



# **Device Type Manager compliant with FDT 1.2**

## **for parameterization of Profibus PA Profile 3.0 field devices**

### **User manual**

### **Release 1.0**

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### Profibus PA Profile 3.0 DTM

Device Type Manager for parameterization of field devices with Profibus communication. The Profibus PA Profile 3.0 DTM runs in applications which have been implemented compliant with the Field Device Tool Specification Release 1.2. Applications may include parameterization programs such as PACTware, engineering tools, or control systems.

The Profibus PA Profile 3.0 DTM runs with Windows XP, Vista, and Windows7.

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## 1. Introduction

The Profibus PA Profile 3.0 Device Type Managers (DTM) are used to parameterize field devices with Profibus communication which comply with the PA Profile Release 3.0. The DTMs are generic to the particular extent that structures of the same type and compliant with the profile can be recognized and processed by them.

Either an Ethernet/Profibus gateway or a Profibus master interface card is required for hardware communication with a Profibus device. These products are offered by several vendors.

The software communication is carried out via a Profibus Communication Device Type Manager (CommDTM). Profibus CommDTMs are offered by the vendors of communication modules as a component of their products. Applications such as the control systems of large automation system vendors contain their own Profibus CommDTMs or equivalent interfaces.

Both the Profibus PA Profile 3.0 DTM and the Profibus CommDTM must have been implemented in accordance with the Field Device Tool (FDT) Specification Release 1.2 (see /1/) to enable them to be used in applications compliant with FDT 1.2.

Since the Field Device Tool Specification is continuously being developed further, the DTM component which processes the interfaces to the applications is also being continuously updated. This component is the DTM Runtime Library which was developed by ICS GmbH and is used in the DTMs of numerous device manufacturers.

A parameter component for multi-lingual representation and input of values which is used in the GUI of the Profibus PA Profile 3.0 DTM was also developed by ICS GmbH.

### 1.1 Support of PA Profile 3.0

Profibus PA Profile 3.0 DTM supports the following PA profiles:

- Profile Transmitter  
supports all measuring procedures for which a profile description is present, for pressure, temperature, level, and flow as the physical variables.
- Profile Discrete Input
- Profile Discrete Output
- Profile Actuator

Multi-variable devices are supported.

Profiles and measuring procedures can be limited for the Profile Transmitter using a license file.



## 1.2 Components of a PA Profile 3.0 DTM

A Profibus PA Profile 3.0 DTM comprises several forms with which the functions of a DTM can be processed. These include:

- Parameterization
- Measured-value display
- Trend with archive function
- Simulation
- Diagnostics
- Setpoint
- Alarm dialog
- Service dialog
- Linearization table
- Profile view with all parameters in accordance with the profile specification listed in line with block and slot indexes
- Block management
- Search function for associative searching of terms
- Channel assignment
- DTM options
- Printing of parameter values

The GUI of the DTM is available in English and German.

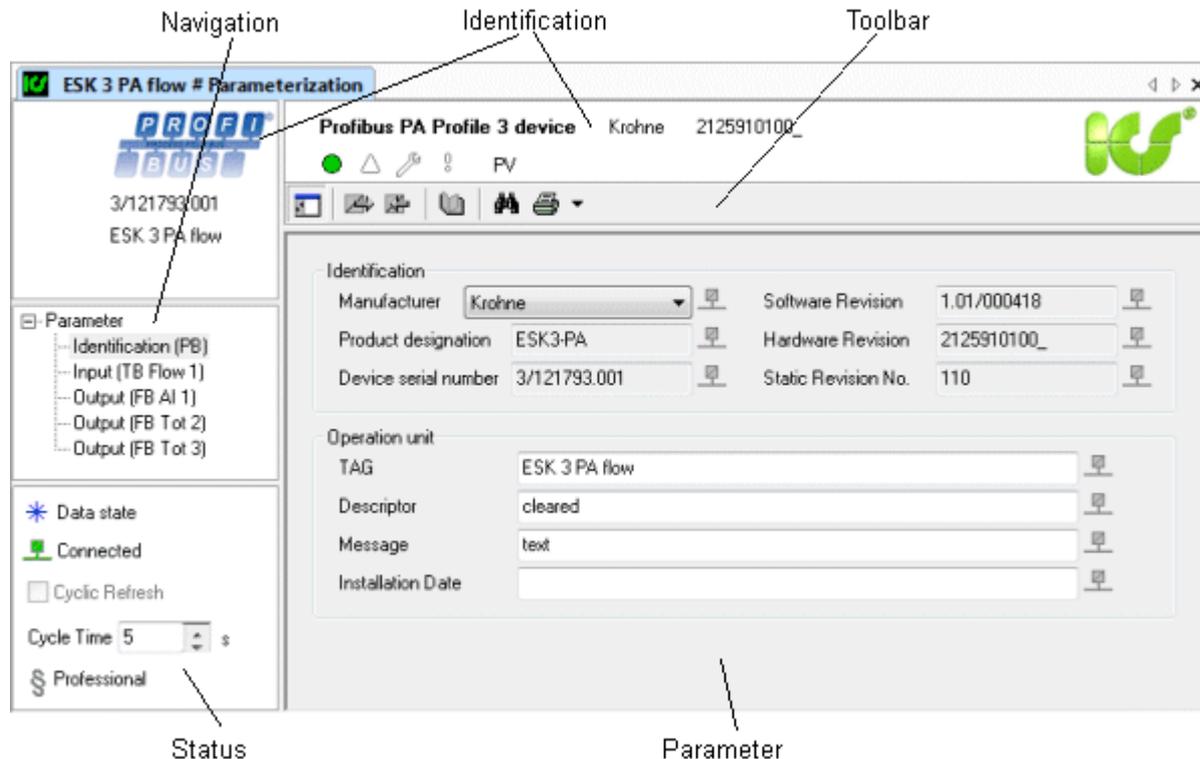
Without a license, it is possible to use all functions of the Profibus PA Profile 3.0 DTM – except saving and printing of the parameter values – for 10 minutes. In order to use the Profibus PA Profile 3.0 DTM again without a license, the project containing the Profibus PA Profile 3.0 DTM must be loaded again.

