101	QB	0x0001	0x0000
Device*	4 Bit Output	0x00000101	QB	0x0001	0x0001
Device*	4 Bit Output	0x00000101	QB	0x0001	0x0002

Figure 53: Configuration > Address Table

*The name of the PROFINET IO-Device appears.

Parameter	Description	Value range / value
Station name	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 79]) 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	Data type	QB, QW, IB, IW
Length	Length of the module / submodule in bytes	
Address	Data offset address	

Table 20: Address table pane parameters - inputs / outputs

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

Use **Display mode** Display mode: Hexadecimal 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.

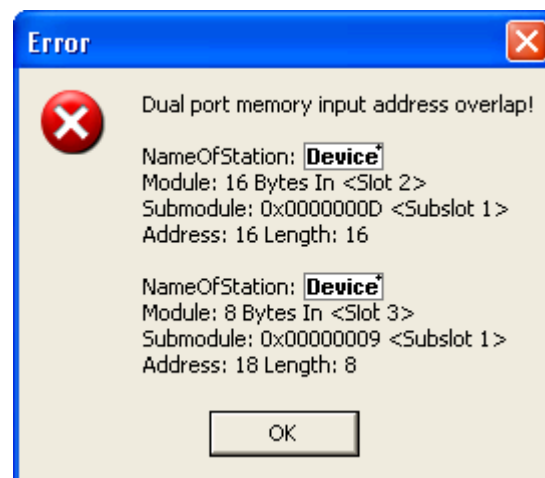


Figure 54: Configuration > Address table – address overlap

*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.

6.7 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
		Device name*	Station name Device**	
		Interface 1 - Port1		AUTO
		Interface 1 - Port2		AUTO
		Device name*	Station name Device**	
		Interface 1 - Port1		AUTO
		Interface - Port2		AUTO

Figure 55: 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 79]) 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>	<i>AUTO</i> , <i>100BASETXFD</i>
FSU	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.	checked, unchecked

Table 21: FSU/port settings

6.8 Stations timing

The **Station timing** dialog pane shows the timing of the station.

To configure the stations timing settings:

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

Figure 56: Configuration > Stations timing

*The name of the PROFINET IO-Device appears.

Parameter	Description	Range of value / value
Name of station	Network name of the PROFINET IO-Controller station. Under Name of station all devices are displayed, which are connected to the PROFINET IO-Controller. The corresponding name of station is set in the Device Table in the PROFINET IO Controller DTM (refer to section <i>Device table</i> [▶ page 79]) or otherwise it must be set directly in the configuration tool of the PROFINET IO-Device.	1 - 240 characters
Updating time [ms]	Selectable cycle time (total cycle time) with which the device exchanges data	All values that are defined in the GSDML file are selectable.
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'

Table 22: Parameters in the 'Stations timing' pane

- Select the PROFINET IO-Device station from the **Name of station** drop-down list.

For the station selected:

- Adjust the value for **Updating time** manually.
- Adjust the value for **Watchdog time** manually.
- Apply the settings made or complete the configuration via **OK**.

6.9 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 95].

➤ Open **Configuration > Controller settings**.

Figure 57: 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.

6.9.1 Start of bus communication

Figure 58: 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.

6.9.2 Application monitoring

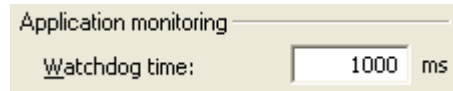


Figure 59: PROFINET IO-Controller settings > Application monitoring

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 23: Range of value / Value for the watchdog time

6.9.3 Process image storage format

The **Process image storage format** determines how the data words are stored in the process image.

For the data type *Word* it is possible to choose **Big Endian** or **Little Endian**.

Storage format (word module)	
Big Endian	MSB/LSB = higher/lower = Motorola format = Big Endian
Little Endian	LSB/MSB = lower/higher = Intel format = Little Endian

Table 24: Process image storage format

6.9.4 Module alignment

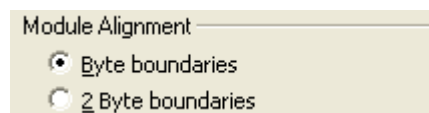


Figure 60: PROFINET IO-Controller settings > Module alignment

The **Module alignment** defines the addressing mode of the process data image. The addresses (offsets) of the process data are always interpreted as byte addresses. The **Module alignment** then defines the addressing mode, **Byte boundaries** or **2 Byte boundaries**.

Parameter	Description
Byte boundaries	The module address can start at any byte offset.
2 Byte boundaries	The module address can only start at even byte offsets.

Table 25: Parameters PROFINET IO-Controller Settings > Module Alignment

6.9.5 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*“).

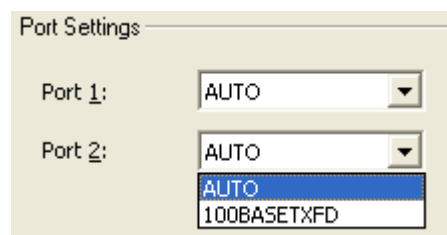


Figure 61: Controller settings > Port settings

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.

6.9.6 IO state information

Reference to firmware: The option IO State Information was implemented since PROFINET IO-Controller Firmware Version 2.6.x.x.

Under **IO state information** you can configure the IOPS interface. If configured, the PROFINET Input/Output Object Provider State (IOPS) allows to the PROFINET IO-Controller application program to detect, whether the data received from the PROFINET IO-Devices are valid or not and to declare its output data sent to the PROFINET IO-Device devices valid or invalid.

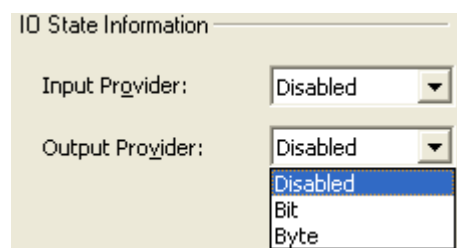


Figure 62: Controller settings > IO state information

Parameter	Description	Range of value/value
Input provider	IOPS interface for input direction	Disabled, Bit, Byte; Default: Disabled
Output provider	IOPS interface for output direction	Disabled, Bit, Byte; Default: Disabled

Table 27: Parameters IO state information

You can select the three IOPS interface modes ,Disabled', ,Bit' and ,Byte'. The modes for input and output direction can be configured independently.

- **Disabled:** The PROFINET IO-Controller application program cannot detect, whether the data received from the PROFINET IO-Devices are valid or declare its output data sent to the PROFINET IO-Devices valid or invalid.
- **Bit:** In the Dual-Port Memory (DPM) of the PROFINET IO-Controller device the IOPS is handled as a bit list. Each submodule description is represented by a single bit. If this bit is set to 1 the data is valid, if the bit is set to 0 the data is invalid.
Note: Submodules with input and output data at the same time have IOPS in input and output direction.
- **Byte:** In the Dual-Port Memory (DPM) of the PROFINET IO-Controller device the IOPS is handled as a byte array. Each submodule description is represented by a byte. If the byte is set to 0x80 the data is valid, otherwise it is invalid. In this mode, the whole IOPS-byte is directly copied from / to the cyclic frame giving the PROFINET IO-Controller application program the possibility to access all bits of IOPS. Typically, only the first bit of this IOPS byte is interesting as it stated valid or invalid.



Further information on the IOPS Interface is comprised in the **PROFINET IO-Controller protocol API manual**, in section IOPS Interface (e.g. Revision 16 of the API manual, in section 4.6.).

6.10 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 details, refer to section *Safety messages on firmware or configuration download* [► page 16].

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.

An overview of the descriptions for these steps you find in the section *Overview settings for driver and device assignment* [► page 24].

- 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 the **Connect** command 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 of the master 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:

- In the DTM interface dialog, select the **OK** button, to close the DTM interface dialog.
- Right-click on the PROFINET IO-Controller icon.
- Select the **Disconnect** command 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.

6.11 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 93].

**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 using the frame application netFrame in SYCON.net 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?"

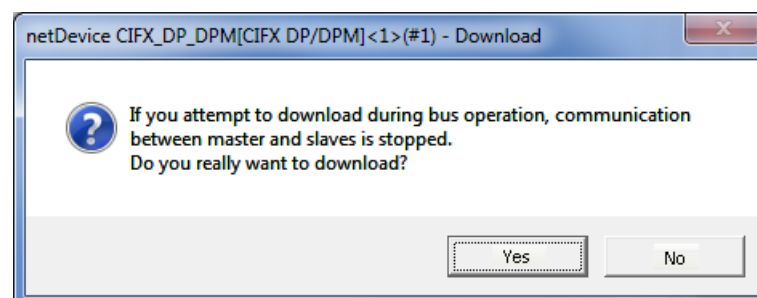


Figure 63: netDevice Message: Download

**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**.

6.12 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.

6.12.1 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 17].

6.12.2 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.

