Operating Instruction Manual

DTM for YOKOGAWA PROFIBUS DP Master Device ALP121

Configuration of YOKOGAWA Master Device

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Table of Contents

1 Introduction

1.1 About this Manual

This manual provides information on how to set and configure the device parameters of a PROFIBUS DP Master using the PROFIBUS DP Master YOKOGAWA ALP121 DTM.

ALP121 is the PROFIBUS DP Communication Module for CENTUM VP by YOKOGAWA.

“YOKOGAWA” means Yokogawa Electric Corporation.

1.1.1 Descriptions of the Dialog Panes

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

Section	Subsection	Page
Configuration	*Overview Configuration*	17
	Bus Parameters	18
	DPM Management	25
	Station Table	31
	Master Settings	32

Table 1: Descriptions Dialog Panes

1.1.2 List of Revisions

Index	Date	Version	Component	Chapter	Revision
1	2012-05-21	2.104 2.104	YokoPBMasterDTMx.dll YokoPBMasterGui.ocx	all	Created.
2	2012-10-26	2.105 2.105	YokoPBMasterDTMx.dll YokoPBMasterGui.ocx	3.4	Section *Station Table* updated; ‘Activate’ checkbox is checked by default and grayed out, new selection list showing all free station addresses can be used to change the station address.

Table 2: List of Revisions

1.1.3 Conventions in this Manual

Operation instructions, a result of an operation step or notes are marked as follows:

Operation Instructions:

➢ <instruction>

or

1. <instruction>
2. <instruction>

Results:

⇳ <result>

Notes:

Important: <important note>

Note: <note>

<note, where to find further information>

1.2 Documentation Overview

The following table lists the documents for SYCON.net/YOKO for ALP 121:

Content	Document Name
General description of netFrame: Description of the output window, menus and toolbars.	SYCONnet netFrame YOKOGAWA ALP121 OI 01 EN.pdf
General description of netDevice. Graphical network view, device catalog and the project tree. Description of ▪ menus, ▪ context menus, ▪ insert device, cut/copy/paste device, additional functions (print), delete device, ▪ symbolic name, ▪ network menu, ▪ network toolbar. Getting started/Configuration steps. How to add a device description. Working with bus lines. How to import SyCon-PB/YOKO project.	SYCONnet netDevice YOKOGAWA ALP121 OI 01 EN.pdf
Description of the configuration dialogs to configure the PROFIBUS DP master. Getting started/Configuration steps. Configuration of the master ▪ bus parameters, ▪ DPM management (DPM Settings and DPM Layout), ▪ station table, ▪ master settings, ▪ time sync.	PROFIBUS DP Master YOKOGAWA ALP121 DTM OI 01 EN.pdf
Description of the configuration dialogs to configure the PROFIBUS DP slave. Getting started/Configuration steps. Configuration of the slave ▪ general, ▪ modules, ▪ parameter, ▪ groups, ▪ extension, ▪ DPV1, ▪ DPV2, ▪ redundancy.	PROFIBUS DP Generic Slave DTM YOKOGAWA OI 01 EN.pdf

Table 3: Documentation Overview

1.3 Legal Notes

1.3.1 Copyright

1.3.2 Important Notes

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1.4 About PROFIBUS DP Master DTM

You can use the PROFIBUS DP Master DTM to configure the PROFIBUS DP Master device ALP121 within a FDT Framework.

1.4.1 Requirements

Requirements PROFIBUS DP Master DTM

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

- Completed hardware installation of a DTM-compatible PROFIBUS DP Master device, inclusive loaded firmware, license and loaded configuration file
- Installed FDT/DTM V 1.2 compliant frame application
- Loaded DTM in the Device Catalog of the FTD Framework

For more information to the hardware installation, please refer to the corresponding **User Manual** of your device.

1.5 Dialog Structure PROFIBUS DP Master 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.

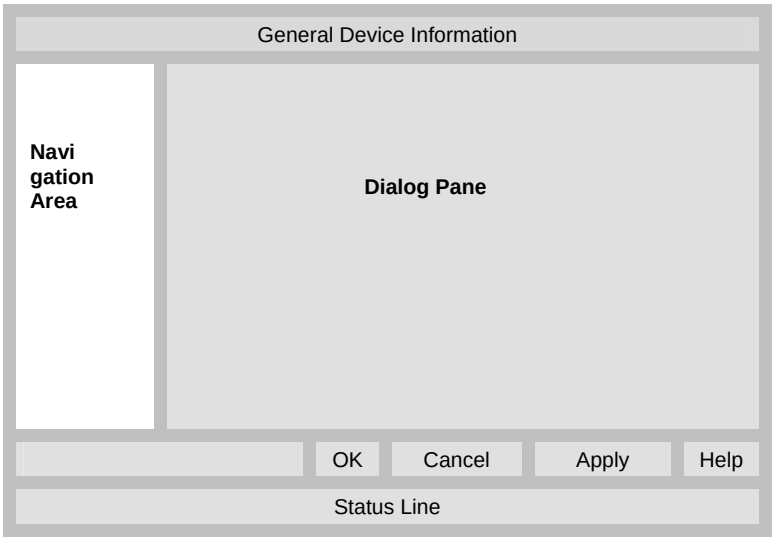


Figure 1: Dialog Structure of the PROFIBUS DP Master DTM

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 4: General Device Information

1.5.2 Navigation Area

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

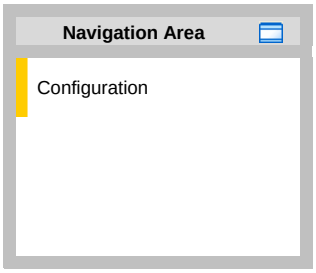


Figure 2: Navigation Area

➢ 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 **Configuration** pane is opened via the corresponding folder in the navigation area.

Configuration	
Bus Parameter	The **Bus Parameters** are the basis of an operating data exchange. For further information refer to section *Bus Parameters* on page *18*.
DPM Management	The **DPM Management** pane consists of two pages: DPM Settings and DPM Layout. The **DPM Settings** is for the handling of reserved areas. The **DPM Layout** pane shows a list of all dpram addresses used in the process data image. For further information, refer to section *DPM Management* on page *25.*
Station Table	The **Station Table** displays the list of all configured slave devices. Further information to the station table can be found in the section *Station Table* on page *31.*
Master Settings	At the **Master Settings** pane device related settings can be made. For further information, refer to section *Master Settings* on page *32*.
Time Sync	At the **Time Sync** pane a global clock sync interval can be set, if needed. For further information, refer to section *Time Sync* on page *37.*

Table 5: 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. *The dialog then closes.*
Cancel	To cancel your latest changes, click **Cancel**. Answer to the safety query **Configuration data has been changed. Do you want to save the data?** by **Yes**, **No** or **Cancel**. **Yes**: The changes are saved or the changed values are applied on the frame application database. *The dialog then closes.* **No**: The changes are not saved or the changed values are not applied on the frame application database. *The dialog then closes.* **Cancel**: *Back to the DTM.*
Apply	To confirm your latest settings, click **Apply**. All changed values will be applied on the frame application database. *The dialog remains opened.*
Help	To open the DTM online help, click **Help**.

