



Operating Instruction Manual
DTM for Hilscher EtherCAT Slave Device
Configuration of Hilscher Slave Devices
V1.1100

Hilscher Gesellschaft für Systemautomation mbH

www.hilscher.com

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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 EtherCAT Slave device within a FDT Framework using the EtherCAT Slave DTM, and what can be read from the diagnosis panes.

In a network project the EtherCAT Slave DTM can be dropped:

- to the root line (Stand-Alone Slave),
- or to the Master busline of a EtherCAT Master DTM.



Note: This manual edition first provides information for the case if the EtherCAT Slave DTM is dropped to the root line (Stand-Alone Slave) and in addition important information for the case if the EtherCAT Slave DTM is dropped to the Master busline of a EtherCAT Master DTM.

1.1.1 Descriptions of the Dialog Panes

The table below gives an overview for the individual dialog panes descriptions:

| Section | Subsection | Manual Page |
|---------------------------|------------------------------------|-------------|
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| | <i>Driver</i> | 34 |
| | <i>Device Assignment</i> | 44 |
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Table 1: Descriptions Dialog Panes

1.1.2 Online Help

The EtherCAT Slave DTM contains an integrated online help.

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

1.1.3 List of Revisions

| Index | Date | Version | Chapter | Revision |
|-------|----------|---------|---------|--|
| 6 | 20-01-28 | 1.1100 | 5.5 | Section <i>Signal Configuration</i> added. |

Table 2: List of Revisions

1.1.4 Conventions in this Manual

Notes, operation instructions and results of operation steps are marked as follows:

Notes



Important: <important note you must follow to avoid malfunction>



Note: <general note>



<note, where to find further information>

Operation Instructions

1. <instruction>

2. <instruction>

or

➤ <instruction>

Results

⇒ <result>

Positions in Figures

The *Positions* ①, ②, ③ ... or a, b, c ... or A, B, C ... refer to the figure used in that section. If the numbers reference to a section outside the current section then a cross reference to that section and figure is indicated.

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1.4 About EtherCAT Slave DTM

You can use the EtherCAT Slave DTM to configure EtherCAT Slave devices within a FDT Framework and to view the device diagnosis.

In a network project the EtherCAT Slave DTM can be dropped:

- to the root line (Stand-Alone Slave),
- or to the Master busline of a EtherCAT Master DTM.

Slave DTM at the Root-Line (Stand-Alone Slave)

Insert the EtherCAT Slave DTM to the root busline if you intend to configure only one single EtherCAT Slave device.

Slave DTM at the Master Busline

Insert the EtherCAT Slave DTM to the Master busline of the EtherCAT Master DTM if within the network project the Slave device and the Master device are used, i. e. if you intend to configure the Slave device and the Master device.

1.4.1 Requirements

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.

Requirements EtherCAT Slave DTM

To configure the EtherCAT Slave device with the EtherCAT Slave DTM the following requirements have to be accomplished:

- Completed hardware installation of a netX based DTM-compatible EtherCAT Slave device, inclusive loaded firmware and loaded configuration file
- Installed FDT/DTM V 1.2 compliant frame application
- Installed EtherCAT Master DTM (If Slave DTM is dropped to the Master busline.)
- Loaded DTM in the Device Catalog of the FTD Framework



Note: If the EtherCAT Slave DTM and the EtherCAT Slave 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.

1.5 Dialog Structure of the EtherCAT Slave DTM

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.

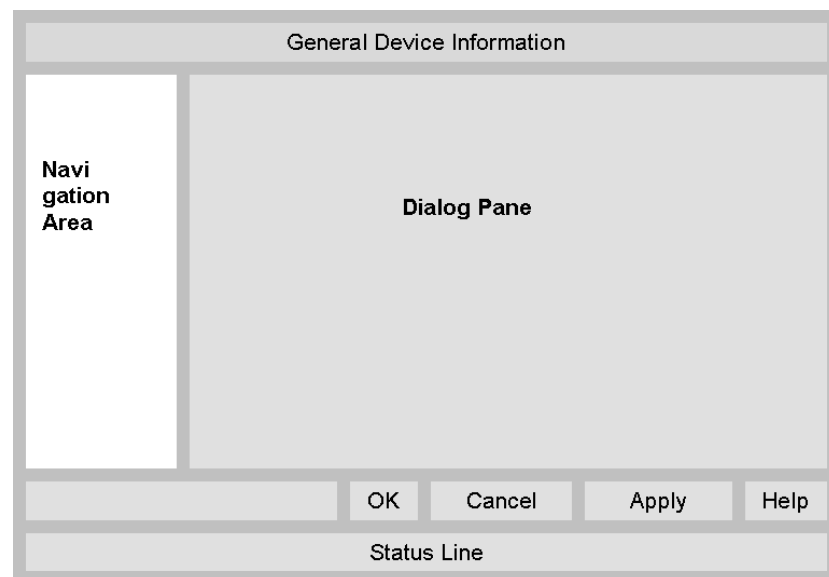


Figure 1: Dialog Structure of the EtherCAT Slave DTM

1.5.1 General Device Information

| Parameter | Meaning |
|-----------|-------------------------------------|
| IO Device | Name of the device |
| Vendor | Vendor name of the device |
| Device ID | Identification number of the device |
| Vendor ID | Identification number of the vendor |

Table 3: General Device Information

1.5.2 Navigation Area

The **Navigation Area** contains folders and subfolders to open the dialog panes of the DTM.

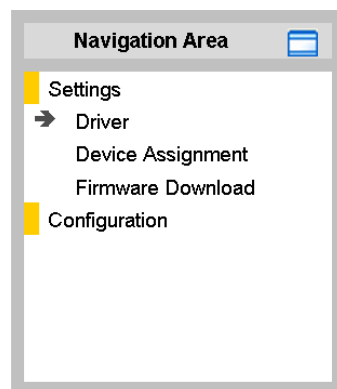


Figure 2: Navigation Area

- Select the required folder and subfolder.
- The corresponding Dialog pane is displayed.

Hide / display Navigation

| | |
|----------------------|--|
| | Hiding the navigation area (above right side). |
| Show navigation area | Opening the navigation area (below left side). |

1.5.3 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.

| Settings | |
|----------------------------------|--|
| Driver | To establish a connection from the EtherCAT Slave DTM to the EtherCAT Slave device, on the pane Driver you can verify if the default driver is checked and respectively check another driver or multiple drivers. For further information, refer to section <i>Driver</i> on page 34. |
| Device Assignment | On the pane Device Assignment you select the device and assign the device to the driver. For further information, refer to section <i>Device Assignment</i> on page 44. |
| Firmware Download | The dialog on the pane Firmware Download is used to load a new firmware into the device. A detailed description can be found in section <i>Firmware Download</i> on page 50. |
| Configuration | |
| Configuration | At the Configuration pane you can perform the basic configuration tasks for the EtherCAT Slave device. |
| <i>General</i> | At the General pane EtherCAT Slave information is displayed. For further information, refer to section <i>General</i> on page 60. |
| <i>General Settings</i> | The General Settings pane displays the most important general settings. For further information, refer to section <i>General Settings</i> on page 61. |
| Signal Configuration | In the Signal Configuration pane the data structure of the input and output data for the signal assignment is determined. For further information, refer to section Signal Configuration on page 67. |
| <i>Behavior</i> | At the Behavior pane the parameters of the Device checkup, the Process Data and the Watchdog are described. For further information, refer to section <i>Behavior</i> on page 73. |
| <i>Mailbox</i> | At the Mailbox pane you can get information on mailbox-based data transfer and the CoE (CANopen over Ethernet) functionality. For further information, refer to section <i>Mailbox</i> on page 80. |
| Diagnosis | |
| Diagnosis/ Extended Diagnosis | At the Diagnosis panes information can be read for troubleshooting. For further information, refer to section <i>Overview Diagnosis</i> on page 88 and section <i>Overview Extended Diagnosis</i> on page 92. |
| Tools | |
| Packet Monitor/ IO Monitor | Under Tools the Packet Monitor and the IO Monitor are provided for test and diagnosis purposes. For further information, refer to section <i>Packet Monitor</i> on page 101 or section <i>IO Monitor</i> on page 104. |

Table 4: Overview Dialog Panes



Note: Accessing the **Diagnosis** panes of the EtherCAT Slave DTM requires an online connection from the EtherCAT Slave DTM to the EtherCAT Slave DTM.



For further information, refer to section *Connecting/Disconnecting Device* on page 84.

1.5.4 OK, Cancel, Apply and Help

OK, Cancel, Apply and Help you can use as described hereafter.

| | Meaning |
|---------------|---|
| OK | To confirm your latest settings, click OK . All changed values will be applied on the frame application database. <i>The dialog then closes.</i> |
| 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. <i>The dialog then closes.</i> No: The changes are <u>not</u> saved or the changed values are not applied on the frame application database. <i>The dialog then closes.</i> Cancel: <i>Back to the DTM.</i> |
| Apply | To confirm your latest settings, click Apply . All changed values will be applied on the frame application database. <i>The dialog remains opened.</i> |
| Help | To open the DTM online help, click Help . |

Table 5: OK, Cancel, Apply and Help

1.5.5 Table Lines

In the DTM dialog pane table lines can be selected, inserted or deleted.

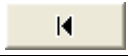


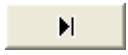


| | Meaning |
|---|---|
|  | To select the first line of a table use First Line . |
|  | To select the previous line of a table use Previous Line . |
|  | To select the next line of a table use Next Line . |
|  | To select the last line of a table use Last Line . |
|  | Create a new Line inserts new lines into the table. |
|  | Delete selected Line deletes the selected line from the table. |

Table 6: Selecting, inserting, deleting Table Line

1.5.6 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.

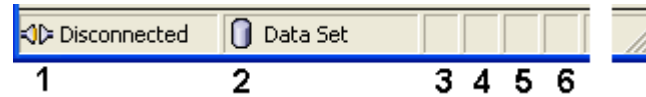
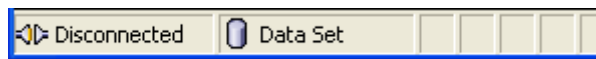


Figure 3: Status Bar – Status Fields 1 to 6

| Status Field | Icon / Meaning | |
|--------------|--|---|
| 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 are read out from the instance data set (database). |
| | | Device: The displayed data are 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 7: Status Bar Icons [1]

Offline State



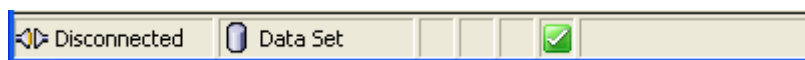
Save operation succeeded



Firmware Download



Firmware Download successful



Online State and Diagnosis

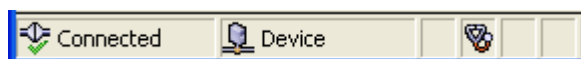


Figure 4: Status Bar Display Examples

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 educated 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 EtherCAT Master DTM serves for configuration and diagnosis of EtherCAT 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 Instructions

To ensure your own personal safety and to avoid personal injury, you necessarily must read, understand, and comply with the safety instructions and safety messages in this manual before you install and operate your system.

For cases if both, personal injury as well as property damage (damage of equipment or device) may occur together, you find the safety instructions in this section.

2.4.1 Communication Stop during Firmware or Configuration Download

If you want to perform either a firmware update (as a download) or a configuration download, both via the EtherCAT Slave DTM, 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 is stopped.

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 data base. The firmware download overwrites the existing firmware in the network device.
- To complete the firmware update and to make the device operable again, re-load the configuration after the firmware update has been finished.
- Device parameters that have been saved volatile, e. g. as the temporarily set IP address parameters, are getting lost during the reset.
- In order to prevent loss of configuration data, make sure that your project configuration data are saved non-volatile, before you initiate a firmware update or download the configuration.

2.4.2 Mismatching System Configuration

Mismatching system configuration loaded into the device could result in faulty data mapping in the application program and thus unexpected equipment operation may cause personal injury or damage of equipment.

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

2.5 Property Damage

To avoid property damage and damage to your system or to your equipment, you necessarily must read, understand, and comply with the safety instructions and safety messages in this manual before you configure your system.

2.5.1 Power Disconnect while downloading Firmware or Configuration

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 EtherCAT Slave device is interrupted,
- or a reset to the device is performed,

this may lead to the following consequences:

Loss of Device Parameters, Firmware Corruption

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

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

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 device unusable.

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

Otherwise you might be forced to return your device for repair.

2.6 Labeling of Safety Messages

- The **Section Safety Messages** at the beginning of a chapter are pinpointed particularly and highlighted by a signal word according to the degree of endangerment. The type of danger is specified by the safety message text
- The **Integrated Safety Messages** within an instruction description are highlighted with a signal word according to the degree of endangerment. The kind of danger is specified exactly by the safety message text.





| Signal Word | Meaning (International) | Meaning (USA) |
|--|--|--|
|  DANGER | Indicates a direct hazard with high risk, which will have a consequence of death or grievous bodily harm if it is not avoided. | Indicates a hazardous situation which if not avoided, will result in death or serious injury. |
|  WARNING | Indicates a possible hazard with medium risk, which will have a consequence of death or (grievous) bodily harm if it is not avoided. | Indicates a hazardous situation which if not avoided, could result in death or serious injury. |
|  CAUTION | Indicates a minor hazard with medium risk, which could have a consequence of minor or moderate bodily harm if it is not avoided. | Indicates a hazardous situation which if not avoided, may result in minor or moderate injury. |
|  NOTICE | Indicates a property damage message. | Indicates a property damage message. |

Table 8: Signal Words



Note: The ANSI Z535.6 standard specifies in section 4.8: "Messages about hazards that could result in both, physical injury and property damage are considered safety messages, not property damage messages." Thus depending of the type of danger and its consequences, warning messages marked by a signal word DANGER, WARNING or CAUTION may include both, messages on physical injury and property damage.

In this document all Safety Instructions and Safety Messages are designed according both to the international used safety conventions as well as to the ANSI Z535.6 standard, refer to safety reference [S1].

In this document the signal words 'WARNING', 'CAUTION' and 'NOTICE' are used according to ANSI Z535.6 standard. The meaning given in ISO/IEC 26514 [S4] section '11.11 Contents of warnings and cautions' is not relevant in this manual.

2.7 References Safety

- [S1] ANSI Z535.6-2011 American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials
- [S4] 26514-2010 - IEEE Standard for Adoption of ISO/IEC 26514:2008 Systems and Software Engineering--Requirements for Designers and Developers of User Documentation

3 Getting started

3.1 Configuration Steps

The following overview provides to you the step sequence on how to configure a netX based EtherCAT Slave device with EtherCAT Slave DTM as it is typical for many cases. At this time it is presupposed that the hardware installation was done.




The overview lists all the steps in a compressed form. For detailed descriptions of each step refer to the sections noted in the column *For detailed information see section*.

The following two cases are considered:

- Slave DTM at the Root-Line (Stand-Alone Slave)
- and Slave DTM at the Master busline.

3.1.1 Slave DTM at the Root-Line (Stand-Alone Slave)



| # | Step | Short Description | For detailed information see section | Page |
|---|--|--|--|------|
| 1 | Load device catalog | Depending of the FDT Container: For netDevice: - select Network > Device Catalog , - select Reload Catalog . | <i>(See Operating Instruction Manual netDevice and netProject)</i> | - |
| 2 | Create new project / Open existing project | Depending of the frame application. For the configuration software: - select File > New or File > Open . | <i>(See Operating Instruction Manual of the Frame Application)</i> | - |
| 3 | Insert Slave into configuration | Depending of the FDT Container: For netDevice: - in the Device Catalog under Gateway / Stand-Alone Slave click to the Slave, - and insert the Slave via drag and drop to the root line in the network view. | <i>(See Operating Instruction Manual netDevice and netProject)</i> | - |
| 4 | Open the Slave DTM configuration dialog | Open the Slave DTM configuration dialog. - Double click to the device icon of the Slave. - The Slave DTM configuration dialog is displayed. | - | - |


| # | Step | Short Description | For detailed information see section | Page |
|---|--|---|---|---------------------|
| 5 | Verify or adapt Driver Settings | <p>In the Slave DTM configuration dialog: - select Settings > Driver.</p>  <ul style="list-style-type: none"> • 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 EtherCAT Slave DTM is installed on the same PC as the EtherCAT Slave device. • Use the netX Driver to establish a USB, Serial (RS232) or TCP/IP connection from the EtherCAT Slave DTM to the EtherCAT Slave device. • The 3SGateway Driver for netX (V3.x) is used only in relationship with CODESYS. <p>To search for devices you can check one or multiple drivers simultaneously.</p> <p>- Verify that the default driver is checked. - If necessary, check another driver or multiple drivers.</p> | <p><i>Settings for Driver and Device Assignment and Driver</i></p> | <p>32</p> <p>34</p> |
| 6 | Configure Driver | <p>If you use the netX Driver, you respectively must configure it.</p> <p>For netX Driver and communication via TCP/IP set the IP address of the device: - Select Settings > Driver > netX Driver > TCP Connection. - Via  add an IP range. - Under IP Address enter the IP Address of the device or an IP range. - Click Save.</p> <p>Adjust the driver parameters netX Driver USB/RS232 only if they differ from the default settings.</p>  <p>Note!</p> <ul style="list-style-type: none"> • The cifX Device Driver requires no configuration. • The configuration of the 3SGateway Driver for netX (V3.x) is carried out via the CODESYS surface. | <p><i>Configuring netX Driver</i></p> | <p>37</p> |
| 7 | Assign Slave device (with or without firmware) | <p>Assign the device to this driver.</p> <p>In the Slave DTM configuration dialog: - select Settings > Device Assignment, - select a Slave device (with or without firmware), - therefore check the appropriate checkbox, - select Apply.</p> | <p><i>Selecting the Device (with or without firmware)</i></p> | <p>47</p> |
| 8 | Select and download firmware | <p>If not yet a firmware was loaded to the device: - Adhere to the necessary safety precautions to prevent personnel injury and property damage.</p> <p>In the Slave DTM configuration dialog: - select Settings > Firmware Download, - select Browse..., - select a firmware file, - select Open, - select Download and Yes.</p> | <p><i>Safety Messages on Firmware or Configuration Download</i></p> <p><i>Firmware Download</i></p> | <p>30</p> <p>50</p> |

| # | Step | Short Description | For detailed information see section | Page |
|----|--|--|--|--------------------|
| 9 | Assign Slave device once more (with firmware and system channel) <i>For repeated download this step is omitted.</i> | In the Slave DTM configuration dialog: - select Settings > Device Assignment , - select Scan , - select the Slave device (with loaded firmware and defined system channel), - therefore check the appropriate checkbox, - select Apply , - close the Slave DTM configuration dialog via OK . | <i>Selecting the Device once more (with Firmware)</i> | 48 |
| 10 | Configure Slave device | 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 Settings , - set the Device Settings, - select Configuration > Signal Configuration , - proceed the signal configuration. - Close the Slave DTM configuration dialog via OK . | <i>Configuring Slave Parameter</i> <i>General Settings</i> Signal Configuration | 58 61 67 |
| 11 | Save project | Depending of the frame application. For the configuration software: - select File > Save . | <i>(See Operating Instruction Manual of the Frame Application)</i> | - |
| 12 | Connect Slave device | Depending of the FDT Container. For netDevice: - right click to the device icon of the Slave, - select Connect . | <i>Connecting/Disconnecting Device</i> | 84 |
| 13 | Download Configuration | - Adhere to the necessary safety precautions to prevent personnel injury and property damage. Depending of the FDT Container. For netDevice: - right click to the device icon of the Slave, - select Download . | <i>Safety Messages on Firmware or Configuration Download</i> <i>Download Configuration</i> | 30 86 |
| 14 | Diagnosis | Depending of the FDT Container. For netDevice: - right click to the device icon of the Slave, - select Diagnosis . - The Slave 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 Slave DTM diagnosis dialog via OK . | <i>Overview Diagnosis</i> | 88 |
| 15 | IO Monitor | Depending of the FDT Container: For netDevice: - right click to the device icon of the Slave, - select Diagnosis , - select Tools > IO Monitor . - Check the input or output data, - close the IO Monitor dialog via OK . | <i>IO Monitor</i> | 104 |
| 16 | Disconnect | Depending of the FDT Container. For netDevice: - right click to the device icon of the Slave, - select Disconnect . | <i>Connecting/Disconnecting Device</i> | 84 |

Table 9: Getting Started - Configuration Steps (Slave DTM at the Root-Line (Stand-Alone Slave))

3.1.2 Slave DTM at the Master Busline

| # | Step | Short Description | For detailed information see section | Page |
|----|--|--|---|----------|
| 1 | Load device catalog | Depending of the FDT Container: For netDevice: - select Network > Device Catalog , - select Reload Catalog . | (See Operating Instruction Manual netDevice and netProject) | - |
| 2 | Create new project / Open existing project | Depending of the frame application. For the configuration software: - select File > New or File > Open . | (See Operating Instruction Manual of the Frame Application) | - |
| 3 | Insert Master or Slave into configuration | For netDevice: - in the Device Catalog click to the Master, - and insert the device via drag and drop to the root line in the network view, - in the Device Catalog click to the Slave, - and insert the device via drag and drop to the Master bus line in the network view. | (See Operating Instruction Manual netDevice and netProject) | - |
| 4 | Open the Slave DTM configuration dialog | Open the Slave DTM configuration dialog. - Double click to the device icon of the Slave. - The Slave DTM configuration dialog is displayed. | - | - |
| 5 | Verify or adapt Driver Settings | <p>In the Slave DTM configuration dialog: - select Settings > Driver.</p> <p> 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.</p> <ul style="list-style-type: none"> • Use the cifX Device Driver if the EtherCAT Slave DTM is installed on the same PC as the EtherCAT Slave device. • Use the netX Driver to establish a USB, Serial (RS232) or TCP/IP connection from the EtherCAT Slave DTM to the EtherCAT Slave device. • The 3SGateway Driver for netX (V3.x) is used only in relationship with CODESYS. <p>To search for devices you can check one or multiple drivers simultaneously.</p> <p>- Verify that the default driver is checked. - If necessary, check another driver or multiple drivers.</p> | Settings for Driver and Device Assignment and Driver | 32 34 |
| 6. | Configure Driver | <p>If you use the netX Driver, you respectively must configure it.</p> <p>For netX Driver and communication via TCP/IP set the IP address of the device: - Select Settings > Driver > netX Driver > TCP Connection. - Via  add an IP range. - Under IP Address enter the IP Address of the device or an IP range. - Click Save.</p> | Configuring netX Driver | 37 |

| # | Step | Short Description | For detailed information see section | Page |
|----|--|--|---|--------------------------------|
| 6 | Configure Driver (continued) | <p>Adjust the driver parameters netX Driver USB/RS232 only if they differ from the default settings.</p> <div>  <p>Note!</p> <ul style="list-style-type: none"> • The cifX Device Driver requires no configuration. • The configuration of the 3SGateway Driver for netX (V3.x) is carried out via the CODESYS surface. </div> | <i>Configuring netX Driver</i> | 37 |
| 7 | Assign Slave device (with or without firmware) | <p>Assign the device to this driver.</p> <p>In the Slave DTM configuration dialog:</p> <ul style="list-style-type: none"> - select Settings > Device Assignment, - select a Slave device (with or without firmware), - therefore check the appropriate checkbox, - select Apply. | <i>Selecting the Device (with or without firmware)</i> | 47 |
| 8 | Select and download firmware | <p>If not yet a firmware was loaded to the device:</p> <ul style="list-style-type: none"> - Adhere to the necessary safety precautions to prevent personnel injury and property damage. <p>In the Slave DTM configuration dialog:</p> <ul style="list-style-type: none"> - select Settings > Firmware Download, - select Browse..., - select a firmware file, - select Open, - select Download and Yes. | <i>Safety Messages on Firmware or Configuration Download</i> <i>Firmware Download</i> | 30 50 |
| 9 | Assign Slave device once more (with firmware and system channel) <i>For repeated download this step is omitted.</i> | <p>In the Slave DTM configuration dialog:</p> <ul style="list-style-type: none"> - select Settings > Device Assignment, - select Scan, - select the Slave device (with loaded firmware and defined system channel), - therefore check the appropriate checkbox, - select Apply, - close the Slave DTM configuration dialog via OK. | <i>Selecting the Device once more (with Firmware)</i> | 48 |
| 10 | Configure Slave device | <p>Configure the Slave device.</p> <ul style="list-style-type: none"> - Double click to the device icon of the Slave. - The Slave DTM configuration dialog is displayed. <p>In the Slave DTM configuration dialog:</p> <ul style="list-style-type: none"> - select Configuration > General Settings, - set the Device Settings, - select Configuration > Signal Configuration, - proceed the signal configuration, - select Configuration > Behavior, - set the Behavior, - select Configuration > Mailbox->CoE, - set the CoE Settings. - close the Slave DTM configuration dialog via OK. | <i>Configuring Slave Parameter</i> <i>General Settings</i> Signal Configuration <i>Behavior</i> <i>CoE</i> | 58 61 67 73 80 |
| 11 | Configure Master device | Configure the Master device via the EtherCAT Master DTM netX. | <i>(See Operating Instruction Manual DTM for EtherCAT Master devices)</i> | - |
| 12 | Save project | <p>Depending of the frame application.</p> <p>For the configuration software:</p> <ul style="list-style-type: none"> - select File > Save. | <i>(See Operating Instruction Manual of the Frame Application)</i> | - |
| 13 | Connect Slave device | <p>Depending of the FDT Container.</p> <p>For netDevice:</p> <ul style="list-style-type: none"> - right click to the device icon of the Slave, - select Connect. | <i>Connecting/Disconnecting Device</i> | 84 |

| # | Step | Short Description | For detailed information see section | Page |
|----|------------------------|---|---|--------------|
| 14 | Download Configuration | <ul style="list-style-type: none"> - Adhere to the necessary safety precautions to prevent personnel injury and property damage. Depending of the FDT Container. For netDevice: <ul style="list-style-type: none"> - right click to the device icon of the Slave, - select Download. | <i>Safety Messages on Firmware or Configuration Download</i> <i>Download Configuration</i> | 30 86 |
| 15 | Diagnosis | Depending of the FDT Container. For netDevice: <ul style="list-style-type: none"> - right click to the device icon of the Slave, - select Diagnosis. - The Slave 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 Slave DTM diagnosis dialog via OK . | <i>Overview Diagnosis</i> | 88 |
| 16 | IO Monitor | Depending of the FDT Container: For netDevice: <ul style="list-style-type: none"> - right click to the device icon of the Slave, - select Diagnosis, - select Tools > IO Monitor. - Check the input or output data, - close the IO Monitor dialog via OK. | <i>IO Monitor</i> | 104 |
| 17 | Disconnect | Depending of the FDT Container. For netDevice: <ul style="list-style-type: none"> - right click to the device icon of the Slave, - select Disconnect. | <i>Connecting/Disconnecting Device</i> | 84 |

Table 10: Getting Started - Configuration Steps (Slave DTM at the Master busline)

3.2 Safety Messages on Firmware or Configuration Download

If you perform a firmware download or a configuration download via the EtherCAT Slave DTM be aware of the following:

⚠ WARNING

Communication Stop caused by Firmware or Configuration Download

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

The firmware download overwrites the existing firmware. The communication stop may cause loss of device parameters and possible device damage may occur.

