hilscher
COMPETENCE IN COMMUNICATION

Operating instruction manual

DTM for Hilscher DeviceNet Master devices
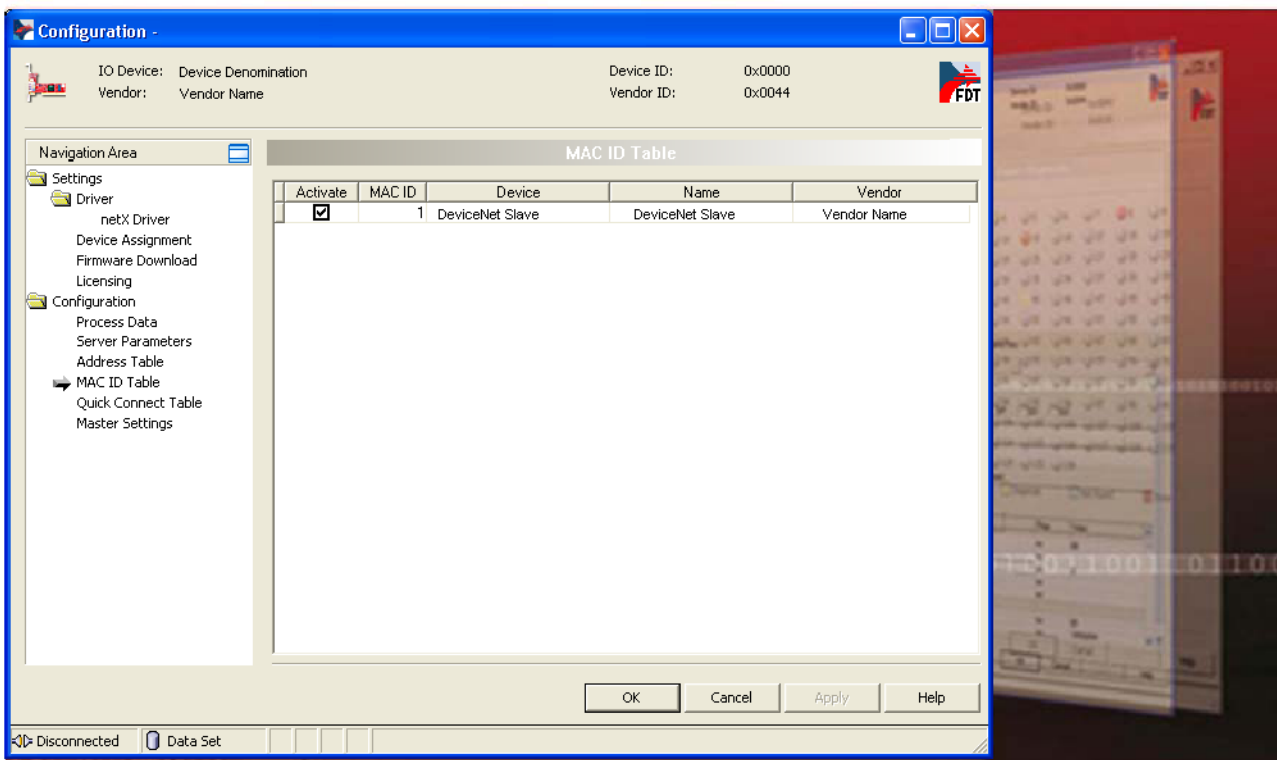## Configuration of Hilscher master devices
V1.1000

DeviceNet™

Configuration -

| IO Device: | Device Denomination | Device ID: | 0x0000 |
| Vendor: | Vendor Name | Vendor ID: | 0x0044 |

Navigation Area

- Settings
    - Driver
        - netX Driver
    - Device Assignment
    - Firmware Download
    - Licensing
- Configuration
    - Process Data
    - Server Parameters
    - Address Table
    - → MAC ID Table
    - Quick Connect Table
    - Master Settings

MAC ID Table

Activate	MAC ID	Device	Name	Vendor
☑	1	DeviceNet Slave	DeviceNet Slave	Vendor Name

OK   Cancel   Apply   Help

Disconnected   Data Set

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Table of contents

1 Introduction

1.1 About this manual

This manual provides information on how to set and configure the device parameters of a netX based DeviceNet Master device using the DeviceNet Master 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 DeviceNet Slave devices, how to configure the DeviceNet Slave 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 DeviceNet Master 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
16	2022-06-13	1.1000	DNMasterDTM.dll, DNMasterGUI.ocx	Document revised. Chapter Error codes removed. See API Manual "Hilscher status and error codes" instead.
17	2022-06-27	1.1000	DNMasterDTM.dll, DNMasterGUI.ocx	Section *Overview extended diagnosis* [▷ page 108] updated.

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	• Creating project configuration • Start/stop communication	*Device start up* [▶ page 17] *Create project configuration* [▶ page 21] *Start/stop communication* [▶ page 23]
Driver and device assignment settings	• Verifying or adapting driver settings • Configuring drivers • Assigning device (with or without firmware) • Selecting and downloading firmware	*Overview settings for driver and device assignment* [▶ page 24] *Verifying or adapting driver settings* [▶ page 27] *Configuring drivers* [▶ page 29] *Assigning device (with or without firmware)* [▶ page 36] *Selecting and downloading firmware* [▶ page 41]
Licensing	(licenses for master protocols)	*Licensing* [▶ page 48]
Configuring device parameters	• Set bus parameters • Set server parameters • Set process data • Set device address • Set device for data exchange • Configure fast user data exchange • Master settings	*Overview of configuring device parameters* [▶ page 60] *Bus parameters* [▶ page 63] *Server parameters* [▶ page 65] *Process data* [▶ page 66] *Address table* [▶ page 67] *MAC ID table* [▶ page 68] *Quick connect table* [▶ page 70] *Master settings* [▶ page 74]
Connecting/disconnecting device	Establishing online connection	*Connecting/disconnecting device* [▶ page 78]
Downloading configuration	Download to the device	*Download configuration* [▶ page 80]
Importing network structure and upload	Identifying network configuration automatically.	*Network scan and upload* [▶ page 82]
Diagnosis	• General diagnosis • Master diagnosis • Bus diagnosis • Station diagnosis • Firmware diagnosis	*Overview diagnosis* [▶ page 93] *General diagnosis* [▶ page 94] *Master diagnosis* [▶ page 96] *Bus diagnosis* [▶ page 97] *Station diagnosis* [▶ page 100] *Firmware diagnosis* [▶ page 101]
Live List	Overview device presence	*Live list* [▶ page 102]
Debug mode	Status of the cyclic master/slave communication	*Debug mode* [▶ page 103]
Extended diagnosis	Finding communication/configuration errors.	*Extended diagnosis* [▶ page 108]
Packet Monitor	Test of send and receive data.	*Packet monitor* [▶ page 117]
IO Monitor	Test of communication.	*I/O monitor* [▶ page 120]
Process Image Monitor	Display fieldbus structure and data structure of the input and output data of the devices transmitted on the bus.	*Process image monitor* [▶ page 121]
User rights	Definition of access rights	*User rights* [▶ page 124]

Table 2: Overview use cases

1.3   About the DeviceNet Master DTM

Important:
For a 2-channel device, channel 1 or channel 2 must be assigned to the DTM consecutively, and each must be configured individually.

The DeviceNet Master DTM is used to configure a DeviceNet Master device. The configuration is done using the FDT frame application SYCON.net, which serves as configuration software.

1.4   Requirements DeviceNet Master DTM

To configure the a DeviceNet Master device with the DeviceNet Master DTM the following requirements have to be accomplished:

- Completed hardware installation of a netX based DTM-compatible DeviceNet Master 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 DeviceNet Master DTM and the DeviceNet Master 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".

1.5   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.

1.6   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.
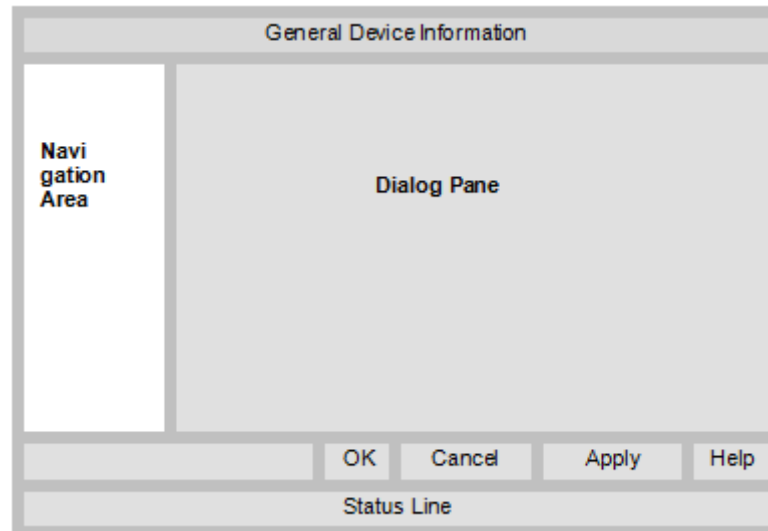
Figure 1: Dialog structure DeviceNet Master DTM

1.6.1   General device information

Parameter	Description
IO device	Device name
Vendor	Vendor name of he 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.
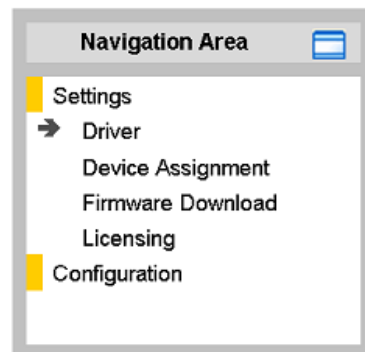
Figure 2: Navigation area

➢ 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**.
	• **Yes**: The changes are saved or the changed values are applied on the frame application database. The dialog then closes.
	• **No**: The changes are *not* saved or the changed values are *not* 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.
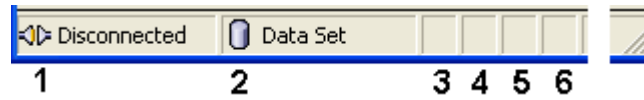
Figure 3: Status bar – status fields 1 to 6

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 date set**	
		Valid Modified: Parameter is changed (not equal to data source).
4	**Changes directly made on the Device**	
		Load/configure diagnosis parameters: Diagnosis is activated.
6	**Device diagnosis status**	
		Save operation succeeded: The save operation has been successful. Further messages due to successful handling of device data.
		Firmware Download: Firmware download is running
		Save operation failed: The save operation has failed. Further fail operation messages due to incorrect communication due to malfunction in the field device or its peripherals.

Table 5: Status bar icons [1]
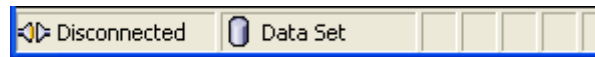
Offline state	
Save operation succeeded	
Firmware download	
Firmware download successful	
Online state and diagnosis	
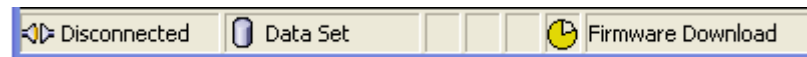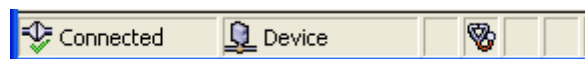
Table 6: Status bar display examples

2   Safety

2.1   General note

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

2.2   Intended use

The DeviceNet Master DTM serves for configuration and diagnosis of DeviceNet Master 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 DeviceNet Master 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.

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 DeviceNet Master 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 DeviceNet Master DTM, adhere to the following warnings:

⚠ WARNING

Communication stop caused by firmware or configuration download

Initiating a firmware or configuration dowload 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.

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3   Device start up

3.1   Configuration steps

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

> **Important:**
> For a 2-channel device, channel 1 or channel 2 must be assigned to the DTM consecutively, and each must be configured individually.

Step	Brief description	Further information
Add DeviceNet Slave 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 *Create project configuration* [▸ 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 master device and the slave device and into configuration	- In the **Device catalog**, select the master device and insert the device via drag & drop **to the line** in the network view. - In the **Device catalog**, select 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 window. When sorting by fieldbus, display of multiple devices with identical names by different vendors is possible.	
Open master DTM configuration dialog	Open the master DTM configuration dialog. - Double click to the device icon of the master. - The master DTM configuration dialog is displayed.	-
Verify or adapt driver settings	In the master 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. • Use the **cifX device driver** if the DeviceNet Master DTM is installed on the same PC as the DeviceNet Master device. • Use the **netX driver** to establish a USB, Serial (RS232) or TCP/IP connection from the DeviceNet Master DTM to the DeviceNet Master 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 *Overview settings for driver and device assignment* [▸ page 24] or *Verifying or adapting driver settings* [▸ page 27]

Step	Brief description	Further information
Configure driver	If you use the **netX driver**, you respectively must configure it. For **netX Driver and communication via TCP/IP** set the IP adress of the device. - Select **Settings** > **Driver** > **netX driver** > **TCP connection**. - Via [icon] add an IP range. - Under **IP address** enter the IP Address of the device or an IP range. - Click **Save**. Adjust the driver parameters **netX driver USB/RS232** only if they differ from the default settings. **Note!** • 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.	*Configuring netX driver* [▶ page 30]
Assign master device (with or without firmware)	Assign the master device to this driver. In the master DTM configuration dialog: - Select **Settings** > **Device assignment**, - select a master device (with or without firmware), - therefore check the appropriate checkbox. - Click **Apply**.	*Assigning device (with or without firmware)* [▶ page 36]
Select and download firmware	If not yet a firmware was loaded to the device: - Adhere to the necessary safety precautions to prevent personnel injury and property damage. In the master DTM configuration dialog: - Select **Settings** > **Firmware download**, - clock **Browse..**, - select a firmware file, - click **Open**. - Click **Download** and **Yes**.	*Safety messages on firmware or configuration download* [▶ page 16] *Selecting and downloading firmware* [▶ page 41]
Assign master device once more (with firmware and system channel) *For repeated download this step is omitted.*	In the master DTM configuration dialog: - Select **Settings** > **Device assignment**, - click **Scan**, - select the master device (with loaded and defined system channel), - therefore check the appropriate checkbox. - Click **Apply**. - Close the master DTM configuration dialog via **OK**.	*Selecting the device once more (with firmware)* [▶ page 39]
Configure slave device* (*This step will not be necessary if the network structure is scanned automatically.)*	Configure the slave device. - Double click to the device icon of the slave. - The slave DTM configuration dialog is displayed. In the slave DTM configuration dialog: - Select **Configuration** > **General**, - set UCMM and Fragmentation Timeout, - select **Configuration** > **Connection**, - configure the device connection, - select **Configuration** > **Parameters**, - set the parameter data of the device. - Close the slave DTM configuration dialog via **OK**.	Operating instruction manual "Generic DTM for DeviceNet Slave devices"

Step	Brief description	Further information
Configure master device	Configure the master device. - Double click to the device icon of the master. - The master DTM configuration dialog is displayed. In the master DTM configuration dialog: - Select **Configuration** > **Bus parameters**, - set the bus parameters. - Select **Configuration > Server parameter**, - set the server parameters. - Select **Configuration > Process data**, - set symbolic names for the configured modules or signals. - Select **Configuration > MAC ID table**, - set the MAC ID table options. - Select **Configuration > Quick connect table**, - check **Quick connect** for the Slave device(s), which shall work as „Quick Connect" Slave. - Select **Configuration > Master settings**, - set the Master Settings. - Close the master DTM configuration dialog via **OK**.	Sections *Overview of configuring device parameters* [▷ page 60] *Bus parameters* [▷ page 63] *Server parameters* [▷ page 65] *Process data* [▷ page 66] *Address table* [▷ page 67] *MAC ID table* [▷ page 68] *Quick connect table* [▷ page 70] *Master settings* [▷ page 74]
Save project	- Select **File** > **Save**.	Operating instruction manual "SYCON.net"
Connect master device	- Right click to the device icon of the master, - select **Connect**.	Section *Connecting/ disconnecting device* [▷ page 78]
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 master, - select **Download**.	Section *Safety messages on firmware or configuration download* [▷ page 16] or *Download configuration* [▷ page 80]
Network scan / upload	Alternative to manual configuration of the slave device, you can scan the network structure (in the master DTM) and upload the slave device configuration. Proceed as follows: 1. Click **Network scan**. 2. Make the settings in the **Scan response** dialog. 3. Click **Create devices**. 4. Click **Upload** (in the slave DTM), and create the slave device connection configuration. 5. Download the current slave device configuration to the master device.	Section *Network scan and upload* [▷ page 82]
Diagnosis	- 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**.	Section *Diagnosis* [▷ page 93] Section *Extended diagnosis* [▷ page 108]
Live list	Via the context menu **Additional functions** > **Live list** you can display the devices present at the bus.	Section *Live list* [▷ page 102]

Step	Brief description	Further information
Diagnosis	- 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**.	Section *Diagnosis* [▶ page 93] Section *Extended diagnosis* [▶ page 108]
I/O monitor	- 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/O monitor* [▶ page 120]
Disconnect	- Right click to the device icon of the Master, - select **Disconnect**.	Section *Connecting/ disconnecting device* [▶ page 78]

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 slave device, you can automatically scan the network structure by using the context menu **Network scan**. Then you can create the module configuration of the slave device by configuration upload and download it to the master device.

Take the following steps:

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

For more information, refer to the section *Network scan and upload* [▶ page 82].

3.4   Start/stop communication

You can manually start or stop the communication between a DeviceNet Master device and DeviceNet Slave 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 DeviceNet Slave DTM to the DeviceNet Slave device is required. Further information can be found in the section *Connecting/disconnecting device* [▶ page 78].

➢ 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 DeviceNet Master DTM to the DeviceNet Master 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.
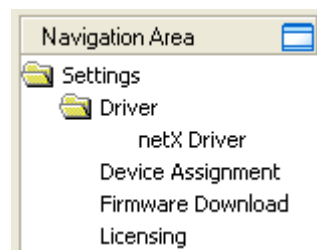
Figure 4: Navigation area - Settings (example)

There may be more drivers.

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

> **Important:**
> For a 2-channel device, channel 1 or channel 2 must be assigned consecutively to the DTM.

Overview on steps

To establish a connection between the DeviceNet Master DTM and the DeviceNet Master device, the following steps are required:

1. Verifying or adapting driver settings

   ➢ In the FDT container, **netDevice** double-click on the DeviceNet Master 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 DeviceNet Master DTM is installed on the same PC as the DeviceNet Master device.

- Use the **netX driver** to establish an USB, Serial (RS232) or TCP/IP connection from the DeviceNet Master DTM to the DeviceNet Master 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 master 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 DeviceNet Master icon.

➢ Select the **Connect** command from the context menu.

⇨ In the network view, the device description at the device icon of the master is displayed with a green colored background. The DeviceNet Master device now is connected to the DeviceNet Master 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 36], *Selecting and downloading firmware* [▶ page 41]or *Licensing* [▶ page 47].

