



**Operating instruction manual**  
**Generic DTM for EtherCAT Slave devices**  
**Configuration of EtherCAT Slave devices**  
**V1.1100**

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# 1 Introduction

## 1.1 About this manual

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

### 1.1.1 Online help

The generic EtherCAT Slave DTM contains an integrated online help.

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

### 1.1.2 List of revisions

Index	Date	Version	Component	Changes
8	2023-02-06	1.1100	EtherCATGenericSlaveDTM.dll	Document revised.
		1.1100	EtherCATGenericSlaveDTM.ocx	

Table 1: List of revisions

## 1.2 Overview use cases

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

Use case	Description	Chapter, section
Device start up	<ul style="list-style-type: none"> <li>• Creating project configuration</li> </ul>	Create project configuration
Configuring device parameters	<ul style="list-style-type: none"> <li>• Device behavior settings</li> <li>• Set distributed clock parameters</li> <li>• Set process data parameters</li> </ul>	<i>Behavior</i> [▶ page 15] <i>Distributed clock</i> [▶ page 19] <i>Process data</i> [▶ page 24]
Descriptions	<ul style="list-style-type: none"> <li>• XML DDF viewer</li> </ul>	<i>XML DDF viewer</i> [▶ page 29]
User rights	Definition of access rights	User rights

Table 2: Overview use cases

## 1.3 System requirements

- PC with 1 GHz processor or higher
- Windows® XP SP3,  
Windows® Vista (32-Bit) SP2,  
Windows® 7 (32-Bit and 64-Bit) SP1,  
Windows® 8 (32-Bit and 64-Bit),  
Windows® 8.1 (32-Bit and 64-Bit),  
Windows® 10 (32-Bit and 64-Bit)
- Administrator privilege required for installation
- Internet Explorer 5.5 or higher
- RAM: min. 512 MByte, recommended 1024 MByte
- Graphic resolution: min. 1024 x 768 pixel
- Keyboard and Mouse
- Restriction: Touch screen is not supported.

**Note:**

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

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## 1.4 About the generic EtherCAT Slave DTM

Using the generic EtherCAT Slave DTM you can:

- configure slave device within an FDT frame application whose settings are defined via XML DDF files;
- store the information required for configuring the slave device in the master and thus configure the master device.

## 1.5 Requirements generic EtherCAT Slave DTM

The following requirements apply when working with a generic EtherCAT Slave DTM:

- Installed FDT/DTM frame application (V1.2 compliant)
- Installed EtherCAT Master DTM
- XML DDF files of the devices to be configured
- The DTM must be loaded into the device catalog.
- Loading XML DDL files

To add devices to the netDevice device catalog, the XML DDL files of the used devices must be imported via **Network > Import device descriptions** .... into the folder `C:\ProgramData\ SYCONnet\[protocol name]\DDL` and the device catalog must be reloaded.

## 1.6 DTM dialog structure

The graphical user interface of the DTM is composed of different areas and elements listed hereafter:

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

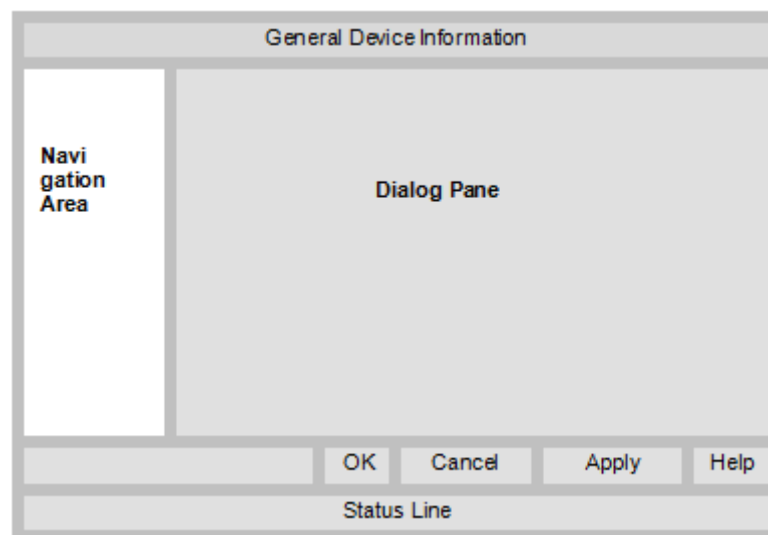


Figure 1: Dialog structure of the Device Type Manager

### 1.6.1 General device information

Parameter	Description
IO device	Device name
Vendor	Vendor name of the device
Device ID	Identification number of the device
Vendor ID	Identification number of the vendor

Table 3: General device information

### 1.6.2 Navigation area

In the navigation area, you can select the individual dialog panes via the folder structure of the DTM.

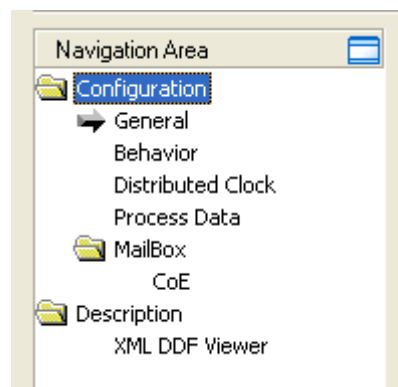



Figure 2: Navigation area

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

### 1.6.3 Dialog pane

In the dialog pane area, the different windows of the DTM appear only with displayed information or for required setting steps. You call up the respective windows via the associated folder in the navigation area.