6.12.3 Starting network scan

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

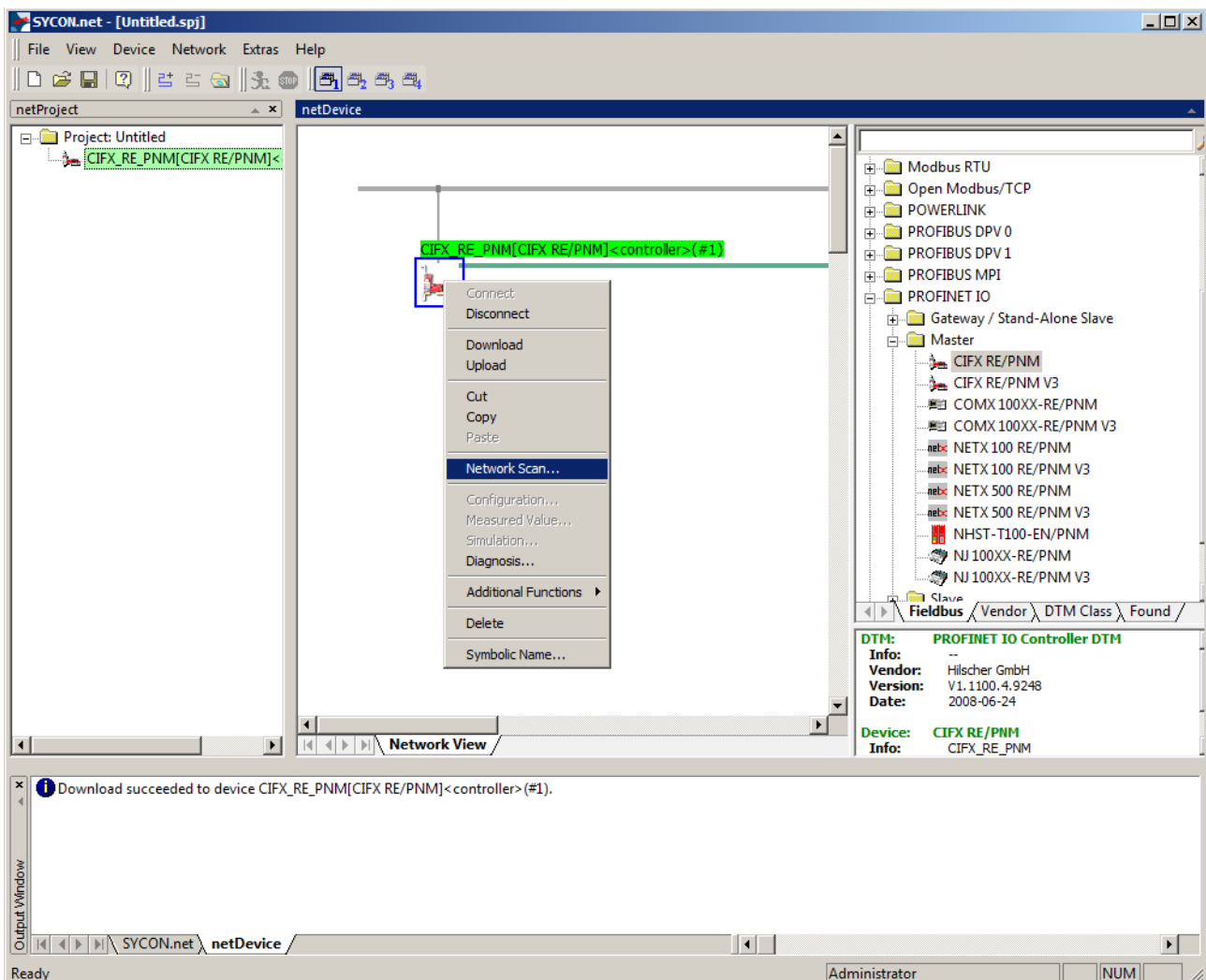


Figure 64: Starting 'Network scan' (example)

- 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.

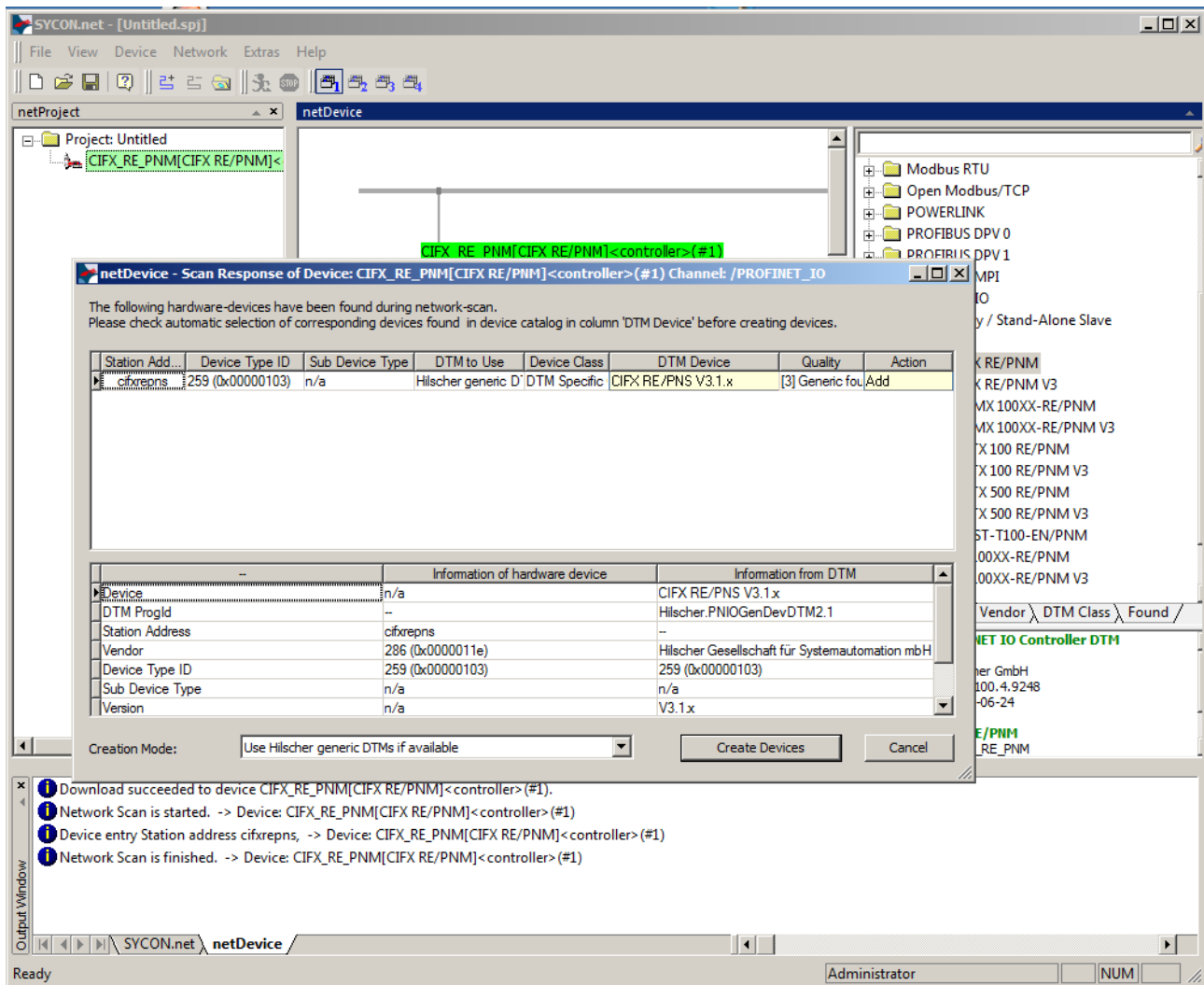


Figure 65: Scan response dialog of the controller DTM (example)

6.12.4 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.

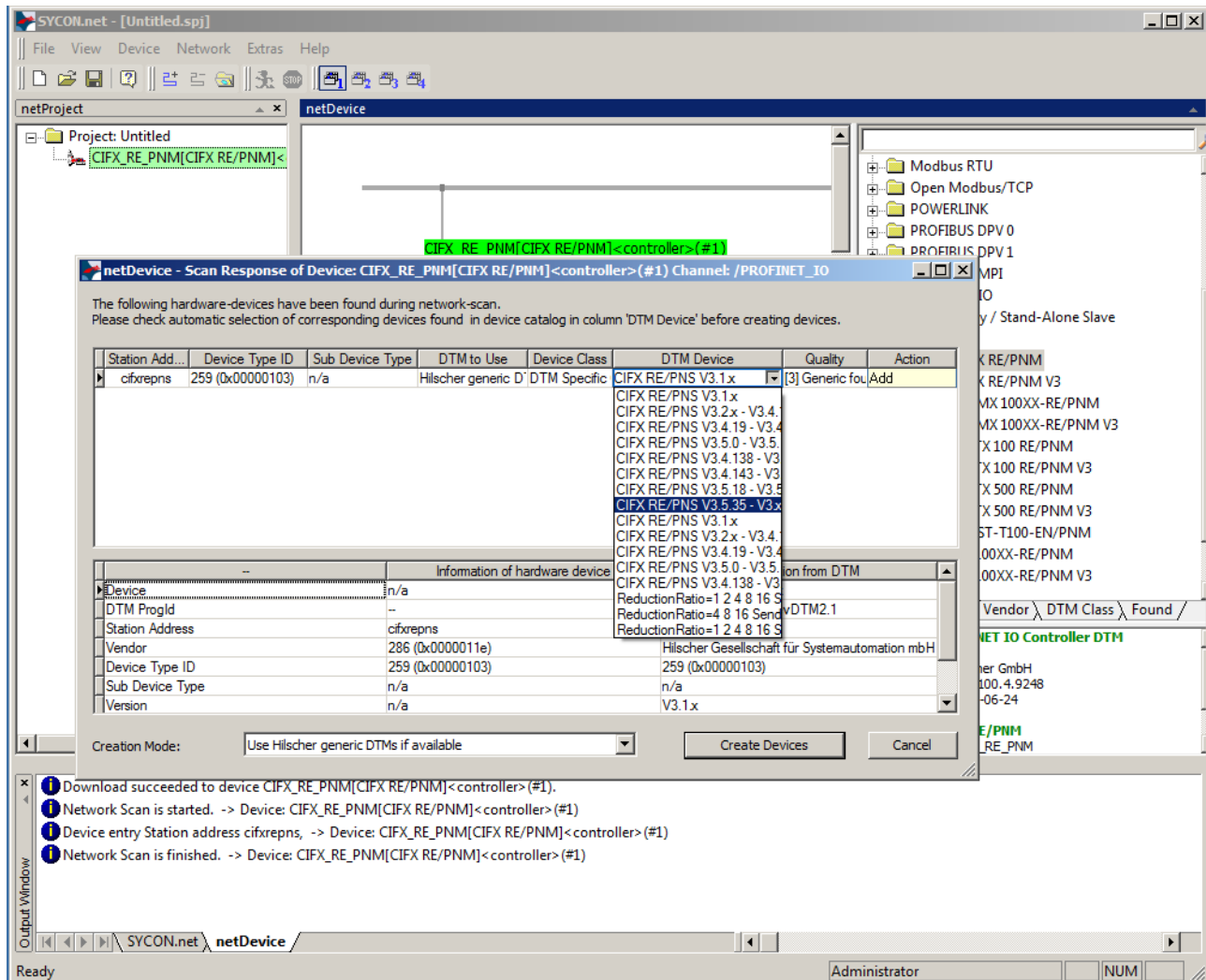
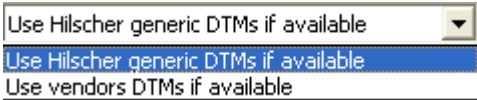


Figure 66: Scan response dialog of the PROFINET IO-Controller DTM (example)

- 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).