Descriptions of the netX Driver are avaible 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 DeviceNet Master 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
☑	CIFX Device Driver	1.101.1.9801	{368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}
☐	3SGateway Driver for netX (V3.x)	0.9.1.2	{787CD3A9-4CF6-4259-8E4D-109B6A6BEA91}
☐	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
☐	CIFX Device Driver	1.101.1.9801	{368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}
☐	3SGateway Driver for netX (V3.x)	0.9.1.2	{787CD3A9-4CF6-4259-8E4D-109B6A6BEA91}
☑	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 DeviceNet Master DTM to the DeviceNet Master 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 DeviceNet Master DTM to the DeviceNet Master device must be supported by the device and must be available for the device.

- Use the **cifX device driver** if the DeviceNet Master DTM is installed on the same PC as the DeviceNet Master device.

- Use the **netX driver** to establish an USB, Serial (RS232) or TCP/IP connection from the DeviceNet Master DTM to the DeviceNet Master 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
☑	CIFX Device Driver	1.101.1.9801	{368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}
☐	3SGateway Driver for netX (V3.x)	0.9.1.2	{787CD3A9-4CF6-4259-8E4D-109B6A6BEA91}
☑	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 DeviceNet Master 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 DeviceNet Master DTM is installed in the same PC as the DeviceNet Master device.

> **Note:**
> To establish a connection from a DTM to a master device via the **cifX device driver**, the cifX device driver must be installed and the driver must have access to the master 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
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	In the error detection in data transmission using parity bits, "parity" describes the number of bits occupied with 1 in the transmitted information word. No Parity: no parity bit Odd Parity: The parity is "odd" if the number of bits occupied with 1 in the transmitted information word will be odd. Even parity: The parity is "even" if the number of bits occupied with 1 in the transmitted information word will be even. Mark Parity: if the parity bit is always 1, this will be named mark-parity (the bit does not contain any information). Space Parity: if the parity bit always 0, this will be named space-parity (the bit represents an empty space).	No Parity, Odd Parity, Even Parity, Mark Parity, Space Parity; Default (RS232): No Parity
Keep alive timeout	The "Keep Alive" mechanism is used to monitor whether the connection to the device is active. connection errors are detected using a periodic heartbeat mechanism. The heartbeat mechanism will be initiated after the set time has elapsed if the communication has failed.	100 … 60.000 [ms]; Default (RS232 und USB): 2000 ms
Restore	Resets all settings in the configuration dialog to the default values.	
Save	Saving all settings made in the configuration dialog **cifX driver** > **USB/RS232 connection**, i. e. only for the selected connection type.	
Save all	Saving all settings made in the configuration dialog **cifX driver**, i. e. for all connection types.	

Table 9: Parameters cifX driver > USB/RS232 connection

4.3.5   netX driver - TCP/IP connection

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

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

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

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

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

4.3.5.1 Driver parameters for cifX driver - TCP/IP connection

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

➢ Open the **TCP connection** dialog via navigation area **Settings** > **Driver** > **netX driver**.

↳ The dialog **netX driver** is displayed:

➢ Select **TCP connection**.
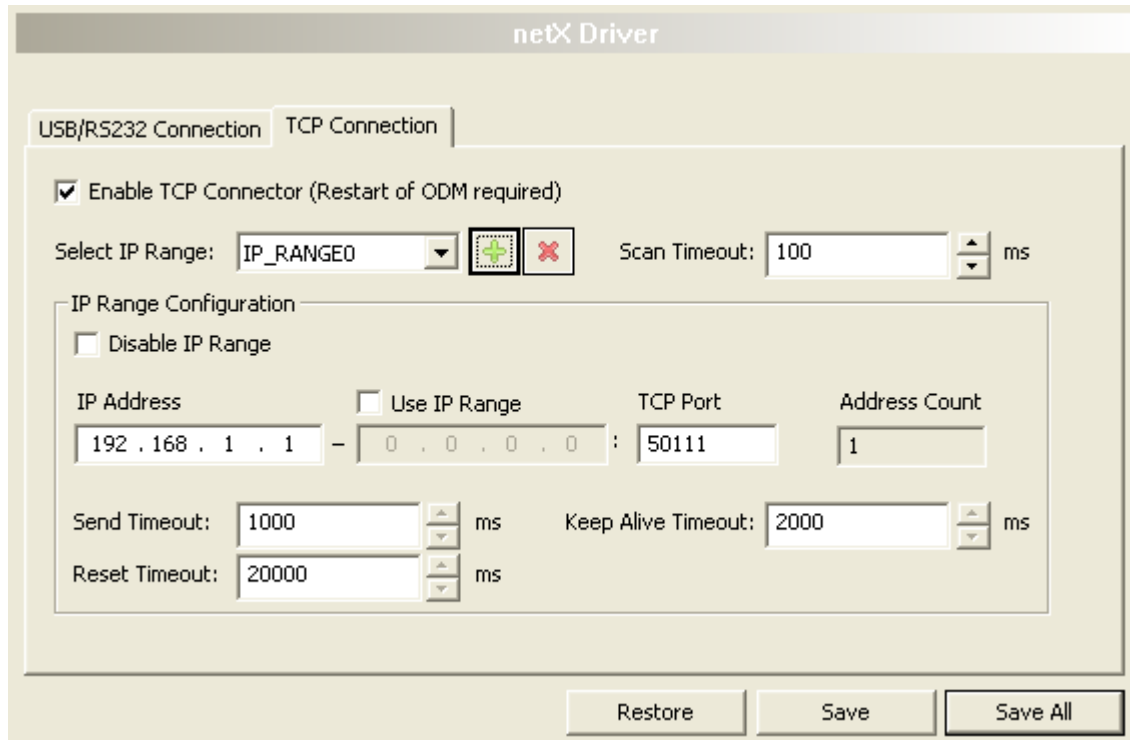
Figure 9: netX driver > TCP connection

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

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

Table 10: Parameters netX driver > TCP connection

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

4.4   Assigning device (with or without firmware)

> **Note:**
> In the **Device assignment** dialog pane, you first must assign the DeviceNet Master device to the DeviceNet Master DTM by checking the check box. This is essential to establish an online connection from the DeviceNet Master DTM to the DeviceNet Master device later, as described in section *Connecting/disconnecting device* [▶ page 78].

Therefore, in the **Device assignment** dialog pane you scan for the DeviceNet Master 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.

> **Important:**
> For a 2-channel device, channel 1 or channel 2 must be assigned consecutively to the DTM.

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 DeviceNet Master DTM via the preselected driver.

	Device	Hardware Port 0/1/2/3	Slot number	Serial number	Driver	Channel Protocol	Access path
☐	Device C/.	-/-/PROFIBUS/-	1	20148	CIFX Device Driver	Undefined Undefined	...\cifX3_SYS
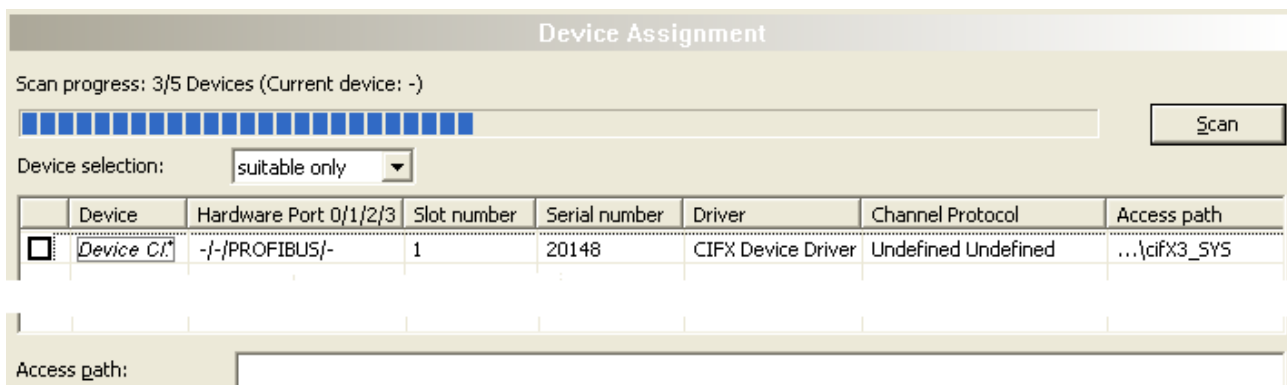
Figure 10: Device Assignment - detected devices (example: device without firmware)

> **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 *suitable only* or *all* devices.	suitable only, all
Device	*The device name (= name of the device class) of the DeviceNet Master 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).	1 to 9, n/a
	The indication **n/a** means, that no **Slot nummer (card ID)** exists. This will occure 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).	
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.	Depending on the device and on the driver: board or channel number, IP address or COM interface
	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	
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.	Driver identification (ID) Depending on the device and on the driver: board or channel number, IP address or COM interface
	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	

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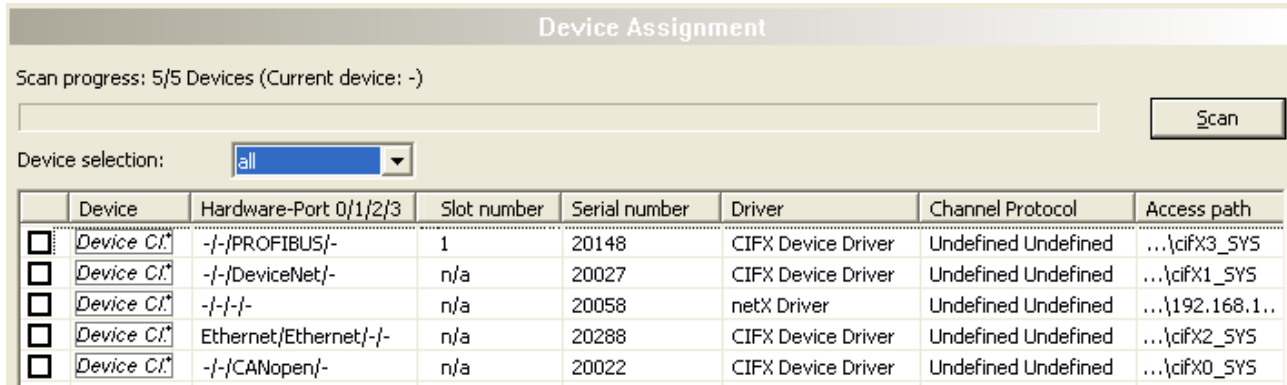
Figure 11: Device Assignment - detected devices (example: device without firmware)

↳ 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 DeviceNet Master 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 DeviceNet Master DTM can only be established with *one* DeviceNet Master device.

To select the physical DeviceNet Master 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.

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

Note:
Before an online connection from the DeviceNet Master DTM to the DeviceNet Master 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 41] or to section *Selecting the device once more (with firmware)* [▷ page 39].

4.4.3 Selecting the device once more (with firmware)

Note:
For repeated download this step is omitted.

To select the DeviceNet Master 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 DeviceNet Master DTM via the preselected drivers.

➢ Check the appropriate device.

➢ Select **Apply**, to apply the selection.

➢ Or select **OK**, to apply the selection and to close the DTM interface dialog.

➢ Connect the DTM to the device using the context menu (right mouse click).

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

Note:

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

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

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

cifX[*0toN*] = board number 0 to N

Ch[*0to3*] = channel number 0 to 3

For further information how to establish an online connection from the DeviceNet Master DTM to the DeviceNet Master device, refer to section *Connecting/disconnecting device* [▷ page 78].

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.
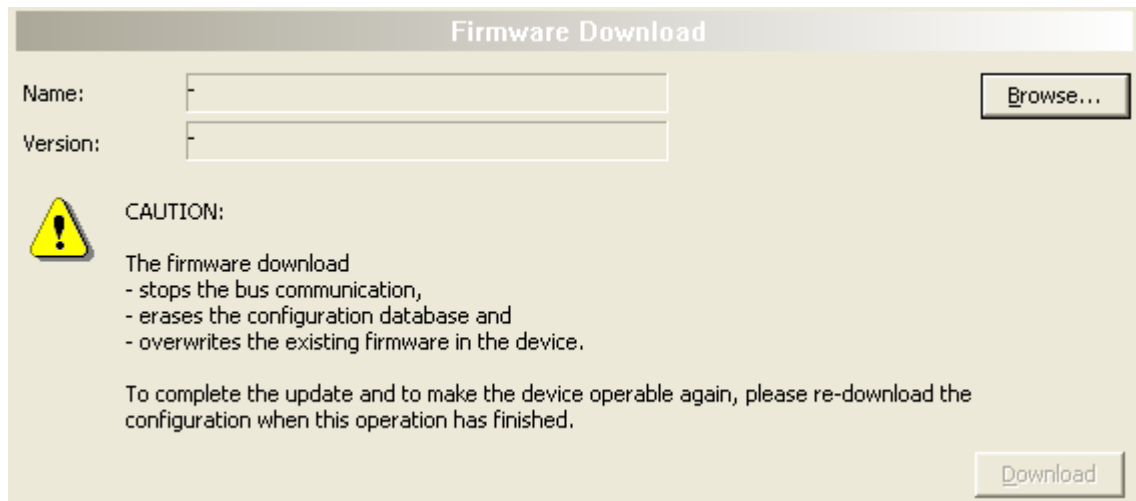
Figure 14: Firmware download

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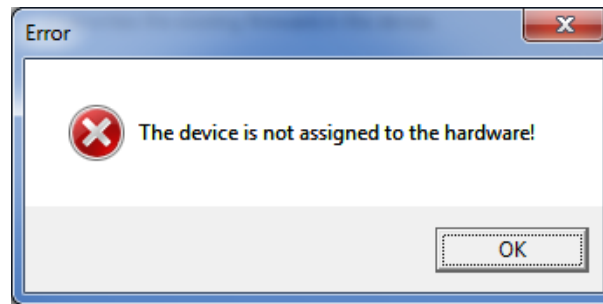
Figure 15: Error Message "The device is not assigned to the hardware!"

➢ Click **OK** and select and assign the master device as described in section *Assigning device (with or without firmware)* [▶ page 36].

↳ 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**.
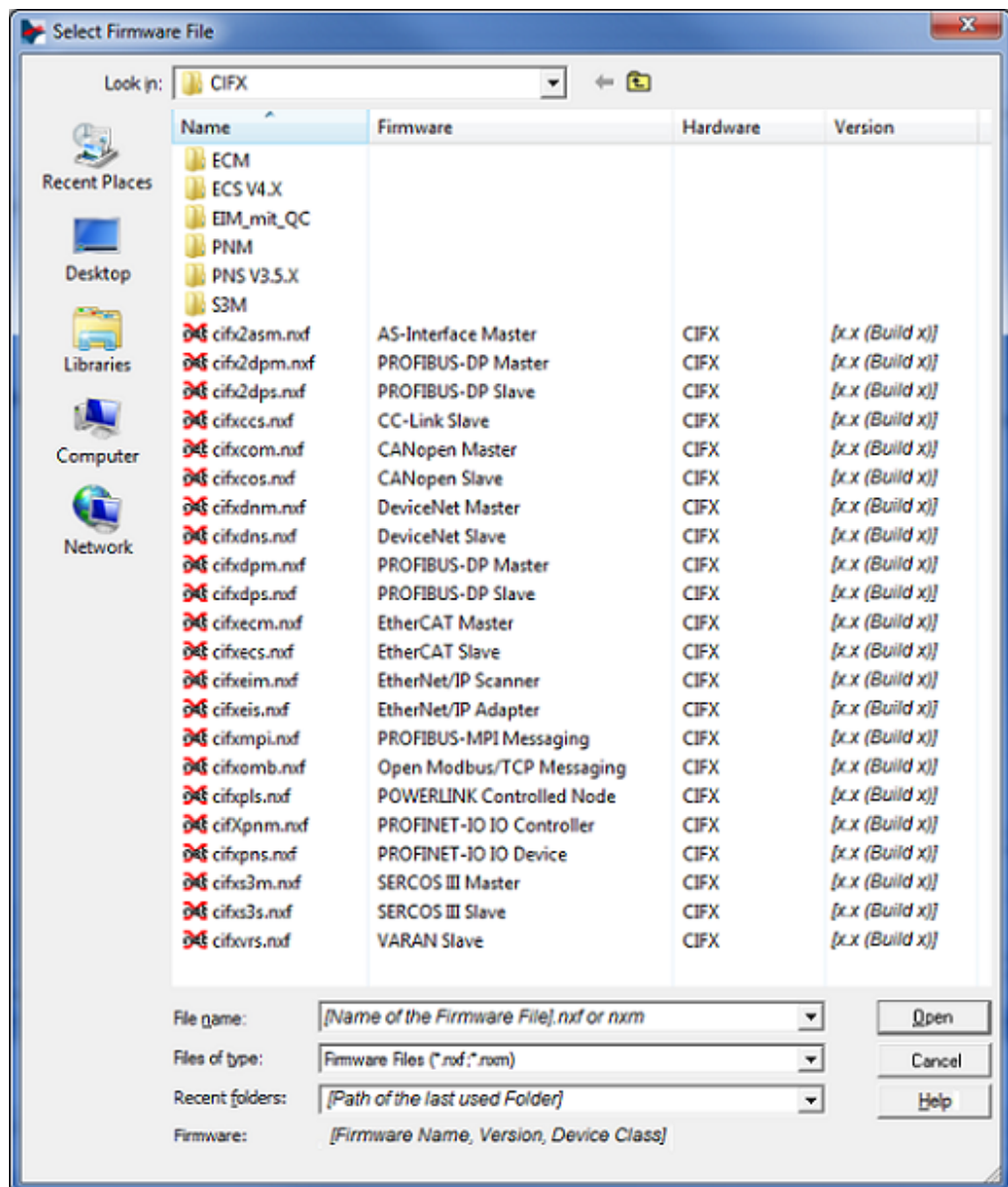
Figure 16: "Select firmware file" selection window (example CIFX)
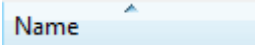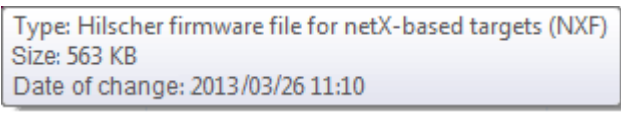
Parameter	Description	Range of value / value
Column **Name**	File name of the firmware file To sort the entries of the window **Select firmware file** by name click to the column head Name .	nxf, nxm
Column **Firmware**	Name of the firmware (consisting of the protocol name and the protocol class)	
Column **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. Type: Hilscher firmware file for netX-based targets (NXF) Size: 563 KB Date of change: 2013/03/26 11:10	
File of Type	*"All Files (*.*)"* if before in the **Device assignment** pane the list entry **all** was selected. *"Firmware Files (*.nxm)"* or *"Firmware Files (*.nxf)"* if before in the **Device assignment** pane under **Device selection - suitable only** was selected.	All Files (*.*), Firmware Files (*.nxm), Firmware Files (*.nxf)
Recent folders	Path of the recently opened folder	
Firmware	As soon as the firmware file has been selected, under **Firmware** the name, the version and the build version as well as the device class for the selected firmware is displayed.	Name, Version, Build Version, Device Class for the selected firmware
Help	Button to open the online help of the DTM.	