All functions are available for unlimited use with the professional license.



## 2. DTM layout

The DTM displays several areas containing general and specific data of the field device. These areas are used for controlling the display and for communication with the field device.



### Identification

The serial number and the tag of the field device processed using the Profibus PA Profile 3.0 DTM are displayed underneath the Profibus logo. The right-hand part of the identification shows the name of the DTM, the vendor, and the hardware version of the field device, including the status and the company logo of ICS GmbH.

The company logo can be used to access the website of ICS GmbH if an Internet connection is present at the workstation.

### Navigation

The navigation area can be used to switch rapidly between the DTM blocks. You can use the mouse and the direction keys on the keyboard to switch between the dialogs.

### Toolbar

The toolbar contains the following tools:



The left part of the DTM (navigation and status) can be displayed or hidden.

The following keys are only active if the DTM is connected to the field device.



All parameters values visible in the dialog are read out of the device.



All parameter values visible in the dialog are written into the device.



Opens this documentation.

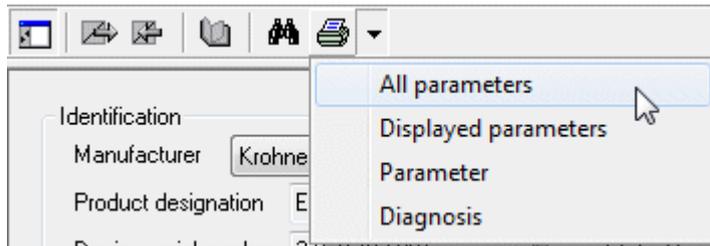


Searches for terms within the DTM and opens the dialog page if a found term has been selected.



Prints parameter lists.

The parameter lists can be selected using a menu.



### **Status**

This part of the GUI displays the status of the parameters of the complete DTM and the connection status between field device and DTM. In addition, cyclic updating of the parameter values can be set here. The licensee is displayed on the paragraph sign by means of a tooltip.

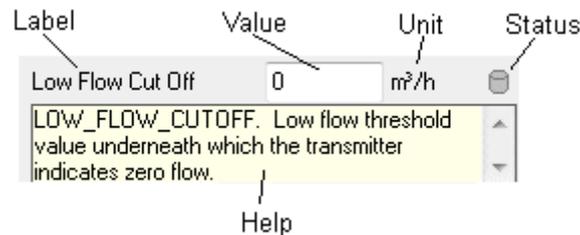
### **Parameter area**

The parameter area displays the respective group of parameters which has been selected using the application (e.g. with the shortcut menu of the DTM in PACTware) or an entry in the navigation.



### 3. Parameter component

The parts of the parameter component are shown in the following figure:



The name is displayed in German, or in English if the application has been set to a language other than German.

The value is displayed differently depending on the data type. The representation is in accordance with the Windows Style Guide.

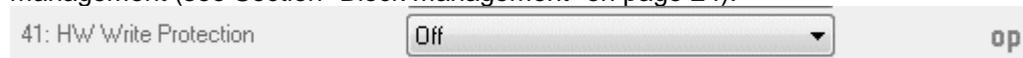
The status of the parameter can assume the following values:

-  Error during communication
-  Device error (described in more detail in the tooltip)
-  Range violation
-  Invalid input
-  Parameter must be confirmed
-  Parameter was changed
-  Parameter is updated
-  Parameter cannot be changed with the current privileges
-  Parameter has initial value
-  Parameter has been read out of the project or written into the project
-  Parameter has been read out of the device or written into the device
-  Optional parameter is deactivated
-  Parameter is invalid

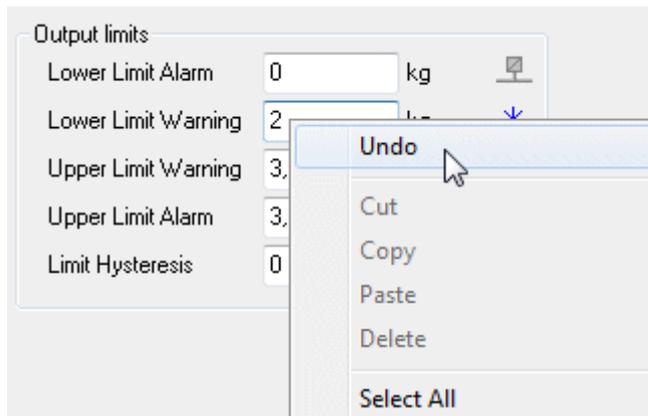
A help text is available for each parameter and is also displayed in abbreviated form as tooltip. The help text can be displayed using the key combination "Shift F1".



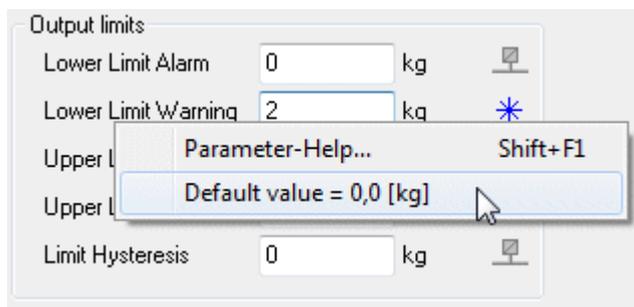
The names of optional parameters which have not been configured or are not offered by the field device are displayed in gray. Which of the optional parameters are to be included is defined in the block management (see Section "Block management" on page 24).



Two shortcut menus are additionally offered for each parameter. The standard menu corresponding to the type of displayed value is opened in the shortcut menu of the parameter value. Various menus may appear here depending on the configuration of the operating system.



