Operating instruction manual

DTM for Hilscher PROFIBUS DP Master devices
Configuration of Hilscher master devices
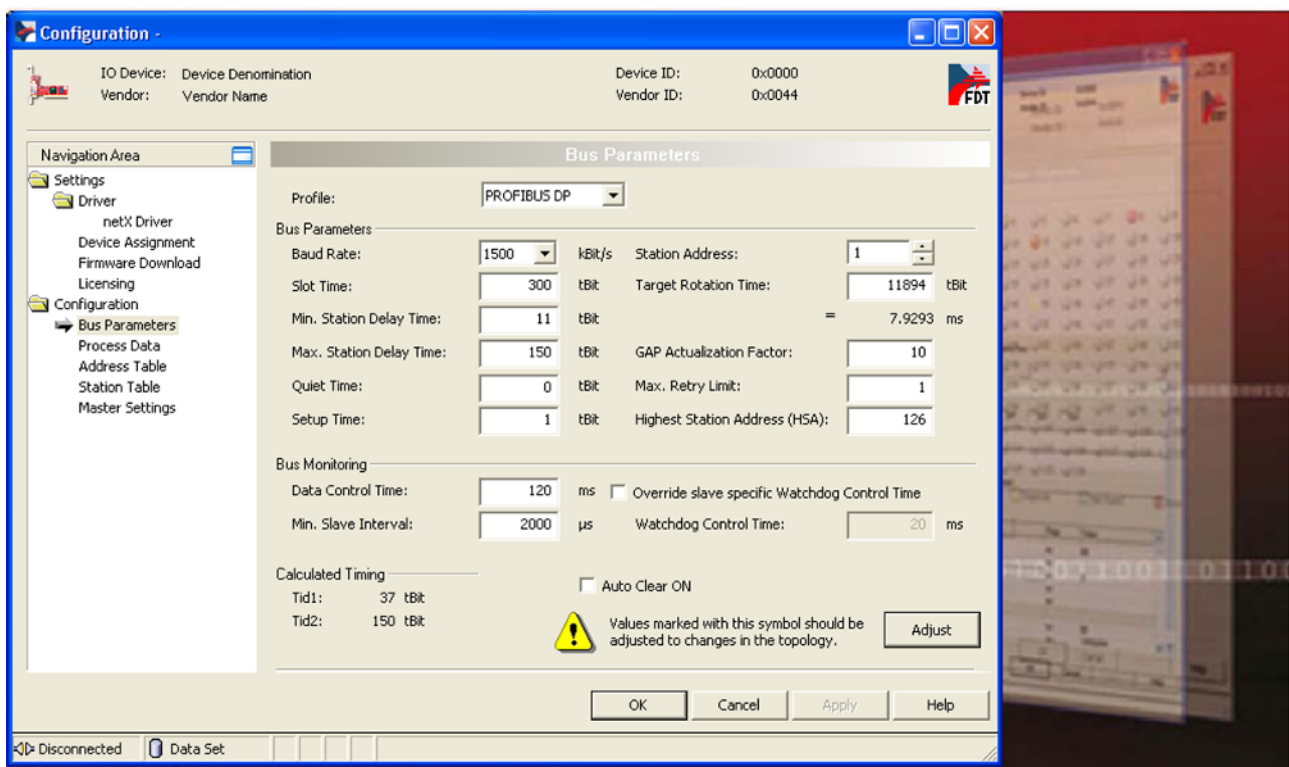## V2.1100

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1 Introduction

1.1 About this manual

This manual provides information on how to set and configure the device parameters of a netX based PROFIBUS DP Master device using the PROFIBUS DP 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 PROFIBUS DP Slave devices, how to configure the PROFIBUS DP 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 PROFIBUS DP 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
26	2022-04-25	2.1000.x.x 2.1000.x.x and 2.1100.x.x 2.1100.x.x	PBMasterDTMx.dll PBMasterGui.ocx and PBMasterDTMx.dll PBMasterGui.ocx	Document revised. Chapter Error codes removed. See API Manual "Hilscher status and error codes" instead.
27	2022-06-13	2.1000.x.x 2.1000.x.x and 2.1100.x.x 2.1100.x.x	PBMasterDTMx.dll PBMasterGui.ocx and PBMasterDTMx.dll PBMasterGui.ocx	Corrections.

Table 1: List of revisions

1.2   Overview use cases

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

Use case	Description	Chapter, section
Device start up	• Creating project configuration • Start/stop communication	*Device start up* [▸ page 17] *Create project configuration* [▸ page 21] *Start/stop communication* [▸ page 25]
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 26] *Verifying or adapting driver settings* [▸ page 29] *Configuring drivers* [▸ page 31] *Assigning device (with or without firmware)* [▸ page 38] *Selecting and downloading firmware* [▸ page 43]
Licensing	(licenses for master protocols)	*Licensing* [▸ page 50]
Configuring device parameters	• Set bus parameters • Set process data • Set device address • Set station addresses of devices • Master settings	*Overview configure device parameters* [▸ page 62] *Bus parameters* [▸ page 64] *Process data* [▸ page 70] *Address table* [▸ page 71] *Station table* [▸ page 73] or *Set station address* [▸ page 74] *Master settings* [▸ page 75]
Connecting/disconnecting device	Establishing online connection	*Connecting/disconnecting device* [▸ page 79]
Downloading configuration	Download to the device	*Download configuration* [▸ page 81]
Importing network structure and upload	Identifying network configuration automatically.	*Network scan and upload* [▸ page 83]
Configuration in Run	Change configuration of the "running" PROFIBUS network.	*Configuration in run* [▸ page 96]
Diagnosis	• General diagnosis • Master diagnosis • Bus diagnosis • Station diagnosis • Firmware diagnosis	*Overview diagnosis* [▸ page 111] *General diagnosis* [▸ page 112] *Master diagnosis* [▸ page 114] *Bus diagnosis* [▸ page 115] *Station diagnosis* [▸ page 116] *Firmware diagnosis* [▸ page 117]
Live List	Overview device presence	*Live list* [▸ page 118]
Debug mode	Status of the cyclic master/slave communication	*Debug mode* [▸ page 119]
Extended diagnosis	Finding communication/configuration errors.	*Extended diagnosis* [▸ page 124]
Packet Monitor	Test of send and receive data.	*Packet monitor* [▸ page 140]
IO Monitor	Test of communication.	*I/O monitor* [▸ page 153]
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 154]
User rights	Definition of access rights	*User rights* [▸ page 157]

Table 2: Overview use cases

1.3 System requirements

- PC with 1 GHz processor or higher

- Windows® XP SP3,
  Windows® Vista (32-Bit) SP2,
  Windows® 7 (32-Bit and 64-Bit) SP1,
  Windows® 8 (32-Bit and 64-Bit),
  Windows® 8.1 (32-Bit and 64-Bit),
  Windows® 10 (32-Bit and 64-Bit)

- Administrator privilege required for installation

- Internet Explorer 5.5 or higher

- RAM: min. 512 MByte, recommended 1024 MByte

- Graphic resolution: min. 1024 x 768 pixel

- Keyboard and Mouse

- Restriction: Touch screen is not supported.

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

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

1.5   Requirements PROFIBUS DP Master DTM

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

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

1.6   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.
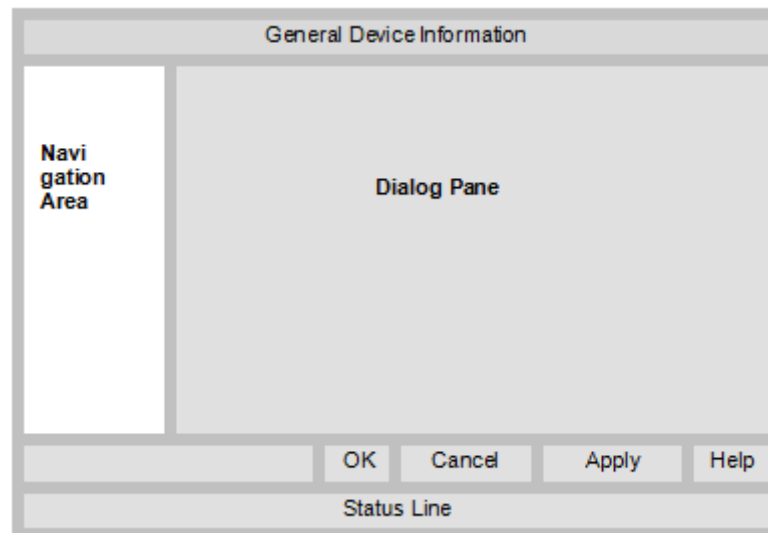
Figure 1: Dialog structure PROFIBUS DP Master DTM

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.
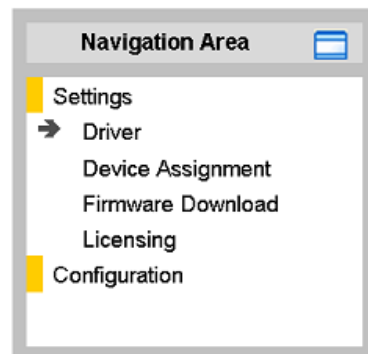
Figure 2: Navigation area

➢ 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.
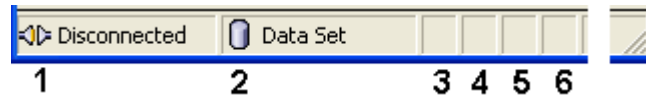
Figure 3: Status bar – status fields 1 to 6

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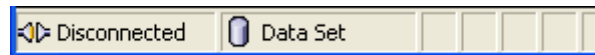
Offline state	
Save operation succeeded	
Firmware download	
Firmware download successful	
Online state and diagnosis	
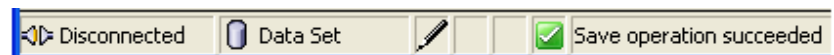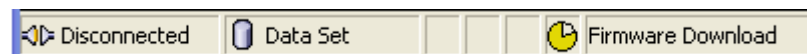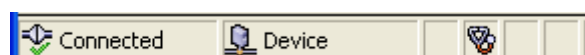
Table 6: Status bar display examples

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 PROFIBUS DP Master DTM serves for configuration and diagnosis of PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP Master device with PROFIBUS DP 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 PROFIBUS DP 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.	
	Note! You can select a device PROFIBUS DPV0 (with cyclic communication), a device PROFIBUS DPV1 (with acyclic communication) as well as a device PROFIBUS DPV2 (with cyclic and acyclic communication and Time Sync configuration fo the Slave).	-
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.	-

Step	Brief description	Further information
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 PROFIBUS DP Master DTM is installed on the same PC as the PROFIBUS DP Master device. • Use the **netX driver** to establish a USB, Serial (RS232) or TCP/IP connection from the PROFIBUS DP Master DTM to the PROFIBUS DP 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 26] or *Verifying or adapting driver settings* [▶ page 29]
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 [+] 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 32]
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 38]
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 43]
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 41]

Step	Brief description	Further information
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 the watchdog control and interval, - select **Configuration** > **Modules**, - configure the modules of the slave, - select **Configuration** > **Signal configuration**, - proceed the signal configuration, - select **Configuration** > **Parameters**, - set the module parameters, - select **Configuration** > **Groups**, - assign the slave to a group, - select **Configuration** > **Extensions**, - set the extension parameters, - select **Configuration** > **DPV1**, - configure the DPV1 functions, - select **Configuration** > **DPV2**, - configure the DPV2 functions, - select **Configuration** > **Redundancy**, - perform the redundancy configuration. - Close the slave DTM configuration dialog via **OK**.	Operating instruction manual "Generic DTM for PROFIBUS DP Slave devices"
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** > **Process data**. - Set symbolic names for the configured modules or signals, - select **Configuration** > **Address table**, - set the device address if necessary, - select **Configuration** > **Station table**, - set the station address of the devices, - select **Configuration** > **Master settings**, - set the master settings. - For the option **Enable configuration download during network state "operate"** refer to the descriptions about Configuration in Run. - Close the master DTM configuration dialog via **OK**.	Sections *Overview configure device parameters* [▶ page 62] *Bus parameters* [▶ page 64] *Process data* [▶ page 70] *Address table* [▶ page 71] *Station table* [▶ page 73] *Master settings* [▶ page 75] *Configuration in run* [▶ page 96]
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 79]
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 81]

Step	Brief description	Further information
Network Scan /upload	Alternative to manual configuration of the slave device, you can scan the network structure, create the module configuration of the slave device via **Upload** of the device configuration, and download to the master device. **Steps:** 1. Start **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 slave device configuration, and create the module configuration. 5. Via **Download** (in the master DTM), download the current configuration of the slave devices to the master device.	Section *Network scan and upload* [▸ page 83]
Live list	Via the context menu **Additional functions** > **Live list** you can display the devices present at the bus.	Section *Live list* [▸ page 118]
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 111] Section *Extended diagnosis* [▸ page 124]
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 153]
Disconnect	- Right click to the device icon of the Master, - select **Disconnect**.	Section *Connecting/ disconnecting device* [▸ page 79]

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.

   Note:
   You can select both a device PROFIBUS DPV0 (with cyclic communication), a device PROFIBUS DPV1 (with acyclic communication) and a device PROFIBUS DPV2 (with cyclic and acyclic communication and time-sync configuration for the slave).

   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 module 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 83].

3.4   Steps for "Configuration in Run"

Required steps to perform a configuration update during running network operation:

#	Step	Description	Further information
1.	**Preparation**	**1. Activate "Configuration in Run".** - Double-click to the device icon of the master. In the master DTM configuration dialog: - select **Configuration > Master Settings**, - check **Enable configuration download during network state "operate"**.	*How to proceed* [▶ page 98] *Activating „Configuration in Run"* [▶ page 99]
		2. Define the number of bytes after the input data. - In the **Master Settings** pane set **Device Status Offset** to **Static**. - In the field. **Starts ... bytes after the last input data** specify the distance (free buffer) between the last input data byte and the device status. - Close the master DTM configuration dialog via **OK**.	*Defining number of bytes after input data* [▶ page 99]
		3. Create the configuration. - Create the network configuration and perform the parameter settings for the respective slave device in the PROFIBUS DP Slave DTM, (see *steps 3, 4 and 12* in the table Getting started - configuration steps). **Note!** The "Address" and the "Baud Rate" of the PROFIBUS DP Master devices can not be changed in the new configuration (new database).	*Creating the configuration* [▶ page 100]
		4. Start the download of the new 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**. - The download is performed. - The dialog pane **Configuration in Run** is opened.	*Safety messages on firmware or configuration download* [▶ page 16] *Starting the download* [▶ page 102]
		5. Activate changes. - Select **Activate changes**. - The **Configuration in Run** dialog closes. - The Information pane with the text **The database changes were successfully activated.** is displayed.	*Activating or rejecting the changes* [▶ page 107]

#	Step	Description	Further information
2.	**Change Configuration via Configuration in Run**	**1. Expand or change the configuration.** - Change the network configuration and adjust the parameter settings for the respective slave device in the AS-InterfaceAS-Interface PROFIBUS DP Slave DTM, (refer to *step 3, 4 and 12* of the table Getting started - configuration steps). - Close the slave DTM configuration dialog via **OK**. **Note!** The "Address" and the "Baud Rate" of the PROFIBUS DP Master devices can not be changed in the new configuration (new database).	*Changing the Configuration [▶ page 101]*
		2. Start the download of the changed 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**. - The download is performed. - The dialog pane **Configuration in Run** is opened.	*Safety messages on firmware or configuration download [▶ page 16]* *Starting the download [▶ page 102]*
		3. Evaluate configuration data. - Check in the dialog pane **Configuration in Run**, whether the changed configuration (new data base) can be applied or not.	*Evaluating the configuration data [▶ page 103]*
		4. Activate or reject changes. **Note!** The changed configuration (new database) can only be accepted if: • - the **changes to the database parameters** are possible, - the **Master Settings** ("Startup", "Watchdog", "Statusoffset", "Busparameter") have not changed and • - the **Master State** is "OK" (= 0x00000000). • - In the **Configuration in Run** pane select **Activate changes**. - The **Configuration in Run** dialog closes. - The Information pane with the text **The database changes were successfully activated.** is displayed or respectively an error message.	*Activating or rejecting the changes [▶ page 107]*
3.	**If the new configuration can not be applied**	In this case you may need to increase the number of bytes after the input data.	*Increasing the number of bytes after the input data [▶ page 108]*

Table 8: Getting started - steps for "Configuration in Run"

3.5   Start/stop communication

You can manually start or stop the communication between a PROFIBUS DP Master device and PROFIBUS DP 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 PROFIBUS DP Slave DTM to the PROFIBUS DP Slave device is required. Further information can be found in the section *Connecting/disconnecting device* [▶ page 79].

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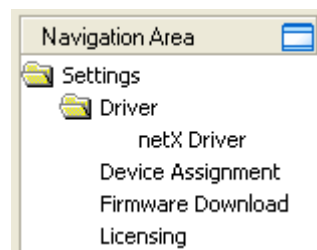
Figure 4: Navigation area - Settings (example)

There may be more drivers.

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

> **Note:**
> Configuration changes via "Configuration in Run" can only be stored in the driver directory, using the **cifX device driver**, see section *Requirements* [▷ page 97].

> **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 PROFIBUS DP Master DTM and the PROFIBUS DP Master device, the following steps are required:

1. Verifying or adapting driver settings

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

   • Use the **netX driver** to establish an USB, Serial (RS232) or TCP/IP connection from the PROFIBUS DP Master DTM to the PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP Master device now is connected to the PROFIBUS DP Master DTM via an online connection.

For more information on the required settings, see sections *Verifying or adapting driver settings* [▶ page 29], *Assigning device (with or without firmware)* [▶ page 38], *Selecting and downloading firmware* [▶ page 43]or *Licensing* [▶ page 49].

> 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 PROFIBUS DP 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 9: Parameters of the driver selection list

2. Verify whether the default driver is checked.
   - ➢ To establish a connection from the PROFIBUS DP Master DTM to the PROFIBUS DP 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 PROFIBUS DP Master DTM to the PROFIBUS DP Master device must be supported by the device and must be available for the device.

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

- Use the **netX driver** to establish an USB, Serial (RS232) or TCP/IP connection from the PROFIBUS DP Master DTM to the PROFIBUS DP 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	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 PROFIBUS DP 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 PROFIBUS DP Master DTM is installed in the same PC as the PROFIBUS DP 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.
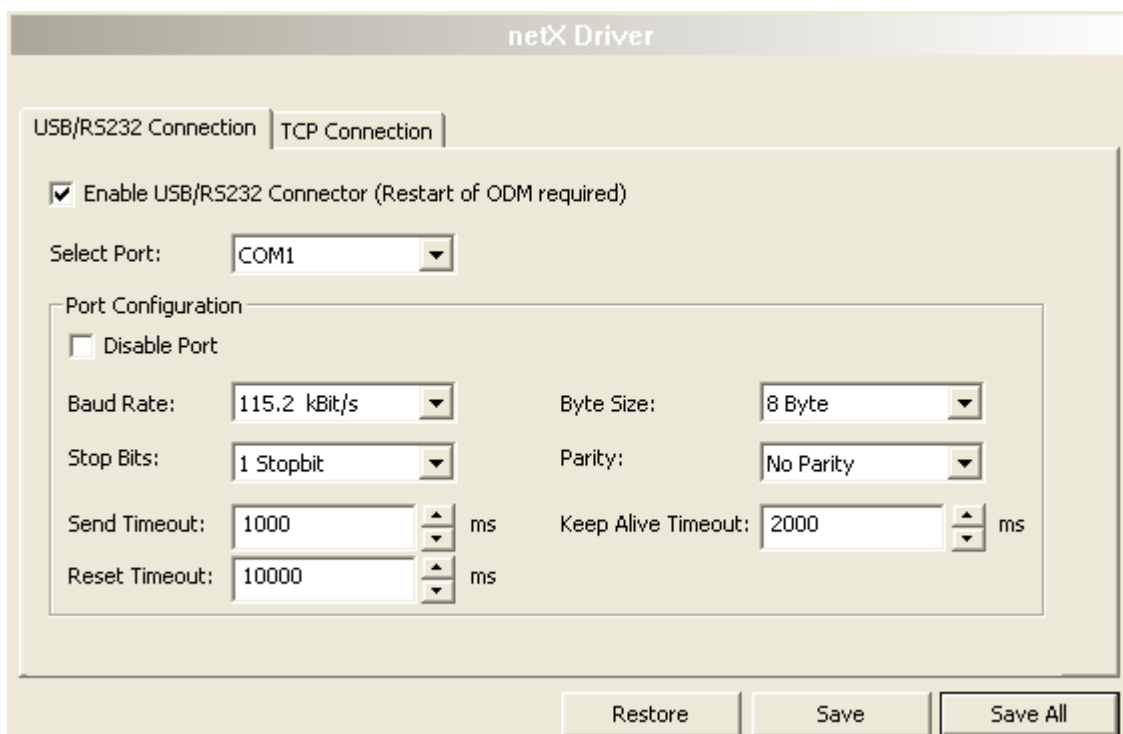
Via the RS232 interface or USB interface, the device is configured or diagnosis is performed.

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 10: 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**.
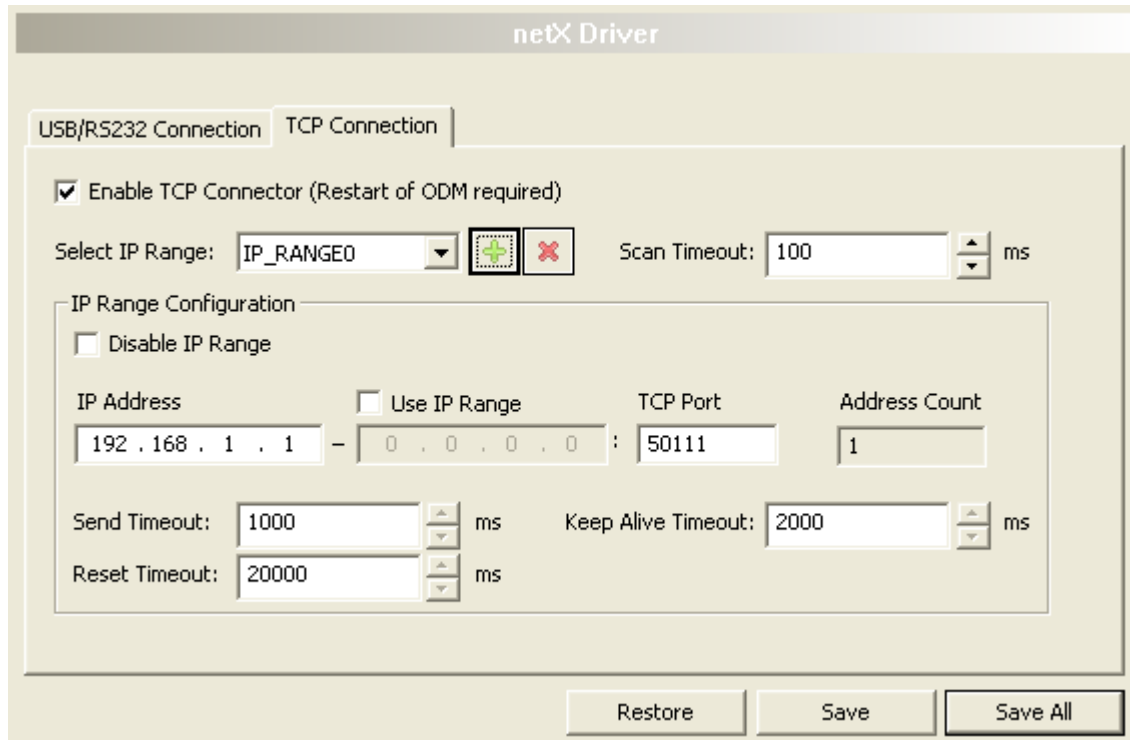
Figure 9: netX driver > TCP connection

Parameter	Description	Range of value / value
Enable TCP connector (restart of ODM required)	checked: The cifX driver can communicate via the TCP/IP interface.	checked, unchecked; Default: unchecked
	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**.	
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.	checked, unchecked (Default)
	unchecked: The cifX driver tries to establish a connection using the configured TCP/IP interface.	