Table 13: Parameters "Select firmware file"

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

Note:

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

(for the list box entry ->)	all	suitable only
In the selection window **Select firmware file**:	all files from the selected folder	only firmware files from the selected folder
Under **File of type***:	"All Files (*.*)"	"Firmware files (*.nxm)", "Firmware Files (*.nxf)"
Validation:	A restricted validation will be performed if the selected firmware is applied for the download.	A validation is made whether the firmware file is suitable for the DeviceNet Master 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 DeviceNet Master 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.
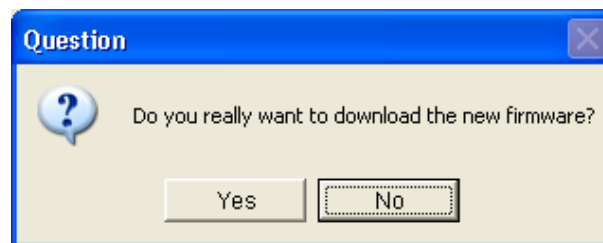
Figure 18: Request - Do you really want to download the firmware?

➢ 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.
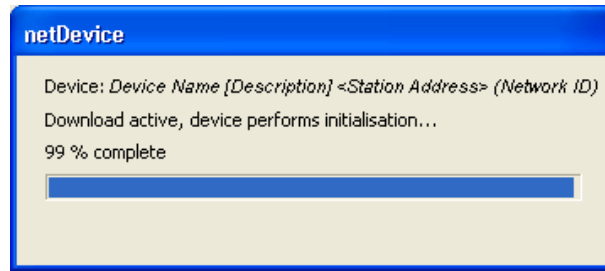
Figure 19: Firmware download - progress bar
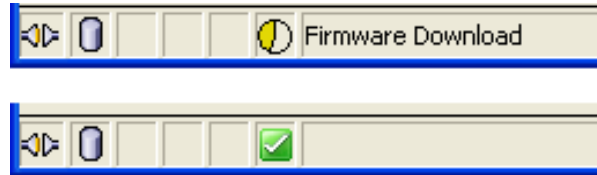
Figure 20: Clock symbol and hook symbol green
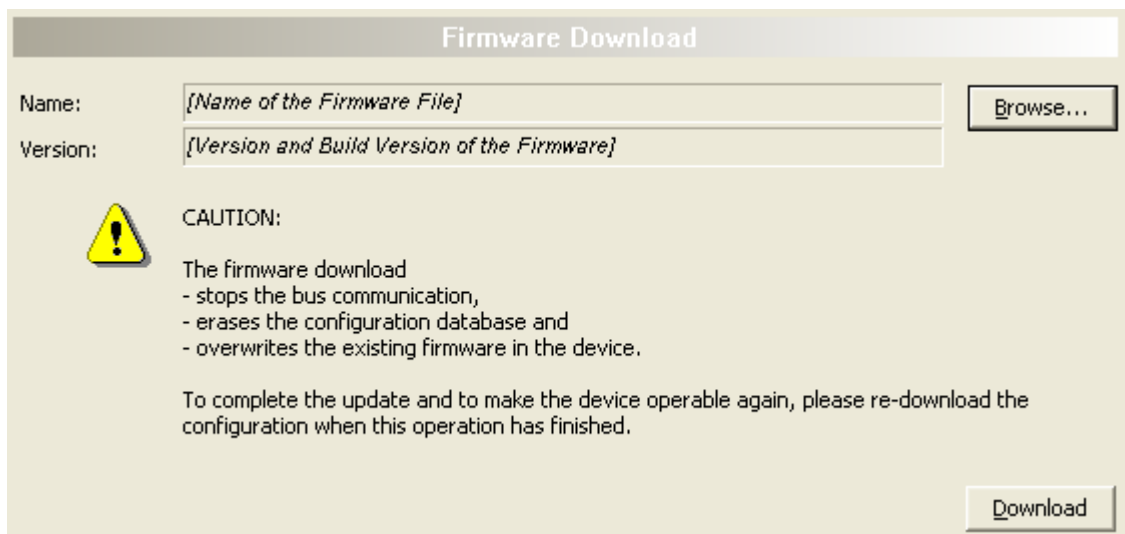
Figure 21: Firmware download - download

4.6   Licensing

To open the Licensing pane:

➢ In the navigation area select **Settings** > **Licensing**.

↳ The dialog pane **Licensing** is displayed.

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 48].

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),
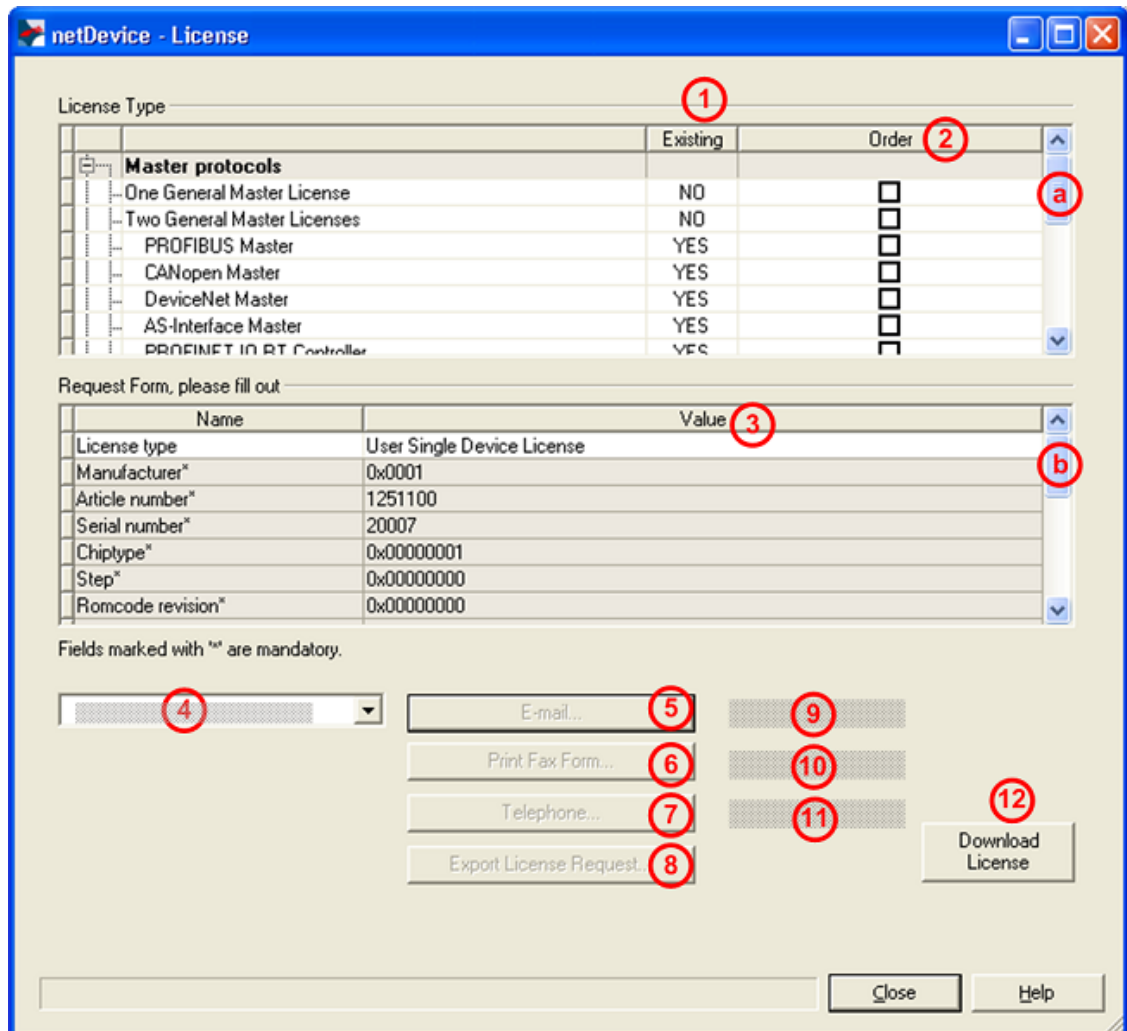
Figure 23: License pane

> **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 48].
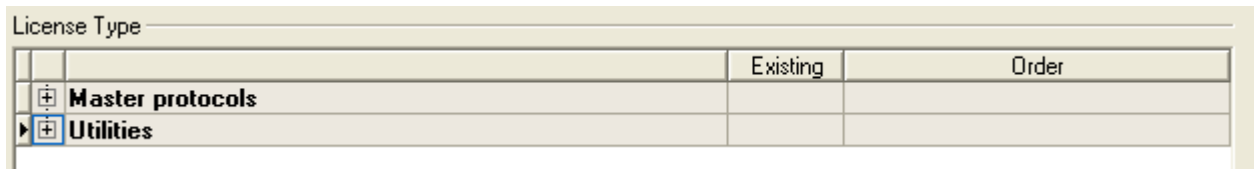
Figure 24: License pane - License Type

➢ Under **License type** click ➕ at **Master protocols**.

↳ The **Master protocols** overview opens:
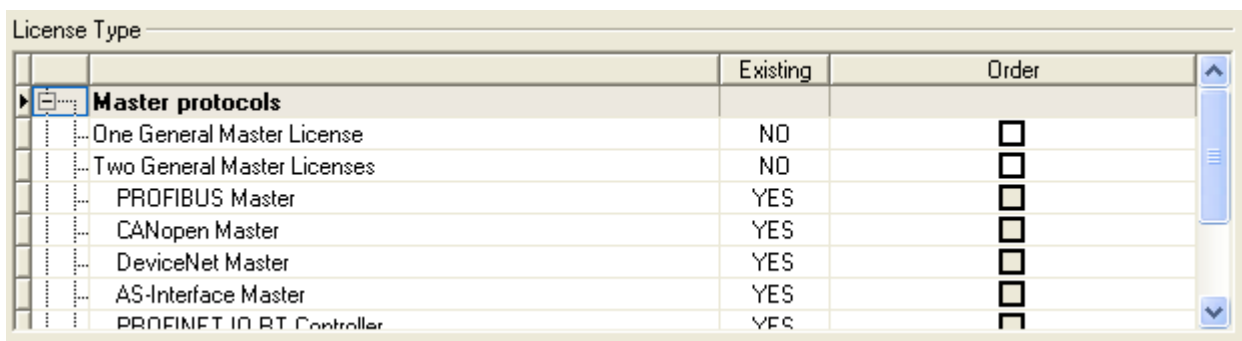
Figure 25: License pane – License Type / Master protocols

➢ Or click ➕ at **Utilities**.

↳ The **Utilities** overview opens:
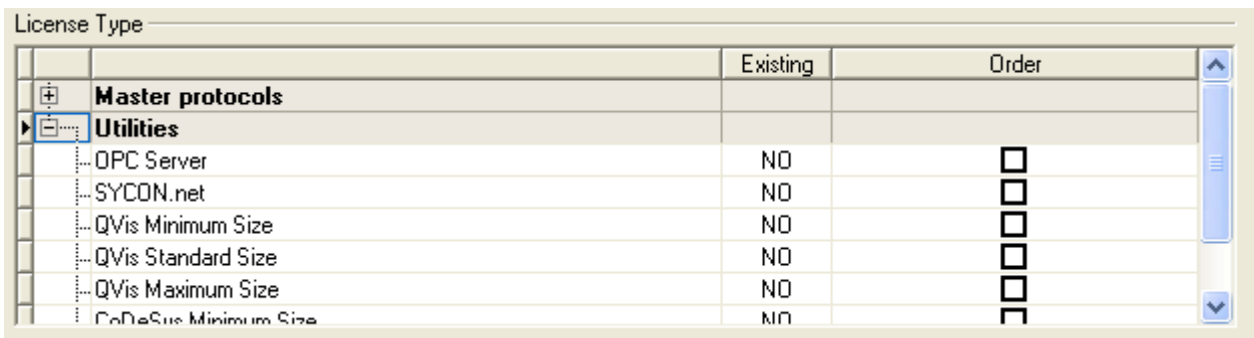
Figure 26: License pane – License Type / Utilities

↳ 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 48].
2. Select the required licenses.
   - ➢ Refer to Section *Selecting license(s)* [▶ page 52].
3. Enter the ordering data.
   - ➢ Refer to Section *Ordering data* [▶ page 53].
4. Place your order.
   - ➢ Refer to Section *Ordering the license* [▶ page 55].

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 54]).

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:

Name	Value
Manufacturer*	0x0001
Article number*	1251100
Serial number*	20007
Chiptype*	0x00000001
Step*	0x00000000
Romcode revision*	0x00000000
Checksum*	G

Request Form, please fill out

Fields marked with '*' are mandatory.
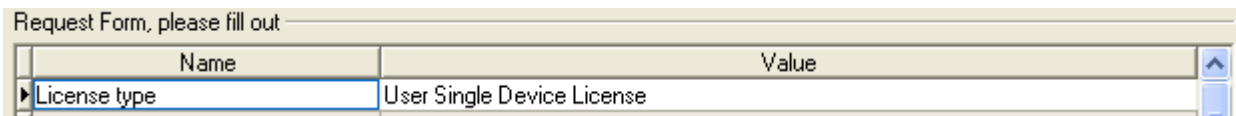
Figure 27: License pane - request form, please fill out / device information

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:
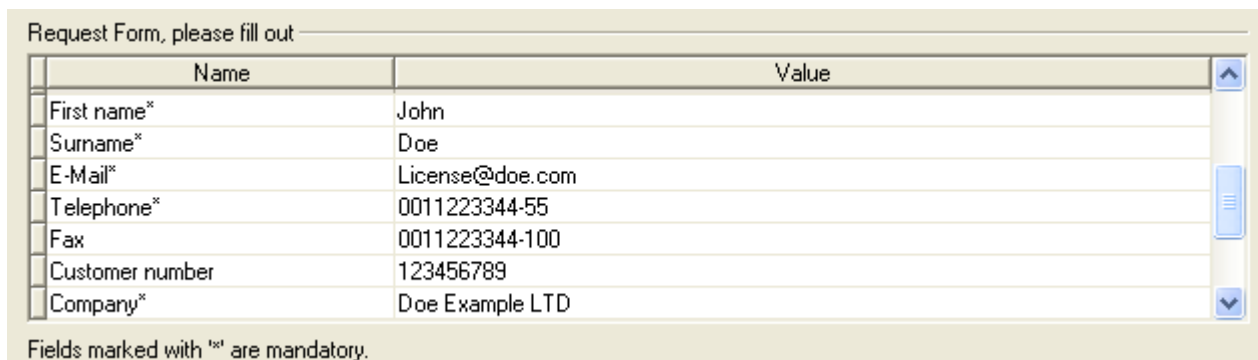
- License type (User Single Device License).

Figure 28: 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

Figure 29: 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 30: License pane – selecting the subsidiary / ordering / contacts

➢ Select the subsidiary (4), to which the order shall be send.

➢ Place the order:

• by **E-Mail** (5),

• or by **Fax** (6) or by **Telephone** (7),

• or in a **file** (8).

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

5.7.1   Ordering the license by e-mail

You can place your order by e-mail.

➢ In the **License** pane, click **e-mail…** (5).

↳ The order e-mail **License request** opens:
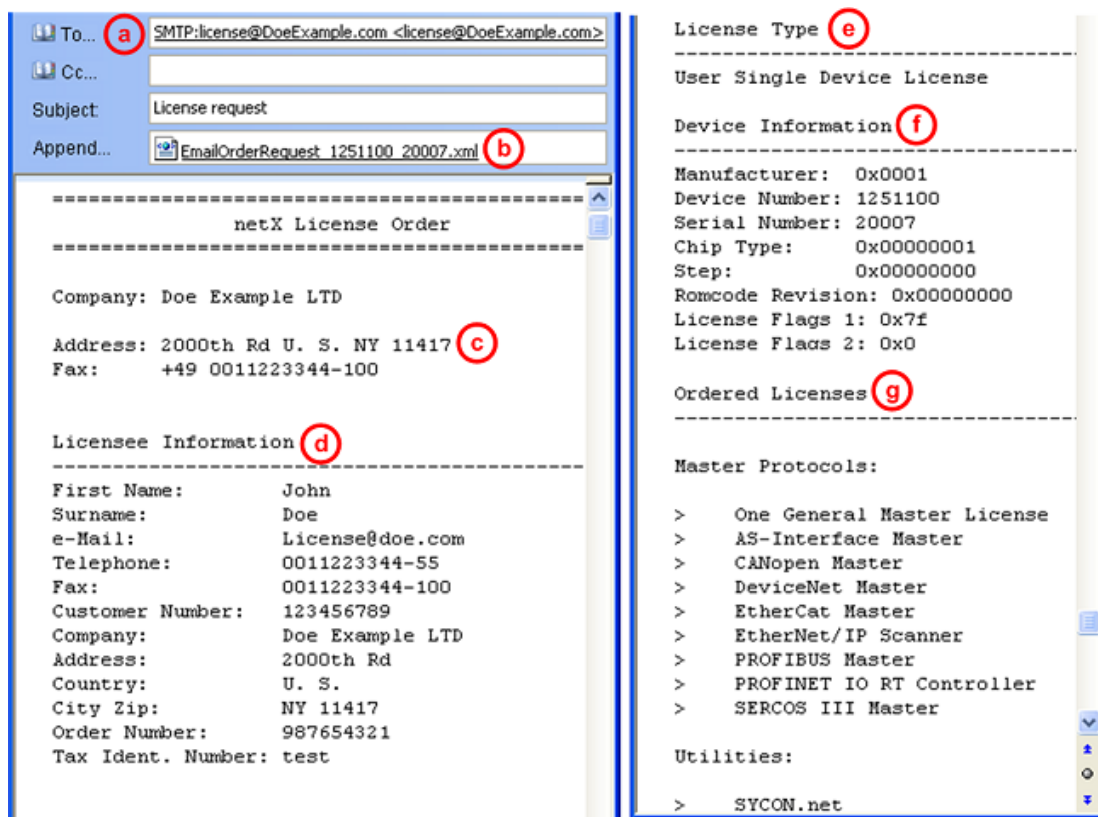
Figure 31: Example: Order e-mail License request

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

- the **E-mail…** of the selected subsidiary (a),

- the automatically generated **XML file** (b) *EmailOrderRequest_-
  [Devicenumber]_[Serialnumber].xml* with a summary info of the **order
  information**,

- the **Order address** (c),

- the **License information** (d),

- the **License type** (e),

- the **Device information** (f),

- the **ordered licenses** (g).

➢ Send the order e-mail **License request**.

⇨ The order process is complete.

5.7.2   Ordering the license by fax or by telephone

You can place your order by fax or by telephone.

➢ In the **License** pane, click **Print fax form** (6) or **Telephone…** (7).

✑ The summary of the ordering data *PrintOrderRequest_[Devicenumber]_[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.

Figure 32: 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 49]).

