Operating Instruction Manual

# Generic Slave DTM for DeviceNet Slave Devices

## Configuration of DeviceNet Slave Devices

## V1.1100

**Hilscher Gesellschaft für Systemautomation mbH**

**www.hilscher.com**

DOC041201OI11EN | Revision 11 | English | 2019-04 | Released | Public

# Table of Contents

# 1 Introduction

## 1.1 About this Manual

This manual provides information on how to set up DeviceNet Slave devices described with EDS files. These devices can be configured with the DeviceNet generic Slave DTM within an FDT Framework.

**Dialog Panes**

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

| Section | Subsection | Manual Page |
|---|---|---|
| *Configuration* | *General Settings* | *18* |
| | *Connection Configuration* | *19* |
| | *Poll Connection* | *20* |
| | *Change of State Connection* | *22* |
| | *Cyclic Connection* | *24* |
| | *Bit-Strobe Connection* | *25* |
| | *Parameter* | *27* |
| *Device Description* | *Device* | *29* |
| | *EDS* | 30 |

*Table 1: Descriptions Dialog Panes*

### 1.1.1 Online Help

The generic DeviceNet Slave DTM contains an integrated online help facility.

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

### 1.1.2 List of Revisions

| Index | Date | Version | Chapter | Revision |
|---|---|---|---|---|
| 9 | 17-02-23 | 1.107 (and 1.0107) | 1.4.1 | Section *Requirements* Internet access added, Windows 8.1 and Windwos 10 added. |
| 10 | 18-02-14 | 1.107 (and 1.0107) | | Versioning information revised (title page and this section). |
| 11 | 19-04-05 | 1.1100 | 3.4.1 | Section *Connection Types* updated (figures and terms). |

*Table 2: List of Revisions*

### 1.1.3 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>

## 1.2 Legal Notes

### Copyright



### Important notes

Utmost care was/is given in the preparation of the documentation at hand consisting of a user's manual, operating manual and any other document type and accompanying texts. However, errors cannot be ruled out. Therefore, we cannot assume any guarantee or legal responsibility for erroneous information or liability of any kind. You are hereby made aware that descriptions found in the user's manual, the accompanying texts and the documentation neither represent a guarantee nor any indication on proper use as stipulated in the agreement or a promised attribute. It cannot be ruled out that the user's manual, the accompanying texts and the documentation do not completely match the described attributes, standards or any other data for the delivered product. A warranty or guarantee with respect to the correctness or accuracy of the information is not assumed.

We reserve the right to modify our products and the specifications for such as well as the corresponding documentation in the form of a user's manual, operating manual and/or any other document types and accompanying texts at any time and without notice without being required to notify of said modification. Changes shall be taken into account in future manuals and do not represent an obligation of any kind, in particular there shall be no right to have delivered documents revised. The manual delivered with the product shall apply.

Under no circumstances shall Hilscher Gesellschaft für Systemautomation mbH be liable for direct, indirect, ancillary or subsequent damage, or for any loss of income, which may arise after use of the information contained herein.

### Liability disclaimer

The hardware and/or software was created and tested by Hilscher Gesellschaft für Systemautomation mbH with utmost care and is made available as is. No warranty can be assumed for the performance or flawlessness of the hardware and/or software under all application

conditions and scenarios and the work results achieved by the user when using the hardware and/or software. Liability for any damage that may have occurred as a result of using the hardware and/or software or the corresponding documents shall be limited to an event involving willful intent or a grossly negligent violation of a fundamental contractual obligation. However, the right to assert damages due to a violation of a fundamental contractual obligation shall be limited to contract-typical foreseeable damage.

It is hereby expressly agreed upon in particular that any use or utilization of the hardware and/or software in connection with

- Flight control systems in aviation and aerospace;
- Nuclear fusion processes in nuclear power plants;
- Medical devices used for life support and
- Vehicle control systems used in passenger transport

shall be excluded. Use of the hardware and/or software in any of the following areas is strictly prohibited:

- For military purposes or in weaponry;
- For designing, engineering, maintaining or operating nuclear systems;
- In flight safety systems, aviation and flight telecommunications systems;
- In life-support systems;
- In systems in which any malfunction in the hardware and/or software may result in physical injuries or fatalities.

You are hereby made aware that the hardware and/or software was not created for use in hazardous environments, which require fail-safe control mechanisms. Use of the hardware and/or software in this kind of environment shall be at your own risk; any liability for damage or loss due to impermissible use shall be excluded.

**Warranty**

Hilscher Gesellschaft für Systemautomation mbH hereby guarantees that the software shall run without errors in accordance with the requirements listed in the specifications and that there were no defects on the date of acceptance. The warranty period shall be 12 months commencing as of the date of acceptance or purchase (with express declaration or implied, by customer's conclusive behavior, e.g. putting into operation permanently).

The warranty obligation for equipment (hardware) we produce is 36 months, calculated as of the date of delivery ex works. The aforementioned provisions shall not apply if longer warranty periods are mandatory by law pursuant to Section 438 (1.2) BGB, Section 479 (1) BGB and Section 634a (1) BGB [Bürgerliches Gesetzbuch; German Civil Code] If, despite of all due care taken, the delivered product should have a defect, which already existed at the time of the transfer of risk, it shall be at our discretion to either repair the product or to deliver a replacement product, subject to timely notification of defect.

The warranty obligation shall not apply if the notification of defect is not asserted promptly, if the purchaser or third party has tampered with the products, if the defect is the result of natural wear, was caused by unfavorable operating conditions or is due to violations against our operating regulations or against rules of good electrical engineering

practice, or if our request to return the defective object is not promptly complied with.

### Costs of support, maintenance, customization and product care

Please be advised that any subsequent improvement shall only be free of charge if a defect is found. Any form of technical support, maintenance and customization is not a warranty service, but instead shall be charged extra.

### Additional guarantees

Although the hardware and software was developed and tested in-depth with greatest care, Hilscher Gesellschaft für Systemautomation mbH shall not assume any guarantee for the suitability thereof for any purpose that was not confirmed in writing. No guarantee can be granted whereby the hardware and software satisfies your requirements, or the use of the hardware and/or software is uninterruptable or the hardware and/or software is fault-free.