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 11: 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 PROFIBUS DP Master device to the PROFIBUS DP Master DTM by checking the check box. This is essential to establish an online connection from the PROFIBUS DP Master DTM to the PROFIBUS DP Master device later, as described in section *Connecting/ disconnecting device* [▸ page 79].

Therefore, in the **Device assignment** dialog pane you scan for the PROFIBUS DP 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 PROFIBUS DP 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
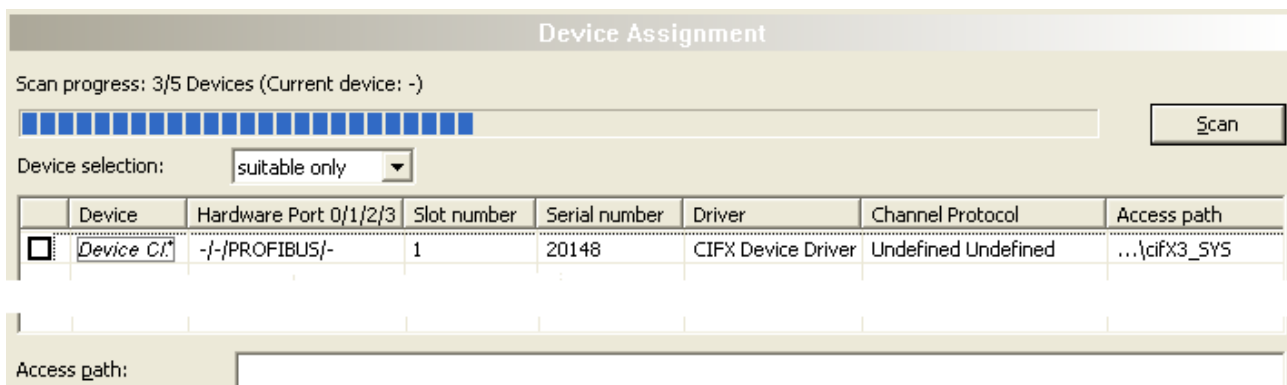
Figure 10: Device Assignment - detected devices (example: device without firmware)

> **→** **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 PROFIBUS DP 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). 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).	1 to 9, n/a
Serial number	Serial number of the device	
Driver	Name of the driver.	
Channel Protocol	Shows, which firmware is loaded to which device channel. The data for the used channel consists of the protocol class and the communication class. a.) For devices without firmware: Undefined Undefined, b.) For devices with firmware: Protocol name corresponding to the used Firmware	
Access path (last column on the right)	Depending on the used driver in the column **Access path** different data to the device is displayed. For the **cifX device driver** the following data is displayed: a.) For devices without firmware: …\cifX[*0toN*]_SYS, b.) For devices with firmware: …\cifX[*0toN*]_Ch[*0to3*]. cifX[*0toN*] = Board number 0 to N Ch[*0to3*] = Channel number 0 to 3	Depending on the device and on the driver: board or channel number, IP address or COM interface
Access path (at the lower side of the dialog pane)	If in the table a device is checked, under **Access path** (at the lower side of the dialog pane) the driver identification or depending on the used driver additional data to the device will be displayed. For the **cifX device driver** the following data is displayed: a.) For devices without firmware: …\cifX[*0toN*]_SYS, b.) For devices with firmware: …\cifX[*0toN*]_Ch[0to3]. cifX[*0toN*] = Board number 0 to N Ch[*0to3*] = Channel number 0 to 3	Driver identification (ID) Depending on the device and on the driver: board or channel number, IP address or COM interface

Table 12: Parameters of the Device Assignment

4.4.1.1   Selecting suitable only or all devices

All
- ➢ Under **Device selection** select *all*.
- ➢ Select **Scan**.
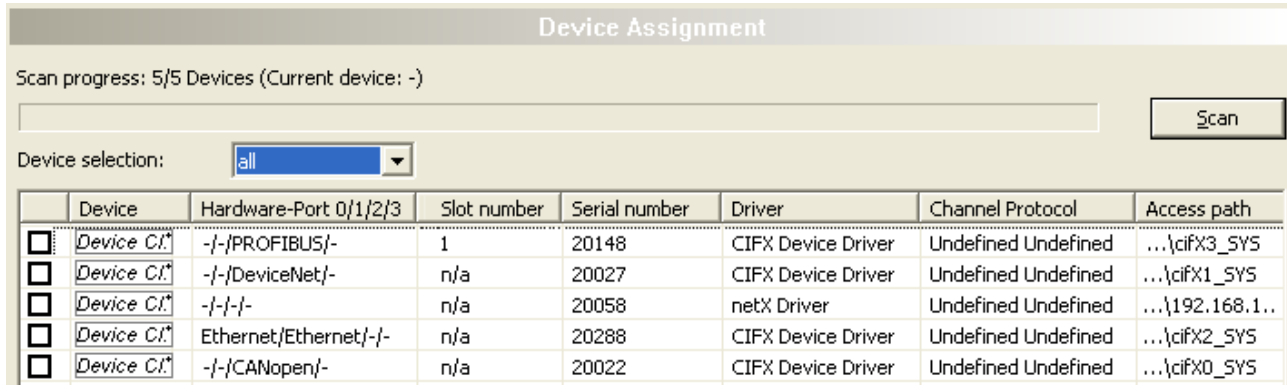
Figure 11: Device Assignment - detected devices (example: device without firmware)

- ➭ 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 PROFIBUS DP 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 PROFIBUS DP Master DTM can only be established with *one* PROFIBUS DP Master device.

To select the physical PROFIBUS DP 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 PROFIBUS DP Master DTM to the PROFIBUS DP 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 43] or to section *Selecting the device once more (with firmware)* [▷ page 41].

4.4.3   Selecting the device once more (with firmware)

> **Note:**
> For repeated download this step is omitted.

To select the PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP Master DTM to the PROFIBUS DP Master device, refer to section *Connecting/disconnecting device* [▶ page 79].

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 26].

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.
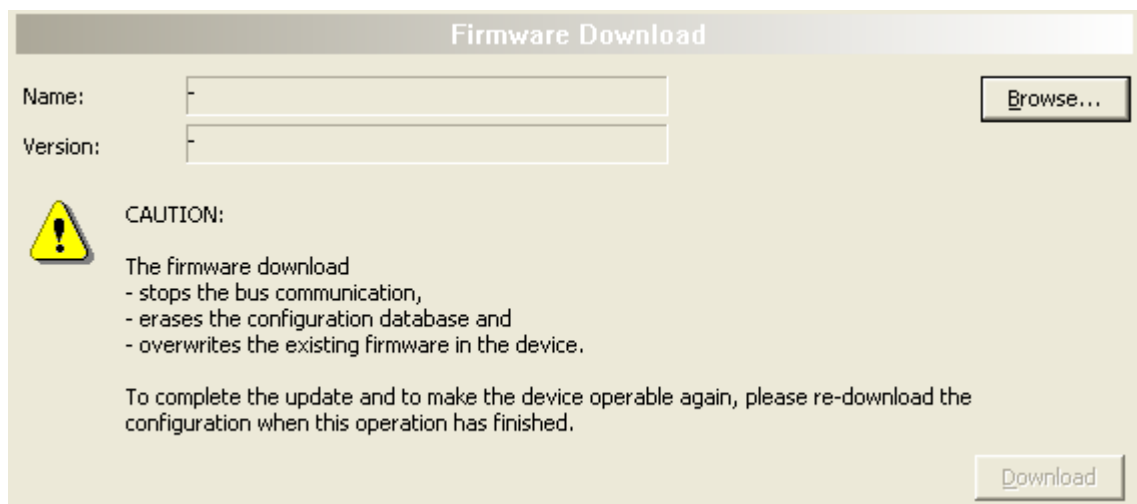
Figure 14: Firmware download

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 13: 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.
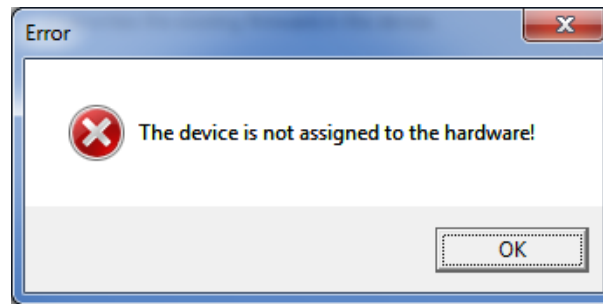
Figure 15: Error Message "The device is not assigned to the hardware!"

➢ Click **OK** and select and assign the master device as described in section *Assigning device (with or without firmware)* [▷ page 38].

↴ 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**.
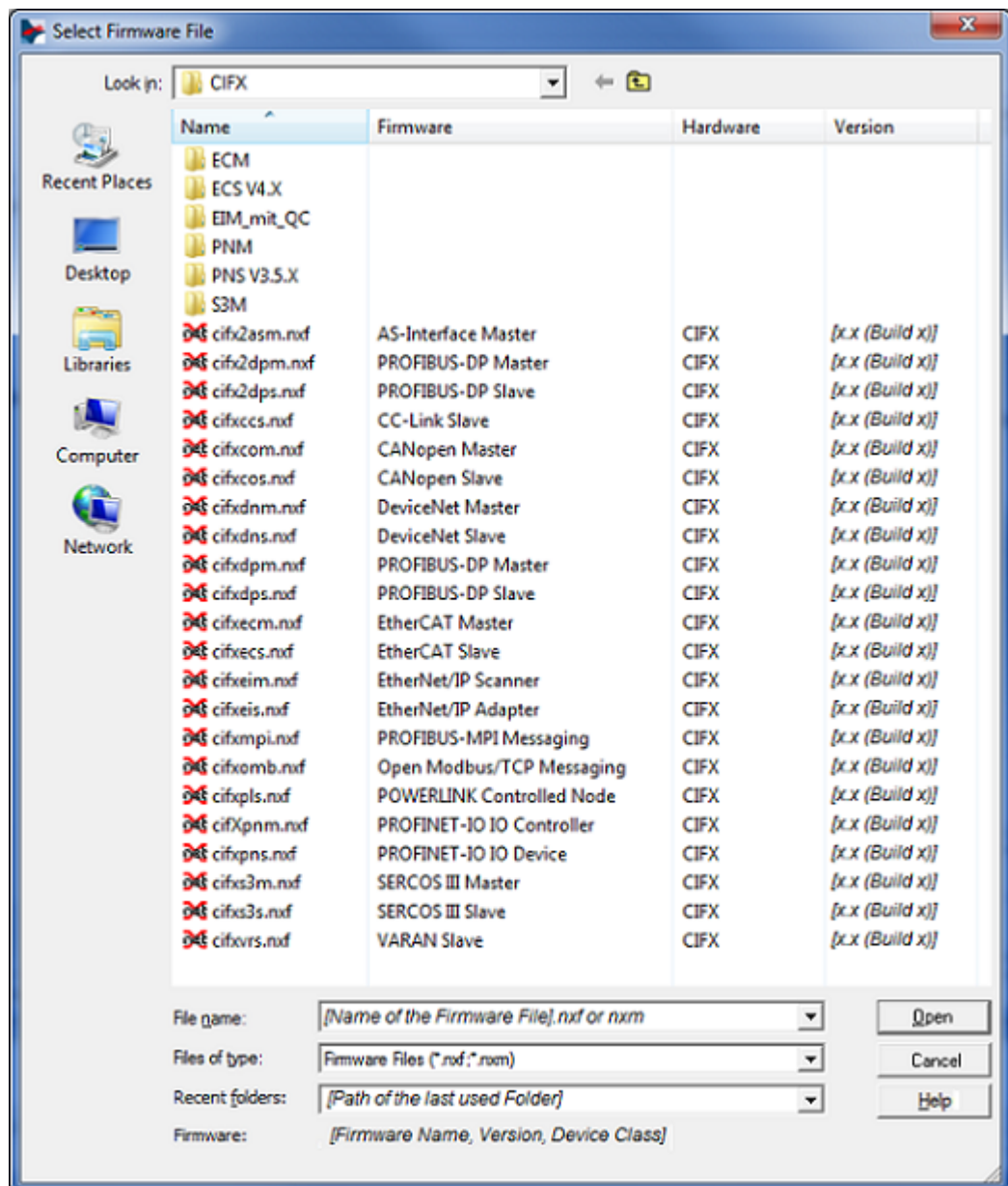
Figure 16: "Select firmware file" selection window (example CIFX)
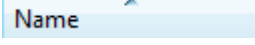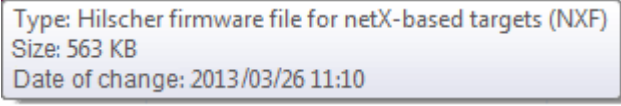
Parameter	Description	Range of value / value
Column **Name**	File name of the firmware file To sort the entries of the window **Select firmware file** by name click to the column head ⬚Name⬚.	nxf, nxm
Column **Firmware**	Name of the firmware (consisting of the protocol name and the protocol class)	
Column **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 14: Parameters "Select firmware file"

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

Note:

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

(for the list box entry ->)	all	suitable only
In the selection window **Select firmware file**:	all files from the selected folder	only firmware files from the selected folder
Under **File of type***:	"All Files (*.*)"	"Firmware files (*.nxm)", "Firmware Files (*.nxf)"

(for the list box entry ->)	all	suitable only
Validation:	A restricted validation will be performed if the selected firmware is applied for the download.	A validation is made whether the firmware file is suitable for the PROFIBUS DP Master DTM.
These settings in the selection window **Select firmware file** can also be changed manually.		

Table 15: 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 PROFIBUS DP 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.
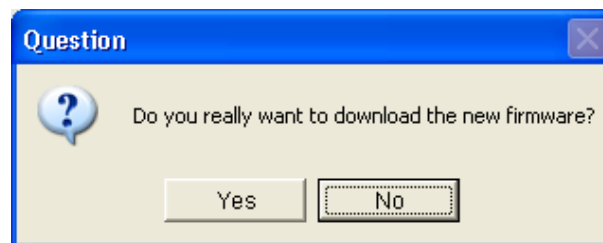
Figure 18: Request - Do you really want to download the firmware?

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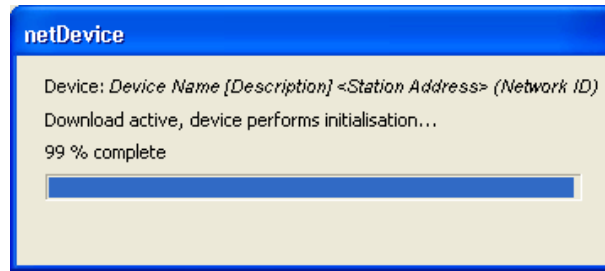
Figure 19: Firmware download - progress bar
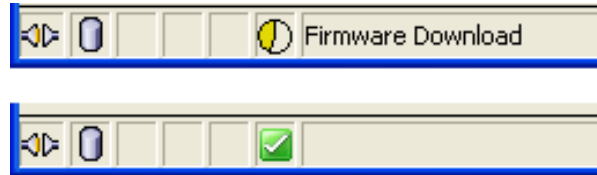
Figure 20: Clock symbol and hook symbol green
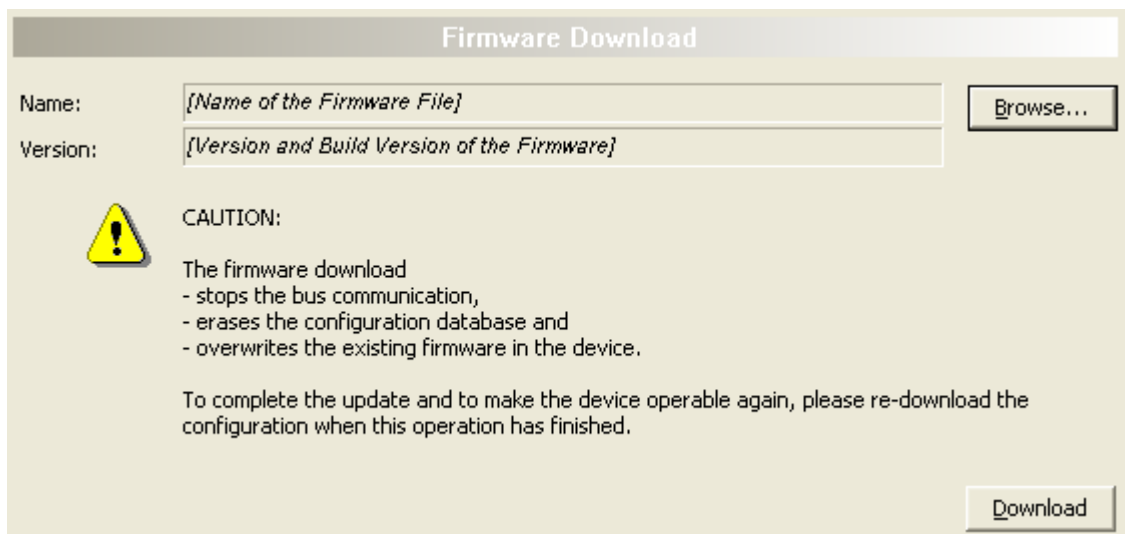
Figure 21: Firmware download - download

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 50].

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 26].

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),
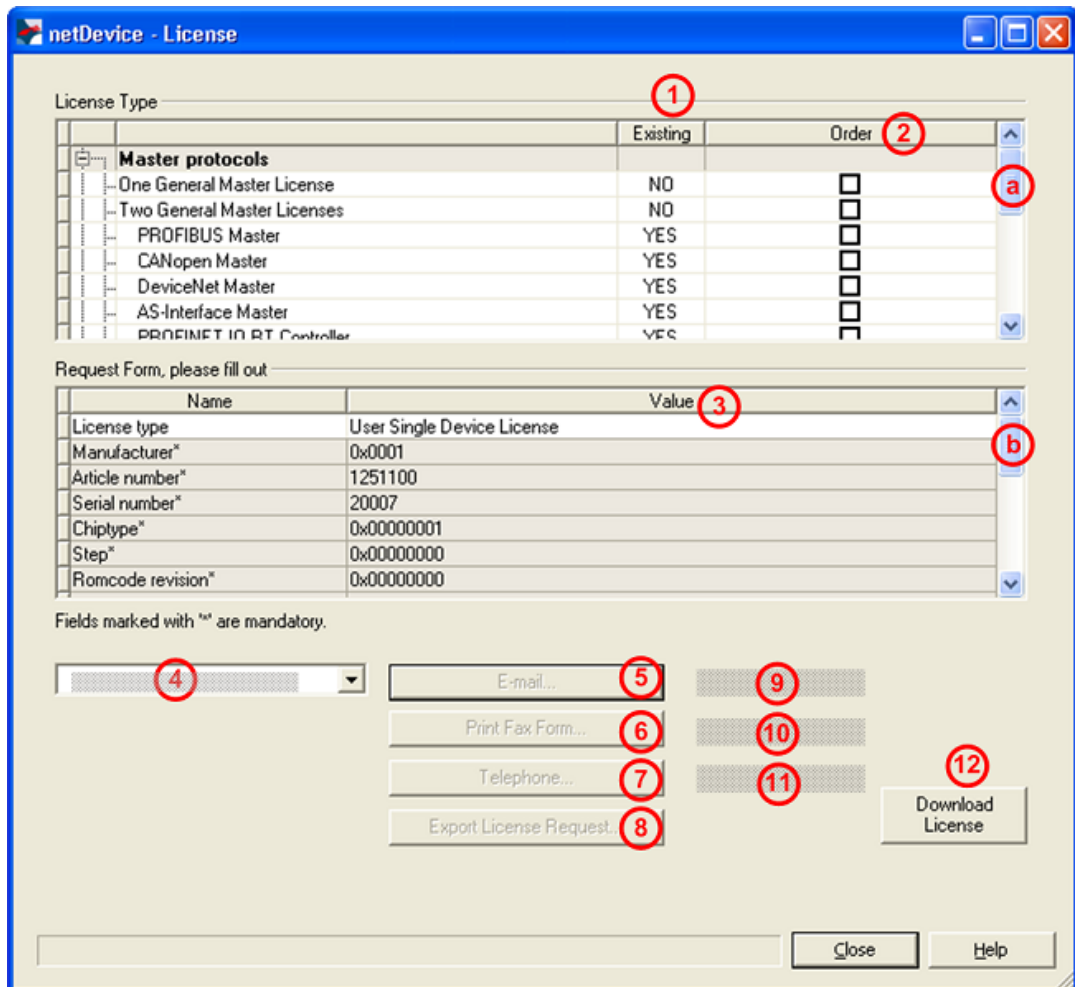
Figure 23: License pane

> **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 50].
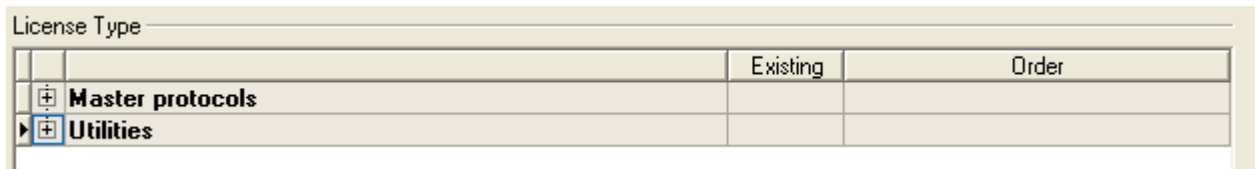
Figure 24: License pane - License Type

➢ Under **License type** click ⊞ at **Master protocols**.
↳ The **Master protocols** overview opens:
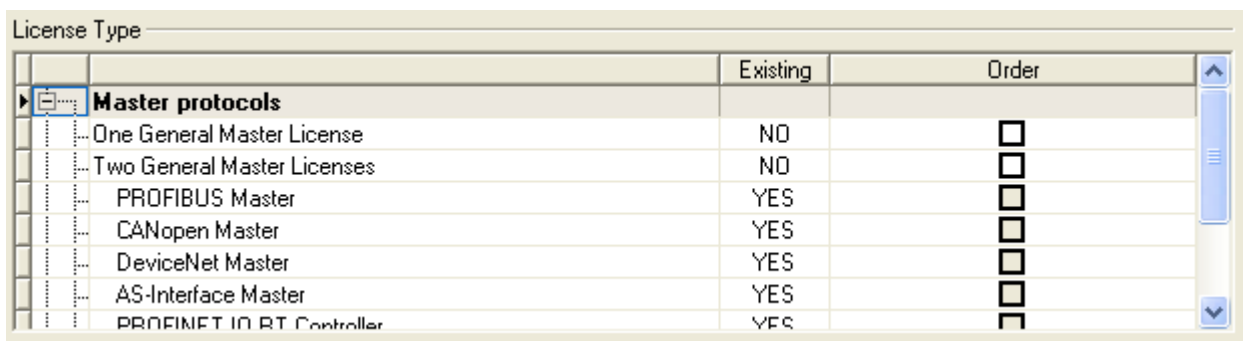
Figure 25: License pane – License Type / Master protocols

➢ Or click ⊞ at **Utilities**.
↳ The **Utilities** overview opens:
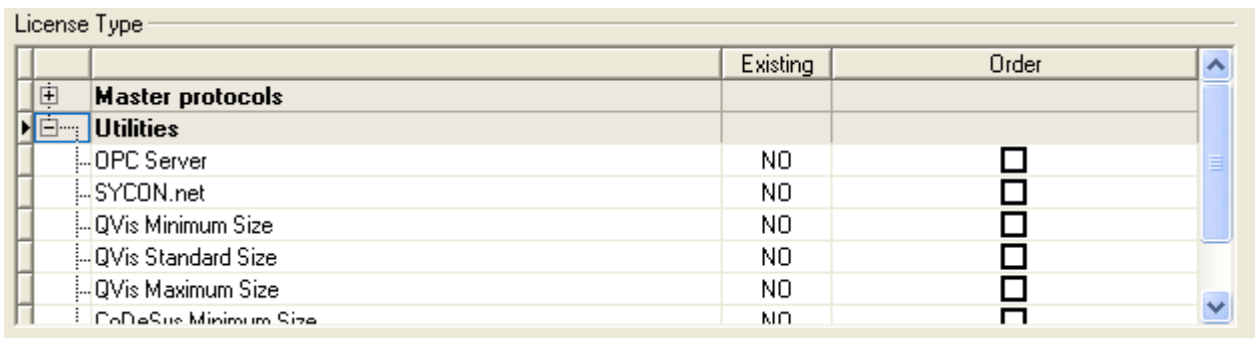
Figure 26: License pane – License Type / Utilities

↳ 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 50].
2. Select the required licenses.
   - ➢ Refer to Section *Selecting license(s)* [▶ page 54].
3. Enter the ordering data.
   - ➢ Refer to Section *Ordering data* [▶ page 55].
4. Place your order.
   - ➢ Refer to Section *Ordering the license* [▶ page 57].