⇨ 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 *.nxl* 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 (*.nxl)*.
    - ➢ 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 50].

6   Configuration

6.1   Overview of configuring device parameters

Under "Configuration", you can configure your device.

- The **Bus parameters** are the basis for the correct operation of the data exchange. They include a device description, the MAC ID, the baud rate, as well as auto-clear for error handling.

- Under **Server parameters,** the DeviceNet Master can also be configured as a server, for data exchange with other masters in the network.

- The **Process data** pane serves as a process data interface for the DeviceNet Master DTM to the outside.

- The **Address table** shows a list of all addresses used in the process image memory.

- At the **Master settings** pane, device related settings can be made.

- The **MAC ID table** shows all devices configured in the master. The devices that are to be included in the data exchange with the master can be defined here.

- In the **Quick connect table** the option of an accelerated exchange of payload data can be set for each DeviceNet Slave device configured in the DeviceNet Master device configuration.

- The **Master settings** dialog pane includes options for device specific settings.
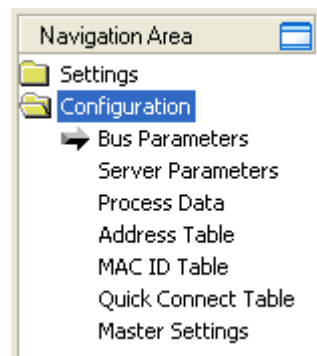
Figure 33: Navigation area - Configuration

> **Important:**
> For a 2-channel device, channel 1 or channel 2 must be individually configured one after the other.

Configuring device parameters

The following steps are required to configure the parameters of the
DeviceNet Master device using the DeviceNet Master DTM:

1. Set the bus parameters.

   ➢ In the navigation area, select **Configuration** > **Bus parameters**.

   ➢ Make the settings for the device description, MAC ID, baud rate and
     error handling.

2. Set the server parameters.

   ➢ In the navigation area, select **Configuration**> **Server parameters**.

   ➢ Configure the DeviceNet Master as a server for data exchange with
     other masters in the network.

3. Setting process data

   ➢ In the navigation area, select **Configuration** > **Process data**.

   ➢ Set symbolic names for the configured modules or measuring signals.

   ➢ Apply all settings.

4. If necessary, set the device address.

   ➢ In the navigation area, select **Configuration**> **Address table**.

5. Define the devices for data exchange.

   ➢ In the navigation area, select **Configuration** > **MAC ID table**.

   ➢ Configure the devices for the data exchange to the master.

6. Configure accelerated user data exchange.

   ➢ In the navigation area, select **Configuration** > **Quick connect table**.

   ➢ Configure the option for accelerated payload data exchange for the
     individual devices.

7. Make the Master Settings.

   ➢ Select **Configuration** > **Master 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 **Process data handshake,** select the **process data handshake
     type** to be used.

   ➢ Under **Device status offset** select **Automatic calculation** or **Static**
     option.

8. Close the master DTM configuration dialog.

   ➢ Click **OK** to close the master DTM configuration dialog and save the
     configuration.

9. Download configuration parameters to the DeviceNet Master 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 DeviceNet Master device,
> download the data of the configuration parameters into the
> DeviceNet Master device. See also section *Download*
> *configuration* [▶ page 80].

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

- *Bus parameters* [▶ page 63],
- *Server parameters* [▶ page 65],
- *Process data* [▶ page 66],
- *Address table* [▶ page 67],
- *MAC ID table* [▶ page 68],
- *Quick connect table* [▶ page 70] and
- *Master settings* [▶ page 74].

6.2   Bus parameters

The bus parameters represent the basis for the functioning data exchange. This section contains information on setting the bus parameters and the description of the individual bus parameters.
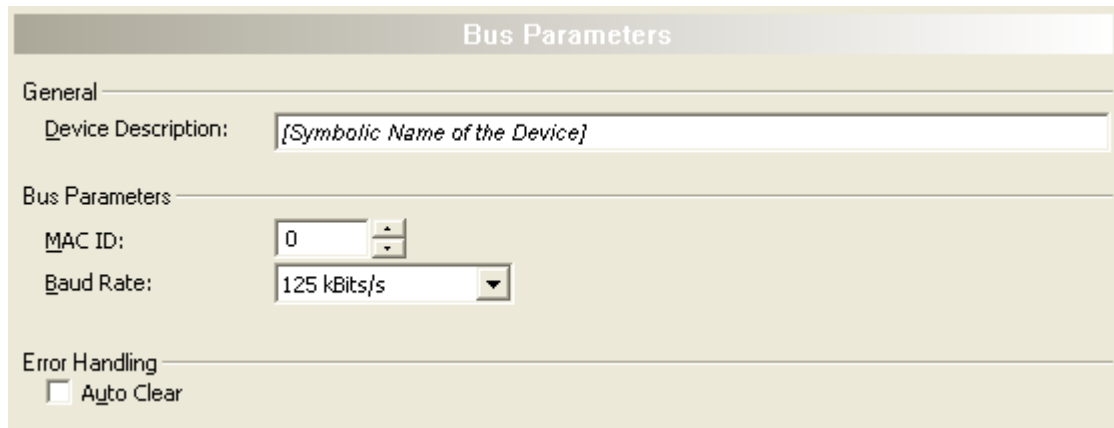
Figure 34: Bus parameters

6.2.1   Device description

Under **Device description** the symbolic name of the device appears and can be adapted here.
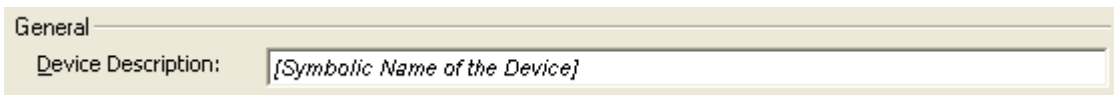
Figure 35: General > Device description

6.2.2   Bus parameters
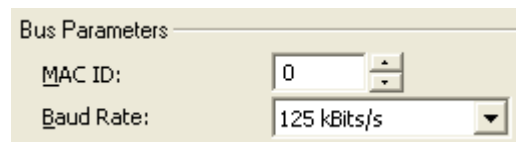
Figure 36: Bus parameters

Parameter	Description	Range of value / value
MAC ID	The MAC ID is the device address of the DeviceNet Master. Each device must have an own (unique) MAC ID to distinguish it in the network.	0 … 63 Default: 0
Baud rate	This value shows the baud rate to be set to the DeviceNet Master. The baud rate is the transmission rate of the data: Number of bits per second.	125 kBit/s, 250 kBit/s, 500 kBit/s, Default: 125 kBit/s

Table 15: Bus parameters

6.2.3   Error handling

Auto clear defines the behavior of the master device when the communication to a slave device is disturbed or breaks down.
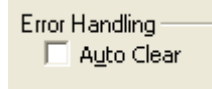
Figure 37: Error handling

- If Auto clear is "checked" and a communication failure to at least one slave device occurs, the master changes its mode from *Operate* to *Stop* and thus stops the communication to all slave devices. The master can only leave this state by a reset.

- If Auto clear is "unchecked" and a communication failure to one or more slave devices occurs, the master remains in Operate mode. The master continues to communicate with the slave devices present in the configuration and tries to re-establish the communication to missing or faulty slave devices.

For further information, see section *General diagnosis* [▶ page 94].

6.3   Server parameters

The DeviceNet-specific server parameters enable the device to operate simultaneously as a DeviceNet master and as a server. This allows another master device in this network to exchange I/O data with this master device.
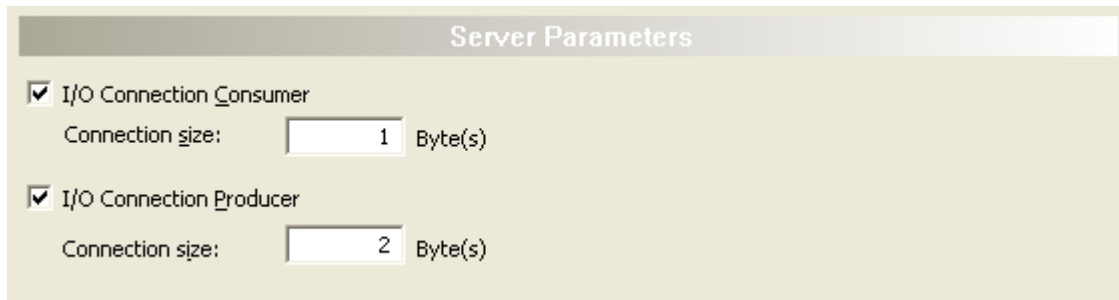
Figure 38: Server parameters

➢ Configure the server parameters **I/O connection consumer** and **I/O connection producer**.

Parameters	Description	Range of value / value
I/O connection consumer	• If "checked", the server function I/O connection consumer (receiving data) is enabled and the connection size can be configured.	checked, not checked
	• If "not checked ", the server function I/O connection consumer is not activated.	Default: checked
	Connection size: Size for the consumer I/O connection.	0 … 255 Default: 2
I/O connection producer	• If "checked", the server function I/O connection producer (sending data) is enabled and the connection size can be configured.	checked, not checked
	• If "not checked ", the server function I/O connection producer is not activated.	Default: checked
	Connection size: Size for the producer I/O connection.	0 … 255 Default: 1

Table 16: Server parameters

6.4   Process data

For the DeviceNet Master 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 is to be made available on the OPC server (column SCADA).

		Typ	Name	SCADA
▶ ⊟	Device	Slave device* <1>	Slave device*	☑
⊟	module	Poll <Slot 0>	Poll	☑
	I/O	structured input	input	☐
	I/O	structured output	output	☑

*Figure 39: Process data (*display device name)*

Column	Symbol	Description
Type	Device	Device labeling* provided by the hardware followed by the device's name of station in pointy brackets
	module, submodule I/O signal	Description of the modules, submodules or input or output signals configured on the device (not editable)
Tag	Device	Symbolic name* of the device
	module, submodule I/O signal	Symbolic name for the modules, submodules or input or output signals configured on the device (editable)
	⚠ 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 17: Process data

6.5 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 DeviceNet Master.

To configure the address data:

➢ Select **Configuration** > **Address table** in the navigation area.
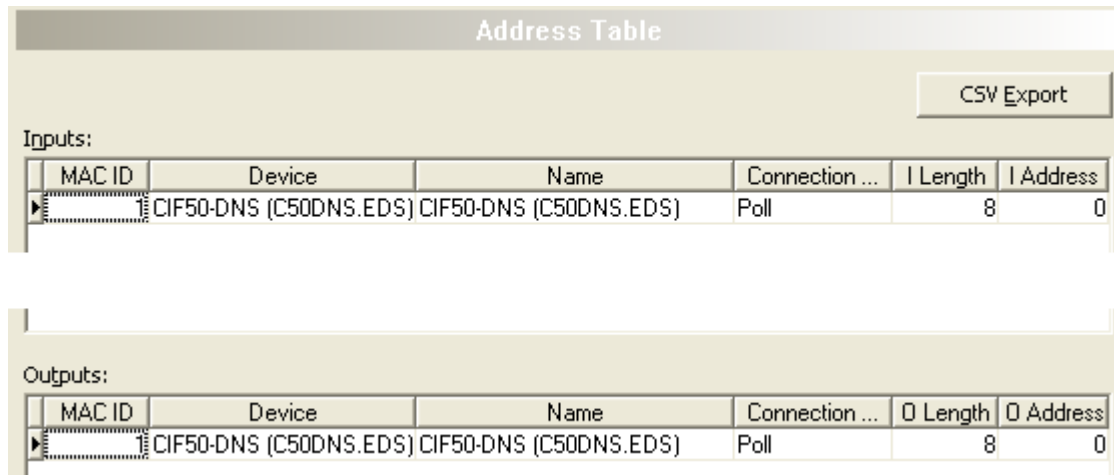
Figure 40: Configuration > Address Table (Example)

Parameter	Description
MAC ID	Device network address
Device	Device name of the slave device
Name	Designation for the slave device
Connection mode	Mode of the input or output data
I length, O length	Input data length or output data length
I address, O address	Output data offset address or input data offset address

Table 18: Address table pane parameters - inputs / outputs

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.

Sort addresses

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

6.6   MAC ID table

The MAC ID table shows a list of all devices configured in the master.

Figure 41: MAC ID table (example)

Parameter	Description	Range of value / value
Activate	• If „checked", memory for process data is reserved in the master for this slave device and the master enters into data exchange with this slave device on the bus. • If „not checked", the master reserves memory in the process image for this slave device, but no data exchange is performed with this slave device on the bus.	checked, not checked Default: checked
MAC ID	Network address of the slave device The displayed values of the MAC IDs can be changed by editing. The entered MAC ID must be unique, otherwise an error message appears.	1 … 63
Device	Name of the device from the device description file (EDS file).	String (editable)
Name	Symbolic name for the DeviceNet slave station (user changeable).	
Vendor	Name of the slave device manufacturer.	

Table 19: Parameters MAC ID table

➢ Under **Activate**, configure which devices should go into data exchange with the master.

➢ To change the address of the selected device, proceed as described in the *Set MAC ID* [▶ page 69] section.

6.7   Set MAC ID

With the dialog **Set MAC ID** the DeviceNet MAC ID of the device can be changed.

To set the MAC ID, proceed as described hereafter:

➢ Select and connect the device.

➢ Disconnect the device (only if the device is online).

> **Note:**
> The **Set MAC ID** dialog is only available offline. There must be no online connection from the DeviceNet Master DTM to the DeviceNet Master device.

For further information on how to establish or how to disconnect an online connection from the DeviceNet Master DTM to the DeviceNet Master device, refer to section *Connecting/disconnecting device* [▶ page 78].

➢ Select **Additional functions** > **Set MAC ID** from the context menu (right mouse click).

Figure 42: Set MAC ID

➢ Under **Current MAC ID**, select the current MAC ID.

➢ Under **New MAC ID** enter the new MAC ID and select **Set MAC ID**.

⇨ The new MAC ID of the device is set and in addition, appears in the **Current MAC ID** list.

6.8   Quick connect table

In the Quick connect table for every DeviceNet Slave device in the
DeviceNet Master configuration you need to define whether the master
device shall accelerate connection establishment to this slave device by
using the „Quick connect" for the cyclic data exchange (see also [3] 2-3.4).

Figure 43: Quick connect table

Parameter	Description	Range of Value / Value
Quick connect	• If „checked", the connection from the DeviceNet Master device to this slave device is established using „Quick connect". • If „not checked", the connection from the DeviceNet Master device to this slave device is established without using „Quick connect".	angehakt, nicht angehakt Default: angehakt
MAC ID	Network address of the slave device. See section *MAC ID table* [▶ page 68].	1 … 63
Device	Name of the device from the device description file (EDS file).	String (editable)
Name	Symbolic name for the DeviceNet slave station (user changeable).	

Table 20: Parameters Quick connect table

➢ Under **Quick connect**, configure whether the connection setup from the
DeviceNet Master device to this slave device should be done using
"Quick connect".

6.8.1   What is „Quick connect"?

The „Quick connect" feature allows a reconnected slave device on a DeviceNet network to quickly go into operation (e. g. after a tool exchange) by shortening the time required to make the logical connection between the slave device and the master. [5]

6.8.2   How does „Quick connect" work?

DeviceNet Master device

The „Quick connect" feature is activated in the *DeviceNet Master device* if in the master configuration at least for one DeviceNet Slave device is defined, that the master device shall establish the connection to this slave device using „Quick connect". [6] S. 97.

"Quick connect" enables a DeviceNet Master device to initiate a connection request as soon as a "dup mac" request is received from a newly connected slave device. [5]

When a slave device is defined as „Quick connect" slave, the master concurrently sends UCMM and Alloc master/slave requests. Depending on the response of the slave device, an explicit connection will be established via „UCMM" or „Group 2 Only Explicit Connection Port". [6] S. 97.

DeviceNet Slave device

At the *DeviceNet Slave device* the „Quick connect" option effects the connection request from the master device will be accepted without waiting for the 2-second delay in its typical power-up sequence. [5]

When „Quick connect" is enabled, the slave device transitions to the OnLine state concurrently with sending the first duplicate MAC ID request message. However, the slave device is still required to execute the network State Transition Diagram ([3] 2-3.1), including going offline anytime a duplicate MAC ID response message is received. [3] 2-3.4.

6.8.3   Requirements for the use of „Quick connect"

Must both, the DeviceNet Master device and the DeviceNet Slave device support „Quick connect"?

What happens, if the Master uses „Quick connect" to connect a Slave that does not support „Quick connect"?

As prerequisite for the optimal use of „Quick connect", the Master device and the Slave device both must support „Quick connect". That is, the Slave device must support „UCMM" or „Predefined Master/Slave Connection" as a connection type. The Hilscher DeviceNet Slave devices support the connection type „Predefined Master/Slave Connection".

What combinations are possible?

In the following cases, „Quick connect" is available:

*   *Master supports „Quick connect", Slave supports „Quick connect"*:
    The time to establish the connection until the I/O data exchange starts is reduced optimally.

*   *Master supports „Quick connect", Slave does not support „Quick connect"*:
    The time to establish the connection until the I/O data exchange starts is shorter than without „Quick connect".

*   *Master does not support „Quick connect", Slave supports „Quick connect"*:
    The time to establish the connection until the I/O data exchange starts is shorter than without „Quick connect".

In this case, „Quick connect" is not possible:

*   *Master does not support „Quick connect", Slave does not support „Quick connect":*
    The time to establish the connection until the I/O data exchange starts is not shorter than without „Quick connect".

What the user needs to observe for „Quick connect"?

Important:
Generally for DeviceNet and specifically for the use of „Quick connect" it is left up to the user:
(1) to guarantee that no Slave exist with the same MAC ID AND
(2) that no more than one Master device is configured to access the same Slave device using the "Predefined Master/Slave Connection Set" ([3] section 3-15.1.).
Bus errors may occur if either of these conditions exists. Further details can be found in [3] Section 2-3.4.

6.8.4   How fast the I/O connection can be established with "Quick connect"?

If quick connect is supported by both, the master device and the slave device, the connection is established faster. The required time to establish the connection is reduced from 3 s (seconds) to less than 200 ms (milliseconds) approximately.

The following times are required to establish the I/O connection. The values are valid for Hilscher Master devices.

below 200 ms

If both the master device and the slave device support quick connect.

• Immediately after the slave device has sent the duplicate MAC ID request, the master device sends the „Quick connect" request.

• Depending on the reaction time of the slave device, the delay time up to the I/O data exchange can be 20 … 200 milliseconds.

Approx. 2 s

If only the master device supports „Quick connect" and the slave device does not support „Quick connect".

• Immediately after the slave device has sent the duplicate MAC ID request, the master device sends the „Quick connect" request.

• Immediately after the slave device has sent the second duplicate MAC ID request, the master device sends the „Quick connect" request and the I/O connection is established.

Approx. 2… 3 s

If the master device does not support „Quick connect" but only the slave device supports „Quick connect".

In contrary to

Approx. 2 … 5 s

If neither the master device nor the slave device support „Quick connect".