## 1.6.4 OK, Cancel, Apply, Help,

In the configuration software SYCON.net the following is valid:

	Description
<b>OK</b>	To confirm your latest settings, click <b>OK</b> . All changed values will be applied on the frame application database. The dialog then closes.
<b>Cancel</b>	To cancel your latest changes, click <b>Cancel</b> . Answer to the safety query "Configuration data has been changed. Do you want to save the data?" by <b>Yes</b> , <b>No</b> or <b>Cancel</b> . <ul style="list-style-type: none"> <li>• <b>Yes</b>: The changes are saved or the changed values are applied on the frame application database. The dialog then closes.</li> <li>• <b>No</b>: The changes are <i>not</i> saved or the changed values are <i>not</i> applied on the frame application database. The dialog then closes.</li> <li>• <b>Cancel</b>: Back to the DTM.</li> </ul>
<b>Apply</b>	To confirm your latest settings, click <b>Apply</b> . All changed values will be applied on the frame application database. The dialog remains opened.
<b>Help</b>	To open the DTM online help, click <b>Help</b> .

Table 4: OK, Cancel, Apply, Help

## 1.6.5 Table lines

In the DTM dialog pane, you can select table lines.





Element	Description
	Click <b>First line</b> to select the first row of a table.
	Click <b>Previous line</b> to select the previous row of a table.
	Click <b>Next line</b> to select the next row in a table.
	Click <b>Last line</b> to select the last row of a table.

Table 5: Select table line



## 1.6.6 Status bar

In the status bar, graphical icons display the current DTM state (e. g., connection status, or other activities).

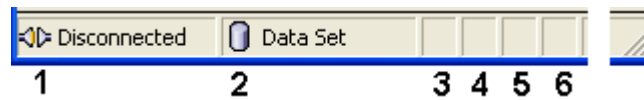


Figure 3: Status bar – status fields 1 to 6






Status field	Icon / description
1	<b>DTM connection states</b>
	 <b>Connected:</b> Icon closed = Device is online
	 <b>Disconnected:</b> Icon opened = Device is offline
2	<b>Data source states</b>
	 <b>Data set:</b> The displayed data is read out from the instance data set (database).
	 <b>Device:</b> The displayed data is read out from the device.
3	<b>States of the instance date set</b>
	 <b>Valid Modified:</b> Parameter is changed (not equal to data source).

Table 6: Status bar icons [1]

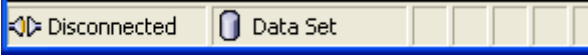
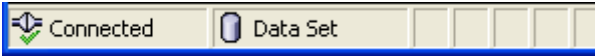
<b>Offline state</b>	
<b>Online state</b>	

Table 7: Status bar, display examples

## 2 Safety

### 2.1 General note

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

### 2.2 Intended use

The generic EtherCAT Slave DTM serves for configuration of EtherCAT Slave 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.

## 3 Device start up

### 3.1 Configuration steps

The following overview provides to you the step sequence on how to configure an EtherCAT Slave device with a generic EtherCAT Slave DTM as it is typical for many cases. It is assumed at this point that the installation of the EtherCAT Master DTM has been completed.

Step	Brief description	Further information
Add EtherCAT Slave in the device catalog	<ul style="list-style-type: none"> <li>- Open configuration software SYCON.net.</li> <li>- <b>Network &gt; Import device descriptions.</b></li> <li>- Import the device description.</li> </ul>	Section <i>Create project configuration</i> [▶ page 12], or operating instruction manual “SYCON.net” and operating instruction manual “netDevice and netProject”
Load device catalog	<ul style="list-style-type: none"> <li>- Select <b>Network &gt; Device catalog,</b></li> <li>- <b>Reload catalog.</b></li> </ul>	
Create / open project	<ul style="list-style-type: none"> <li>- Select <b>File &gt; New</b> or <b>File &gt; Open.</b></li> </ul>	
Insert the master device and the slave device and into configuration	<ul style="list-style-type: none"> <li>- In the <b>Device catalog</b>, select the master device and insert the device via drag &amp; drop <b>to the line</b> in the network view.</li> <li>- In the <b>Device catalog</b>, select the slave device, and insert it via drag and drop <b>to the master bus line</b> in the network view.</li> </ul>	
Configure slave	<ul style="list-style-type: none"> <li>- Select <b>Behavior.</b></li> <li>- Set the device behavior parameters.</li> <li>- Select <b>Distributed clock.</b></li> <li>- Set the distributed clock parameters.</li> <li>- Select <b>Process data.</b></li> <li>- Set the process data parameters.</li> <li>- Close the dialog via <b>OK.</b></li> </ul>	<i>Behavior</i> [▶ page 15] <i>Distributed clock</i> [▶ page 19] <i>Process data</i> [▶ page 24]
Configure master device	Configure the master device via the EtherCAT Master DTM netX.	Operating instruction manual of the DTM
Save project	<ul style="list-style-type: none"> <li>- Select <b>File &gt; Save.</b></li> </ul>	Operating instruction manual “SYCON.net”

Table 8: Getting started – Configuration steps

## 3.2 Create project configuration

1. Complete the slave device in the device catalog.
  - Select **Network > Import device descriptions**.
  - Import the device description file.
2. Load device catalog
  - Select **Network > Device catalog**.
  - Select **Reload catalog**.
3. Create or open a project.
  - Create new project / open existing project:
  - Select **File > New** or **File > Open**.
4. Insert slave device to the configuration.
  - In the device catalog, select the master device, and insert it via drag and drop **to the line** in the network view.
  - In the device catalog, under **Slave**, select the slave device.
  - Insert the slave device via drag and drop **to the master bus line**.