It cannot be guaranteed that patents and/or ownership privileges have not been infringed upon or violated or that the products are free from third-party influence. No additional guarantees or promises shall be made as to whether the product is market current, free from deficiency in title, or can be integrated or is usable for specific purposes, unless such guarantees or promises are required under existing law and cannot be restricted.

### Confidentiality

The customer hereby expressly acknowledges that this document contains trade secrets, information protected by copyright and other patent and ownership privileges as well as any related rights of Hilscher Gesellschaft für Systemautomation mbH. The customer agrees to treat as confidential all of the information made available to customer by Hilscher Gesellschaft für Systemautomation mbH and rights, which were disclosed by Hilscher Gesellschaft für Systemautomation mbH and that were made accessible as well as the terms and conditions of this agreement itself.

The parties hereby agree to one another that the information that each party receives from the other party respectively is and shall remain the intellectual property of said other party, unless provided for otherwise in a contractual agreement.

The customer must not allow any third party to become knowledgeable of this expertise and shall only provide knowledge thereof to authorized users as appropriate and necessary. Companies associated with the customer shall not be deemed third parties. The customer must obligate authorized users to confidentiality. The customer should only use the confidential information in connection with the performances specified in this agreement.

The customer must not use this confidential information to his own advantage or for his own purposes or rather to the advantage or for the purpose of a third party, nor must it be used for commercial purposes and this confidential information must only be used to the extent provided for in this agreement or otherwise to the extent as expressly authorized by the disclosing party in written form. The customer has the right, subject to the obligation to confidentiality, to disclose the terms and conditions of this agreement directly to his legal and financial consultants as would be required for the customer's normal business operation.

**Export provisions**

The delivered product (including technical data) is subject to the legal export and/or import laws as well as any associated regulations of various countries, especially such laws applicable in Germany and in the United States. The products / hardware / software must not be exported into such countries for which export is prohibited under US American export control laws and its supplementary provisions. You hereby agree to strictly follow the regulations and to yourself be responsible for observing them. You are hereby made aware that you may be required to obtain governmental approval to export, reexport or import the product.

## 1.3 Registered Trademarks

Windows® XP, Windows® Vista, Windows® 7, Windows® 8, Windows® 8.1 and Windows® 10 are registered trademarks of Microsoft Corporation.

DeviceNet™ is a trademark of ODVA (Open DeviceNet Vendor Association, Inc).

All other mentioned trademarks are property of their respective legal owners.

## 1.4 About Generic DeviceNet Slave DTM

You can use the DeviceNet generic Slave DTM to configure the DeviceNet Slave devices described with EDS files within a FDT Framework.

The information necessary for the configuration of the DeviceNet Slave devices is stored within the DeviceNet Master device when using the DeviceNet generic Slave DTM and thus the Master device is configured.

### 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 DeviceNet Generic Slave DTM**

Requirements for working with the DeviceNet generic Slave DTM are:

- Installed FDT/DTM V 1.2 compliant frame application
- Installed DeviceNet Master DTM
- EDS file of the devices to be configured
- The user needs to reload the Device Catalog

**Loading EDS files**

To add devices to the **netDevice** device catalog, you must import the EDS file of the used device via **netDevice** menu **Network > Import Device Descriptions ….** into the EDS folder of the DTM. Then the Device Cataloge must be reloaded. The folder EDS inclusively Windows® XP is located in the application data directory (All Users) of the configuration software (or from with Windows® 7 on in the *C:\ProgramData\ SYCONnet* directory).

For further information refer to section *Configuration Steps* on page 15 , under step 1 and 2.

## 1.5 Dialog Structure of the Generic DeviceNet 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.

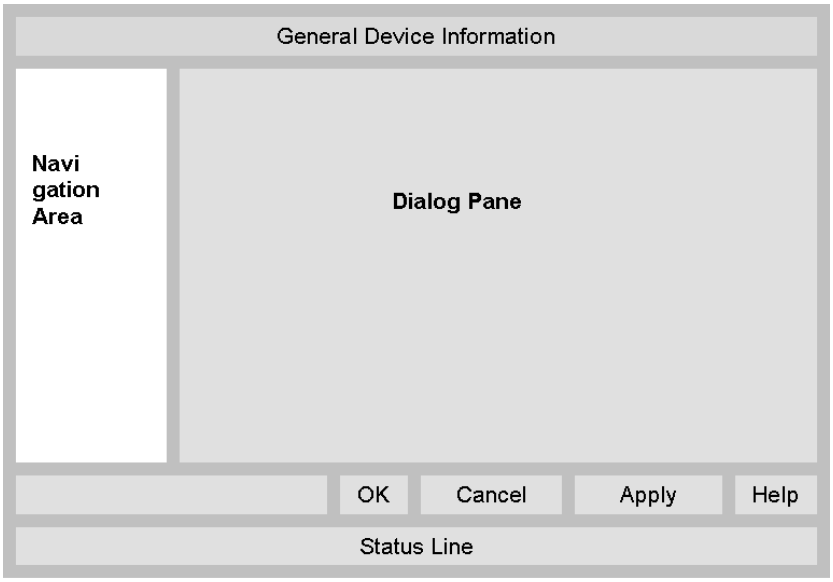



*Figure 1: Dialog Structure of the Generic DeviceNet Slave DTM*

### 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.

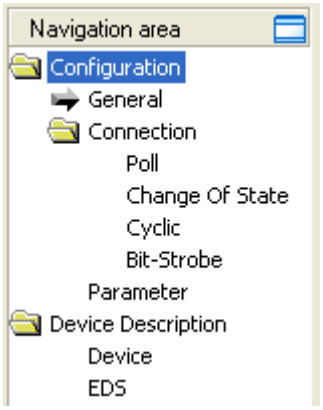



*Figure 2: Navigation Area*

➢ Select the required folder and subfolder.

➢ The corresponding Dialog pane is displayed.