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

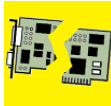
⚠ WARNING

Mismatching System Configuration

Mismatching system configuration loaded into the device could result in faulty data mapping in the application program and thus unexpected equipment operation may cause personal injury or damage of equipment.

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

NOTICE

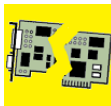


Power Disconnect while downloading Firmware or Configuration

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 or the configuration database will be corrupted, the device parameters will 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.
-

4 Settings

4.1 Overview Settings

Settings Dialog Panes

The table below gives an overview for the individual **Settings** dialog panes descriptions:

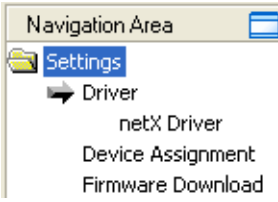
| EtherCAT Slave DTM | Folder Name / Section | Subsection | Manual Page |
|---|-----------------------|---|-------------|
|  <p>Navigation Area – Settings (Example)</p> <p>Additional drivers can be displayed.</p> | Driver | | 34 |
| | | Verify or adapt Driver Settings | 34 |
| | | cifX Device Driver | 36 |
| | | netX Driver | 36 |
| | | Configuring netX Driver | 37 |
| | Device Assignment | | 44 |
| | | Scanning for Devices | 44 |
| | | Scanning for all Devices or for suitable only | 46 |
| | | Selecting the Device (with or without firmware) | 47 |
| | | Selecting the Device once more (with Firmware) | 48 |
| | Firmware Download | | 50 |

Table 11: Descriptions of the Dialog Panes Settings



Note: To edit the **Settings** dialog panes you need *User Rights* for “Maintenance”.



Notice the descriptions in the section *Settings for Driver and Device Assignment* on page 32.

To access to the online help with the descriptions of the drivers:

- Select **Settings > Driver > [Name of the assigned driver]**.
- Press the **F1** key.

4.2 Settings for Driver and Device Assignment

The following steps are needed to establish a connection from the EtherCAT Slave DTM to the EtherCAT Slave device:

Verifying or adapting Driver Settings

Verify the Driver Settings and adapt them if necessary.

1. Open the DTM configuration dialog.
 - In the FDT container **netDevice** double click to the EtherCAT Slave device icon.
2. Verify that the default driver is checked and respectively check another or multiple 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 EtherCAT Slave DTM is installed on the same PC as the EtherCAT Slave device.
- Use the **netX Driver** to establish an USB, Serial (RS232) or TCP/IP connection from the EtherCAT Slave DTM to the EtherCAT Slave device.
- The **3SGateway Driver for netX (V3.x)** is used only in relationship with CODESYS.

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

- Verify that the default driver for your device is checked.
- If necessary, check another driver or multiple drivers.

Configuring Driver



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.

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

3. Configure the **netX Driver** if necessary.

For the driver **netXDriver** an individual driver dialog window can be opened where you can configure the driver.

- Select **Settings > Driver > netX Driver**.
- 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.

Assigning the Slave device to the DTM

4. Scan for and select the devices (with or without firmware).
 - Select **Settings > Device Assignment**.
 - Under **Device selection** select *suitable only* or *all* and then **Scan**.
 - In the table check the required devices.
 - Select **Apply**.

Selecting and downloading the Firmware

5. 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**.
 - Select **Apply**.
6. 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.
7. Close the DTM configuration dialog via **OK**.

Connecting the Device

8. In **netDevice** put a right-click on the EtherCAT Slave device icon.
9. Select the **Connect** command from the context menu.
- In the network view the device description at the device icon of the Slave is displayed with a green colored background. The EtherCAT Slave device now is connected to the EtherCAT Slave DTM via an online connection.

Further Information



For descriptions about these steps refer to the sections following hereafter.

4.3 Driver

The **Driver** dialog pane displays the drivers to be used for a EtherCAT Slave DTM to establish a device communication connection.



Note! A **default driver** is set in the configuration software.

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

Figure 5: Default Driver ‚cifX Device Driver’ for PC cards cifX

| Parameter | Meaning |
|-----------|--|
| Driver | Name of the driver (for more details see descriptions hereafter) |
| Version | ODMV3 Version of the respective driver |
| ID | ID of the driver (driver identification) |

Table 12: Driver Selection List Parameters

To establish a connection from the EtherCAT Slave DTM to the EtherCAT Slave device, verify if the default driver is checked and respectively check another driver or multiple drivers.

4.3.1 Verify or adapt Driver Settings

Proceed as follows:

1. Select **Settings > Driver** in the navigation area.
- The **Driver** dialog pane is displayed with the available drivers and the setting for the default driver.

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

Figure 6: Default Driver ‚cifX Device Driver’ for PC cards cifX (example)

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

Figure 7: Default Driver ‚netX Driver’ for Hilscher devices except for PC cards cifX (example)

2. Verify that the default driver is checked.
- Verify that the default driver for your device is checked.

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.

3. Respectively check another driver.



Note! The driver used for the connection from the EtherCAT Slave DTM to the EtherCAT Slave device must be supported by the device and must be available for the device.

- Use the **cifX Device Driver** if the EtherCAT Slave DTM is installed on the same PC as the EtherCAT Slave device.
- Use the **netX Driver** to establish a USB, Serial (RS232) or TCP/IP connection from the EtherCAT Slave DTM to the EtherCAT Slave 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.

➤ Check the checkbox for the driver in the selection list.

4. Respectively check multiple drivers.

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

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

Figure 8: Manual Selection of multiple drivers (Example)

4.3.2 cifX Device Driver

In the EtherCAT Slave-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 EtherCAT Slave DTM is installed in the same PC as the EtherCAT Slave device.



Note: To establish a connection from a DTM to a Slave device via the **cifX Device Driver**, the **cifX Device Driver** must be installed and the driver must have access to the Slave device.

4.3.3 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.

4.3.4 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. Select **Settings > Driver > netX Driver > USB/RS232 Connection**.
 - Set the driver netX Driver USB/RS232 parameters.

TCP/IP Connection

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

1. Select **Settings > Driver > netX Driver > TCP Connection**.
2. Set IP Address of the device:
 - Add an IP Range via **Select IP Range** .
3. Under **IP Range Configuration > IP Address** enter the IP Address of the device (**Use IP Range** is unchecked).

Or

4. 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).
 5. Click **Save**, to save the IP address or the IP range.
- After saving the changed driver parameters, these parameters are used for the device assignment when scanning devices.

4.3.5 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.


4.3.5.1 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 9: netX Driver > USB/RS232 Connection

| Parameter | Meaning | Range of Value / Default Value |
|---|--|---|
| Enable USB/RS232 Connector (Restart of ODM required) | checked: The netX Driver can communicate via the USB/RS232 interface. unchecked: The netX Driver can <u>not</u> 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 netX 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 or 115.2 [kBit/s]; Default (RS232): 115.2 [kBit/s] |

| Parameter | Meaning | Range of Value / Default Value |
|---------------------------|--|---|
| 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 and 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 and USB): 2000 ms |
| Restore | Resets all settings in the configuration dialog to the default values. | |
| Save | Saving all settings made in the configuration dialog netX Driver > Save USB/RS232 Connection , i. e. only for the selected connection type. | |
| Save All | Saving all settings made in the configuration dialog netX Driver , i. e. for all connection types. | |

Table 13: Parameters netX Driver > USB/RS232 Connection

4.3.6 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.

4.3.6.1 Driver Parameters for netX Driver - TCP/IP Connection

The settings of 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**.

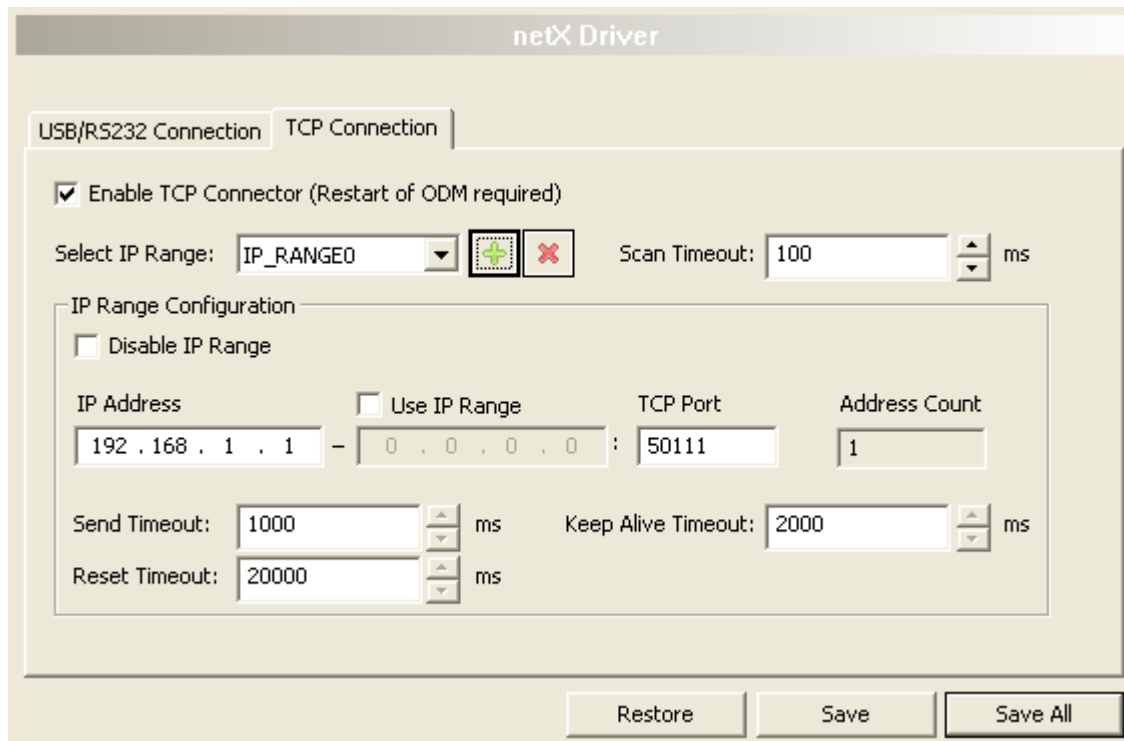





Figure 10: netX Driver > TCP Connection

| Parameter | Meaning | Range of Value / Default Value |
|---|--|--|
| Enable TCP Connector (Restart of ODM required) | <p>checked: The netX Driver can communicate via the TCP/IP interface.</p> <p>unchecked: The netX Driver can <u>not</u> communicate via the TCP/IP interface.</p> <p>If the check mark for Enable TCP Connector is set or removed, then the ODM server must be restarted¹, to make the new setting valid.</p> <p>¹ Restart the ODM server via the ODMV3 Tray Application:</p> <ul style="list-style-type: none"> - In the foot line click on  using the right mouse key. - In the context menu select Service > Start. | checked, unchecked; Default: unchecked |
| Select IP Range | <p>Via Select IP Range already created IP ranges can be selected.</p> <p>Via  an additional IP range can be added.</p> <p>Via  an IP range can be deleted.</p> | |

| Parameter | Meaning | Range of Value / Default Value |
|--------------------------------|--|---|
| Scan Timeout [ms] | With Scan Timeout can be set, how long to wait for a response while a connection is established. | 10 ... 10000 [ms]; Default: 100 ms |
| IP Range Configuration | | |
| Disable IP Range | checked: No connection. unchecked: The netX Driver tries to establish a connection using the configured TCP/IP interface. | checked, unchecked (Default) |
| IP Address (left) | Enter the IP address of the device, (if Use IP Range is not checked). Enter the start address of the IP scanning range, (if Use IP Range is 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 ending 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 [ms] | 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 (TCP/IP): 1000 ms |
| Reset Timeout [ms] | Maximum time for a device reset, including the re-initialization of the physical interface used for the communication. | 100 ... 60.000 [ms]; Default (TCP/IP): 2000 ms |
| Keep Alive Timeout [ms] | 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 netX Driver > Save TCP/IP Connection , i. e. only for the selected connection type. | |
| Save All | Saving all settings made in the configuration dialog netX Driver , i. e. for all connection types. | |

Table 14: 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 Device Assignment



Note: In the **Device Assignment** dialog pane you first must assign the EtherCAT Slave device to the EtherCAT Slave DTM by checking the check box. This is essential to establish an online connection from the EtherCAT Slave DTM to the EtherCAT Slave device later, as described in section *Connecting/Disconnecting Device* on page 84.

Therefore in the **Device Assignment** dialog pane you scan for the EtherCAT Slave 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.

4.4.1 Scanning for Devices

1. Select **Settings > Device Assignment** in the navigation area.
- The dialog pane **Device Assignment** is displayed.

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

Figure 11: Device Assignment - detected Devices (* The name of the device class is displayed.) – Example for a device without firmware

2. Under **Device Selection** select *suitable only*.
3. Select **Scan**, to start the scanning process.
- In the table all devices are displayed, which can be connected to the EtherCAT Slave DTM via the preselected driver.



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 | Meaning | Range of Value / Default Value |
|--|--|--|
| Device selection | Selecting suitable only or all devices. | suitable only, all |
| Device | Device class of the EtherCAT Slave devices. | |
| 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-Number (Card ID) exists. This will occur if the PC card cifX is not equipped with a Rotary Switch Slot Number (Card ID) or for PC cards cifX equipped with a Rotary Switch Slot Number (Card ID) if the rotary switch is set to the value 0 (zero). | 1 to 9, n/a |
| Serial number | Serial number of the device | |
| Driver | Name of the driver | |
| Channel Protocol | Shows, which firmware is loaded to which device channel. The data for the used channel consists of the protocol class and the communication class. a.) For devices without firmware: Undefined Undefined, b.) For devices with firmware: Protocol name corresponding to the used Firmware | |
| Access path (last column on the right) | Depending on the used driver in the column Access path different data to the device are displayed. For the cifX Device Driver the following data are 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 are 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 15: Parameters of the Device Assignment

4.4.1.1 Scanning for all Devices or for suitable only

all

1. Under **Device Selection** select *all*.
2. Select **Scan**.

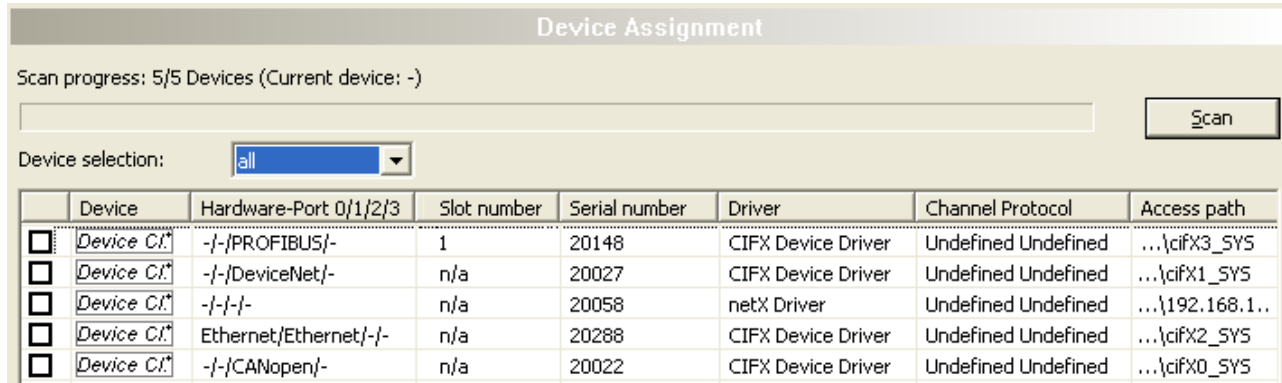


Figure 12: Device Assignment - detected Devices (* The name of the device class is displayed.) Example for Devices without Firmware

- ⇒ 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

1. Under **Device Selection** select *suitable only*.
2. Select **Scan**.

- ⇒ In the table all devices are displayed, which can be connected to the EtherCAT Slave DTM via the preselected drivers.



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 EtherCAT Slave DTM can only be established with one EtherCAT Slave device.

To select the physical EtherCAT Slave device (with or without firmware):

1. Check the appropriate device.

Device Assignment

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

Device selection: suitable only Scan

| | Device | Hardware Port 0/1/2/3 | Slot number | Serial number | Driver | Channel Protocol | Access path |
|-------------------------------------|------------|-----------------------|-------------|---------------|--------------------|------------------|----------------|
| <input checked="" type="checkbox"/> | Device Cl* | -/-/PROFIBUS/- | 1 | 20148 | CIFX Device Driver | PROFIBUS Master | ...\\cifx3_SYS |

Access path: {368BEC5B-0E92-4C0E-B4A9-64F62AE7AAFA}\\cifx3_SYS

Figure 13: Device Assignment - Selecting the Device (* The name of the device class is displayed.) – Example for a device without firmware / one Device is selected

- 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 are displayed.

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



Note: Before an online connection from the EtherCAT Slave DTM to the EtherCAT Slave 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 to section *Firmware Download* on page 50 or to section *Selecting the Device once more (with Firmware)* on page 48.

4.4.3 Selecting the Device once more (with Firmware)



Note: For repeated download this step is omitted.

To select the EtherCAT Slave device (with firmware and defined system channel) once more, proceed as described hereafter:

all

1. Under **Device Selection** select *all*.
2. Select **Scan**.
 - In the table all devices are displayed, which are attainable in the network and which can be connected to a DTM via the preselected drivers.
3. Check the appropriate device.

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

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

Figure 14: Device Assignment - Selecting the Device (* The name of the device class is displayed.) – Example for Devices with and without Firmware / one Device is selected



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

4. Select **Apply**, to apply the selection.
5. Or select **OK**, to apply the selection and to close the DTM interface dialog.
6. Connect the DTM to the device using the context menu (right mouse click).

Or:

suitable only

1. Under **Device Selection** select *suitable only*.
2. Select **Scan**.
- ↗ In the table all devices are displayed, which can be connected to the EtherCAT Slave DTM via the preselected drivers.
3. Check the appropriate device.

Device Assignment

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

Device selection: suitable only Scan

| | Device | Hardware Port 0/1/2/3 | Slot number | Serial number | Driver | Channel Protocol | Access path |
|-------------------------------------|------------|-----------------------|-------------|---------------|--------------------|--------------------|---------------|
| <input checked="" type="checkbox"/> | Device Cl* | -/-/PROFIBUS/- | 1 | 20148 | CIFX Device Driver | PROFIBUS-DP Master | ...\cifX3_Ch0 |

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

Figure 15: Device Assignment - Selecting the Device (* The name of the device class is displayed.) – Example for a device with firmware / one Device is selected



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

4. Select **Apply**, to apply the selection.
5. Or select **OK**, to apply the selection and to close the DTM interface dialog.
6. Connect the DTM to the device using the context menu (right mouse click).



For further information how to establish an online connection from the EtherCAT Slave DTM to the EtherCAT Slave device, refer to section *Connecting/Disconnecting Device* on page 84.

4.5 Firmware Download

Using the **Firmware Download** dialog a firmware can be transferred to the device.



Note: Prior to the firmware download, you must select the driver and the Slave device (with or without firmware) and the device must be assigned to the hardware. For further information refer to section *Overview Settings* on page 31.

To load the firmware to the device:

1. In the navigation area select **Settings > Firmware Download**.

➤ The dialog **Firmware-Download** pane is displayed.

Figure 16: Firmware Download

| Element | Meaning |
|-----------|--|
| Name | The path and name of the firmware file selected are displayed. |
| Version | The version and build version of the firmware file selected are displayed. |
| Browse... | Via 'Browse...' you can select the firmware file for the download. |
| Download | Via 'Download' you can download the firmware to the device. |

Table 16: Parameter Firmware Download

➤ Select **Browse**.

Device is not assigned to the Hardware

If the device is not assigned to the Hardware, the error message 'The device is not assigned to the hardware!' is displayed:

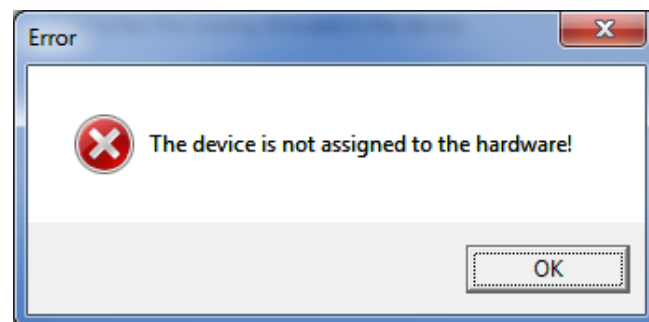


Figure 17: Error Message 'The device is not assigned to the hardware!'