6.12.5 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: <div> <div>Red</div> <div>If a field marked in red appears in column Station address, the respective DTM device is already present on the network.</div> <div>Yellow</div> <div>If a field appears marked in yellow, a selection can be made by a combo box.</div> </div>		
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>  <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>		
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> <tr> <td> <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> <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>		

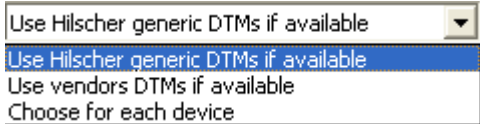
Column	Description
Action	<p>The action to be performed with the corresponding device during the process of device creation.</p> <ul style="list-style-type: none"> • If no device is present within the current project, the selection Add/Skip will appear. • If there is already a device present within the 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 28: Description on the Scan response dialog of the PROFINET IO-Controller DTM

6.12.6 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"

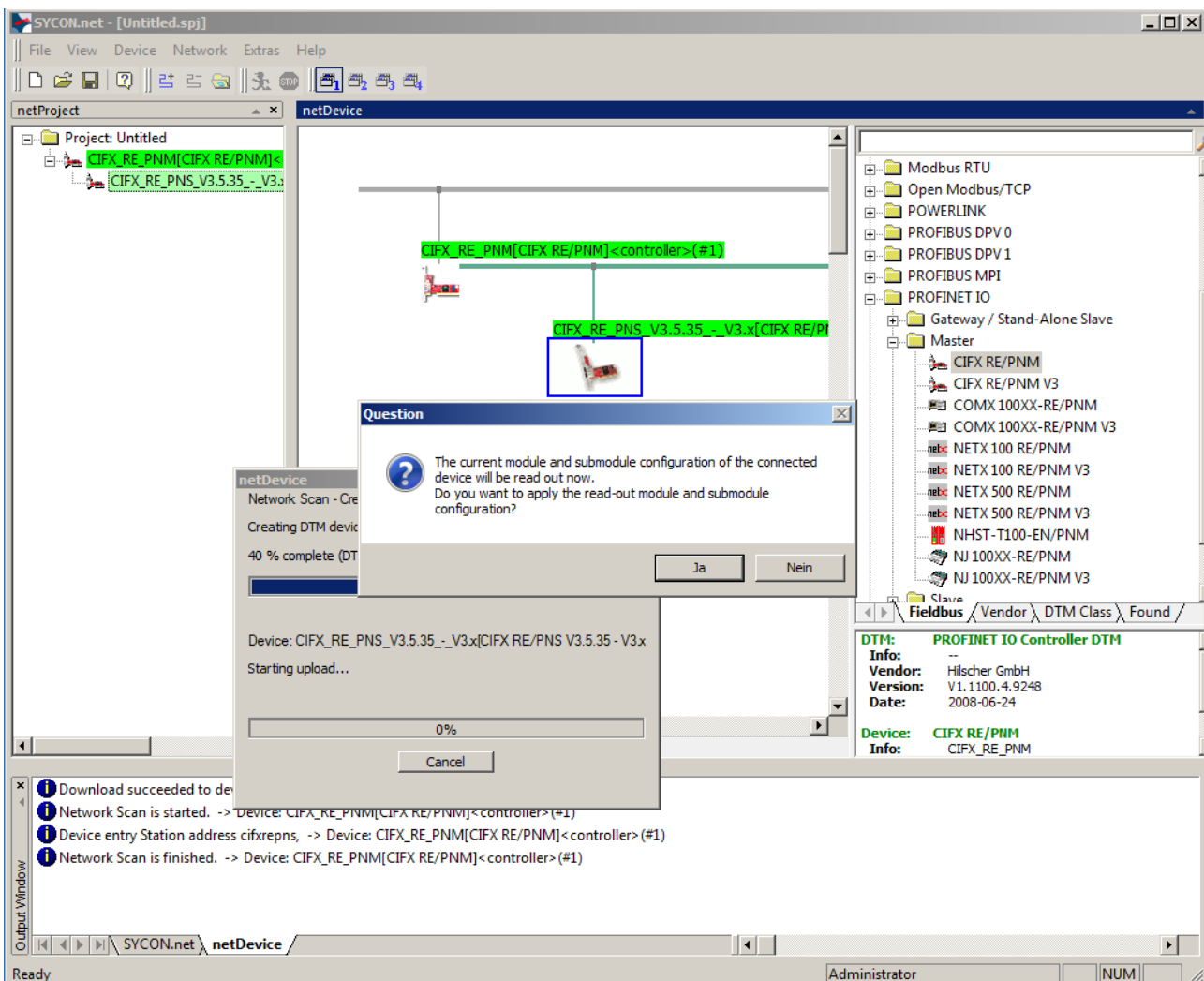


Figure 67: Query to create the module configuration (example)

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

6.12.7 Downloading IP settings

Safety precautions

Adhere to the necessary safety precautions to prevent personnel injury and property damage. For more refer to section *Safety messages on firmware or configuration download* [► page 16].

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:

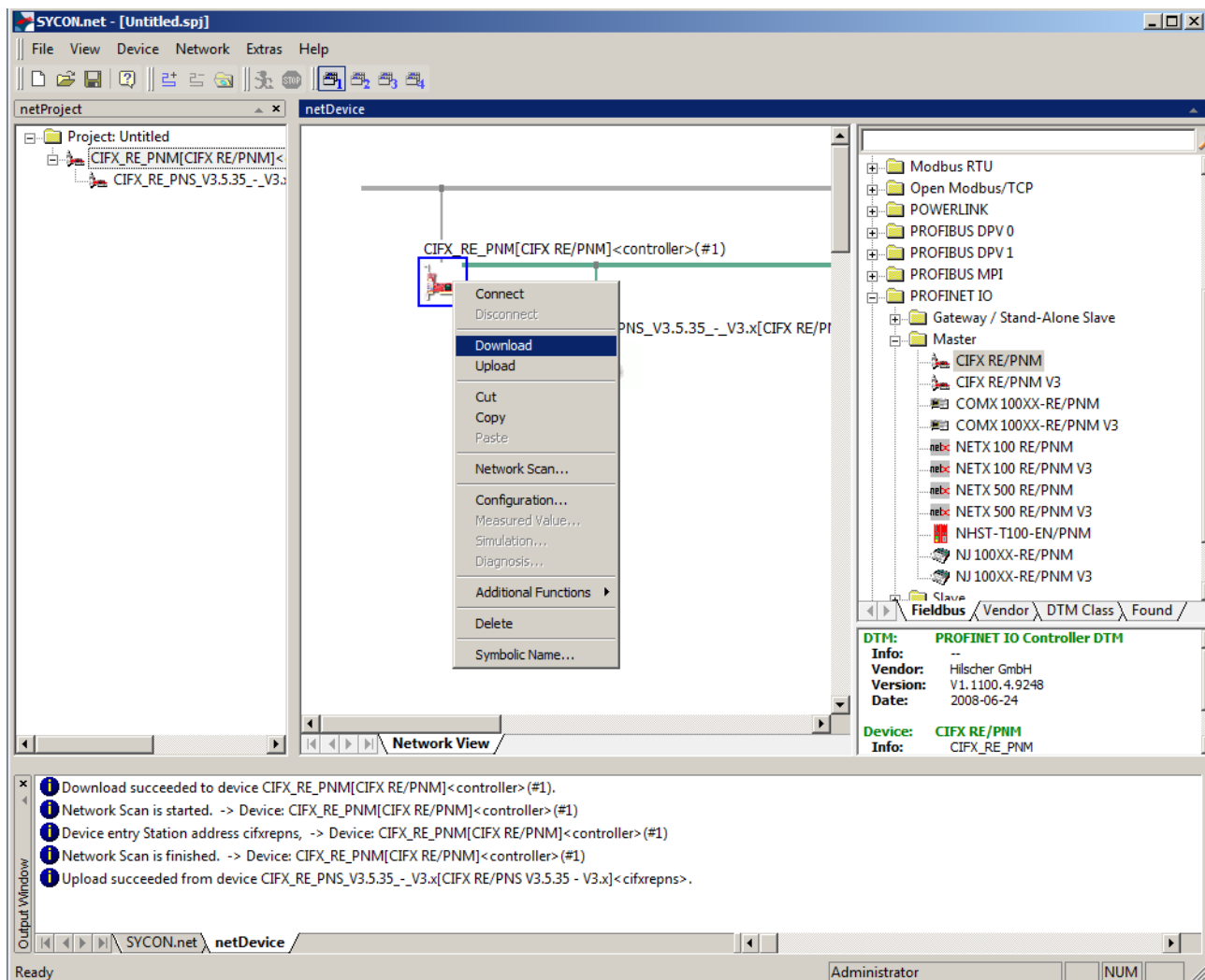


Figure 68: 'Download' - download the modified configuration to the PROFINET IO-Controller device (example)

- 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>."

6.12.8 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.