**Hide / display Navigation**

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

## 1.5.3 Dialog Panes

At the dialog pane the **Settings** or **Device Description** panes are opened via the corresponding folder in the navigation area.

| **Configuration** | |
|---|---|
| General | On the page **General Settings** the MAC-ID can be read and the parameters 'UCMM ', 'Fragmentation Timeout' or 'Verify Device ID' can be preset. Further information to this you find in section *General Settings* on page *18*. |
| …Connection Configuration | On the page **Connection Configuration** a connection type can be selected and configured. Further information to this you find in section *Connection Configuration* on page *19*. |
| Parameters | In the **Parameter** dialog the parameter data of the device can be edited. A detailed description you find in section *Parameter* on page *27.* |
| **Device Description** | |
| Device | The **Device Info** pane contains the manufacturer information about the device. For further information see section *Device* on page *29.* |
| EDS | By use of the **EDS Viewer** an EDS file can be viewed and searched through. For further information see section *EDS* on page 30. |

*Table 4: Overview Dialog Panes*

### 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.<br>*The dialog then closes.* |
| **Cancel** | To cancel your latest changes, click **Cancel**.<br>Answer to the safety query **Configuration data has been changed. Do you want to save the data?** by **Yes**, **No** or **Cancel**.<br>**Yes**: The changes are saved or the changed values are applied on the frame application database.<br>*The dialog then closes.*<br>**No**: The changes are not saved or the changed values are not applied on the frame application database.<br>*The dialog then closes.*<br>**Cancel**: *Back to the DTM.* |
| **Apply** | To confirm your latest settings, click **Apply**. All changed values will be applied on the frame application database.<br>*The dialog remains opened.* |
| **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.

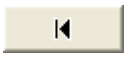
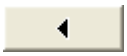
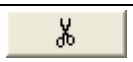
| | Meaning |
|---|---|
|  | To select the first line of a table use **First Line**. |
|  | To select the previous line of a table use **Previous Line**. |
|  | To select the next line of a table use **Next Line**. |
|  | To select the last line of a table use **Last Line**. |
|  | **Create a new Line** 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. the DTM connection state, is signaled graphically via icons in the status bar.

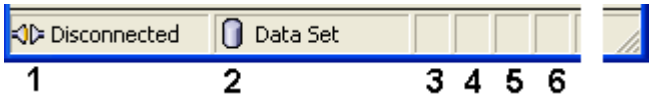
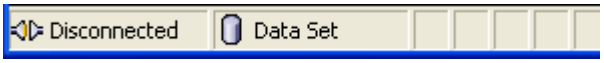



*Figure 3: Status Bar – Status Fields 1 to 6*

| 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). |

*Table 7: Status Bar Icons [1]*

**Offline State**




**Online State**

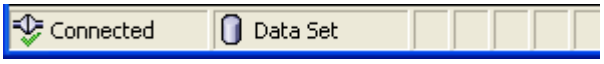



*Figure 4: Status Bar Display Example*

# 2 Getting started

## 2.1 Configuration Steps

The following table describes the steps to configure a DeviceNet Slave device with the DeviceNet generic Slave DTM as it is typical for many cases. At this time it is presupposed that the DeviceNet Master DTM installation was already done.

| # | Step | Short Description | For detailed information see section | Page |
|---|---|---|---|---|
| 1 | Add DeviceNet Slave in the Device Catalog | Add the Device in the Device Catalog by importing the device description file to the Device Catalog.<br>Depending of the FDT Container.<br>For netDevice:<br>- **Network > Import Device Descriptions**. | *(See Operating Instruction Manual netDevice and netProject)* | - |
| 2 | Load device catalog | Depending of the FDT Container:<br>For netDevice:<br>- select **Network > Device Catalog**,<br>- select button **Reload Catalog**. | *(See Operating Instruction Manual netDevice and netProject)* | - |
| 3 | Create new project / Open existing project | Depending of the frame application.<br>For the configuration software:<br>- select **File > New** or **File > Open**. | *(See Operating Instruction Manual of the Frame Application)* | - |
| 4 | Insert Controller or Device into configuration | Depending of the FDT Container:<br>For netDevice:<br>- in the Device Catalog click to the Controller,<br>- and insert the device via drag and drop **to the line** in the network view,<br>- in the Device Catalog click to the Device,<br>- and insert the device via drag and drop **to the Controller bus line** in the network view. | *(See Operating Instruction Manual of the Frame Application)* | - |
| 5 | Configure Device | Configure the Device.<br>- Double click to the device icon of the Device.<br>- The Generic Device DTM configuration dialog is displayed.<br>In the Generic Device DTM configuration dialog:<br>- select **Configuration >General**,<br>- set UCMM and Fragmentation Timeout,<br>- select **Configuration > Connection**,<br>- configure the device connection,<br>- select **Configuration >Parameter**,<br>- set the parameter data of the device,<br>- close the Generic Device DTM configuration dialog via the button **OK**. | *Configuring Device Parameters*<br><br>*General Settings*<br><br>*Connection Configuration*<br><br>*Parameter* | 17<br><br>*18*<br><br>*19*<br><br>*27* |
| 6 | Configuration Steps Controller device | Configure the Controller device via DeviceNet Master DTM. | *(See Operating Instruction Manual DTM for DeviceNet Master devices)* | - |
| 7 | Save project | Depending of the frame application.<br>For the configuration software:<br>- select **File > Save**. | *(See Operating Instruction Manual of the Frame Application)* | - |

*Table 8: Getting started - Configuration Steps*

For information to further steps as **Download Configuration** or **Diagnosis**, refer to the **User Manual** *DTM for DeviceNet Master devices*.

# 3 Configuration

## 3.1 Overview Configuration

**Dialog Panes “Configuration”**

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

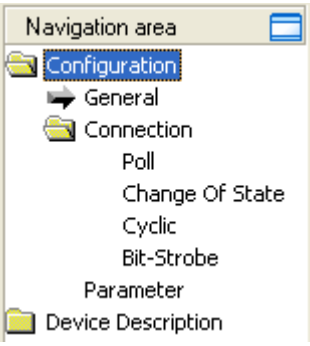
| Generic DeviceNet Slave DTM | Folder Name / Section | Page |
|---|---|---|
|  | *General Settings* | 18 |
| | *Connection Configuration* | 19 |
| | *Poll Connection* | 20 |
| | *Change of State Connection* | 22 |
| | *Cyclic Connection* | 24 |
| | *Bit-Strobe Connection* | 25 |
| | *Parameter* | 27 |

*Table 9: Descriptions of the Dialog Panes Configuration*

Notice the descriptions in the section *Configuration Steps* on page 15.

**Note:** Access to the configuration panes is enabled without requirement of user rights. However for editing certain user rights are required. Further information can be found in section and *User Rights* on page 31.