### Notes



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**Note:**

In order to select the desired device in the device catalog, note the details about the DTM and the device at the bottom of the device catalog window. When sorting by fieldbus, several devices with the same name from different vendors can be displayed.

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For further information, see operating instruction manual "SYCON.net" or "netDevice and netProject".

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## 4 Configuration

### 4.1 Overview configure device parameters

Under "Configuration", you can configure your device.

- The **General** dialog pane shows general device data.
- In the **General settings** dialog pane, you can make device specific settings.
- In the **Signal configuration** dialog, you can define the data structure of the input and output data of your device and assign suitable data types, names or signal names.
- In the **Behavior** pane, you can set or read parameters for the device behavior (state machine time monitoring, device check, process data, and watchdog timer).
- In the **CoE Mailbox** settings pane you can read the configured size of the input or output mailbox for slave devices with CoE mailbox functionality. CoE (CANopen over EtherCAT) is configured in the master DTM.

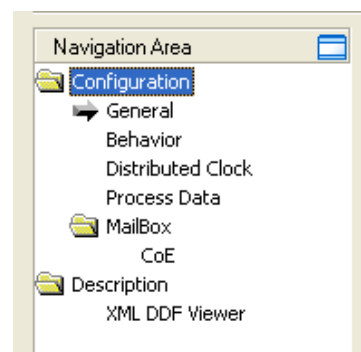


Figure 4: Navigation area – configuration



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**Note:**

To edit the dialog panes under **Configuration**, you need the user rights for "Maintenance".

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For further information about configuration, see the sections:

- *General* [▶ page 14],
- *Behavior* [▶ page 15],
- *Distributed clock* [▶ page 19],
- *Process data* [▶ page 24] and
- *Mailbox* [▶ page 28].

## 4.2 General

The **General** dialog pane shows the general device data. The description (editable) shows the current device designation. The station address (non-editable) is set by the EtherCAT Master.

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

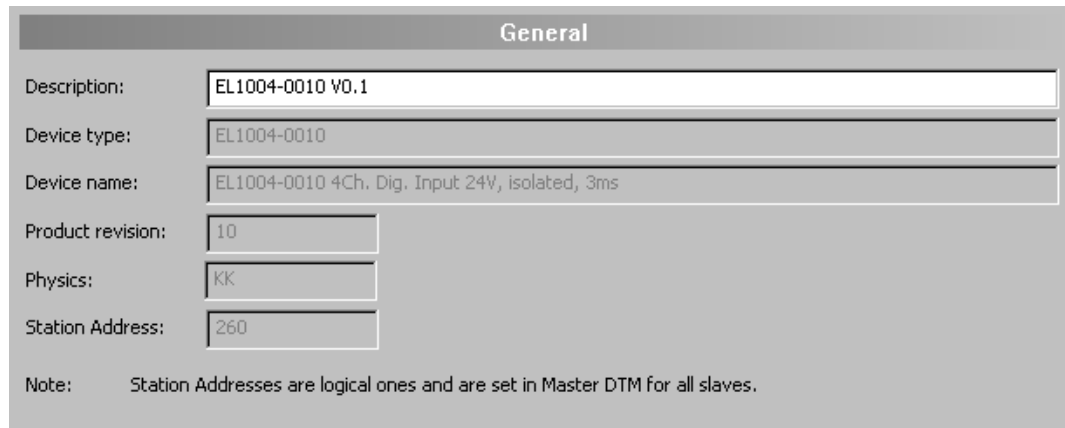


Figure 5: Configuration > General

Parameter	Description	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 <sup>2</sup> PROM	No
Physics	EtherCAT port configuration: Available ports and their types (see table below).	No
Station Address	Station Address denominates a logical address. The station address of a slave is set in the Master DTM.	No

Table 9: General dialog pane 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 10: Coding of parameter “Physics”

### 4.3 Behavior

At the “Behavior” pane, 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.

The screenshot shows the 'Behavior' configuration pane with the following sections and values:

- State Machine Timeout (ms):**
  - I2P: 3000
  - P2S, S2O: 10000
  - Back to P, I: 5000
  - O2S: 200
- Device checkup:**
  - VendorID
  - Product code
  - Revision
- Process data:**
  - Use LRD/LWR instead of LRW
- 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 6: Behavior

### 4.3.1 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

Behavior > State Machine Timeout - Configuration



### 4.3.2 Device checkup

The “Device checkup” part of the Behavior dialog looks like:

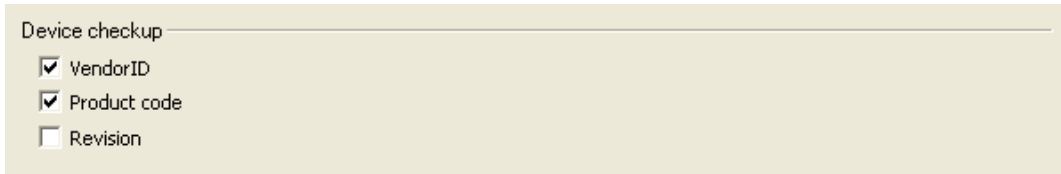


Figure 7: Behavior > Device Check

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

Parameter	Description
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 11: 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 E<sup>2</sup>PROM circuit), if the according check box is marked.