6.9 Master settings

At the **Master 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 80].

➢ Open **Configuration** > **Master settings**.

Figure 44: Configuration > Master settings

> **Note:**
> The setting options at the dialog pane **Master 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 45: DeviceNet Master settings > Start of bus communication

If **Automatically by device** is selected, the DeviceNet Master 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
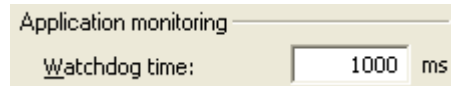
Figure 46: DeviceNet Master settings > Application monitoring

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 21: Range of value / Value for the watchdog time

6.9.3   Module alignment
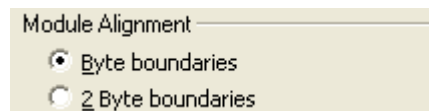
Figure 47: DeviceNet Master settings > Module alignment

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 22: Parameters DeviceNet Master Settings > Module Alignment

6.9.4   Process data handshake
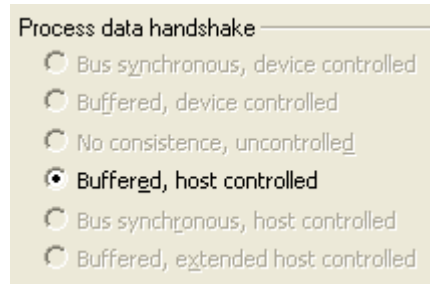
Figure 48: DeviceNet Master settings > Process data handshake

The various types of **Process data handshakes** are used for setting the handshake of the process data for the DeviceNet Master device.

The selection of the used process data handshake is important for the correct data exchange between the application program and the device.

The used handshake of the process data needs to be supported by the used application program.

Usually the **Buffered, host controlled** handshake is supported.

6.9.5   Advanced

The **Enable configuration download during network state "operate"** option for the DeviceNet network allows to change the configuration of a running DeviceNet network without resetting the devices.
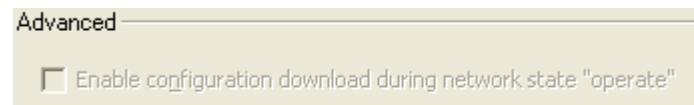
Figure 49: DeviceNet Master settings > Advanced

➢ Check **Enable configuration download during network state "operate"** to enable configuration download during network state "operate".

↳ A new configuration is downloaded and the configuration of the DeviceNet network is changed and saved.

6.9.6   Device status offset

Reference to Firmware: The option **Device status offset** was implemented since DeviceNet Master firmware CIFXDNM.NXF version 2.2.2.0.

The option **Device status offset** allows via **Automatic calculation** to calculate the offset for the start address of the device status in the dual-port memory automatically or via **Static** to preset the offset.
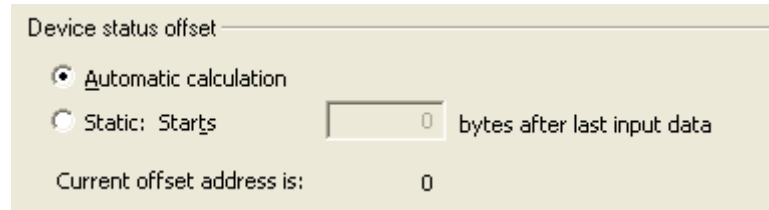
Figure 50: DeviceNet Master settings > Device status offset

Device status offset	Description
Automatic calculation	(Default) Device status always after the last input byte.
	If further input data is added in the configuration, then the starting address of the device status in the dual-port memory will move.
Static	Here, the distance (free buffer) between the last input byte and the start of the device status can be set.
	If further input data is added in the configuration, then the distance will be reduced, so that the start address of the device status in the dual-port memory remains the same.
	If more input data is added in the configuration, as free buffer exists, then the start address of the device status in the dual-port memory must be moved.

Table 23: Option Scanner Settings > Device Status Offset

6.10 Connecting/disconnecting device

> **Note:**
> Several DeviceNet Master DTM functions, e. g. diagnosis or the configuration download in SYCON.net, require an online connection from the DeviceNet Master DTM to the DeviceNet Master device.

> **Important:**
> For a 2-channel device, channel 1 or channel 2 each must be connected to the DTM separately.

Connecting device

To establish an online connection from the DeviceNet Master device to the DeviceNet Master 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 DeviceNet Master icon.

➢ Select the **Connect** command from the context menu.

➢ The DeviceNet Master device now is connected to the DeviceNet Master 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 DeviceNet Master device to the DeviceNet Master DTM, take the following steps:

➢ In the DTM interface dialog, select the **OK** button, to close the DTM interface dialog.

➢ Right-click on the DeviceNet Master 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 DeviceNet Master device to the DeviceNet Master 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 DeviceNet Master device an online connection from the DeviceNet Master DTM to the DeviceNet Master device is required. Further information can be found in *Connecting/disconnecting device* [▸ page 78].

⚠ 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 DeviceNet Master 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?"
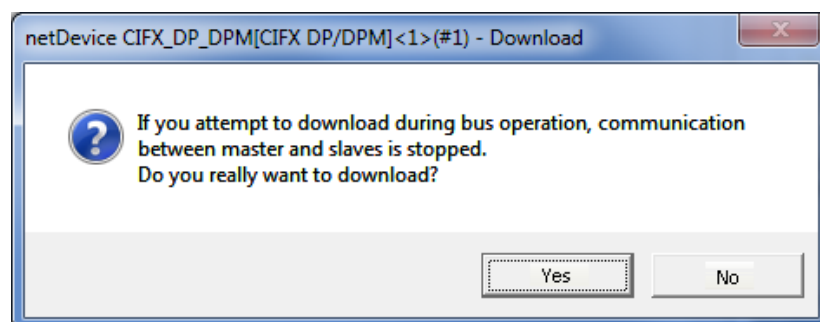
Figure 51: netDevice Message: Download

> **Important:**
> If the communication between the master device and the slave devices is stopped, the data exchange between the master device and the slave devices is stopped.

➢ Click **Yes** if you intend to download the configuration.

↳ Then the current configuration in the application program is down loaded to the device.

➢ Otherwise click to **No**.

6.12 Network scan and upload

With the function **Network scan...** of the DeviceNet Master DTM you can find out automatically, which DeviceNet Slave device are attached to the DeviceNet Master device and how these devices are configured. During the network scan the master device requests the ident codes of the slave devices found at the bus. For each connected DeviceNet Slave device its ident code is read out.

In the **Scan response** dialog of the master 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 slave device. Via **Create devices** for each slave device the selected DTM device is created.

The **upload** of the configuration is proceeded subsequent to a network scan procedure. The upload function of the DeviceNet Slave DTM allows to upload connection configuration data from all DeviceNet Slave devices via the DeviceNet Master device and the DeviceNet Master DTM to the DeviceNet Slave DTMs.

6.12.1 Requirements

The DeviceNet Master device must be configured. Therefore, you must set the baud rate and the MAC ID of the master under **Settings** > **Bus parameters.**

> **Important:**
> The configuration of the master device must be loaded into the master device . For further information, see section *Configuration steps* [▶ page 17].

6.12.2 Overview on steps

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

6.12.3   Starting network scan

➢ In netDevice: Right-click on the device symbol of master DTM.

➢ Select **Network scan...** from the context menu.
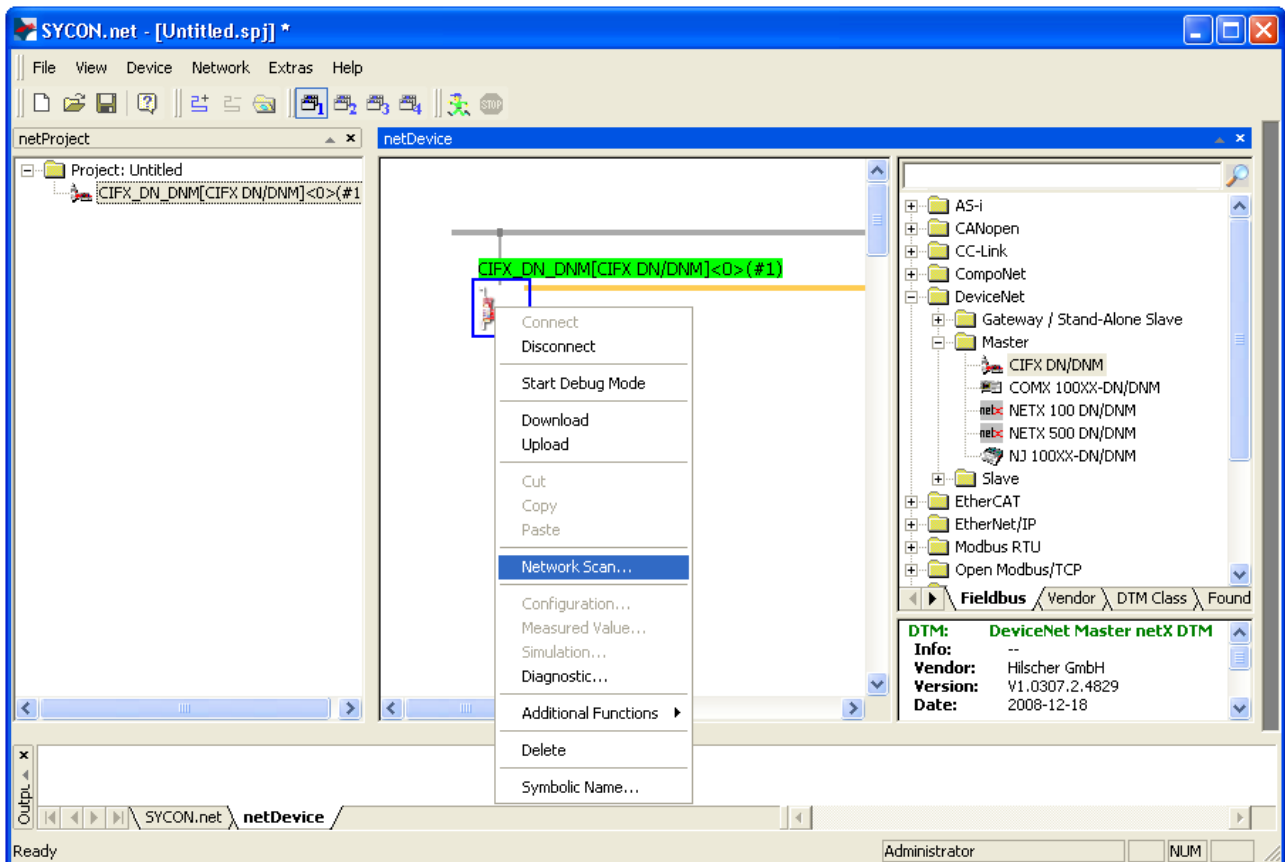
Figure 52: Starting 'Network scan' (example)

➢ Wait for a moment.

> **Note:**
> It may take a few seconds to display the **Scan response** dialog of the DeviceNet Master DTM.

➢ Via **Network scan...** an online connection from the DeviceNet Master DTM to the DeviceNet Master device is established. SYCON.net scans, which DeviceNet Slave devices are connected to the network or the DeviceNet Master device.

⇨ The Scan response dialog of the master DTM appears.
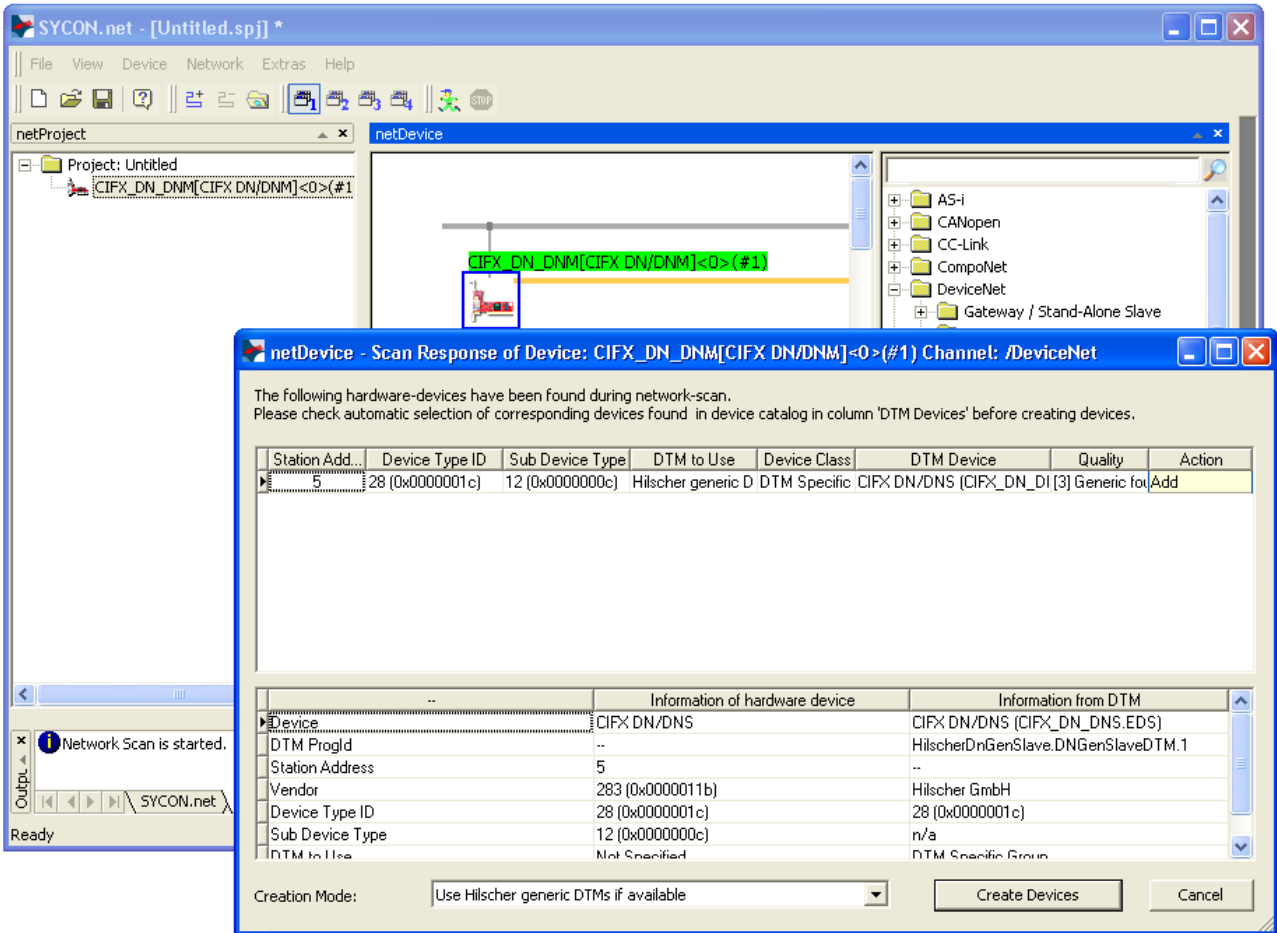
Figure 53: Scan response dialog of the master DTM (example)

6.12.4   Scan response dialog settings

> ➢ Make the settings in the **Scan response** dialog of the DeviceNet Master DTM.

> ↝ In the **DTM device** column the DTM devices assigned to the found ident codes appear.
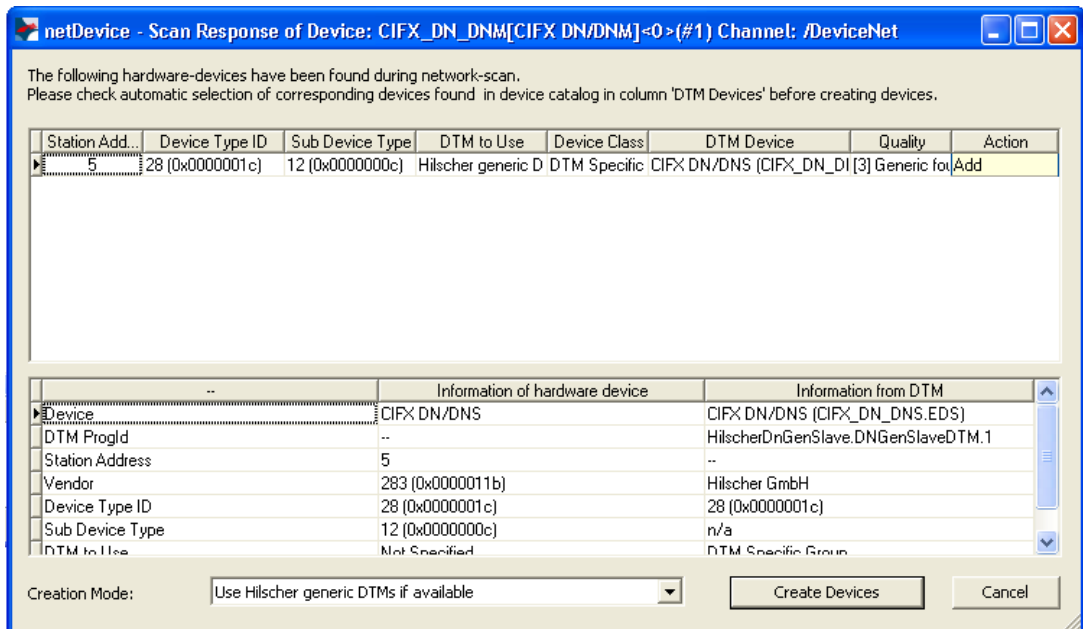
Figure 54: Scan response dialog of the DeviceNet Master DTM (example)

> ➢ In the **DTM device** column, select for every identified device the DTM device corresponding to the firmware loaded in this DeviceNet Slave.

- 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 DeviceNet Master Master DTM.

Column	Description
Title bar	With the text: "*Symbolic Name [Device description] (#Network ID)* channel/*[Name of the network]*". It is the symbolic name of the DeviceNet DeviceNet Master 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	DeviceNet station address, which displays the logical sequence of the devices within a DeviceNet network.
Colors	Meaning of colors in the **Scan response** dialog of the DeviceNet Master DTM: Red If a field marked in red appears in column **Station address**, the respective DTM device is already present on the network. Yellow If a field appears marked in yellow, a selection can be made by a combo box.
Device type ID	Identification (ID): Ident code read out from each device (Unique Identifier)
Sub device type	Sub-device type of the device type, if applicable (not used in PROFIBUS).

DTM to use	Display of the DTM devices, which are assigned to the ident codes found during scanning:
	
	 If `Use Hilscher generic DTMs if available` is displayed without color marking, there is no selection possibility.
	
	 If `Use Hilscher generic DTMs if available` is displayed marked in yellow, the following selection can be made:
	
	 `Use Hilscher generic DTMs if available` ▼
	 `Use Hilscher generic DTMs if available`
	 `Use vendors DTMs if available`
	
	 (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.
	
	 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.

Device class	Device class of the DeviceNet Slave device.
DTM device	Found DTM device (the device name as taken from the DTM). Only the device description files or **DTM devices** can be displayed within the column DTM devices: • 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**.