## 3.2 Configuring Device Parameters

The following steps are needed to configure the device parameters using the Generic DeviceNet Slave DTM:

**General**

1. Set UCMM and Fragmentation Timeout.

➢ Select **Configuration > General** in the navigation area.

**Connection**

2. Configure the device connection.

➢ Select **Configuration > Connection** in the navigation area.

**Parameter**

3. Set the parameter data of the device.

➢ Select **Configuration > Parameter** in the navigation area.

**Close Generic Slave DTM Configuration Dialog**

4. Click **OK** in order to close the Generic Slave configuration dialog and to store your configuration.

**Further Information**

For more information refer to section *General Settings* on page 18, *Connection Configuration* on page 19 and *Parameter* on page 27.

# 3.3 General Settings

The Dialog **General Settings** contains the following configuration possibilities:

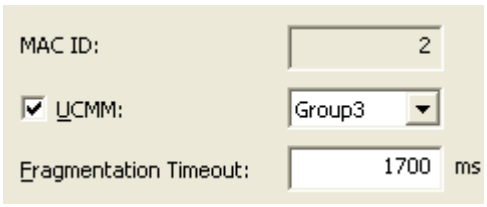



*Figure 5: General Settings - Attributes of the device identification*

| Parameter | Meaning | Range of Value |
|---|---|---|
| **MAC ID** | The **MAC ID** is assigned by the Master and can not be edited here. Changing the MAC ID has to be made with the DeviceNet Master DTM.<br>With each device inserted into the configuration the **MAC ID** is increased automatically by one. | 0 … 63 |
| **UCMM** | If the field **UCMM** is selected, the device is used as UCMM-compatible device.<br>The option **UCMM** is used for devices which need the UCMM message format. Group 1, 2 and 3 are supported. The documentation of the used device gives information whether this option is to be used or not. | Group1,<br>Group2,<br>**Group3** |
| **Fragmentation Timeout** | **Fragmentation Timeout** (Expl. Message Timeout): If an IO data transmission or an Explicit Message is larger than 8 byte, this must be transferred fragmented in the DeviceNet (in several telegrams).<br>The **Fragmentation Timeout** specifies, how long the Master waits, until a Slave answers a fragmented telegram.<br>**Note:** Small values can lead to communication disturbances. | 0 … **1700** … 65535 |

*Table 10: General Settings - Attributes of the device identification*

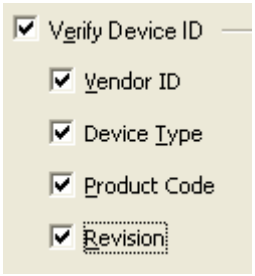



*Figure 6: General Settings - Verify Device ID*

The function **Verify Device ID** compares the device description in the EDS file of the device with the existing hardware, if the device characteristics of the EDS file agree with those of the hardware.

The check is made for the selected attributes in each case.

# 3.4 Connection Configuration

DeviceNet allows establishing several kinds of **Connections** between devices. In DeviceNet a device (Slave) is mapped as a collection of objects. These objects communicate via different connection types, which you can adjust under **Connection**.

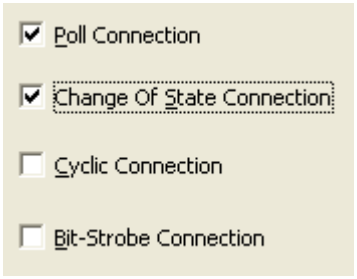



*Figure 7: Configuration Dialog Connection*

In the **Connection** dialog a connection type or a combination of types can be selected. Please note that a device has not to support all types of IO connections. Connection types which are not supported by the device are automatically disabled.

In the lower section of this dialog the possible combinations of the connection types are displayed:

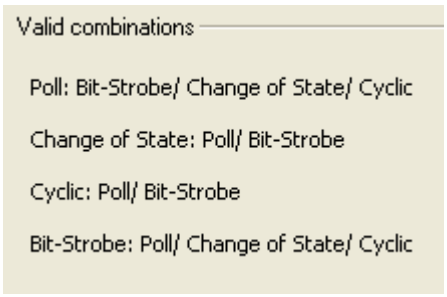



*Figure 8: Indication of possible combinations of connection types*

If an invalid combination is set, the following warning appears:

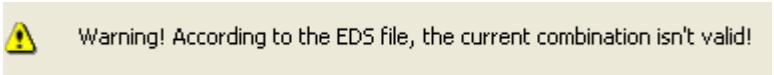



*Figure 9: Warning invalid connection type combination*

## 3.4.1 Connection Types

The following connection types are available:

| Connection Type | Page |
|---|---|
| *Poll Connection* | *20* |
| *Change of State Connection* | *22* |
| *Cyclic Connection* | *24* |
| *Bit-Strobe Connection* | *25* |

*Table 11: Possible connection types*

### 3.4.1.1 Poll Connection

If the **Poll Connection** type was activated, the elements of this connection type are editable. Otherwise this dialog is disabled.

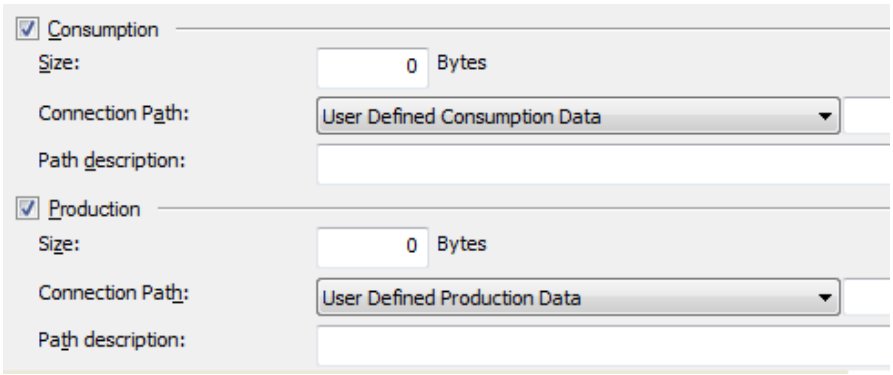



*Figure 10: Poll Connection - Consumption and Production*

One poll command from the Master sends a size (length) of output data in the poll command to the device. The device receives (consumes) the output data.