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 56]).

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

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:
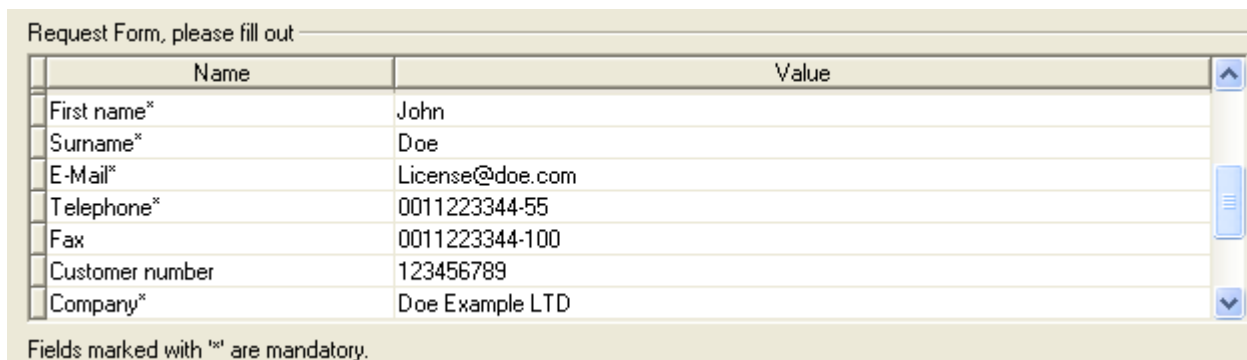
- License type (User Single Device License).

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:


```
To...  (a)  SMTP:license@DoeExample.com <license@DoeExample.com>     License Type  (e)
Cc...                                                                -----------------------------------------
Subject:    License request                                         User Single Device License
Append...   EmailOrderRequest_1251100_20007.xml  (b)
                                                                    Device Information  (f)
=============================================                       -----------------------------------------
             netX License Order                                     Manufacturer:   0x0001
=============================================                       Device Number: 1251100
                                                                    Serial Number: 20007
Company: Doe Example LTD                                            Chip Type:      0x00000001
                                                                    Step:           0x00000000
Address: 2000th Rd U. S. NY 11417  (c)                              Romcode Revision: 0x00000000
Fax:     +49 0011223344-100                                         License Flags 1: 0x7f
                                                                    License Flags 2: 0x0

Licensee Information  (d)                                           Ordered Licenses  (g)
-----------------------------------------------                     -----------------------------------------
First Name:       John
Surname:          Doe                                               Master Protocols:
e-Mail:           License@doe.com
Telephone:        0011223344-55                                     >     One General Master License
Fax:              0011223344-100                                    >     AS-Interface Master
Customer Number:  123456789                                         >     CANopen Master
Company:          Doe Example LTD                                   >     DeviceNet Master
Address:          2000th Rd                                         >     EtherCat Master
Country:          U. S.                                             >     EtherNet/IP Scanner
City Zip:         NY 11417                                          >     PROFIBUS Master
Order Number:     987654321                                         >     PROFINET IO RT Controller
Tax Ident. Number: test                                            >     SERCOS III Master

                                                                    Utilities:

                                                                    >     SYCON.net
```

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.

netX License Order Form

Doe Example LTD
2000th Rd

(c)

NY 11417
U. S.
fax: +11223344-100

Licensee Information (d)

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

License Type (e)
User Single Device License

Device Information (f)

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

Ordered Licenses (g)
Master Protocols

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

Utilities

- SYCON.net

Date: _____   Signature: _____

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 51]).

⇨ 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 52].

6 Configuration

6.1 Overview configure device parameters

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

- The **Bus parameters** are the basis for the correct operation of the data exchange.

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

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

- The **Station table** shows the list of all configured slave devices.

- At the **Master settings** pane device related settings can be made, also the option "Configuration in Run" can be activated.
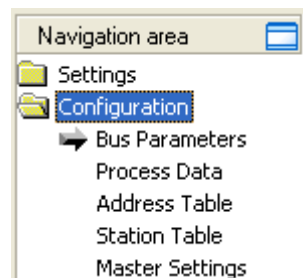
Figure 33: Navigation area - Configuration

> **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 PROFIBUS DP Master device using the PROFIBUS DP Master DTM:

1. Set the bus parameters.
   - ➢ In the navigation area, select **Configuration** > **Bus parameters**.
   - ➢ Put the settings for the bus parameters (e. g. baude rate or station address) and for the bus monitoring parameters.

2. Setting process data
   - ➢ In the navigation area, select **Configuration** > **Process data**.
   - ➢ Set symbolic names for the configured modules or measuring signals.
   - ➢ Apply all settings.

3. If necessary, set the device address.
   - ➢ In the navigation area, select **Configuration**> **Address table**.

4. Set the station address of the devices:

   ➢ In the navigation area, select **Configuration** > **Station table** to display the list of all slaves configured in the master configuration.

   ➢ If necessary, set the station address of the devices via the **Set address** dialog.

5. Set 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 **Advanced** check **Enable configuration download during network state "operate"** to enable configuration download during network state "operate" (Configuration in Run).

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

6. Close the master DTM configuration dialog.

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

7. Download configuration parameters to the PROFIBUS DP 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 PROFIBUS DP Master device, download the data of the configuration parameters into the PROFIBUS DP Master device. See also section *Download configuration* [▷ page 81].

For **further information** about the configuration, see sections *Bus parameters* [▷ page 64], *Process data* [▷ page 70], *Address table* [▷ page 71], *Station table* [▷ page 73] or *Set station address* [▷ page 74] and *Master settings* [▷ page 75].

Information on how to proceed for a configuration update during the network is running (online function "Configuration in Run") can be found in the section *Configuration in run* [▷ page 96].

6.2   Bus parameters

The bus parameters are the basis for the correct operation of the data exchange. This section contains information on setting the bus parameters as well as the description of the individual bus parameters.

> **Note:**
> Observe the following **basic rule**: The bus parameters must be set the same for all devices. The station address must be different from device to device.

6.2.1   Profile

Figure 34: Bus parameters > Profile

The following Profiles are available for the Master DTM:

- PROFIBUS DP (Decentralized Periphery)
- PROFIBUS-PA (Process Automation)

According to the selected profile the associated standard bus parameters are displayed when opening the dialog for the first time. Each parameter can be edited.

For the PROFIBUS DP profile several baud rates can be selected. In the PROFIBUS-PA profile the baud rate 93.75 kBit/s is preset.

6.2.2 Bus Parameters

Bus Parameters > Bus Parameters

> **Note:**
> The changing of bus parameters can cause communication interruptions.
> The offline bus parameters are displayed. The bus parameters are transferred to the device after the download of the configuration.

A description about the download you find in section *Download configuration* [▶ page 81].

Bus parameters	Description
Baudrate	The **Baud Rate** is the data transfer speed: number of bits per second.
	The **Baud Rate** must be set to be the same for all devices on the bus. The result of changing the Baud rate is that all other parameters must be re-calculated.
	<table><tr><td>Baud rate</td><td>Bit time (t_{Bit})</td><td>Max cable length (type A)</td></tr><tr><td>9,6 kBit/s 19,2 kBit/s 31,25 kBit/s 45,45 kBit/s 93,75 kBit/s 187,5 kBit/s 500 kBit/s **1500 kBit/s** 3000 kBit/s 6000 kBit/s 12000 kBit/s</td><td>104,2 µs 52,1 µs 32 µs 22 µs 10,7 µs 5,3 µs 2 µs 666,7 ns 333,3 ns 166,7 ns 83,3 ns</td><td>1200 m 1200 m 1200 m 1200 m 1200 m 1000 m 400 m 200 m 100 m 100 m 100 m</td></tr></table>
Slot Time (T_{SL})	'Wait for receipt' – Monitoring time of the sender (Requestor) of telegram for the acknowledgement of the recipient (Responder). After expiration, a retry occurs in accordance with the value of 'Max. telegram retries'.
	Value range: 37 .. 16383 (The default value depends from the baud rate.)
Min. Station Delay Time (min T_{SDR})	This is the shortest time period that must elapse before a remote recipient (Responder) may send an acknowledgement of a received query telegram. The shortest time period between the reception of the last Bit of a telegram to the sending of the first Bit of a following telegram.
	Value range: 1 .. **11** .. 65535
Max. Station Delay Time (max T_{SDR})	This is the longest time period that must elapse before a Sender (Requestor) may send a further query telegram. Greatest time period between the reception of the last Bit of a telegram to the sending of the first Bit of a following telegram. The Sender (Requestor, Master) must wait at least for this time period after the sending of an unacknowledged telegram (e.g. Broadcast only) before a new telegram is sent.
	Value range: 1 .. 65535 (The default value depends from the baud rate.)
Quiet Time (T_{QUI})	This is the time delay that occurs for modulators (Modulator-trip time) and Repeaters (Repeater-switch time) for the change over from sending to receiving.
	Value range: 0 .. 127 (The default value depends from the baud rate.)

Bus parameters	Description
Setup Time (T_{SET})	Minimum period "reaction time" between the receipt of an acknowledgement to the sending of a new query telegram (Reaction) by the Sender (Requestor).
	Value range: 1 .. 255 (The default value depends from the baud rate.)
Station Address	The Station Address is the individual device address of the Master device on the bus.
	Value range: 0 .. 125
Target Rotation Time (T_{TR})	Pre-set nominal Token cycling time within the Sender authorization (Token) will cycle around the ring. How much time the Master still has available for sending data telegrams to the Slaves is dependent on the difference between the nominal and the actual token cycling time.
	The **Target rotation time (T_{TR})** is shown in Bit times (t_{Bit}) like the other Bus Parameters. Below the displayed Bit time, the **Target rotation time** is also displayed in milliseconds (ms).
	Value range: 1 .. 224-1 (=16.777.215) (The default value depends of the number of Slaves attached to the Master and their module configuration)
GAP Actualization Factor (G)	Factor for determining after how many Token cycles an added participant is accepted into the Token ring. After expiry of the time period G*TTR, the Station searches to see whether a further participant wishes to be accepted into the logical ring.
	Value range: 0 .. **10** .. 255
Max. Retry Limit	Maximum number of repeats in order to reach a station.
	Value range: 1 .. 15 (The default value depends from the baud rate.)
Highest Station Address (HSA)	The **Highest Station Address** is the highest bus address up to which a Master searches for another Master at the bus in order to pass on the Token. This station address must on no account be smaller than the Master station address.
	Value range: 1 .. **126**

Table 16: Bus Parameters > Bus Parameters

6.2.2.1 Adjusting bus parameters

If the bus configuration has changed and these changes have an impact on the bus parameters, a note symbol appears beside the concerned parameters, which displayed values are out of date now.

Figure 35: Note bus configuration was changed, bus parameters not longer actual

With **Adjust** the bus parameters on basis of the current bus configuration are calculated again and updated in the bus parameter dialog.
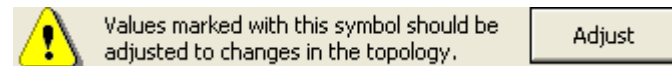
Figure 36: Adjust the bus parameters

If no note symbol is displayed beside the parameters of the bus configuration, the indicated values are up to date and valid.

6.2.2.2 Additional conditions for correct communication

$$T_{QUI} < min\ T_{SDR}$$

$$T_{RDY} < min\ T_{SDR}$$

$$T_{QUI} < T_{RDY}$$

6.2.2.3 Representation of the bus parameters

All times for the bus parameters are given in bit times. The bit time tBit is the result of the reciprocal of the baud rate:

t_{Bit} **= 1 / baud rate (baud rate in Bit/s)**

The conversion from milliseconds into a bit time is shown in the following formula:

Bit time = time [milliseconds] * baud rate

6.2.3   Bus monitoring
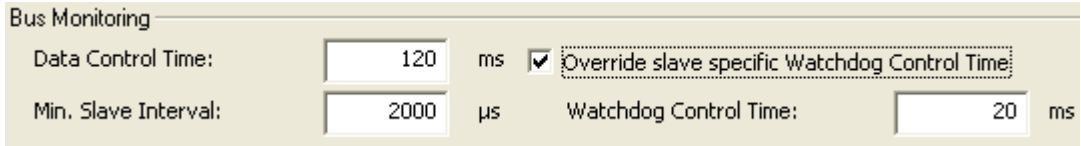
Figure 37: Bus Parameters > Bus Monitoring

Bus parameters	Description
Data Control Time	The**Data Control Time** defines the time within the Data_Transfer_List is updated at least once. After the expiration of this period, the Master (class 1) reports its operating condition automatically via the Global_Control command.
	Value range: 10 .. 655350 (The default value depends from the baud rate.)
Min. Slave Interval	The **Min Slave Interval** defines the minimum time period between two Slave list cycles. The maximum value that the active Stations require is always given. Value range: 100 .. 6553500 (The default value depends of the Slave types)
	Value range: 100 .. 6553500 (The default value depends of the Slave types)
Override slave specific Watchdog Control Time	Each Slave returns a specific Watchdog Control Time to the Master. The option **Override slave specific Watchdog Control Time** allows the user to override individual slave specific settings with an equal value for all slaves configured at this master, for example to set a consistent value for slower transmission rates (which may require extended Watchdog Control Times) in critical environments.
Watchdog Control Time	The DP Slaves utilizes the **Watchdog Control Time** setting in order to detect communication errors to the assigned Master. When the Slave finds an interruption of an already operational communication, defined by a Watchdog time, then the Slave carries out an independent Reset and places the outputs into the secure condition.
	Value range: 20 .. 650250 (The default value depends of the number of Slaves attached to the Master and their configuration)

Table 17: Bus Parameters > Bus Monitoring

6.2.3.1   Adjust bus monitoring parameters

If the bus configuration has changed and these changes have an impact on the bus parameters, a note symbol appears next to the relevant parameters, whose displayed values are out of date.
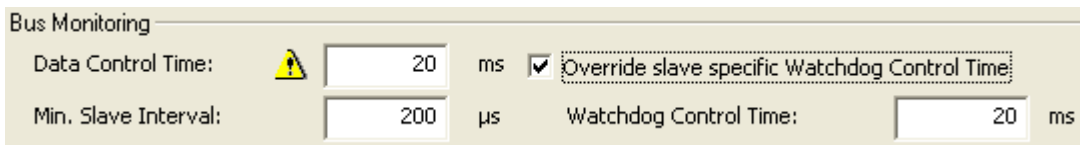
Figure 38: Note bus configuration was changed, bus monitoring parameters out of date

With **Adjust**, the bus monitoring parameters are recalculated based on the current bus configuration and updated in the bus monitoring parameter dialog.
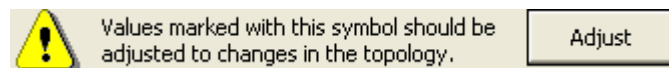
Figure 39: Adjust bus monitoring parameters

If there is no note symbol next to the individual parameters, the displayed values are up to date and valid.

6.2.4   Error handling

Figure 40: Bus Parameters > Error Handling

For PROFIBUS DP, the **Auto Clear** setting is provided for global error handling. The PROFIBUS DP master monitors the data exchange to all PROFIBUS DP slaves by means of a timer.

- Auto Clear ON (checked)
  The "Masters Operation Mode" will change from **Operate** to **Clear** and it shuts down the communication to all assigned slaves if at least one slave is not responding within the **Data Control Time**.

- Auto Clear OFF (Auto Clear ON unchecked)
  The "Master Operation Mode" stays in the **Operate** mode and keeps the communication to all available slaves.

For further information to the "Masters Operation Mode" refer to section *General diagnosis* [▷ page 112] or to the **Data Control Time** refer to section *Bus monitoring* [▷ page 68].

6.2.5   Calculated timing

Note:
The **Calculated Timing** cannot be set; they result from the given calculations. The display of these times is for informational purposes only.

Figure 41: Bus Parameters > Calculated Timing

The **Calculated Timing** is the time that the Sender spends at idle after the receipt of the last Bit of a telegram on the Bus, until the first Bit of a new telegram is sent on the Bus.

Depending on the type of the telegram:

Bus time	Description	Formula
Tid1	Tid1 starts after the Initiator has received an acknowledgement, answer or a token telegram.	**Tid1** = max $(T_{QUI} + 2 * T_{SET} + 2 + T_{SYN},$ min $T_{SDR})$ T_{SYN} (*)
Tid2	Tid2 starts after the initiator has sent a telegram that is not acknowledged.	**Tid2** = max $(T_{QUI} + 2 * T_{SET} + 2 + T_{SYN},$ max $T_{SDR})$ T_{SYN}(*)

Table 18: Bus Parameters > Calculated Timing

Depending on the utilized ASIC and the utilized Baud Rate, the **Tid1** and **Tid2** can assume somewhat different values because of the ASIC software.

(*) T$_{SYN}$:

This is the minimum time that must be available to each device as a rest condition before it is allowed to accept the start of a query and it is determined at 33 Bit times.

6.3   Process data

For the PROFIBUS DP 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 are to be made available on the OPC server (column SCADA).

IMAGE	TYPE	TAG	SCADA
▲ 🖳	CIFX DP/DPS V2.10 <Addr 3>	CIFX DP/DPS V2.10	−
▲ 🗒	1 Byte In <Slot 1>	1 Byte In <Slot 1>	−
🔲	1 byte input	Input_11	☐
▲ 🗒	8 Bytes In <Slot 2>	8 Bytes In <Slot 2>	−
🔲	1 byte input	Input_3	☐
🔲	1 byte input	Input_4	☑
🔲	1 byte input	Input_5	☐
🔲	1 byte input	Input_6	☐
🔲	1 byte input	Input_7	☐
🔲	1 byte input	Input_8	☐
🔲	1 byte input	Input_9	☐
🔲	1 byte input	Input_10	☐
▲ 🗒	2 Words In <Slot 3>	2 Words In <Slot 3>	−
🔲	1 unsigned16 input	Input_1	☐
🔲	1 unsigned16 input	Input_2	☑

Figure 42: Process data

Column	IMAGE	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)
SCADA	Selection option which module, submodule or signal data should be made available on the OPC server. „SCADA" (= Supervisory Control and Data Acquisition), here used with the meaning „to provide for visualizing purposes".	
*Depending on the protocol, either the device name or the symbolic name can be edited via the device symbol context menu.		

Table 19: Process data

6.4   Address table
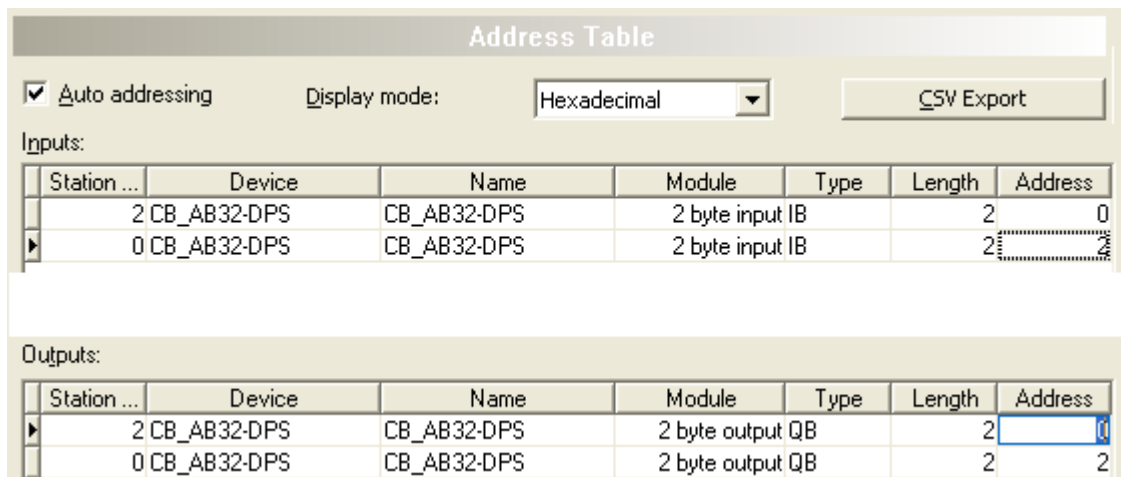
Figure 43: Configuration > Address Table

Parameter	Description
Station address	Station address of the assigned slave device
Device	Actual device name of the assigned slave device from the GSE file.
Name	Free definable symbolic name of the assigned slave device.
Module	Name of the module according GSD
Type	Input data type or output data type
Length	Number of the Signals included (IB, QB, IW or QW)
Address	Output data offset address or input data offset address

Table 20: Address table pane parameters - inputs / outputs

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

Use **Display mode** [Display mode: Hexadecimal ▼] to select data display mode decimal or hexadecimal.

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

➢ Click to the **CSV export** button.

↳ A file saving dialog opens.

➢ Save the data as *.CSV file.

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

Inputs, outputs

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

➤ Click on an address of a module.

➤ Edit the field and type in a new address.

➤ Confirm your modifications by clicking on the **OK** button.

⇨ The manually changed address is now set.

Sort addresses

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

6.5 Station table

The **Station Table** shows the list of all slave devices configured in the master configuration.

Figure 44: Station table (example)

Parameters	Description
Activate	Checkbox, to activate / deactivate a station
Station address	Station address of the salve assigned
	Range for valid station address: 0 - 125
Device	Current device name of the assigned Slave device from the GSE file.
Name	Free definable symbolic name of the assigned slave device.
Vendor	Name of the device vendor

Table 21: Parameters of the station table dialog box

➢ If necessary, set the station address of the devices via the **Set Address** dialog. Refer to section *Set station address* [▶ page 74].

➡ **Note:**

The station address 126 is used exclusively for commissioning a slave device. If station address 126 is used, I/O communication from the master device to this slave device is excluded.

6.6   Set station address

With the dialog **Set Station Address** the PROFIBUS station address of the device can be changed.

To set the station address, proceed as described hereafter:

➢ Select and connect the device.

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

→ **Note:**
The **Set Station Address** dialog is enabled only during offline mode. The PROFIBUS DP Master DTM and the PROFIBUS DP Master may not be connected to each other via an online-connection.

For further information how to establish or how to disconnect an online connection from the PROFIBUS DP Master DTM to the PROFIBUS DP Master, refer to section *Connecting/disconnecting device* [▶ page 79].

➢ Select **Additional Functions** > **Set Station Address** from the context menu (right mouse click).

Figure 45: Set station address

→ **Note:**
The station address 126 is used exclusively for commissioning a slave device. If station address 126 is used, I/O communication from the master device to this slave device is excluded.