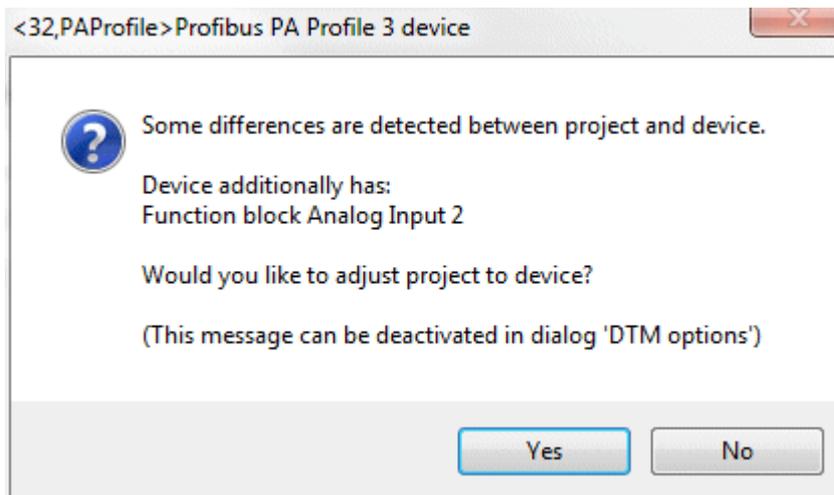
The shortcut menu which is reached from the parameter name displays a number of default settings for the parameter value depending on the type of parameter, as well as the opportunity for calling help text.





## 4. Establishing alignment between DTM and field device

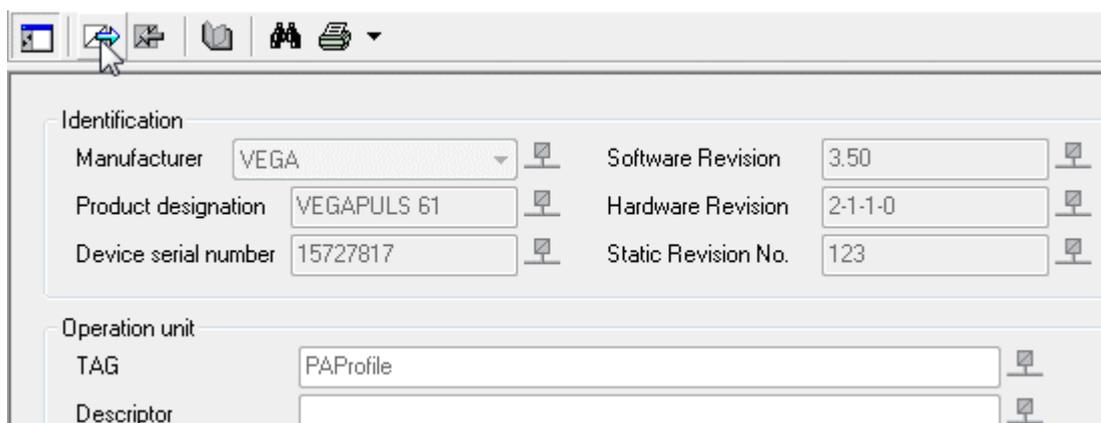
When the connection to the field device has been established, the DTM initially reads the configuration data of the field device and compares this with the structures set in the DTM. If there are differences, the user decides whether the DTM entered in the project is to be aligned with the field device.



If the user wishes to carry out alignment, blocks which have been configured in the DTM and have no counterpart in the field device are deleted. If the field device offers additional blocks, these are automatically configured in the DTM. Block types which are neither supported nor licensed are also displayed for information purposes but are not configured.

The parameters can either be completely read by the field device or written into the field device, or only for the respectively displayed page. Page-by-page reading and writing is started using the function keys in the toolbar.

The parameter values are displayed in gray during read and write operations, and changes to parameters by the user are not possible.





## 5. Parameterization

The parameterization function displays a selection of all standard parameters of the field device which can be processed using the Profibus PA Profile 3.0 DTM. Access to all parameters of the field device is possible using the profile view function (see Section 14).

Parameterization comprises several pages, the number of which can vary depending on the configuration of the DTM or the data offered by the field device. In the example, the field device offers two output blocks.

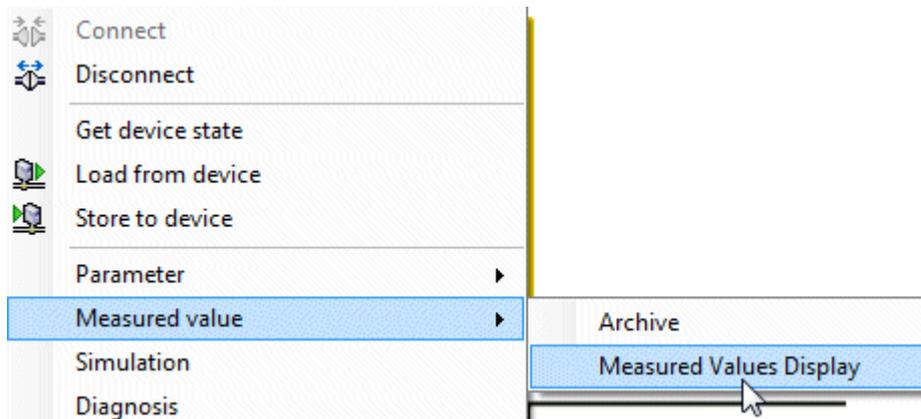
The screenshot shows the 'Unitrans PA # Parameterization' software interface. The main window displays 'Profibus PA Profile 3 device' with 'WIKA' and 'Version 0.01'. The interface includes a 'Parameter' tree on the left with 'Output (FB AI 2)' selected. The main panel contains several configuration sections: 'Measuring limits' (Raw Value Unit: bar, Lower Value Min: 0 bar, Upper Value Max: 0,01 bar), 'Measuring range' (SV1 Unit: mbar, Scale-In Lower Value: 0 mbar, Scale-In Upper Value: 1E-09 mbar), 'Sensor temperature' (Temperature Unit: °C), and 'Working range' (PV Unit: %, Scale-Out Lower Value: 0 %, Scale-Out Upper Value: 100 %). Below these sections is a 'Transducer block' diagram showing the flow from 'Corrected pressure value' (SV1) through 'Normalisation' (SV2 = (SV1 - Scale\_In\_0) / (Endwert-Anfangswert)), 'Linearisation', and 'Scaling' (PV = (SV2 \* (ScaleOut\_100 - ScaleOut\_0)) + ScaleOut\_0) to 'Process parameter' (PV). The 'Measuring' and 'Working range' boxes in the diagram are highlighted with a dark background.

The figure shows parameters from the transducer block "Pressure". The sketch serves to explain the relationships within the transducer block, and the assigned parameters are emphasized (area with dark background).