### 4.3.3 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 choosing between these alternatives:

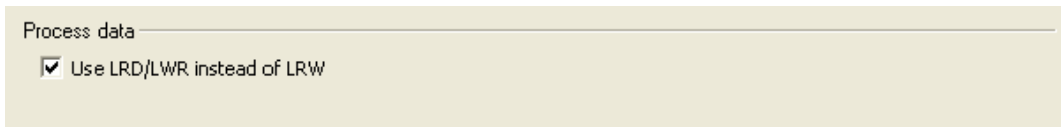


Figure 8: Behavior > Process data

Parameter	Description
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 12: 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.

### 4.3.4 Watchdog

Watchdog timers (separately) monitor both the entire PDI (Process Data Interface) and all sync managers. 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.

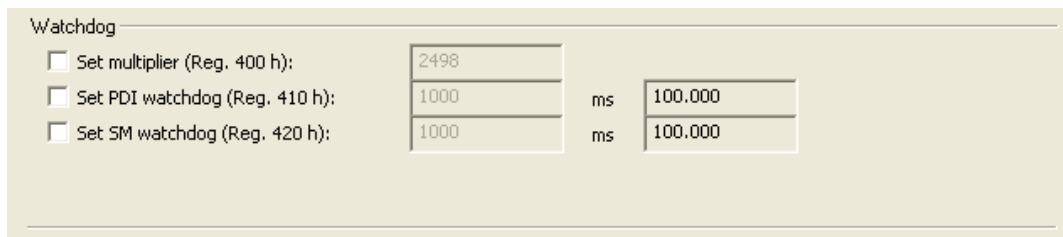


Figure 9: Behavior > Watchdog

Parameter	Description
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

Table 13: Parameters Behavior > Watchdog



**Note:**

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

**PDI** watchdog timeout = ([value of register 0x400] + 2) \* 40 \* [value of register 0x 410]

**SM** watchdog timeout = ([value of register 0x 400] + 2) \* 40 \* [value of register 0x 420]

## 4.4 Distributed clock

At the “Distributed clock” pane you can activate the DC Sync mechanism, Sync0 and Sync1, and you can make settings for the parameters:

- Sync 0 Cycle time,
- Sync 0 Shift time,
- Sync 1 Cycle time,
- Sync 1 Shift time.

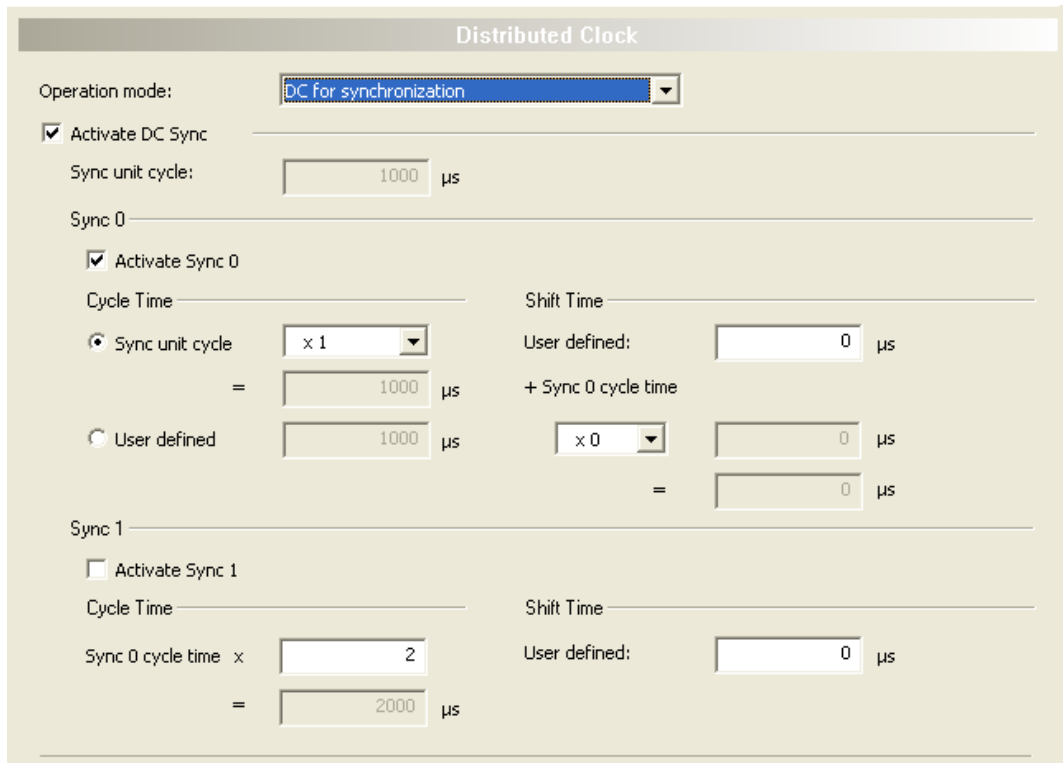


Figure 10: Distributed Clock

### Operation mode

- Select one of the three different operating modes for Distributed clock:
  - DC unused,
  - DC for synchronization oder
  - User-defined Operation Mode.