- Click **OK** and select and assign the Slave device as described in section *Device Assignment*.

Device is assigned to the Hardware

- The selection window **Select Firmware File** is displayed.
- Enlarge the selection window to view the columns **Hardware** and **Version**.

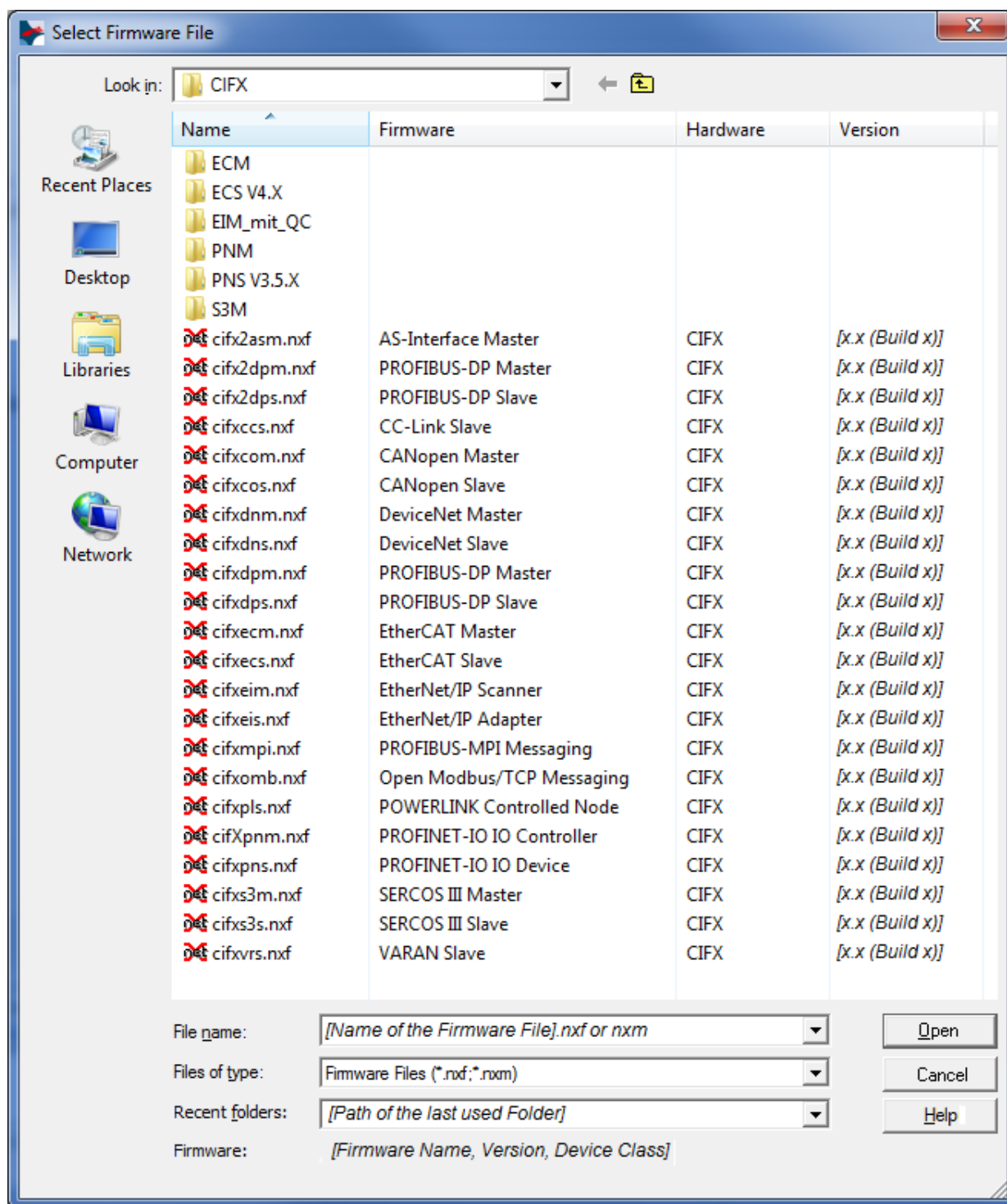


Figure 18: Window 'Select Firmware File' (Example CIFX)


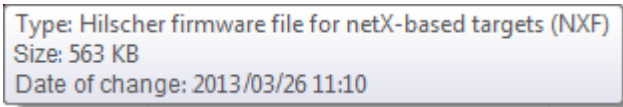
| Parameter | Meaning | Range of Value / Default Value |
|------------------------|--|---|
| Column Name | File name of the firmware file To sort the entries of the window Select Firmware File by name click to the column head  . | nxf, nxm |
| Column Firmware | Name of the firmware (consisting of the protocol name and protocol class) | |
| Column Hardware | Device class of the associated 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 information move with the mouse pointer over the selected firmware line.  | |
| Files of Type | „All Files (*.*)“ if before in the Device Assignment pane under Device selection <i>all</i> was selected. „Firmware Files (*.nxm)“ or <i>Firmware Files (*.nxf)</i> if before in the Device Assignment pane under Device selection <i>suitable only</i> 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 17: 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 are displayed or set:

| (for 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 Files of Type *: | „All Files (*.*)“ | „Firmware Files (*.nxm)“, „Firmware Files (*.nxf)“ |
| Validation: | A restricted validation will be performed if the selected firmware is applied for the download. | A validation is made whether the firmware file is suitable for the EtherCAT Slave DTM. |

*These settings in the selection window **Select Firmware File** can also be changed manually.

- 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.

4. In the selection window select the **Open** button.

Validation

- A validation is made, whether the selected firmware file is suitable for the EtherCAT Slave device.

Invalid Firmware

NOTICE

Invalid Firmware

Loading invalid firmware files could render your device unusable.

- Only proceed with a firmware version valid for your device.
- If a firmware file is selected, which is not valid for the assigned device, the request **Select Firmware File** will be displayed.
'Invalid firmware for assigned device!
[detailed explication]
Shall firmware file nevertheless be applied for the download?'



Figure 19: Request Select Firmware File - Example Invalid Firmware

- Answer to the request with **No** and select a valid firmware.
- The selection window is closed.

Valid Firmware

➤ The selection window is directly closed (without dialog).

5. Start firmware upgrade.

⚠ 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 placed 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.

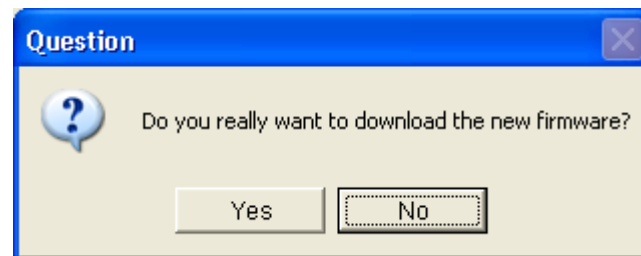


Figure 20: Request - Do you really want to download the firmware?

6. 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** **Download** is grayed out.

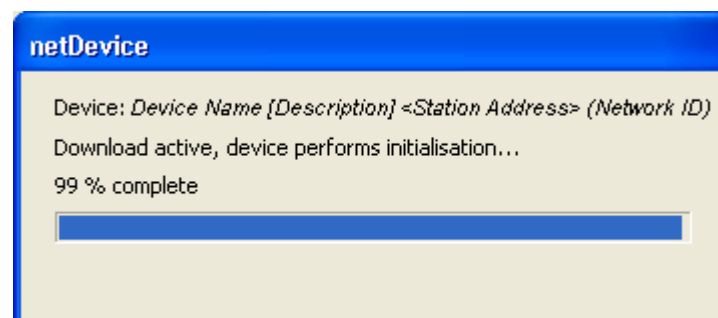


Figure 21: Firmware Download - Progress Bar

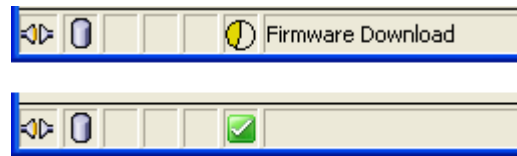


Figure 22: Clock Symbol and Hook Symbol green

- In the **Firmware-Download** dialog pane the path and name as well as the version of the selected firmware file are displayed.

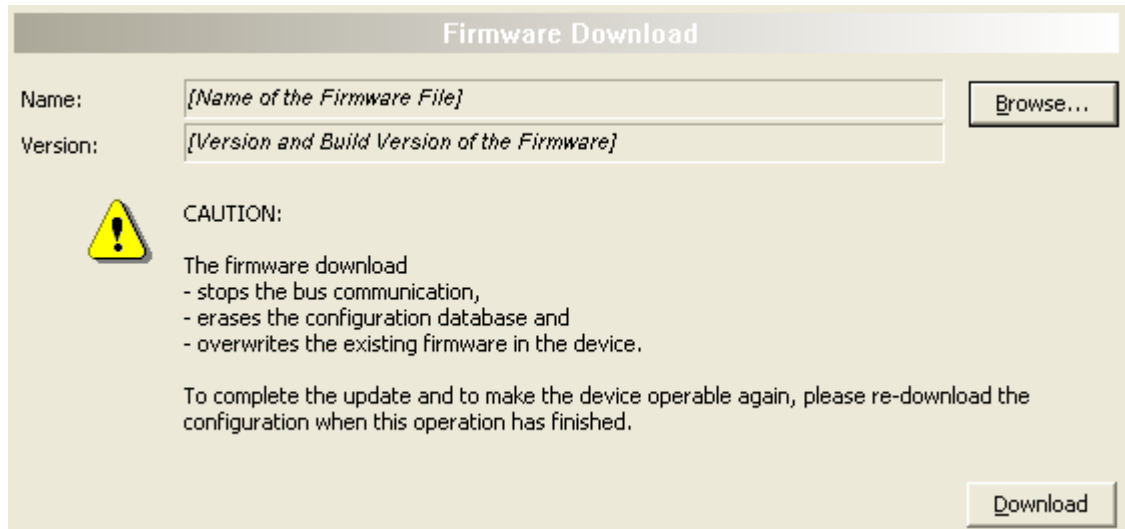


Figure 23: Firmware Download – Download

5 Configuration

5.1 Overview Configuration

5.1.1 General Remarks

The appearance of the EtherCAT Slave DTM depends on the mode of invocation, i.e. whether the EtherCAT Slave DTM has been dragged to the root line (Stand-alone Slave) or to a Master line (Slave connected to a Master).



Take care of the descriptions in the section *Configuration Steps* on page 24.



Note: In order to transfer the configuration to the EtherCAT Slave device, download the data of the configuration parameters in the EtherCAT Slave device. See section *Download Configuration* on page 86.

5.1.2 Slave DTM at the Root-Line (Stand-Alone Slave)

In this case of the tree view looks like:

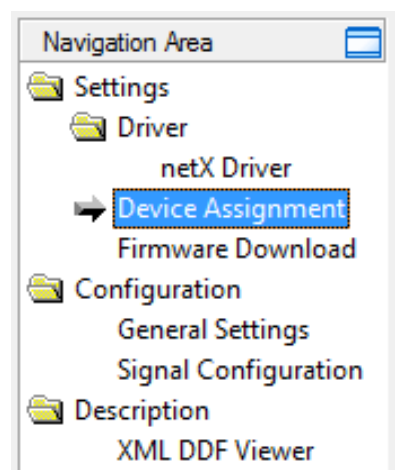


Figure 24: Configuration (Slave DTM at the Root-Line (Stand-Alone Slave))

If the EtherCAT Slave DTM is dragged to the root busline within the network project, at **Configuration** the following panes will be available:

Configuration > General Settings

Dialog Panes “Configuration”

The table below gives an overview about the available **Configuration** dialog panes descriptions:

| Folder Name / Section | Subsection | Page |
|-----------------------|----------------------|------|
| Configuration | Signal Configuration | 67 |
| | General Settings | 61 |

Table 18: Dialog Panes Configuration

All other descriptions given in this chapter are not applicable if the EtherCAT Slave DTM has been dragged to the root busline in the network project.

5.1.3 Slave DTM at the Master Busline

In this case of the tree view looks like:

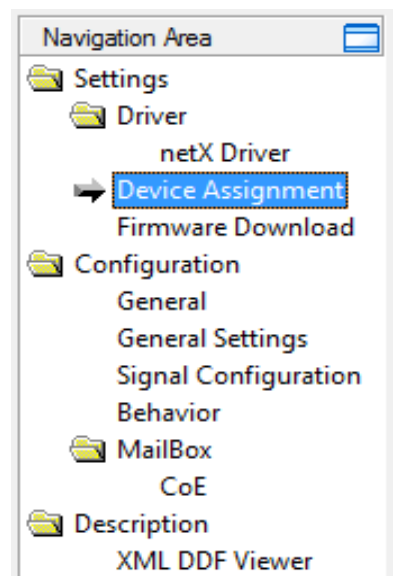


Figure 25: Configuration > General (Slave DTM at the Master busline)

If the EtherCAT Slave DTM is dragged to the Master busline of the EtherCAT Master DTM within the network project, at **Configuration** the following panes will be available:

- General pane
- General Settings pane
- Behavior pane
- Mailbox pane

Dialog Panes “Configuration”

The table below gives an overview about the available **Configuration** dialog panes descriptions:

| Folder Name / Section | Subsection | Page |
|-----------------------|----------------------|------|
| Configuration | General | 60 |
| | General Settings | 61 |
| | Signal Configuration | 67 |
| | Behavior | 73 |
| | Mailbox | 80 |

Table 19: Dialog Panes Configuration

5.2 Configuring Slave Parameters

The steps provided in the following two sections are alternatively required for the two cases listed hereafter, to configure the parameters of the EtherCAT Slave device using the EtherCAT Slave DTM:

- Slave DTM at the Root-Line (Stand-Alone Slave)
- and Slave DTM at the Master busline.

5.2.1 Slave DTM at the Root-Line (Stand-Alone Slave)

If in the network project the EtherCAT Slave DTM is dropped to the root busline:

General Settings

1. Set the Device Settings:
 - Select **Configuration > General Settings** in the navigation area.
 - Under **Bus Startup**: Select option **Automatic** or **Application Controlled**.
 - Under **Watchdog time**: Set **Watchdog time**.

Signal Configuration

2. Proceed the **Signal Configuration**:
 - Select **Configuration > Signal Configuration** in the navigation area.

Close Slave DTM Configuration Dialog

3. Click **OK** in order to close the Slave DTM configuration dialog and to store your configuration.

Configuration Download to the EtherCAT Slave Device

- Adhere to the necessary safety precautions to prevent personnel injury and property damage.



Note: In order to transfer the configuration to the EtherCAT Slave device, download the data of the configuration parameters in the EtherCAT Slave device. See section *Download Configuration* on page 86.

Further Information



For more information refer to the section hereafter.

5.2.2 Slave DTM at the Master Busline

If in the network project the EtherCAT Slave DTM is dropped to the root busline:

General

1. Put in an optional description of the device
 - Select **Configuration > General**. If you want, you can put in a descriptive text about the slave device under **Description**.

General Settings

2. Set the Device Settings:
 - Select **Configuration > General Settings** in the navigation area.
 - Under **Bus Startup**: Select option **Automatic** or **Application Controlled**.
 - Under **Watchdog time**: Set **Watchdog time**.

Signal Configuration

3. Proceed the **Signal Configuration**:
 - Select **Configuration > Signal Configuration** in the navigation area.

Behavior

4. Make the settings concerning the behavior of the device:
 - In the navigation area, select **Configuration > Behavior** and then make your settings.

Mailbox >CoE

5. Make settings for CoE (CANopen over EtherCAT):
 - In the navigation area, select **Configuration > Mailbox >CoE** and then make your CoE settings.

Close Slave DTM Configuration Dialog

6. Click **OK** in order to close the Slave DTM configuration dialog and to store your configuration.

Configuration Download to the EtherCAT Slave Device

- Adhere to the necessary safety precautions to prevent personnel injury and property damage.



Note: In order to transfer the configuration to the EtherCAT Slave device, download the data of the configuration parameters in the EtherCAT Slave device. See section *Download Configuration* on page 86.

Further Information



For more information refer to the sections hereafter.

5.3 General

The **General** pane shows the **Description** of the EtherCAT Slave.

This pane is only available in case of a Slave DTM at the Master busline.



Note: The **Station Address** is set by the EtherCAT Master, therefore the corresponding data field is not editable.

General

| | |
|-------------------|------------------|
| Description: | CIFX RE/ECS V0.2 |
| Device type: | CIFX RE/ECS |
| Device name: | CIFX RE/ECS |
| Product revision: | 0.2 (0x00000002) |
| Physics: | YY |
| Station Address: | 256 (0x0100) |

Note: Station Addresses are logical ones and are set in Master DTM for all slaves.

Figure 26: Configuration > General

| Parameter | Meaning | Editable |
|------------------|---|----------|
| Description | Symbolic Name of the EtherCAT Slave station | Yes |
| Device type | Device type as defined in the DDF | No |
| Device name | Device name as defined in the DDF | No |
| Product revision | Product revision as defined in the DDF or E ² PROM | No |
| Physics | EtherCAT Port configuration: available ports and their types, see <i>Table 21: Coding of Parameter "Physics"</i> below. | No |
| Station Address | Station Address denominates a logical address. The station address of a slave is set in the Master DTM. | No |

Table 20: General Page Parameters

Physics in the context of EtherCAT Port configuration is described by two characters indicating the physical interface of the connection. The coding is as follows:

| Physics | Port type |
|---------|------------|
| K | E-Bus |
| Y | 100Base-TX |
| F | 100Base-FX |

Table 21: Coding of Parameter "Physics"

5.4 General Settings

At the **General Settings** pane device related settings can be made. These settings are assigned with the download of the configuration.



Information about the download you find in section *Download Configuration* on page 86.

Figure 27: General Settings



Note: The setting options at the dialog pane **General Settings** for client specific variants of the configuration software can differ from the setting options displayed here.

5.4.1 Interface Parameters

5.4.1.1 Bus Startup

This parameter offers the options **Automatic** and **Application Controlled**.

If **Automatic** is selected, the EtherCAT Master device starts with the data exchange on the bus after the initializing has been ended.

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



Note: The setting options under **Bus Startup** for client specific variants of the configuration software can differ from the setting options displayed here.

5.4.1.2 Watchdog Time for Application Monitoring



Figure 28: Device 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



Note: The setting options under **Watchdog Time** for client specific variants of the configuration software can differ from the setting options displayed here.

5.4.1.3 I/O Data Status

This parameter allows setting of the status of the input or the output data i.e. the I/O Status Enable bit (bit 1 of the system flags) and the I/O Status 8/32Bit bit (bits 2 of the system flags).

For each input and output data the following status information (in Byte) is memorized in the dual-port memory.

Currently the field is grayed out as only the option 'None' is supported.

5.4.2 Ident Parameters

The following table lists all ident parameters of the EtherCAT Stand-alone Slave DTM along with their meaning and their default values:

| Parameter | Meaning | Default value | Subindex (within Object 0x1018) |
|---------------|---|--|---------------------------------|
| VendorID | Vendor Identification number of the manufacturer of an EtherCAT device. | 0xE0000044 (denoting device has been manufactured by Hilscher) | 1 |
| Product code | Product code of the device | 1 | 2 |
| Revision | Revision number of the device as specified by the manufacturer | 0x20001 | 3 |
| Serial number | Serial number of the device | 0 | 4 |

Table 23: Ident Parameters

These parameters are exactly those which are also stored in EtherCATs object dictionary within the object with index 0x1018 thus the table also mentions the corresponding subindex numbers of each parameter.

The values for the parameters VendorID, Product code and Revision can be taken from the XML file which is bundled with the particular firmware. The following default value sets for the identification data have been defined:

| Firmware | Vendor Id | Product Code | Revision Number |
|----------|------------|--------------|-----------------|
| cifX | 0xE0000044 | 0x00000001 | 0x00020001 |
| comX | 0xE0000044 | 0x00000003 | 0x00020001 |
| netIC | 0xE0000044 | 0x0000000B | 0x00000000 |

Table 24: Values for the Ident Parameters VendorId, ProductCode and RevisionNumber

5.4.3 Data Parameters

The following table shows the data parameters of the general Settings.




| Parameter | Meaning | Default value | Maximum value |
|---------------------|--|--------------------|-----------------------|
| Input Data Bytes | Process Data Input Size Number of data bytes used for input | 200 Byte | 256 Byte |
| Output Data Bytes | Process Data Output Size Number of data bytes used for output | 200 Byte | 256 Byte |
| Sync impulse length | Sync impulse length (in units of 10 ns) | 100 (= 1000 ns) | 65535 (=655350 ns) |

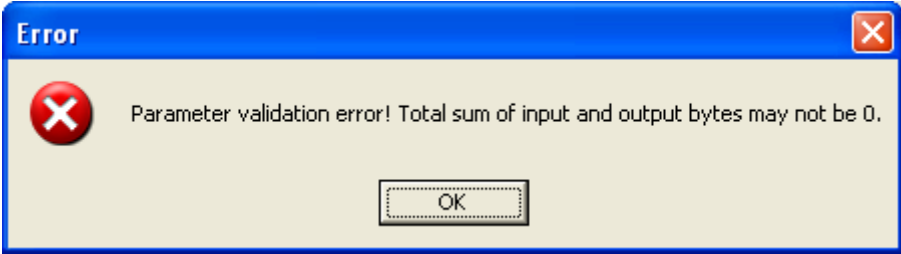
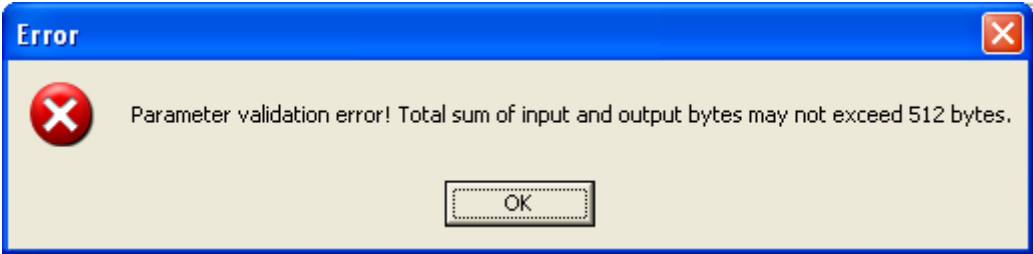

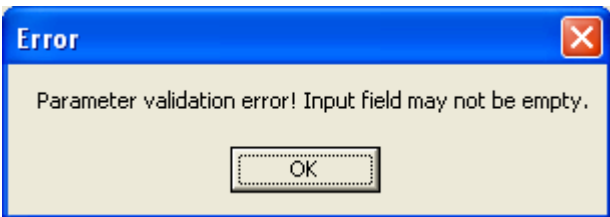
Table 25: Data Parameters

5.4.4 Messages

5.4.4.1 Errors

The following table provides an overview which error situations might occur in the “General Settings” pane.

| | |
|-------------|--|
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | This error message appears in case either a value below 20 but unequal 0 or a value exceeding 65535 is put in for the watchdog time in the configuration pane. |
| Action | Put in a correct the value for the watchdog time (between 20 and 65535) or switch the watchdog feature off (in order to do so, set the value of the watchdog time equal to 0)! |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | No value at all has been put in for the watchdog time in the configuration pane. |
| Action | Put in a correct the value for the watchdog time (between 20 and 65535) or switch the watchdog feature off (in order to do so, set the value of the watchdog time equal to 0)! |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The specified value for the length of either input or output data exceeds the upper limit of 256 bytes. |
| Action | Specify a lower value either for the input data length or for the output data length! |
| Problem | The error message |

| | |
|-------------|--|
| |  <p>appears.</p> |
| Explanation | The specified values of input data length and output data length may not be 0 at the same time. |
| Action | Specify at least one non-zero value either for input data length or output data length. |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The sum of the specified values of input data length and output data length may exceed 512 bytes. |
| Action | Specify a lower value for at least one of these values so that the sum of both values does not exceed the 512 bytes limit. |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | In an input field requiring a hexadecimal value, you tried to put in a character which is neither a digit nor any of the letters ("A,B,C,D,E,F"), for instance another letter. |
| Action | Correct your input accordingly! |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | An input field (either the input data length or the output data length) is empty. |


| | |
|-------------|--|
| Action | Check for the empty field. Then specify a valid value there. |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The specified value for the Sync Impulse Length exceeds the upper limit of 65535 bytes. |
| Action | Specify a lower value either for the Sync Impulse Length! |

Table 26: Possible Error Messages issued at General Settings Pane

5.4.4.2 Warnings

The following table provides informs about which warnings might appear in the configuration pane.