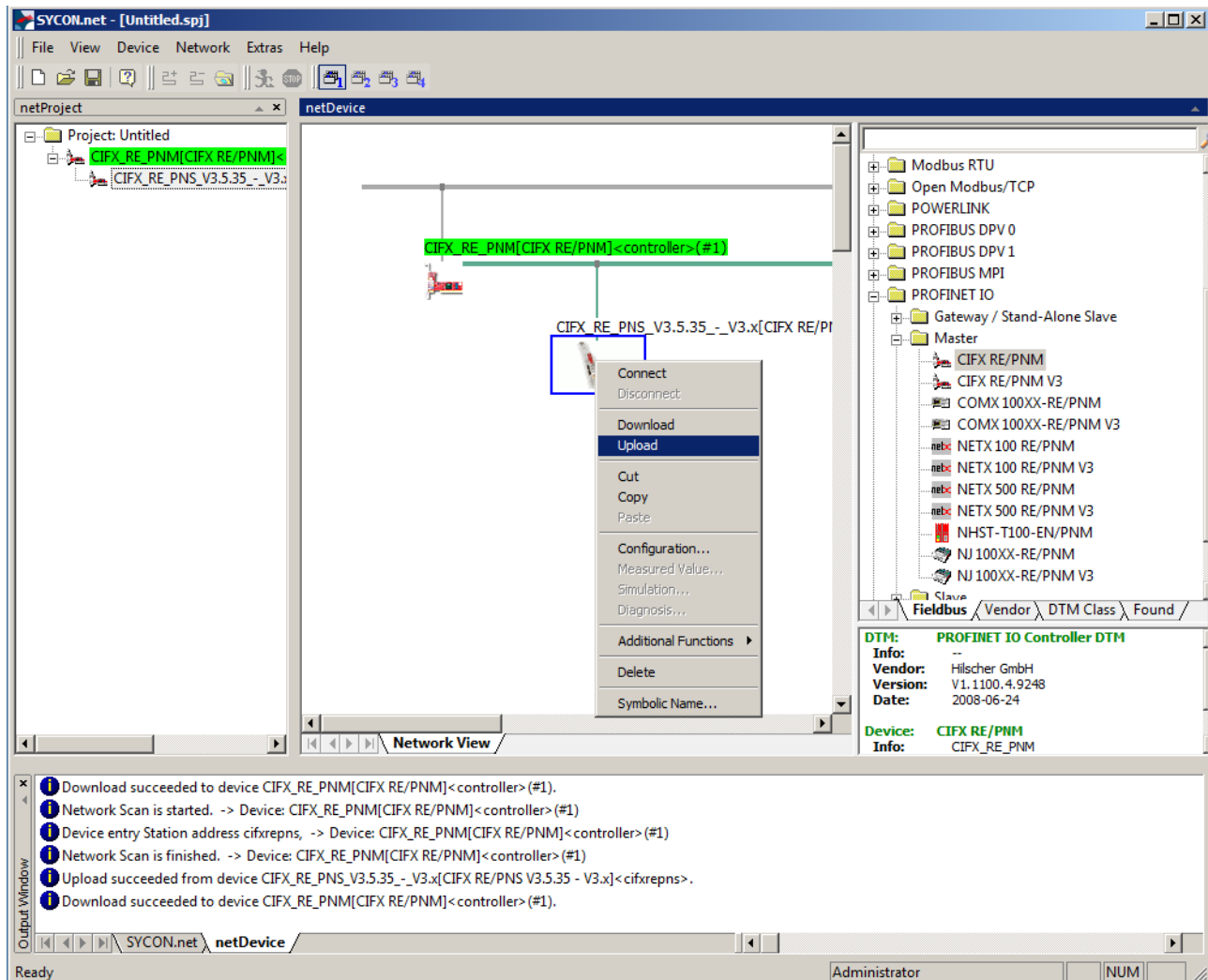


Figure 69: "Upload" the configuration of the device (example)

- 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"

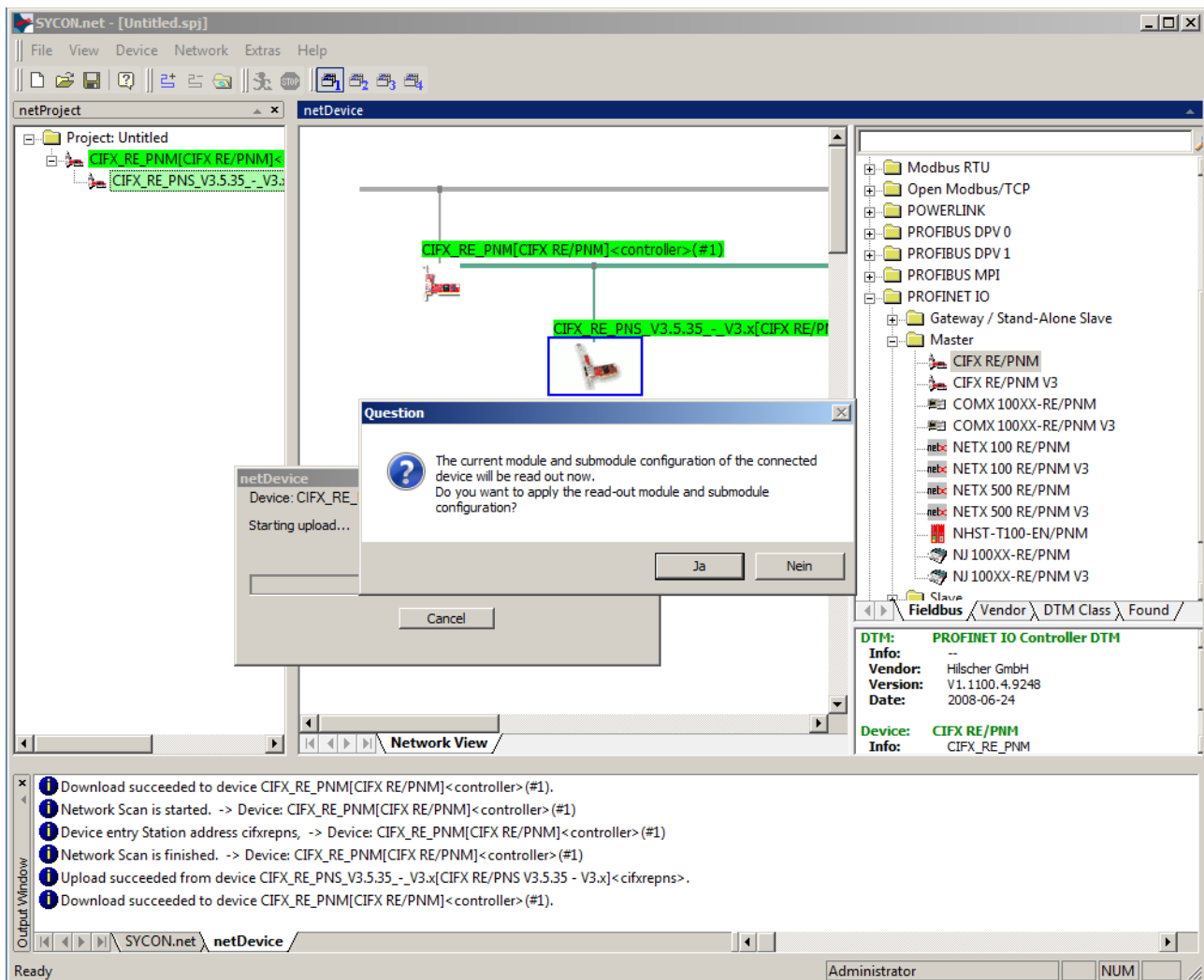


Figure 70: Query to create the module configuration (example)

- 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 110].

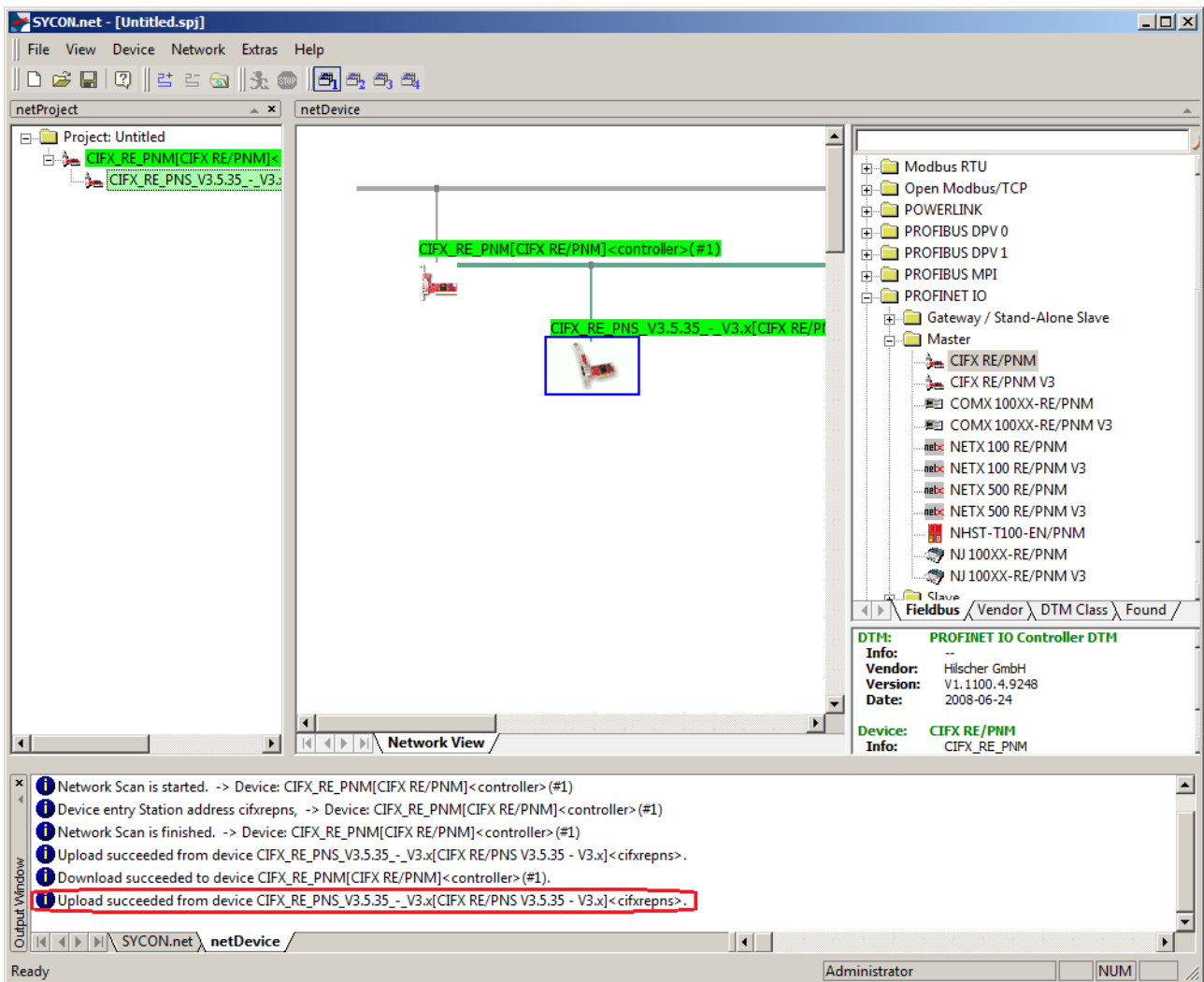


Figure 71: Upload successful (example)