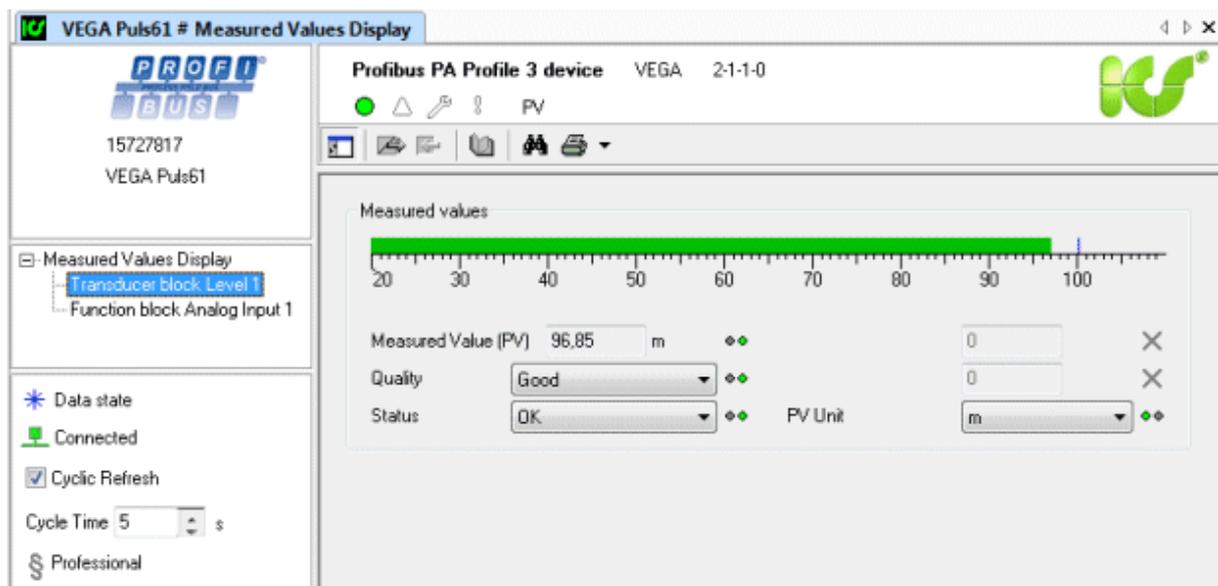


## 6. Measured-value display

A connection must be present between DTM and device in order to call the measured-value display. The function is started e.g. with PACTware from the **Device data** menu.

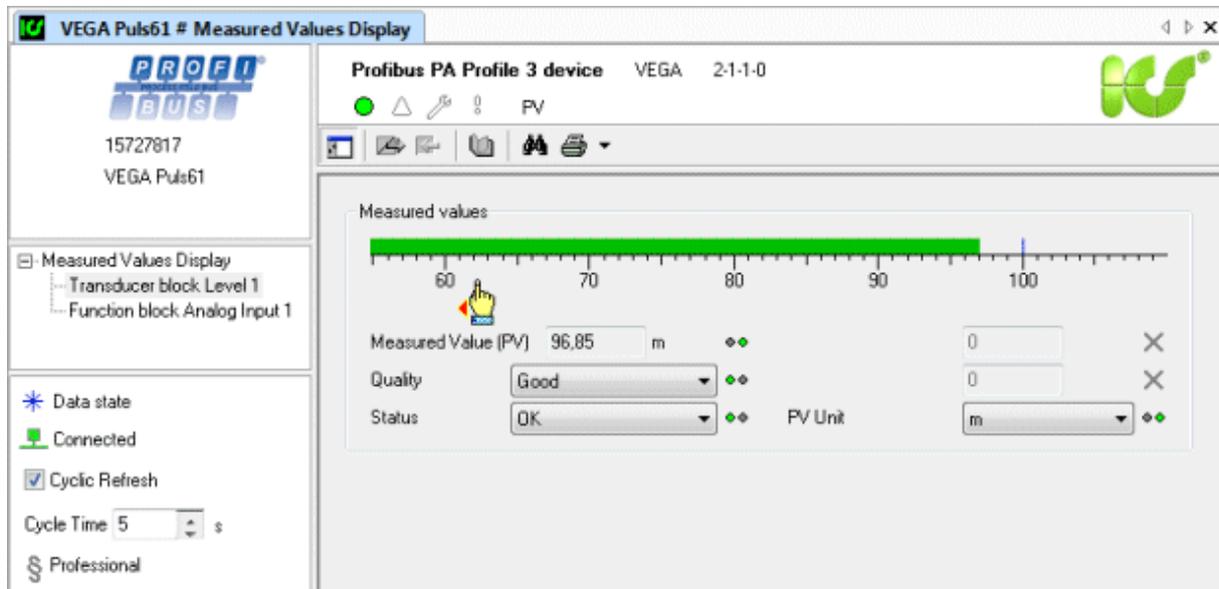


Depending on the number of blocks offered by the field device, measured values are displayed by a bargraph. The measured values can be read cyclically from the field device.





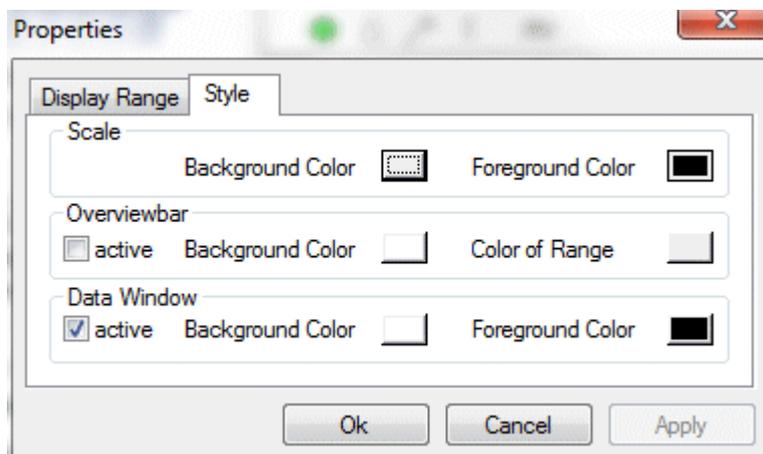
The displayed measuring range can be changed using the mouse. The start-of-scale value is changed using the left button, the full-scale value using the right button.