If the device has input data configured for this poll connection it reacts by sending (producing) back the size (length) of input data to the Master.

Before a polled I/O connection is initiated by the Master, it reads the consumed and produced connection size (length) of the data from the device (Slave) first and compares this values with the values configured in Master. If different values are determined, the connection can not be established.

A poll command can be sent from the Master to a device. The device has to respond if it has received the poll command of the Master, even if it has no input data. Else the Master will report a timeout error. Polling data to many devices has the disadvantage that the network traffic rate is very high and most data which is transferred has not changed since the last transmission. Furthermore the higher the bus load more communication errors can occur if the bus is disturbed by external influences.


*Figure 11: Poll Connection – Timing*

The **Production Inhibit Time**, one for each connection, configures the minimum delay time between new data production in multiples of a millisecond. The timer is reloaded each time new data production through the established connection occurs. While the timer is running the device suppresses new data production until the timer has expired. This method prevents that the device is overloaded with to fast incoming requests.

The value 0 defines no **Production Inhibit Time** and data production can and will be done as fast as possible. If in polled mode for example a Production Inhibit Time of 1000 ms is configured, then the poll request message to the device will be sent every second.

The **Expected Packet Rate**, one for each connection, is always transferred to the device before starting and doing the I/O transfer. The fourfold value is used by the device later to reload its 'Watchdog Timer'. If no data production of the remote station takes place within this time, so the connection changes into a watchdog timeout error. Incoming data productions of the remote station load the Watchdog Time again to the fourfold value of the **Expected Packet Rate**.

**Note:** the **Production Inhibit Time** is verified against the **Expected Packet Rate**. If the **Expected Packet Rate** value is unequal to zero, but less than the **Production Inhibit Time** value, then an error message is displayed by the application.

The **Watchdog Timeout Action** defines the device behavior when the watchdog timer in the device (Slave) expires. The following actions are adjustable:

- **Timeout:** The connection transitions to the timeout state and remains in this state until it is Reset or Deleted.
- **Auto reset:** The connection remains in the established state and immediately restarts the Inactivity/Watchdog timer.
- **Auto delete:** The connection class automatically deletes the connection if it experiences an Inactivity/Watchdog timeout.

To reset the defalut values from the EDS file, click 

.

### 3.4.1.2 Change of State Connection

If the **Change of State Connection** type was activated, the elements of this connection type are editable. Otherwise this dialog is disabled.

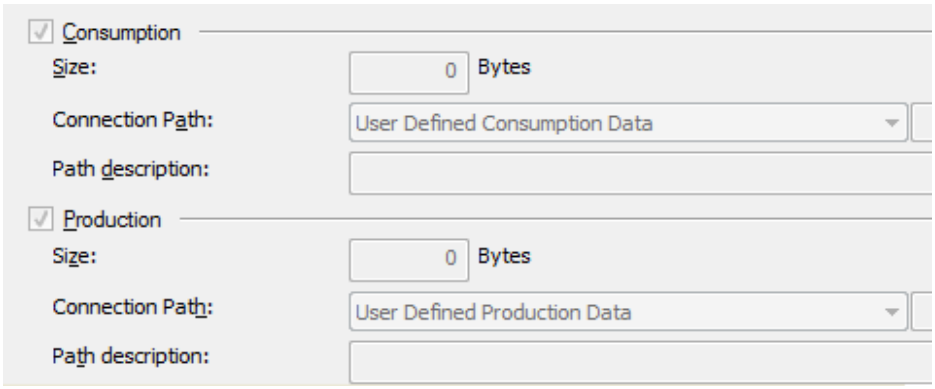



*Figure 12: Change of State Connection - Consumption and Production*

With this type of connection both Master and Slave send the configured size (length) of data (max. 255 Byte) to the respective remote station. This data production is started at change in value (trigger). If the data production does not take place during a defined time interval, the devices trigger the data production automatically to load the Watchdog Timer of the connection again. Depending on how the device behavior is configured, they can send back a confirmation message which contains any quantity of data and/or status information. Before a **Change of State** connection is initialized by the Master, it reads out the consumed and produced connection size (length) of the data from the device (Slave) and compares this values with the values configured in the Master during configuration. If different values are determined, the connection can not be established.

Data production only over 'Change of State' keeps the bus load as low as possible, while data than can be transmitted as fast as possible by each device because bus conflicts are less possible. So you can get high performance data transmission with in comparison low baud rates.


*Figure 13: Change of State Connection – Timing*

The **Production Inhibit Time**, one for each connection, configures the minimum delay time between new data production in multiples of a millisecond. The timer is reloaded each time new data production through the established connection occurs. While the timer is running the device suppresses new data production until the timer has expired. This method prevents that the device is overloaded with to fast incoming requests.

The value 0 defines no **Production Inhibit Time** and data production can and will be done as fast as possible.

The **Expected Packet Rate**, one for each connection, is always transferred to the device before starting and doing the I/O transfer. The value is used by the device to reload its 'Transmission Trigger' and 'Watchdog Timer'. In **Change of State** connections the fourfold value of **the Expected Packet Rate** is used to build the 'Watchdog Timer'. If no data production of the remote station takes place within this time, so the connection changes into a watchdog timeout error. Incoming data productions of the remote station load the Watchdog Time again to the fourfold value of the **Expected Packet Rate**.

If a data production did not take place since starting the 'Transmission Trigger Timer' as single values of the **Expected Packet Rate**, so the device triggers a data production at the latest then automatically.

**Note:** the **Production Inhibit Time** is verified against the **Expected Packet Rate**. If the **Expected Packet Rate** value is unequal to zero, but less than the **Production Inhibit Time** value, then an error message is displayed by the application.

The **Watchdog Timeout Action** defines the device behavior when the watchdog timer in the device (Slave) expires. The following actions are adjustable:

- **Timeout:** The connection transitions to the timeout state and remains in this state until it is Reset or Deleted.
- **Auto reset:** The connection remains in the established state and immediately restarts the Inactivity/Watchdog timer.
- **Auto delete:** The connection class automatically deletes the connection if it experiences an Inactivity/Watchdog timeout.

### 3.4.1.3 Cyclic Connection

If the **Cyclic Connection** type was activated, the elements of this connection type are editable. Otherwise this dialog is disabled.