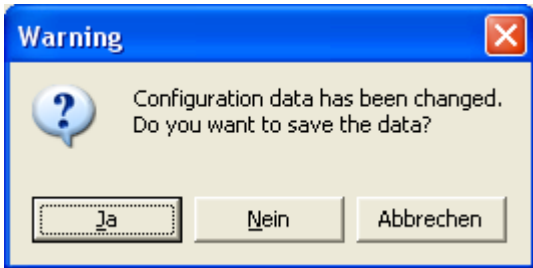
| | |
|-------------|--|
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | You have changed the configuration data. |
| Action | If you want to store the configuration data permanently, click at <i>Yes</i> otherwise at <i>No</i> or return to preceding screen with <i>Cancel</i> . |

Table 27: Possible Warning Messages issued at General Settings Pane

5.5 Signal Configuration

With the EtherCAT Slave, the process data to be transmitted via the bus is configured at fieldbus level as the number of output data bytes or input data bytes.

The application requires the information on the meaning and data type of the input and output data specified via the **signals**.



Important: First, configure in the **General Settings** dialog pane the number of output data bytes or input data bytes. Do not perform the signal configuration steps until you have finished.

In the **Signal Configuration** dialog you can define the data structure of the input or output data of your device and define the I/O data for your application

- assign data types,
- assign names or signal names, and
- define data structures.

The aim is to create a suitable signal configuration, which subsequently enables easy identification of the transmitted input and output data. This requires a structuring of the input and output data according to signals and the configuration of signal names or data types suitable for the individual application cases.

Signal names

The names assigned by default by the configuration software for the signals distinguish between input and output signals. You can replace these general names with suitable designations, such as "Setpoint" or "Status".

Merging or splitting signals

You can merge or split signals or data types by configuring the data type and the number of signals.

Example: 1 "Word (input)" = 16 "Bit (input)".

This means that 1 "word input data" corresponds to 16 signals with the data type "Bit".

To identify split data types, the configuration software assigns appropriate suffixes to the signal names, which depend on the selected new data type, for example _Byte_0, _Byte_4 ... or _Bit_1, _Bit_2 ...

5.5.1 Signal Configuration Pane

- Select **Configuration > Signal Configuration** in the navigation area.
- The dialog pane **Signal Configuration** is displayed.

| Signal Configuration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|--|-------------|------|--------|--|----------------|-----------|---|--|----------------|-----------|---|--|----------------|-----------|---|--|----------------|-----------|---|--|----------------|-----------|---|--|----------------|-----------|---|--|----------------|-----------|---|--|----------------|-----------|---|--|----------------|-----------|---|--|----------------|-----------|---|--|-----------------|-----------|----|--|-----------------|-----------|----|--|-----------------|-----------|----|--|-----------------|-----------|----|--|-----------------|-----------|----|--|-----------------|-----------|----|--|--|--|
| Slot | Name | Module Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RxPdo 0x1600 | Outputs0 <RxPdo 0x1600> | RxPdo | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Offset</th> <th></th> </tr> </thead> <tbody> <tr><td>1 Byte Out (0)</td><td>unsigned8</td><td>0</td><td></td></tr> <tr><td>1 Byte Out (1)</td><td>unsigned8</td><td>1</td><td></td></tr> <tr><td>1 Byte Out (2)</td><td>unsigned8</td><td>2</td><td></td></tr> <tr><td>1 Byte Out (3)</td><td>unsigned8</td><td>3</td><td></td></tr> <tr><td>1 Byte Out (4)</td><td>unsigned8</td><td>4</td><td></td></tr> <tr><td>1 Byte Out (5)</td><td>unsigned8</td><td>5</td><td></td></tr> <tr><td>1 Byte Out (6)</td><td>unsigned8</td><td>6</td><td></td></tr> <tr><td>1 Byte Out (7)</td><td>unsigned8</td><td>7</td><td></td></tr> <tr><td>1 Byte Out (8)</td><td>unsigned8</td><td>8</td><td></td></tr> <tr><td>1 Byte Out (9)</td><td>unsigned8</td><td>9</td><td></td></tr> <tr><td>1 Byte Out (10)</td><td>unsigned8</td><td>10</td><td></td></tr> <tr><td>1 Byte Out (11)</td><td>unsigned8</td><td>11</td><td></td></tr> <tr><td>1 Byte Out (12)</td><td>unsigned8</td><td>12</td><td></td></tr> <tr><td>1 Byte Out (13)</td><td>unsigned8</td><td>13</td><td></td></tr> <tr><td>1 Byte Out (14)</td><td>unsigned8</td><td>14</td><td></td></tr> <tr><td>1 Byte Out (15)</td><td>unsigned8</td><td>15</td><td></td></tr> </tbody> </table> | Name | Type | Offset | | 1 Byte Out (0) | unsigned8 | 0 | | 1 Byte Out (1) | unsigned8 | 1 | | 1 Byte Out (2) | unsigned8 | 2 | | 1 Byte Out (3) | unsigned8 | 3 | | 1 Byte Out (4) | unsigned8 | 4 | | 1 Byte Out (5) | unsigned8 | 5 | | 1 Byte Out (6) | unsigned8 | 6 | | 1 Byte Out (7) | unsigned8 | 7 | | 1 Byte Out (8) | unsigned8 | 8 | | 1 Byte Out (9) | unsigned8 | 9 | | 1 Byte Out (10) | unsigned8 | 10 | | 1 Byte Out (11) | unsigned8 | 11 | | 1 Byte Out (12) | unsigned8 | 12 | | 1 Byte Out (13) | unsigned8 | 13 | | 1 Byte Out (14) | unsigned8 | 14 | | 1 Byte Out (15) | unsigned8 | 15 | | | |
| Name | Type | Offset | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (0) | unsigned8 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (1) | unsigned8 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (2) | unsigned8 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (3) | unsigned8 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (4) | unsigned8 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (5) | unsigned8 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (6) | unsigned8 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (7) | unsigned8 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (8) | unsigned8 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (9) | unsigned8 | 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (10) | unsigned8 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (11) | unsigned8 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (12) | unsigned8 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (13) | unsigned8 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (14) | unsigned8 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Byte Out (15) | unsigned8 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TxPdo 0x1A00 | Inputs0 <TxPdo 0x1A00> | TxPdo | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Figure 29: Signal Configuration Pane

| Parameter | Description | Range of Value/ Value |
|--------------------|--|---|
| Slot | Process data object for the output or input data | RxPdo 0x1600, TxPdo 0xA00 |
| Name | Name for the Process Data Object including object number for the output or input data of the EtherCAT slave. | Outputs0 <RxPdo 0x1600>, Inputs0 <TxPdo 0xA00> |
| Module Type | PDO type of the process data object | RxPdo, TxPdo |
| Signal level | | |
| Name | Name of the input or output signal that can be set here. The configuration software assigns the names by default: 1 Byte Out (0) ... 1 Byte Out (199) 1 Byte In (0) ... 1 Byte In (199) | String |
| Type | Data type of the input or output signal (depending on the configured size of the I/O data). | bit, byte, signed8, unsigned8, word, signed16/24, unsigned16/24, dword, signed32/40/48/56, unsigned32/40/48/56, lword, signed64, unsigned64, real32, real64 |
| Offset | Offset of the input or output signal, in relation to the data in the process data object. | |

Table 28: Explanations Signal Configuration Pane

5.5.2 Create Signal Configuration

In the **Signal Configuration** pane, you can edit the signal configuration in the lower table.

Edit Signal

- Right-click on the signal to be configured to open the context menu.

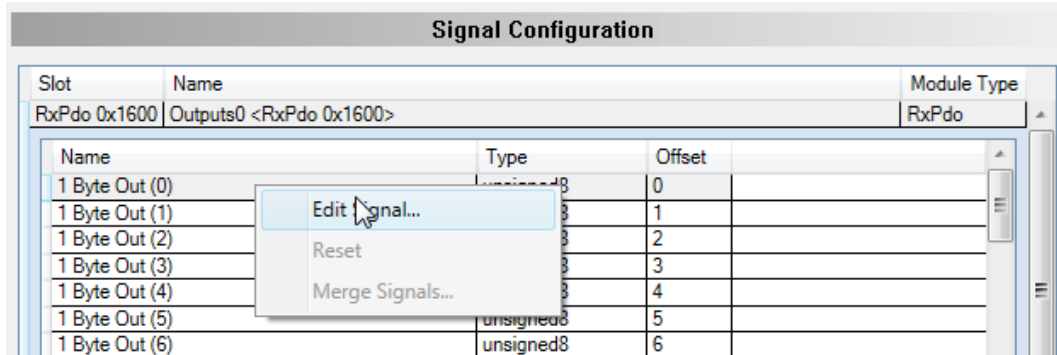


Figure 30: Edit Signal

- Click **Edit Signal**.
- The **Edit Signal** dialog pane is opened.

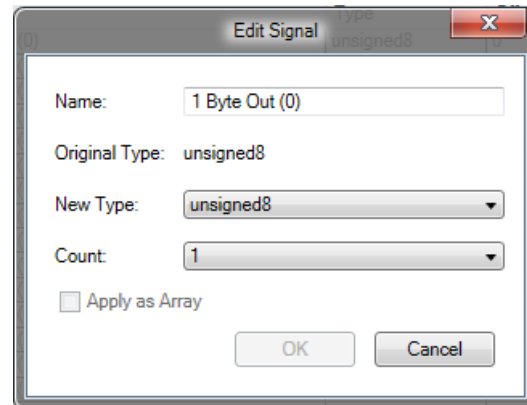


Figure 31: Edit Signal Dialog Pane

| Parameter | Description | Range of Value/Value |
|-----------------------|---|---|
| Name | Here you can edit the signal name. | String |
| Original Type | Input or output signal data type preconfigured by the configuration software or by the user. | |
| New Type | Here you can edit the new data type for the input or output signal. Only permitted data types are displayed in the selection list. | bit, byte, signed8, unsigned8, word, signed16/24, unsigned16/24, dword, signed32/40/48/56, unsigned32/40/48/56, lword, signed64, unsigned64, real32, real64 |
| Count | Here you can set the number of signals with the data type "New Type". | |
| Apply as Array | If checked, the signal is displayed as an array. If unchecked, the individual signals are displayed. | Checked, unchecked, Default: checked |

Table 29: Explanations Edit Signal Dialog Pane

- In the field **Name** edit the signal name.
- Use **New Type** to define the new data type or **Count** to define the number of signals.

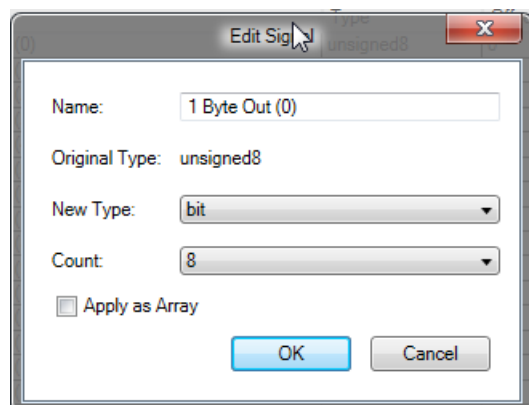


Figure 32: Edit Signal (Example)

- Click **OK**.
- When splitting signals, the configuration software assigns suitable standard suffixes to the signal name to identify the subordinate signals.

| Signal Configuration | | | |
|-----------------------------|-------------------------|-------------|--|
| Slot | Name | Module Type | |
| RxPdo 0x1600 | Outputs0 <RxPdo 0x1600> | RxPdo | |
| Name | Type | Offset | |
| 1 Byte Out (0) | unsigned8 | 0 | |
| 1 Byte Out (0)_Byte_0_Bit_0 | bit | 0.0 | |
| 1 Byte Out (0)_Byte_0_Bit_1 | bit | 0.1 | |
| 1 Byte Out (0)_Byte_0_Bit_2 | bit | 0.2 | |
| 1 Byte Out (0)_Byte_0_Bit_3 | bit | 0.3 | |
| 1 Byte Out (0)_Byte_0_Bit_4 | bit | 0.4 | |
| 1 Byte Out (0)_Byte_0_Bit_5 | bit | 0.5 | |
| 1 Byte Out (0)_Byte_0_Bit_6 | bit | 0.6 | |
| 1 Byte Out (0)_Byte_0_Bit_7 | bit | 0.7 | |
| 1 Byte Out (1) | unsigned8 | 1 | |
| 1 Byte Out (2) | unsigned8 | 2 | |
| 1 Byte Out (3) | unsigned8 | 3 | |
| 1 Byte Out (4) | unsigned8 | 4 | |
| 1 Byte Out (5) | unsigned8 | 5 | |
| 1 Byte Out (6) | unsigned8 | 6 | |

Figure 33: Signal Output_Assembly split (Example)

- You can further split already split signals.
- Click **Apply** to save the created configuration.

Reset



Note: As long as you have not applied the created signal configuration, you can undo the steps you have taken by clicking **Reset**.

- Right-click on the configured signal to open the context menu.

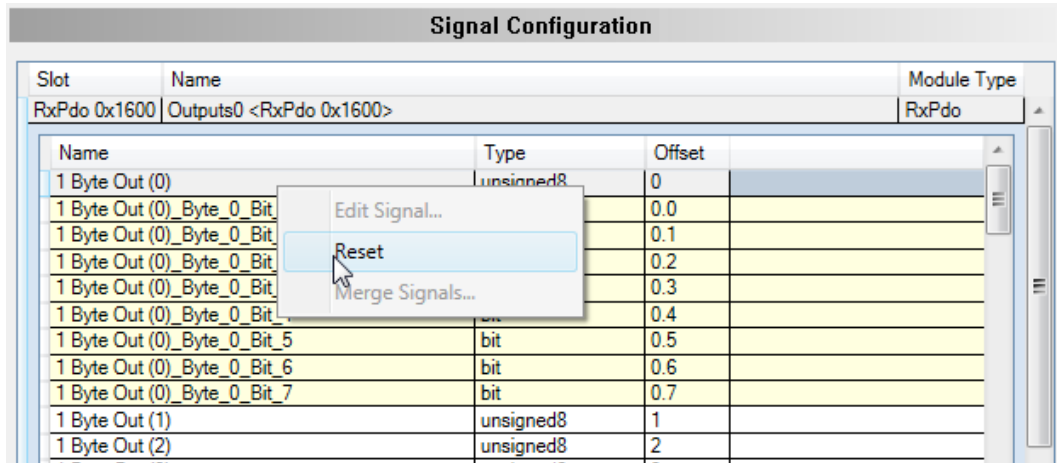


Figure 34: Reset

- Click **Reset**.
- The created signal configuration with a splitting of a signal is undone.

Merge Signals

- First, confirm a signal splitting with **Apply**.
- Then press **Shift** and mark the signals to be merged with the mouse pointer.
- Open the context menu by right-clicking on the marked signals.

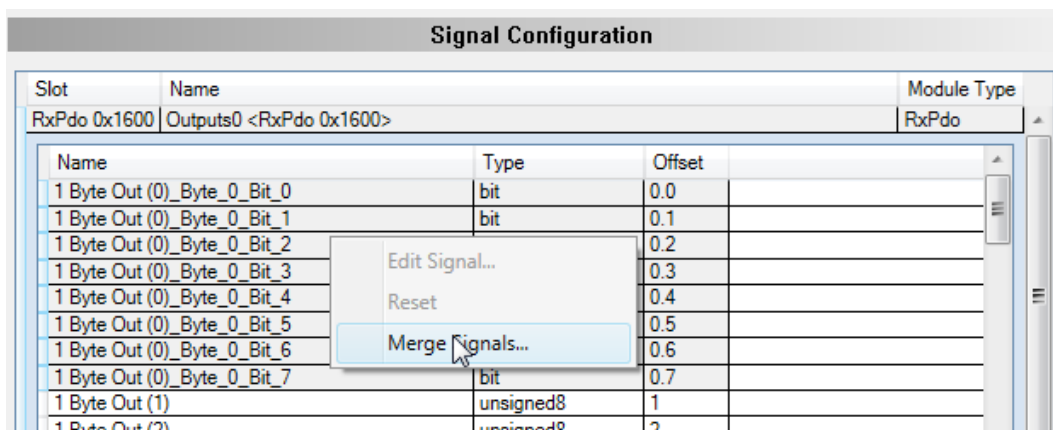


Figure 35: Merge Signals

- Click **Merge Signals**.
- The dialog pane **Merge Signals** opens.

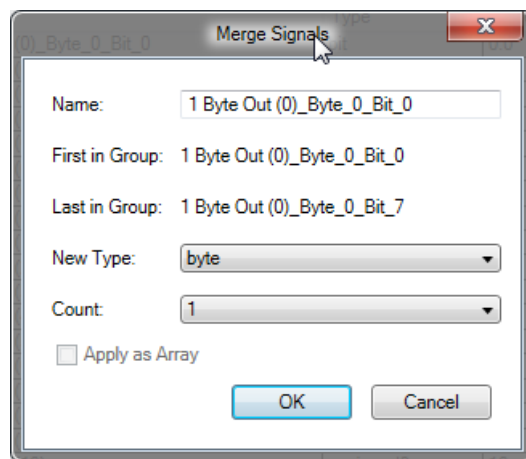


Figure 36: Dialog Pane Merge Signals

| Parameter | Description | Range of Value/Value |
|-----------------------|---|---|
| Name | Here you can edit the signal name. The name displayed here contains the suffix assigned by the configuration software, example „_Byte_0” or „_Byte_0_Bit_0”. | String |
| First in Group | Shows the name of the first signal from which the merge will start. | |
| Last in Group | Shows the name of the last signal up to which the merge is performed. | |
| New Type | Here you can edit the new data type for the input or output signal. Only permitted data types are displayed in the selection list. | bit, byte, signed8, unsigned8, word, signed16/24, unsigned16/24, dword, signed32/40/48/56, unsigned32/40/48/56, lword, signed64, unsigned64, real32, real64 |
| Count | Shows the number of data types of the merged signal, which you can adjust here. | |
| Apply as Array | An array is formed when merging. | Allways checked |

Table 30: Explanations Merge Signals Dialog Pane

- For the signals that you want to merge, specify the name via **Name**, the data type via **New Type** or the number of data types of the merged signal via **Count**.
- Click **OK**.
- The signals are merged.
- Click **Apply** to save the created configuration.

5.6 Behavior

At the page **Behavior**, the parameters of

- the state machine timeout values
- the device checkup,
- the process data
- and the watchdog timer.

are set and displayed.

This pane is only available in case of a Slave DTM at the Master busline.

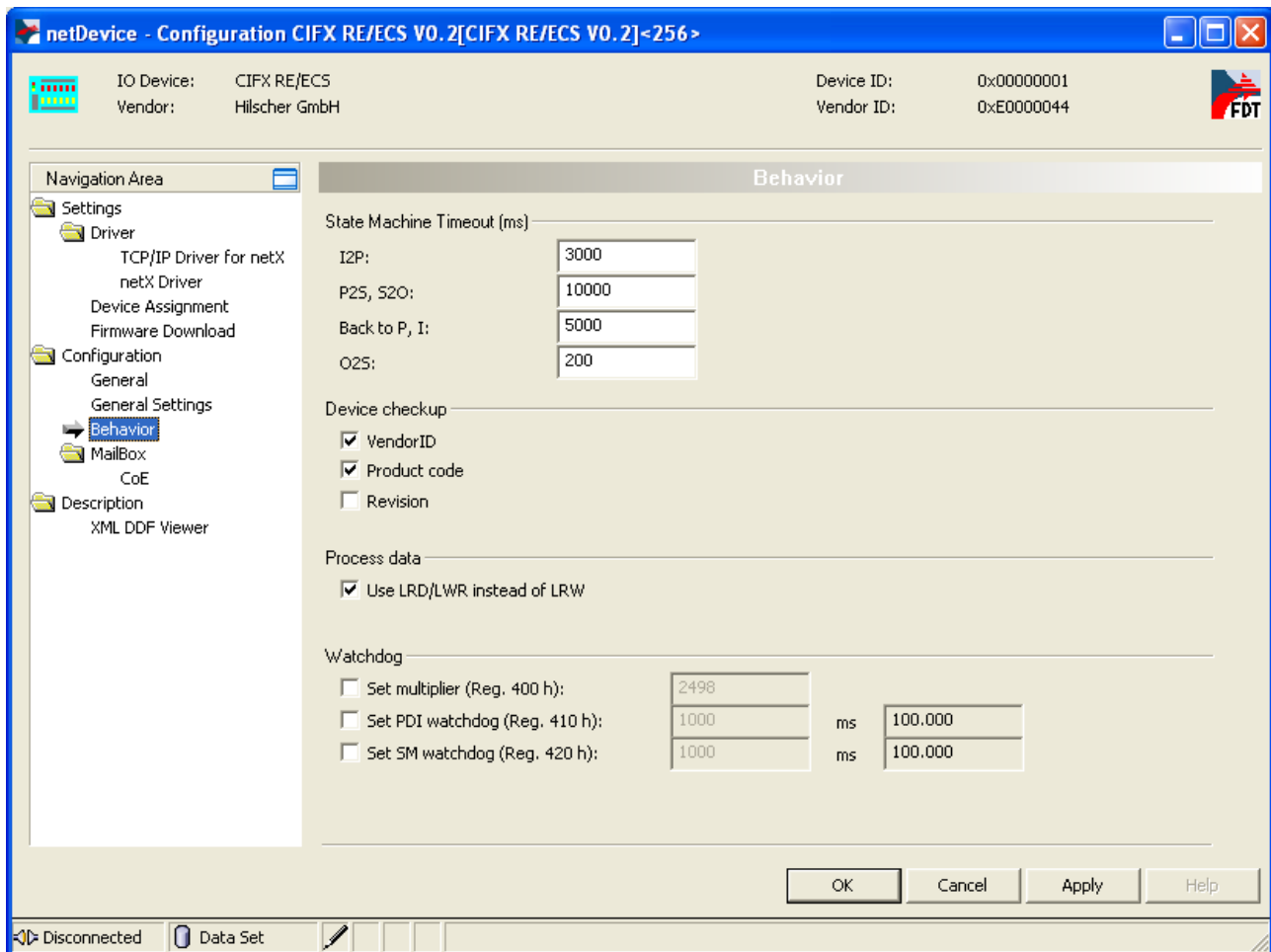


Figure 37: Configuration > Behavior

5.6.1 State Machine Timeout

For various transitions between states of the EtherCAT slave state machine the associated timeout values can be configured separately in the state machine timeout section of the 'Behavior' dialog:

- I2P

This value applies to the transition from *Init* state to *Pre-Operational* state

- P2S, S2O

This value applies to the transition from *Pre-Operational* state to *Safe-Operational* state and from *Safe-Operational* state to *Operational* state.

- Back to P, I

This value applies to the transition from any higher state back to *Pre-Operational* state or *Init* state.

- O2S

This value applies to the transition from *Operational* state to *Safe-Operational* state.