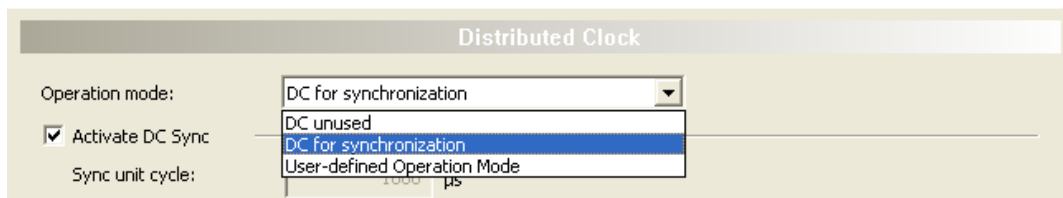


Figure 11: Operation mode

### Activate DC Sync

To set Sync 0 and Sync 1, "Activate DC Sync" must be checked. Only then data entry is possible on this dialog pane, otherwise all fields and selection elements are grayed out and disabled.

- Check **Activate DC Sync** if you want to configure Sync 0 or Sync 1.

### Sync unit cycle

The displayed value for "Sync Unit Cycle" is set in the EtherCAT Master DTM (free-running cycle time of the EtherCAT Master). In the generic EtherCAT Slave DTM the field is therefore grayed out and disabled.

## 4.4.1 Sync 0

### Activate Sync 0

- Activate Sync 0 by checking **Activate Sync 0**.
- Deactivate Sync 0 by unchecking **Activate Sync 0**.

### 4.4.1.1 Sync 0 Cycle Time



#### Note:

Whether this value can be adjusted by means of the generic EtherCAT Slave DTM or not depends on the Device Description File of the appropriate device.

Figure 12: Sync 0 Cycle Time

The Sync 0 Cycle Time can either be derived from the Sync Unit Cycle Time adjusted at the EtherCAT Master (see above) by multiplying it with a factor or it can be entered directly.

- For calculating the Sync 0 Cycle Time from the Sync Unit Cycle Time, check **Sync Unit Cycle**.
- ↻ The Sync Unit Cycle Time is multiplied with (or divided by) an adjustable factor.

The following factors are available within the selector list:

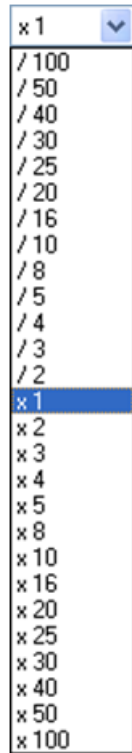


Figure 13: Sync Unit Cycle

➤ For specifying the Sync 0 Cycle Time directly, check **User defined**.

The value is specified in units of microseconds. The default value is 1000 microseconds. The allowed range of values is from 0 to 4,294,967.295 microseconds. If the specified value violates one of these limits, an error message is issued.

#### 4.4.1.2 Sync 0 Shift Time



**Note:**

Whether this value can be adjusted by means of the generic EtherCAT Slave DTM or not depends on the Device Description File of the appropriate device.

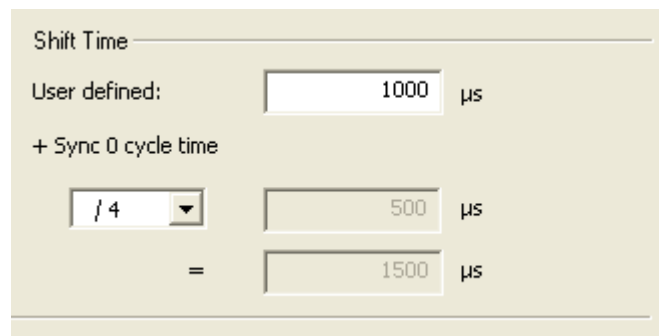


Figure 14: Sync 0 Shift Time

The Sync 0 Shift Time is calculated in the following way:

The Sync 0 Cycle Time is multiplied with (or divided by) an adjustable factor, the Sync 0 Shift Time Modifier.

The following values are available within the selector list:

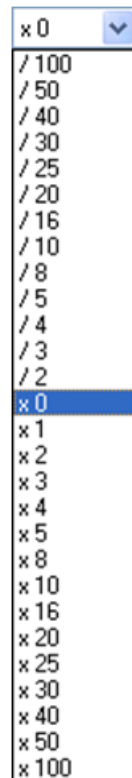


Figure 15: Sync 0 Cycle Time



**Note:**

In contrast to the Sync 0 Cycle Time described above, here also the factor 0 may be chosen!

The default value for this factor is

- 0: if the chosen operation mode (see above) is *DC for synchronization*
- 1: otherwise.

Then the value specified in the input field **User defined** is added to the product. The allowed range of values extends from -2147483.648 to +2147483.647. If a value outside of these limits is specified, an error message will be issued.

The sum is displayed in the lower field having been grayed out. It is now used as the Sync 0 Shift Time.