	For each device type ID in the column DTM device the following is displayed:	This means, within the device catalog of netDevice for the found ident code and the selected Creation mode these alternatives are available:
	• *no* device,	• no DTM,
	• *one* single device	• a device description file respectively a DTM device of a manufacturer,
	• or *multiple* devices (within a combobox).	• or one or more device description files respectively a DTM devices of a manufacturer.

Quality	Associated quality information Display: [1] DTM found, [3] Generic found
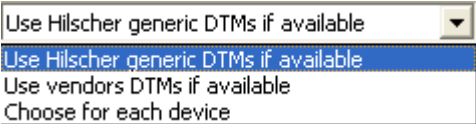
Column	Description
Action	The action to be performed with the corresponding device during the process of device creation.
	• If no device is present within the current project, the selection **Add**/**Skip** will appear.
	• If there is already a device present within the current project, the selection **Replace**/**Skip** will appear.
	Add adds during the device creation process a new instance for the selected DTM to the newly found device address.
	Skip skips the device creation process for the respective device address.
	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.
Table below	
	The lower table in the **Scan response** dialog of the DeviceNet Master DTM shows a comparison of possible differences in device information taken from:
	• The hardware device (displayed in central column of 3)
	• and the DTM (displayed in right column of 3)
	The left column contains which information is compared between the information sources "Hardware Device" and "DTM".
	Note! If a field contains the text 'n/a', the corresponding information is not applicable in the current context (fieldbus).
Creation mode	Under **Creation mode** one of the following options can be selected:
	• Use Hilscher generic DTM if available
	• Use vendors DTMs if available
	• Choose for each device
	Scan response dialog of the DeviceNet Master DTM > "Creation mode"
	Use Hilscher generic DTMs if available ▼
	Use Hilscher generic DTMs if available Use vendors DTMs if available Choose for each device
Create devices	About **Create devices**...
	• for each DeviceNet Slave device the previously selected DTM device is created.
	• the DeviceNet Slave device configuration is uploaded to the created DeviceNet Slave DTM and thereby the module configuration is generated.
	In case a conflict occurs between a device description file and a device, the **Upload** dialog appears where conflicts are displayed in red.
Cancel	Click **Cancel** to leave the dialog without creating a device.

Table 24: Description on the Scan response dialog of the DeviceNet Master DTM

6.12.6   Creating devices

➤ In the **Scan response** dialog of the DeviceNet Master DTM click **Create devices**.

↳ For each DeviceNet Slave device the previously selected DTM device is created.

↳ The dialog **Network scan – Creating devices** appears.

> **Note:**
> Depending on the manufacturer of the respective device, also a dialog with some slight deviations from this one may be displayed.
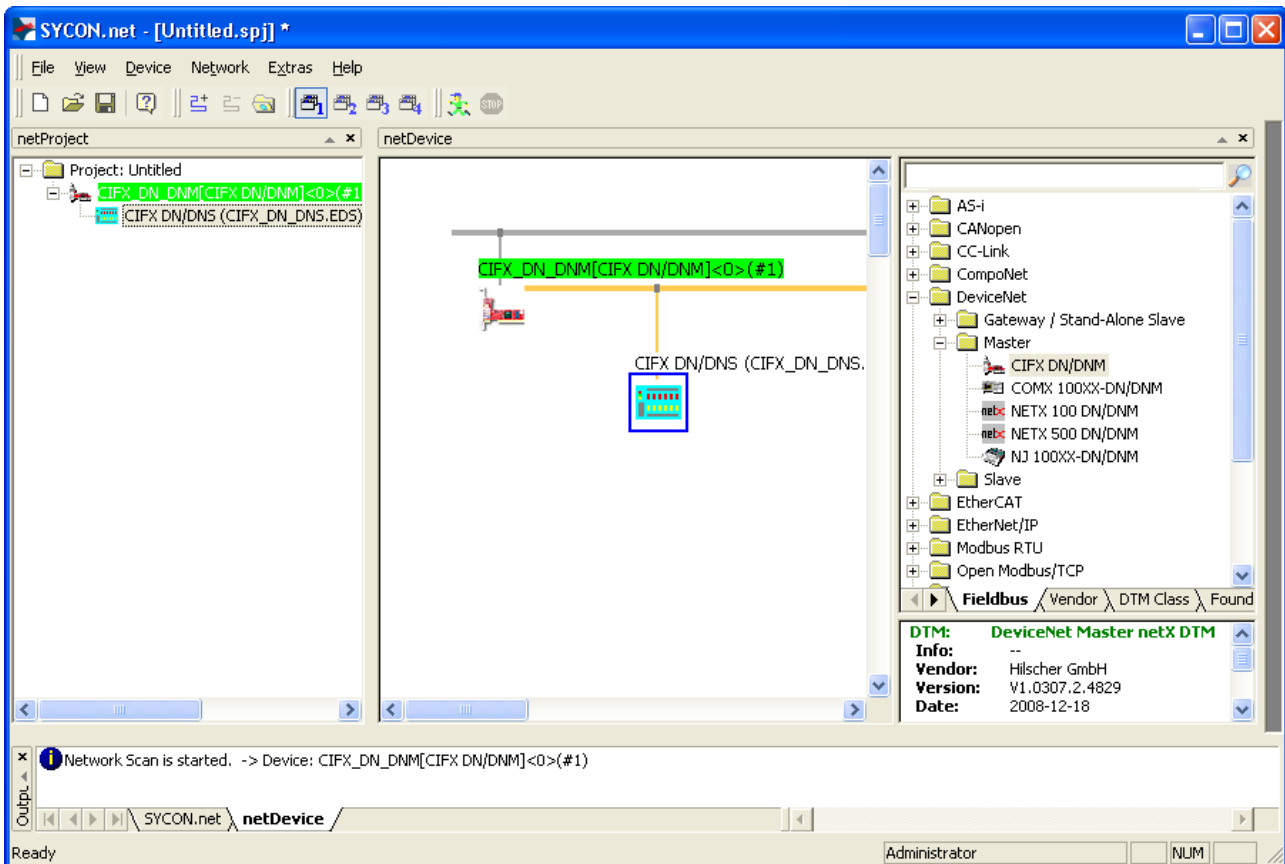
Figure 55: DTM device is generated. (example)

6.12.7 Upload and connection configuration

Use the upload function to upload the device configuration of each slave device to the slave DTM.

➢ In **netDevice**: Right-click on the device symbol of the DeviceNet Slave DTM.
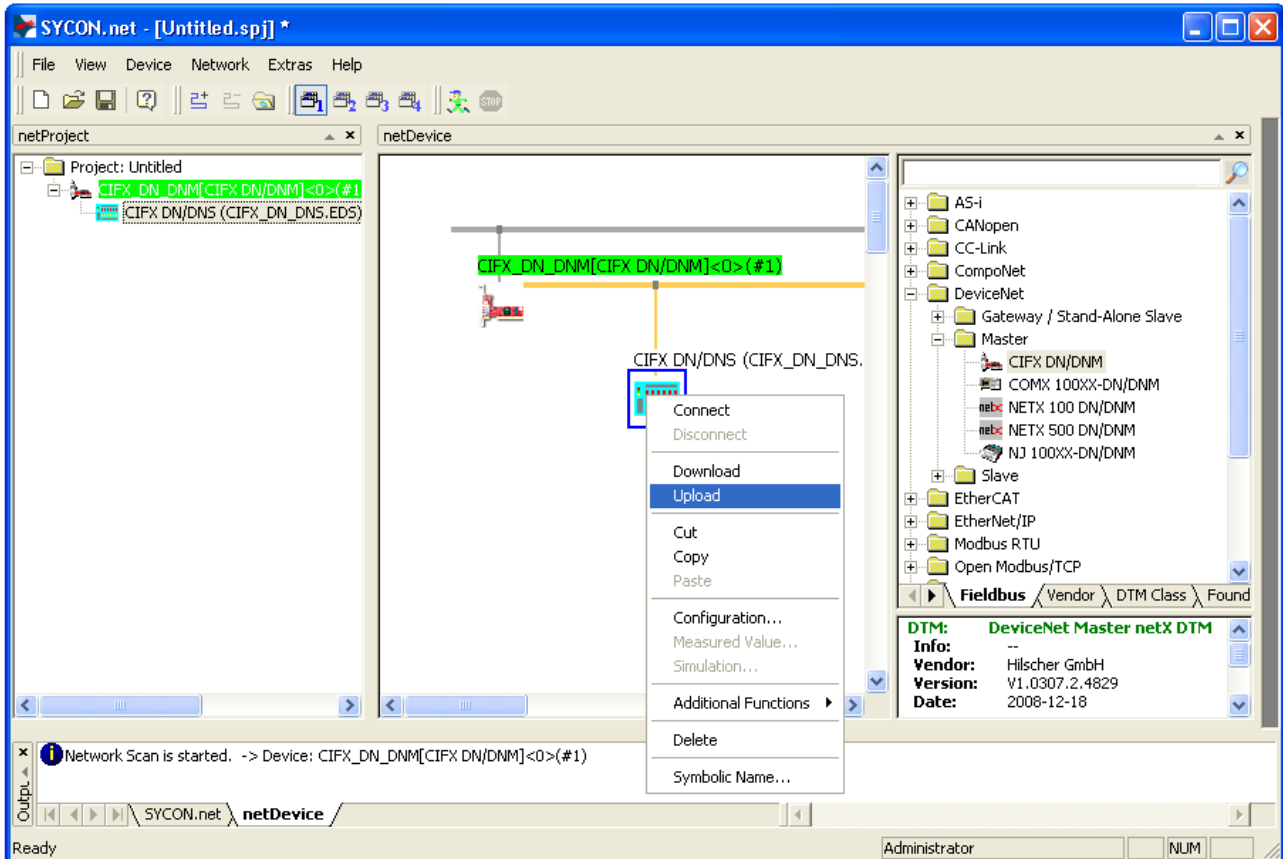
Figure 56: 'Upload' the configuration of the slave device (example)

➢ Select **Upload** from the context menu.

↳ The dialog **Device** *Symbolic name of the master 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.

↳ Additionally the query appears whether the upload function may overwrite the existing module configuration (for DeviceNet this means 'connection configuration') of the DeviceNet Slave device.
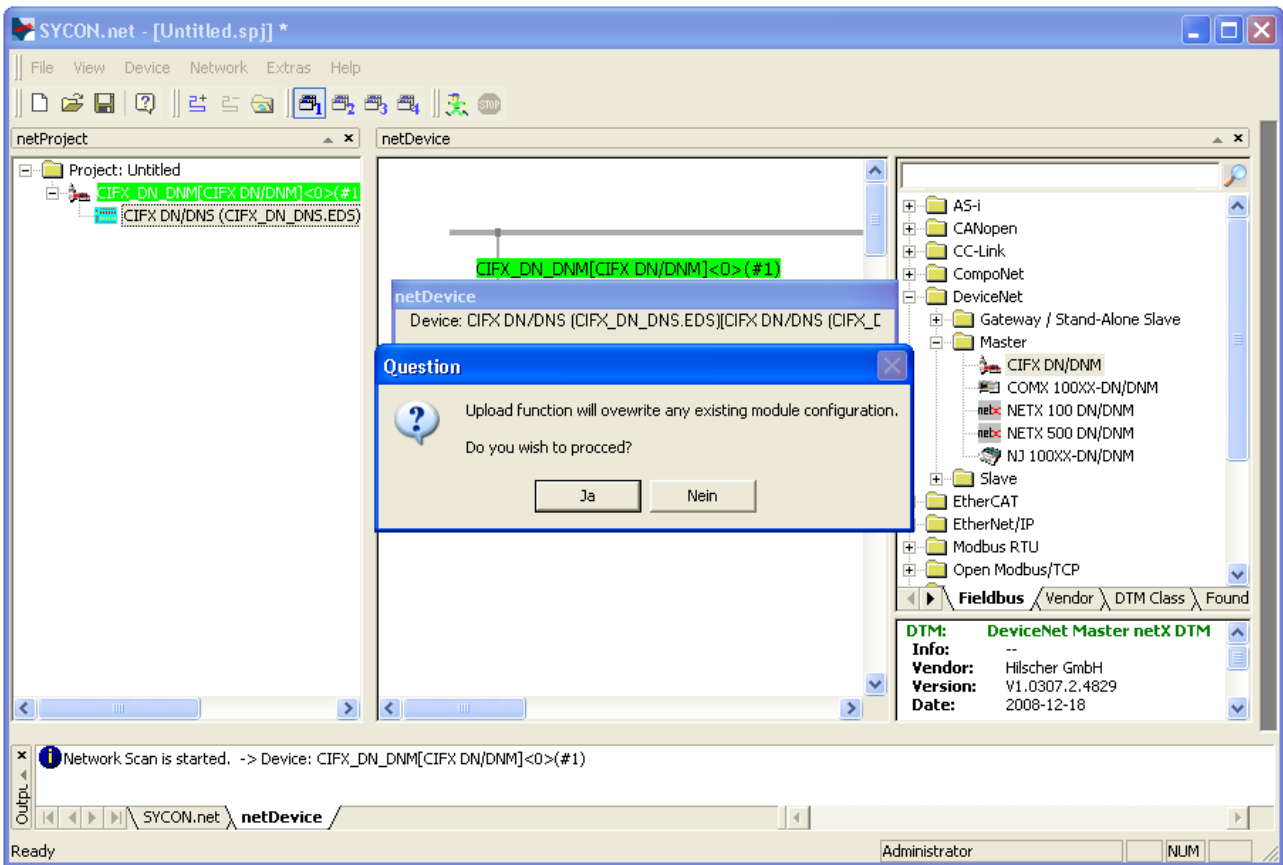
Figure 57: Query of the upload function (example)

➢ Click **Yes**.

✎ For the slave device, its current configuration is uploaded to the slave DTM via the master device and the master DTM.

✎ The successful progress of the upload procedure is reported in the output window.
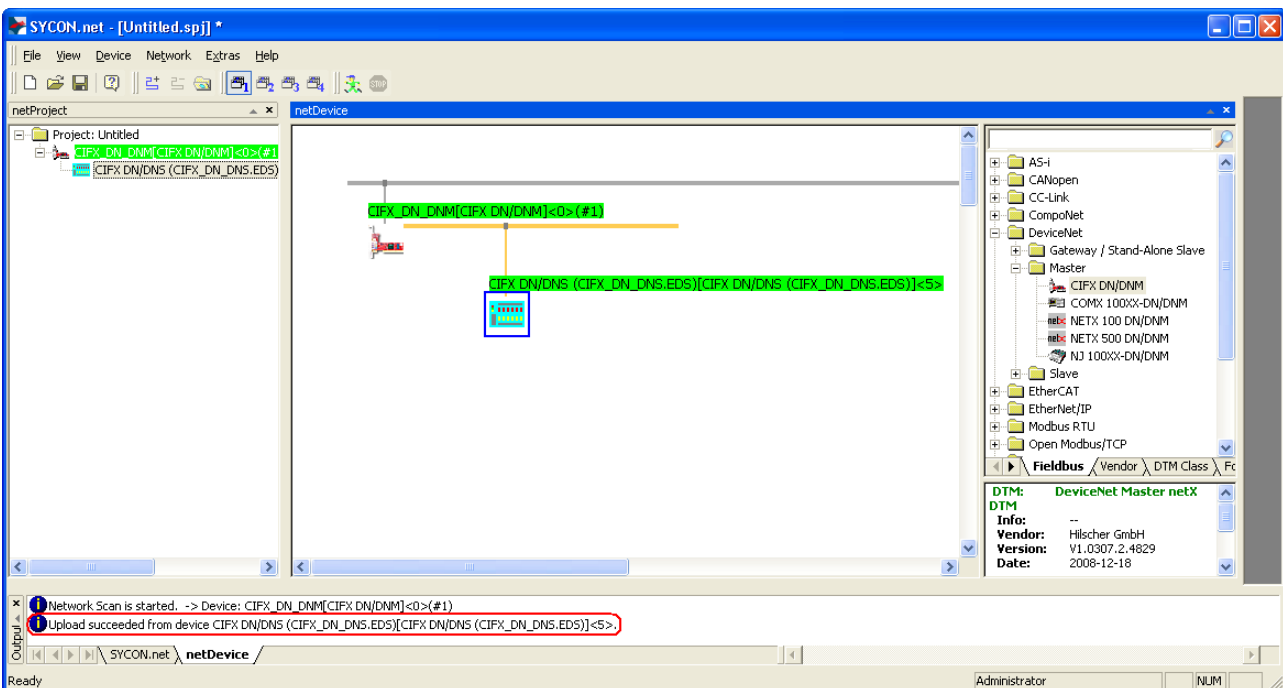
Figure 58: Upload successful (example)

After the connection configuration of the DeviceNet Slave device has been created, you can display the uploaded connection configuration by double-clicking the slave device symbol.
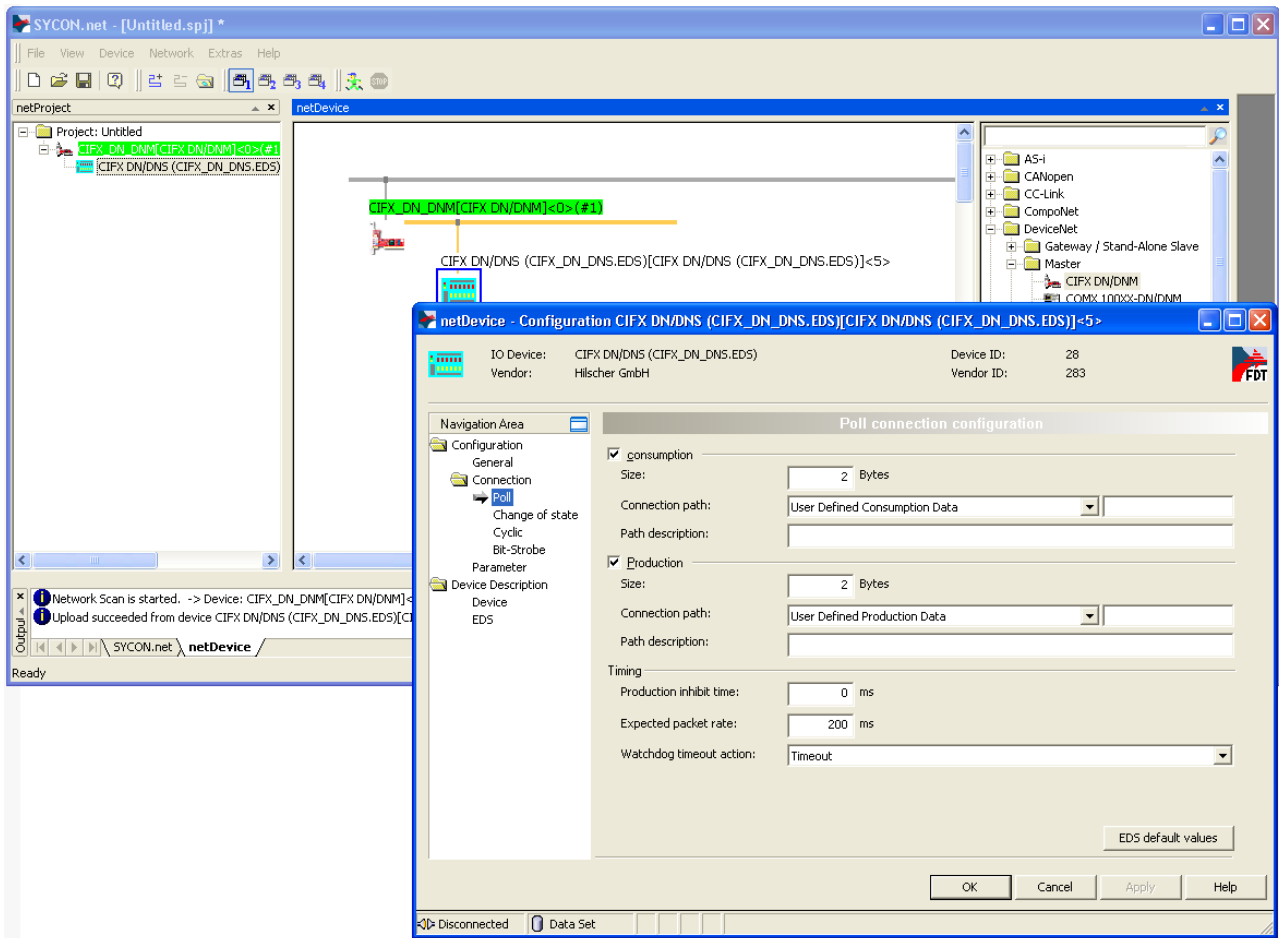
Figure 59: Uploaded connection configuration (example)

6.12.8   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

Via the **Download** function of the DeviceNet Master DTM, download the current configurations of the DeviceNet Slave devices to the DeviceNet Master device.