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

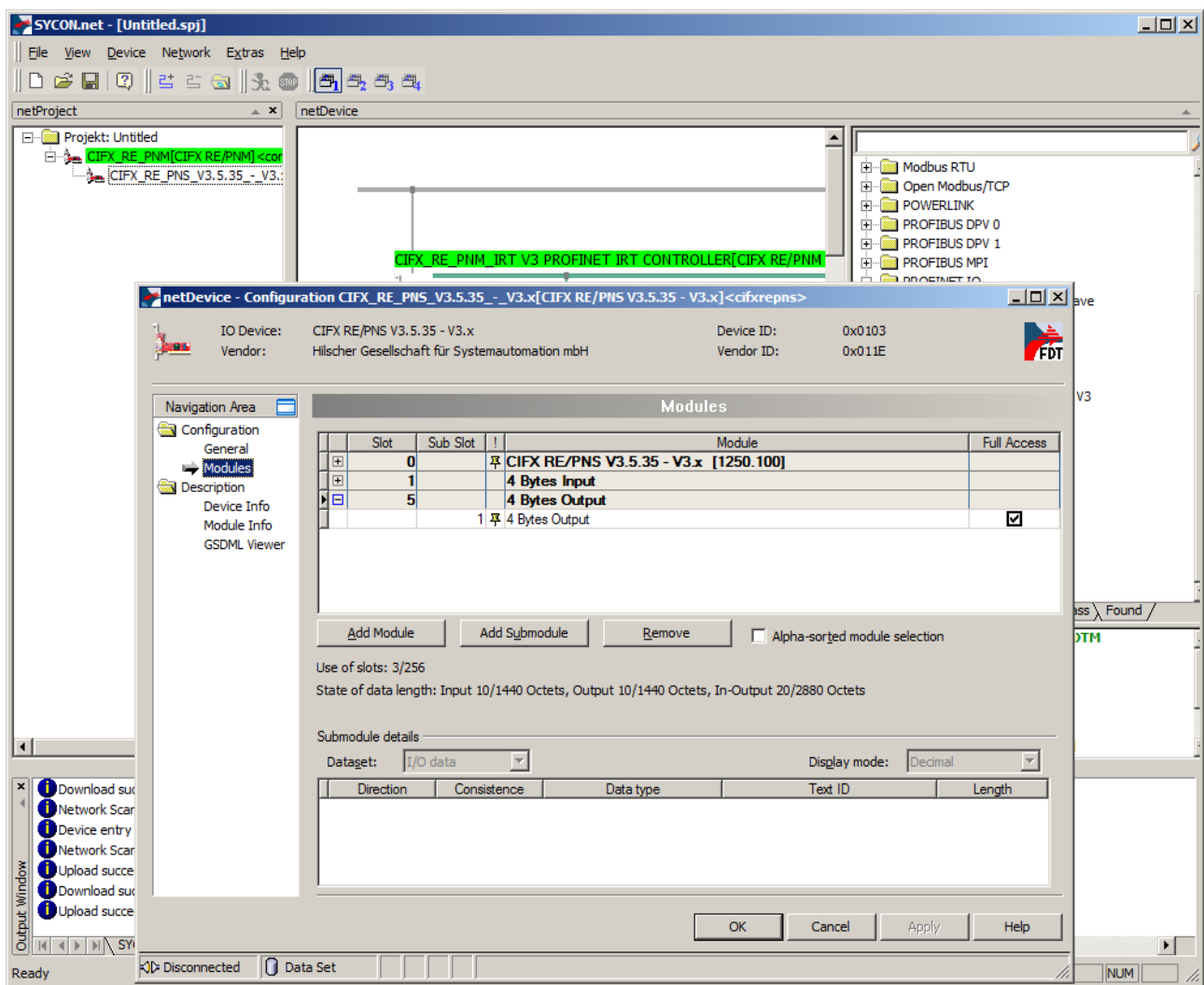


Figure 72: Uploaded modules (example)

6.12.9 Downloading configuration

Safety precautions

Adhere to the necessary safety precautions to prevent personnel injury and property damage. For more refer to section *Safety messages on firmware or configuration download* [► page 16].

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 CIFS_RE_PNM[CIFS RE/PNM]<>(# 1).”

6.12.10 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.

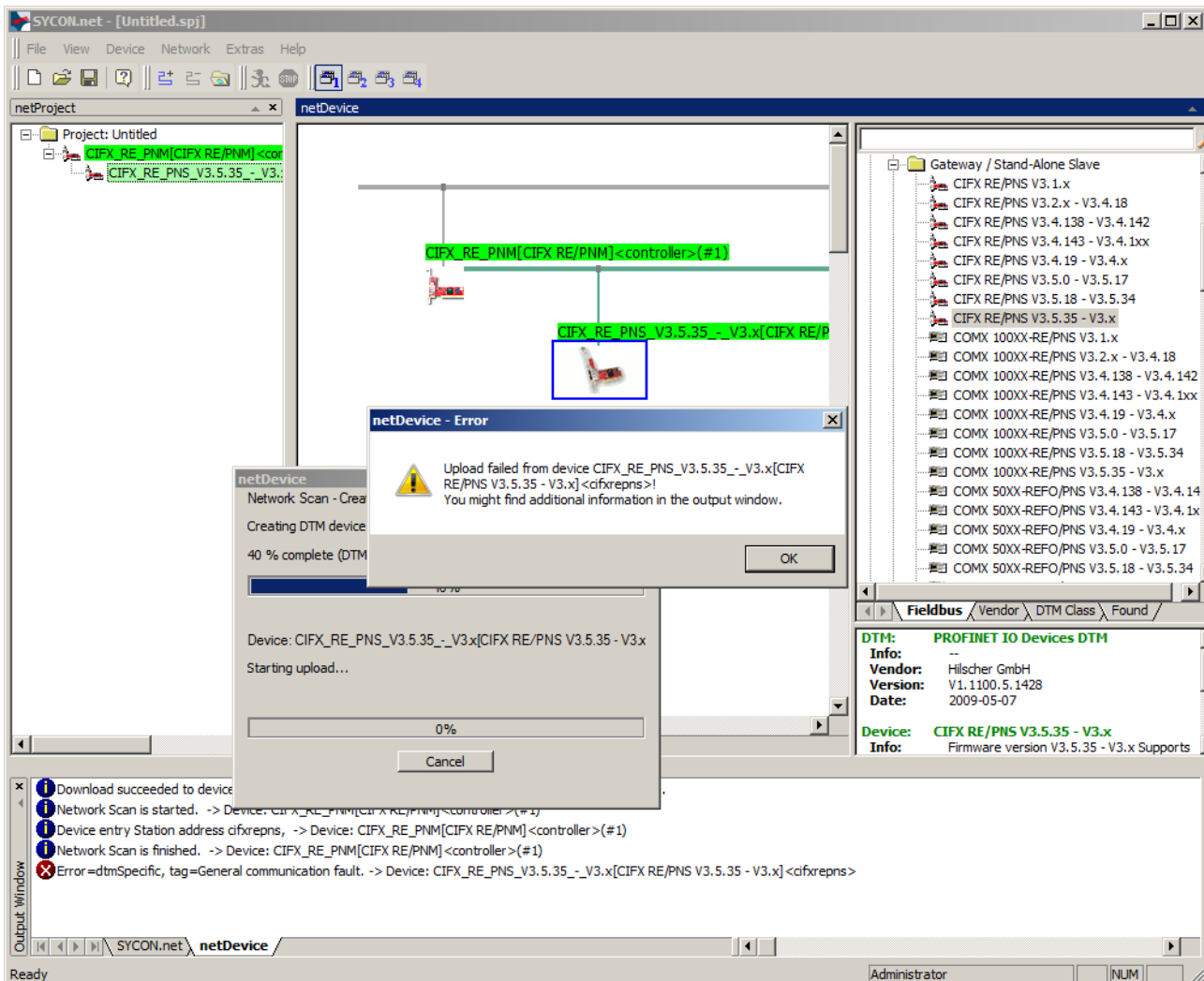


Figure 73: Upload failed from device (example)

- 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

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

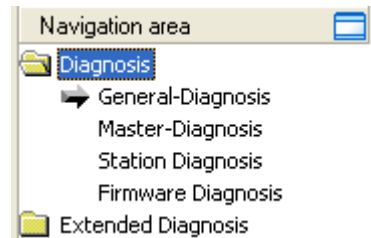


Figure 74: Navigation area - Diagnosis PROFINET IO-Controller DTM

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 93].

How to proceed

- In the controller DTM 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 117].

7.2 General diagnosis

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

General Diagnosis

Device state

- ☐ Communication
- ☒ Run
- ☐ Ready
- ☐ Error

Network state

- ☒ Operate
- ☐ Idle
- ☐ Stop
- ☐ Offline

Configuration state















- ☐ Configuration locked
- ☐ New configuration pending
- ☐ Reset required
- ☒ Bus ON

Communication error:

Watchdog time:

Error count:

Figure 75: 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.	 (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.	 (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 29: 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 30: 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.