## 4.4.2 Sync 1

### Activate Sync 1

- Activate Sync 1 by checking **Activate Sync 1**.
- Deactivate Sync 1 by unchecking **Activate Sync 1**.

### 4.4.2.1 Sync 1 Cycle Time



#### Note:

Whether this value can be adjusted by means of the generic EtherCAT Slave DTM or not depends on the Device Description File of the appropriate device.

Figure 16: Sync 1 Cycle Time

The Sync 1 Cycle Time is calculated as the product of the Sync 0 Cycle Time (see subsection *Sync 0 Cycle Time* [▶ page 20] above) with a positive integer factor that is specified in the input field right of **Sync 0 cycle time x**.

The range of allowed factors extends from 1 to 1024. If a value violating these limits is entered, an error message will be issued.

The product is then displayed in the grayed out field just below of the input field.

### 4.4.2.2 Sync 1 Shift Time



#### Note:

Whether this value can be adjusted by means of the generic EtherCAT Slave DTM or not depends on the Device Description File of the appropriate device.

Figure 17: Sync 1 Shift Time

The value for the Sync 1 Shift Time is to be entered to the **User defined** field.

## 4.5 Process data

In EtherCAT, the process data objects (PDO) are assigned to sync managers. A sync manager is used for synchronization of data communication on a certain communication channel. This channel is configured either for input or for output and either for cyclic or for acyclic communication. (This is defined within the device description file.) Up to 16 sync manager can be configured. These are numbered from 0 up to 15. The process data dialog only displays the sync manager which is for cyclic communication. Possible sync managers for acyclic communication is displayed in the **CoE MailBox** dialog.

The illustration below shows the process data dialog of the EtherCAT Generic Slave DTM:

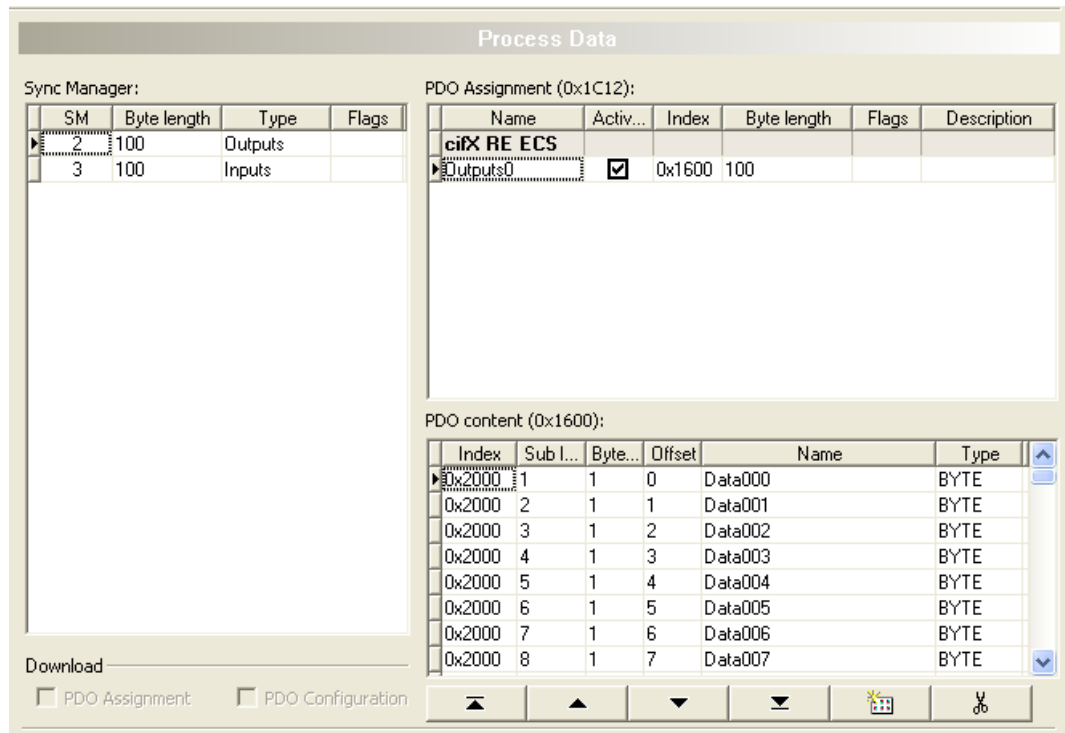


Figure 18: Configuration > process data

The process data dialog consists of three parts:

- Sync Manager area
- PDO Assignment area
- PDO Content area

### 4.5.1 Sync manager

Within the process data dialog only those PDOs can be shown simultaneously, which are assigned to the same sync manager.

The left part of the process data dialog represents the **Sync Manager** area which is used for choosing the sync manager to be used. It provides the Sync Manager table for choosing the sync manager whose PDOs are to be displayed, and additionally two checkboxes for PDO assignment and PDO configuration which however are relevant in case of variable configuration only.