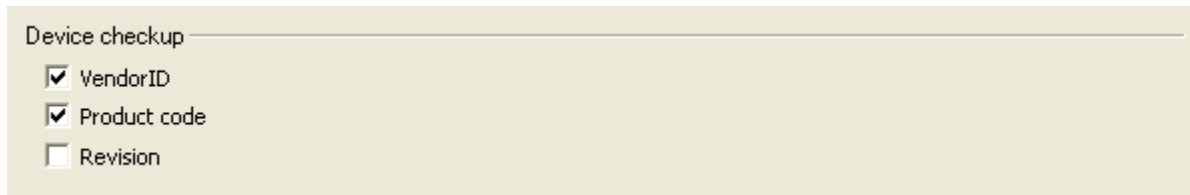
Note: These timeout values are specified in units of milliseconds.

| Behavior | |
|----------------------------|-------|
| State Machine Timeout (ms) | |
| I2P: | 3000 |
| P2S, S2O: | 10000 |
| Back to P, I: | 5000 |
| O2S: | 200 |

Figure 38: Configuration > Behavior > State Machine Timeout - Configuration

5.6.2 Device Check-up

The *device check-up* part of the **Behavior** dialog looks like:



Device checkup

☒ VendorID

☒ Product code

☒ Revision

Figure 39: Configuration > Behavior > Device Check

The following table shows which items identifying the EtherCAT device can optionally be verified during device check-up if marked in the dialog accordingly.

| Parameter | Meaning |
|--------------|---|
| VendorID | Device's vendor ID (DDF or stored device-internally) |
| Product code | Device's product code (DDF or stored device-internally) |
| Revision | Device's revision (DDF or stored device-internally) |

Table 31: Parameters Behavior > Device checkup

A verification of the serial number is not available here.

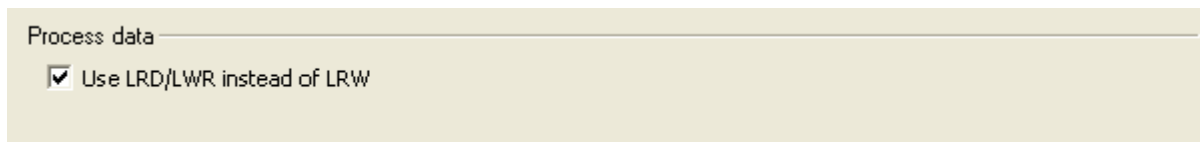
The values within the DDF file are verified against the corresponding information stored in the device (for example, within an E²PROM circuit), if the according check box is marked.

5.6.3 Process Data

EtherCAT supplies different command sets for reading and writing:

- a combined read/write command (LRW)
- separate read and write commands (LRD/LWR)

This option allows to choose between these alternatives:



Process data

☒ Use LRD/LWR instead of LRW

Figure 40: Configuration > Behavior > Process data

| Parameter | Meaning |
|----------------------------|--|
| Use LRD/LWR instead of LRW | Logical read and write operation: If marked, separate EtherCAT read (LRD) and write (LWR) commands will be used. Otherwise, a combined EtherCAT read and write (LRW) command will be used. |

Table 32: Parameters Behavior > Process data

For more information on EtherCAT read and write commands see the *EtherCAT Communication Specification*, version 1.0, section 6.2 “EtherCAT Services”, page 43.

5.6.4 Watchdog

Both the entire PDI (Process Data Interface) and all sync managers (separately) are monitored by watchdog timers.

The following rules apply for resetting the watchdog timers:

- Each access from the application controller to the EtherCAT Slave controller resets the watchdog timer of the Process Data Interface.
- Each write access to the associated memory area of a sync manager resets the sync manager's watchdog timer.

The watchdog timeout values can be calculated using the formula given below from an individually configurable value and a common multiplier.

The "Watchdog" part of the "Behavior" dialog allows specifying the multiplier and the individual values for PDI watchdog and sync manager watchdogs.

Watchdog

☐ Set multiplier (Reg. 400 h): 2498

☐ Set PDI watchdog (Reg. 410 h): 1000 ms 100.000

☐ Set SM watchdog (Reg. 420 h): 1000 ms 100.000

Figure 41: Configuration > Behavior > Watchdog

| Parameter | Meaning |
|-------------------------|---|
| Set multiplier | Watchdog multiplier, content of the register 0x400 |
| Set PDI watchdog | PDI watchdog, see note below |
| Set SM watchdog | SM watchdog, see note below |
| Include WC state Bit(s) | If this check box is marked, an input variable is added to the slave device, that shows the working counter state of the EtherCAT slave device. |

Table 33: Parameters Configuration > Behavior > Watchdog



Note: The **PDI & SM** watchdog timeout values are calculated as follows.

PDI watchdog timeout =

$([\text{value of register 0x400}] + 2) * 40 * [\text{value of register 0x 410}]$

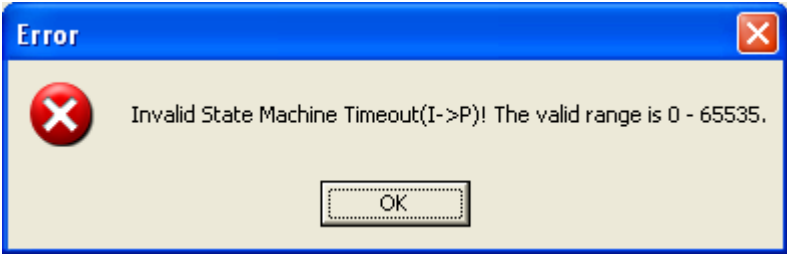
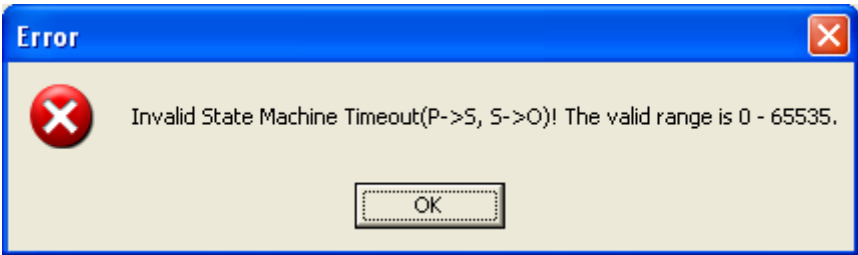
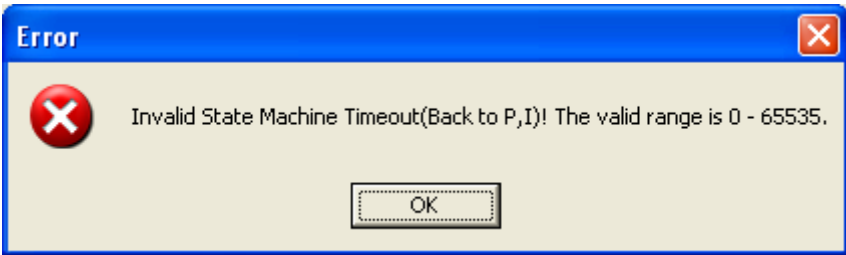
SM watchdog timeout =

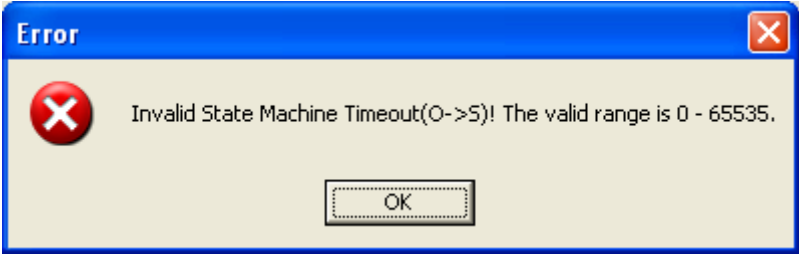



$([\text{value of register 0x 400}] + 2) * 40 * [\text{value of register 0x 420}]$

5.6.5 Messages

5.6.5.1 Errors

The following table provides an overview which error situations might occur in the “Behavior” pane.

| | |
|-------------|---|
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The specified value for the State Machine Timeout (I->P) exceeds the upper limit of 65535 bytes. |
| Action | Specify a lower value than 65535 for the State Machine Timeout (I->P)! |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The specified value for the State Machine Timeout (P->S,S->O) exceeds the upper limit of 65535 bytes. |
| Action | Specify a lower value than 65535 for the State Machine Timeout (P->S,S->O)! |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The specified value for the State Machine Timeout (Back to P,I) exceeds the upper limit of 65535 bytes. |
| Action | Specify a lower value than 65535 for the State Machine Timeout (Back to P,I)! |
| Problem | The error message |

| | |
|-------------|---|
| |  <p>appears.</p> |
| Explanation | The specified value for the State Machine Timeout (O->S) exceeds the upper limit of 65535 bytes. |
| Action | Specify a lower value than 65535 for the State Machine Timeout (O->S)! |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The specified value for the Multiplier (Register 0x400) exceeds the upper limit of 65535 bytes. |
| Action | Specify a lower value than 65535 for the Multiplier (Register 0x400)! |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The specified value for the PDI Watchdog (Register 0x410) exceeds the upper limit of 65535 bytes. |
| Action | Specify a lower value than 65535 for the PDI Watchdog (Register 0x410)! |
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | The specified value for the SM Watchdog (Register 0x420) exceeds the upper limit of 65535 bytes. |

| | |
|--------|--|
| Action | Specify a lower value than 65535 for the SM Watchdog (Register 0x420)! |
|--------|--|

Table 34: Possible Error Messages issued at Behavior Pane

5.6.5.2 Warnings

The following table provides informs about which warnings might appear in the configuration pane.

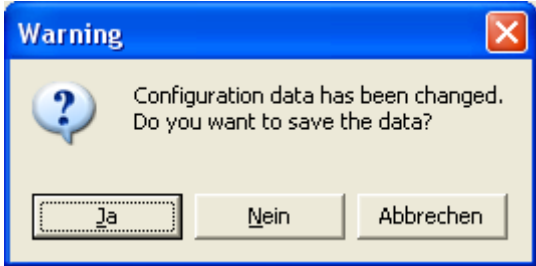
| | |
|-------------|--|
| Problem | <p>The error message</p>  <p>appears.</p> |
| Explanation | You have changed the configuration data. |
| Action | If you want to store the configuration data permanently, click at Yes otherwise at No or return to preceding screen with Cancel. |

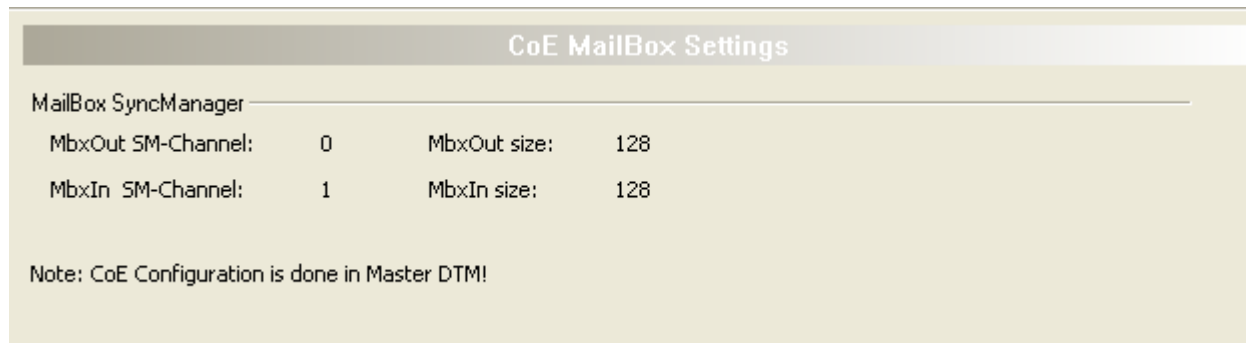
Table 35: Possible Warning Messages issued at Behavior Pane

5.7 Mailbox

This pane is only available in case of a Slave DTM at the Master busline. It has one option: CoE.

5.7.1 CoE

For slave devices supporting the CoE MailBox, the following dialog page is additionally displayed:



| CoE MailBox Settings | | | |
|--|---|--------------|-----|
| MailBox SyncManager | | | |
| MbxOut SM-Channel: | 0 | MbxOut size: | 128 |
| MbxIn SM-Channel: | 1 | MbxIn size: | 128 |
| Note: CoE Configuration is done in Master DTM! | | | |

Figure 42: Configuration > Mailbox > CoE Mailbox Settings

The dialog page provides the following information:

- The channel number of the sync manager (for mailbox input and output)
- The configured mailbox size (this applies both for the input mailbox and for the output) mailbox

The complete MailBox configuration for each slave with MailBox support is done in the EtherCAT Master-DTM.

6 Description

6.1 Overview Description

The **Description** pages contain the following information:

- XML Viewer page: the devices XML file content in HTML style.

Description Dialog Panes

The table below informs about the contents of the **Description** dialog page:

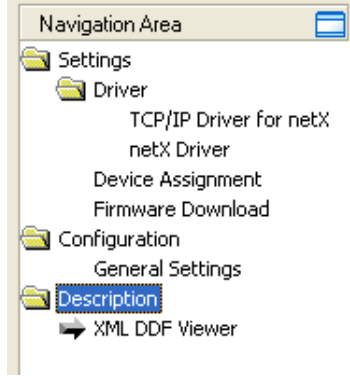
| EtherCAT Slave-DTM | Folder Name / Section | Page |
|--|-----------------------|------|
|  <p>Navigation Area – Description</p> | XML DDF Viewer | 81 |

Table 36: Descriptions of the Description Pages

6.2 XML DDF Viewer

The **XML DDF Viewer** displays the content of the DDF file of the device which is stored in an XML format..

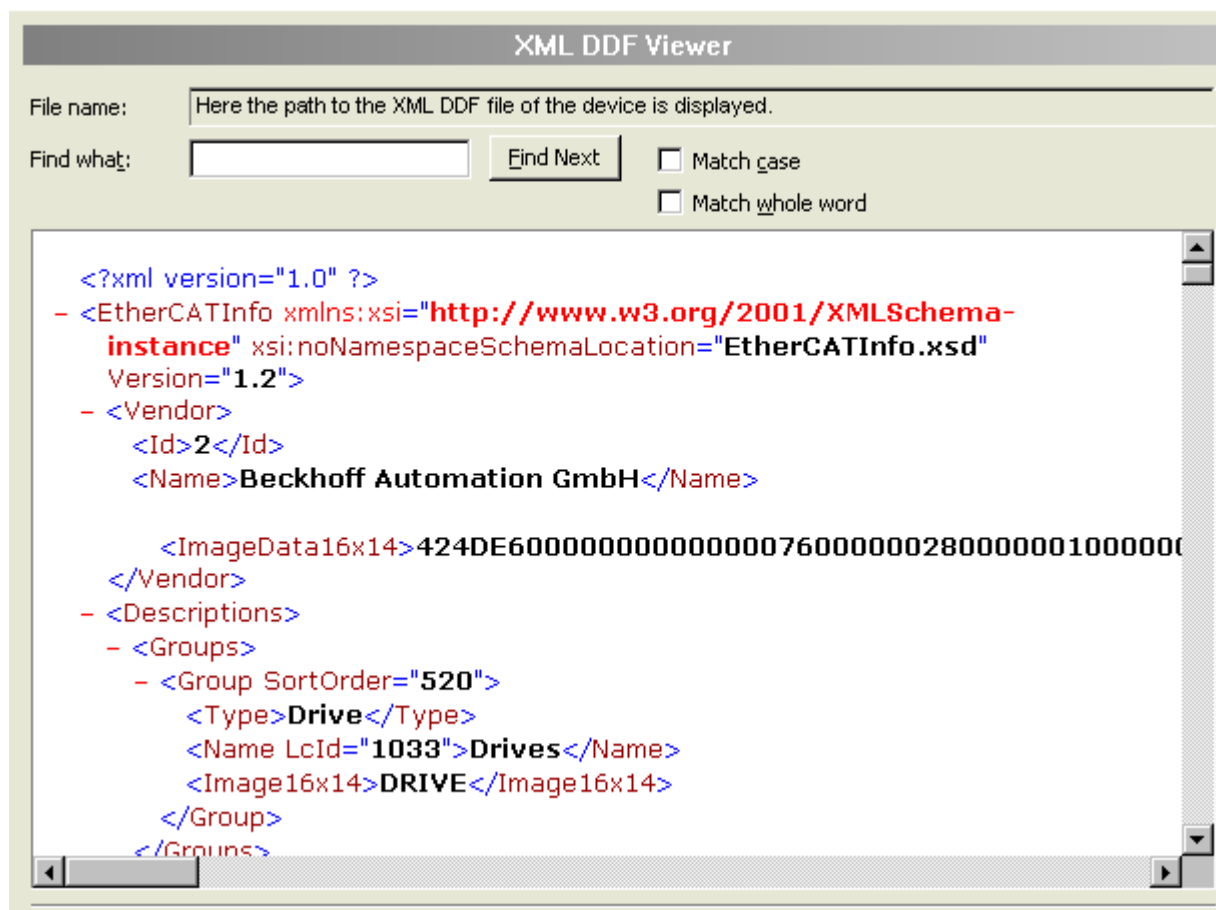


Figure 43: XML DDF Viewer

Under **Filename** the absolute file directory path and the file name of the displayed DDF file is displayed. **Find what** offers a search feature to search for text contents within the text of the DDF file.

In the DDF Viewer window on the left side, the line number is displayed for simple overview, the further entries show the DDF file in text format.

| Parameter | Meaning |
|------------------|---|
| Filename | File directory path and the file name of the displayed DDF file. |
| Find what | Search feature to search for text contents within the text of the DDF file. |
| Match case | Search option |
| Match whole word | Search option |

Table 37: Device Description – XML DDF Viewerr

The **XML DDF Viewer** page consists of the following elements:

- **File name** shows the absolute path of the DDF file.
- **Find what** offers searching for specific text within the DDF file.
- Using the **Find Next** button allows you to jump to the next occurrence of the text to be searched for within the XML DDF file.
- Check **Match case** if you want to perform a case-sensitive search.
- Check **Match whole word** if only entire words should match and fragments of words should be excluded from matching.



Note: You can also access the search functionality of the **XML DDF Viewer** by typing **Ctrl-F** on the keyboard.

7 Online Functions

7.1 Connecting/Disconnecting Device



Note: Several EtherCAT Slave DTM functions e. g. **Diagnosis** or the configuration download in the FDT Framework require an online connection from the EtherCAT Slave DTM to the EtherCAT Slave device.

Connecting Device

The following steps are needed to establish a connection from the EtherCAT Slave DTM to a EtherCAT Slave device:

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

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

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

3. Scan for the devices (with or without firmware).
4. 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. For more refer to section *Safety Messages on Firmware or Configuration Download* on page 30.

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

5. Select and download the firmware.

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

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



An overview of the descriptions for these steps you find in the section *Overview Settings* on page 31.

8. In the DTM interface dialog select the **OK** button, to apply the selection and to close the DTM interface dialog.
9. Put a right-click on the EtherCAT Slave device icon.
10. Select the **Connect** command from the context menu.

↗ The EtherCAT Slave device now is connected to the EtherCAT Slave DTM via an online connection. In the network view the device description at the device icon of the Slave is displayed with a green colored background.

Disconnecting Device

To disconnect an online connection from the EtherCAT Slave device to a EtherCAT Slave DTM take the following steps:

1. In the DTM interface dialog select the **OK** button, to close the DTM interface dialog.
 2. Right-click on the EtherCAT Slave device icon.
 3. Select the **Disconnect** command from the context menu.
- ⇒ In the network view the device description at the device icon of the Slave is not any more displayed with a green colored background. Now the EtherCAT Slave device is disconnected from the DTM.

7.2 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 EtherCAT Slave device an online connection from the EtherCAT Slave DTM to the EtherCAT Slave device is required. Further information can be found in the *Connecting/Disconnecting Device* section on page 84.

Safety Precautions

If you plan to perform a configuration download via the EtherCAT Slave DTM be aware of the following:

⚠ WARNING

Communication Stop due to 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 placed 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 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!

For more see next page.

Download Steps

To transfer the configuration with the corresponding parameter data to the EtherCAT Slave device you download the data using the frame application of the configuration software.

For netDevice the download is made via **Device > Download** or use the context menu with **Download**.

1. 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?'

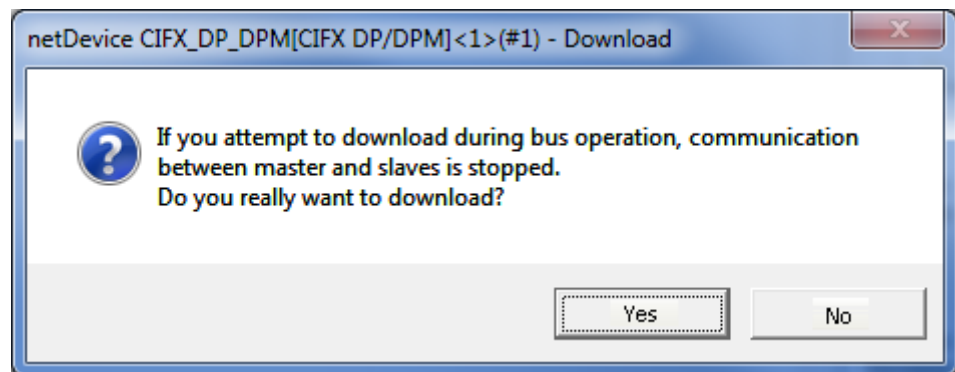


Figure 44: netDevice Message: Download



Important: If the communication between the Master and the Slave devices is stopped, the data exchange between the Master device and the Slave devices is stopped.

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

⇒ Then the current configuration in the application program is downloaded to the device.

3. Otherwise click to **No**.

8 Diagnosis

8.1 Overview Diagnosis

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

Diagnosis Panes

The table below gives an overview for the individual **Diagnosis** dialog panes descriptions:

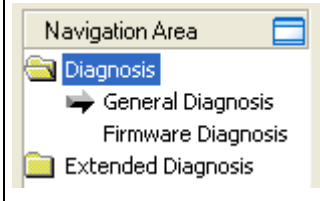
| EtherCAT Slave DTM | Folder Name / Section | Manual Page |
|--|-----------------------|-------------|
|  Navigation Area - Diagnosis | General Diagnosis | 89 |
| | Firmware Diagnosis | 91 |

Table 38: Descriptions of the Diagnosis Panes



Online Connection to the Device

Note: Accessing the **Diagnosis** panes of the EtherCAT Slave DTM requires an online connection from the EtherCAT Slave DTM to the EtherCAT Slave device. For further information refer to section *Connecting/Disconnecting Device* on page 84.

How to proceed

1. In the Slave DTM diagnosis dialog 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.

Extended Diagnosis

The **Extended Diagnosis** helps to find communication and configuration errors, when default diagnosis fails. For further information refer to section *Overview Extended Diagnosis* on page 92.