Limits are indicated as blue lines above the scale.

The scale value is shown in the data window at the mouse position on a scale.

The displayed measuring range, an overview bar, the data window, and various colors can be set for each scale in a user dialog. The user dialog is opened by a double-click on the scale.

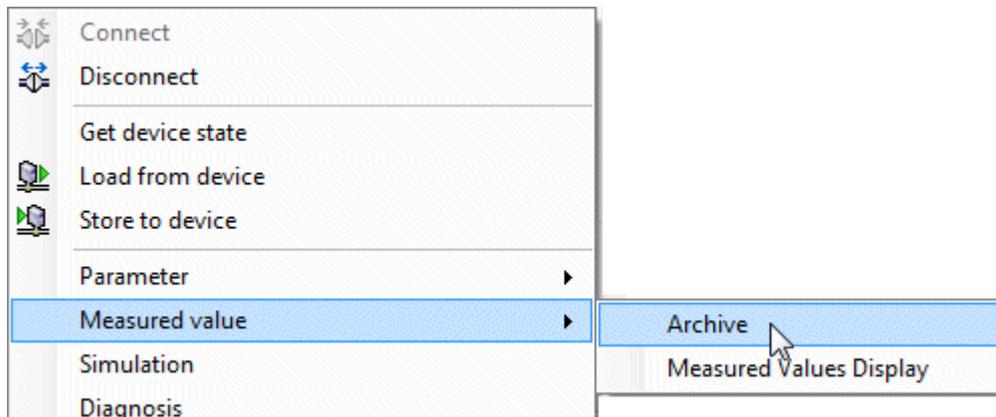


The overview bar indicates which section of the complete measuring range is displayed by the scale.

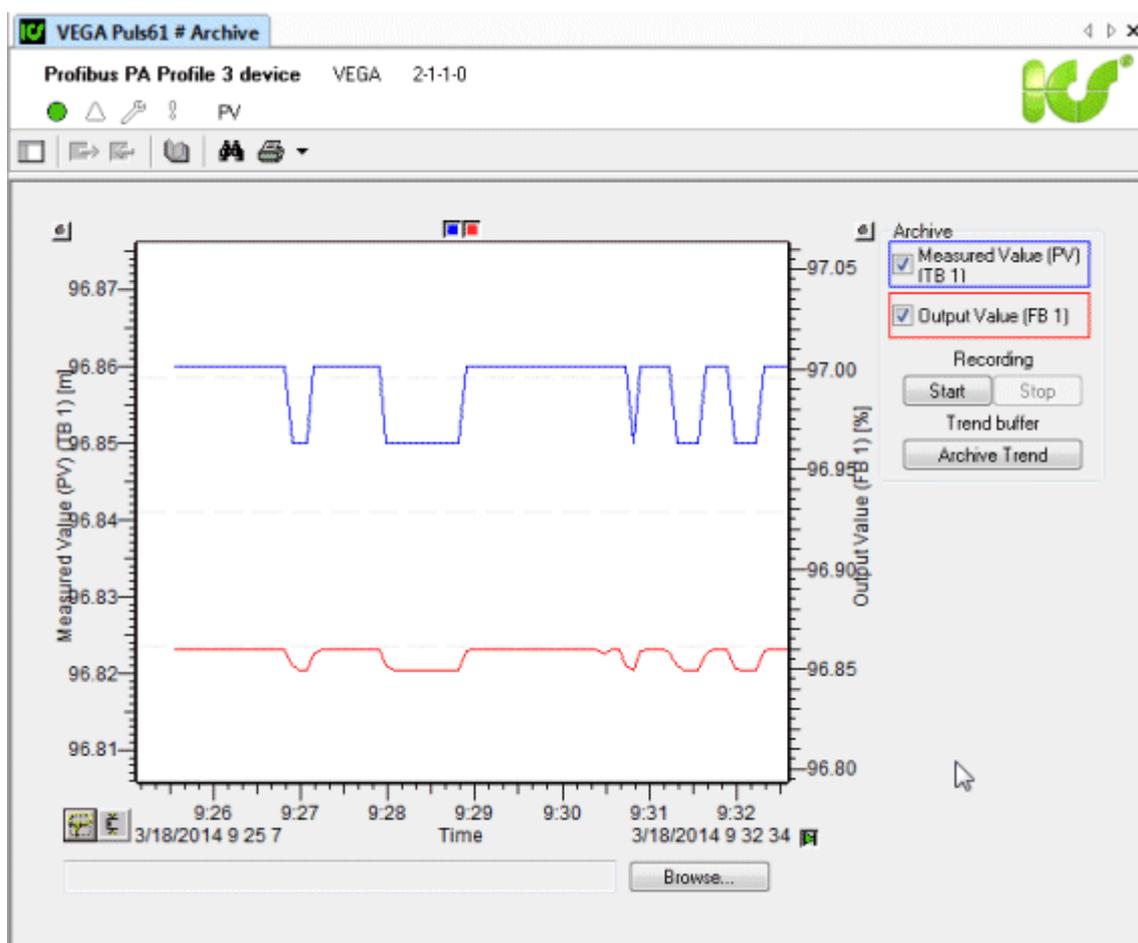


## 7. Trend display with archive function

A connection must be present between DTM and device in order to call the archive function. The function is started e.g. with PACTware from the **Device data** menu.