Table 6: OK, Cancel, Apply and Help

1.5.5 Status Bar

The **Status Bar** displays information about the current state of the DTM. The current activity, is signaled graphically via icons in the status bar.

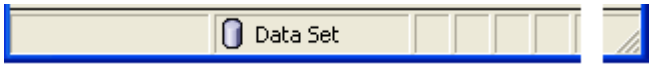


Figure 3: Status Bar

Icon / Meaning	
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.
States of the instance Date Set	
	**Valid Modified**: Parameter is changed (not equal to data source).

Table 7: Status Icons

2 Getting started and Instructions Step by Step

2.1 Overview Configuration Steps

The following table describes the steps to configure an ALP121 device with PROFIBUS DP Master DTM as it is typical for many cases. At this time it is presupposed that the hardware installation was done.

#	Step	Short Description	For detailed information see section	Page
1	Add PROFIBUS DP Slave in the Device Catalog	Add a missing Slave in the Device Catalog by importing the device description file to the Device Catalog. Depending of the FDT Container. For netDevice: - **Network > Import Device Descriptions**.	*(See Operating Instruction Manual netDevice and netProject)*	-
2	Load device catalog	- select **Network > Device Catalog**, - select **Reload Catalog**.	*(See Operating Instruction Manual netDevice and netProject)*	-
3	Configure Master device	Configure the Master device, if reserved memory should be used or not, before you insert the first slave - Double click to the device icon of the Master. - The Master DTM configuration dialog is displayed. In the Master DTM configuration dialog: - select **Configuration > DPM Management > DPM Settings**, - set if reserved memory should be used or not, - if used, then set the size of the reserved memory - close the Master DTM configuration dialog via **OK**.	*DPM Settings*	*25*
4	Insert Slave(s) into the configuration	- 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. - add more slaves, if needed	*(See Operating Instruction Manual netDevice and netProject)*	-
5	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**, - set the Watchdog control and Interval, - select **Configuration >Modules**, - configure the Modules of the Slave, - select **Configuration >Parameter**, - set the module Parameters, - Select **Configuration > Group**, - assign the Slave to a group, - select **Configuration > Extensions**, - set the Extension parameters, - select **Configuration > DPV1**, - configure the **DPV1** functions, - select **Configuration > DPV2**, - configure the **DPV2** Time Sync function, - select **Configuration > Redundancy**, - configure the **Redundancy** function, - close the Slave DTM configuration dialog via **OK**.	*(See Operating Instruction Manual Generic Slave DTM for PROFIBUS DP Slave Devices)*	-

#	Step	Short Description	For detailed information see section	Page
6	Configure Master device	Configure the Master device. - Double click to the device icon of the Master. - The Master DTM configuration dialog is displayed. In the Master DTM configuration dialog: - select **Configuration > Bus Parameters**, - set the bus parameters, - select **Configuration > DPM Management > DPM Layout**, - set symbolic names for the configured modules or signals, - select **Configuration > Station Table**, - set the station address of the devices, - select **Configuration > Master Settings**, - set the **Master Settings**, - select **Configuration > Time Sync**, - set the global clock sync interval, if needed, - close the Master DTM configuration dialog via **OK**.	*Configuring Device Parameters* *Bus Parameters* *DPM Layout* *Station Table* *Master Settings* *Time Sync*	16 18 *26* 31 32 37
7	Save project	- select **File > Save**.	*(See Operating Instruction Manual of the Frame Application)*	-

Table 8: Getting started - Configuration Steps

2.2 Configuring Device Parameters

The following steps are required to configure the parameters of the PROFIBUS DP Master device ALP121 using the PROFIBUS DP Master DTM:

Before you insert the first slave into the configuration:

1. Set the DPM management:

➢ Select **Configuration > DPM Management > DPM Settings** in the navigation area.

➢ Set if reserved memory should be used or not,

➢ If used, then set the size of the reserved memory

After you have inserted the slave(s) into the configuration:

1. Set the bus parameters:

➢ Select **Configuration > Bus Parameters** in the navigation area.

➢ Set the bus parameters

2. Set the DPM management:

➢ Select **Configuration > DPM Layout** in the navigation area.

➢ Set symbolic names for the configured modules or signals.

3. Set/change the station address of the devices:

➢ Select **Configuration > Station Table** in the navigation area.

➢ Set/change the station address of the devices

4. Set the Master Settings:

➢ Select **Configuration > Master Settings** in the navigation area.

Under **Application Monitoring**:

➢ Set **Watchdog time**.

5. Set a global clock sync interval, if needed for slaves that support this:

➢ Select **Configuration > Time Sync** in the navigation area.

➢ Set a global clock sync interval

For more information refer to section *Bus Parameters* on page 18, to section *DPM Management* on page 25, to section *Station Table* on page 31, to section *Master Settings* on page 32 and to section *Time Sync* on page 37 of this document.

3 Configuration

3.1 Overview Configuration

Performing Configuration stepwise

You must perform the following settings to configure the parameters of the PROFIBUS DP Master device ALP121 using the PROFIBUS DP Master DTM:

1. The bus parameters.
2. The DPM Management.
3. The station address of the devices.
4. The Master Settings

Configuration Dialog Panes

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

Section	Subsection	Page
Bus Parameters	*Profile*	18
	Bus Parameters	19
	Bus Monitoring	22
	Error Handling	23
	Calculated Timing	24
DPM Management		25
	DPM Settings	*25*
	DPM Layout	*26*
Station Table		31
Master Settings		32
	Start of Bus Communication	33
	Application Monitoring	33
	Process Image Storage Format	34
	Module Alignment	34
	Process Data Handshake	35
	Advanced	35
	Device Status Offset	36
Time Sync		37

Table 9: Descriptions of the Dialog Panes Configuration

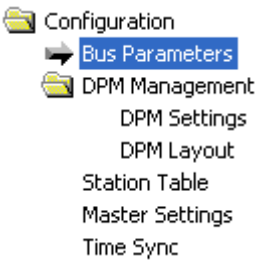


Figure 4: Navigation Area - Configuration

3.2 Bus Parameters

The **Bus Parameters** are the basis of an operating data exchange. This section contains information for setting the Bus Parameters as well as the description of the individual parameters.