➢ Enter the new station address and select **Set Address**.

↳ The new station address of the device is set and in addition it is displayed in the **Current station address** list.

6.7   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 81].

➢ Open **Configuration** > **Master settings**.
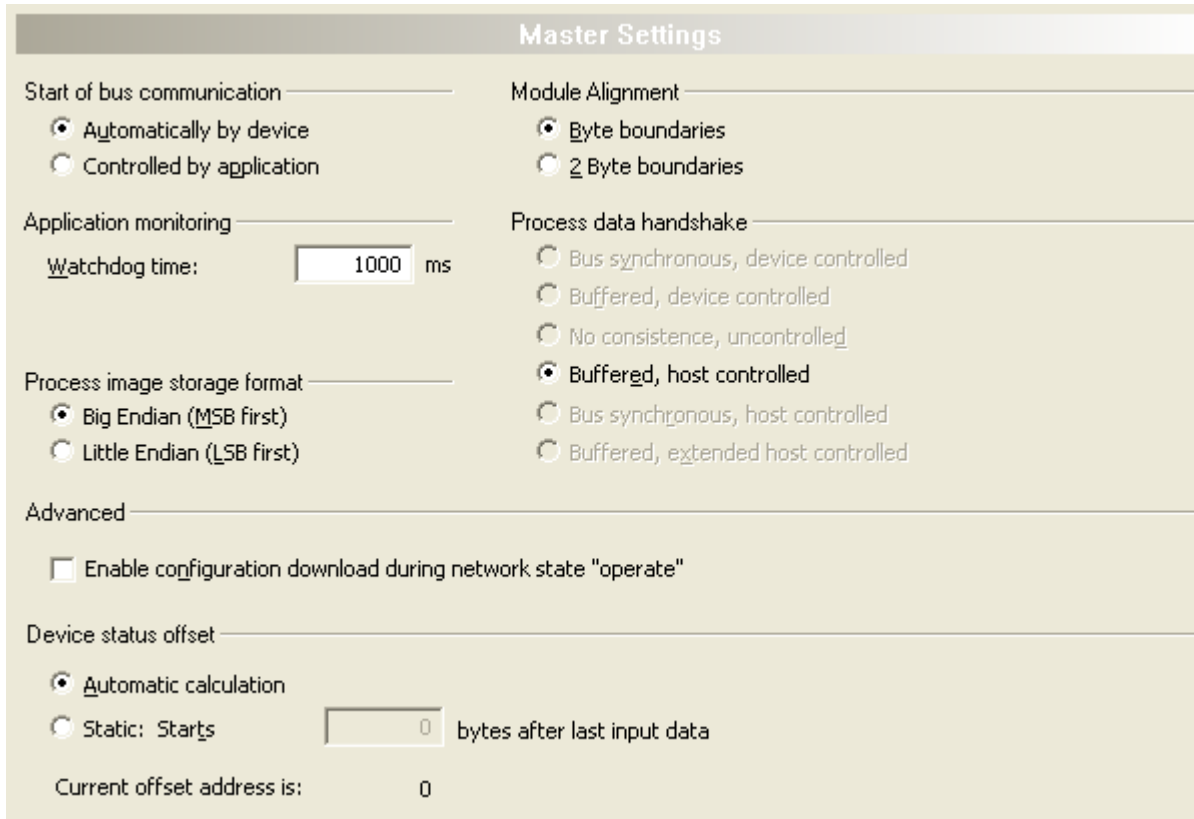
Figure 46: Configuration > Master settings

> **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.

6.7.1   Start of bus communication
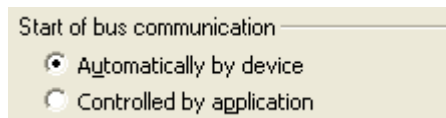
Figure 47: PROFIBUS DP Master settings > Start of bus communication

If **Automatically by device** is selected, the PROFIBUS DP 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.

6.7.2   Application monitoring

Application monitoring

Watchdog time: 1000   ms
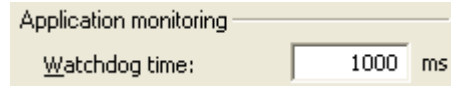
Figure 48: PROFIBUS DP Master settings > Application monitoring

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 22: Range of value / Value for the watchdog time

6.7.3   Process image storage format

Process image storage format
⦿ Big Endian (MSB first)
○ Little Endian (LSB first)
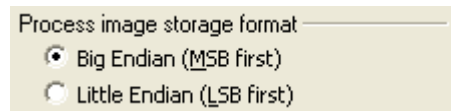
Figure 49: PROFIBUS DP Master settings > Process image storage format

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

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

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

Table 23: Process image storage format

6.7.4   Module alignment

Module Alignment
⦿ Byte boundaries
○ 2 Byte boundaries
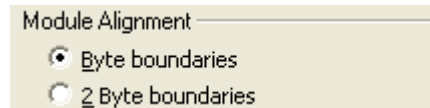
Figure 50: PROFIBUS DP Master settings > Module alignment

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 24: Parameters PROFIBUS DP Master Settings > Module Alignment

6.7.5 Process data handshake
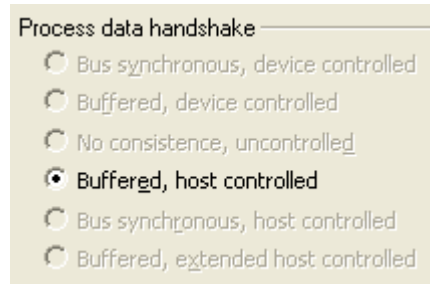
Figure 51: PROFIBUS DP Master settings > Process data handshake

The various types of **Process data handshakes** are used for setting the handshake of the process data for the PROFIBUS DP 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.

6.7.6 Advanced

The **Enable configuration download during network state "operate"** option for the PROFIBUS network allows to change the configuration of a running PROFIBUS network without resetting the devices.
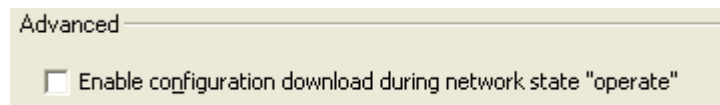
Figure 52: PROFIBUS DP Master settings > Advanced

➢ 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 PROFIBUS network is changed and saved.

6.7.7 Device status offset

Reference to Firmware: The option **Device status offset** was implemented since PROFIBUS DP Master firmware CIFXDPM.NXF version 2.3.14.0.

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.
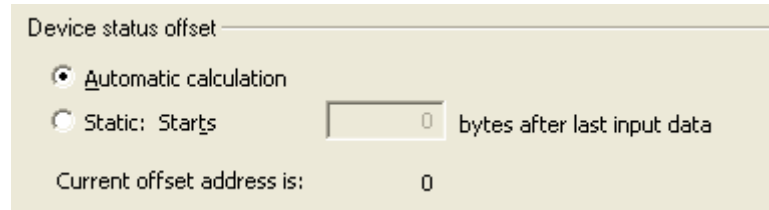
Figure 53: PROFIBUS DP Master settings > Device status offset

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 25: Option Scanner Settings > Device Status Offset

6.8   Connecting/disconnecting device

> **Note:**
> Several PROFIBUS DP Master DTM functions, e. g. diagnosis or the configuration download in SYCON.net, require an online connection from the PROFIBUS DP Master DTM to the PROFIBUS DP 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 PROFIBUS DP Master device to the PROFIBUS DP 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 26].

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

➢ Right-click on the PROFIBUS DP Master icon.

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

➢ The PROFIBUS DP Master device now is connected to the PROFIBUS DP 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 PROFIBUS DP Master device to the PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP Master device to the PROFIBUS DP Master DTM.

6.9 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 PROFIBUS DP Master device an online connection from the PROFIBUS DP Master DTM to the PROFIBUS DP Master device is required. Further information can be found in *Connecting/disconnecting device* [▸ page 79].

⚠ 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 PROFIBUS DP 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?"
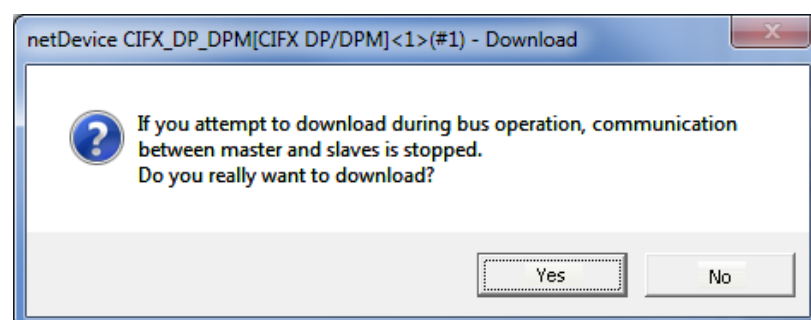
Figure 54: netDevice Message: Download

> **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**.

6.10 Network scan and upload

With the function **Network scan...** of the PROFIBUS DP Master DTM you can find out automatically, which PROFIBUS DP Slave device are attached to the PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP Slave DTM allows to upload module configuration data from all PROFIBUS DP Slave devices via the PROFIBUS DP Master device and the PROFIBUS DP Master DTM to the PROFIBUS DP Slave DTMs.

6.10.1 Requirements

The PROFIBUS DP Master device must be configured.

> **Important:**
> The configuration of the master device must be downloaded to the master device. For further details refer to section *Configuration steps* [▸ page 17].

6.10.2 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 module configuration.
5. Via **Download** (in the master DTM), download the current configuration of the slave devices to the master device.
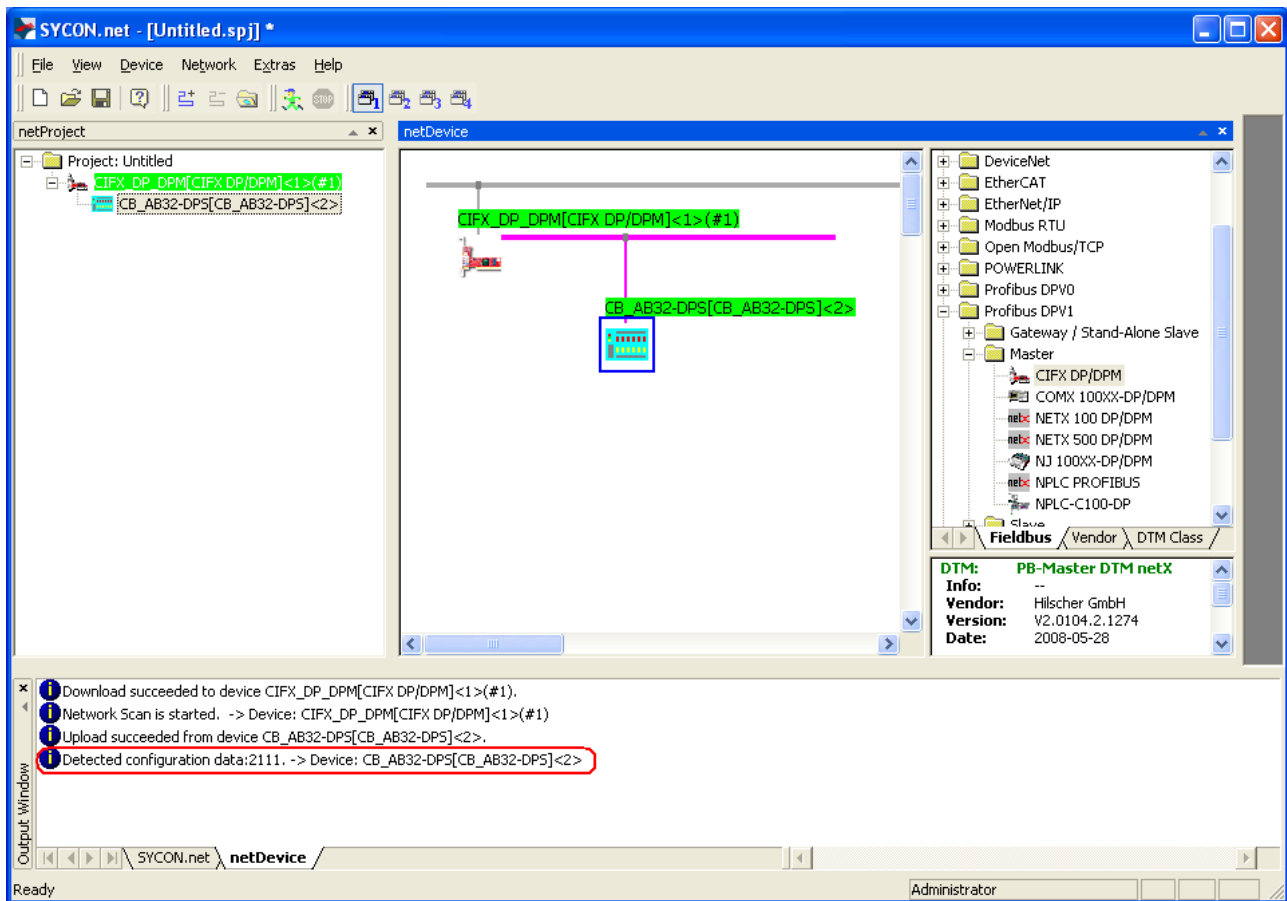
> **Note:**
> If a module identifier conflict occurs when scanning the modul configuration, the **Upload** dialog appears, where occurred conflicts are displayed in red. For information to resolve identified module identifier conflicts refer to section *Fix module identifier conflicts* [▸ page 93].

6.10.3   Starting network scan

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

➢ Select **Network scan...** from the context menu.
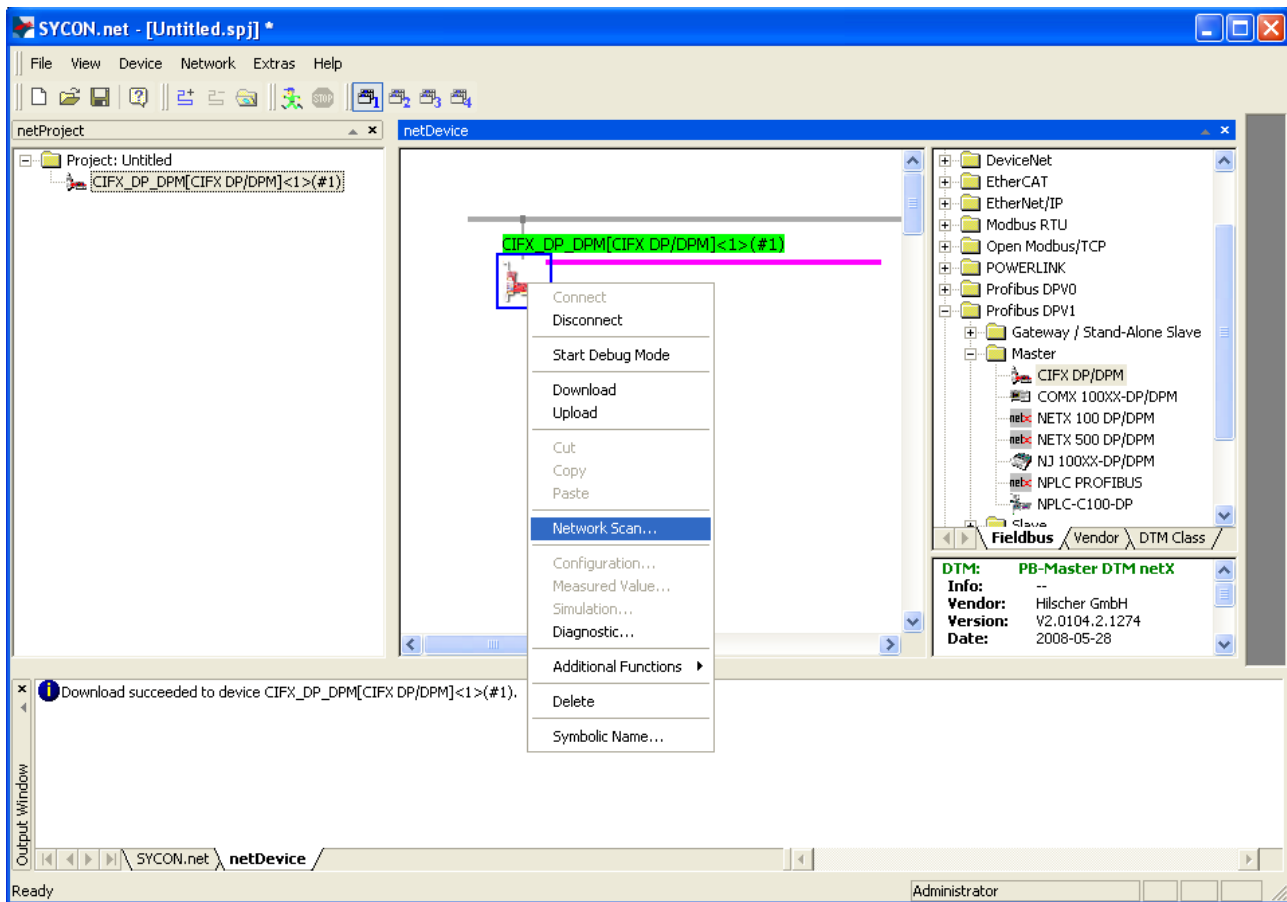
Figure 55: Starting 'Network scan' (example)

➢ Wait for a moment.

➢ If you are asked whether you want to stop IO communication, click **Yes**.

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

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

⇨ The Scan response dialog of the master DTM appears.
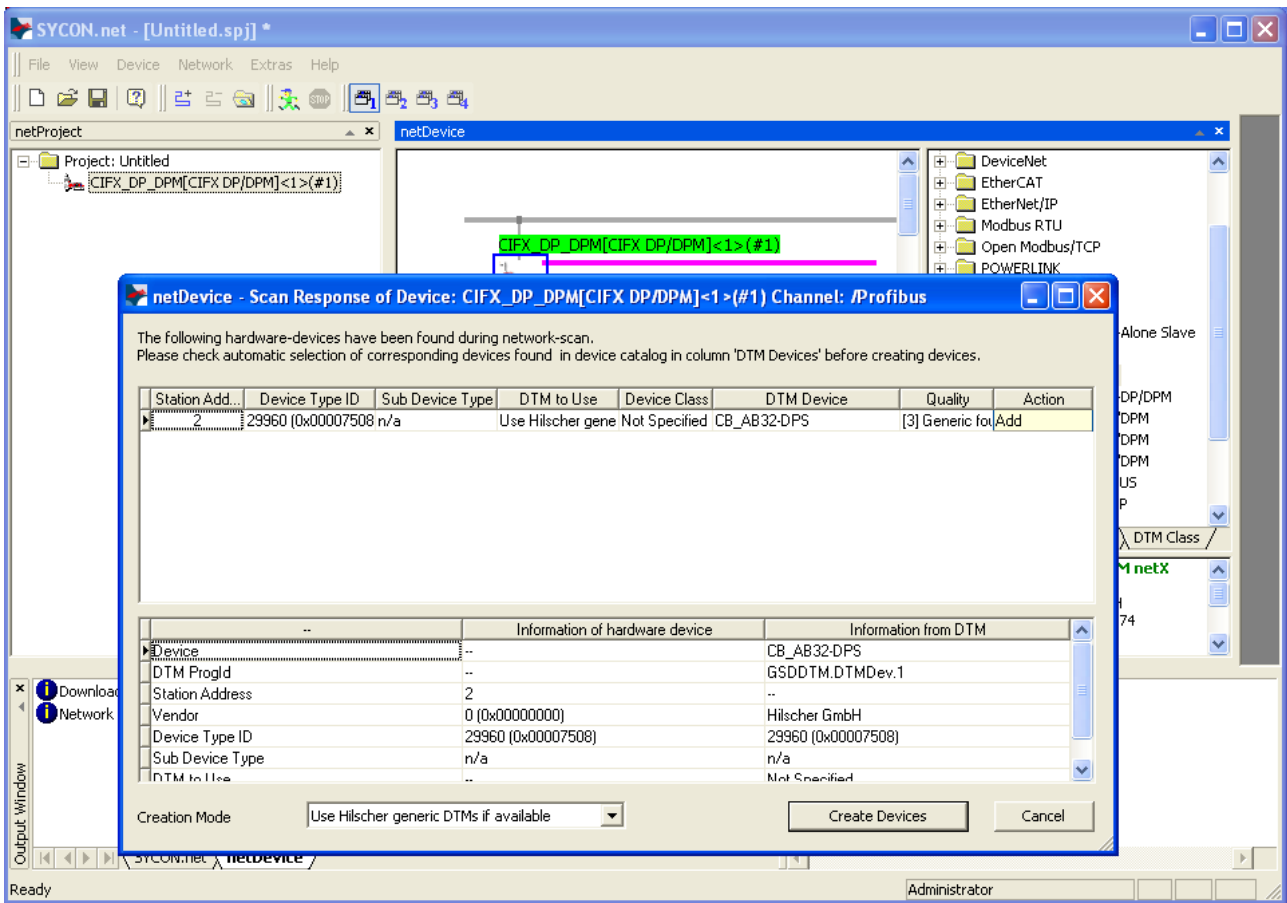
Figure 56: Scan response dialog of the master DTM (example)

6.10.4   Scan response dialog settings

> Make the settings in the **Scan response** dialog of the PROFIBUS DP Master DTM.

✎ In the **DTM device** column the DTM devices assigned to the found ident codes appear.
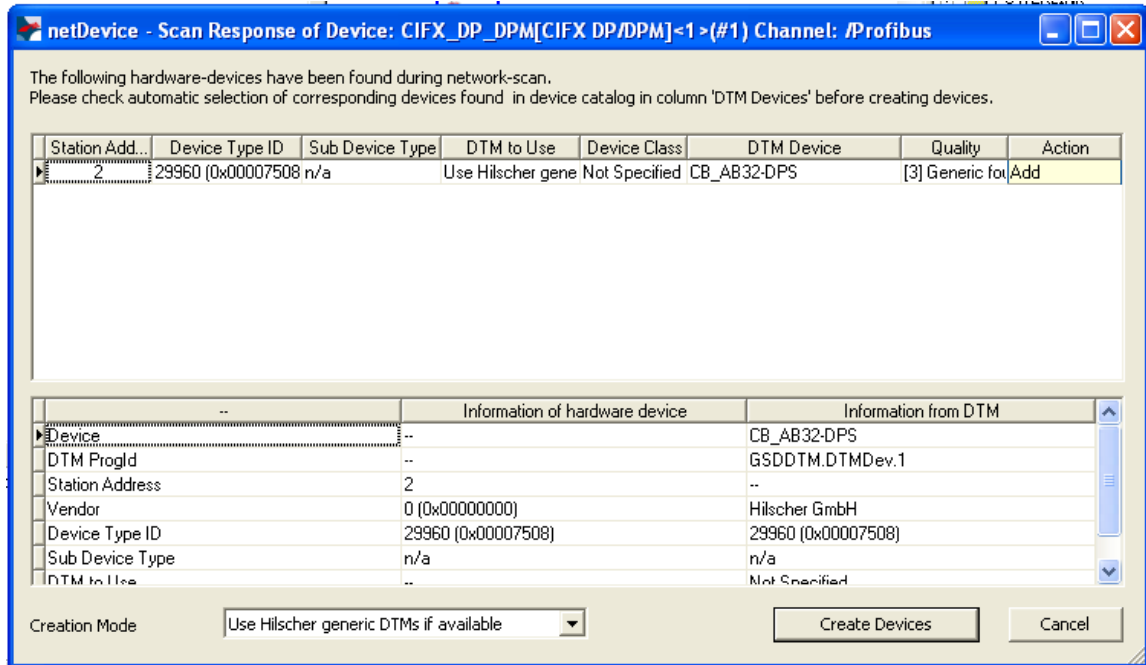
Figure 57: Scan response dialog of the PROFIBUS DP Master DTM (example)

> In the **DTM device** column, select for every identified device the DTM device corresponding to the firmware loaded in this PROFIBUS DP 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).