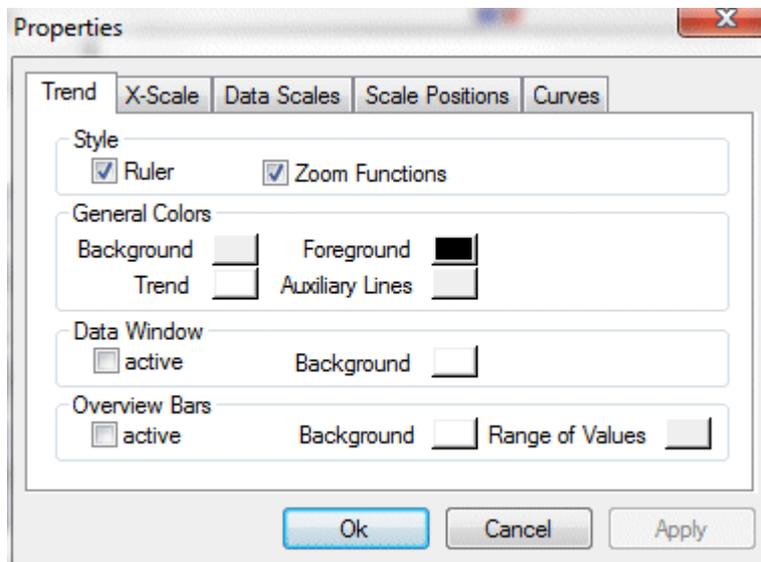


A trend is recorded for each transducer block and each function block. The recorded measured values can be written cyclically in a trend display and saved in a csv file.

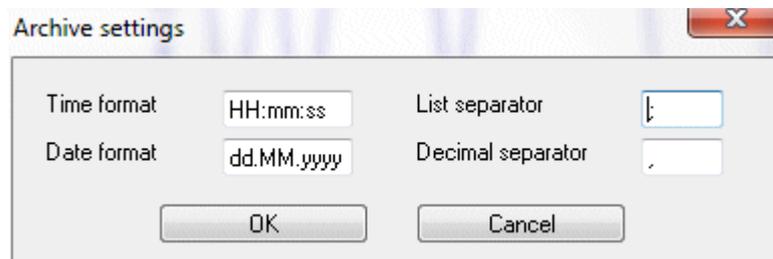




Many parameters of the trend can be changed using a properties dialog which is opened by a double-click.



If a new archive file is created, the following form can be used to set the format of the recorded data:



The setting of the correct list delimiter is particularly important for further processing of the archived data. The time and date format as well as the decimal delimiter depend on the regionally used settings in Windows.

The **Archive trend** button is used to write the data collected in the trend into the specified file.

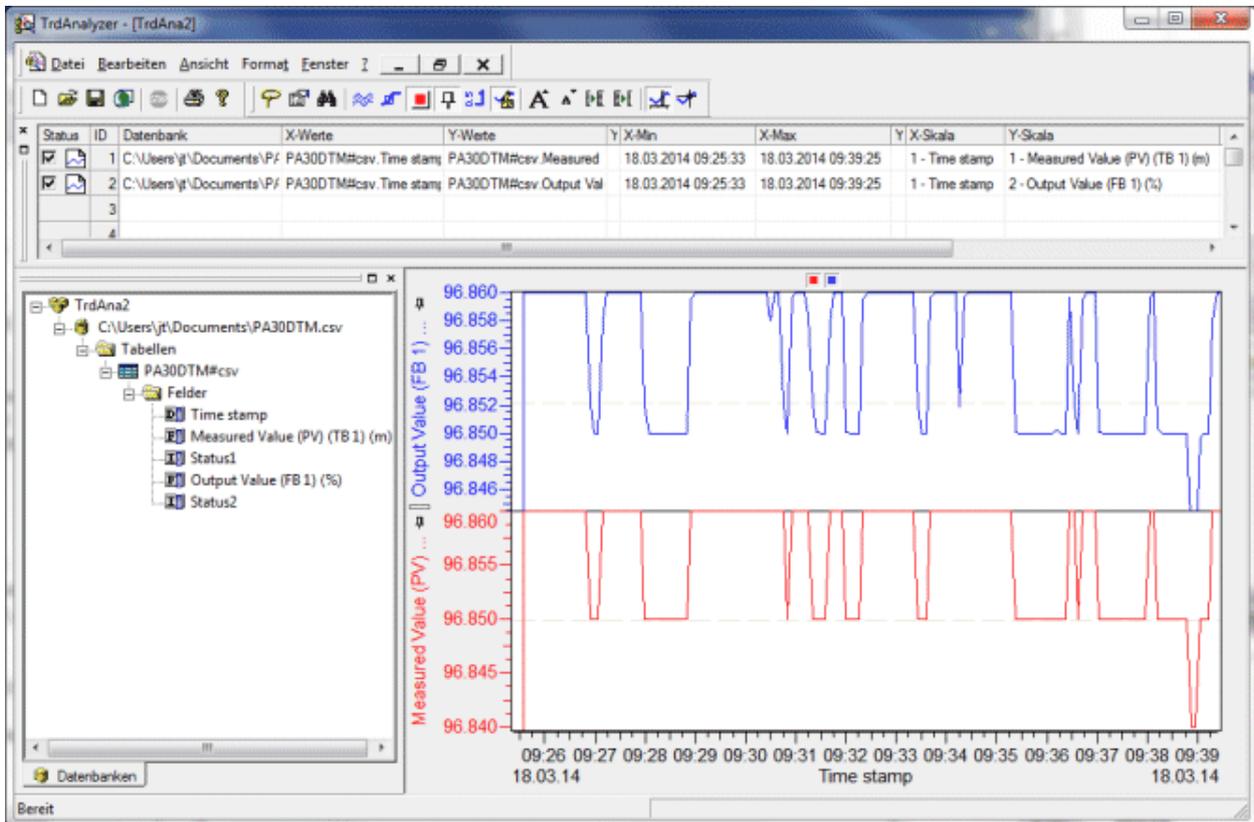
The **Start** and **Stop** buttons are used to write the recorded measured values into the specified file or to stop the recording.