Basic Rule: The Bus Parameters must be set the same for all devices. The Station Address, on the other hand, must be different from device to device

3.2.1 Profile

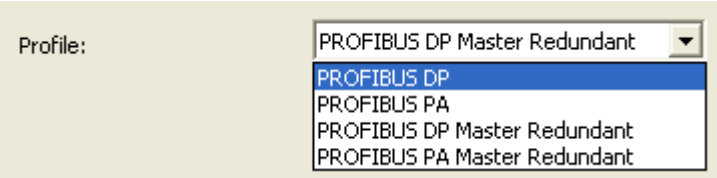


Figure 5: Bus Parameters > Profile

The following Profiles are available for the Master DTM:

- PROFIBUS DP (Default)
- PROFIBUS PA
- PROFIBUS DP Master Redundant
- PROFIBUS PA Master Redundant

According to the selected profile the associated standard bus parameters are displayed when opening the dialog for the first time.

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

DP is the abbreviation for Decentralized Periphery and PA for Process Automation.

3.2.2 Bus Parameters

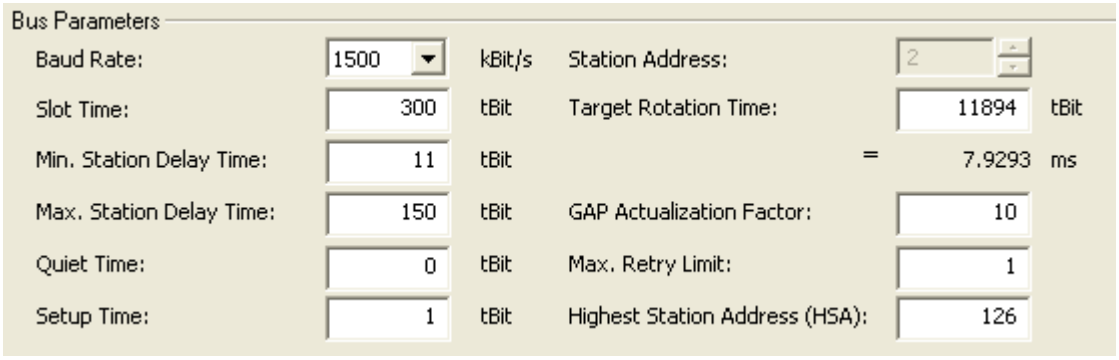


Figure 6: Bus Parameters > Bus Parameters

Note: The changing of Bus Parameters can cause communication interruptions.
The offline Bus Parameters are displayed. The Bus Parameters are transferred to the device after the download of the configuration.

Bus Parameters	Meaning		
Baud Rate	The **Baud Rate** is the data transfer speed: number of Bits per second. The **Baud Rate** must be set to be the same for all devices on the bus. The result of changing the Baud rate is that all other parameters must be re-calculated.		
	Baud Rate	Bit time (t_{Bit})	Max cable length (type A)
	9,6 kBit/s 19,2 kBit/s 31,25 kBit/s 45,45 kBit/s 93,75 kBit/s 187,5 kBit/s 500 kBit/s **1500 kBit/s** 3000 kBit/s 6000 kBit/s 12000 kBit/s	104,2 us 52,1 us 32 us 22 us 10,7 us 5,3 us 2 us 666,7 ns 333,3 ns 166,7 ns 83,3 ns	1200 m 1200 m 1200 m 1200 m 1200 m 1000 m 400 m 200 m 100 m 100 m 100 m
Slot time (T_{SL})	'Wait for receipt' – Monitoring time of the sender (Requestor) of telegram for the acknowledgement of the recipient (Responder). After expiration, a retry occurs in accordance with the value of 'Max. telegram retries'. Value range: 37 .. 16383 (The default value depends from the baud rate.)		
Min. Station Delay Time (min T_{SDR})	This is the shortest time period that must elapse before a remote recipient (Responder) may send an acknowledgement of a received query telegram. The shortest time period between the reception of the last Bit of a telegram to the sending of the first Bit of a following telegram. Value range: 1 .. **11** . 65535		
Max. Station Delay Time (max T_{SDR})	This is the longest time period that must elapse before a Sender (Requestor) may send a further query telegram. Greatest time period between the reception of the last Bit of a telegram to the sending of the first Bit of a following telegram. The Sender (Requestor, Master) must wait at least for this time period after the sending of an unacknowledged telegram (e.g. Broadcast only) before a new telegram is sent. Value range: 1 .. 65535 (The default value depends from the baud rate.)		
Quiet Time (T_{QUI})	This is the time delay that occurs for modulators (Modulator-trip time) and Repeaters (Repeater-switch time) for the change over from sending to receiving. Value range: 0 .. 127 (The default value depends from the baud rate.)		
Setup Time (T_{SET})	Minimum period “reaction time” between the receipt of an acknowledgement to the sending of a new query telegram (Reaction) by the Sender (Requestor). Value range: 0 .. 255 (The default value depends from the baud rate.)		

Bus Parameters	Meaning
Station Address	The Station Address is the individual device address of the Master device on the bus. Value range: 2
Target Rotation Time (T_{TR})	Pre-set nominal Token cycling time within the Sender authorization (Token) will cycle around the ring. How much time the Master still has available for sending data telegrams to the Slaves is dependent on the difference between the nominal and the actual token cycling time. The **Target rotation time (T_{TR})** is shown in Bit times (tBit) like the other Bus Parameters. Below the displayed Bit time, the **Target rotation time** is also displayed in milliseconds (ms). Value range: 1 .. 2^{24}-1 (=16.777.215) (The default value depends of the number of Slaves attached to the Master and their module configuration)
GAP Actualization Factor (G)	Factor for determining after how many Token cycles an added participant is accepted into the Token ring. After expiry of the time period G*T_{TR}, the Station searches to see whether a further participant wishes to be accepted into the logical ring. Value range: 0 .. **10** .. 255
Max. Retry Limit	Maximum number of repeats in order to reach a Station. Value range: 1 .. 15 (The default value depends from the baud rate.)
Highest Station Address (HSA)	The **Highest Station Address** is the highest bus address up to which a Master searches for another Master at the bus in order to pass on the Token. This station address must on no account be smaller than the Master station address. Value range: 1 .. **126**

Table 10: Bus Parameters > Bus Parameters

3.2.2.1 Adjust Bus Parameters

If the bus configuration is changed and these changes have effects on the bus parameters, a note symbol appears next to the concerned parameters which displayed values are not longer actual.