6.10.5   Scan response dialog

In the following table, you find a description about the **Scan response** dialog of the PROFIBUS DP 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 PROFIBUS DP PROFIBUS DP 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	PROFIBUS DP station address, which displays the logical sequence of the devices within a PROFIBUS network.
Colors	Meaning of colors in the **Scan response** dialog of the PROFIBUS DP 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 PROFIBUS DP 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
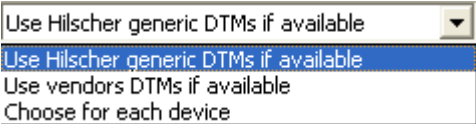
Column	Description
Action	The action to be performed with the corresponding device during the process of device creation.
	• If no device is present within the current project, the selection **Add**/**Skip** will appear.
	• If there is already a device present within the current project, the selection **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 PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP Slave device the previously selected DTM device is created.
	• the PROFIBUS DP Slave device configuration is uploaded to the created PROFIBUS DP 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 26: Description on the Scan response dialog of the PROFIBUS DP Master DTM

6.10.6   Creating devices and upload

➢ In the **Scan response** dialog of the PROFIBUS DP Master DTM click **Create devices**.

✎ For each PROFIBUS DP Slave device the previously selected DTM device is created.

✎ The dialog **Network scan – Creating devices** appears showing the progress bar **Creating DTM device** and **Starting upload …**. The dialog shows the progress of the device creating and the upload process.

→ **Note:**
Depending on the manufacturer of the respective device, also a dialog with some slight deviations from this one may be displayed.
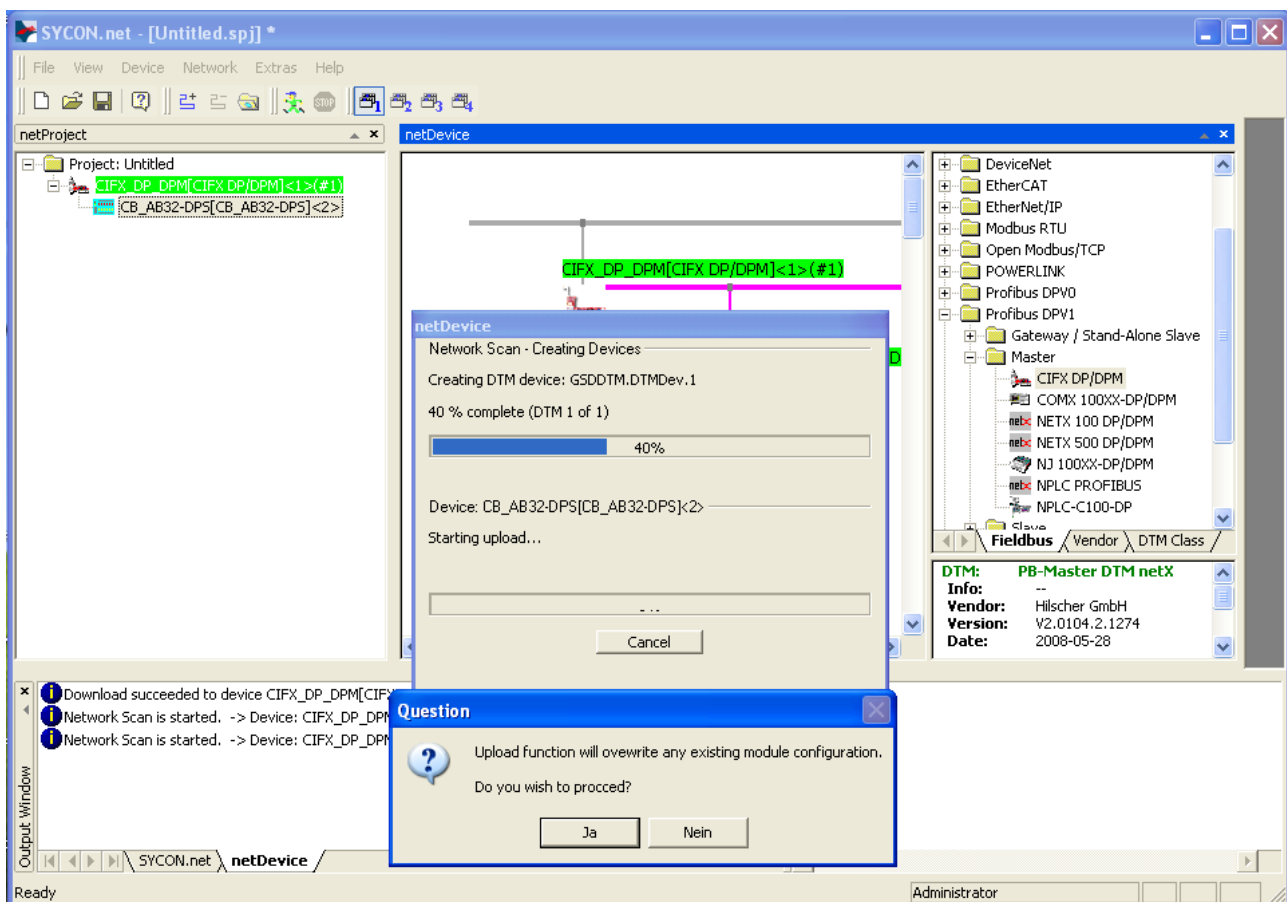
Figure 58: Query about the generation of the module configuration (example)

➢ Confirm the query whether the I/O module configurations of the PROFIBUS DP Slave devices from the imported configurations should be created with **Yes**.

⇨ For each PROFIBUS DP Slave device its current configuration is uploaded via the PROFIBUS DP Master device and the PROFIBUS DP Master DTM to the PROFIBUS DP Slave DTM and the success of the upload procedure is reported in the output window.

Figure 59: Upload succeeded (example)

> **→ Note:**
>
> If a module identifier conflict occurs when scanning the modul configuration, the **Upload** dialog appears, where occurred conflicts are displayed in red. For information to resolve identified module identifier conflicts refer to section *Fix module identifier conflicts* [▶ page 93].

After the I/O module configuration of the PROFIBUS DP Slave device has been created, you can display the uploaded modules by double-clicking the slave device symbol.
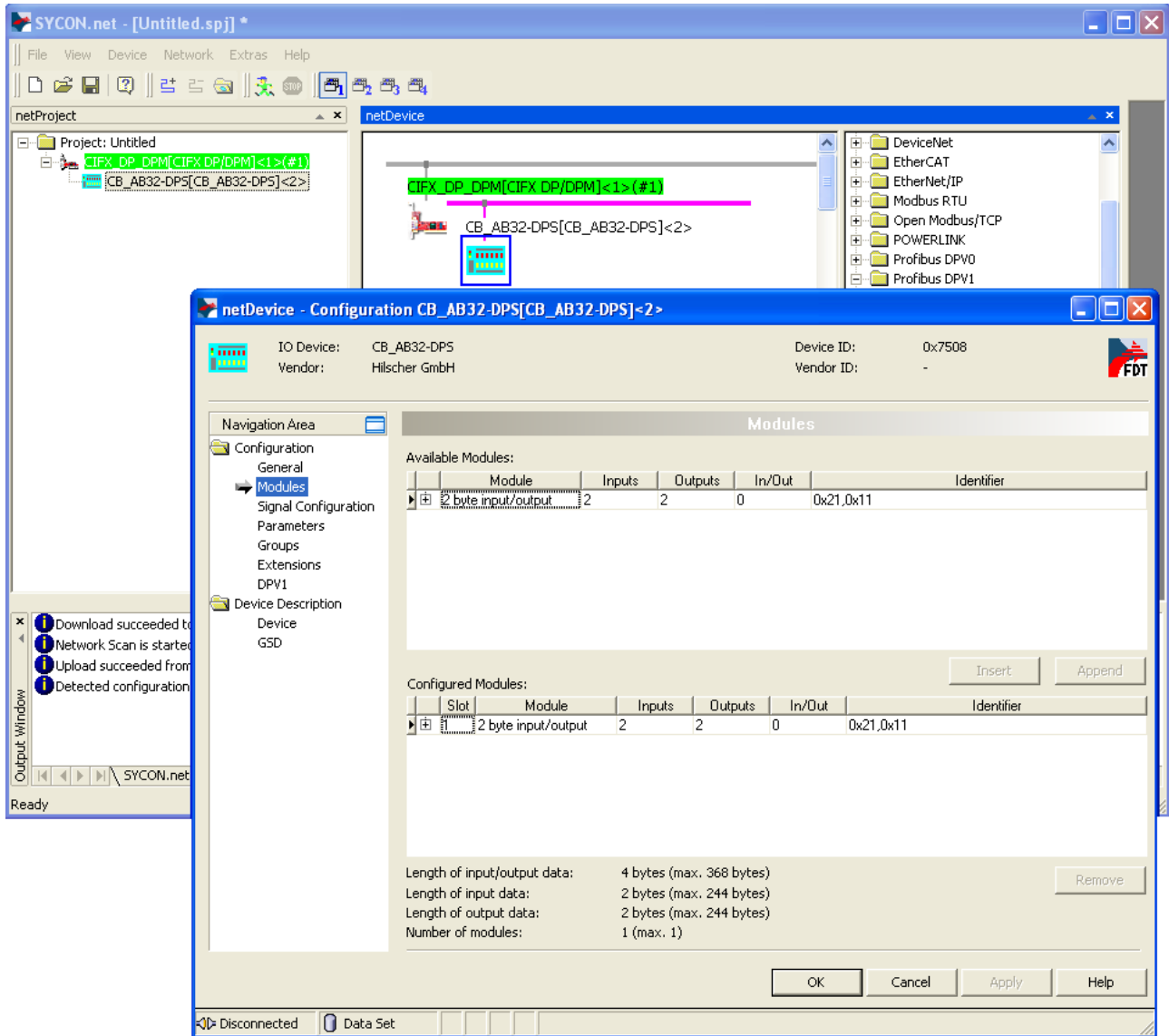
Figure 60: Uploaded modules (example)

6.10.7   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 PROFIBUS DP Master DTM, download the current configurations of the PROFIBUS DP Slave devices to the PROFIBUS DP 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_DP_DPM[CIFX_DP/DPM]<1>(1#)."

6.10.8 Fix module identifier conflicts

6.10.8.1 Upload Dialog of the Slave DTM

The Upload pane of the Slave DTM is displayed only if modules are detected, which show a module identifier conflict, i. e., modules which have the same module identifier and not a unique one each. These modules then are listed under **Configured Modules** marked in red.
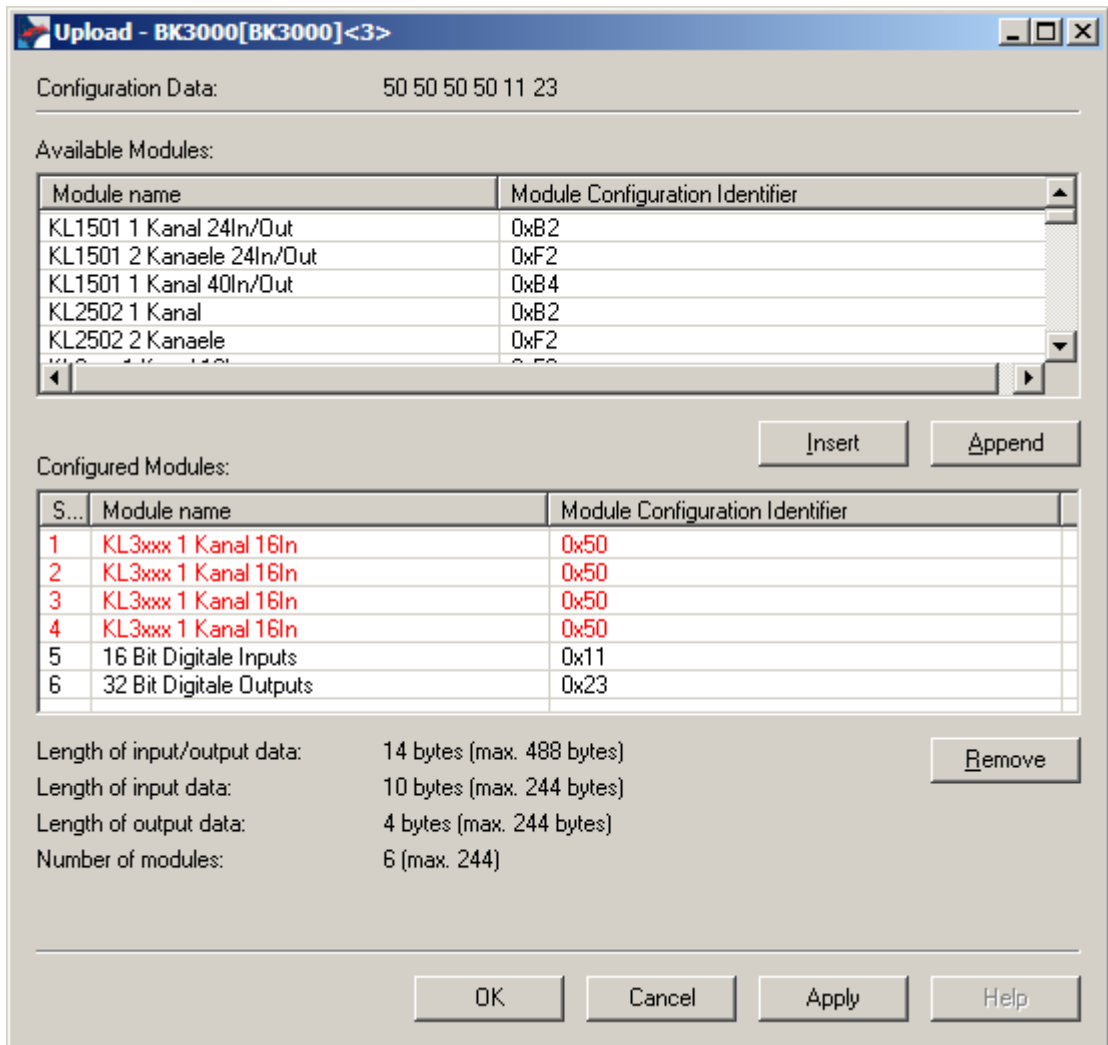
Figure 61: Network Scan > Create Devices > Upload

Column	Description
Configuration Data	Shows the scanned module configuration (sequence of the module configuration identifier).
Available Modules	Shows all possible modules of the slave device.
Configured Modules	In case of a modular slave device, the scanned module configuration is displayed here.
Module name	Shows the name of the available respectively of the configured modules.
Module Configuration Identifier	Shows all identifier of the modules in the same row. For more information refer to the Operating Instruction Manual of the Generic PROFIBUS DP Slave DTM.
Slot	Shows the sequential number for modules.

Table 27: Network Scan > Create Devices > Upload

6.10.8.2 Module identifier conflicts

During the upload detected module identifier conflicts are displayed in the Upload dialog marked in red. This allows the user to clarify whether the scanned module configuration of the slave device corresponds to the actual physical module sequence in the slave device or not. The user must replace scanned modules indicating a conflict using **Remove**, **Insert** or **Append**.

6.10.8.3 Fix module identifier conflicts

If the module configuration of a PROFIBUS DP Slave device is indicated with a conflict, you must check and manually adapt this scanned module configuration.

> **Note:**
> The sequence of the modules in the list **Configured Modules** is important and must match with the sequence which exists in the PROFIBUS DP Slave device. Typically, the sequence is the current physical sequence. There are PROFIBUS DP Slave devices to which this rule does not apply and where for example first analogue modules and then digital modules must be entered, independent of their actual sequence.
> If the aPROFIBUS DP Slave device has only one module, this module is taken over automatically in the table Configured Modules and can not be deleted.
>
> For further information about the modules of the used PROFIBUS DP Slave device see the manual of the device manufacturer.

1. Check if the scanned module configuration of a Slave corresponds to the actual physical module sequence in the Slave device or not.

2. Replace scanned modules which do not correspond to the physical module sequence using the**Remove**, **Insert** or **Append** buttons:

   ➢ Delete these scanned modules from the list **Configured Modules** using the Remove button.

   ➢ Then insert the required modules from the selection list **Available Modules**into the list **Configured Modules**.

You can append or insert one or several modules to the list **Configured Modules**.

> **Note:**
> A multiselection is possible. Therefore click in the list **Available Modules** on several modules while holding the SHIFT key.

- Appending Modules
➢ Under **Available Modules** click on one or several modules and click on **Append**.
➢ Or double click on these modules.
↳ The modules appear at the lower end of the list **Configured Modules**.
- Inserting Modules
➢ Under Available Modules click on one or several modules.

➢ Under **Configured Modules** click to the module before which the additional modules shall be inserted.

➢ Click **Insert**.

✎ The modules appear in the list **Configured Modules** before the selected module.

➢ Click on **OK** to confirm your selection. If the selection should not be taken over, click the **Cancel** button.

➢ Download to the master device

6.11 Configuration in run

Using the **Configuration in Run** method you can change the configuration of the PROFIBUS network in OPERATE state, but a reset of the connected devices is not required. This means, the Master will remain in data exchange with the unchanged Slave. With the configuration software or your application program as host you can activate the changes of database parameters.

Process to activate the changes

The process to activate the changes (configuration-update) includes the exchange of messages between the host and the device firmware (PROFIBUS DP Master) as requests and confirmations. **SYCON.net** as a configuration software with the components "Device Type Manager" (DTM), "Online Data Manager" (ODM) or "ODM driver" sends or receives data packets, while the exchange of I/O data is only possible using an appropriate application program.
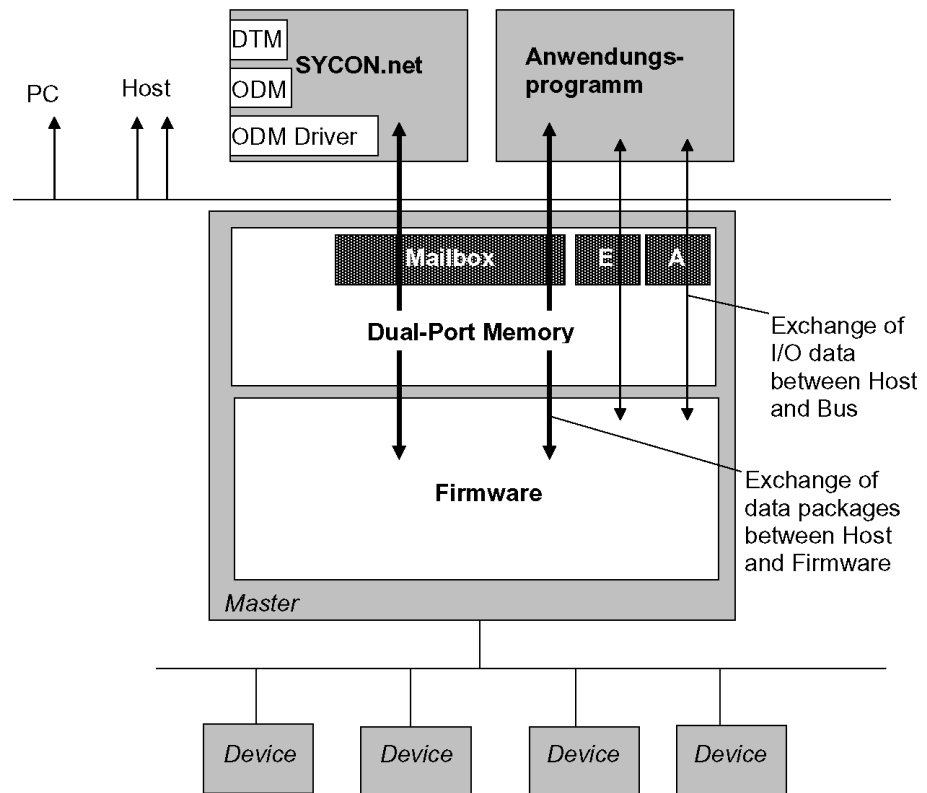
Figure 62: Overview configuration software and master firmware

6.11.1 Requirements

For a successful configuration-update of the PROFIBUS network (in the status OPERATE), the following conditions and criteria are valid:

- In the PROFIBUS DP Master DTM **Enable configuration download during network state "operate"** must be checked.

- The PROFIBUS DP Master DTM set **Device status offset** to **Static** and enter the number of bytes to be left free between the last input data byte and the device status. This way later during network in OPERATE ("Configuration in Run" activated) and with activated "Auto-addressing" additional input data deriving from newly inserted Slave devices or modules can be saved.

- The "Address" and the "Baud Rate" of the PROFIBUS DP Master device can not be changed in the new configuration.

- The changed configuration (new database) can only be accepted if:
  – the changes to the database parameters are "possible",
  – the **Master Settings** (*Startup, Watchdog, Statusoffset, Busparameter*) have "not changed" and
  – The **Master State** is "OK" (= 0x00000000).

- The configuration changes can only be saved in the driver's directory using the **cifX Device Driver**.

> **Note:**
> If the **cifX Device Driver** (ODMnetX) is used, a persistent storage of the updated configuration database will only work on flash-based hardware and ONLY if there is no configuration stored in the remote cifX Driver / Toolkit.

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].

6.11.2   How to proceed

6.11.2.1   Preparation

In preparation for a configuration update during network state OPERATE, you must perform Step 1 to Step 5.

1. Activate „Configuration in Run".
2. Define number of bytes after input data.
3. Create the configuration.
4. Start the download of the new configuration.
5. Activate the changes.

   ➢ To use "Configuration in Run", you must first activate **Configuration in Run** in the PROFIBUS DP Master DTM, set the number of **bytes after the last input data**, create the configuration, download the configuration using the configuration software and activate the new configuration in the **Configuration in Run** pane. Further details on each step, see the following subsections.

6.11.2.2   Change configuration via Configuration in Run

To perform a configuration update during network state OPERATE, you must perform Step 1 to Step 4.

1. Expand or change the configuration.
2. Start the download of the changed configuration.
3. Evaluate the configuration data.
4. Activate or reject the changes.

   ➢ If you want to change the configuration via the "Configuration in Run", first adjust your configuration and restart the download of the configuration.

   ➢ Then check at **Configuration in Run** pane, whether the evaluation of the Slave devices and of the Master device allows to apply the new configu-ration (new database) during network state OPERATE and activate the new configuration or reject it. The new configuration is then applied to the Master device or discarded. Further details on each step, see the following subsections.

   Note:
   If the new configuration can not be applied, you may need to increase the number of bytes after the input data.

6.11.3   Activating „Configuration in Run"

➢ Open the Master DTM configuration dialog (in the netDevice pane via double click on the device icon of the Master).

➢ Select **Configuration** > **Master Settings** (refer to section *Advanced* [▶ page 77]).

➢ Check **Enable configuration download during network state "operate"**.
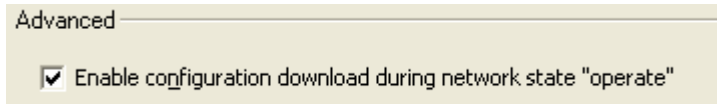
Figure 63: Enable configuration download during network state "operate" - checked

➢ Click **Apply**.

⇨ The setting made will be saved. Via **OK** the DTM configuration dialog will be closed.

6.11.4   Defining number of bytes after input data

➢ Open the Master DTM configuration dialog (in the netDevice pane via double click on the device icon of the Master).

➢ Select **Configuration** > **Master Settings** (refer to section *Device status offset* [▶ page 78]).

➢ Set **Device Status Offset** to **Static**.
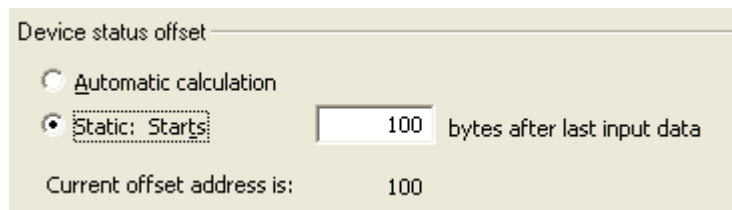
Figure 64: Master Settings > Device status offset

➢ Enter in the field **bytes after last input data** the number of bytes to be left free between the last input data byte and the device status.