➢ In netDevice: right-click on the device symbol of the DTM.

➢ Select **Download** from the context menu.

↳ The Dialog **netDevice - Download** 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 dialog **netDevice** appears showing the progress bar **Download active, device performs initialisation…**.

⇨ The **netDevice** window shows the message (example): "Download succeeded to device CIFX_DN_DNM[CIFX_DN/DNM]<1>(1#)."

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.
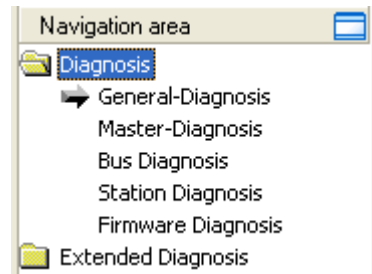
Figure 60: Navigation area - Diagnosis DeviceNet Master DTM

Online connection to the device

> **Note:**
> Accessing the **Diagnosis** panes of the DeviceNet Master DTM requires an online connection from the DeviceNet Master DTM to the DeviceNet Master device. For further information refer to section *Connecting/disconnecting device* [▶ page 78].

How to proceed

➢ In the master 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 108].

7.2   General diagnosis

Information regarding the Device State and other general diagnosis parameters are displayed in the **General Diagnosis** dialog.
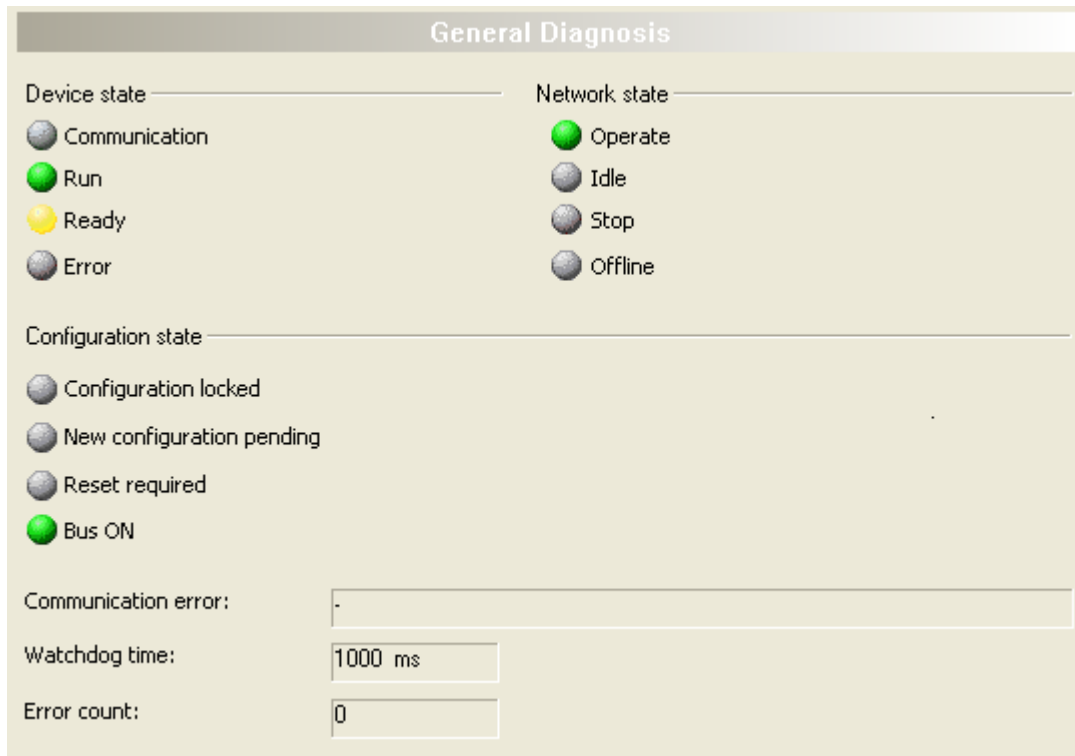
Figure 61: General diagnosis

LED	Description	Color	State
	Device state		
Communication	Shows whether the DeviceNet device executes the network communication.	(green)	In COMMUNICATION state
		(gray)	Not in COMMUNICATION state
Run	Shows whether the DeviceNet device has been configured correctly.	(green)	Configuration OK
		(gray)	Configuration not OK
Ready	Shows whether the DeviceNet device has been started correctly. The DeviceNet device waits for a configuration.	yellow	Device READY
		(gray)	Device not READY
Error	Shows whether the DeviceNet 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 DeviceNet device is in data exchange. In a cyclic data exchange the input data or the output data of the DeviceNet Master is transmitted to the DeviceNet Slave.	(green)	In OPERATION state
		(gray)	Not in OPERATION state
Idle	Shows whether the DeviceNet device is in data exchange.	(yellow)	In IDLE state
		(gray)	Not in IDLE state
Stop	Shows whether the DeviceNet device is in Stop state: There is no cyclic data exchange at the DeviceNet network. The DeviceNet 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 DeviceNet Master 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 DeviceNet 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 DeviceNet 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 DeviceNet 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 25: 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 26: Indication general diagnosis

7.3   Master diagnosis

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

Figure 62: 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 27: Parameters Master diagnosis

7.4   Bus diagnosis
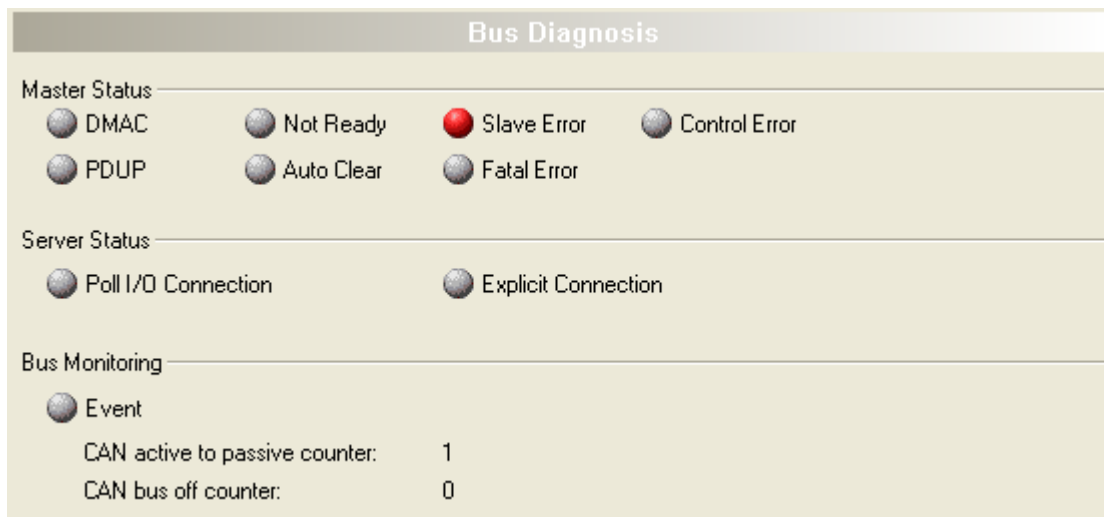
Figure 63: Bus diagnosis

7.4.1   Master status
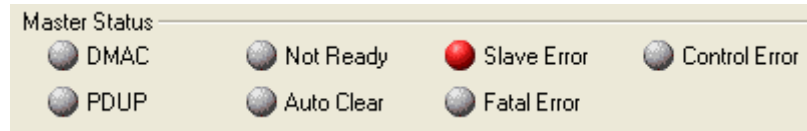
Figure 64: Bus diagnosis - Master status

The Master status shows individual bus errors. A pending error is displayed by a red LED. The meaning of the individual errors is described in the following:

LED	Description	Color	State
DMAC	The **DUPLICATE-MAC-ID** indicates that the DeviceNet Master has found another device in the network which has the same MAC ID.	(red)	DUPLICATE-MAC-ID found
		(gray)	no DUPLICATE-MAC-ID found
PDUP	The **DUPLICATE-MAC-ID** check is performed. As long, this bit is set; the Master is involved in handling the duplicate MAC-ID check.	(red)	DUPLICATE-MAC-ID check is performed
		(gray)	DUPLICATE-MAC-ID check is not performed
Not ready	**HOST-NOT-READY** shows, that the application program has not started or it has stopped the DeviceNet Master.	(red)	HOST-NOT-READY
		(gray)	HOST-READY
Auto clear	The **AUTO-CLEAR-ERROR** displays, that device has stopped the communication to all Slaves and it has reached the auto-clear end state.	(red)	AUTO-CLEAR-ERROR
		(gray)	no AUTO-CLEAR-ERROR
Slave error	The **NON-EXCHANGE-ERROR** shows, that at least one Slave is not in the cyclic data exchange with the DeviceNet Master.	(red)	NON-EXCHANGE-ERROR
		(gray)	no NON-EXCHANGE-ERROR
Fatal error	A **FATAL-ERROR** has occurred. Because of a heavy bus error no further bus communication is possible.	(red)	FATAL-ERROR
		(gray)	no FATAL-ERROR
Control error	The **CONTROL-ERROR** displays that a parameterization error has occurred.	(red)	CONTROL-ERROR
		(gray)	no CONTROL-ERROR

Table 28: Parameters Bus diagnosis - Master status

7.4.2 Server status
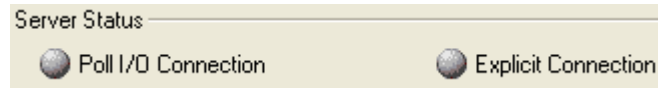
Figure 65: Bus diagnosis – Server status

LED	Description	Color	State
Poll I/O Connection	Indicates, that the master as server has built up a **Poll I/O connection**.	(red)	Poll I/O connection
		(gray)	no Poll I/O connection
Explicit Connection	Indicates, that the master as server has built up an **Explicit connection**.	(red)	Explicit connection
		(gray)	no Explicit connection

Table 29: Parameters Bus diagnosis - Server status

7.4.3 Bus monitoring
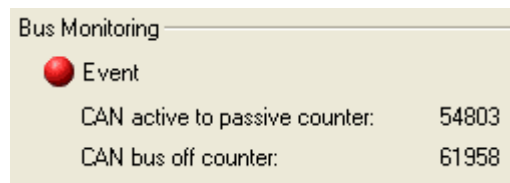
Figure 66: Bus diagnosis - Bus monitoring

LED	Description	Color	State
Event	The used CAN chip has detected transmission errors. The number of detected events is counted in the **CAN bus off counter** and the **CAN active to passive counter**. The bit will be set when the first event was detected and will not be deleted until the Master is reset.	(red)	Event (transmission errors detected)
	• **CAN active to passive counter:** This value indicates a bad transmission quality at the CAN bus. This counter is based on a Transmission Rejected Error of the CAN chip, which is always reported, whenever an increased number of faulty CAN frames were detected.	(gray)	no Event (no transmission errors detected)
	• **CAN bus off counter:** This counter counts the number of reported bus off events. A bus off event occurs whenever the CAN bus was disturbed substantially during the transmission of CAN frames and therefore the communication chip has to withdraw itself from the bus.		

Table 30: Parameters Bus diagnosis - Bus monitoring

7.5   Station diagnosis
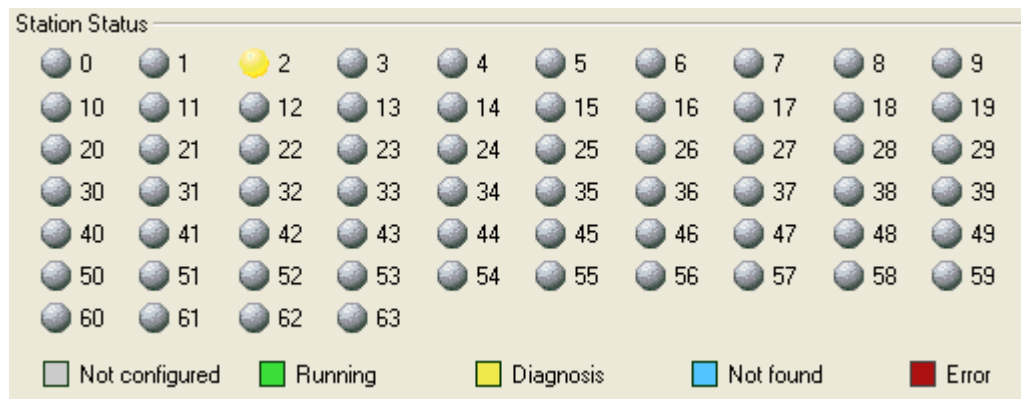
Figure 67: Station diagnosis

Under **Station status** all disposal station addresses (0-63) and their states are shown as LED. If the device is connected, the DTM will update this display cyclically.

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

Color	Name	Description
(gray)	Not configured	This station address is not configured with a device.
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.

Table 31: Possible values for the status

7.6   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.
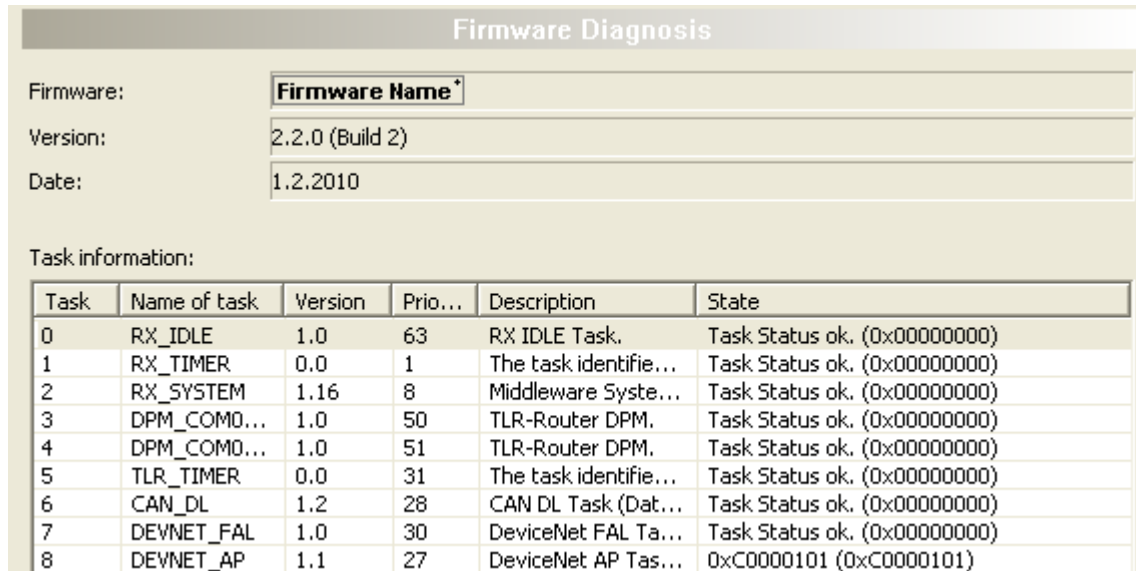
Figure 68: Firmware Diagnosis

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 32: Description table task information

7.7   Live list

The **Live list** gives an overview of the devices, which are physically present in the real DeviceNet network network constellation. The live list works online.

How to proceed

To work with the **Live list**, proceed as follows:

➢ Connect device

> **Note:**
> Accessing the **Live list** display requires an online connection from the DeviceNet Master DTM to the DeviceNet Master device. For further information refer to section *Connecting/disconnecting device* [▶ page 78].

➢ Select **Additional functions** > **Live list** from the context menu (right mouse click).

Remember that all devices on DeviceNet must first go through the autobaud detection phase, which can take a few milliseconds.
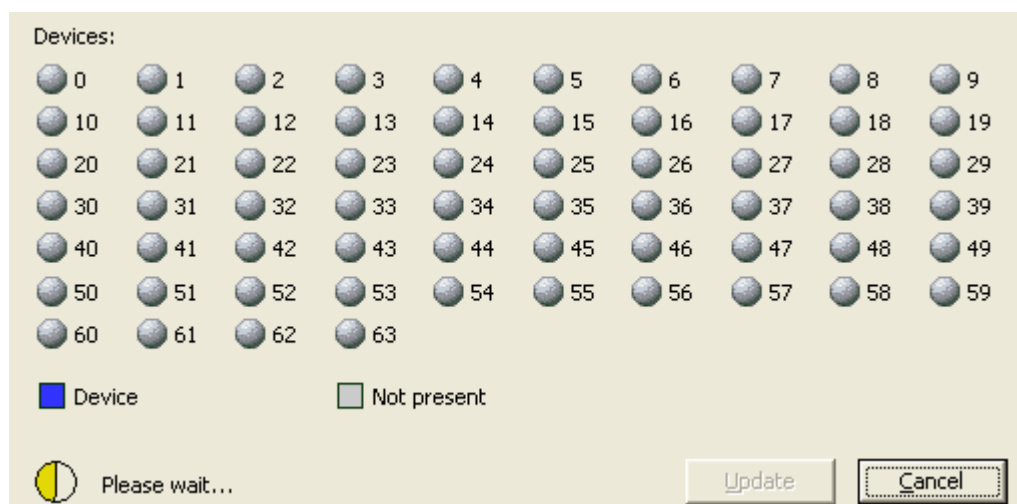
Figure 69: Live list

Under **Live list** > **Devices** all disposal station addresses* and their states are shown as LED, where the number indicates the DeviceNet-Adresse (MAC ID) of the device (*0 to 63).