Figure 7: Note bus configuration was changed, Bus Parameters not longer actual

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

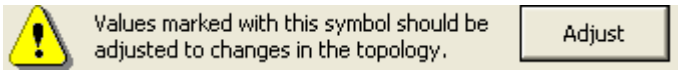


Figure 8: Adjust Bus Parameters

If no note symbol is displayed next to the parameters of the bus configuration, the indicated values are current and valid.

3.2.2.2 Additional Conditions for correct Communication

T_{QUI} < min T_{SDR}

T_{RDY} < min T_{SDR}

T_{QUI} < T_{RDY}

3.2.2.3 Representation of the Bus Parameters

All times for the Bus parameters are given in Bit times. The Bit time t_{Bit} is the result of the reciprocal of the Baud rate:

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

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

Bit time = Time [milliseconds] * Baud rate

3.2.3 Bus Monitoring

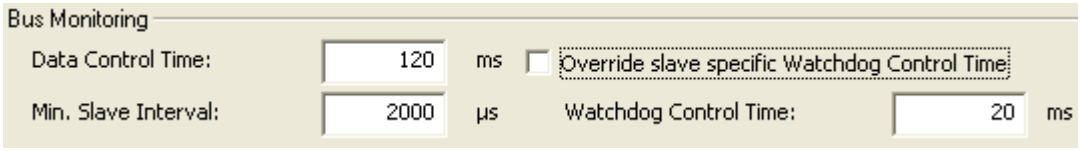


Figure 9: Bus Parameters > Bus Monitoring

Bus Parameters	Meaning
Data Control Time	The **Data Control Time** defines the time within the Data_Transfer_List is updated at least once. After the expiration of this period, the Master (class 1) reports its operating condition automatically via the Global_Control command. Value range: 1.. 2^{32}-1 (= 4.294.967.295) (The default value depends from the baud rate.) For a valid configuration the **Data Control Time** has to be: Data Control Time >= 6 * Watchdog Control Time
Min. Slave Interval	The **Min Slave Interval** defines the minimum time period between two Slave list cycles. The maximum value that the active Stations require is always given. Value range: 1 .. 65535 (The default value depends of the Slave types)
Override slave specific Watchdog Control Time	Each Slave returns a specific Watchdog Control Time to the Master. The option **Override slave specific Watchdog Control Time** allows the user to override individual slave specific settings with an equal value for all slaves configured at this master, for example to set a consistent value for slower transmission rates (which may require extended Watchdog Control Times) in critical environments.
Watchdog Control Time	The DP Slaves utilizes the **Watchdog Control Time** setting in order to detect communication errors to the assigned Master. When the Slave finds an interruption of an already operational communication, defined by a Watchdog time, then the Slave carries out an independent Reset and places the outputs into the secure condition. Value range: 20 .. 65025 (The default value depends of the number of Slaves attached to the Master and their configuration)

Table 11: Bus Parameters > Bus Monitoring

The default settings for Data Control Time and for Watchdog Control Time depends on the selected profile.

Profile	Data Control Time	Watchdog Control Time	Overwrite slave specific Watchdog Control Time
PROFIBUS DP (default)	120	20	unchecked
PROFIBUS PA	1320	220	checked
PROFIBUS DP Master Redundant	24000	4000	checked
PROFIBUS PA Master Redundant	24000	4000	checked

Table 12: Bus Parameters > Bus Monitoring: Default Values

3.2.3.1 Adjust Bus Monitoring Parameter

If the bus configuration is changed and these changes have effects on the bus monitoring parameters, a note symbol appears next to the concerning parameters which displayed values are not longer current.

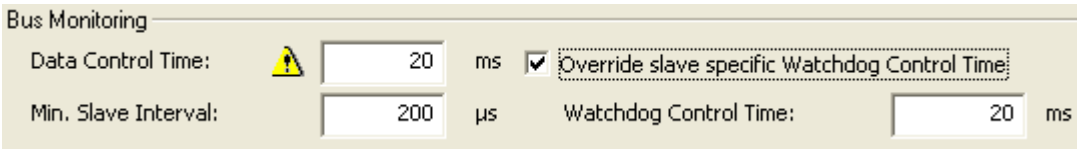


Figure 10: Note Bus configuration was changed, Bus Monitoring Parameters not longer actual

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

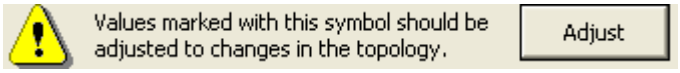


Figure 11: Adjust Bus Monitoring Parameters

If no note symbol is displayed next to the parameters of the bus monitoring configuration, the indicated values are current and valid.

3.2.4 Error Handling

Figure 12: Bus Parameters > Error Handling

For PROFIBUS DP, the **Auto Clear** setting is provided for global error handling.

The DP Master monitors the data exchange to all DP Slaves by means of a timer.

- Auto Clear OFF (Not Selected)

The **Master Operation Mode** will stay in the mode **Operate** and the communication to all available Slaves is kept up. This is the default setting and is not changeable.

- Auto Clear ON (Enabled)

Not usable.

For further information to the **Data Control Time** refer to section *Bus Monitoring* on page 22.

3.2.5 Calculated Timing

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

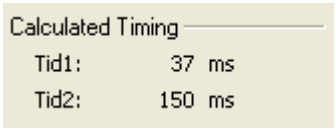


Figure 13: Bus Parameters > Calculated Timing

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

Depending on the type of the telegram:

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

Table 13: Bus Parameters > Calculated Timing

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

(*) T_{SYN}:

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

3.3 DPM Management

The PROFIBUS DP Master device ALP121 uses a dual-port memory (DPM) to store the process data for input and output data. The size of the process data image for input data is 5712 bytes and for output data 5760 bytes.

The **DPM Management** consists of two pages: **DPM Settings** and **DPM Layout**.

3.3.1 DPM Settings

The handling of the reserved memory is configured in the **DPM Settings** pane.