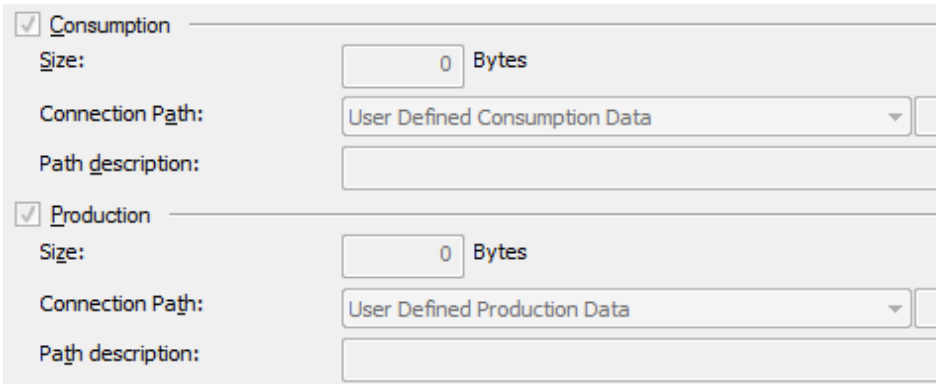



*Figure 14: Cyclic Connection - Consumption and Production*

At this transmission type a data production takes place automatically, if the 'Transmission Trigger Timer' has expired as single value of the **Expected Packet Rate**.


*Figure 15: Cyclic Connection - Timing*

The **Expected Packet Rate**, one for each connection, is always transferred to the device before starting and doing the I/O transfer. The value is used by the device to reload its 'Transmission Trigger' and 'Watchdog Timer'. In **Cyclic** connections the fourfold value of the **Expected Packet Rate** is used to reload the 'Transmission Trigger Timer' and the 'Watchdog Timer'. If no data production of the remote station takes place within this time, so the connection changes into a watchdog timeout error. Incoming data productions of the remote station load the Watchdog Time again to the fourfold value of the **Expected Packet Rate**.

The **Watchdog Timeout Action** defines the device behavior when the watchdog timer in the device (Slave) expires. The following actions are adjustable:

- **Timeout:** The connection transitions to the timeout state and remains in this state until it is Reset or Deleted.
- **Auto reset:** The connection remains in the established state and immediately restarts the Inactivity/Watchdog timer.
- **Auto delete:** The connection class automatically deletes the connection if it experiences an Inactivity/Watchdog timeout.

### 3.4.1.4 Bit-Strobe Connection

If the **Bit-Strobe Connection** type was activated, the elements of this connection type are editable. Otherwise this dialog is disabled.

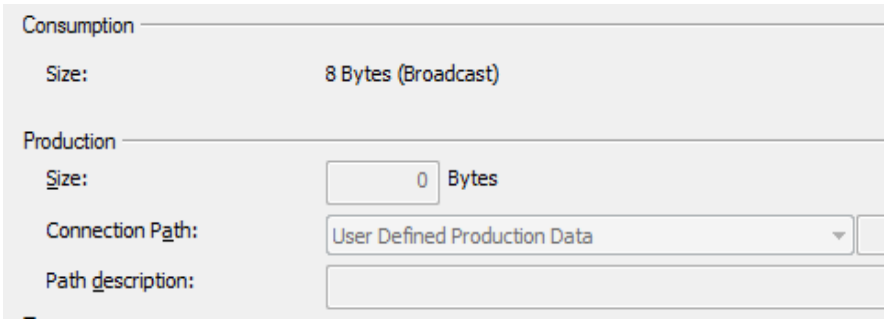



*Figure 16: Bit-Strobe Connection - Consumption and Production*

Bit strobe command and response messages rapidly move small amounts of output data between the Master device and one/some/all Slave devices. The bit strobe message contains a bit string of 64 bits of output data, one output bit per possible device. Each bit in there is assigned to one device address (MAC-ID) in the network. Herewith this service has broadcast functionality that means more than one Slave device can be addressed by one command. Because all addressed Slave devices get this command at the same time, this command is normally used to synchronize data transfer to several Slave devices. A Slave device can take its corresponding output bit as a real output information to give it to the peripheral connections (e.g. an LED) and/or use the bit as a trigger to send back its input data with a poll response message. The data that can be sent back from each Slave after a bit strobe command was received is limited to 8 bytes in length. Bit strobe usage causes therefore a reduced bus loading than poll connections.


*Figure 17: Bit-Strobe Connection - Timing*

The **Expected Packet Rate**, one for each connection, is always transferred to the device before starting and doing the I/O transfer. The fourfold value is used by the device later to reload its 'Watchdog Timer'. If no data production of the remote station takes place within this time, so the connection changes into a watchdog timeout error. Incoming data productions of the remote station load the Watchdog Time again to the fourfold value of the **Expected Packet Rate**.

The **Watchdog Timeout Action** defines the device behavior when the watchdog timer in the device (Slave) expires. The following actions are adjustable:

- **Timeout:** The connection transitions to the timeout state and remains in this state until it is Reset or Deleted.
- **Auto reset:** The connection remains in the established state and immediately restarts the Inactivity/Watchdog timer.
- **Auto delete:** The connection class automatically deletes the connection if it experiences an Inactivity/Watchdog timeout.