Master Diagnosis	
Slave state	failed
Slave error log indicator	available
Configured slaves	2
Active slaves	0
Slaves with diagnostic	2

Figure 76: 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 31: Parameters Master diagnosis

7.4 Station diagnosis

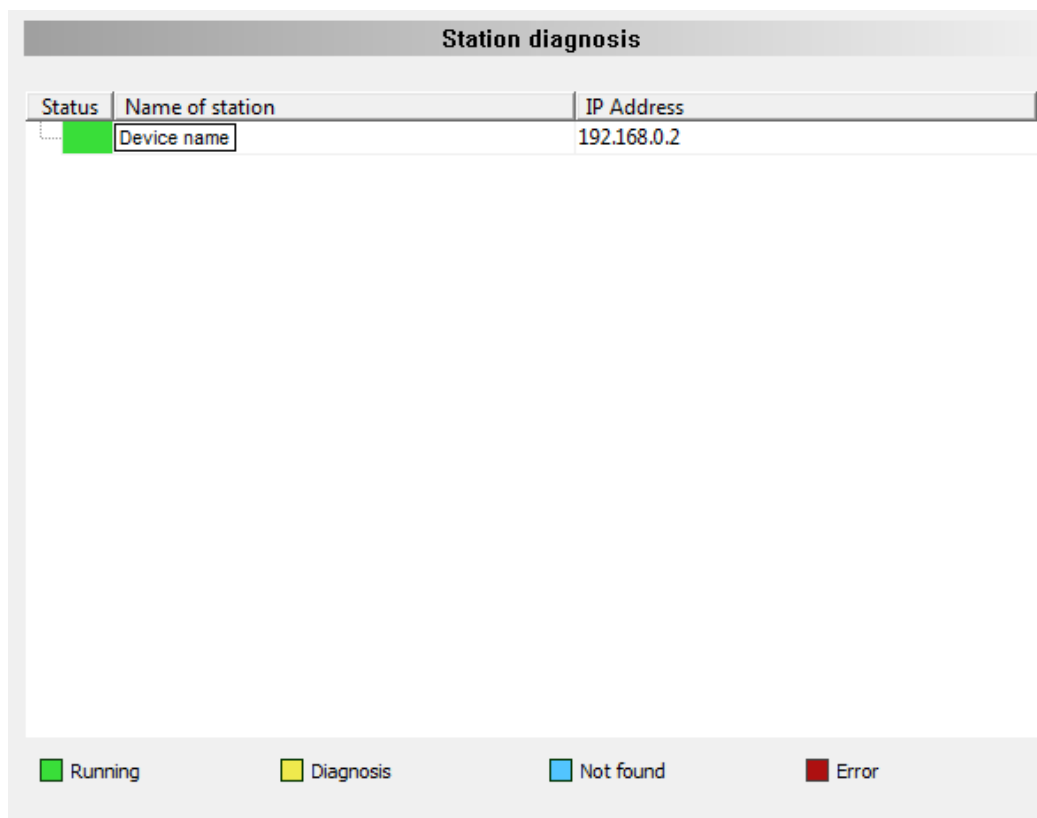


Figure 77: Station diagnosis

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 32: 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 33: 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:

2.6.0 (Build 5)

Date:

3.2.2012

Task information:

Task	Name of task	Version	Prio...	Description	State
0	RX_IDLE	1.0	63	RX IDLE Task.	Task Status ok. (0x00000000)
1	RX_TIMER	1.0	1	rcX Timer.	Task Status ok. (0x00000000)
2	RX_SYSTEM	1.16	32	Middleware Syste...	Task Status ok. (0x00000000)
3	DPM_COMO...	1.0	50	TLR-Router DPM.	Task Status ok. (0x00000000)
4	DPM_COMO...	1.0	51	TLR-Router DPM.	Task Status ok. (0x00000000)
5	TlrTimer	0.0	17	The task identifier ...	Task Status ok. (0x00000000)
6	MARSHALLER	2.0	59	Marshaller: Main T...	Task Status ok. (0x00000000)
7	T_PNIO_EDD	1.0	16	PROFINET IO EDD...	Task Status ok. (0x00000000)
8	T_PNIO_ACP	1.0	18	PROFINET IO ACP...	Task Status ok. (0x00000000)
9	T_PNIO_DCP	1.0	19	PROFINET IO DCP...	Task Status ok. (0x00000000)
10	T_PNIO_MGT	1.0	20	PROFINET IO Man...	Task Status ok. (0x00000000)
11	TCP_UDP	2.16	21	TCPUDP task (TCP...	Task Status ok. (0x00000000)
12	T_RPC	4.0	22	RPC Task.	Task Status ok. (0x00000000)
13	T_PNIO_CM...	1.0	23	PROFINET IO-Con...	Task Status ok. (0x00000000)
14	T_PNIO_AP...	1.0	24	PROFINET IO-Con...	Task Status ok. (0x00000000)
15	T_PNIO_AP...	1.0	25	PROFINET IO-Con...	Task Status ok. (0x00000000)
16	SNMP-Server	4.1	29	SNMP Server Task.	Task Status ok. (0x00000000)
17	Mib-Database	4.1	30	MIB Database for ...	Task Status ok. (0x00000000)
18	LLDP-Task	4.2	27	LLDP protocol task	Task Status ok. (0x00000000)
19	PACKET_RO...	2.0	60	Marshaller: Packet...	Task Status ok. (0x00000000)

Figure 78: 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 34: 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 118]
RX-SYSTEM	<i>IniBatch status</i> [▶ page 119]
T_PNIO_EDD	<i>Extended Diagnosis Information</i> [▶ page 121] <i>XMAC Diagnosis Structure</i> [▶ page 121]
T_PNIO_ACP	<i>Extended Diagnosis Information</i> [▶ page 122]
T_PNIO_DCP	<i>Extended Diagnosis Information</i> [▶ page 123]
T_PNIO_MGT	<i>Extended Diagnosis Information</i> [▶ page 124]
TCPUDP	<i>IP-Information</i> [▶ page 125] <i>IP Packet Counter</i> [▶ page 125] <i>TCP_UDP-Information</i> [▶ page 126]
T_RCP	<i>Extended Diagnosis Information</i> [▶ page 127]
T_PNIO_CMCTL	<i>Extended Diagnosis Information</i> [▶ page 128] <i>NRPM (resolution device name) results</i> [▶ page 129] <i>Connection establishment results</i> [▶ page 130]
T_PNIO_APCTL	<i>Extended Diagnosis Information</i> [▶ page 131]
T_PNIO_APCFG	<i>Erweiterte Diagnose Informationen</i> [▶ page 132]

Table 35: 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 93].

8.2 Task information:

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

Figure 79: 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 36: 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 80: 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 37: 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 General diagnosis information

general Diagnosis Information	
Task states	
Name	Value
Last TLR error code	Operation succeeded.
Last PNIO error code	Operation succeeded.
TLR Error Counter (may count single error several times!)	0
PNIO Error Counter (may count single error several times!)	0
active PM Counter	0
Send Packet Error Counter	0
Malloc Error Counter	0
ErrExternal (Received unsupported Requests)	0
ErrInternal (Received unsupported Confirmations)	0
maximum Pool usage	0
current Pool usage	0

Figure 81: Extended Diagnosis > [Folder Name] > General Diagnosis Information

Name	Description
Last TLR error code	Error code of the last internally occurred error. TLR: Task Layer Reference (Modell)
Last PNIO error code	Error code of the last externally occurred error which has been reported by an IO Device.
TLR Error Counter (may count single error several times!)	Counts the number of occurred TLR error codes.
PNIO Error Counter (may count single error several times!)	Counts the number of occurred PNIO error codes.
Active PM Counter	Counter of the active protocol machines in the task.
Send Packet Error Counter	Counts how often a task sends a packet to another task and this fails.
Malloc Error Counter	Counts how often storage capacity is requested in the operating system and the operating system cannot follow this demand.
ErrExternal (Received unsupported Requests)	Counts how often an unknown request packet was received.
ErrInternal (Received unsupported Confirmations)	Counts how often an unknown confirmation packet was received.
maximum Pool usage*	Counts how many pool elements were used simultaneously as a maximum.
current Pool usage*	Counts how many pool elements are used currently.
*Not used for the diagnosis task „T_RPC“.	

Table 38: Extended Diagnosis > [Folder Name] > General Diagnosis Information

8.5 T_PNIO_EDD

8.5.1 Extended Diagnosis Information

extended Diagnosis Information	
Task states	
Name	Value
Cyclic Frames sent	0
missing cyclic Frames counter (CPM)	0

Figure 82: Extended Diagnosis > T_PNIO_EDD > Extended Diagnosis Informationen

Name	Description
Cyclic Frames sent	Counts the sent cyclic frames
Missing cyclic Frames counter (CPM)	Counts the missing agreed cyclic frames

Table 39: Extended Diagnosis > T_PNIO_EDD > Extended Diagnosis Informationen

EDD: Ethernet Device Driver

8.5.2 XMAC Diagnosis Structure

XMAC diagnosis structure	
Task states	
Name	Value
FramesTransmittedOk	0
SingleCollisionFrames	0
MultipleCollisionFrames	0
LateCollisions	0
LinkDownDuringTransmission	0
UtxUnderflowDuringTransmission	0
FramesReceivedOk	0
FrameCheckSequenceErrors	0
AlignmentErrors	0
FrameTooLongErrors	0
RuntFramesReceived	0
CollisionFragmentsReceived	0
FramesDroppedDueLowResource	0
FramesDroppedDueUrxOverflow	0

Figure 83: Extended Diagnosis > T_PNIO_EDD > XMAC Diagnosis Structure

The values of the XMAC diagnosis structure are read every 2 seconds from the XMACs (hardware).

Name	Description	Range of value/value
FramesTransmittedOk	Number of the correctly received Ethernet frames	0..4294967295
SingleCollisionFrames	Number of the frames involved in a collision	0..4294967295
MultipleCollisionFrames	Number of frames involved in several collisions	0..4294967295
LateCollisions	Number of clashed frames after at least 512bit of the frame have been transmitted	0..4294967295
LinkDownDuringTransmission	Number of frames sent during a broken connection	0..4294967295
UtxUnderflowDuringTransmission	Number of frames sent erroneously because of buffer underflow	0..4294967295
FramesReceivedOk	Number of correctly received frames	0..4294967295
FrameCheckSequenceErrors	Number of corruptly received frames (FCS check failed)	0..4294967295

Name	Description	Range of value/value
AlignmentErrors	Number of received frames whose length is not an integer set of bytes	0..4294967295
FrameTooLongErrors	Number of received frames whose length exceeds the maximum permissible frame length	0..4294967295
RuntFramesReceived	Number of undamaged frames received with a length of 42...63 bytes. (falling below the minimum permissible frame length)	0..4294967295
CollisionFragmentsReceived	Number of damaged received frames with a length of 42...63 bytes. (FCS check failed)	0..4294967295
FramesDroppedDueLowResource	Number of frames lost due to lack of memory	0..4294967295
FramesDroppedDueUrxOverflow	Number of frames sent incorrectly due to buffer underflow	0..4294967295

Table 40: Extended Diagnosis > T_PNIO_EDD > XMAC Diagnosis Structure

EDD: Ethernet Device Driver

XMAC: Flexible Media Access Controller

8.6 T_PNIO_ACP

8.6.1 Extended Diagnosis Information

extended Diagnosis Information	
Task states	
Name	Value
Received unsupported Frames	0
active Consumer Protocol Machines	0
active Provider State Machines	0
received high priority alarms	0
received low priority alarms	0