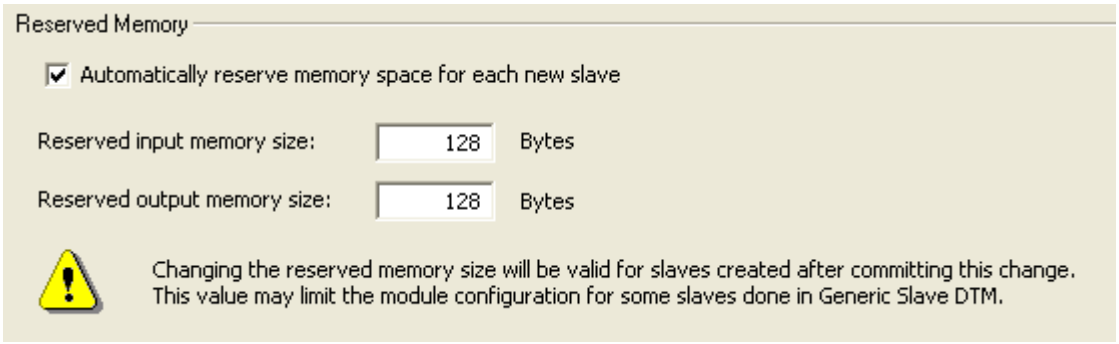


Figure 14: Configuration > DPM Management > DPM Settings

The usage of reserved memory can be activated or deactivated. A reserved memory space can be used for each slave. If reserved memory is used, then the offset addresses of input and output data of other slaves do not change, if one slave is extended regarding the size of input and output data.

Reserved Memory	Meaning
Automatically reserve memory space for each new slave	☑ Reserved memory is used for each new slave If a slave is inserted, then **Reserved input memory size** and **Reserved output memory size** is reserved in the process data for this slave. The configured size of input data and output data of this slave will be used from the reserved memory size. Example: If the reserved size is 128 bytes and the slave has 4 bytes, then 4 bytes are used in the process data for this slave and 124 bytes stay reserved for this slave for future use.
	☐ Reserved memory is not used for each new slave If a slave is inserted, then exactly the configured size of input data and output data is used in the process data for this slave.
Reserved input memory size	Size of the reserved memory for input process data Range of value: 8 … 244 bytes, Default: 128 bytes
Reserved output memory size	Size of the reserved memory for output process data Range of value: 8 … 244 bytes, Default: 128 bytes

Table 14: Configuration > DPM Management > DPM Settings

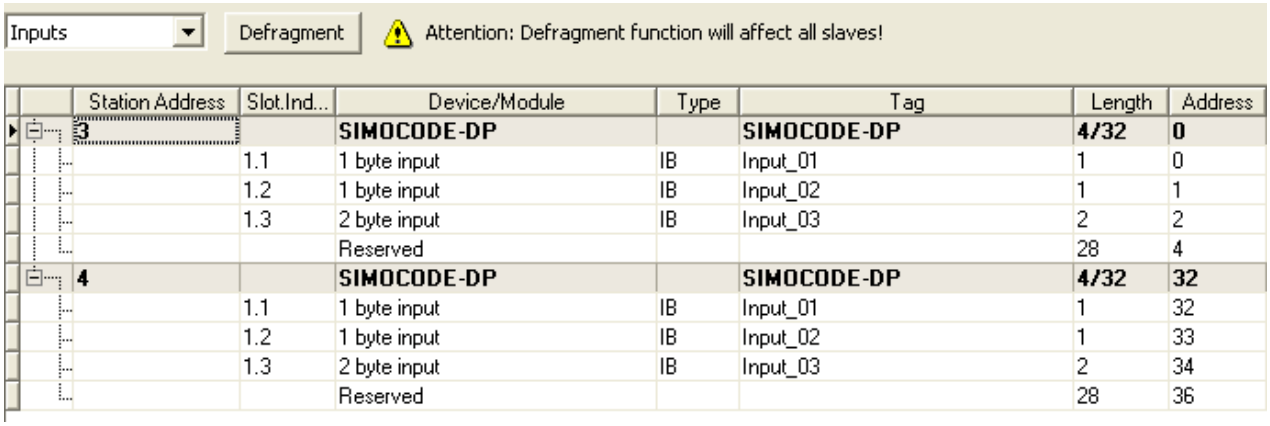
3.3.2 DPM Layout

The **DPM Layout** dialog pane shows a list of all addresses used in the process data image. The displayed addresses refer to the used PROFIBUS DP Master. The dialog pane allows additionally to edit tags. This dialog pane offers the following functionality:

- View the offset addresses of input / output modules
- Defragmentation
- Edit tags

To open the **Address DPM** dialog pane:

➢ Select **Configuration > DPM Management > DPM Layout** in the navigation area.



Station Address	Slot.Ind...	Device/Module	Type	Tag	Length	Address
3		**SIMOCODE-DP**		**SIMOCODE-DP**	**4/32**	**0**
	1.1	1 byte input	IB	Input_01	1	0
	1.2	1 byte input	IB	Input_02	1	1
	1.3	2 byte input	IB	Input_03	2	2
		Reserved			28	4
4		**SIMOCODE-DP**		**SIMOCODE-DP**	**4/32**	**32**
	1.1	1 byte input	IB	Input_01	1	32
	1.2	1 byte input	IB	Input_02	1	33
	1.3	2 byte input	IB	Input_03	2	34
		Reserved			28	36

Figure 15: Configuration > DPM Management > DPM Layout

➢ First select **Input** or **Outputs** to display the information about the input process data respectively output process data.

Input Process Data / Output Process Data

Parameter	Meaning
Station Address	Station address of the assigned Slave device
Slot.Index	Slot (module) and index (submodule) of a slave.
Device	Actual device name of the assigned Slave device from the GSD file.
Module	Name of the module according GSD. The module name **Reserved** indicated that reserved process data memory is available for this slave.
Type	Output data type: QB output byte, QW output word Input data type: IB input byte, IW input word
Tag	Free definable symbolic name of the assigned Slave module.
Length	Number of the output process data respectively input process data) First number: Number of output data (or input data) used (configured) for this slave. The number is the number of bytes. Second number: Number of output data (or input data) reserved for this slave. The number is the number of bytes. If the first number is less then the second number, then reserved memory exists for this slave. The length of module *Reserved* displayes the length of the reserved memory, which is still available to extend the slave.
Address	Output data offset address or input data offset address

Table 15: DPM Layout

Defragment

The **Defragment** function rearranges slaves' offset addressing avoiding gaps in the input and output process memory image.

The defragmentation can be done in two way: The offset addresses can be sorted according to the slave station address if the following question is answered with **Yes**. If the following question is answered with **No**, then the existing slave sequence is kept.

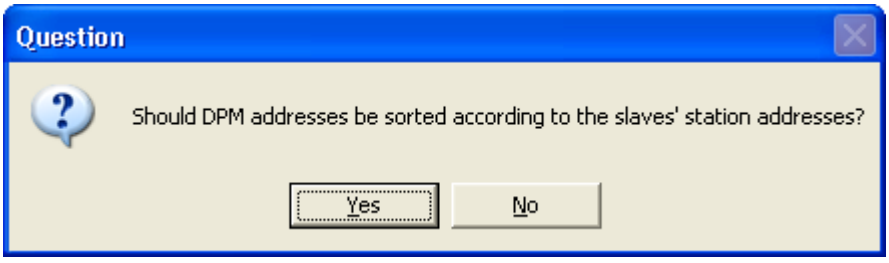


Figure 16: Defragmentation

The Defragment function will change slave/module/signal addresses in the process data image.