8.2 General Diagnosis

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

General Diagnosis

Device state

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

Network state

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

Configuration state













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

Communication error:

Watchdog time:

Error count:

Figure 45: General Diagnosis

| LED | Meaning | Color | State |
|---------------|--|---|----------------------------|
| Device State | | | |
| Communication | Shows whether the EtherCAT device executes the network communication. |  (green) | In COMMUNICATION state |
| | |  (gray) | Not in COMMUNICATION state |
| Run | Shows whether the EtherCAT device has been configured correctly. |  (green) | Configuration OK |
| | |  (gray) | Configuration not OK |
| Ready | Shows whether the EtherCAT device has been started correctly. The EtherCAT device waits for a configuration. |  (yellow) | Device READY |
| | |  (gray) | Device not READY |
| Error | Shows whether the EtherCAT 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 EtherCAT device is in data exchange. In a cyclic data exchange the input data or the output data of the EtherCAT Slave are transmitted to the EtherCAT Master. |  (green) | In OPERATION state |
| | |  (gray) | Not in OPERATION state |
| Idle | Shows whether the EtherCAT device is in idle state. |  (yellow) | In IDLE state |
| | |  (gray) | Not in IDLE state |













| LED | Meaning | Color | State |
|---------------------------|--|---|------------------------------|
| Stop | Shows whether the EtherCAT device is in Stop state: There is no cyclic data exchange at the EtherCAT network. The EtherCAT 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 |
| Offline | The EtherCAT Slave 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 EtherCAT device configuration is locked, to avoid the configuration data are typed over. |  (yellow) | Configuration LOCKED |
| | |  (gray) | Configuration not LOCKED |
| New Configuration pending | Shows whether a new EtherCAT 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 EtherCAT 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 39: Indication General Diagnosis

| Parameter | Meaning |
|---------------------|--|
| 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 40: Parameter General Diagnosis

8.3 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.

| Task | Name of task | Version | Prio | Description | State |
|------|---------------|---------|------|---------------------------------|--|
| 0 | RX_IDLE | 1.0 | 63 | RX IDLE Task. | Task Status ok. (0x00000000) |
| 1 | RX_TIMER | 1.0 | 1 | rcX Timer. | Task Status ok. (0x00000000) |
| 2 | RX_SYSTEM | 1.16 | 8 | Middleware System Task. | Task Status ok. (0x00000000) |
| 3 | DPM_COMO_SMBX | 1.0 | 50 | TLR-Router DPM. | Task Status ok. (0x00000000) |
| 4 | DPM_COMO_RMBX | 1.0 | 51 | TLR-Router DPM. | Task Status ok. (0x00000000) |
| 5 | ECAT_SDO | 2.5 | 31 | EtherCAT CoE SDO Task. | Task Status ok. (0x00000000) |
| 6 | ECAT_COE | 2.5 | 32 | EtherCAT CoE Task. | Task Status ok. (0x00000000) |
| 7 | ECAT_ESM | 2.5 | 35 | EtherCAT ESM Task. | Slave is currently in state INIT. (0x00200000) |
| 8 | ECAT_MBX | 2.5 | 34 | EtherCAT Mailbox Task. | Task is currently disabled. (0x00000001) |
| 9 | ECATDPM | 2.5 | 36 | EtherCAT Slave DPM Task. | Task Status ok. (0x00000000) |
| 10 | MARSHALLER | 2.0 | 54 | Marshaller: Main Task. | Task Status ok. (0x00000000) |
| 11 | PACKET_ROUTER | 2.0 | 49 | Marshaller: Packet Router Task. | Task Status ok. (0x00000000) |

Figure 46: Firmware Diagnosis (Example)

Task Information:

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

| Column | Meaning |
|--------------|----------------------------|
| Task | Task number |
| 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 41: Description Table Task Information

9 Extended Diagnosis

9.1 Overview Extended Diagnosis

The **Extended Diagnosis** of the EtherCAT Slave DTM helps to find communication and configuration errors. Therefore it contains a list of diagnosis structures as online counter, states and parameters.

Dialog Panes “Extended Diagnosis”

The table below gives an overview for the **Extended Diagnosis** dialog panes descriptions:

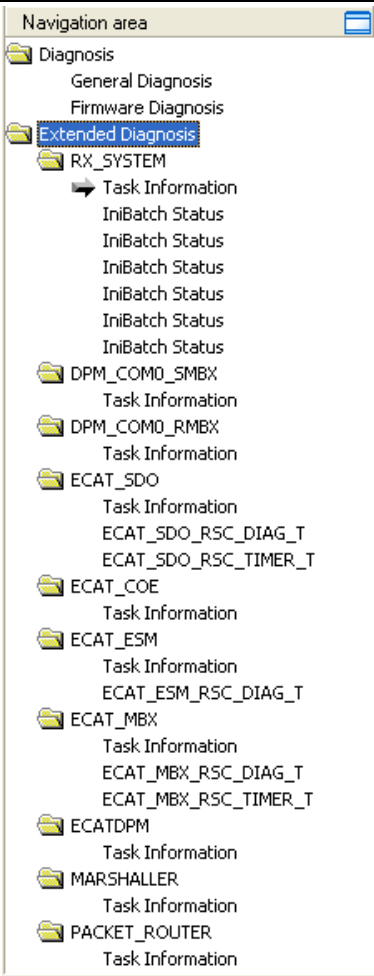
| EtherCAT Slave DTM | Folder Name in the Navigation Area | Subsection | Page |
|--|------------------------------------|----------------------|------|
|  | RX-SYSTEM | Task Information | 93 |
| | | IniBatch Status | 94 |
| | DPM_COMO_SMBX | Task Information | 93 |
| | DPM_COMO_RMBX | Task Information | 93 |
| | ECAT_SDO | Task Information | 93 |
| | | ECAT_SDO_RSC_DIAG_T | 95 |
| | | ECAT_SDO_RSC_TIMER_T | 96 |
| | ECAT_COE | Task Information | 93 |
| | ECAT_ESM | Task Information | 93 |
| | | ECAT_ESM_RSC_DIAG_T | 97 |
| | ECAT_MBX | Task Information | 93 |
| | | ECAT_MBX_RSC_DIAG_T | 98 |
| | | ECAT_MBX_RSC_TIMER_T | 99 |
| | ECAT_DPM | Task Information | 93 |
| | MARSHALLER | Task Information | 93 |
| | PACKET_ROUTER | Task Information | 93 |
| Navigation Area - Extended Diagnosis | | | |

Table 42: Descriptions of the Dialog Panes Extended Diagnosis

Online Connection to the Device



Note: Accessing the **Extended Diagnosis** dialog panes of the EtherCAT Slave DTM requires an online connection from the EtherCAT Slave DTM to the EtherCAT Slave device. For further information refer to section *Connecting/Disconnecting Device* on page 84.

9.2 Task Information

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

Figure 47: 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 are 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 43: Extended Diagnosis > [Folder Name] > Task Information

9.3 IniBatch Status

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

Figure 48: 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 data base 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 44: Extended Diagnosis > [Folder Name] > IniBatch Status

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

9.4 ECAT_SDO_RSC_DIAG_T

| ECAT_SDO_RSC_DIAG_T | |
|----------------------------|-------|
| Task states | |
| Name | Value |
| ulCompletedDownloadsServer | 0 |
| ulCompletedUploadsServer | 0 |
| ulCompletedDownloadsClient | 0 |
| ulCompletedUploadsClient | 0 |
| ulAbortedDownloadsServer | 0 |
| ulAbortedUploadsServer | 0 |
| ulAbortedDownloadsClient | 0 |
| ulAbortedUploadsClient | 0 |
| ulServerTimeouts | 0 |
| ulClientTimeouts | 0 |
| | |
| | |
| | |
| | |

Figure 49: Extended Diagnosis > [Folder Name] > ECAT_SDO_RSC_DIAG_T Example Display

This window lists the diagnostic counters of the ECAT_SDO_RSC_DIAG_T layer. It shows in particular, which services are currently executed. (The services of the packets are described within the EtherCAT-Slave Protocol API Manual [2].)

| Name | Description |
|----------------------------|---|
| ulCompletedDownloadsServer | Counter for Completed Downloads at the Server |
| ulCompletedUploadsServer | Counter for Completed Uploads at the Server |
| ulCompletedDownloadsClient | Counter for Completed Downloads at the Client |
| ulCompletedUploadsClient | Counter for Completed Uploads at the Client |
| ulAbortedDownloadsServer | Counter for Aborted Downloads at the Server |
| ulAbortedUploadsServer | Counter for Aborted Uploads at the Server |
| ulAbortedDownloadsClient | Counter for Aborted Downloads at the Client |
| ulAbortedUploadsClient | Counter for Aborted Uploads at the Client |
| ulServerTimeouts | Counter for Server Timeouts |
| ulClientTimeouts | Counter for Client Timeouts |

Table 45: Extended Diagnosis > [Folder Name] > ECAT_SDO_RSC_DIAG_T

9.5 ECAT_SDO_RSC_TIMER_T

| ECAT_SDO_RSC_TIMER_T | |
|----------------------|---------|
| Task states | |
| Name | Value |
| ulTimerCnt | 8110100 |
| ulTimerGran | 100 |
| ulSDOClientTimeout | 1000 |
| ulSDOServerTimeout | 1000 |
| | |
| | |
| | |
| | |
| | |

Figure 50: Extended Diagnosis > [Folder Name] > ECAT_SDO_RSC_TIMER_T Example Display

| Name | Description |
|--------------------|--------------------|
| ulTimerCnt | Timer count |
| ulTimerGran | Timer granularity |
| ulSDOClientTimeout | SDO Client Timeout |
| ulSDOServerTimeout | SDO Server Timeout |

Table 46: Extended Diagnosis > [Folder Name] > ECAT_SDO_RSC_TIMER_T

9.6 ECAT_ESM_RSC_DIAG_T

[illegible]

Figure 51: Extended Diagnosis > [Folder Name] > ECAT_ESM_RSC_DIAG_T Example Display

This window lists the diagnostic counters of the ECAT_ESM_RSC_DIAG_T T layer. It shows in particular, which services are currently executed. (The services of the packets are described within the EtherCAT-Slave Protocol API Manual [2].)

| Name | Description |
|-------------------------|---|
| ulReadyBits | Counter for Ready Bits |
| ulSetInitBits | Counter for SetInit Bits |
| ulCorrectStateChanges | Counter for correct state changes |
| ulInvalidStateChanges | Counter for invalid state changes |
| ulErrorStateChanges | Counter for error state changes |
| ulInvalidStateRequested | Counter for requested invalid states |
| ulParameterFailures | Counter for parameter failures |
| ulTimeoutStateChanges | Counter for timeout state changes |
| ulAIStatus | AL Status according to EtherCAT Specification, part 5 and 6 |

Table 47: Extended Diagnosis > [Folder Name] > ECAT_ESM_RSC_DIAG_T

9.7 ECAT_MBX_RSC_DIAG_T

| ECAT_MBX_RSC_DIAG_T | |
|---------------------|-------|
| Task states | |
| Name | Value |
| fGotPacketWaiting | 0 |
| fActive | 0 |
| ulMessagesReceived | 0 |
| ulMessagesSent | 0 |
| ulMsgTooLong | 0 |
| | |
| | |

Figure 52: Extended Diagnosis > [Folder Name] > ECAT_ESM_RSC_DIAG_T Example Display

This window lists the diagnostic counters of the ECAT_MBX_RSC_DIAG_T layer. It shows in particular, which services are currently executed. (The services of the packets are described within the EtherCAT-Slave Protocol API Manual [2].)

| Name | Description |
|--------------------|---|
| fGotPacketWaiting | If TRUE, a packet is still waiting |
| fActive | If TRUE, the ECAT_MBX task is active |
| ulMessagesReceived | Counter for number of received messages |
| ulMessagesSent | Counter for number of sent messages |
| ulMsgTooLong | Counter for number of too long messages |

Table 48: Extended Diagnosis > [Folder Name] > ECAT_MBX_RSC_DIAG_T

9.8 ECAT_MBX_RSC_TIMER_T

| ECAT_MBX_RSC_TIMER_T | |
|----------------------|-------|
| Task states | |
| Name | Value |
| ulTimerGran | 50 |
| ulTimerCnt | 0 |
| ulLowTrafficTimeout | 100 |
| | |
| | |

Figure 53: Extended Diagnosis > [Folder Name] > ECAT_MBX_RSC_TIMER_T Example Display

| Name | Description |
|---------------------|---------------------|
| ulTimerGran | Timer granularity |
| ulTimerCnt | Timer count |
| ulLowtrafficTimeout | Low traffic timeout |

Table 49: Extended Diagnosis > [Folder Name] > ECAT_MBX_RSC_TIMER_T

10 Tools

10.1 Overview Tools

Under **Tools** the Packet Monitor and the IO Monitor are provided for test and diagnosis purposes.

Tools Panes

The table below gives an overview for the individual **Tools** dialog panes descriptions:

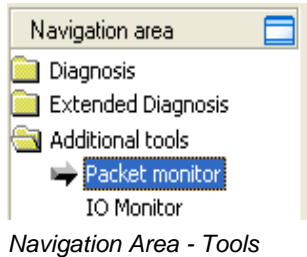
| EtherCAT Slave DTM | Folder Name / Section | Manual Page |
|---|-----------------------|-------------|
|  | Packet Monitor | 101 |
| | IO Monitor | 104 |

Table 50: Descriptions of the Diagnosis Panes

Online Connection to the Device



Note: Accessing the **Tools** dialog panes of the EtherCAT Slave DTM requires an online connection from the EtherCAT Slave DTM to the EtherCAT Slave device. For further information refer to section *Connecting/Disconnecting Device* on page 84.

10.2 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 are added.



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

- Open the **Packet Monitor** via **Tools > Packet Monitor**.

Figure 54: 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.

10.2.1 Sending Packet

Figure 55: 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 51: 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**.

10.2.2 Receiving Packet

The screenshot shows a software interface for receiving packets. On the left, under the 'Receive' tab, is the 'Packet header' section with the following fields:

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

On the right, under the 'Receive data' section, there is a 'Counter: 0' and a table of received data. The table has 10 columns (0-9) and 7 rows (0-60). The data is as follows:

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 04 |
| 10 | 00 | 00 | 01 | 00 | 01 | 00 | 00 | 00 | | |
| 20 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 40 | | | | | | | | | | |
| 50 | | | | | | | | | | |
| 60 | | | | | | | | | | |

Figure 56: 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 52: 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) are displayed.

10.3 IO 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 are transmitted at the bus and have effect on subordinate drives, IO etc.

IO Monitor

Columns: 10 Display mode: Decimal

Input data

Offset: 0 Go

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

Output data

Offset: 0 Go

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60 | n | n | n | n | n | n | n | n | n | n |

Update

Figure 57: 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**.

⚠ Always the data of the process image are displayed, also when these Bytes have not been reserved by the configuration.

11 Error Codes

11.1 Error Code Definition

For COM based application, like the ODM Server and ODM drivers, a common error definition is used, similar to the Microsoft Windows® HRESULT definition.

Error Code Structure:

COM Errors are HRESULTs, which are 32 bit values using the following layout:

```

3 3 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1
1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
+---+---+---+---+---+---+---+---+---+---+
|Sev|C|R|      Facility      |      Code      |
+---+---+---+---+---+---+---+---+---+---+

```

where

Sev - is the severity code:

00 - Success

01 - Informational

10 - Warning

11 - Error

C - is the Customer code flag

R - is a reserved bit

Facility - is the facility code

Code - is the facility's status code

In this common error definition, several error code regions are already reserved by Windows® itself, the ODM and some other modules.

11.2 Overview Error Codes

| Overview Error Codes | Range |
|---|---|
| General Hardware Errors RCX Operating System | <i>RCX General Task:</i> 0xC02B0001 to 0xC02B4D52 |
| | <i>RCX Common Status & Errors Codes:</i> 0x00000000 to 0xC002000C |
| | <i>RCX Status & Error Codes:</i> 0x00000000 to 0xC0000008 |
| ODM Server | <i>General ODM Error Codes:</i> 0x8004C700 to 0x8004C761 |
| | <i>General ODM Driver Error Codes:</i> 0x8004C7A0 to 0x8004C7C2 |
| ODM Drivers | <i>cifX Driver Specific ODM Error:</i> 0x8004C001 to 0x8004C0A4 |
| cifX Device Driver and netX Driver | <i>Generic Error:</i> 0x800A0001 bis 0x800A0017 |
| | <i>Generic Driver Error:</i> 0x800B0001 bis 0x800B0042 |
| | <i>Generic Device Error:</i> 0x800C0010 bis 0x800C0041 |
| netX Driver | <i>CIFX API Transport:</i> 0x800D0001 bis 0x800D0013 |
| | <i>CIFX API Transport Header State Error:</i> 0x800E0001 bis 0x800E000B |
| DBM | <i>ODM Error Codes:</i> 0xC004C810 to 0xC004C878 |

Table 53: Overview Error Codes and Ranges



The fieldbus specific error codes are described in the manuals of the corresponding protocol tasks.

11.3 General Hardware Error Codes

11.3.1 RCX General Task Errors

| Error Code (Definition) | Value | Description |
|------------------------------|------------|--------------------------------------|
| RCX_E_QUE_UNKNOWN | 0xC02B0001 | Unknown Queue |
| RCX_E_QUE_INDEX_UNKNOWN | 0xC02B0002 | Unknown Queue Index |
| RCX_E_TASK_UNKNOWN | 0xC02B0003 | Unknown Task |
| RCX_E_TASK_INDEX_UNKNOWN | 0xC02B0004 | Unknown Task Index |
| RCX_E_TASK_HANDLE_INVALID | 0xC02B0005 | Invalid Task Handle |
| RCX_E_TASK_INFO_IDX_UNKNOWN | 0xC02B0006 | Unknown Index |
| RCX_E_FILE_XFR_TYPE_INVALID | 0xC02B0007 | Invalid Transfer Type |
| RCX_E_FILE_REQUEST_INCORRECT | 0xC02B0008 | Invalid File Request |
| RCX_E_TASK_INVALID | 0xC02B000E | Invalid Task |
| RCX_E_SEC_FAILED | 0xC02B001D | Security EEPROM Access Failed |
| RCX_E_EEPROM_DISABLED | 0xC02B001E | EEPROM Disabled |
| RCX_E_INVALID_EXT | 0xC02B001F | Invalid Extension |
| RCX_E_SIZE_OUT_OF_RANGE | 0xC02B0020 | Block Size Out Of Range |
| RCX_E_INVALID_CHANNEL | 0xC02B0021 | Invalid Channel |
| RCX_E_INVALID_FILE_LEN | 0xC02B0022 | Invalid File Length |
| RCX_E_INVALID_CHAR_FOUND | 0xC02B0023 | Invalid Character Found |
| RCX_E_PACKET_OUT_OF_SEQ | 0xC02B0024 | Packet Out Of Sequence |
| RCX_E_SEC_NOT_ALLOWED | 0xC02B0025 | Not Allowed In Current State |
| RCX_E_SEC_INVALID_ZONE | 0xC02B0026 | Security EEPROM Invalid Zone |
| RCX_E_SEC_EEPROM_NOT_AVAIL | 0xC02B0028 | Security EEPROM Eeprom Not Available |
| RCX_E_SEC_INVALID_CHECKSUM | 0xC02B0029 | Security EEPROM Invalid Checksum |
| RCX_E_SEC_ZONE_NOT_WRITEABLE | 0xC02B002A | Security EEPROM Zone Not Writeable |
| RCX_E_SEC_READ_FAILED | 0xC02B002B | Security EEPROM Read Failed |
| RCX_E_SEC_WRITE_FAILED | 0xC02B002C | Security EEPROM Write Failed |
| RCX_E_SEC_ACCESS_DENIED | 0xC02B002D | Security EEPROM Access Denied |
| RCX_E_SEC_EEPROM_EMULATED | 0xC02B002E | Security EEPROM Emulated |
| RCX_E_INVALID_BLOCK | 0xC02B0038 | Invalid Block |
| RCX_E_INVALID_STRUCT_NUMBER | 0xC02B0039 | Invalid Structure Number |
| RCX_E_INVALID_CHECKSUM | 0xC02B4352 | Invalid Checksum |
| RCX_E_CONFIG_LOCKED | 0xC02B4B54 | Configuration Locked |
| RCX_E_SEC_ZONE_NOT_READABLE | 0xC02B4D52 | Security EEPROM Zone Not Readable |

Table 54: RCX General Task Errors

11.3.2 RCX Common Status & Errors Codes

| Error Code (Definition) | Value | Description |
|-------------------------------|------------|-------------------------|
| RCX_S_OK | 0x00000000 | Success, Status Okay |
| RCX_E_FAIL | 0xC0000001 | Fail |
| RCX_E_UNEXPECTED | 0xC0000002 | Unexpected |
| RCX_E_OUTOFMEMORY | 0xC0000003 | Out Of Memory |
| RCX_E_UNKNOWN_COMMAND | 0xC0000004 | Unknown Command |
| RCX_E_UNKNOWN_DESTINATION | 0xC0000005 | Unknown Destination |
| RCX_E_UNKNOWN_DESTINATION_ID | 0xC0000006 | Unknown Destination ID |
| RCX_E_INVALID_PACKET_LEN | 0xC0000007 | Invalid Packet Length |
| RCX_E_INVALID_EXTENSION | 0xC0000008 | Invalid Extension |
| RCX_E_INVALID_PARAMETER | 0xC0000009 | Invalid Parameter |
| RCX_E_WATCHDOG_TIMEOUT | 0xC000000C | Watchdog Timeout |
| RCX_E_INVALID_LIST_TYPE | 0xC000000D | Invalid List Type |
| RCX_E_UNKNOWN_HANDLE | 0xC000000E | Unknown Handle |
| RCX_E_PACKET_OUT_OF_SEQ | 0xC000000F | Out Of Sequence |
| RCX_E_PACKET_OUT_OF_MEMORY | 0xC0000010 | Out Of Memory |
| RCX_E_QUE_PACKETDONE | 0xC0000011 | Queue Packet Done |
| RCX_E_QUE_SENDPACKET | 0xC0000012 | Queue Send Packet |
| RCX_E_POOL_PACKET_GET | 0xC0000013 | Pool Packet Get |
| RCX_E_POOL_GET_LOAD | 0xC0000015 | Pool Get Load |
| RCX_E_REQUEST_RUNNING | 0xC000001A | Request Already Running |
| RCX_E_INIT_FAULT | 0xC0000100 | Initialization Fault |
| RCX_E_DATABASE_ACCESS_FAILED | 0xC0000101 | Database Access Failed |
| RCX_E_NOT_CONFIGURED | 0xC0000119 | Not Configured |
| RCX_E_CONFIGURATION_FAULT | 0xC0000120 | Configuration Fault |
| RCX_E_INCONSISTENT_DATA_SET | 0xC0000121 | Inconsistent Data Set |
| RCX_E_DATA_SET_MISMATCH | 0xC0000122 | Data Set Mismatch |
| RCX_E_INSUFFICIENT_LICENSE | 0xC0000123 | Insufficient License |
| RCX_E_PARAMETER_ERROR | 0xC0000124 | Parameter Error |
| RCX_E_INVALID_NETWORK_ADDRESS | 0xC0000125 | Invalid Network Address |
| RCX_E_NO_SECURITY_MEMORY | 0xC0000126 | No Security Memory |
| RCX_E_NETWORK_FAULT | 0xC0000140 | Network Fault |
| RCX_E_CONNECTION_CLOSED | 0xC0000141 | Connection Closed |
| RCX_E_CONNECTION_TIMEOUT | 0xC0000142 | Connection Timeout |
| RCX_E_LONELY_NETWORK | 0xC0000143 | Lonely Network |
| RCX_E_DUPLICATE_NODE | 0xC0000144 | Duplicate Node |
| RCX_E_CABLE_DISCONNECT | 0xC0000145 | Cable Disconnected |
| RCX_E_BUS_OFF | 0xC0000180 | Network Node Bus Off |
| RCX_E_CONFIG_LOCKED | 0xC0000181 | Configuration Locked |
| RCX_E_APPLICATION_NOT_READY | 0xC0000182 | Application Not Ready |
| RCX_E_TIMER_APPL_PACKET_SENT | 0xC002000C | Timer App Packet Sent |