➢ Click **Apply**.

⇨ The setting made will be saved. Via OK the DTM configuration dialog will be closed.

6.11.5 Creating the configuration

Create the configuration of the slave devices (and the possibly for the Master device). The configuration consists from the network configuration of the master device and the slave devices as well as for the slave devices the configuration of the I/O data and the parameter settings to be made in the PROFIBUS DP Slave DTM.

➢ Create the network configuration of the slave device (and possibly for the master device).

• • Insert master device (inclusively Firmware Download).

• Insert new slave devices (inclusively I/O data).

➢ Perform the parameter settings for the slave device in the PROFIBUS DP Slave DTM.

➢ Click **OK**.

↳ The setting made will be saved. The Slave DTM configuration dialog will be closed.

If so, perform the parameter settings for the master device in the PROFIBUS DP Master DTM.

> **Note:**
> The "Address" and the "Baud Rate" of the PROFIBUS DP Master device can not be changed in the new configuration (new database).

➢ Click **OK**.

↳ The setting made will be saved. The Master DTM configuration dialog will be closed.

Notice the descriptions in the sections *Steps for "Configuration in Run"* [▶ page 23] or *Overview configure device parameters* [▶ page 62].

6.11.6   Changing the Configuration

Change the configuration of the slave devices (and the possibly for the master device).

➢ Change the network configuration of the slave device.

• Insert new slave devices (inclusively I/O data).

• Adapt existing slave devices (change).

• Delete slave devices (deactivate).

➢ Adjust the parameter settings for the slave device in the PROFIBUS DP Slave DTM.

➢ Click **OK**.

↳ The setting made will be saved. The slave DTM configuration dialog closes.

➢ If so, perform the parameter settings for the master device in the PROFIBUS DP Master DTM.

> **Note:**
> The "Address" and the "Baud Rate" of the PROFIBUS DP Master device can not be changed in the new configuration (new database).

➢ Click **OK**.

↳ The setting made will be saved. The master DTM configuration dialog will be closed.

Notice the descriptions in the sections *Steps for "Configuration in Run"* [▶ page 23]or *Overview configure device parameters* [▶ page 62].

6.11.7 Starting the download

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].

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

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

How to proceed

Start the download of the configuration in the configuration software SYCON.net. Proceed as follows:

➢ In the FDT container **netDevice** right-click to the device icon for the master.

➢ Select **Download**.

↳ The download is performed.

↳ The **Configuration in Run** pane is displayed and it shows the evaluation of the configuration by the PROFIBUS DP Master DTM.

During the download in the PROFIBUS DP Master DTM the internal value "for the File Download gets valid". The PROFIBUS DP Master DTM sends the request to "verify the database" to the PROFIBUS DP Master firmware. The PROFIBUS DP Master firmware compares the newly downloaded configuration (new database) with the previously valid configuration (previous database) and sends the confirmation (response) to "verify the database" to PROFIBUS DP Master DTM.

6.11.8   Evaluating the configuration data

➢ Evaluate the configuration data displayed in the **Configuration in Run** pane. Check whether the new configuration (new database) can be applied or not.
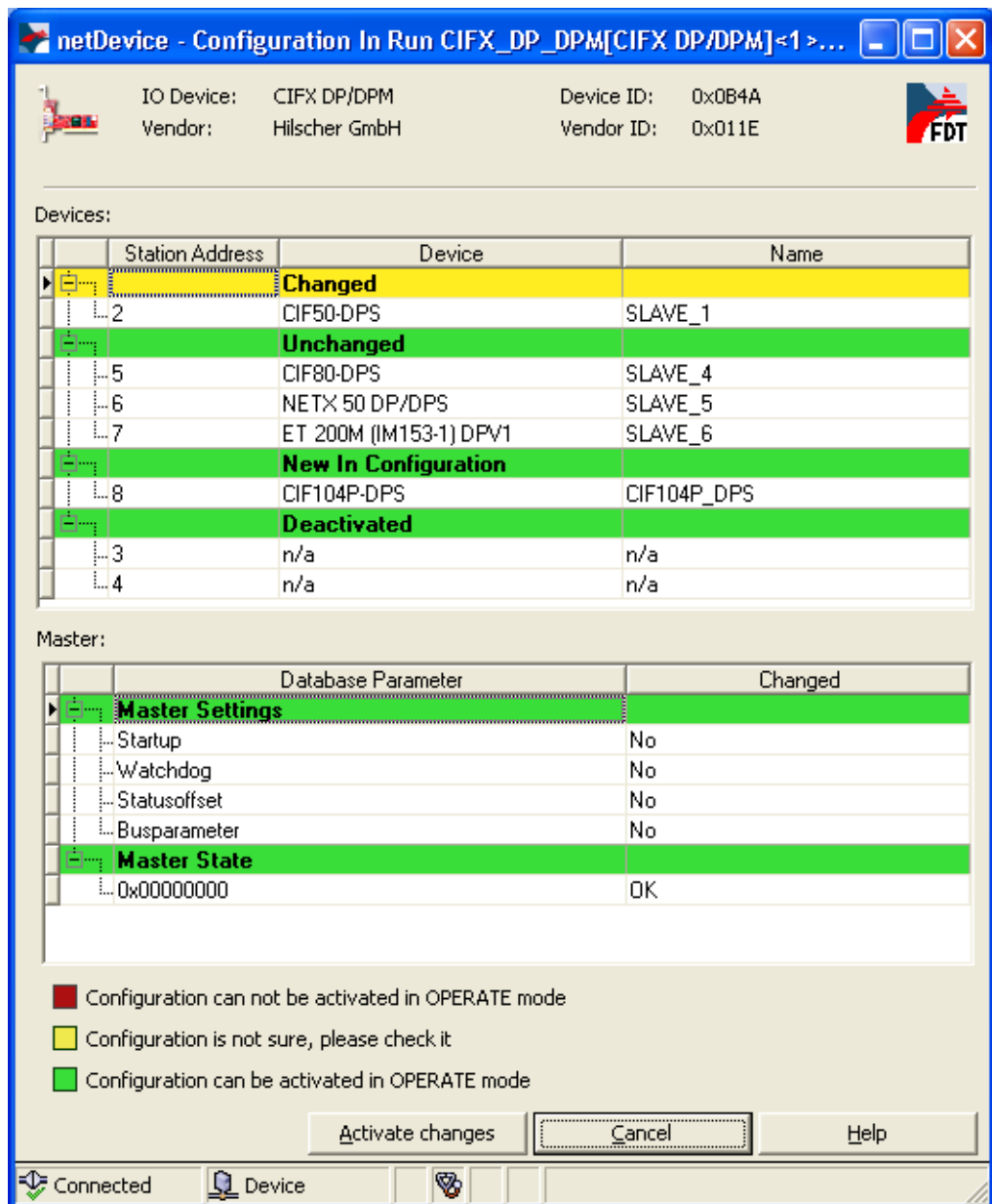
Figure 65: Dialog pane Configuration in Run (example)

In the **Configuration in Run** dialog pane for the **Devices** and the **Master** you can see the status of configuration changes and activate changes. In the dialog pane, you see:

• In the list **Devices** all slave devices assigned to the status.

• In the list **Master**, whether one of the **Master Settings** "Startup", "Watchdog", "Statusoffset" or "Busparameter" has been changed and whether the **Master State** shows errors.

• The evaluations are shown by different colors.

6.11.8.1   "Devices" List

Figure 66: Dialog pane Configuration in Run (example) – „Devices"

In the **Devices** list, all slave devices are displayed, which are contained in the database of the master device and for each device the status of the network configuration. Each device is identified by its **Station Address**. In the column **Device**, the device name from the device description file is displayed and under **Name** an additional symbolic name.

For each Slave device in a state entry an evaluation is displayed textually and by the color. The evaluation indicates the Slave device state in regard to the configuration update, or whether its configuration (network configuration or Slave device parameter set) has changed. The following evaluations may be displayed:

- **Changes not possible** (red): The changes of the Slave device parameter set can not be activated.

- **Changed** (yellow): The Slave device parameter set has changed.

- **Unchanged** (green): The Slave device parameter set has not changed.

- **New in Configuration** (green): The device has been inserted into the network configuration newly.

- **Deactivated** (green): The device was removed from the network configuration ("n/a" = not available).

Meaning of the colors

In the list **Devices** the colors have the following meanings:

Figure 67: Dialog pane Configuration in Run – meaning of the colors

- For a `red` configuration state entry you can not activate the changed Slave device parameter set in the OPERATE mode. It is not possible to apply the changed Slave device parameter set in the OPERATE mode to the concerned Slave device.

- For a `yellow` configuration state entry it is not clear whether you can apply the changed Slave device parameter set in the OPERATE mode to the Slave device concerned. If you activate changes, the following cases may occur:

  – **Changes can be applied:** The changed Slave device parameter set can be applied to the concern-ed Slave device in the OPERATE mode. The Slave device will remain in the cyclic data exchange with the Master.

  – **Changes can NOT be applied.** The changed Slave device parameter set can not be applied to the concerned Slave device in the OPERATE mode. The cyclic data exchange from the Master to this Slave device is briefly interrupted. The Slave is reconfigured and parameterized and put back into the cyclic data exchange. This applies to Slave devices, in which a change in configuration or a re-parameterization can be performed only if the cyclic communication is interrupted.

- For `green` status entries you can activate the changed Slave device parameter set in the OPERATE mode and apply the set to the concerned Slave device. It is sure that the changed Slave device parameter set can be applied to the concerned Slave device in the OPERATE mode.

6.11.8.2 "Master" list

Figure 68: Dialog pane Configuration in Run (example) – „Master"

> **→ Note:**
> If one of the **Master Settings** "Startup", "Watchdog", "Statusoffset" or "Busparameter" is changed, the complete Master Settings can not be applied for the configuration update.

Furthermore, the **Master State** gives information on whether the communication between the master and the devices (slaves) works error-free. Only in that case Master Settings can be applied.

The data under **Master** have the following meanings:

- If the line **Master Settings** OR **Master State** red is displayed in red, the Master Settings or the changes of the master configuration can "not be applied" in the OPERATE mode to the master.

  – Line **Master Settings** red and under **Changed** ! Yes and No: The Master Settings have been "changed" and can "not be applied".

  – Line **Master State** red / 0x0000000, under **Changed** ! Error: An error has occurred during the communication between Master and Slave. The changed database parameters can not be applied.

- The Master Settings or the changes of the Master configuration can only be "applied" in the OPERATE mode to the Master if the line **Master Settings** AND the line **Master State** green are displayed in green.

  – Line **Master Settings** green and under Changed No: The Master Settings have "not" been "changed" and can "be applied" if also the Master State is free of errors.

  – Line **Master State** green / = 0x0000000, under Changed OK: The communication between Master and Slave device is "free of errors". The Master Settings can "be applied" if none of the Master Settings "Startup", "Watchdog", "Statusoffset" or "Busparameter" was changed.

6.11.9   Activating or rejecting the changes

> **Note:**
> The changed configuration (new database) can only be accepted if:
> - the **changes to the database parameters** are possible,
> - the **Master Settings** ("Startup", "Watchdog", "Statusoffset", "Busparameter") have not changed and - the **Master State** is "OK" (= 0x00000000).

Activate changes

If the configuration displayed in the **Configuration in Run** dialog pane gives the result, that the updated configuration (new database) can be applied, you can activate the modified database parameters (configuration update):

➢ Therefore select in the dialog pane **Configuration in Run** > **Activate changes**.

| Activate changes | Cancel | Help |

Figure 69: Dialog pane Configuration in Run – Activate changes, Cancel, Help

↳ The **Configuration in Run** dialog closes. The pane **Information** with the text **The database changes were successfully activated.** is displayed. The **Configuration in Run** dialog closes.

Internally the PROFIBUS DP Master firmware activates the new configuration (new database) and sends back the confirmation (response) to activate the database to the PROFIBUS DP Master DTM. The DTM saves the new configuration. The changed database parameters (new database) are downloaded to the device, applied and used as new configuration during network state OPERATE.

> **Note:**
> If you activate the changes in spite of the configuration can not be applied, an error is detected during the verification of the data base. The pane **Error** is displayed, e. g. with the text **Error by activation of data base! A packet index has been not in the expected sequence.** .

OR Cancel - Rejecting changes

Reject the modified database parameters if the configuration displayed in the **Configuration in Run** dialog pane gives the result, that the updated configuration (new database) can not be applied:

➢ Therefore select in the pane **Configuration in Run** > **Cancel**.

⇨ The modified database parameters are discarded. The **Configuration in Run** dialog closes.

6.11.10 Increasing the number of bytes after the input data

If the new configuration can not be applied, you may need to increase the number of bytes after the input data. Proceed as is described below.

1. Disconnecting device
   ➢ For **netDevice**: Right-click on the PROFIBUS DP Master device icon.
   ➢ Select the Disconnect command from the context menu.
   ↳ The PROFIBUS DP Master device is disconnected from the PROFIBUS DP Master DTM.

2. Deactivate „Configuration in Run".
   ➢ Open the Master DTM configuration dialog (in the netDevice pane via double click on the device icon of the master).
   ➢ Select **Settings** > **Master Settings**.
   ➢ Uncheck **Enable configuration download during network state "operate"**.
   ➢ Click **OK**.
   ↳ The setting made will be saved. The DTM configuration dialog will be closed.

> **Important:**
> In this situation the "Configuration in Run" option is no longer usable.

3. Start the configuration download.
   ➢ For **netDevice**: right-click to the device icon for the Master.
   ➢ Select Download.
   ↳ The download is performed.

4. Increase the number of **bytes after the last input data**.
   ➢ Open the Master DTM configuration dialog (in the netDevice pane via double click on the device icon of the Master).
   ➢ Open Settings > Master Settings.
   ➢ Enter in the field **bytes after last input data** the number of bytes to be left free between the last input data byte and the device status.

5. Reactivate „Configuration in Run".
   ➢ Check Enable configuration download during network state "operate" to enable configuration download during network state "operate".
   ➢ Click **OK**.
   ↳ The setting made will be saved. The Master DTM configuration dialog will be closed.

6. Start the configuration download.
   ➢ For **netDevice**: right-click to the device icon for the Master.
   ➢ Select **Download**.
   ↳ The download is performed.
   ⇨ **Configuration in Run** now can be used again. The Master-DTM shows the evaluation of the configuration in the dialog pane **Configuration in Run**.

6.11.11 Quick reference dialog pane "Configuration in Run"

Device

- **Station Address:** Station address of the assigned Slave device: The PROFIBUS DP station address displays the addresses of the devices (master and slave) within a PROFIBUS network.
  Range for valid station address: 0 - 125

- **Device:** Real device name of the assigned slave device from the device description file.

- **Name:** Free definable symbolic name of the assigned slave device.

For each slave device an evaluation is displayed and whether the changes of the configuration can be applied. The following evaluations may be displayed:

- **Changes not possible** (red): The changes of the slave device parameter set can not be activated.

- **Changed** (yellow): The Slave device parameter set has been changed.

- **Unchanged** (green): The slave device parameter set has not changed.

- **New in Configuration** (green): The device has been inserted into the network configuration newly.

- **Deactivated** (green): The device was removed from the network configuration ("n/a" = not available).

In the list **Devices** the colors have the following meanings:

- **red**: You can not activate the changed slave device parameter set in the OPERATE mode or apply the set to the device concerned.

- **yellow**: It is not clear whether you can apply the changed slave device parameter set in the OPERATE mode to the device concerned or not. For some slave devices the configuration can only be changed if the cyclic communication to this slave device is disconnected.

- **green**: You can activate the changed slave device parameter set in the OPERATE mode or apply the set to the device concerned.

Master

Database parameters	Changed	
Master Settings • Startup, • Watchdog, • Statusoffset, • Bus parameter	**! Yes**	• The Master Settings have been "changed" and can "not be applied".
	No	• Line Master Settings and under Changed : The Master Settings have "not" been "changed" and can "be applied" if also the Master State is free of errors. If one of the Master Settings "Startup", "Watchdog", "Statusoffset" or "Busparameter" is changed, the complete Master Settings can not be applied for the configuration update.
Master Status = 0x0000000	**OK**	• The communication between master and slave device is free of errors. The Master Settings can be applied if none of the Master Settings "Startup", "Watchdog", "Statusoffset" or "Busparameter" were changed.
⎕ 0x0000000	**! Error**	• During the communication between master and slave an "error" has occurred. The changed database parameters can not be applied. In this case reject the changes via **Cancel**.

Table 28: Database parameters "Master Settings" and "Master Status"

Under **Master** the colors have the following meanings:

- If the line **Master Settings** OR **Master State** red is displayed in red, you can not activate the Master Settings or the changes of the Master configuration in the OPERATE mode and download the configuration to the master.

- If the line **Master Settings** OR **Master State** green is displayed in green, you can activate the Master Settings or the changes of the Master configuration in the OPERATE mode and download the configuration to the master.

Activate changes, Cancel, Help

- Via **Activate changes** you can download and apply possible changes to the configuration of devices and the master in the OPERATE mode (configuration update). A message is displayed, that the database has been activated successfully or respectively an error message.

- Via **Cancel** you discard the configuration changes. The **Configuration in Run** pane closes.

- About **Help** you open the help topic-related information from the online help.

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.
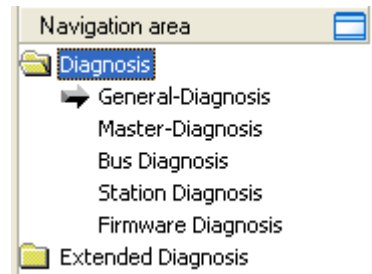
Figure 70: Navigation area - Diagnosis PROFIBUS DP Master DTM

Online connection to the device

> **Note:**
> Accessing the **Diagnosis** panes of the PROFIBUS DP Master DTM requires an online connection from the PROFIBUS DP Master DTM to the PROFIBUS DP Master device. For further information refer to section *Connecting/disconnecting device* [▶ page 79].

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 124].

7.2   General diagnosis

Information regarding the Device State and other general diagnosis parameters are displayed in the **General Diagnosis** dialog.
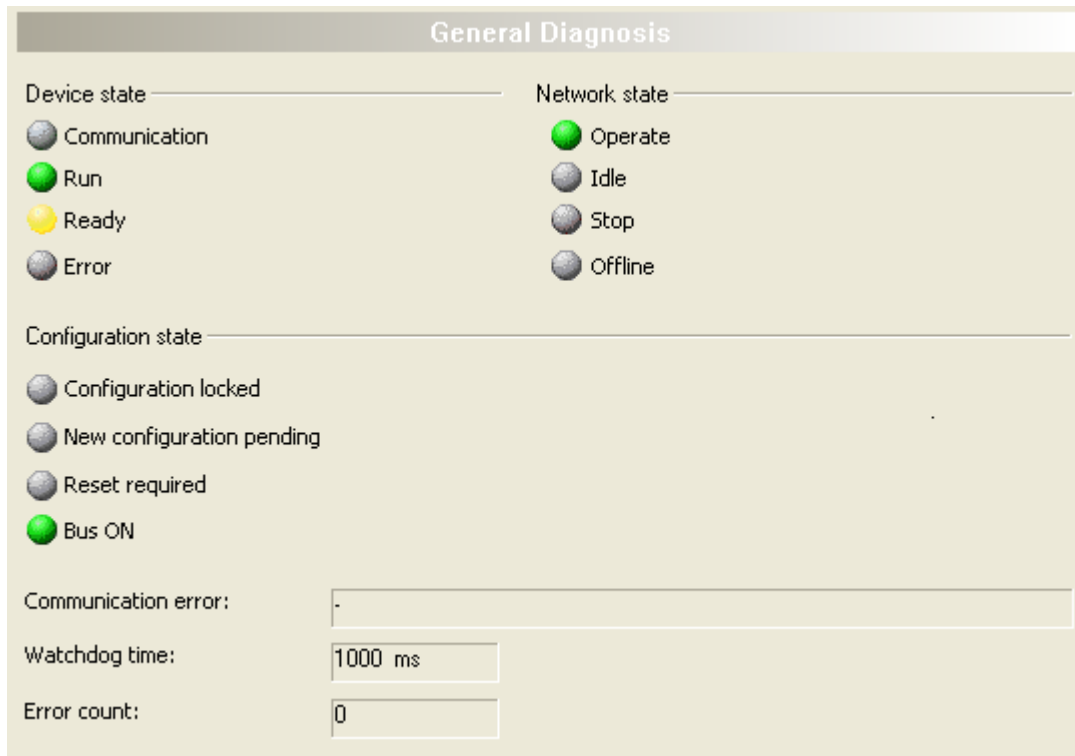
Figure 71: General diagnosis

LED	Description	Color	State
	Device state		
Communication	Shows whether the PROFIBUS DP device executes the network communication.	🟢 (green)	In COMMUNICATION state
		⚪ (gray)	Not in COMMUNICATION state
Run	Shows whether the PROFIBUS DP device has been configured correctly.	🟢 (green)	Configuration OK
		⚪ (gray)	Configuration not OK
Ready	Shows whether the PROFIBUS DP device has been started correctly. The PROFIBUS DP device waits for a configuration.	🟡 yellow	Device READY
		⚪ (gray)	Device not READY
Error	Shows whether the PROFIBUS DP 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 PROFIBUS DP device is in data exchange. In a cyclic data exchange the input data or the output data of the PROFIBUS DP Master is transmitted to the PROFIBUS DP Slave.	🟢 (green)	In OPERATION state
		⚪ (gray)	Not in OPERATION state
Idle	Shows whether the PROFIBUS DP device is in data exchange.	🟡 (yellow)	In IDLE state
		⚪ (gray)	Not in IDLE state
Stop	Shows whether the PROFIBUS DP device is in Stop state: There is no cyclic data exchange at the PROFIBUS network. The PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP device configuration has been loaded into the device.	yellow	RESET required
		(gray)	No RESET required
Bus ON	Shows whether the bus communication was started or stopped. I. e., whether the device is active on the bus or no bus communication to the device is possible and no response telegrams are sent.	(green)	Bus ON
		(gray)	Bus OFF

Table 29: Indication general diagnosis

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

Table 30: Indication general diagnosis

7.3 Master diagnosis

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

Figure 72: Master diagnosis

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

Table 31: Parameters Master diagnosis

7.4   Bus diagnosis

Figure 73: Bus diagnosis - Bus monitoring

Parameter	Description	Range of value / value
Short Circuit Counter	Number of short circuits on the PROFIBUS detected by the master.	0 .. 65535 (rollover possible)
Transmission Rejected Count	Number of rejected telegrams. A possible cause for the rejection of telegrams is that the master can no longer receive the token itself.	0 .. 65535 (rollover possible)

Table 32: Parameters Bus diagnosis - Bus monitoring

7.5 Station diagnosis
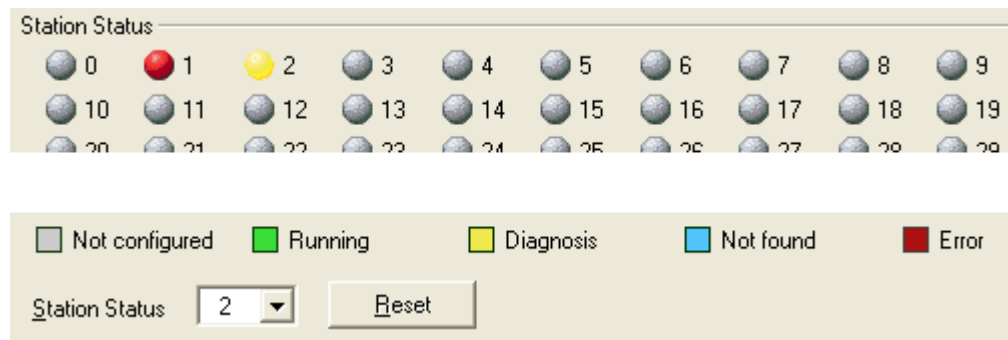
Figure 74: Station diagnosis

Under **Station status** all disposal station addresses (0-125) 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 33: Possible values for the status

Reset station status for status diagnosis (yellow):

To check if the station status Diagnosis (yellow) persists, the **Station status** can be reset for every device separately. Therefore:

➢ Select in the list field **Stations Status** the station address of the device.