When 'Automatically reserve memory space for each new slave' is disabled, then offset addresses may require rearrangement due to defragmentation of the dual-port memory or possible memory overlappings. Then click **Defragment** to recalculate the offset addresses.

Remaining free Memory

The **Remaining free Memory** shows the free process data memory in bytes for the input process data respectively output process data.

Figure 17: Remaining free Memory

3.3.2.1 Addressing Rules

The following auto-addressing rules apply:

1. The minimum relocatable memory blocks in PROFIBUS are modules. Signal offset addresses are based on their parent module's offset addresses. Slave's offset addresses is always the offset address of its first module.
2. Modules' addresses are packed at byte alignment as set in DTM's Master Settings page; Thus slave's offset address always begins byte aligned according to this setting.
3. Slaves offset addresses are bind to the first module's offset address of this slave (or vice-versa). Slaves occupies contiguous memory area which embraces all the modules and the remaining reserved area for this slave.
4. The memory available for the defragmentation is consisted of the reserved memory previously used for slaves but deleted afterwards.
5. When defragmenting, changing the offset address of a slave reallocates/shifts everything belonging to this slave with the delta of the slave offset addresses (new offset address minus old offset address or vice-versa); slave's reserved memory area (handled as a module) is also relocated.
6. The remaining free memory always shows the amount of memory in bytes unoccupied at the bottom of the dual-port memory area, input or output correspondingly. That is, the memory space after the last slave in the table. A memory block occupied by a slave begins with its offset address (offset address of its first module) and ends by its last module (offset plus length) or its reserved area (offset and length).
7. If the remaining reserved space is 0, that is completely consumed, it is not displayed i.e. the corresponding row in the table is not displayed.
8. The following restrictions apply for the offset address and length combination of the reserved memory, being created or modified:
    a. The reserved area always begins after the last reserved area (with the highest offset address) configured module of the same (parent) slave.
    b. The reserved area shall occupy contiguous memory and does not overlap with the subsequent slave if such slave has been already configured.
    c. The length value (column length) for a reserved space always reflects remaining reserved space – the memory not assigned to modules of the corresponding slave.

9. If the slave module configuration, which is done in the (Generic) Slave DTM, exceeds reserved amount of bytes, the user will be prompted a warning message:

    a. When dual-port memory input space is affected: “The module configuration exceeds 128 bytes of reserved input space for this slave. Remove the slave from the configuration; extend default reserved space areas as needed; add the slave to the configuration again and configure modules anew!”.

    b. When dual-port memory output space is affected: “The module configuration exceeds 80 bytes of reserved output space for this slave. Remove the slave from the configuration; extend default reserved space areas as needed; add the slave to the configuration again and configure modules anew!”.

    c. When both, dual-port memory input and output spaces is affected: “The module configuration exceeds 128 bytes of reserved input space and 80 bytes of reserved output space for this slave. Remove the slave from the configuration; extend default reserved space areas as needed; add the slave to the configuration again and configure modules anew!”.

    Remark: The numbers 128 and 80 are example numbers. They’re depending on the configuration of the reserved spaces per slave.

The user can reconfigure the reserved space(s) of slaves and modules as follows:

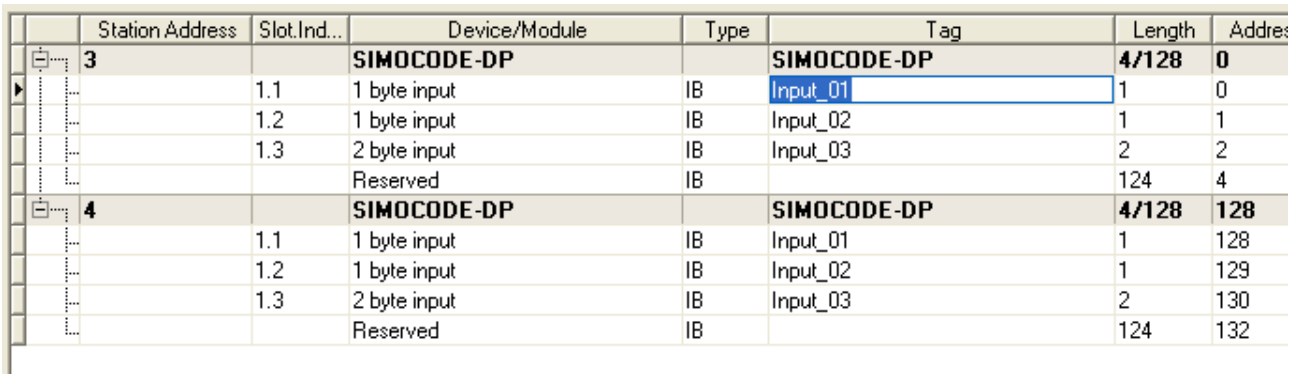
1. The user deletes the Slave DTM for the device which has not enough space, see above slave. The corresponding memory is freed by the Master DTM and not reserved for any slave with a specific station address.
2. The user expands a default reserved size for all new devices in the Master DTM's DPM Settings pane manually.
3. User adds a new device that is new Slave DTM to the configuration. As this new slave requires more space then freed by the deletion of the previous slave, the DPM Manager assigns other space available to it. NB: The station address for the newly added slave will be always the lowest free station address. This does mean that in some cases the new station address will not be the same as the station address for the previously deleted slave.
4. The user may add new IO modules to the slave device in the corresponding Slave DTM. Steps in the item 9 apply again when new configuration causes its size to exceed reserved space again.

    Remark: The user has to do steps 1., 2. and 3. as described above.

3.3.2.2 Tag

For the PROFIBUS DP Master DTM the **DPM Layout** pane serves as an external process data interface, e. g. for configuration data transfer. The DPM Layout pane lists the slave devices connected to the master, as well as the configured modules or input or output signals of the devices.

For the configured modules a tag can be set.



	Station Address	Slot.Ind...	Device/Module	Type	Tag	Length	Addres
	3		**SIMOCODE-DP**		**SIMOCODE-DP**	**4/128**	**0**
		1.1	1 byte input	IB	Input_01	1	0
		1.2	1 byte input	IB	Input_02	1	1
		1.3	2 byte input	IB	Input_03	2	2
			Reserved	IB		124	4
	4		**SIMOCODE-DP**		**SIMOCODE-DP**	**4/128**	**128**
		1.1	1 byte input	IB	Input_01	1	128
		1.2	1 byte input	IB	Input_02	1	129
		1.3	2 byte input	IB	Input_03	2	130
			Reserved	IB		124	132

Figure 18: Tag

➢ To edit the tag, click into the field containing the tag.