The archive has the following content, for example:

```
Time stamp;PV;Status1;Strom;Status2;SV;Status3;TV;Status4;QV;Status5
25.09.02 18:41:03;59,5224800109863;1;13,5235967636108;1;59,528995513916;1;23,9977188110352;1;855,952941894531;1;
25.09.02 18:41:06;59,5132369995117;1;13,5221176147461;1;59,5146942138672;1;23,9959201812744;1;855,953125;1;
25.09.02 18:41:08;59,5112609863281;1;13,5218019485474;1;59,5093536376953;1;23,995246887207;1;855,953125;1;
25.09.02 18:41:10;59,5085372924805;1;13,5213661193848;1;59,5146942138672;1;23,9959201812744;1;855,953308105469;1;
25.09.02 18:41:12;59,5048751831055;1;13,5207796096802;1;59,5013427734375;1;23,9942359924316;1;855,953308105469;1;
25.09.02 18:41:14;59,5073890686035;1;13,5211820602417;1;59,5075988769531;1;23,9950256347656;1;855,953308105469;1;
25.09.02 18:41:16;59,5043106079102;1;13,5206899642944;1;59,5013427734375;1;23,9942359924316;1;855,953430175781;1;
25.09.02 18:41:17;59,4987411499023;1;13,5197982788086;1;59,4933738708496;1;23,9932289123535;1;855,952453613281;1;
25.09.02 18:41:18;59,4959907531738;1;13,5193586349487;1;59,4933395385742;1;23,9932250976563;1;855,953308105469;1;
25.09.02 18:41:20;59,4987297058105;1;13,51979637146;1;59,5013771057129;1;23,9942398071289;1;855,953308105469;1;
```



The software tool "TrendAnalyzer" is highly suitable for analyzing or documenting the archived measured values. For example, during the development of field devices, during production or quality assurance, and in warranty cases where trends have to be repeatedly recorded and documented, it is possible to simply recall the corresponding project file.

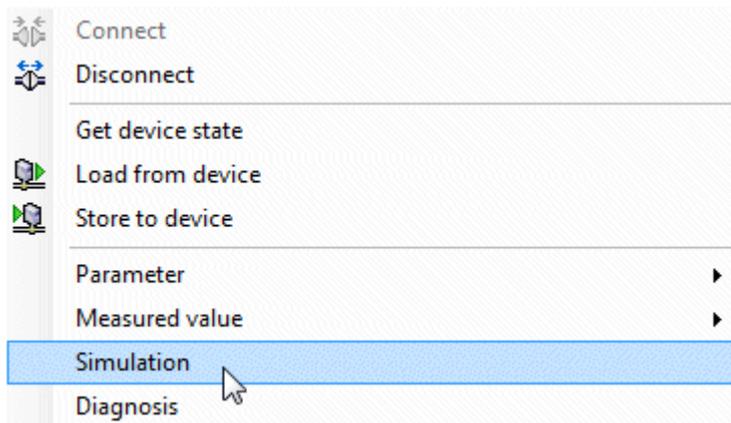


Further information on the TrendAnalyzer is available at [www.icsgmbh.com](http://www.icsgmbh.com).



## 8. Simulation

A connection must be present between DTM and device in order to start the simulation. The function is started e.g. with PACTware from the **Device data** menu.

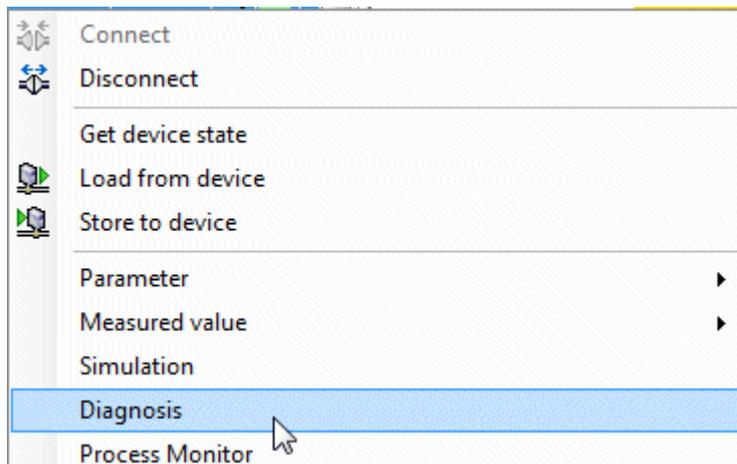


The simulation can be used to define fixed values for input variables of the field device. If the trend function of the DTM is activated simultaneously, a set simulation value can be directly checked.

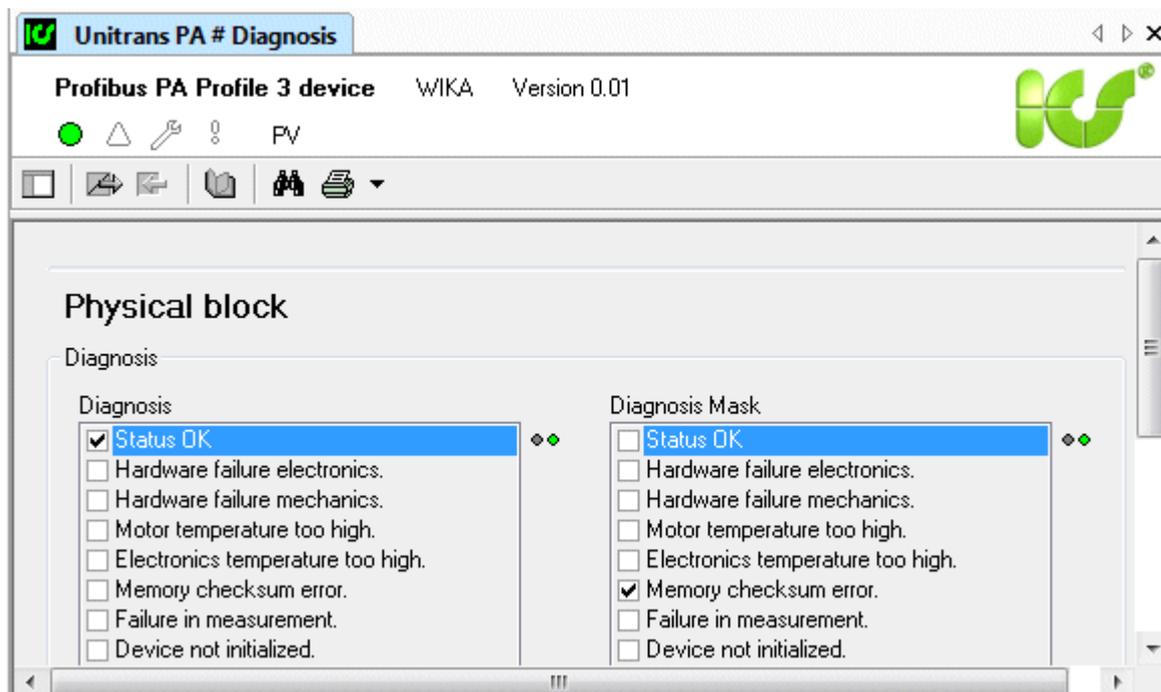


## 9. Diagnostics

A connection must be present between DTM and device in order to display the diagnostics. The function is started e.g. with PACTware from the **Device data** menu.