Figure 84: Extended Diagnosis > T_PNIO_ACP > Extended Diagnosis Information

Name	Description
Received unsupported Frames	Frames which can not be used by the consumer.
active Consumer Protocol Machines	Number of state machines supervised by the cyclical communication consumer = receiver (supervises frames of the IO devices received)
active Provider State Machines	Number of state machines, the frames transmit to the IO devices
received high priority alarms	Number of high priority alarms for PROFINET IO
received low priority alarms	Number of low priority alarms for PROFINET IO

Table 41: Extended Diagnosis > T_PNIO_ACP > Extended Diagnosis Information

ACP: Application Configuration Protocol

8.7 T_PNIO_DCP

8.7.1 Extended Diagnosis Information

extended Diagnosis Information	
Task states	
Name	Value
Active Application Timers Counter	0
Erroneous Frames received	0
Ident Request sent Counter	0
Ident Response received Counter	0
DCP Set Requests sentcounter	0
Positiv DCP Set Responses	0
Negativ DCP Set Responses	0
DCP Hello Requests Received	0
Hello reported to NRPM	0

Figure 85: Extended Diagnosis > T_PNIO_DCP > Extended Diagnosis Information

Name	Description
Active Application Timers Counter	Software timer currently running in the task
Erroneous Frames received	Counter for erroneous frames received
Ident Request sent Counter	Counter for Ident Requests sent
Ident Response received Counter	Counter for Ident Responses received
DCP Set Requests sent counter	Counter for DCP Set Requests sent
Positive DCP Set Responses	Counter for Positive DCP Set Responses
Negative DCP Set Responses	Counter for Negative DCP Set Responses
DCP Hello Requests Received	Counter for DCP Hello Requests received
Hello reported to NRPM	Counter for Hello reported to the NRPM state machine

Table 42: Extended Diagnosis > T_PNIO_DCP > Extended Diagnosis Information

NRPM: Name Resolution PROFINET IO-Controller

8.8 T_PNIO_MGT

8.8.1 Extended Diagnosis Information

extended Diagnosis Information	
Task states	
Name	Value
Ident Requests Sent	0
Ident Responses received (Conflict)	0
Ident Responses received (Forbid)	0
Ident Responses received (Permid)	0
Identify Q Indications received (Multiple)	0
Identify Q Indications received (Forbid)	0
Identify Q Indications received (Permid)	0
NRPM Init Request Counter	0
NRPM Init Confirmation Counter	0
NRPM Init Error Counter	0
Identify Q Indications received (Ident ALL)	0

Figure 86: Extended Diagnosis > T_PNIO_MGT > Extended Diagnosis Information

Name	Description
Ident Requests Sent	PROFINET IO specific service
Ident Responses received (Conflict)	Status of the internal status machines in the controller
Ident Responses received (Forbid)	
Ident Responses received (Permid)	
Identify Q Indications received (Multiple)	Status of the internal status machines in the controller
Identify Q Indications received (Forbid)	
Identify Q Indications received (Permid)	
NRPM Init Request Counter	Counter for special PROFINET IO services
NRPM Init Confirmation Counter	Counter for special PROFINET IO services
NRPM Init Error Counter	Counter for special PROFINET IO services
Identify Q Indications received (Ident ALL)	Counter for special PROFINET IO services

Table 43: Extended Diagnosis > T_PNIO_MGT > Extended Diagnosis Information

MGT: Management Task

8.9 TCPUDP

8.9.1 IP-Information

IP Information	
Task states	
Name	Value
Task State	3
Error Count	2
Last Error	0xC0000101
IP Address	0.0.0.0
Net Mask	0.0.0.0
Gateway	0.0.0.0

Figure 87: Extended Diagnosis > TCP_UDP > IP-Information

Name	Description
Task State	Actual state of the protocol process: 0 = Task not initialized 1 = Task is running 2 = Task initialized 3 = Initialization error
Error Counter	Counter for errors
Last Error	Last occurred error (Description see appropriate Protocol Manual)
IP Address	IP address of the PROFINET IO-Device station.
Net Mask	Network mask of the PROFINET IO-Device station.
Gateway	Gateway address of the PROFINET IO-Device station.

Table 44: Extended Diagnosis > TCP_UDP > IP-Information

8.9.2 IP Packet Counter

IP Packet Counter	
Task states	
Name	Value
Packet Recv TCP	0
Packet Recv UDP	0
Packet Recv ICMP	0
Packet Recv IP Header Err	0
Packet Recv ARP	0
Packet Recv Unknown	0

Figure 88: Extended Diagnosis > TCP_UDP > IP Packet Counter

Name	Description
Packet Recv TCP	Counter for received TCP packets
Packet Recv UDP	Counter for received UDP packets
Packet Recv ICMP	Counter for received ICMP packets
Packet Recv IP Header Err	Counter for received IP packets with errors
Packet Recv ARP	Counter for received ARP packets
Packet Recv Unknown	Counter for received packets of an unknown type

Table 45: Extended Diagnosis > TCP_UDP > IP Packet Counter

8.9.3 TCP_UDP-Information

TCP_UDP Information	
Task states	
Name	Value
Task State	3
Error Counter	2
Last Error	0xC0080032

Figure 89: Extended Diagnosis > TCP_UDP > TCP_UDP Information

Name	Description
Task State	Actual state of the protocol process: 0 = Task not initialized 1 = Task is running 2 = Task initialized 3 = Initialization error
Error Counter	Counter for errors
Last Error	Last occurred error (Description see appropriate Protocol Manual)

Table 46: Extended Diagnosis > TCP_UDP > TCP_UDP Information

8.10 T_RCP

8.10.1 Extended Diagnosis Information

extended Diagnosis Information	
Task states	
Name	Value
PINGs sent	0
PINGs received	0
WORKINGS sent	0
WORKINGS received	0
NOCALLs sent	0
NOCALLs received	0
CANCELS sent	0
CANCELS received	0
REJECTs sent	0
REJECTs received	0
Requests sent	0
Requests received	0
Responses sent	0
Responses received	0
Fragments sent	0
Fragments received	0
Active Application Timers	0

Figure 90: Extended Diagnosis > T_RPC > Extended Diagnosis Information

The parameters under T_RPC > Extended Diagnosis Information represent PROFINET IO specific counters.

For further information refer to the PROFINET IO specification. [2], [3]

8.11 T_PNIO_CMCTL

8.11.1 Extended Diagnosis Information

extended Diagnosis Information	
Task states	
Name	Value
Release Request Counter	0
Received RPC RequestsCounter	0
Sent RPC Requests Counter	0
Module Diff Block Counter	0
Connect Request Counter	0
NRPM Init Request Counter	0
Positive NRPM Init Response Counter	0
Negativ NRPM Init Response Counter	0
Get Device Information counter	0
Read Request counter	0
Positive Read Response Counter	0
Negativ Read Response Counter	0
Write Request counter	0
Positive Write Response Counter	0
Negativ Write Response Counter	0

Figure 91: Extended Diagnosis > T_PNIO_CMCTL > Extended Diagnosis Information

The parameters under T_PNIO_CMCTL > Extended Diagnosis Information represent PROFINET IO specific counters.

For further information refer to the PROFINET IO specification. [2], [3]

CMCTL: Controller Context Management

8.11.2 NRPM (resolution device name) results

NRPM (Device NameResolution) results	
Task states	
Name	Value
Last TLR result (Handle 0)	0x00000000
Last PNIO result (Handle 0)	0x00000000
Last TLR result (Handle 1)	0xFFFFFFFF
Last PNIO result (Handle 1)	0xFFFFFFFF
Last TLR result (Handle 2)	0xFFFFFFFF
Last PNIO result (Handle 2)	0xFFFFFFFF
Last TLR result (Handle 3)	0xFFFFFFFF
Last PNIO result (Handle 3)	0xFFFFFFFF
Last TLR result (Handle 4)	0xFFFFFFFF
Last PNIO result (Handle 4)	0xFFFFFFFF
Last TLR result (Handle 5)	0xFFFFFFFF
Last PNIO result (Handle 5)	0xFFFFFFFF
Last TLR result (Handle 6)	0xFFFFFFFF
Last PNIO result (Handle 6)	0xFFFFFFFF
Last TLR result (Handle 7)	0xFFFFFFFF
Last PNIO result (Handle 7)	0xFFFFFFFF
Last TLR result (Handle 8)	0xFFFFFFFF
Last PNIO result (Handle 8)	0xFFFFFFFF
Last TLR result (Handle 9)	0xFFFFFFFF
Last PNIO result (Handle 9)	0xFFFFFFFF
Last TLR result (Handle 10)	0xFFFFFFFF
Last PNIO result (Handle 10)	0xFFFFFFFF
Last TLR result (Handle 11)	0xFFFFFFFF

Figure 92: Extended Diagnosis > T_PNIO_CMCTL > NRPM (Resolution Device Name) Results

The parameters under T_PNIO_CMCTL > NRPM (resolution device name) Results are PROFINET IO-Controller package status and error codes for the PROFINET IO-Devices 0... 127 connected to the PROFINET IO-Controller in the PROFINET IO network.

Name	Description	Range of value/value
Last TLR error (handle 0)	Error code of the last internally occurred error for the PROFINET IO-Device 0.	Values 0x0000000000 = PROFINET IO Device configured and no error.
Last PNIO error (handle 0)	Error code of the last externally occurred error reported by PROFINET IO-Device 0.	Values other than 0x0000000000 or 0xFFFFFFFF are error codes (see API manual Hilscher status and error codes, Firmware and driver).
...	...	Values 0xFFFFFFFF = no PROFINET IO Device configured.
...	...	
Last TLR error (handle 127)	Error code of the last internal error occurred for the PROFINET IO Device 127.	
Last PNIO error (handle 0)	Error code of the last externally occurred error reported by PROFINET IO-Device 127.	