The name must be unique for a slave device.

If the name already exists, then an exclamation mark appears. Then rename the tag to a unique name.

3.4 Station Table

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

The **Station Address** and **Name** can be changed in this table.

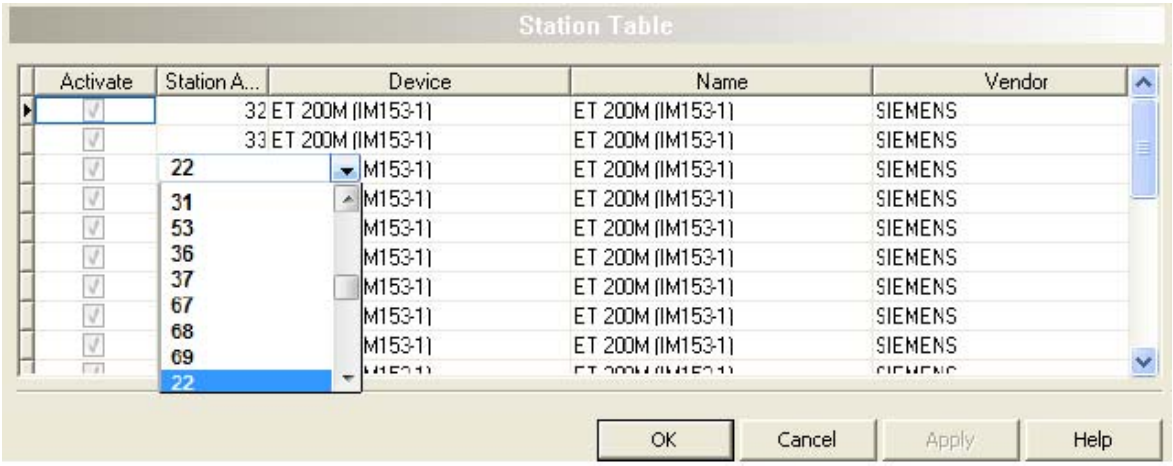


Figure 19: Station Table (In the Figure shown here, in the column Device or Name example devices are displayed.)

Column	Meaning
Activate	Checkbox, is checked by default and grayed out (not changeable). **Note:** If there were unchecked checkboxes (deactivated Slaves) in earlier projects, then the blank checkboxes will be checked automatically after loading of such project; i.e., when saving NXD database, all Slaves in the configuration will be set activated.
Station Address	Station address of the Salve assigned Range for valid station address: 3 … 125 Can be changed here.
Device	Actual device name of the assigned Slave device from the GSD file.
Name	Free definable symbolic name of the assigned Slave device. Can be changed here.
Vendor	Name of the vendor of the device

Table 16: Station Table

- For changing the station address set the cursor into the appropriate **Station Address** field.

A selection list with all free station addresses appears.

- Select the required station address.

3.5 Master Settings

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

➢ Open the **Master Settings** dialog via **Settings** > **Master Settings**.

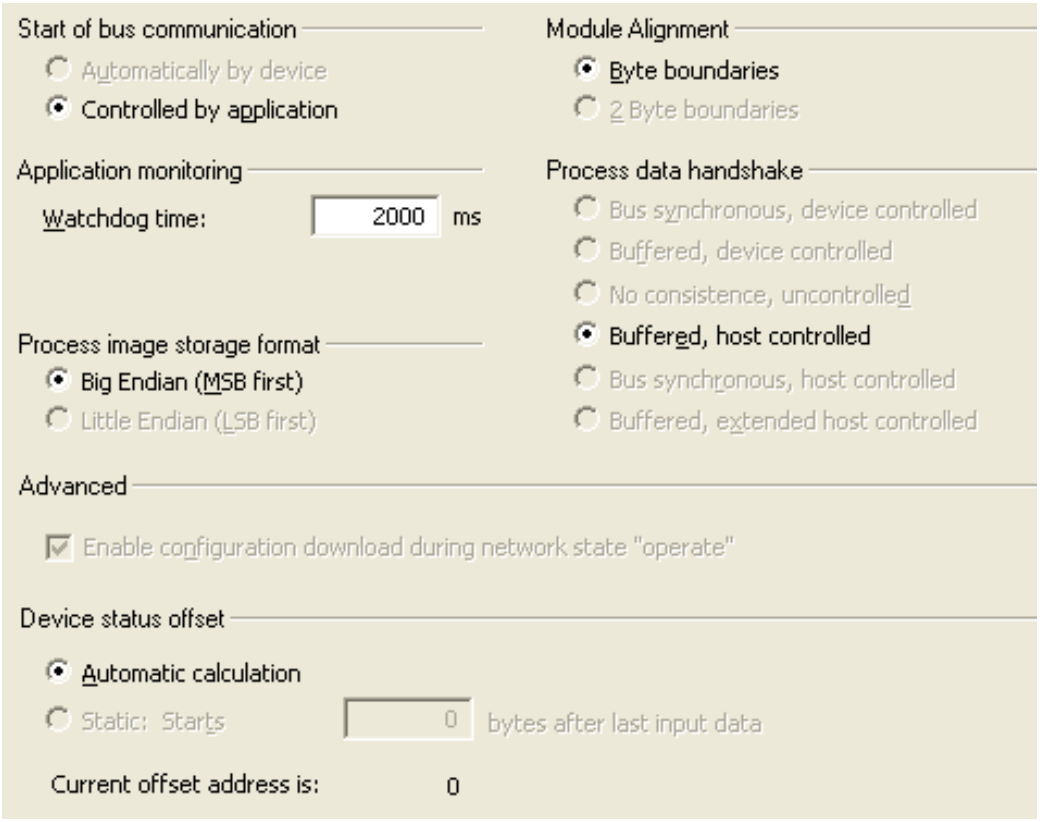


Figure 20: Configuration > Master Settings

The following adjustments can be made here:

- *Start of Bus Communication* on page 33
- *Application Monitoring* on page 33
- *Process Image Storage Format* on page 34
- *Module Alignment* on page 34
- *Process Data Handshake* on page 35
- *Advanced* (Configuration in Run) on page 35
- *Device Status Offset* on page 36

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

3.5.1 Start of Bus Communication

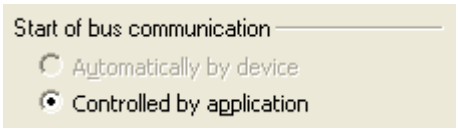


Figure 21: Master Settings > Start of Bus Communication

When **Controlled by application** is selected, the application program must activate the data exchange on the bus. This is the default setting and is not changeable.