Table 55: RCX Common Status & Errors Codes

11.3.3 RCX Status & Error Codes

| Error Code (Definition) | Value | Description |
|------------------------------|------------|------------------------|
| RCX_S_OK | 0x00000000 | SUCCESS, STATUS OKAY |
| RCX_S_QUE_UNKNOWN | 0xC02B0001 | UNKNOWN QUEUE |
| RCX_S_QUE_INDEX_UNKNOWN | 0xC02B0002 | UNKNOWN QUEUE INDEX |
| RCX_S_TASK_UNKNOWN | 0xC02B0003 | UNKNOWN TASK |
| RCX_S_TASK_INDEX_UNKNOWN | 0xC02B0004 | UNKNOWN TASK INDEX |
| RCX_S_TASK_HANDLE_INVALID | 0xC02B0005 | INVALID TASK HANDLE |
| RCX_S_TASK_INFO_IDX_UNKNOWN | 0xC02B0006 | UNKNOWN INDEX |
| RCX_S_FILE_XFR_TYPE_INVALID | 0xC02B0007 | INVALID TRANSFER TYPE |
| RCX_S_FILE_REQUEST_INCORRECT | 0xC02B0008 | INVALID FILE REQUEST |
| RCX_S_UNKNOWN_DESTINATION | 0xC0000005 | UNKNOWN DESTINATION |
| RCX_S_UNKNOWN_DESTINATION_ID | 0xC0000006 | UNKNOWN DESTINATION ID |
| RCX_S_INVALID_LENGTH | 0xC0000007 | INVALID LENGTH |
| RCX_S_UNKNOWN_COMMAND | 0xC0000004 | UNKNOWN COMMAND |
| RCX_S_INVALID_EXTENSION | 0xC0000008 | INVALID EXTENSION |

Table 56: RCX Status & Error Codes

11.3.3.1 RCX Status & Error Codes Slave State

| Error Code (Definition) | Value | Description |
|---------------------------|------------|-----------------------------|
| RCX_SLAVE_STATE_UNDEFINED | 0x00000000 | UNDEFINED |
| RCX_SLAVE_STATE_OK | 0x00000001 | OK |
| RCX_SLAVE_STATE_FAILED | 0x00000002 | FAILED (at least one slave) |

Table 57: RCX Status & Error Codes Slave State

11.4 ODM Error Codes

11.4.1 General ODM Error Codes

| Error Code (Definition) | Value | Description |
|---|------------|---|
| CODM3_E_INTERNALERROR | 0x8004C700 | Internal ODM Error |
| ODM3_E_DESCRIPTION_NOTFOUND | 0x8004C701 | Description not found in ODM database |
| CODM3_E_WRITEREGISTRY | 0x8004C710 | Error writing to the registry |
| CODM3_E_BAD_REGULAR_EXPRESSION | 0x8004C711 | Invalid regular expression |
| CODM3_E_COMCATEGORIE_MANAGER_FAILED | 0x8004C712 | Component Category Manager could not be instantiated |
| CODM3_E_COMCATEGORIE_ENUMERATION_FAILED | 0x8004C713 | Driver could not be enumerated by the Category Manager |
| CODM3_E_CREATE_LOCAL_BUFFER | 0x8004C714 | Error creating local buffers |
| CODM3_E_UNKNOWNHANDLE | 0x8004C715 | Unknown handle |
| CODM3_E_QUEUE_LIMIT_REACHED | 0x8004C717 | Queue size limit for connection reached |
| CODM3_E_DATASIZE_ZERO | 0x8004C718 | Zero data length passed |
| CODM3_E_INVALID_DATA | 0x8004C719 | Invalid data content |
| CODM3_E_INVALID_MODE | 0x8004C71A | Invalid mode |
| CODM3_E_DATABASE_READ | 0x8004C71B | Error reading database |
| CODM3_E_CREATE_DEVICE_THREAD | 0x8004C750 | Error creating device thread |
| CODM3_E_CREATE_DEVICE_THREAD_STOP_EVENT | 0x8004C751 | Error creating device thread stop event |
| CODM3_E_CLIENT_NOT_REGISTERED | 0x8004C752 | Client is not registered at the ODM |
| CODM3_E_NO_MORE_CLIENTS | 0x8004C753 | Maximum number of clients reached |
| CODM3_E_MAX_CLIENT_CONNECTIONS_REACHED | 0x8004C754 | Maximum number of client connections reached |
| CODM3_E_ENTRY_NOT_FOUND | 0x8004C755 | Driver/device not found |
| CODM3_E_DRIVER_NOT_FOUND | 0x8004C757 | The requested driver is unknown to the ODM |
| CODM3_E_DEVICE_ALREADY_LOCKED | 0x8004C758 | Device is locked by another process |
| CODM3_E_DEVICE_UNLOCKED_FAILED | 0x8004C759 | Device could not be unlocked, lock was set by another process |
| CODM3_E_DEVICE_LOCK_NECESSARY | 0x8004C75A | Operation requires a device lock to be set |
| CODM3_E_DEVICE_SUBSCRIPTIONLIMIT | 0x8004C75B | Maximum number of servers registered for this device reached |
| CODM3_E_DEVICE_NOTSUBSCRIBED | 0x8004C75C | Process is not registered as a server on this device |
| CODM3_E_DEVICE_NO_MESSAGE | 0x8004C75D | No message available |
| CODM3_E_TRANSFERTIMEOUT | 0x8004C760 | Message transfer timeout |
| CODM3_E_MESSAGE_INSERVICE | 0x8004C761 | Message in service |

Table 58: ODM Error Codes - General ODM Error Codes

11.4.2 General ODM Driver Error Codes

| Error Code (Definition) | Value | Description |
|--|------------|---|
| CODM3_E_DRV_OPEN_DEVICE | 0x8004C7A0 | Packet type unsupported by driver |
| CODM3_E_DRV_INVALID_IDENTIFIER | 0x8004C7A1 | Invalid device identifier |
| CODM3_E_DRV_DEVICE_PARAMETERS_MISMATCH | 0x8004C7A3 | Parameters differ from requested device |
| CODM3_E_DRV_BROWSE_NO_DEVICES | 0x8004C7A4 | No devices found |
| CODM3_E_DRV_CREATE_DEVICE_INST | 0x8004C7A5 | Device instance could not be created |
| CODM3_E_DRV_DEVICE_NOMORE_TX | 0x8004C7A6 | Device connection limit reached |
| CODM3_E_DRV_DEVICE_DUPLICATE_TX | 0x8004C7A7 | Duplicate transmitter ID |
| CODM3_E_DRV_DEVICE_NOT_CONFIGURED | 0x8004C7A8 | Device is not configured |
| CODM3_E_DRV_DEVICE_COMMUNICATION | 0x8004C7A9 | Device communication error |
| CODM3_E_DRV_DEVICE_NO_MESSAGE | 0x8004C7AA | No message available |
| CODM3_E_DRV_DEVICE_NOT_READY | 0x8004C7AB | Device not ready |
| CODM3_E_DRV_INVALIDCONFIGURATION | 0x8004C7AC | Invalid driver configuration |
| CODM3_E_DRV_DLINVALIDMODE | 0x8004C7C0 | Invalid download mode |
| CODM3_E_DRV_DLINPROGRESS | 0x8004C7C1 | Download is active |
| CODM3_E_DRV_ULINPROGRESS | 0x8004C7C2 | Upload is active |

Table 59: ODM Error Codes - General ODM Driver Error Codes

11.4.3 cifX Driver Specific ODM Error Codes

| cifX Driver Specific ODM Error Codes | | |
|--------------------------------------|------------|--|
| Error Code (Definition) | Value | Description |
| DRV_E_BOARD_NOT_INITIALIZED | 0x8004C001 | DRIVER Board not initialized |
| DRV_E_INIT_STATE_ERROR | 0x8004C002 | DRIVER Error in internal init state |
| DRV_E_READ_STATE_ERROR | 0x8004C003 | DRIVER Error in internal read state |
| DRV_E_CMD_ACTIVE | 0x8004C004 | DRIVER Command on this channel is active |
| DRV_E_PARAMETER_UNKNOWN | 0x8004C005 | DRIVER Unknown parameter in function |
| DRV_E_WRONG_DRIVER_VERSION | 0x8004C006 | DRIVER Version is incompatible with DLL |
| DRV_E_PCI_SET_CONFIG_MODE | 0x8004C007 | DRIVER Error during PCI set configuration mode |
| DRV_E_PCI_READ_DPM_LENGTH | 0x8004C008 | DRIVER Could not read PCI dual port memory length |
| DRV_E_PCI_SET_RUN_MODE | 0x8004C009 | DRIVER Error during PCI set run mode |
| DRV_E_DEV_DPM_ACCESS_ERROR | 0x8004C00A | DEVICE Dual port ram not accessible(board not found) |
| DRV_E_DEV_NOT_READY | 0x8004C00B | DEVICE Not ready (ready flag failed) |
| DRV_E_DEV_NOT_RUNNING | 0x8004C00C | DEVICE Not running (running flag failed) |
| DRV_E_DEV_WATCHDOG_FAILED | 0x8004C00D | DEVICE Watchdog test failed |
| DRV_E_DEV_OS_VERSION_ERROR | 0x8004C00E | DEVICE Signals wrong OS version |
| DRV_E_DEV_SYSERR | 0x8004C00F | DEVICE Error in dual port flags |
| DRV_E_DEV_MAILBOX_FULL | 0x8004C010 | DEVICE Send mailbox is full |
| DRV_E_DEV_PUT_TIMEOUT | 0x8004C011 | DEVICE PutMessage timeout |
| DRV_E_DEV_GET_TIMEOUT | 0x8004C012 | DEVICE GetMessage timeout |
| DRV_E_DEV_GET_NO_MESSAGE | 0x8004C013 | DEVICE No message available |
| DRV_E_DEV_RESET_TIMEOUT | 0x8004C014 | DEVICE RESET command timeout |
| DRV_E_DEV_NO_COM_FLAG | 0x8004C015 | DEVICE COM-flag not set. Check if Bus is running |
| DRV_E_DEV_EXCHANGE_FAILED | 0x8004C016 | DEVICE I/O data exchange failed |
| DRV_E_DEV_EXCHANGE_TIMEOUT | 0x8004C017 | DEVICE I/O data exchange timeout |
| DRV_E_DEV_COM_MODE_UNKNOWN | 0x8004C018 | DEVICE I/O data mode unknown |
| DRV_E_DEV_FUNCTION_FAILED | 0x8004C019 | DEVICE Function call failed |
| DRV_E_DEV_DPMSIZE_MISMATCH | 0x8004C01A | DEVICE DPM size differs from configuration |
| DRV_E_DEV_STATE_MODE_UNKNOWN | 0x8004C01B | DEVICE State mode unknown |
| DRV_E_DEV_HW_PORT_IS_USED | 0x8004C01C | DEVICE Output port already in use |
| DRV_E_USR_OPEN_ERROR | 0x8004C01E | USER Driver not opened (device driver not loaded) |
| DRV_E_USR_INIT_DRV_ERROR | 0x8004C01F | USER Can't connect to device |
| DRV_E_USR_NOT_INITIALIZED | 0x8004C020 | USER Board not initialized (DevInitBoard not called) |
| DRV_E_USR_COMM_ERR | 0x8004C021 | USER IOCTL function failed |
| DRV_E_USR_DEV_NUMBER_INVALID | 0x8004C022 | USER Parameter DeviceNumber invalid |
| DRV_E_USR_INFO_AREA_INVALID | 0x8004C023 | USER Parameter InfoArea unknown |
| DRV_E_USR_NUMBER_INVALID | 0x8004C024 | USER Parameter Number invalid |
| DRV_E_USR_MODE_INVALID | 0x8004C025 | USER Parameter Mode invalid |
| DRV_E_USR_MSG_BUF_NULL_PTR | 0x8004C026 | USER NULL pointer assignment |
| DRV_E_USR_MSG_BUF_TOO_SHORT | 0x8004C027 | USER Message buffer too small |

| cifX Driver Specific ODM Error Codes | | |
|--------------------------------------|------------|--|
| Error Code (Definition) | Value | Description |
| DRV_E_USR_SIZE_INVALID | 0x8004C028 | USER Parameter Size invalid |
| DRV_E_USR_SIZE_ZERO | 0x8004C02A | USER Parameter Size with zero length |
| DRV_E_USR_SIZE_TOO_LONG | 0x8004C02B | USER Parameter Size too long |
| DRV_E_USR_DEV_PTR_NULL | 0x8004C02C | USER Device address null pointer |
| DRV_E_USR_BUF_PTR_NULL | 0x8004C02D | USER Pointer to buffer is a null pointer |
| DRV_E_USR_SENDSIZE_TOO_LONG | 0x8004C02E | USER Parameter SendSize too large |
| DRV_E_USR_RECVSIZE_TOO_LONG | 0x8004C02F | USER Parameter ReceiveSize too large |
| DRV_E_USR_SENDBUF_PTR_NULL | 0x8004C030 | USER Pointer to send buffer is a null pointer |
| DRV_E_USR_RECVBUF_PTR_NULL | 0x8004C031 | USER Pointer to receive buffer is a null pointer |
| DRV_E_DMA_INSUFF_MEM | 0x8004C032 | DMA Memory allocation error |
| DRV_E_DMA_TIMEOUT_CH4 | 0x8004C033 | DMA Read I/O timeout |
| DRV_E_DMA_TIMEOUT_CH5 | 0x8004C034 | DMA Write I/O timeout |
| DRV_E_DMA_TIMEOUT_CH6 | 0x8004C035 | DMA PCI transfer timeout |
| DRV_E_DMA_TIMEOUT_CH7 | 0x8004C036 | DMA Download timeout |
| DRV_E_DMA_DB_DOWN_FAIL | 0x8004C037 | DMA Database download failed |
| DRV_E_DMA_FW_DOWN_FAIL | 0x8004C038 | DMA Firmware download failed |
| DRV_E_CLEAR_DB_FAIL | 0x8004C039 | DMA Clear database on the device failed |
| DRV_E_DEV_NO_VIRTUAL_MEM | 0x8004C03C | DMA USER Virtual memory not available |
| DRV_E_DEV_UNMAP_VIRTUAL_MEM | 0x8004C03D | DMA USER Unmap virtual memory failed |
| DRV_E_GENERAL_ERROR | 0x8004C046 | DRIVER General error |
| DRV_E_DMA_ERROR | 0x8004C047 | DRIVER General DMA error |
| DRV_E_WDG_IO_ERROR | 0x8004C048 | DRIVER I/O WatchDog failed |
| DRV_E_WDG_DEV_ERROR | 0x8004C049 | DRIVER Device Watchdog failed |
| DRV_E_USR_DRIVER_UNKNOWN | 0x8004C050 | USER Driver unknown |
| DRV_E_USR_DEVICE_NAME_INVALID | 0x8004C051 | USER Device name invalid |
| DRV_E_USR_DEVICE_NAME_UNKNOWN | 0x8004C052 | USER Device name unknown |
| DRV_E_USR_DEVICE_FUNC_NOTIMPL | 0x8004C053 | USER Device function not implemented |
| DRV_E_USR_FILE_OPEN_FAILED | 0x8004C064 | USER File could not be opened |
| DRV_E_USR_FILE_SIZE_ZERO | 0x8004C065 | USER File size zero |
| DRV_E_USR_FILE_NO_MEMORY | 0x8004C066 | USER Not enough memory to load file |
| DRV_E_USR_FILE_READ_FAILED | 0x8004C067 | USER File read failed |
| DRV_E_USR_INVALID_FILETYPE | 0x8004C068 | USER File type invalid |
| DRV_E_USR_FILENAME_INVALID | 0x8004C069 | USER Invalid filename |
| DRV_E_FW_FILE_OPEN_FAILED | 0x8004C06E | USER Firmware file could not be opened |
| DRV_E_FW_FILE_SIZE_ZERO | 0x8004C06F | USER Not enough memory to load firmware file |
| DRV_E_FW_FILE_NO_MEMORY | 0x8004C070 | USER Not enough memory to load firmware file |
| DRV_E_FW_FILE_READ_FAILED | 0x8004C071 | USER Firmware file read failed |
| DRV_E_FW_INVALID_FILETYPE | 0x8004C072 | USER Firmware file type invalid |
| DRV_E_FW_FILENAME_INVALID | 0x8004C073 | USER Firmware file name not valid |
| DRV_E_FW_DOWNLOAD_ERROR | 0x8004C074 | USER Firmware file download error |
| DRV_E_FW_FILENAME_NOT_FOUND | 0x8004C075 | USER Firmware file not found in the internal table |
| DRV_E_FW_BOOTLOADER_ACTIVE | 0x8004C076 | USER Firmware file BOOTLOADER active |

| cifX Driver Specific ODM Error Codes | | |
|--------------------------------------|------------|---|
| Error Code (Definition) | Value | Description |
| DRV_E_FW_NO_FILE_PATH | 0x8004C077 | USER Firmware file no file path |
| DRV_E_CF_FILE_OPEN_FAILED | 0x8004C078 | USER Configuration file could not be opened |
| DRV_E_CF_FILE_SIZE_ZERO | 0x8004C079 | USER Configuration file size zero |
| DRV_E_CF_FILE_NO_MEMORY | 0x8004C07A | USER Not enough memory to load configuration file |
| DRV_E_CF_FILE_READ_FAILED | 0x8004C07B | USER Configuration file read failed |
| DRV_E_CF_INVALID_FILETYPE | 0x8004C07C | USER Configuration file type invalid |
| DRV_E_CF_FILENAME_INVALID | 0x8004C07D | USER Configuration file name not valid |
| DRV_E_CF_DOWNLOAD_ERROR | 0x8004C07E | USER Configuration file download error |
| DRV_E_CF_FILE_NO_SEGMENT | 0x8004C07F | USER No flash segment in the configuration file |
| DRV_E_CF_DIFFERS_FROM_DBM | 0x8004C080 | USER Configuration file differs from database |
| DRV_E_DBM_SIZE_ZERO | 0x8004C083 | USER Database size zero |
| DRV_E_DBM_NO_MEMORY | 0x8004C084 | USER Not enough memory to upload database |
| DRV_E_DBM_READ_FAILED | 0x8004C085 | USER Database read failed |
| DRV_E_DBM_NO_FLASH_SEGMENT | 0x8004C086 | USER Database segment unknown |
| DEV_E_CF_INVALID_DESCRIPTOR_VERSION | 0x8004C096 | CONFIG Version of the descriptor table invalid |
| DEV_E_CF_INVALID_INPUT_OFFSET | 0x8004C097 | CONFIG Input offset is invalid |
| DEV_E_CF_NO_INPUT_SIZE | 0x8004C098 | CONFIG Input size is 0 |
| DEV_E_CF_MISMATCH_INPUT_SIZE | 0x8004C099 | CONFIG Input size does not match configuration |
| DEV_E_CF_INVALID_OUTPUT_OFFSET | 0x8004C09A | CONFIG Invalid output offset |
| DEV_E_CF_NO_OUTPUT_SIZE | 0x8004C09B | CONFIG Output size is 0 |
| DEV_E_CF_MISMATCH_OUTPUT_SIZE | 0x8004C09C | CONFIG Output size does not match configuration |
| DEV_E_CF_STN_NOT_CONFIGURED | 0x8004C09D | CONFIG Station not configured |
| DEV_E_CF_CANNOT_GET_STN_CONFIG | 0x8004C09E | CONFIG Cannot get the Station configuration |
| DEV_E_CF_MODULE_DEF_MISSING | 0x8004C09F | CONFIG Module definition is missing |
| DEV_E_CF_MISMATCH_EMPTY_SLOT | 0x8004C0A0 | CONFIG Empty slot mismatch |
| DEV_E_CF_MISMATCH_INPUT_OFFSET | 0x8004C0A1 | CONFIG Input offset mismatch |
| DEV_E_CF_MISMATCH_OUTPUT_OFFSET | 0x8004C0A2 | CONFIG Output offset mismatch |
| DEV_E_CF_MISMATCH_DATA_TYPE | 0x8004C0A3 | CONFIG Data type mismatch |
| DEV_E_CF_MODULE_DEF_MISSING_NO_SI | 0x8004C0A4 | CONFIG Module definition is missing,(no Slot/Idx) |

Table 60: cifX Driver Specific ODM Error Codes

11.5 Error Codes cifX Device Driver and netX Driver

11.5.1 Generic Error Codes

| Error Code (Definition) | Value | Description |
|-----------------------------------|-------------|---|
| CIFX_INVALID_POINTER | 0x800A0001L | Invalid pointer (NULL) passed to driver |
| CIFX_INVALID_BOARD | 0x800A0002L | No board with the given nameindex available |
| CIFX_INVALID_CHANNEL | 0x800A0003L | No channel with the given index available |
| CIFX_INVALID_HANDLE | 0x800A0004L | Invalid handle passed to driver |
| CIFX_INVALID_PARAMETER | 0x800A0005L | Invalid parameter |
| CIFX_INVALID_COMMAND | 0x800A0006L | Invalid command |
| CIFX_INVALID_BUFFERSIZE | 0x800A0007L | Invalid buffer size |
| CIFX_INVALID_ACCESS_SIZE | 0x800A0008L | Invalid access size |
| CIFX_FUNCTION_FAILED | 0x800A0009L | Function failed |
| CIFX_FILE_OPEN_FAILED | 0x800A000AL | File could not be opened |
| CIFX_FILE_SIZE_ZERO | 0x800A000BL | File size is zero |
| CIFX_FILE_LOAD_INSUFF_MEM | 0x800A000CL | Insufficient memory to load file |
| CIFX_FILE_CHECKSUM_ERROR | 0x800A000DL | File checksum compare failed |
| CIFX_FILE_READ_ERROR | 0x800A000EL | Error reading from file |
| CIFX_FILE_TYPE_INVALID | 0x800A000FL | Invalid file type |
| CIFX_FILE_NAME_INVALID | 0x800A0010L | Invalid file name |
| CIFX_FUNCTION_NOT_AVAILABLE | 0x800A0011L | Driver function not available |
| CIFX_BUFFER_TOO_SHORT | 0x800A0012L | Given buffer is too short |
| CIFX_MEMORY_MAPPING_FAILED | 0x800A0013L | Failed to map the memory |
| CIFX_NO_MORE_ENTRIES | 0x800A0014L | No more entries available |
| CIFX_CALLBACK_MODE_UNKNOWN | 0x800A0015L | Unkown callback handling mode |
| CIFX_CALLBACK_CREATE_EVENT_FAILED | 0x800A0016L | Failed to create callback events |
| CIFX_CALLBACK_CREATE_RECV_BUFFER | 0x800A0017L | Failed to create callback receive buffer |

Table 61: Generic Error Codes

11.5.2 Generic Driver Error Codes

| Error Code (Definition) | Value | Description |
|--|-------------|--|
| CIFX_DRV_NOT_INITIALIZED | 0x800B0001L | Driver not initialized |
| CIFX_DRV_INIT_STATE_ERROR | 0x800B0002L | Driver init state error |
| CIFX_DRV_READ_STATE_ERROR | 0x800B0003L | Driver read state error |
| CIFX_DRV_CMD_ACTIVE | 0x800B0004L | Command is active on device |
| CIFX_DRV_DOWNLOAD_FAILED | 0x800B0005L | General error during download |
| CIFX_DRV_WRONG_DRIVER_VERSION | 0x800B0006L | Wrong driver version |
| CIFX_DRV_DRIVER_NOT_LOADED | 0x800B0030L | CIFx driver is not running |
| CIFX_DRV_INIT_ERROR | 0x800B0031L | Failed to initialize the device |
| CIFX_DRV_CHANNEL_NOT_INITIALIZED | 0x800B0032L | Channel not initialized (xOpenChannel not called) |
| CIFX_DRV_IO_CONTROL_FAILED | 0x800B0033L | IOControl call failed |
| CIFX_DRV_NOT_OPENED(| 0x800B0034L | Driver was not opened |
| CIFX_DRV_DOWNLOAD_STORAGE_UNKN OWN | 0x800B0040L | Unknown download storage type (RAMFLASH based) found |
| CIFX_DRV_DOWNLOAD_FW_WRONG_CHA NNEL | 0x800B0041L | Channel number for a firmware download not supported |
| CIFX_DRV_DOWNLOAD_MODULE_NO_BAS EOS | 0x800B0042L | Modules are not allowed without a Base OS firmware |