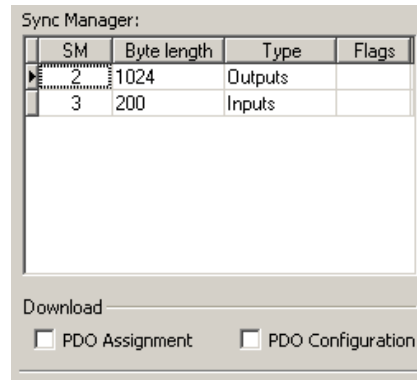


Figure 19: Configuration > Process data > Sync Manager

The table **Sync Manager** displays the configuration of the sync managers for the device, as defined in its device description file (DDF). For each of the 4 sync managers available at maximum in the table, the following information is displayed:

Parameter	Description
SM	Sync Manager channel number (0-15)
Byte length	Sync Manager length in bytes
Type	Sync Manager type (Inputs/ Outputs)
Flags	Sync Manager flags (Flag F = fixed contents)

Table 14: Parameters Process data > Sync Manager

In case this device supports acyclic communication based on mailboxes the Sync Manager 0 is used for the mailbox output (master to slave) and the Sync Manager 1 is used for the mailbox input (slave to master).

If the device does not support acyclic communication based on mailboxes, Sync Manager 0 - 15 can be used for the Process data outputs and inputs (also see Figure *Configuration > process data* [▶ page 24] > Sync Manager).

The size of the Sync Managers is defined by the assigned PDO objects. In this case, the PDO object is assigned to the Sync Manager 3 and because the content of this object has the size 8 the Sync Manager is configured to 8 bytes.

The read-only checkboxes below show the download flags which are defined in device description file. They have the following meaning:

Checkbox	Description
PDO Assignment	This flag indicates whether to download PDO assignment of Sync Manager. If this flag is checked, this means that PDO assignment of the slave is writable and special CoE Init-Commands should be generated by the EtherCAT Master DTM in the Configuration Information File. These CoE Init-commands include the indices of transmit/receive PDOs. Therefore the slave knows how such PDOs are related to the Sync Manager.
PDO Configuration	This flag indicates whether to download PDO mapping. If this flag is set as checked, this means that PDO mapping of the slave is writable and special CoE Init-Commands should be generated by the EtherCAT Master DTM in the Configuration Information File. These CoE Init-Commands include the indices of mapped process data objects. Therefore slave knows how mapped PDOs are related to transmit /receive PDOs.

Table 15: Meaning of checkboxes

### 4.5.2 PDO Assignment (Index 0x1C10- 0x1C1F)

The upper right part of the process data dialog represents the *PDO Assignment* area for the sync manager chosen within the left part of the window. It contains the transmit/receive PDOs.

Thus, the contents of this table depends on the choice of the sync manager in the left part of the window. If a sync manager with type “Outputs” is selected, all defined receive PDOs (Index 0x1600 -0x17FF) in the device description file will be shown in this table.

Similarly, if a sync manager with type “Inputs” is selected, all defined transmit PDOs (Index 0x1A00 -0x1BFF) will be shown in this table.

Name	Activate	Index	Byte length	Flags	Description
Outputs0	<input checked="" type="checkbox"/>	0x1600	100		

Figure 20: Process data > PDO Assignment

For the transmit/receive PDOs assigned to the chosen sync manager, the following values are displayed:

Parameter	Description
Name	Name of the PDO
Activate	Activation check box for assigned PDO of the selected Sync Manager
Index	Object index of the PDO
Byte length	Length of the PDO in bytes
Flags	Flags assigned to the PDO
Description	Description of the PDO

Table 16: Parameters process data > PDO Assignment

The PDO assignment is stored in a sync manager channel object within the object dictionary of the EtherCAT slave. The index of such an object is displayed in the headline of the PDO assignment area, and it has a relationship with the sync manager channel number(n):

$$\text{Index} = 0x1C10 + n \quad (n = 0...15)$$

In the current example the information was taken from the object with the index 0x1C12 indicating sync manager 2 had been chosen for display.

For slave devices with selectable PDO assignment, PDO/PDOs can be selected from the given list of multiple fixed PDOs according to the rules defined by the device description file.

### 4.5.3 PDO Content (Index 0x1600-0x17FF, 0x1A00-0x1BFF)

The lower right part of the process data dialog represents the *PDO Content* area. It contains the mapped process data objects of the transmit/receive PDO, which has been selected in the upper right part of the window.

Index	Sub Index	Byte length	Offset	Name	Type
0x2000	1	1	0	Data000	BYTE
0x2000	2	1	1	Data001	BYTE
0x2000	3	1	2	Data002	BYTE
0x2000	4	1	3	Data003	BYTE
0x2000	5	1	4	Data004	BYTE
0x2000	6	1	5	Data005	BYTE
0x2000	7	1	6	Data006	BYTE
0x2000	8	1	7	Data007	BYTE
0x2000	9	1	8	Data008	BYTE
0x2000	10	1	9	Data009	BYTE
0x2000	11	1	10	Data010	BYTE
0x2000	12	1	11	Data011	BYTE
0x2000	13	1	12	Data012	BYTE
0x2000	14	1	13	Data013	BYTE

Figure 21: Process Data > PDO Content

For the mapped process data objects, the following values are displayed:

Parameter	Description
Index	Object index Subindex of the PDO
Sub index	Sub index for the PDO
Byte length	Size of the PDO entry in Byte
Offset	Offset of the PDO entry (relative to 0x1600 for output and to 0x1A00 for input PDOs)
Name	Name of the PDO entry
Type	Data type of the PDO entry

Table 17: Parameters Process Data > PDO Content

The PDO content is stored in a transmit/receive object within the object dictionary of the EtherCAT slave. You can find the correct index of the selected transmit/receive PDO in the headline of the PDO assignment area.