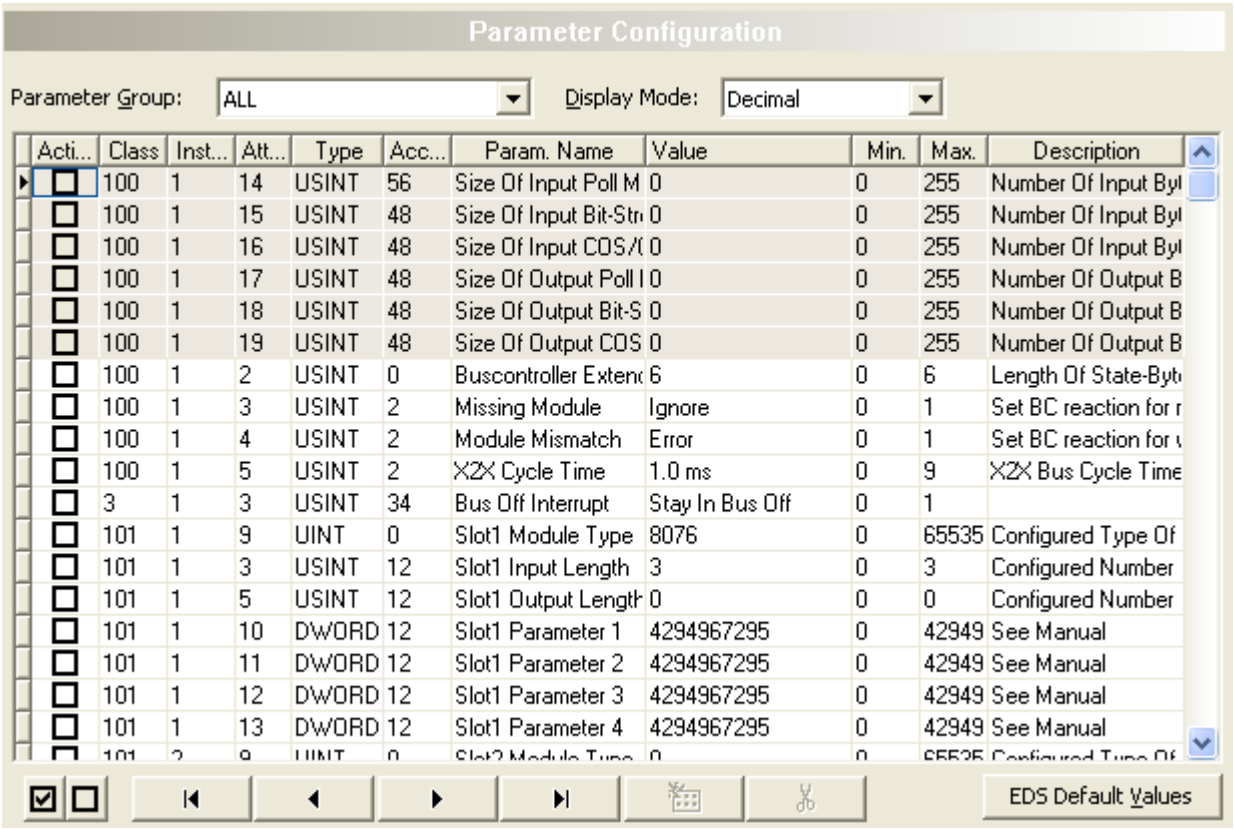
To reset the defalut values from the EDS file, click 

.

## 3.5 Parameter

In the **Parameter** dialog the parameter data of the device can be edited.

If default parameters are configured in the EDS file for this device, these are inserted automatically. Some of devices need further parameterization data, to change for example a measurement limitation or a value range. These data are device specific and their functionality can not be explained at this point. The explanation can be found in the corresponding device manual.




| Acti... | Class | Inst... | Att... | Type | Acc... | Param. Name | Value | Min. | Max. | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| ☐ | 100 | 1 | 14 | USINT | 56 | Size Of Input Poll M | 0 | 0 | 255 | Number Of Input Byt |
| ☐ | 100 | 1 | 15 | USINT | 48 | Size Of Input Bit-Str | 0 | 0 | 255 | Number Of Input Byt |
| ☐ | 100 | 1 | 16 | USINT | 48 | Size Of Input COS/( | 0 | 0 | 255 | Number Of Input Byt |
| ☐ | 100 | 1 | 17 | USINT | 48 | Size Of Output Poll I | 0 | 0 | 255 | Number Of Output B |
| ☐ | 100 | 1 | 18 | USINT | 48 | Size Of Output Bit-S | 0 | 0 | 255 | Number Of Output B |
| ☐ | 100 | 1 | 19 | USINT | 48 | Size Of Output COS | 0 | 0 | 255 | Number Of Output B |
| ☐ | 100 | 1 | 2 | USINT | 0 | Buscontroller Exten | 6 | 0 | 6 | Length Of State-Byt |
| ☐ | 100 | 1 | 3 | USINT | 2 | Missing Module | Ignore | 0 | 1 | Set BC reaction for r |
| ☐ | 100 | 1 | 4 | USINT | 2 | Module Mismatch | Error | 0 | 1 | Set BC reaction for v |
| ☐ | 100 | 1 | 5 | USINT | 2 | X2X Cycle Time | 1.0 ms | 0 | 9 | X2X Bus Cycle Time |
| ☐ | 3 | 1 | 3 | USINT | 34 | Bus Off Interrupt | Stay In Bus Off | 0 | 1 | |
| ☐ | 101 | 1 | 9 | UINT | 0 | Slot1 Module Type | 8076 | 0 | 65535 | Configured Type Of |
| ☐ | 101 | 1 | 3 | USINT | 12 | Slot1 Input Length | 3 | 0 | 3 | Configured Number |
| ☐ | 101 | 1 | 5 | USINT | 12 | Slot1 Output Length | 0 | 0 | 0 | Configured Number |
| ☐ | 101 | 1 | 10 | DWORD | 12 | Slot1 Parameter 1 | 4294967295 | 0 | 42949 | See Manual |
| ☐ | 101 | 1 | 11 | DWORD | 12 | Slot1 Parameter 2 | 4294967295 | 0 | 42949 | See Manual |
| ☐ | 101 | 1 | 12 | DWORD | 12 | Slot1 Parameter 3 | 4294967295 | 0 | 42949 | See Manual |
| ☐ | 101 | 1 | 13 | DWORD | 12 | Slot1 Parameter 4 | 4294967295 | 0 | 42949 | See Manual |

*Figure 18: Parameter Configuration*

| Parameter | Value | Description |
|---|---|---|
| Parameter Group | **ALL**<br><br>USER DEFINED<br><br>xxx | All parameter groups defined in the EDS file are merged in one table.<br>A parameter group defined by the user is displayed.<br>In the EDS file of the device further parameter groups can be defined, which are also displayed in the pull-down menu Parameter Group. The name of this parameter group itself is also defined in the EDS file. |
| Display Mode | **Decimal**<br><br>Hexadecimal | The values **Min** and **Max** in the table are indicated in decimal notation by default. By selecting the **Display Mode** Hexadecimal the values are shown in hexadecimal notation. |

*Table 12: Change Parameter Data*

By using a data set the respective parameter value for the Master configuration are approved and transferred to the Slave by the Master during the initialization phase.