➢ Select **Reset**.

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.

Firmware:	Firmware Name
Version:	2.2.0 (Build 2)
Date:	18.12.2008

Task information:

Task	Name of task	Version	Priority	Description	State
0	RX_IDLE	0.0	63	The task identifier is unknown.	Task Status ok. (0x000000
1	RX_TIMER	0.0	1	The task identifier is unknown.	Task Status ok. (0x000000
2	RX_SYSTEM	1.16	8	Middleware System Task.	Task Status ok. (0x000000
3	DPM_COM0_SMBX	1.0	50	TLR-Router DPM.	Task Status ok. (0x000000
4	DPM_COM0_RMBX	1.0	51	TLR-Router DPM.	Task Status ok. (0x000000
5	TLR_TIMER	0.0	39	The task identifier is unknown.	Task Status ok. (0x000000
6	PROFIBUS_DL	2.0	41	PROFIBUS Data Link Layer Task.	Task Status ok. (0x000000
7	PROFIBUS_FSPMM	1.2	40	PROFIBUS Master Fieldbus Service Protocol Machine Task.	Task Status ok. (0x000000
8	PROFIBUS_FSPMM2	1.0	43	PROFIBUS FSPMM2 Task.	Task Status ok. (0x000000
9	PROFIBUS_APM	1.2	42	PROFIBUS Master Application Task.	Task Status ok. (0x000000

Figure 75: Firmware Diagnosis

Task information:

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

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

Table 34: Description table task information

7.7   Live list

The **Live list** gives an overview of the devices, which are physically present in the real PROFIBUS 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 PROFIBUS DP Master DTM to the PROFIBUS DP Master device. For further information refer to section *Connecting/ disconnecting device* [▶ page 79].

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

Figure 76: Live list

Under **Live list** > **Devices** all disposal station addresses* and their states are shown as LED, where the number indicates the PROFIBUS station address of the device (*0 to 126).

• Present *master* devices are represented as a *green LED* 🟢,

• present *slave* devices appear as *blue LED* 🔵.

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

The meaning of the other colors is given in the list below the table.

Updating live list

The display is not updated automatically as this function loads the PROFIBUS 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 26].

> 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.
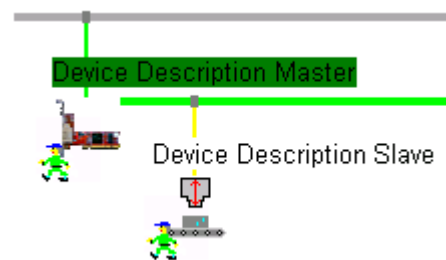
Figure 77: Example Debug mode with pending diagnosis, network view of a project with one network (master and slave)

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 35: 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 36: 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 PROFIBUS DP 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 PROFIBUS DP Master device icon to the PROFIBUS DP 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 PROFIBUS DP 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 PROFIBUS DP Master DTM:

Folder name / Section	Subsection
different folders	*Task information:* [▷ page 125]
RX-SYSTEM	*IniBatch status* [▷ page 126]
PROFIBUS_DL	*Bus parameters* [▷ page 127]
	Zähler [▷ page 128]
PROFIBUS_FSPMM	*Application Commands* [▷ page 129]
	DataLink Commands [▷ page 130]
	DMPMM Counter [▷ page 131]
	MMAC1 Counter [▷ page 131]
	Timer [▷ page 132]
PROFIBUS_FSPMM2	*Task Ressources* [▷ page 132]
	Application Commands [▷ page 133]
PROFIBUS_APM	*Common State* [▷ page 134]
	Global State field [▷ page 135]
	Application Commands [▷ page 137]
	IO Exchange Counter [▷ page 138]
	Packet Router [▷ page 138]

Table 37: Descriptions of the dialog panes extended diagnosis

Note:

Accessing the **Extended Diagnosis** dialog panes of the PROFIBUS DP Master DTM requires an online connection from the PROFIBUS DP Master DTM to the PROFIBUS DP Master device. For further information refer to section *Connecting/disconnecting device* [▷ page 79].

8.2   Task information:

Figure 78: 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 38: Extended Diagnosis > [Folder Name] > Task Information

8.3   IniBatch status

Figure 79: 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 39: 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   PROFIBUS_DL

8.4.1   Bus parameters

Under **Extended Diagnosis > PROFIBUS_DL > Bus parameters** the values of the configured bus parameters are displayed which are active at the bus. This one is also described in section *Bus parameters* [▶ page 64].

Figure 80: Extended Diagnosis > PROFIBUS_DL > Busparameter

Bus Parameters	Description
Station Address	The Station Address is the individual device address of the Master device on the bus.
	Value range: 0 .. 125
Baud Rate	The **Baud Rate** is the data transfer speed: number of Bits per second.
	The **Baud Rate** must be set to be the same for all devices on the bus. The result of changing the Baud rate is that all other parameters must be re-calculated.

Baud Rate	Bit time (t_{Bit})	Max cable length (type A)
9,6 kBit/s	104,2 µs	1200 m
19,2 kBit/s	52,1 µs	1200 m
31,25 kBit/s	32 µs	1200 m
45,45 kBit/s	22 µs	1200 m
93,75 kBit/s	10,7 µs	1200 m
187,5 kBit/s	5,3 µs	1000 m
500 kBit/s	2 µs	400 m
1500 kBit/s	666,7 ns	200 m
3000 kBit/s	333,3 ns	100 m
6000 kBit/s	166,7 ns	100 m
12000 kBit/s	83,3 ns	100 m

Bus Parameters	Description
Slot Time (t_{Bit})	"Wait for receipt" – Monitoring time of the sender (Requestor) of telegram for the acknowledgement of the recipient (Responder). After expiration, a retry occurs in accordance with the value of "Max. telegram retries".
	Value range: 37 .. 16383 (The default value depends from the baud rate.)
Min. Station Delay Time (t_{Bit})	This is the shortest time period that must elapse before a remote recipient (Responder) may send an acknowledgement of a received query telegram. The shortest time period between the reception of the last Bit of a telegram to the sending of the first Bit of a following telegram.
	Value range: 1 .. **11** . 65535
Max. Station Delay Time (t_{Bit})	This is the longest time period that must elapse before a Sender (Requestor) may send a further query telegram. Greatest time period between the reception of the last Bit of a telegram to the sending of the first Bit of a following telegram. The Sender (Requestor, Master) must wait at least for this time period after the sending of an unacknowledged telegram (e.g. Broadcast only) before a new telegram is sent.
	Value range: 1 .. 65535 (The default value depends from the baud rate.)

Bus Parameters	Description
Quiet Time (t_{Bit})	This is the time delay that occurs for modulators (Modulator-trip time) and Repeaters (Repeater-switch time) for the change over from sending to receiving.
	Value range: 0 .. 127 (The default value depends from the baud rate.)
Setup Time (t_{Bit})	Minimum period "reaction time" between the receipt of an acknowledgement to the sending of a new query telegram (Reaction) by the Sender (Requestor).
	Value range: 1 .. 255 (The default value depends from the baud rate.)
Target Rotation Time (t_{Bit})	Pre-set nominal Token cycling time within the Sender authorization (Token) will cycle around the ring. How much time the Master still has available for sending data telegrams to the Slaves is dependent on the difference between the nominal and the actual token cycling time.
	The **Target rotation time (T_{TR})** is shown in Bit times (t_{Bit}) like the other Bus Parameters. Below the displayed Bit time, the **Target rotation time** is also displayed in milliseconds (ms).
	Value range: 1 .. 224-1 (=16.777.215) (The default value depends on the number of Slaves attached to the Master and their module configuration)
GAP Factor	Factor for determining after how many Token cycles an added participant is accepted into the Token ring. After expiry of the time period G*TTR, the Station searches to see whether a further participant wishes to be accepted into the logical ring.
	Value range: 0 .. **10** .. 255
Highest Station Address (HSA)	The **Highest Station Address** is the highest bus address up to which a Master searches for another Master at the bus in order to pass on the Token. This station address must on no account be smaller than the Master station address.
	Value range: 1 .. **126**
Max. Retry Limit	Maximum number of repeats in order to reach a Station.
	Value range: 1 .. 15 (The default value depends from the baud rate.)

Table 40: Extended Diagnosis > PROFIBUS_DL > Busparameter

8.4.2   Zähler

Figure 81: Extended Diagnosis > PROFIBUS_DL > Busparameter

The values of the counter **Receive Frames** and **Transmit Frames** show generally whether there is bus activity or not.

Name	Description
Receive Frames	Counter for number received frames
Transmit Frames	Counter for number transmitted frames
Transmit Error	Counter for number transmitted errors
Receive Error	Counter for number received errors
Target Rotation Timeout	Counter for number target rotation timeout

Table 41: Extended Diagnosis > PROFIBUS_DL > Counter

8.5   PROFIBUS_FSPMM

8.5.1   Application Commands

Application Commands	
Task states	
Name	**Value**
Register Application Req.	1
Register Application Cnf. Pos.	1
Register Application Cnf. Neg.	0
Initialisation Req.	1
Initialisation Cnf. Pos.	1
Initialisation Cnf. Neg.	0
Download Req.	1
Download Cnf. Pos.	1
Download Cnf. Neg.	0
Reset Req.	6
Reset Cnf. Pos.	6
Reset Cnf. Neg.	0
Change Mode Ind.	0
Change Mode Ind. Ret.	0
Change Mode Req.	3
Change Mode Cnf. Pos.	3
Change Mode Cnf. Neg.	0
Set Output Data Req.	0
Set Output Data Cnf. Pos.	0
Set Output Data Cnf. Neg.	0
Get Input Data Req.	8789
Get Input Data Cnf. Pos.	8789
Get Input Data Cnf. Neg.	0
Slave Diag Ind.	1
Slave Diag Ind. Ret.	1
Get Slave Diag Req.	0
Get Slave Diag Cnf. Pos.	0
Get Slave Diag Cnf. Neg.	0
DPV1 C1 Read Req.	0
DPV1 C1 Read Cnf. Pos.	0
DPV1 C1 Read Cnf. Neg.	0
DPV1 C1 Write Req.	0
DPV1 C1 Write Cnf. Pos.	0
DPV1 C1 Write Cnf. Neg.	0
DPV1 C1 R/W Abort Req.	0
DPV1 C1 R/W Abort Cnf. Pos.	0
DPV1 C1 R/W Abort Cnf. Neg.	0
DPV1 Alarm Ind.	0
DPV1 Alarm Ind. Ret.	0
DPV1 Alarm Ack. Req.	0
DPV1 Alarm Ack. Cnf. Pos.	0
DPV1 Alarm Ack. Cnf. Neg.	0
Global Control Req.	0
Global Control Cnf. Pos.	0
Global Control Cnf. Neg.	0
New Input Ind.	0
New Input Ind. Ret.	0
Process End Req.	0
Unknown Command	0
Last Unknown Command	0x00000000

Figure 82: Extended Diagnosis > PROFIBUS_FSPMM > Application Commands

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

Table 42: Extended Diagnosis > PROFIBUS_FSPMM > Application Commands

8.5.2   DataLink Commands

Figure 83: Extended Diagnosis > PROFIBUS_FSPMM > DataLink Commands

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

Table 43: Erweiterte Diagnose > PROFIBUS_FSPMM > DataLink-Kommandos

8.5.3   DMPMM Counter

Figure 84: Extended Diagnosis > PROFIBUS_FSPMM > DMPMM Counter

Name	Description
[Service]	DMPMM counter of the FSPMM layer. Indicates the services [2] processed.

Table 44: Erweiterte Diagnose > PROFIBUS_FSPMM > DMPMM-Zähler

8.5.4   MMAC1 Counter

Figure 85: Extended Diagnosis > PROFIBUS_FSPMM > MMAC1 Counter

Name	Description
[Service]	MMAC1 counter of the FSPMM layer: Counter for the Master-Master communications services[2].
	Indicates which services in this Master have been requested by a class 2 Master. The counter will be incremented by 1 if this Master has been requested by a class 2 Master.

Table 45: Extended Diagnosis > PROFIBUS_FSPMM > MMAC1 Counter

8.5.5 Timer

Figure 86: Extended Diagnosis > PROFIBUS_FSPMM > Timer

Name	Description
DataControlTime Counter	Counter for **Data Control Time** expiration reports. (Further information is given in section *Bus monitoring* [▶ page 68].)
MinSlaveIntervall Counter	Counter for the number of **Min Slave Interval** cycles. I. e., for the number of slave list cycles. (Further information is given in section *Bus monitoring* [▶ page 68].)
C1 Timer Expiration	Expiration time for C1 services* (* acyclic services for all Slaves) This counter will be incremented if a Slave doesn't respond to a DPV1C1 service.

Table 46: Extended Diagnosis > PROFIBUS_FSPMM > Timer

8.6 PROFIBUS_FSPMM2

8.6.1 Task Ressources

Figure 87: Extended Diagnosis > PROFIBUS_FSPMM2 > Task Resources

Name	Description
Memory Used Static (Bytes)	Memory used static from the FSPMM2 task in Bytes
Memory Used Dynamic (Bytes)	Memory used dynamic for the FSPMM2 task in Bytes
Max. supported DPV1C2 connections	Max. possible number DPV1C2 connections, which can be managed via the FSPMM2 task
Used DPV1C2 connections	Used number DPV1C2 connections, which are managed via the FSPMM2 task

Table 47: Extended Diagnosis > PROFIBUS_FSPMM2 > Task Resources

8.6.2   Application Commands

Figure 88: Extended Diagnosis > PROFIBUS_FSPMM2 > Application Commands

Name	Description
[*Service*]	Diagnosis counter of the FSPMM2 layer for Application Commands: Counter for acyclic DPV1 services class 2 (DPV1 C2 services).
	This counter indicates the services processed. (The services of the single packets are described in the API manual.)

Table 48: Extended Diagnosis > PROFIBUS_FSPMM2 > Application Commands

8.7   PROFIBUS_APM

8.7.1   Common State

Figure 89: Extended Diagnosis > PROFIBUS_APM > Common State

The values shown under **Common State** correspond to the **General Diagnosis** (see section *General diagnosis* [▶ page 112]).

The values for **Number of Configured Slaves, Number of Active Slaves** and **Number of Diagnostic Slaves** are summed up values of the single configured, active or diagnosis slaves. In section *Global State field* [▶ page 135] these values are specified bitwise for the single slaves.

Name	Description
Network State	The **Network State** is a general diagnosis state. Possible network states are: **Operate**: Shows that the PROFIBUS stack is in data exchange. **Idle**: Shows that the PROFIBUS stack is in idle mode. **Stop**: Shows that the PROFIBUS stack is in Stop state. **Offline**: The PROFIBUS DP Master is offline as long it does not have a valid configuration. Further information is given in section *General diagnosis* [▶ page 112].
Communication Error	Unique Error Code according to protocol stack This field holds the current error code of the communication channel. If the cause of error is resolved, the communication error field will be set to zero (= RCX_S_OK) again.
Watchdog Time	Shows the watchdog time in ms.
Number errors in total	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.
Number errors logged	This 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.
Number of 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.
Number of 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
Number of Diagnostic Slaves	Shows number of slaves with diagnostic. Number of slaves with diagnosis or error slaves.

Table 49: Extended Diagnosis > PROFIBUS_APM > Common State

8.7.2   Global State field

Figure 90: Extended Diagnosis > PROFIBUS_APM > Global State field

In the **Global State field** window the values of the single configured, active or diagnosis slaves are specified bitwise for the single slaves.

Name	Description
Globale Bits	Bus and master main errors are displayed. The "global state bits" are: • CONTROL-ERROR • AUTO-CLEAR-ERROR • NON-EXCHANGE-ERROR • FATAL-ERROR • HOST-NOT-READY • TIMEOUT-ERROR
Control Error	The **CONTROL-ERROR** displays that a parameterization error has occurred.
Autoclear Error	The **AUTO-CLEAR-ERROR** displays: The PROFIBUS DP Master has stopped the communication to all slaves and it has reached the auto-clear end state.
Non Exchange Error	The **NON-EXCHANGE-ERROR** shows: At least one slave is not in the cyclic data exchange with the PROFIBUS DP Master.
Fatal Error	A **FATAL-ERROR** has occurred. Because of a heavy bus error no further bus communication is possible.
Application State	**HOST-NOT-READY** shows, that the application program has not yet started or stopped the DP Master (READY / NOT-READY).
Timeout Error	The **TIMEOUT-ERROR** indicates that the device has detected a skipped TIMEOUT supervision time because of rejected PROFIBUS telegrams. It's an indication for bus short circuits while the Master interrupts the communication. The number of detected timeouts is fixed in the field **Bus Monitoring** (see section *Bus diagnosis* [▷ page 115]). The bit will be set when the first timeout was detected and can only be deleted via a reset of the device.
Master State	This variable represents the main state of the master system. Following values are possible: **OPERATE**: The PROFIBUS DP Master is in data exchange. In a data exchange the inputs of the PROFIBUS DP Slaves are read and the output information is transferred to all PROFIBUS DP Slaves. **CLEAR**: The PROFIBUS DP Master reads the input information of the PROFIBUS DP Slaves and holds the outputs of the PROFIBUS DP Slaves in a safe condition. **STOP**: The master is in the Stop state. That means no data exchange is performed between the PROFIBUS DP Master and the PROFIBUS DP Slaves. The master was stopped by the application program or it had to go in the state Stop because of a bus error. **OFFLINE**: The PROFIBUS DP Master does not exist on the bus, it is not on-line. This can happen if no or faulty bus parameters are set for the PROFIBUS DP Master. Furthermore this can happen if the correct bus parameters are set, but the application program has not activated the PROFIBUS DP Master for data exchange on the bus.
Error Address	**ERROR REMOTE ADDRESS**: Displays the lowest station address, which signals diagnosis. For further information see section *Station diagnosis* [▷ page 116].
Error Event	**ERROR EVENT**: Indicates the occurred error of the "Error address" as error code. All possible numbers are listed in [3]. For further information see section *Station diagnosis* [▷ page 116].
Bus Error Counter	**BUS ERROR COUNTER**: Counter for heavy bus error events, for example bus short circuits. The "Bus error counter" is increased, whenever an increased number of faulty PROFIBUS frames were detected. For further information see section *Bus diagnosis* [▷ page 115].
Bus Timeout Counter	**TIMEOUT COUNTER**: Counter for bus timeouts This counter counts the number of reported bus-off-events, i. e. the number of rejected PROFIBUS telegrams because of heavy bus error. For further information see section *Bus diagnosis* [▷ page 115].
Configured Slaves 7- 0	8 Bit parameter state Slave 0-7
Configured Slaves 15- 8	8 Bit parameter state Slave 8-15

Name	Description
…	…
Configured Slaves 127- 120	8 Bit parameter state Slave 127- 120
Active Slaves 7- 0	8 Bit active state Slave 0-7
Active Slaves 15- 8	8 Bit active state Slave 8-15
…	…
Active Slaves 127- 120	8 Bit active state Slave 127- 120
Diagnostic Slaves 7- 0	8 Bit diagnostic state Slave 0-7
Diagnostic slaves 15- 8	8 Bit diagnostic state slave 8-15
…	…
Diagnostic Slaves 127- 120	8 Bit diagnostic state slave 127- 120

Table 50: Extended Diagnosis > PROFIBUS_APM > Global State field

8.7.3   Application Commands

Figure 91: Extended Diagnosis > PROFIBUS_APM > Application Commands

Name	Description
[Service]	Diagnosis counter of the PROFIBUS_APM layer for Application Commands. Number of requested services of the FSPMM layer. Indicates the services processed. Note: The sum of the enumerated services must put together each of the positively and negatively counted number of services.

Table 51: Extended Diagnosis > PROFIBUS_APM > Application Commands

8.7.4   IO Exchange Counter

Figure 92: Extended Diagnosis > PROFIBUS_APM > IO Exchange Counter

Name	Description
Host Input Update Req.	Counter, how often the host has read the input data.
Input Update	Counter, how often the input data have been updated at the bus.
Host Output Update Req.	Counter, how often the host has written the output data.
Output Update	Counter, how often the output data have been updated at the bus.

Table 52: Extended Diagnosis > PROFIBUS_APM > IO Exchange Counter

8.7.5   Packet Router

Figure 93: Extended Diagnosis > PROFIBUS_APM > Packet Router

Name	Description
[*Service*]	Diagnosis counter of the PROFIBUS_APM layer for by the user to the appropriate task routed commands. Indicates the services processed.

Table 53: Extended Diagnosis > PROFIBUS_APM > Packet Router

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.
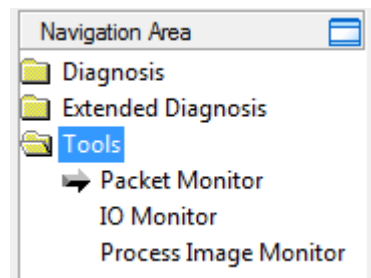
Figure 94: Navigation area - Tools (example)

Online connection to the device

> **Note:**
> Accessing the **Tools** dialog panes of the PROFIBUS DP Master DTM requires an online connection from the PROFIBUS DP Master DTM to the PROFIBUS DP Master device. For further information refer to section *Connecting/disconnecting device* [▶ page 79].

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 95: 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 96: 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 54: 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
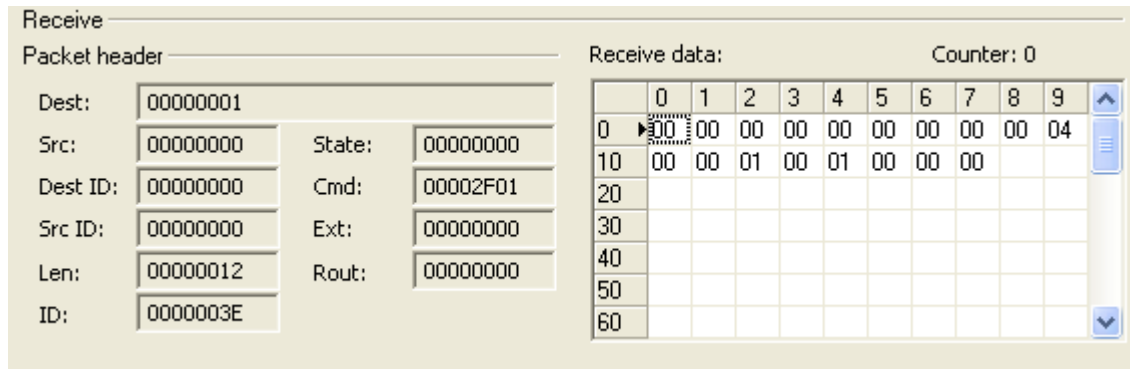
Figure 97: Packet header and Receive data

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 55: 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.

9.2.3   Example – Reading data via DPV1 Class1

To **read** data from a slave device via **DPV1 Class1** using the packet monitor, you must proceed as described below. The single steps are explained with the help of sample data. For more information on the steps under "Settings" and "Configuration" refer to the corresponding chapters in this manual. Required information is easy to find via the overview in the section Configuration steps.

Requirements

The function **DPV1 Class1 read** can only be used if:

- The used device supports **DPV1 Class1 read** and answers DPV1 Class1 requests.