3.5.2 Application Monitoring

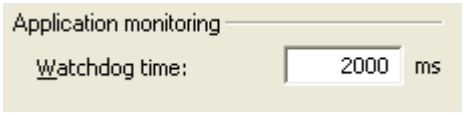


Figure 22: Master Settings > Application Monitoring

The **Watchdog time** determines the time within which the device watchdog must be re-triggered from the application program while the application program monitoring is activated. When the watchdog time value is equal to 0 the watchdog is deactivated and the application program monitoring is deactivated too.

Watchdog time	Range of Value / Value
Permissible range of values	20 … 65535 ms
Default	2000 ms
The software watchdog is deactivated.	0 ms

Table 17: Range of Value / Value for the Watchdog time

3.5.3 Process Image Storage Format

Figure 23: Master Settings > Process Image Storage Format

The **Process Image Storage Format** determines how the data words are stored in the process image.

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

Storage format (word module)	
Big Endian	**MSB/LSB** = higher/lower = Motorola format = Big Endian This is the default setting and is not changeable.
Little Endian	**LSB/MSB** = lower/higher = Intel format = Little Endian Not usable.

Table 18: Master Settings Pane Parameters - Process Image Storage Format

3.5.4 Module Alignment

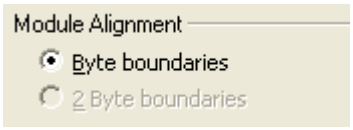


Figure 24: Master Settings > Module Alignment

The **Module Alignment** defines the addressing mode of the process data image. The addresses (offsets) of the process data are always interpreted as byte addresses. The **Module Alignment** then defines the addressing mode, **Byte boundaries** or **2 Byte boundaries**.

Parameter	**Meaning**
Byte boundaries	The module address can start at any byte offset. This is the default setting and is not changeable.
2 Byte boundaries	The module address can only start at even byte offsets. Not usable.

Table 19: Parameters Master Settings > Module Alignment

3.5.5 Process Data Handshake

Figure 25: Master Settings > Process Data Handshake

The various types of **Process Data Handshakes** are used for setting the handshake of the process data for the PROFIBUS DP Master device.

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

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

Only the **Buffered, host controlled** handshake mode is supported. This is the default setting and is not changeable.

3.5.6 Advanced

The **Enable configuration download during network state "operate"** option for the PROFIBUS network allows to change the configuration of a running PROFIBUS network without resetting the devices.

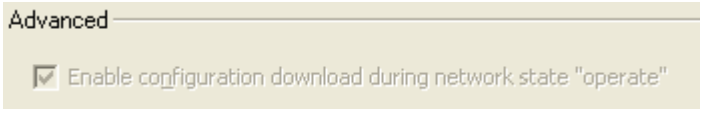


Figure 26: Master Settings > Advanced

The **Enable configuration download during network state "operate"** is always enabled.

- Close the **Master Settings** dialog via OK.

3.5.7 Device Status Offset

Reference on Firmware: The option **Device Status Offset** was implemented since PROFIBUS DP Master Firmware Version 2.3.14.0.

The option **Device Status Offset** allows via **Automatic calculation** to calculate the offset for the start address of the device status in the dual-port memory automatically.

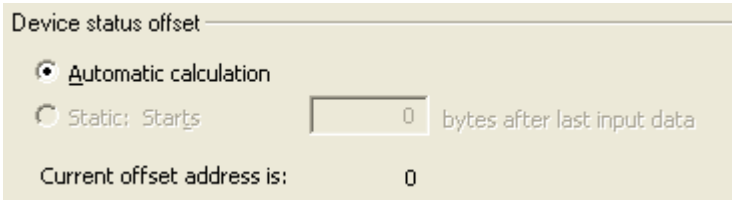


Figure 27: Master Settings > Device Status Offset

Device Status Offset	Meaning
Automatic calculation	Device status always after the last input byte. If further input data are added in the configuration, then the starting address of the device status in the dual-port memory moves. Default, not changeable.
Static	Not usable.

Table 20: Option Master Settings > Device Status Offset

3.6 Time Sync

The **Time Sync** pane is used to set a global clock sync interval, which is valid for all slaves or to allow an individual clock sync interval for each slave. Time Sync (time synchronisation) is a DPV2 feature.

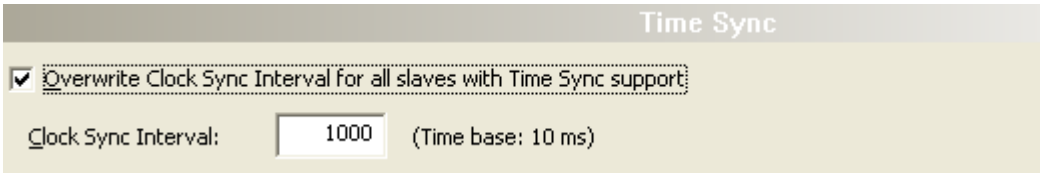


Figure 28: Time Sync

Time Sync	Meaning
Overwrite clock sync interval for all slaves with Time Sync support	☑ Use this setting, if all slaves have to use the same value for the clock sync interval.
	☐ Use this setting, if each slave have to use an individual value for the clock sync interval. The value for the slave is configured in the slave configuration.
Clock Sync Interval	Value for clock sync interval on a time base of 10 ms. The minimum value is 200 which is 2000 ms (2 s). The default value is 1000 which is 10000 ms (10 s). Range of value: 200 … 65535

Table 21: Time Sync

4 Lists

4.1 List of Figures

4.2 List of Tables

5 Glossary

DTM

Device Type Manager

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

DPV0

PROFIBUS DP with cyclic communication

DPV1

PROFIBUS DP with acyclic communication

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.

Master

PROFIBUS DP Master devices initiate the data traffic on the bus. In the PROFIBUS protocol Master devices are called active participants. A master may send messages without external request.

Slave

Slave devices are peripheral devices, like for example I/O devices or drives. Slave devices are also called passive participants. They do not receive the bus access authorization. That means, they may only accept received messages from the Master or send a message to the Master after enquiry of the Master.

6 Appendix

6.1 User Rights

User-rights are set within the FDT-container.

Note: Administrator rights are always used.

6.2 References

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

[2] IEC 61158 Third edition, 2003

[3] PROFIBUS DP-Master; Protocol API (Hilscher), Revision 12