To enable or disable all of the data sets at the same time click ☑☐.

A description of the individual parameters, indicated by **Class**, **Instance** and **Attribute**, can be refered in the device description of the manufacturer.

If “**User Defined**” is selected in **Parameter Group**, the entries in the columns **Param. Name** and **Value** are editable. Otherwise the entries are fixed and can not be changed.

A description on how table lines can be selected, inserted or deleted can be found in section *Table Lines* on pag 13 .

To reset the defalut values from the EDS file, click 

.

# 4 Device Description

## 4.1 Overview Device Description

**Descriptions of "Device Description"**

The table below gives an overview for the **Device Description** dialog panes descriptions:

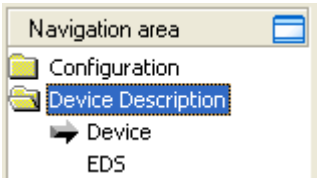
| DeviceNet generic Slave DTM | Folder Name / Section | Page |
|---|---|---|
|  *Navigation Area - Description* | *Device* | 29 |
| | *EDS* | 30 |

*Table 13: Descriptions of the Dialog Panes Device Description*

## 4.2 Device

The **Device Info** dialog contains manufacturer information about the device, which is defined in the EDS file. The following information is indicated:

| Parameter | Meaning |
|---|---|
| Vendor name | Vendor name of the device |
| Vendor ID | Identification number of the manufacturer |
| Product Type | Communication Adapter |
| Product Type String | Product Name as string |
| Product Code | Product code of the device |
| Product Name | Name of the device<br>The variable Product Name is a text string that should represent a short description of the product/product family. |
| Major Revision | Major Revision |
| Minor Revision | Minor Revision |
| Catalog | Used catalog name |
| Icon filei | Udes icon file name |

*Table 14: General Device Information*

## 4.3 EDS

The **EDS Viewer** shows the content of the EDS file in a text view.

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

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

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

*Table 15: Device Description – EDS Viewer*

# 5 Appendix

## 5.1 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 **Configuration** and **Device Description** panes of the Generic DeviceNet Slave DTM you do not need special user rights.

**Note:** To edit, set or configure the parameters of the **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.

### 5.1.1 Configuration

| | Observer | Operator | Mainten-ance | Planning Engineer | Adminis-trator |
|---|---|---|---|---|---|
| *General Settings* | D (X) | D (X) | X | X | X |
| *Connection Configuration* | D (X) | D (X) | X | X | X |
| *Poll Connection* | D (X) | D (X) | X | X | X |
| *Change of State Connection* | D (X) | D (X) | X | X | X |
| *Cyclic Connection* | D (X) | D (X) | X | X | X |
| *Bit-Strobe Connection* | D (X) | D (X) | X | X | X |
| *Parameter* | D (X) | D (X) | X | X | X |

*Table 16: Configuration (D = Displaying, X = Editing, Configuring, D (X) = Displaying all, limited Editing or Configuring)*

## 5.2 References

[1] Device Type Manager (DTM) Style Guide, Version 1.0 ; FDT-JIG - Order No. <0001-0008-000>

[2] DeviceNet Master Protocol API Manual, Revision 9, Hilscher GmbH 2013

[3] DeviceNet Slave Protocol API Manual, Revision 12, Hilscher GmbH 2013

## 5.3 List of Figures



## 5.4 List of Tables

# 5.5 Glossary

**DTM**

Device Type Manager

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

**EDS**

An Electronic Data Sheet (EDS) provides information necessary to access and alter the configurable parameters of a device. An Electronic Data Sheet (EDS) is an external file that contains information about configurable attributes for the device, including object addresses of each parameter. The application objects in a device represent the destination addresses for configuration data. These addresses are encoded in the EDS.

**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.

**MAC ID**

MAC = Media Access Control

The network address of a device serves to distinguish itself on a DeviceNet fieldbus system from any other device or Slave on this network. This should be a unique number for each device.

# 5.6 Contacts

### Headquarters

**Germany**
Hilscher Gesellschaft für
Systemautomation mbH
Rheinstrasse 15
65795 Hattersheim
Phone: +49 (0) 6190 9907-0
Fax: +49 (0) 6190 9907-50
E-Mail: info@hilscher.com

**Support**
Phone: +49 (0) 6190 9907-99
E-Mail: de.support@hilscher.com

### Subsidiaries

**China**
Hilscher Systemautomation (Shanghai) Co. Ltd.
200010 Shanghai
Phone: +86 (0) 21-6355-5161
E-Mail: info@hilscher.cn

**Support**
Phone: +86 (0) 21-6355-5161
E-Mail: cn.support@hilscher.com

**France**
Hilscher France S.a.r.l.
69500 Bron
Phone: +33 (0) 4 72 37 98 40
E-Mail: info@hilscher.fr

**Support**
Phone: +33 (0) 4 72 37 98 40
E-Mail: fr.support@hilscher.com

**India**
Hilscher India Pvt. Ltd.
Pune, Delhi, Mumbai
Phone: +91 8888 750 777
E-Mail: info@hilscher.in

**Italy**
Hilscher Italia S.r.l.
20090 Vimodrone (MI)
Phone: +39 02 25007068
E-Mail: info@hilscher.it

**Support**
Phone: +39 02 25007068
E-Mail: it.support@hilscher.com

**Japan**
Hilscher Japan KK
Tokyo, 160-0022
Phone: +81 (0) 3-5362-0521
E-Mail: info@hilscher.jp

**Support**
Phone: +81 (0) 3-5362-0521
E-Mail: jp.support@hilscher.com

**Korea**
Hilscher Korea Inc.
Seongnam, Gyeonggi, 463-400
Phone: +82 (0) 31-789-3715
E-Mail: info@hilscher.kr

**Switzerland**
Hilscher Swiss GmbH
4500 Solothurn
Phone: +41 (0) 32 623 6633
E-Mail: info@hilscher.ch

**Support**
Phone: +49 (0) 6190 9907-99
E-Mail: ch.support@hilscher.com

**USA**
Hilscher North America, Inc.
Lisle, IL 60532
Phone: +1 630-505-5301
E-Mail: info@hilscher.us

**Support**
Phone: +1 630-505-5301
E-Mail: us.support@hilscher.com