- The used master and slave devices are configured. I. e., in the slave configuration under **DPV1 > enable DPV1** must be checked.

- The used master and slave devices are operational.

How to proceed

➢ In the master DTM under **Settings**: Select the cifX device driver and assign the master device.

Alternative to the connection via the cifX device driver via the netX driver an USB, serial or TCP connection can be used.

➢ In the slave DTM under **Configuration**: Check the DPV1 setting.

> **Important:**
> Under **DPV1 > enable DPV1** must be checked.

Packet description Read Request

structure PROFIBUS_FSPMM_PACKET_READ_REQ_T				
Type: Request				
Area	Variable	Type	Value / Range	Description
Head	structure TLR_PACKET_HEADER_T			
(A)	ulDest	UINT32	0x20/ FSPMM_QUE	Destination queue handle
	ulSrc	UINT32	0 ... 2³²-1	Source queue handle
	ulDestId	UINT32	ulFSPMM0Id	Destination end point identifier, specifying the final receiver of the packet within the destination process. Set to 0 for the Initialization Packet
	ulSrcId	UINT32	ulAPMS0Id	Source end point identifier, specifying the origin of the packet inside the source process
	ulLen	UINT32	16	Packet data length in bytes
	ulId	UINT32	0 ... 2³²-1	Packet identification as unique number generated by the Source process of the packet
	ulSta	UINT32		*See section 7.1 Error Codes of the FSPMM-Task*
(C)	ulCmd	UINT32	0x2210	PROFIBUS_FSPMM_CMD_READ_REQ_T - Command
	ulExt	UINT32	0	Extension not in use, set to zero for compatibility reasons
	ulRout	UINT32	x	Routing, do not change
Data	structure PROFIBUS_FSPMM_READ_REQ_T			
(D)	ulRemAdd	UINT32	0 ...125	Slave address
(E)	ulSlot	UINT32	0 ...254	Requested slot
(F)	ulIndex	UINT32	0 ...254	Requested index
(G)	ulLength	UINT32	1 ...240	Requested data length

Figure 98: Packet description PROFIBUS_FSPMM_CMD_READ_REQ – V1 Class 1 Read Request

Further information on the packet description for this example are comprised in the PROFIBUS DP Master Protocol API Manual, in section PROFIBUS_FSPMM_CMD_READ_REQ/CNF – V1 Class 1 Read Request (e. g. Revision 22 of the API manual, in section 6.1.9.) .

1. Open packet monitor.
   ➢ Open **Tools** > **Packet Monitor**.
2. Under **Send > Packet header** enter data for packet header.
   ➢ Under **Dest** (Dest = Destination) enter or select the receiver.
   ➢ Under **Cmd** (Cmd = Command) enter the read command identification.

		Sample data	
(A)	**Receiver**	*0x20*	(Destination Queue Handle)
(C)	**Read Command Identification**	*00002210*	PROFIBUS_FSPMM_ PACKET_READ_REQ_T (Request)

Figure 99: Example - Reading data via DPV1 Class 1 - FSPMM_QUE – Send > Packet header

3. Enter send data.

   ➢ Under **Send > Send data**: Enter send data.

   > For slot and index for the slave device, see the description of the equipment manufacturer.

		Range of value	Sample data	
D	**Slave address**	0 … 125	*02 00 00 00**	*(for slave 2)*
E	**Slot number**	0 … 254	*0A 00 00 00**	*(for slot 10)*
F	**Index**	0 … 254	*04 00 00 00**	*(for index 4)*
G	**Indication of length**	1 … 240 (UINT32 = 4 bytes)	*06 00 00 00* *Intel format, e. g. LSB first*	*(for the indication of length 6 bytes)*

Figure 100: Example - Reading data via DPV1 Class 1 - FSPMM_QUE –Send > Send data

4. Sending/receiving packets.

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

   ↳ The entered values are sent from the packet monitor to the connected slave device and received packets are displayed.

Packet description read confirmation

Area	Variable	Type	Value / Range	Description
structure PROFIBUS_FSPMM_PACKET_READ_CNF_T				
Type: Confirmation				
Head	structure TLR_PACKET_HEADER_T			
(A)	ulDest	UINT32		Destination queue handle, unchanged
	ulSrc	UINT32		Source queue handle, unchanged
	ulDestId	UINT32	ulAPM0Id	Destination end point identifier, unchanged
	ulSrcId	UINT32	ulFSPMM0Id	Source end point identifier, unchanged
	ulLen	UINT32	12 + n	Packet data length in bytes
	ulId	UINT32	$0 \ldots 2^{32}-1$	Packet identification as unique number generated by the Source process of the packet
	ulSta	UINT32		*See section 7.1 Error Codes of the FSPMM-Task*
(C)	ulCmd	UINT32	0x2211	PROFIBUS_FSPMM_CMD_READ_CNF_T - Command
	ulExt	UINT32	0	Extension, unchanged
	ulRout	UINT32	×	Routing, do not change
Data	structure PROFIBUS_FSPMM_READ_CNF_T			
(D)	ulRemAdd	UINT32	0 ...125	Slave address
(E)	ulSlot	UINT32	0 ...254	Slot
(F)	ulIndex	UINT32	0 ...254	Index
(H)	abData	UINT8[]		Requested data

Figure 101: Packet description PROFIBUS_FSPMM_CMD_READ_CNF – Confirmation of V1 Class 1 Read Request

> Further information on the packet description for this example are comprised in the PROFIBUS DP Master Protocol API Manual, in section PROFIBUS_FSPMM_CMD_READ_REQ/CNF – V1 Class 1 Read Request (e. g. Revision 22 of the API manual, in section 6.1.9.) .

5. Evaluate received packet.

   ➢ Under **Receive > Packet header**: Evaluate received packet.

   ↳ Under **Dest** the receiver is displayed.

   ↳ Under **State** the status code or possibly an error code is displayed.

   ↳ Under **Cmd** the response identification read request is displayed.

Figure 102: Example - Reading data via DPV1 Class 1 - FSPMM_QUE – Receive > Packet header

		Sample data	
Ⓐ	**Receiver**	*0x20*	(Destination Queue Handle)
Ⓑ	**State**	*00000000*	indicates that the read request could be executed without error. If during the execution of the read request an error was detected, an error code will be displayed.
Ⓒ	**Response Identification Read Request**	*00002211*	`PROFIBUS_ FSPMM_PACKET_READ_CNF_T` (Confirmation)

Error codes

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

6. Under **Receive > Receive data**:

➢ View receive data.

↳ Under **Receive data** the data of the receive packet are displayed.
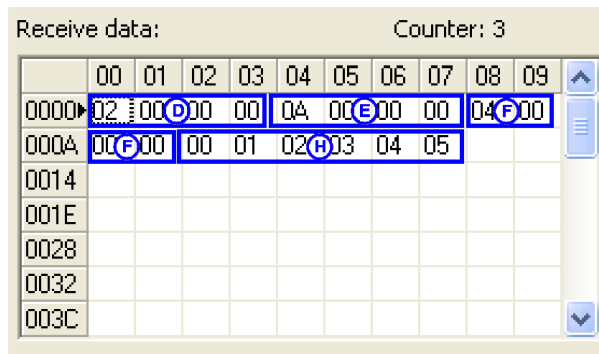
Figure 103: Example - Reading data via DPV1 Class 1 - FSPMM_QUE – Receive > Receive data

		Range of value	*Sample data*	
Ⓓ	**Slave address**	0 … 125	*02 00 00 00**	(for slave 2)
Ⓔ	**Slot number**	0 … 254	*0A 00 00 00**	(for slot 10)
Ⓕ	**Index**	0 … 254	*04 00 00 00**	(for index 4)
Ⓗ	**Receive data**	(UINT32 = 4 bytes)	*00 01 02 03 04 05* **Intel format, e. g. LSB first;*	(6 bytes)

9.2.4   Example - Writing Data via DPV1 Class1

To **write** data to a slave device via **DPV1 Class1** using the packet monitoring, you must proceed as described below. The single steps are explained with the help of sample data. For more information on the steps under "Settings" and "Configuration" refer to the corresponding chapters in this manual. Required information is easy to find via the overview in the section Configuration steps.

Requirements

The function **DPV1 Class1 writing** can only be used if:

- The used device supports **DPV1 Class1 writing** and answers DPV1 Class1 requests.

- The used master and slave devices are configured. I. e., in the slave configuration under **DPV1 > enable DPV1**must be checked.

- The used master and slave devices are operational.

How to proceed

➢ In the master DTM under **Settings**: Select the cifX device driver and assign the master device.

Alternative to the connection via the cifX device driver via the netX driver an USB, serial or TCP connection can be used.

➢ In the slave DTM under **Configuration**: Check the DPV1 setting.

> **Important:**
> Under DPV1 > enable DPV1 must be checked.

Packet description Write Request

structure PROFIBUS_FSPMM_PACKET_WRITE_REQ_T				
Type: Request				
Area	Variable	Type	Value / Range	Description
Head	structure TLR_PACKET_HEADER_T			
(A)	ulDest	UINT32	0x20/ FSPMM_QUE	Destination queue handle
	ulSrc	UINT32	0 ... 2³²-1	Source queue handle
	ulDestId	UINT32	ulFSPMM0Id	Destination end point identifier, specifying the final receiver of the packet within the destination process. Set to 0 for the Initialization Packet
	ulSrcId	UINT32	ulAPMS0Id	Source end point identifier, specifying the origin of the packet inside the source process
	ulLen	UINT32	12 + PROFIBUS_FS PM_MAX_IO_D ATA_LEN	Packet data length in bytes
	ulId	UINT32	0 ... 2³²-1	Packet identification as unique number generated by the Source process of the packet
	ulSta	UINT32		*See section 7.1 Error Codes of the FSPMM-Task*
(C)	ulCmd	UINT32	0x2212	PROFIBUS_FSPMM_CMD_WRITE_REQ_T - Command
	ulExt	UINT32	0	Extension not in use, set to zero for compatibility reasons
	ulRout	UINT32	x	Routing, do not change
Data	structure PROFIBUS_FSPMM_WRITE_REQ_T			
(D)	ulRemAdd	UINT32	0 ... 125	Slave address
(E)	ulSlot	UINT32	0 ... 254	Slot
(F)	ulIndex	UINT32	0 ... 254	Index
(I)	abData	UINT8[]		Write data

Figure 104: Packet description PROFIBUS_FSPMM_CMD_WRITE_REQ – V1 Class 1 Write Request

> Further information on the packet description for this example are comprised in the PROFIBUS DP Master Protocol API Manual, in section PROFIBUS_FSPMM_CMD_WRITE_REQ/CNF – V1 Class 1 Write Request (e. g. Revision 22 of the API manual, in section 6.1.10.).

1. Open packet monitor.

   ➢ **Open Tools** > **Packet Monitor**.

2. Under Send > Packet header enter data for packet header.

   ➢ Under Dest (Dest = Destination) enter or select the receiver.

   ➢ Under **Cmd** (Cmd = Command) enter the write command identification.

		Sample data	
(A)	**Receiver**	*0x20*	(Destination Queue Handle)
(C)	**Read Command Identification**	*00002212*	PROFIBUS_FSPMM_ PACKET_WRITE_REQ_T (Request)

Figure 105: Example - Writing data via DPV1 Class 1 - FSPMM_QUE – Send > Packet header

3. Enter send data.

   ➢ Under **Send > Send data**: Enter send data.

   > For slot and index for the slave device, see the description of the equipment manufacturer.

		Range of value	Sample data	
D	**Slave address**	0 … 125	*02 00 00 00**	*(for slave 2)*
E	**Slot number**	0 … 254	*0A 00 00 00**	*(for slot 10)*
F	**Index**	0 … 254	*04 00 00 00**	*(for index 4)*
G	**Writing data**		*01 02*	*(2 bytes)*
		(UINT32 = 4 bytes)	**Intel format, i. e. LSB first*	

Figure 106: Example - Writing data via DPV1 Class 1 - FSPMM_QUE – Send > Send data

4. Sending/receiving packets.

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

   ↳ The entered values are sent from the packet monitor to the connected slave device and received packets are displayed.

Packet description Confirmation Write Request

Area	Variable	Type	Value / Range	Description
structure PROFIBUS_FSPMM_PACKET_WRITE_CNF_T				
Type: Request				
Head	structure TLR_PACKET_HEADER_T			
(A)	ulDest	UINT32		Destination queue handle, unchanged
	ulSrc	UINT32		Source queue handle, unchanged
	ulDestId	UINT32	ulAPM0Id	Destination end point identifier, unchanged
	ulSrcId	UINT32	ulFSPMM0Id	Source end point identifier, unchanged
	ulLen	UINT32	12	Packet data length in bytes
			15	Only in case of error TLR_E_PROFIBUS_FSPMM_MSAC1_NRS
	ulId	UINT32	0 ... 2^{32}-1	Packet identification as unique number generated by the Source process of the packet
	ulSta	UINT32		*See section 7.1 Error Codes of the FSPMM-Task*
(C)	ulCmd	UINT32	0x2213	PROFIBUS_FSPMM_CMD_WRITE_CNF_T - Command
	ulExt	UINT32	0	Extension, unchanged
	ulRout	UINT32	×	Routing, do not change
Data	structure PROFIBUS_FSPMM_WRITE_CNF_T			
(D)	ulRemAdd	UINT32	0…125	Slave address
(E)	ulSlot	UINT32	0…254	Slot
(F)	ulIndex	UINT32	0…254	Index
	The following three variables are only present in case of error TLR_E_PROFIBUS_FSPMM_MSAC1_NRS			
	bErrorDecode	UINT8	128	A value of 128 here indicates DP V1 error handling is applied.
	bErrorCode1	UINT8	0…255	ErrorCode1, see section 5.3.2.2.of this document
	bErrorCode2	UINT8	0…255	ErrorCode2, meaning depends on bErrorCode1

Figure 107: Package description PROFIBUS_FSPMM_CMD_WRITE_CNF - Confirmation of V1 Class 1 Write Request

> Further information on the packet description for this example are comprised in the PROFIBUS DP Master Protocol API Manual, in section PROFIBUS_FSPMM_CMD_WRITE_REQ/CNF – V1 Class 1 Write Request (e. g. Revision 22 of the API manual, in section 6.1.10.).

5. Evaluate received packet.

➢ Under **Receive > Packet header**: Evaluate received packet.

↳ Under **Dest** the receiver is displayed.

↳ Under **State** the status code or possibly an error code is displayed.

↳ Under **Cmd** the response identification write request is displayed.
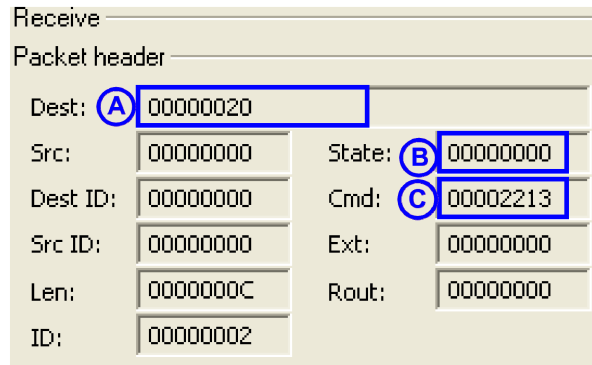
Figure 108: Example - Writing data via DPV1 Class 1 - FSPMM_QUE – Receive > Packet header

		Sample data	
(A)	**Receiver:**	*0x20*	(Destination Queue Handle)
(B)	**State**	*00000000*	indicates that the read request could be executed without error. If during the execution of the read request an error was detected, an error code will be displayed.
(C)	**Response Identification Writing Request**	*00002213*	`PROFIBUS_ FSPMM_PACKET_WRITE_CNF_T` `(Confirmation)`

Error codes

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

6. Under **Receive > Receive data**:

   ➢ View receive data.

   ✑ Under Receive data the data of the receive packet are displayed.
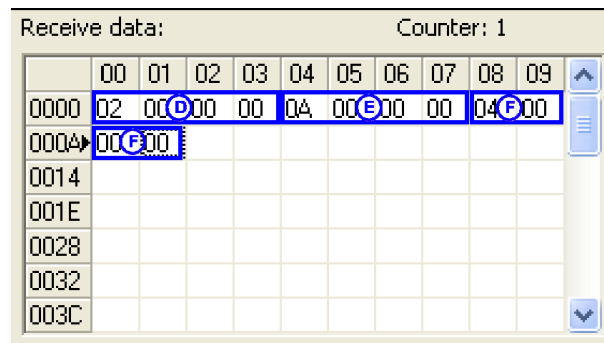
Figure 109: Example - Writing data via DPV1 Class 1 - FSPMM_QUE – Receive > Receive data

		Range of value	*Sample data*	
(D)	**Slave address**	0 … 125	*02 00 00 00**	*(for slave 2)*
(E)	**Slot number**	0 … 254	*0A 00 00 00**	*(for slot 10)*
(F)	**Index**	0 … 254	*04 00 00 00**	*(for index 4)*
		(UINT32 = 4 bytes)	**Intel format, e. g. LSB first*	

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 110: 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**.
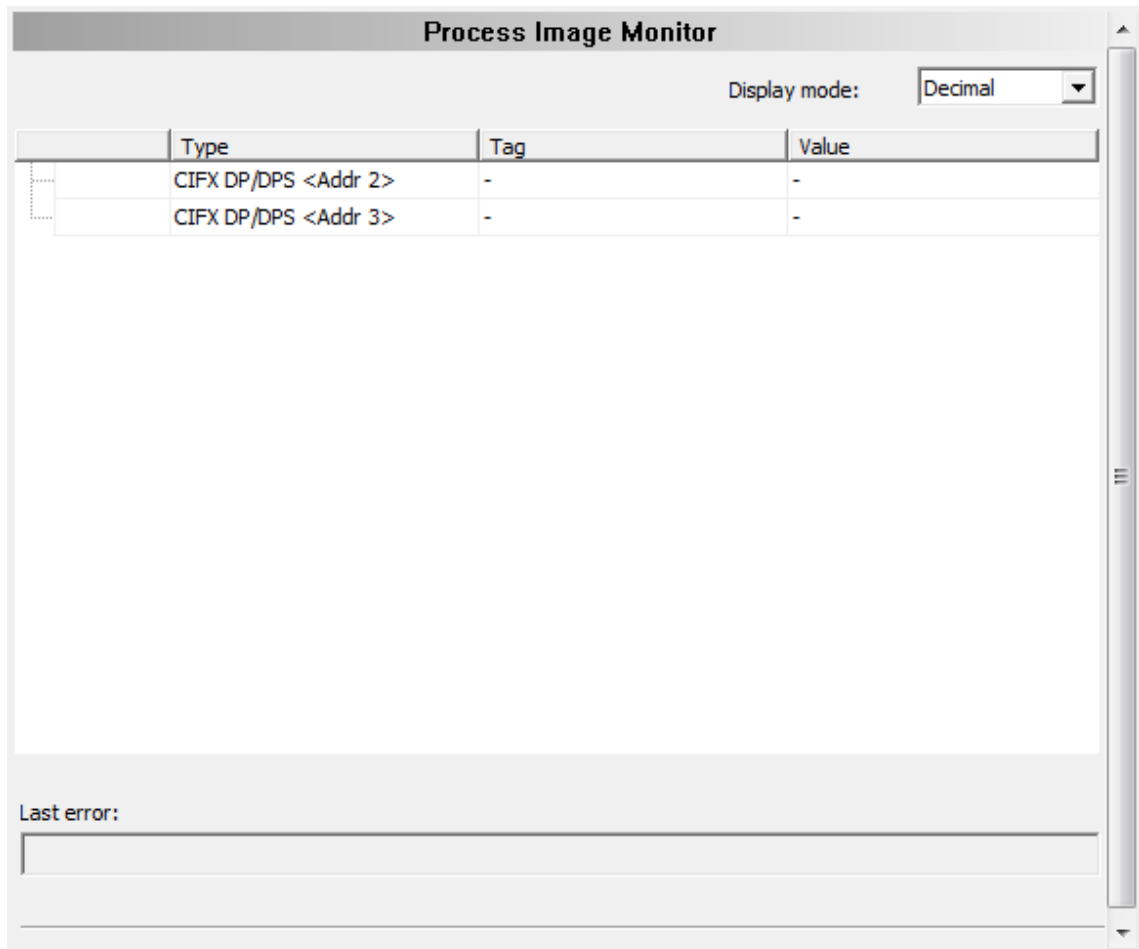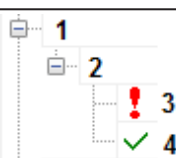
Figure 111: Window "Process image monitor"

Parameter	Description	Range of value/ value
Display mode	Display of the values in the column **Value** in decimal or hexadecimal mode.	Decimal (Default), Hexadecimal
1 2 ! 3 ✓ 4	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.	

Parameter	Description	Range of value/ value
Type	Device labeling provided by the hardware: Also description of the modules or input or output signals configured to the device.	
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 56: Notes to the "Process image monitor" window

10 Appendix

10.1 References

[1] FDT Joint Interest Group (www.fdt-jig.org, FDT-JIG Working Group): Device Type Manager (DTM) Style Guide, Version 1.0; FDT-JIG - Order No. <0001-0008-000>, Englich, 2005.

[2] International Electrical Commission: International Standard, IEC 61158-2, Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition, Edition 6.0, English, 2014.

[3] Hilscher Gesellschaft für Systemautomation mbH: Protocol API, PROFIBUS DP Master, V 2.8.0, Protocol API Manual, Revision 22, DOC061001API22EN, English, 2017-09.

[4] Hilscher Gesellschaft für Systemautomation mbH: Protocol API, PROFIBUS DP Slave, V 2.11.0, Protocol API Manual, Revision 20, DOC050401API20EN, English, 2020-10.

[5] Hilscher Gesellschaft für Systemautomation mbH: API, Hilscher status and error codes, Firmware and driver, Revision 5, DOC100802API05EN, English, 2019-11.

Safety standard

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

10.2 User rights

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

To access the **Settings**, **Configuration** and **Diagnosis** panes of the PROFIBUS DP 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 29]	D	D	X	X	X
	Configuring netX driver [▶ page 32]	D	D	X	X	X
Device Assignment	*Scanning for devices* [▶ page 38]	D	D	X	X	X
	Selecting the device (with or without firmware) [▶ page 41]	D	D	X	X	X
	Selecting the device once more (with firmware) [▶ page 41]	D	D	X	X	X
	Selecting and downloading firmware [▶ page 43]	D	D	X	X	X
Licen-sing	*Licensing* [▶ page 49]	D	D	X	X	X

Table 57: User rights settings (D = displaying, X = editing, configuring)

10.2.2 Configuration

Configuration parameters	Observer	Operator	Maintenance	Planning engineer	Adminis-trator
Bus parameters [▶ page 64]	D	D	X	X	X
Process data [▶ page 70]	D	D	X	X	X
Station table [▶ page 73]	D	D	X	X	X
Address table [▶ page 71]	D	D	X	X	X
Master settings [▶ page 75]	D	D	X	X	X

Table 58: 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 59: 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 60: Signal words

10.4 Legal notes

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- Medical devices used for life support and
- Vehicle control systems used in passenger transport

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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.
DPV0	PROFIBUS DP with cyclic communication
DPV1	PROFIBUS DP with acyclic communication
DPV2	PROFIBUS DP with cyclic and acyclic communication and time-sync configuration for the slave
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.
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.
PROFIBUS DP	PROFIBUS Decentralized Peripherals
PROFIBUS DP Master	Device that initiates the data transfer on the bus and which is an active network node, that is authorized and able to send data without external request
PROFIBUS DP Slave	Peripheral device, such as a IO device or a drive respectively passive participant without bus access authorization, which may only acknowledge received messages or requested by a master, may transmit messages to this one
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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