In the current example the information was taken from the object with index 0x1604.

For an explanation of the navigation buttons see section *Table lines* [▶ page 8] of this document.

## 4.6 Mailbox

### 4.6.1 CoE

For slave devices supporting the CoE MailBox, in addition the following dialog pane appears:

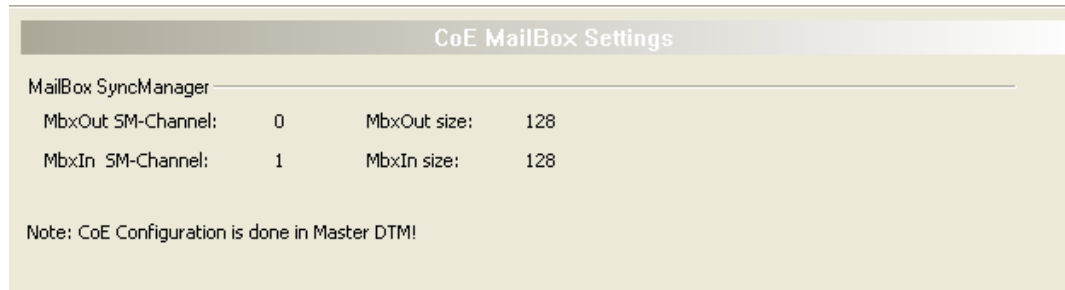


Figure 22: Mailbox > CoE Mailbox settings

The dialog pane 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.

## 5 Description

### 5.1 Overview description

In the navigation area under "Description", you will find the "XML DDF viewer", which displays the contents of the DDF file with the device description.

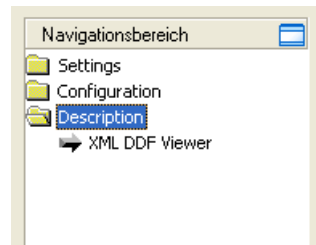


Figure 23: Navigation area - Description

### 5.2 XML DDF viewer

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

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	Description
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 18: Device Description – GSDML Viewer

The "XML DDF Viewer" pane 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 **Find Next** 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.

## 6 Appendix

### 6.1 References

- [1] FDT Joint Interest Group (www.fdt-jig.org, FDT-JIG Working Group): Device Type Manager (DTM) Style Guide, Version 1.0; FDT-JIG - Order No. <0001-0008-000>, English, 2005.
- [2] EtherCAT Technology Group: EtherCAT communication specification, August 2007.
- [3] Hilscher Gesellschaft für Systemautomation mbH: Protocol API, EtherCAT Salve, V 5.3.0, Protocol API Manual, Revision 4, DOC181005API04EN, English, 2021-09.

### 6.2 User rights

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

To access the **Settings**, **Configuration** and **Diagnosis** panes of the generic 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 following tables give an overview of the user right groups and which user rights you need to configure the single parameters.

#### 6.2.1 Configuration

	Observer	Operator	Maintenance	Planning engineer	Administrator
<i>General</i> [▶ page 14]	D	D	X	X	X
General settings	D	D	X	X	X
Signal configuration	D	D	X	X	X
<i>Behavior</i> [▶ page 15]	D	D	X	X	X
<i>Mailbox</i> [▶ page 28]	D	D	X	X	X

Table 19: User rights configuration (D = displaying, X = editing, configuring)

## 6.3 Conventions in this manual

### Instructions

1. Operation purpose
2. Operation purpose
  - Instruction

### Results

- ↻ Intermediate result
- ⇒ Final result

### Signs




Sign	Note
	General note
	Important note that must be followed to prevent malfunctions.
	Reference to further information

Table 20: Signs

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## Glossary

<b>DDF</b>	Device Description File A file containing configuration information about a device being a part of a network that can be read out by masters for system configuration. Device Description Files use various formats which depend on the communication system. Often these formats are based on XML such as EDS_files or GSDML_files. Contains configuration information
<b>DDF</b>	Device Description File: A file containing configuration information about a device being a part of a network that can be read out by masters for system configuration. Device Description Files use various formats which depend on the communication system. Often these formats are based on XML such as EDS_files or GSDML_files.
<b>DTM</b>	Device Type Manager: Software module with graphical user interface for the configuration and/or for diagnosis of devices
<b>EtherCAT</b>	Ethernet for Control Automation Technology: communication system for Industrial Ethernet designed and developed by Beckhoff Automation GmbH, Verl, Germany
<b>EtherCAT Slave</b>	Device which is configured by the EtherCAT master, receives data telegrams containing output data, executes commands issued by the EtherCAT master and provides input and status data
<b>FDT</b>	Field Device Tool: FDT specifies an interface, in order to be able to use DTM (Device Type Manager) in different applications of different manufacturers
<b>netDevice</b>	FDT container of the Hilscher configuration software SYCON.net
<b>Slave</b>	Type of device that is configured by the Master and which then performs the communication
<b>XML</b>	Extended Markup Language: symbolic language for structuring data systematically which is maintained as a standard by the W3C (World-wide web consortium). Device Description Files often use XML-based formats for storing the device-related data appropriately.

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