• Present devices are represented as a *blue LED* 🔵.

• all the other not present devices appear as *gray LED* ⚪.

Updating live list

The display is not updated automatically as this function loads the DeviceNet network. However, the Live List can be renewed with the **Update** button.

7.8   Debug mode

> **Note:**
> Depending by the software variant of the rame application the **debug mode** is available or not.

The **debug mode** allows to identify the status of the cyclical communication between a master device and its slave devices on a network based on the colors of the bus lines as well as the debug icons.

For the **master** device or the master bus line this is valid:

- Master device in operation, cyclic communication is executed.

  (Bus line "light green" ▬▬/ debug icon "RUN" 🏃 next to the master device icon)

- Master device not ready for operation.

  (Bus line "blue" ▬▬/ debug icon "ATTENTION" ⚠ next to the master device icon)

- Master device in STOP state.

  (Bus line "red" ▬▬/ debug icon "STOP" 🛑 next to the master device icon)

The following applies for the **slave** device or for the bus line from the master bus line to the slave device:

- Slave device in operation, cyclic communication to the master device is running.

  (Bus line "light green" ▬▬/ debug icon "RUN" 🏃 next to the slave device icon)

- Diagnostic message available on the master device.

  (Bus line "yellow" ▬▬/ debug icon "RUN" 🏃 next to the slave device icon)

- Slave device not found during cyclical communication boot up.

  (Bus line "blue" ▬▬/ debug icon "ATTENTION" ⚠ next to the slave device icon)

- Error in the slave-to-master communication.

  (Bus line "red" ▬▬/debug icon „STOP" 🛑 next to the slave device icon)

- Slave device is not configured.
  (Bus line "gray" ▬▬)

7.8.1   Requirements

> **Note:**
> You first must:
> - assign the master device to the master DTM,
> - configure the master or the slave device parameters,
> - and download the configuration to the master.
> Only then, the debug mode can be used appropriately.

For details to the device assignment, refer to section *Overview settings for driver and device assignment* [▶ page 24].

> For information on how to configure the master device or how to download the configuration, refer to this operating instruction manual and to the operating instruction manual for netDevice.
>
> For information on how to configure the slave device, refer to the operating instruction manual of the slave DTM.

7.8.2   Starting debug mode

> **→** **Note:**
> The menu entries for the **debug mode** will be only available if the debug mode is supported by the frame application, and the master DTM.

For a *single network*:

➢ Open the context menu of the master. Therefore right-click to the device icon.

➢ Select the **Start debug mode** command from the context menu.

For the *entire project*:

➢ Click to the menu **Network** > **Start project debug mode** or in the netDevice toolbar **Debug** to the icon 🏃.

↳ In the debug mode, the bus lines in the network view are displayed depending on the status of the cyclical communications in various colors. Additionally next to the device icon different debug icons are displayed.
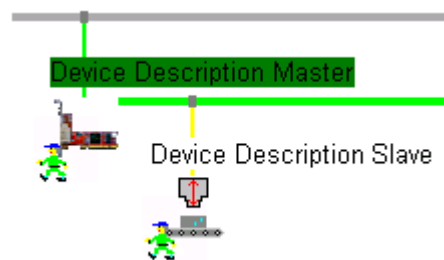
Figure 70: Example Debug mode with pending diagnosis, network view of a project with one network (master and slave)

Line colors shown in the graphic: Root bus line: "gray" ▬▬, master bus line: "light green" ▬▬, bus line to slave: "yellow" ▬▬

- **Root busline:** This busline is always displayed in "gray" ▬▬.

- **Branch line of the master device** (Busline from the root to the master busline): During the debug mode this busline is displayed "light green" ▬▬, "blue" ▬▬ or "red" ▬▬ colored. If the debug mode is not used, this bus line will be displayed "gray" ▬▬ colored.

- **Master busline** or **branch line of the slave device**: During the debug mode these buslines are displayed "light green" ▬▬, "yellow" ▬▬, "blue" ▬▬ or "red" ▬▬ colored. If the debug mode is not used, this bus line will be displayed in the respective fieldbus or protocol specific color (PROFI-BUS: "violet" ▬▬).

7.8.3   Debug mode busline colors and icons

The following table contains information about the displayed colors of the bus lines and on the icons in the debug mode.

Color master bus line	Icon (next to master device icon)	Description
"light green"		The master device has cyclic communication
"blue"	⚠	The master device is not operable. This may have different causes. For example: - There is no valid license in the master device. - There is no valid firmware in the master device.
„red"	🛑	The master device is in STOP state. The cyclic communication has been stopped.

Table 33: Debug mode busline colors and debug icons

Color branch line slave device	Icon (next to slave device icon)	Description
"light green"		The master device has cyclic communication to this slave device.
"yellow"		The master device has cyclic communication to this slave device, but in the diagnostic buffer of the master device, a diagnostic information about this slave is pending.
„blue"	⚠	The device was not found. This may have different causes. For example: - The configuration download to the master device is still missing. - The slave device is not available in the network. - There is no valid firmware in the master device. - Parameter or configuration error at the master device. - The cyclic communication to this slave device has been stopped (without diagnosis information at the master).
„red"	🛑	Due to a communication error, the cyclic communication from the master device to this slave device is not possible. This may have different causes. For example: - The cyclical communication to this slave device has been stopped. - Parameter or configuration error at the slave device. - The validation of the manufacturer or device ID shows different values. - The diagnostic buffer of the master device still a diagnostic information about this slave is pending and the cyclic communication to this slave device has been stopped.
„gray"	-	The slave device is not configured. I. e., in the configuration of the master device there are no configuration parameters to this slave available.

Table 34: Colors of the branch line of the slave device and debug symbols

7.8.4   Reset of the diagnosis information and of the station status

To analyze the "diagnosis information":

➢ Select the diagnosis windows in the DeviceNet Master DTM dialog.

➢ Therefore select **Diagnosis** > [*diagnosis window*] in the navigation area.

To read the diagnosis buffer of the master device and thus to reset the device:

➢ Select **Diagnosis** > **Station diagnosis** in the navigation area.

➢ In the window **Station diagnosis**, click with the right mouse button to the station status LED for the device (yellow).

➢ From the context menu, select **Reset** or **Reset all**.

⇨ In the window **Station diagnosis** the station status LED for the device is displayed in green and in the **network view** the bus line from the DeviceNet Master device icon to the DeviceNet Slave device icon is displayed in "light green".

7.8.5   Stopping debug mode

For a "single network":

➢ Open the context menu of the master. Therefore right-click to the device icon.

➢ Select the **Stop debug mode** command from the context menu.

For the "entire project":

➢ Click to the menu **Network** > **Stop project debug mode** or in the netDevice toolbar **Debug** to the icon 🛑.

8   Extended diagnosis

8.1   Overview extended diagnosis

The "Extended Diagnosis" of the DeviceNet Master 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 DeviceNet Master DTM:

Folder name / Section	Subsection
different folders	*Task information* [▶ page 109]
RX-SYSTEM	*IniBatch status* [▶ page 110]
CAN_DL	*App commands* [▶ page 111]
	CAN driver status [▶ page 112]
DEVNET_FAL	*Application diagnosis* [▶ page 113]
	Device status [▶ page 114]
	Diagnosis error [▶ page 114]
	Timeout counter [▶ page 114]
	Reinit counter [▶ page 115]
	DeviceNet CAN diagnosis [▶ page 115]

Table 35: Descriptions of the dialog panes extended diagnosis

Note:
Accessing the **Extended Diagnosis** dialog panes of the DeviceNet Master DTM requires an online connection from the DeviceNet Master DTM to the DeviceNet Master device. For further information refer to section *Connecting/disconnecting device* [▶ page 78].

8.2 Task information

Figure 71: 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

Figure 72: 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 CAN_DL

8.4.1 App commands

Figure 73: Extended diagnosis > CAN_DL > App commands

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

Table 38: Extended diagnosis > CAN_DL > App commands

8.4.2   CAN driver status

Figure 74: Extended diagnosis > CAN_DL > CAN driver status

Name	Description	
CAN status	collection bits for Bus off, Error warning and Error passive	Diagnosis status of CAN specific error levels. Indicates the respective status of the CAN bus. (For further information refer to the API manual.)
Bus off	true / false CAN status - The CAN is in Bus off state	
Error warning	true / false Error Warning - The CAN is in the status Error warning	
Error passive	true / false Error Warning - The CAN is in Error passive	
Reserved	true / false Status or Error message	
24 Volt network error	true / false - 24 Volt Network Error - The CAN is in 24 Volt Network Error	
[*Service*]	Diagnosis counter of CAN errors. Indicates the services processed. (The services of the single packets are described in the API manual.)	

Table 39: Extended diagnosis > CAN_DL > CAN driver status

8.5   DEVNET_FAL

8.5.1   Application diagnosis

Figure 75: Extended diagnosis > DEVNET_FAL > Application diagnosis

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

Table 40: Extended diagnosis > DEVNET_FAL > Application diagnosis

8.5.2 Device status

Figure 76: Extended diagnosis > DEVNET_FAL > Device status

Name	Description
[*Status*]	Diagnosis status of the single devices. Indicates the current status of the single devices. (For further information refer to the API manual.)

Table 41: Extended diagnosis > DEVNET_FAL > Device status

8.5.3 Diagnosis error

Figure 77: Extended diagnosis > DEVNET_FAL > Diagnosis error

Name	Description
[*Error code*]	Error codes of the device diagnosis. Indicates the error codes by each device. (For further information refer to the API manual.)

Table 42: Extended diagnosis > DEVNET_FAL > Diagnosis error

8.5.4 Timeout counter

Figure 78: Extended diagnosis > DEVNET_FAL > Timeout counter

Name	Description
[*Service*]	Diagnosis counter for device timeout. Indicates the number of timeouts for each device. (For further information refer to the API manual.)

Table 43: Extended diagnosis > DEVNET_FAL > Timeout counter

8.5.5   Reinit counter

Figure 79: Extended diagnosis > DEVNET_FAL > Reinit counter

Name	Description
[*Service*]	Diagnosis counter for device reinitialization. Indicates the number of reinitialization for each device. (For further information refer to the API manual.)

Table 44: Extended diagnosis > DEVNET_FAL > Reinit counter

8.5.6   DeviceNet CAN diagnosis

Figure 80: Extended diagnosis > DEVNET_FAL > DeviceNet CAN diagnosis

Name	Description
Bus state	Status of the CAN bus
Receive CAN frame	Counter for received CAN frames
Transmitted CAN frame	Counter for transmitted CAN frames
Bus Off counter	Status level error counter for „Off" [2]
Error passive counter	Status level error counter for „Passive" [2]
Error warning counter	Status level error counter for „Warning" [2]

Table 45: Extended diagnosis > DEVNET_FAL > DeviceNet CAN diagnosis

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.
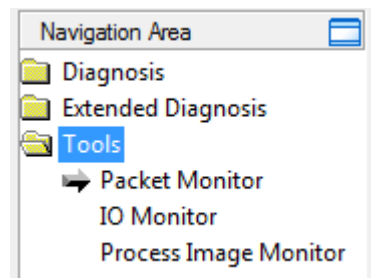
Figure 81: Navigation area - Tools (example)

Online connection to the device

> **Note:**
> Accessing the **Tools** dialog panes of the DeviceNet Master DTM requires an online connection from the DeviceNet Master DTM to the DeviceNet Master device. For further information refer to section *Connecting/disconnecting device* [▶ page 78].

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 82: 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

Figure 83: 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 (*destination task queue* 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 46: Descriptions Packet header

➢ Under **Dest** select the receiver (destination task queue).

➢ Under **Cmd** select the command identification (Request).

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

Send data

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

Sending packets once or cyclic

➢ To send packet "once", select **Put packet**.

➢ To send packet "cyclic", select **Put cyclic**.

9.2.2   Receiving packet
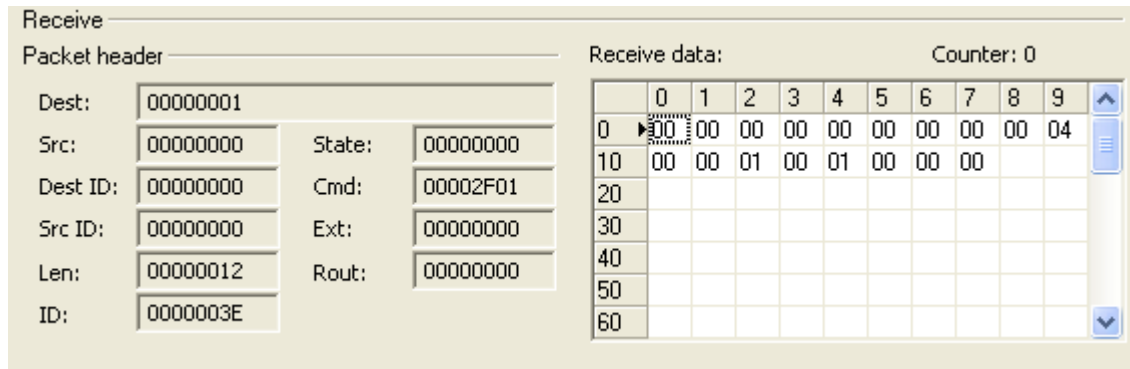
Figure 84: Packet header and Receive data

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 (*destination task queue* 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 47: 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.

Figure 85: 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 slave devices connected to the master, 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**.
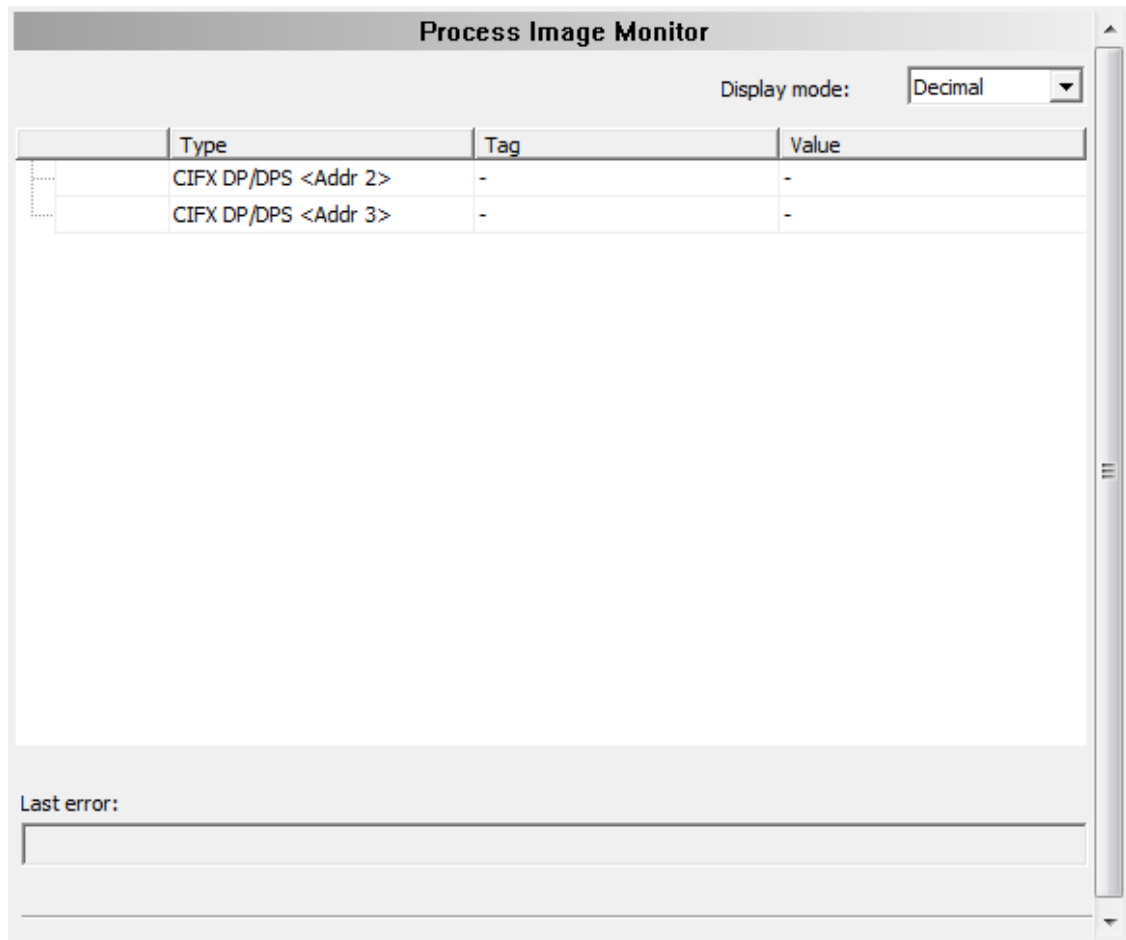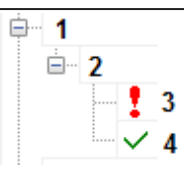
Figure 86: Window "Process image monitor"

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 48: Notes to the "Process image monitor" window

10 Appendix

10.1 References

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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 DeviceNet Master 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	Adminis-trator
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 36]	D	D	X	X	X
	Selecting the device (with or without firmware) [▷ page 39]	D	D	X	X	X
	Selecting the device once more (with firmware) [▷ page 39]	D	D	X	X	X
	Selecting and downloading firmware [▷ page 41]	D	D	X	X	X
Licen-sing	*Licensing* [▷ page 47]	D	D	X	X	X

Table 49: User rights settings (D = displaying, X = editing, configuring)

10.2.2   Configuration

	Observer	Operator	Maintenance	Planning engineer	Adminis-trator
Bus parameters [▷ page 63]	A	A	X	X	X
Server parameters [▷ page 65]	A	A	X	X	X
Process data [▷ page 66]	A	A	X	X	X
Address table [▷ page 67]	A	A	X	X	X
MAC ID table [▷ page 68]	A	A	X	X	X
Quick connect table [▷ page 70]	A	A	X	X	X
Master settings [▷ page 74]	A	A	X	X	X

Table 50: User rights configuration (D = displaying, X = editing, configuring)

10.3 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 51: Signs

Signal words

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

Table 52: 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

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.

DeviceNet Open network standard based on CAN: (1.) Standardization in the European standard EN 50325. Specification and maintenance of the DeviceNet standards incumbent on the ODVA (Open DeviceNet Vendor Association, Inc.). (2.) The application layer of the DeviceNet network consists of the CIP (Common Industrial Protocol). (3.) object-oriented bus system which utilizes the producer/consumer model.

DeviceNet Master Device that initiates the data exchange at the bus

DeviceNet Slave Device, which is configured by the master and which then performs the communication

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

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 network address of a device on a DeviceNet network to distinguish the device from any other device or slave on this network (valid address range 0 to 63). Use configuration software dialog to adjust.
Master	Type of device that initiates and controls the communication on the bus
Module	Hardware or logical component of a physical device
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.
SCADA	Supervisory Control and Data Acquisition: A concept for the control and data acquisition of technical processes
Slave	Type of device that is configured by the Master and which then performs the communication
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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