Table 47: Extended Diagnosis > T_PNIO_CMCTL > NRPM (Resolution Device Name) Results

TLR: Task Layer Reference (Modell)

NRPM: Name Resolution PROFINET IO-Controller

CMCTL: Controller Context Management

8.11.3 Connection establishment results

Connection establishment results	
Task states	
Name	Value
Last TLR result during connection establ...	0x00000000
Last PNIO result during connection esta...	0x00000000
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF
Last TLR result during connection establ...	0xFFFFFFFF
Last PNIO result during connection esta...	0xFFFFFFFF

Figure 93: Extended Diagnosis > T_PNIO_CMCTL > Connection establishment results

The parameters under T_PNIO_CMCTL > Connection establishment results are PROFINET IO-Ccontroller package status and error codes during connection establishment for the PROFINET IO-Devices 0 ... 127.

Name	Description	Range of value/value
Last TLR error during connection establishment (handle 0)	Error code of the last internal error that occurred during connection establishment for the PROFINET IO-Device device 0.	Values 0x0000000000 = PROFINET IO-Device configured and no error.
Last PNIO error during connection establishment (handle 0)	Error code of the last externally occurred error during connection establishment, which was reported by PROFINET IO-Device device 0.	Values other than 0x0000000000 or 0xFFFFFFFF are error codes (see API manual Hilscher status and error codes, Firmware and driver).
...	...	
...	...	
Last TLR error during connection establishment (handle 127)	Error code of the last internal error occurred during connection establishment for the PROFINET IO-Device 127.	Values 0xFFFFFFFF = no PROFINET IO-Device configured.
Letzter PNIO-Fehler beim Verbindungsaufbau (Handle 0)	Error code of the last externally occurred error during connection establishment, which was reported by PROFINET IO-Device 127.	

Table 48: Extended Diagnosis > T_PNIO_CMCTL > Connection construction results

TLR: Task Layer Reference (Modell)

CMCTL: Controller Context Management

8.12 T_PNIO_APCTL

8.12.1 Extended Diagnosis Information

extended Diagnosis Information	
Task states	
Name	Value
active Application Timers	2
Received Alarms	0
Received Diagnosis Alarms	0
Diagnosis entries read by Application	0
Alarms indicated to Application	0
Counter for packets that could not be sent to application	0
Flags	0x00000002

Figure 94: Extended Diagnosis > T_PNIO_APCTL > Extended Diagnosis Information

Name	Erläuterung
Active Application Timer	Number of active software timer
Received Alarms	Alarms read by the application
Received Diagnosis Alarms	
Diagnosis entries read by Application	
Alarms indicated to Application	
Counter for packets that could not be sent to application	Counts how often packets are sent from the firmware to the application and this fails.
Flags	Cached status data

Table 49: Extended Diagnosis > T_PNIO_APCTL > Extended Diagnosis Information

APCTL: Controller Application

8.13 T_PNIO_APCFG

8.13.1 Erweiterte Diagnose Informationen

extended Diagnosis Information	
Task states	
Name	Value
Overhead for database	1716 Byte
Amount of configured IO-Devices	3
Amount of configured IOCRs	6
Amount of configured APIs	3
Amount of configured Modules	9
Amount of configured Submodules	18
Amount of configured SubmoduleDescriptions	18
Amount of configured Data Records	0
Amount of active IO-Devices	3
Amount of configured InterfaceSubmoduleItems	3
Amount of configured PortSubmoduleItems	6

Figure 95: Extended diagnostics > T_PNIO_APCFG > Extended diagnostics information

The parameters under T_PNIO_APCFG > Extended Diagnostic Information are PROFINET IO-specific parameters.

APCFG: Configuration Application

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.

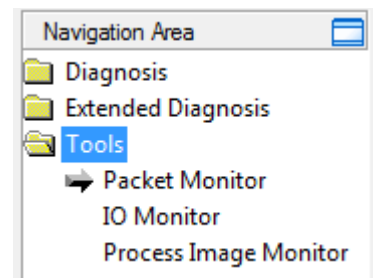


Figure 96: Navigation area - Tools (example)

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 93].

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 97: 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 section:

- 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 section:

- Send data:** A table with 10 columns (0-9) and 7 rows (0-60). The first row (0) has a value of 1 in column 0.
- Counter:** 0
- Buttons:** 'Put cyclic' and 'Put packet'.

Figure 98: 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 50: 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

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

Packet header: This section contains several input fields for packet metadata:

- Dest: 00000001
- Src: 00000000
- Dest ID: 00000000
- Src ID: 00000000
- Len: 00000012
- ID: 0000003E
- State: 00000000
- Cmd: 00002F01
- Ext: 00000000
- Rout: 00000000

Receive data: This section displays the raw data of the packet in a hexadecimal grid. The counter is 0. The data is shown in a 10-column grid (0-9) and 10-row grid (0-9). The first row (0) contains: 00, 00, 00, 00, 00, 00, 00, 00, 00, 04. The second row (1) contains: 00, 00, 01, 00, 01, 00, 00, 00, 00, 00. The remaining rows (2-9) are empty.

Figure 99: 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 51: 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.

IO Monitor

Columns: 10 Display mode: Decimal

Input data

Offset: 0 Go

	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

Output data

Offset: 0 Go

	0	1	2	3	4	5	6	7	8	9
0	0	0	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

Update

Figure 100: 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 window **Process image monitor** 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**.

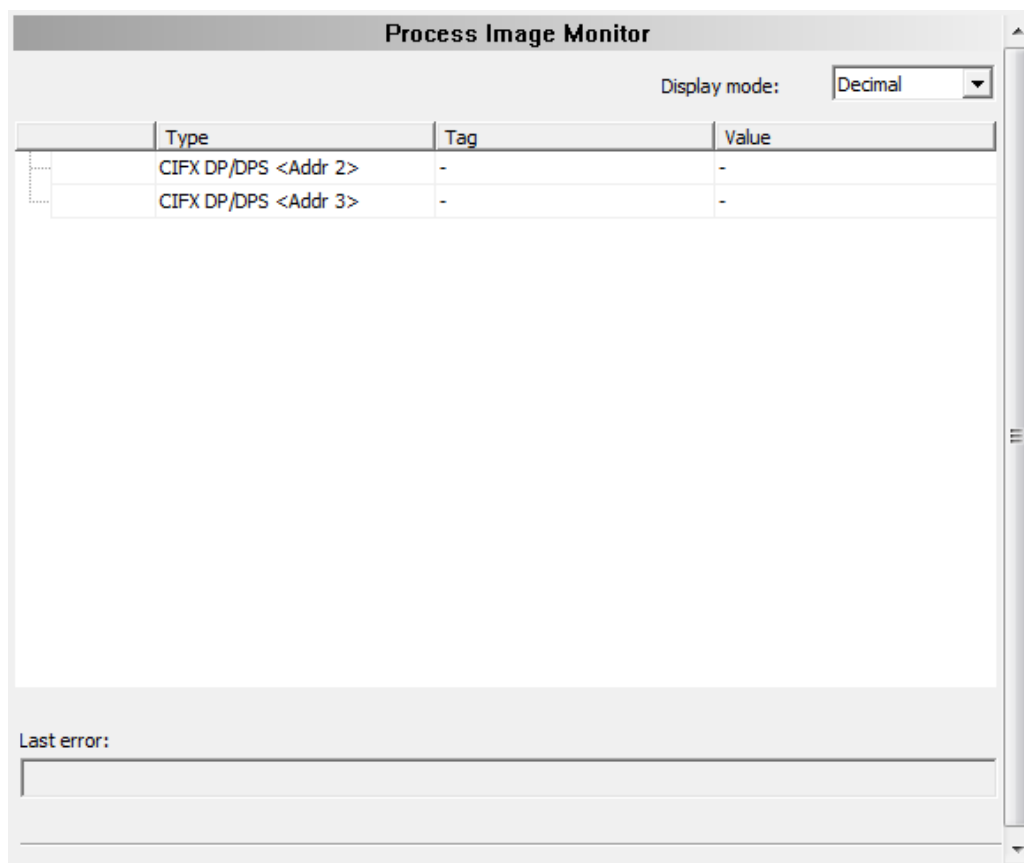
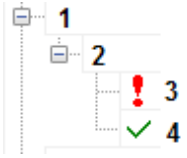





Figure 101: Window "Process image monitor"

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 window Configuration > Process data).	
Value	Display of the valid input and output data values.	
Last error	Last occurred error (Description see appropriate Application Programming Manual)	

Table 52: Notes to the "Process image monitor" window

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.
- [2] Hilscher Gesellschaft für Systemautomation mbH: Protocol API, PROFINET IO RT Controller V2.7, Protocol API Manual, Revision 19, DOC050901API19EN, English, 2015-05.
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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
- [5] Hilscher Gesellschaft für Systemautomation mbH: API, Hilscher status and error codes, Firmware and driver, Revision 5, DOC100802API05EN, English, 2019-11.

Safety standard

American National Standards Institute, Inc.: American National Standard, Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials, ANSI Z535.6-2016, English, 2016.

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 27]	D	D	X	X	X
	Configuring netX driver [► page 30]	D	D	X	X	X
Device Assignment	Scanning for devices [► page 37]	D	D	X	X	X
	Selecting the device (with or without firmware) [► page 40]	D	D	X	X	X
	Selecting the device once more (with firmware) [► page 40]	D	D	X	X	X
	Selecting and downloading firmware [► page 42]	D	D	X	X	X
Licensing	Licensing [► page 48]	D	D	X	X	X

Table 53: User rights settings (D = displaying, X = editing, configuring)

10.2.2 Configuration

Configuration parameters	Observer	Operator	Maintenance	Planning engineer	Administrator
Controller network settings [► page 78]	D	D	X	X	X
Device table [► page 79]	D	D	X	X	X
IP address table [► page 81]	D	D	X	X	X
Process data [► page 83]	D	D	X	X	X
Address table [► page 84]	D	D	X	X	X
FSU/port settings [► page 86]	D	D	X	X	X
Stations timing [► page 88]	D	D	X	X	X
Master settings	D	D	X	X	X

Table 54: 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 55: Signs

Signal words





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

Table 56: 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	General Station Description Markup Language file: special kind of XML-based Device Description File used by PROFINET
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.

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	Is specified by the DNS-compatible name for the device from the GSD file, which can be changed according to the DNS name specification, or is set by the PROFINET IO-Controller if the PROFINET IO-Device uses the name baptism.
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)
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 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
RPC	Remote Procedure Call: Mechanism to call a code on another computer in the network (standard used by PROFINET)
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

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