Table 62: Generic Driver Error Codes

11.5.3 Generic Device Error Codes

| Error Code (Definition) | Value | Description |
|-----------------------------------|-------------|---|
| CIFX_DEV_DPM_ACCESS_ERROR | 0x800C0010L | Dual port memory not accessible (board not found) |
| CIFX_DEV_NOT_READY | 0x800C0011L | Device not ready (ready flag failed) |
| CIFX_DEV_NOT_RUNNING | 0x800C0012L | Device not running (running flag failed) |
| CIFX_DEV_WATCHDOG_FAILED | 0x800C0013L | Watchdog test failed |
| CIFX_DEV_SYSERR | 0x800C0015L | Error in handshake flags |
| CIFX_DEV_MAILBOX_FULL | 0x800C0016L | Send mailbox is full |
| CIFX_DEV_PUT_TIMEOUT | 0x800C0017L | Send packet timeout |
| CIFX_DEV_GET_TIMEOUT | 0x800C0018L | Receive packet timeout |
| CIFX_DEV_GET_NO_PACKET | 0x800C0019L | No packet available |
| CIFX_DEV_MAILBOX_TOO_SHORT | 0x800C001AL | Mailbox too short |
| CIFX_DEV_RESET_TIMEOUT | 0x800C0020L | Reset command timeout |
| CIFX_DEV_NO_COM_FLAG | 0x800C0021L | COM-flag not set |
| CIFX_DEV_EXCHANGE_FAILED | 0x800C0022L | IO data exchange failed |
| CIFX_DEV_EXCHANGE_TIMEOUT | 0x800C0023L | IO data exchange timeout |
| CIFX_DEV_COM_MODE_UNKNOWN | 0x800C0024L | Unknown IO exchange mode |
| CIFX_DEV_FUNCTION_FAILED | 0x800C0025L | Device function failed |
| CIFX_DEV_DPMSIZE_MISMATCH | 0x800C0026L | DPM size differs from configuration |
| CIFX_DEV_STATE_MODE_UNKNOWN | 0x800C0027L | Unknown state mode |
| CIFX_DEV_HW_PORT_IS_USED | 0x800C0028L | Device is still accessed |
| CIFX_DEV_CONFIG_LOCK_TIMEOUT | 0x800C0029L | Configuration locking timeout |
| CIFX_DEV_CONFIG_UNLOCK_TIMEOUT | 0x800C002AL | Configuration unlocking timeout |
| CIFX_DEV_HOST_STATE_SET_TIMEOUT | 0x800C002BL | Set HOST state timeout |
| CIFX_DEV_HOST_STATE_CLEAR_TIMEOUT | 0x800C002CL | Clear HOST state timeout |
| CIFX_DEV_INITIALIZATION_TIMEOUT | 0x800C002DL | Timeout during channel initialization |
| CIFX_DEV_BUS_STATE_ON_TIMEOUT | 0x800C002EL | Set Bus ON Timeout |
| CIFX_DEV_BUS_STATE_OFF_TIMEOUT | 0x800C002FL | Set Bus OFF Timeout |
| CIFX_DEV_MODULE_ALREADY_RUNNING | 0x800C0040L | Module already running |
| CIFX_DEV_MODULE_ALREADY_EXISTS | 0x800C0041L | Module already exists |

Table 63: Generic Device Error Codes

11.6 Error Codes netX Driver

11.6.1 CIFS API Transport Error Codes

| Error Code (Definition) | Value | Description |
|-------------------------------------|-------------|---|
| CIFS_TRANSPORT_SEND_TIMEOUT | 0x800D0001L | Time out while sending data |
| CIFS_TRANSPORT_RECV_TIMEOUT | 0x800D0002L | Time out waiting for incoming data |
| CIFS_TRANSPORT_CONNECT | 0x800D0003L | Unable to communicate to the device no answer |
| CIFS_TRANSPORT_ABORTED | 0x800D0004L | Transfer has been aborted due to keep alive timeout or interface detachment |
| CIFS_CONNECTOR_FUNCTIONS_READ_ERROR | 0x800D0010L | Error reading the connector functions from the DLL |
| CIFS_CONNECTOR_IDENTIFIER_TOO_LONG | 0x800D0011L | Connector delivers an identifier longer than 6 characters |
| CIFS_CONNECTOR_IDENTIFIER_EMPTY | 0x800D0012L | Connector delivers an empty identifier |
| CIFS_CONNECTOR_DUPLICATE_IDENTIFIER | 0x800D0013L | Connector identifier already used |

Table 64: CIFS API Transport Error Codes

11.6.2 CIFS API Transport Header State Error Codes

| Error Code (Definition) | Value | Description |
|----------------------------------|-------------|---|
| CIFS_TRANSPORT_ERROR_UNKNOWN | 0x800E0001L | Unknown error code in transport header |
| CIFS_TRANSPORT_CHECKSUM_ERROR | 0x800E0002L | CRC16 checksum failed |
| CIFS_TRANSPORT_LENGTH_INCOMPLETE | 0x800E0003L | Transaction with incomplete length detected |
| CIFS_TRANSPORT_DATA_TYPE_UNKNOWN | 0x800E0004L | Device does not support requested data type |
| CIFS_TRANSPORT_DEVICE_UNKNOWN | 0x800E0005L | Device not available unknown |
| CIFS_TRANSPORT_CHANNEL_UNKNOWN | 0x800E0006L | Channel not available unknown |
| CIFS_TRANSPORT_SEQUENCE | 0x800E0007L | Sequence error detected |
| CIFS_TRANSPORT_BUFFER_OVERFLOW | 0x800E0008L | Buffer overflow detected |
| CIFS_TRANSPORT_RESOURCE | 0x800E0009L | Device signals out of resources |
| CIFS_TRANSPORT_KEEPA_LIVE | 0x800E000AL | Device connection monitoring error (Keep alive) |
| CIFS_TRANSPORT_DATA_TOO_SHORT | 0x800E000BL | Received transaction data too short |

Table 65: CIFS API Transport Header State Error Codes

11.7 ODM Error Codes DBM V4

| ODM Error Codes DBM V4 | | |
|--|-------------------------------|---|
| Error Code (Definition) | Value | Description |
| CDBM_E_MD5_INVALID | 0XC004C810 | Checksum invalid |
| CDBM_E_INTERNALERROR | 0XC004C811 | Internal Error |
| CDBM_W_WRITEREGISTRY | 0X8004C812 | Error writing to the registry |
| CDBM_E_UNEXPECTED_VALUE_IN_OLD_HEADER_FORMAT | 0XC004C813 | Error in a file containing the old DBM Header format. |
| CDBM_E_CHECKSUM_INVALID | 0XC004C814 | The Checksum of the old Header is invalid |
| CDBM_E_DB_ALREADY_LOADED_FORMAT | 0XC004C815 | A database is already loaded |
| CDBM_E_NO_VALID_TRANSACTION | 0XC004C816 | No valid transaction handle given |
| CDBM_E_STD_STRUCT_ERROR | 0XC004C817 | An error occurred during validation of data |
| CDBM_E_UNSUPPORTED_DATA_TYPE_FORMAT | 0XC004C818 | Unsupported DataType |
| CDBM_W_CLASS_DELETED_FORMAT | 0X8004C819 (Warning) | Using an Object which is marked as deleted |
| CDBM_W_CLIENT_DISCONNECTED | 0X8004C81A (Warning) | A Client has already an outstanding connection to a Table. The connection is now destroyed. |
| CDBM_E_STRUCTURE_DEFINITION_INVALID | 0XC004C81B | A structure definition of an Element in a Table is invalid |
| CDBM_E_NO_DATA_AVAILABLE | 0XC004C81C | No data available for this operation |
| CDBM_E_NO_VALID_STRUCTURE | 0XC004C81D | No valid structure available for this operation |
| CDBM_E_NO_TOGGLE_STRING_FOUND | 0XC004C81E | No Toggle string found for this number |
| CDBM_E_ELEMENT_OUT_OF_RANGE | 0XC004C81F | An element wasn't found in the Record of a Table |
| CDBM_E_ELEMENT_NOT_IN_TABLE | 0XC004C820 | The element is not part of the Table |
| CDBM_E_CANNOT_CONVERT_INTO_CLIENT_TYPE | 0XC004C821 | The data can't be converted into the Client type |
| CDBM_E_TRANSACTION_ALREADY_OPEN | 0XC004C822 | A transaction is already open. Please close this one first before opening a new one. |
| CDBM_I_OLD_WITHOUT_HEADER | 0X4004C823 (Informational) | Use of an old DBM file Format without Header |
| CDBM_E_HR_FROM | 0XC004C824 | An HRESULT was received from a Subroutine |
| CDBM_E_PARAMETER | 0XC004C825 | A Parameter is invalid |
| CDBM_E_NOTIMPL | 0XC004C826 | Method is currently not implemented |
| CDBM_E_OUTOFMEMORY | 0XC004C827 | Out of memory |
| CDBM_E_NO_OPEN_TRANSACTION | 0XC004C828 | No transaction open |
| CDBM_E_NO_CONTENTS | 0XC004C829 | No contents available |
| CDBM_REC_NO_NOT_FOUND | 0XC004C82A | Record not found |
| CDBM_STRUCTURE_ELEMENT_NOT_FOUND | 0XC004C82B | Element of the Structure not found |
| CDBM_E_NO_MORE_RECORDS_IN_TABTYPE | 0XC004C82C | Table type 3 can contain only one record |
| CDBM_E_WRITE | 0XC004C82D | The data in the VARIANT must be given in a SafeArray |
| CDBM_E_WRITE_NO_PARRAY | 0XC004C82E | The VARIANT contains no valid [parray] element |

| ODM Error Codes DBM V4 | | |
|--|-------------------------------|---|
| Error Code (Definition) | Value | Description |
| CDBM_E_WRITE_CANT_ACCESS_DATA | 0XC004C82F | Unable to access SafeArray Data in the VARIANT |
| CDBM_E_WRITE_DATA | 0XC004C830 | To write the data of this Element it must be given as a BSTR, or as an Array of VT_UI1/VT_I1 |
| CDBM_E_WRITE_BSTR_E1 | 0XC004C831 | The BSTR string must have an even length. |
| CDBM_E_WRITE_BSTR_E2 | 0XC004C832 | The BSTR string must contain only hex digits (0..9 and a/A..f/F). |
| CDBM_E_WRITE_CANT_INTERPRET_ARRAY | 0XC004C833 | Unable to interpret data in the SafeArray. |
| CDBM_E_WRITE_VT_ERROR | 0XC004C834 | Data type in the SafeArray is not VT_UI1 or VT_I1. |
| CDBM_E_WRITE_LENGTH | 0XC004C835 | Data length is invalid for write operation of this type. |
| CDBM_WRITE_ELEMENT | 0XC004C836 | Element not found in the Record of the Table |
| CDBM_MIN_MAX_ERROR | 0XC004C837 | Can't write data because of min underflow or max overflow |
| CDBM_TABLE_EXIST | 0XC004C838 | Table already exist in the database |
| CDBM_MIN_MAX_INVALID | 0XC004C839 | The Min value is greater than the Max Value |
| CDBM_DEF_MIN_MAX_INVALID | 0XC004C83A | The Default Value is not in the range between the Min value and the Max Value |
| CDBM_CANT_CHANGE_STRUCTURE_WHILE_RECORDS_EXIST | 0XC004C83B | It's not allowed to change the structure while Records exist in the Table |
| CDBM_NEW_STRUCT_NEEDS_TYPE | 0XC004C83C | In a newly added structure the data type must be set also |
| CDBM_VALUE_ERROR | 0XC004C83D | Range error while validating a value |
| CDBM_DATATYPE_UNSUPPORTED_IN_RCS | 0XC004C83E | The data type is unsupported in the RCS file format |
| CDBM_I_COUNT_OF_TABLES_EXCEEDS_RCS_RANGE | 0X4004C83F (Informational) | The count of Tables exceeds the RCS range of Tables. This can cause problems if the file is downloaded to RCS Systems |
| CDBM_I_COUNT_OF_TABLES_EXCEEDS_OLDDBM_RANGE | 0X4004C840 (Informational) | The count of Tables exceeds the DBM32.DLL range of Tables. This can cause problems if the file is used with older Tools using the DBM32.DLL |
| CDBM_UNSUPPORTED_DATATYPE_IN_RCS_MODE | 0XC004C841 | The Data type is not compatible with the old database format |
| CDBM_WRITE_UNSTRUCTURED_1 | 0XC004C842 | The data of an unstructured record can only be written with the 'Write' Method not with 'WriteElement'. |
| CDBM_READ_UNSTRUCTURED_1 | 0XC004C843 | The data of an unstructured record can only be read with the 'Read' Method not with 'ReadElement' |
| CDBM_WRITE_DATA_LENGTH_INVALID | 0XC004C844 | The given data length doesn't correspond with the expected data length. |
| CDBM_UNKNOWN_VIEW_MODE | 0XC004C845 | The View Mode is unknown. |
| CDBM_E_DIAG_TABLE | 0XC004C846 | It doesn't make much sense to add or delete records from a diagnostic table because those changes are never saved. |
| CDBM_E_ADR_STRING_ERROR | 0XC004C847 | The given Address string doesn't fit the required format of this type where all address bytes must be in the range between 0 and FF |

| ODM Error Codes DBM V4 | | |
|--|-------------------------------|---|
| Error Code (Definition) | Value | Description |
| CDBM_ERROR_FROM_VAR_CHANGE_TYPE | 0XC004C848 | Function VariantChangeType return an error when trying to convert the Parameter |
| CDBM_E_MINERROR | 0XC004C849 | Error while comparing the Value with the lower range |
| CDBM_E_MAXERROR | 0XC004C84A | Error while comparing the Value with the upper range |
| CDBM_E_RANGE_ERROR | 0XC004C84B | Value out of Range |
| CDBM_E_TABLE_TYPE1 | 0XC004C84C | Table type 1 doesn't have a unique record length over all records |
| CDBM_E_TABLE_TYPE3_ADDREC | 0XC004C84D | Table type 3 doesn't allow to insert more than one Record |
| CDBM_E_TABTYPE1 | 0XC004C84E | It's not allowed to insert more Records than structure definitions in Table Type 1 |
| CDBM_E_TOGGLE_NOT_FOUND | 0XC004C84F | Could not find the string for this value in the list of valid toggle strings |
| CDBM_E_TOGGLE_VALUE_IS_EMPTY_STRING | 0XC004C850 | The toggle string for this value is empty. |
| CDBM_VARIANT2BYTEARRAY_ERROR | 0XC004C851 | Error during conversion of Variant to byte array |
| CDBM_E_SET_ELEM_PROP_DEPENDENCY | 0XC004C852 | The Toggle Type needs also the additional string and the additional number entries in the Method |
| CDBM_E_TABTYPE1_REC_DOESNT_CORRESPOND_WITH_ELEMENT | 0XC004C853 | When reading the records of Table type 1 elementwise the record number must correspond with the element number |
| CDBM_TABTYPE1_NO_DATA_FOUND_FOR_RECORD | 0XC004C854 | When reading the records of Table type 1 and structure definitions are present it's assumed that for each structure element a corresponding record must exist |
| CDBM_E_TABTYPE1_WRITE_ELEMENT_NE_RECORD | 0XC004C855 | When writing the records of Table type 1 elementwise and structure definitions are present it's only allowed to write the corresponding element number in each record |
| CDBM_E_TABTYPE1_WRITE_ELEMENT_NOT_FOUND | 0XC004C856 | When writing the records of Table type 1 with an array and structure definitions are present it's assumed that a corresponding element number of this record exist |
| CDBM_I_TABLE_NAME_EXCEEDS_RCS_RANGE | 0X4004C857 (Informational) | The Table name exceeds the maximum length of RCS compatible Table names |
| CDBM_W_CUT_STRING | 0X8004C858 (Warning) | The string exceeds the maximum length and will be limited to the maximum length |
| CDBM_I_STRING_TOO_SHORT | 0X4004C859 (Informational) | The string is below the minimum length. The minimum length will be reduced. |
| CDBM_I_STRING_TOO_LONG | 0X4004C85A (Informational) | The string is exceeding the maximum. The maximum length will be extended. |
| CDBM_E_STRING_TOO_SHORT | 0XC004C85B (Error) | The string is below the minimum length. |
| CDBM_E_STRING_TOO_LONG | 0XC004C85C (Error) | The string is exceeding the maximum length |
| CDBM_E_WRONG_TYPE_FOR_WRITE | 0XC004C85D | Writing on the Element type with the given Data type is not implemented |
| CDBM_E_NO_APPEND_IN_STRUCTURED_RECORDS | 0XC004C85E | Method IDbmRecord::AppendData is not allowed for structured records |

| ODM Error Codes DBM V4 | | |
|---|------------|--|
| Error Code (Definition) | Value | Description |
| CDBM_E_DATA_UNAVAILABLE | 0XC004C85F | No data available |
| CDBM_E_CANT_CONVERT_INT | 0XC004C860 | Unable to convert the value into the Element type |
| CDBM_E_DBM_FILE_OVERFLOW | 0XC004C861 | You try to write a RCS like database which needs too much bytes |
| CDBM_E_PW_ERROR | 0XC004C862 | Password not correct |
| CDBM_E_FILELENGTH_CORRUPT | 0XC004C863 | The file length doesn't correspond to the length given in the Header. |
| CDBM_E_STRUCT_TYPE | 0XC004C864 | Error in the file. |
| CDBM_E_MD5SUM_INVALID | 0XC004C865 | MD5 sum invalid |
| CDBM_E_STRUCT_LENGTH | 0XC004C866 | Error in the expected and given structure length at a specific offset in the file. |
| CDBM_E_APPEND | 0XC004C867 | Append of data is only allowed if the Record contains only one data field and the field type will support this |
| CDBM_APPEND_NOT_SUPPORTED | 0XC004C868 | Append of Data not supported by this filed type |
| CDBM_DATA_TYPE_APPEND_ERROR | 0XC004C869 | Can't append Data of this type. |
| CDBM_E_UNSTRUCTURED_TABLE_DOESNT_SUPPORT_LENGTH | 0XC004C86A | A Table without structure information doesn't support a record length |
| CDBM_E_DISABLED_WHILE_TRANSACTION_IS_OPEN | 0XC004C86B | The Method is disabled while a transaction is open. Please close this one first and call the Method again. |
| CDBM_E_UNABLE_TO_CALL_READ_ON_LINKED_LIST | 0XC004C86C | The Method is disabled on a LinkedList type. Please use the IRecordCollection on this type. |
| CDBM_E_ELEMENT_HAS_NO_SUBSTRUCTURE | 0XC004C86D | An Element from a Table has no substructure |
| CDBM_STRUCT_ERROR_FROM_VAR_CHANGE_TYPE | 0XC004C86E | Error from calling VariantChangeType |
| CDBM_E_FOREIGNKEY_DEF | 0XC004C86F | The definition of a FOREIGNKEY must contain the name of the related Table in the description and this Table must exist at this time |
| CDBM_E_FOREIGNKEY_REF_TAB | 0XC004C870 | The description of a FOREIGNKEY must refer to a Table of type 'eDbmTableTypeLinkedList' |
| CDBM_E_KEY | 0XC004C871 | To create a Record Collection with a KEY it's necessary to have the data type KEY at the first position in all Records of the searched Table |
| CDBM_E_KEY_TABLE_TYPE | 0XC004C872 | This Method needs a Table of type 'eDbmTableTypeLinkedList' |
| CDBM_DATATYPE_NOT_IMPLEMENTED | 0XC004C873 | This data type is currently not implemented |
| CDBM_INSERT_POS_NOT_FOUND | 0XC004C874 | The position of the Record where the new one should be inserted wasn't found |
| CDBM_E_INSERT_REC_QI | 0XC004C875 | Error during insertion of a Record |
| CDBM_E_TAB_PROP | 0XC004C876 | Invalid Property in Table |
| CDBM_E_KEY_NOT_FOUND | 0XC004C877 | The KEY wasn't found in the Table |
| CDBM_E_KEY_INVALID | 0XC004C878 | The KEY is invalid for this operation |

Table 66: ODM Error Codes DBM V4

12 Appendix

12.1 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**, **Device Description** and **Diagnosis** panes of the EtherCAT Slave 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 **Device Description** panes do not contain any editable elements. The indicated values in are only for information purposes.

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

12.1.1 Settings

| | Observer | Operator | Maintenance | Planning Engineer | Administrator |
|--|----------|----------|-------------|-------------------|---------------|
| <i>Driver</i> | D | D | X | X | X |
| <i>Verify or adapt Driver Settings</i> | - | - | X | X | X |
| <i>Configuring netX Driver</i> | - | - | X | X | X |
| <i>Device Assignment</i> | D | D | X | X | X |
| <i>Scanning for Devices</i> | - | - | X | X | X |
| <i>Selecting the Device (with or without firmware)</i> | - | - | X | X | X |
| <i>Selecting the Device once more (with Firmware)</i> | - | - | X | X | X |
| <i>Firmware Download</i> | D | D | X | X | X |

Table 67: Settings (D = Displaying, X = Editing, Configuring)

12.1.2 Configuration

| | Observer | Operator | Maintenance | Planning Engineer | Administrator |
|-------------------------|----------|----------|-------------|-------------------|---------------|
| <i>General</i> | D | D | X | X | X |
| <i>General Settings</i> | D | D | X | X | X |
| <i>Behavior</i> | D | D | X | X | X |
| <i>Mailbox</i> | D | D | X | X | X |

Table 68: Configuration (D = Displaying, X = Editing, Configuring)

12.2 References

- [1] Device Type Manager (DTM) Style Guide, Version 1.0 ; FDT-JIG - Order No. <0001-0008-000>
- [2] EtherCAT Communication Specification, August 2007
- [3] EtherCAT Slave Protocol API Manual, Revision 3 (V4), Hilscher GmbH 2013
EtherCAT Slave Protocol API Manual, Revision 21 (V2), Hilscher GmbH 2013

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12.5 Glossary

CoE

CANopen over EtherCAT

CoE denominates a method for accessing an object dictionary which has been adopted for use in EtherCAT from CANopen.

DDF

Device Description File.

DTM

Device Type Manager.

The Device Type Manager (DTM) is a software module with graphical user interface for the configuration or for diagnosis of devices.

E²PROM

Electronically erasable Programmable Read-Only Memory

E-Bus

Bus system based on LVDS standard (specified in the ANSI/TIA/EIA-644-1995 standard)

EDS

Electronic Data Sheet

EtherCAT-Master

A device which is responsible for the configuration, parameterization of the EtherCAT segment, all connected devices' controllers, and cyclic process data exchange, mailbox and diagnostics services.

EtherCAT-Port

Physical type of data transmission used by EtherCAT. An EtherCAT Slave Controller can have up to 4 EtherCAT ports. Can be one of the following three alternatives:

- E-Bus
- 100Base-TX
- 100Base-FX

EtherCAT-Slave

A device which is configured by the Master, receives telegrams with output data, commands from it and provides input and status data.

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

FMMU

Fieldbus Memory Management Unit

A FMMU organizes the mapping of logical EtherCAT addresses to physical addresses.

LVDS

Low Voltage Differential Signals

A data transmission standard specified in ANSI/TIA/EIA-644-1995 and used in Beckhoff's E-Bus.

Object Dictionary

An object dictionary is a storage area for device parameter data structures. It is accessed in standardized manner very similarly as this is done in CANopen.

ODMV3

The Online-Data-Manager Version 3 (ODMV3) is an application interface. The ODMV3 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.

PDO

Process Data Object

Specific data object for cyclic data communication.

SDO

Service Data Object

Specific data object for acyclic data communication, i.e. mailbox-based communication. It is typically used for accessing the object dictionary.

Sync Manager

Synchronization Manager

A sync manager synchronizes the data communication on a specific communication channel. It is configured for managing either input or output and for working either cyclically or acyclically based on mailboxes. Configuration is done within the DDF file. Up to 4 sync managers numbered 0 to 3 can be configured.

XML

Extensible Markup Language

A versatile data storage format defined by the World Wide Web Consortium (W3C). It is based on elements and attributes. In EtherCAT, it is used in device descriptions stored in DDF files.

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