The diagnostics function displays the status and the diagnostics form of the field device.



All diagnostics bits supported by the field device are checked in the diagnostics form. Diagnostics can be called cyclically.



## 10. Setpoint

This function is called from the shortcut menu (additional functions). A connection must be present between DTM and device in order to display the setpoint function.

You can monitor/modify the operating mode of the function blocks in this dialog. In addition, you can specify the setpoint for the output blocks.

**ICoT5500 # Set value** Westlock Controls EL-30549 Rev B

Profibus PA Profile 3 device

Operation

Target Mode: AUTO

Actual Mode: AUTO

Permitted Mode

- Remote Output (ROUT)
- Remote Cascade (RCAS)
- Cascade (CAS)
- AUTO

Output

Setpoint: 0 %

Quality: Bad: no usable value (no comm.)

Status: OK

Readback

Readback Value: 100 %

Quality:

Status: OK

Check Back

Check Back Mask

- Actuator moving to OPEN.
- Actuator moving to CLOSE.
- Update Alert.
- Simulation enabled.
- Device disturbance.
- Internal control loop disturbed.
- Positioning inactive.
- Device under selftest.
- Total valve travel limit exceeded.

Buttons: Read, Transfer



## 11. Alarm

This function is called from the shortcut menu (additional functions). A connection must be present between DTM and device in order to display the alarm function.

A summary of all alarms for the function blocks "Analog input" is displayed.



The alarms can be read using the toolbar button.

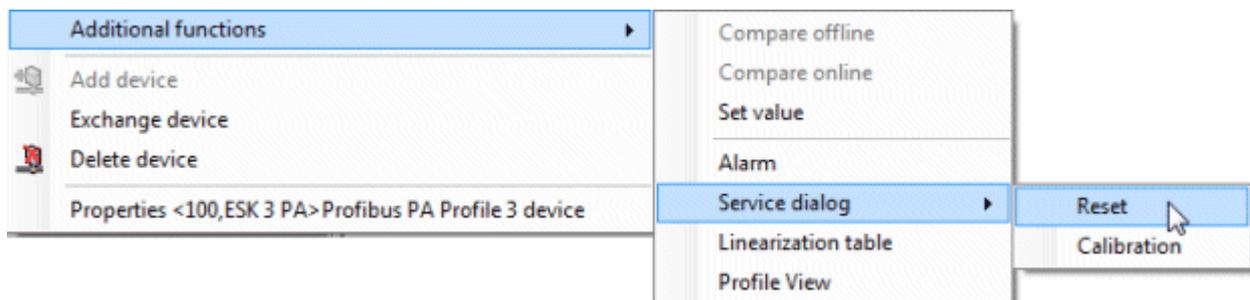


Limits can be changed and written using the toolbar button.



## 12. Service dialog

The service dialog offers reset and sensor adjustment functions. A connection must be present between DTM and device in order to call the service dialog. The function is started e.g. with PACTware from the **Device data** menu.



The reset and sensor adjustment functions are offered.



The reset function is selected and transferred, upon which the diagnostics of the field device is updated.



The sensor adjustment differs according to the various types of transducer block.

VEGA Puls61 # Calibration

Profibus PA Profile 3 device VEGA 2-1-1-0

Calibration

- ✓ Select the Calibration Type and write it to device. Dry
- ✓ Put the Lower Calibration Point and write it to device. 18 m
- ✓ Put the Level empty and write it to device. 0 %
- ▶ Put the Upper Calibration Point and write it to device. 25 m
- Put the Level full and write it to device. %

< Back Next > Cancel

For example, the sensor adjustment for the transducer block "Level" is carried out in several steps. The triangle in the instruction list indicates the next step. One value for adjustment is written into the field device at a time using **Next >**.



### 13. Linearization table

This function is called from the shortcut menu (additional functions).

The linearization table is used to map the input values of measured-value parameters (which differ in the various types of block) in output values.

The linearization table is activated using the "Linearization type" (or "Characteristic type") parameter.

VEGA Puls61 # Linearization table

Profibus PA Profile 3 device VEGA 2-1-1-0

15727817  
VEGA Puls61

Linearization table

Transducer block Level 1

Table configuration and status

Characterization Type: Linear

Number of Coordinates: 8

Max Number of Coordinates: 33

Min Number of Coordinates: 2

Status (Characterization): Good

Linearization table

Y-Values [%]

X-Values [%]

X-Value 1: 0 %

Y-Value 1: 0 %

< Back Next >

\* Data state

Connected

Cyclic Refresh

Cycle Time 5 s

Professional



## 14. Profile view

This function is called from the shortcut menu (additional functions).

The profile view of the field device shows all parameters in the sequence of block index numbers and slot numbers. Optional parameters are identified by the **op** status, and the name is shown in gray.

146: Container diameter	100	%	op
147: Container volume	100	m	op
148: Upper Value Max	30	m	
149: Lower Value Min	0	m	
150: Sensor Value Max	1,123	m	

The parameters of each block are divided into standard parameters and parameters specific to the block type.

**Block index 1**

128: Measured Value (PV)	96,5	m
128: Quality	Good	
128: Status	OK	
129: PV Unit	m	
130: Measured Value (Level)	96,5	%
131: Unit (Level)	%	
132: Sensor Value	0,629	m
133: Sensor Unit	m	
134: SV1 Value	96,5	m
134: Quality	Good	
134: Status	OK	
135: SV1 Unit	m	
136: SV2 Value	0,629	m
136: Quality	Good	
136: Status	OK	
137: SV2 Unit	m	
138: Sensor Offset	0	m
139: Calibration Type	Dry	
140: Lower Calibration Point	18	m

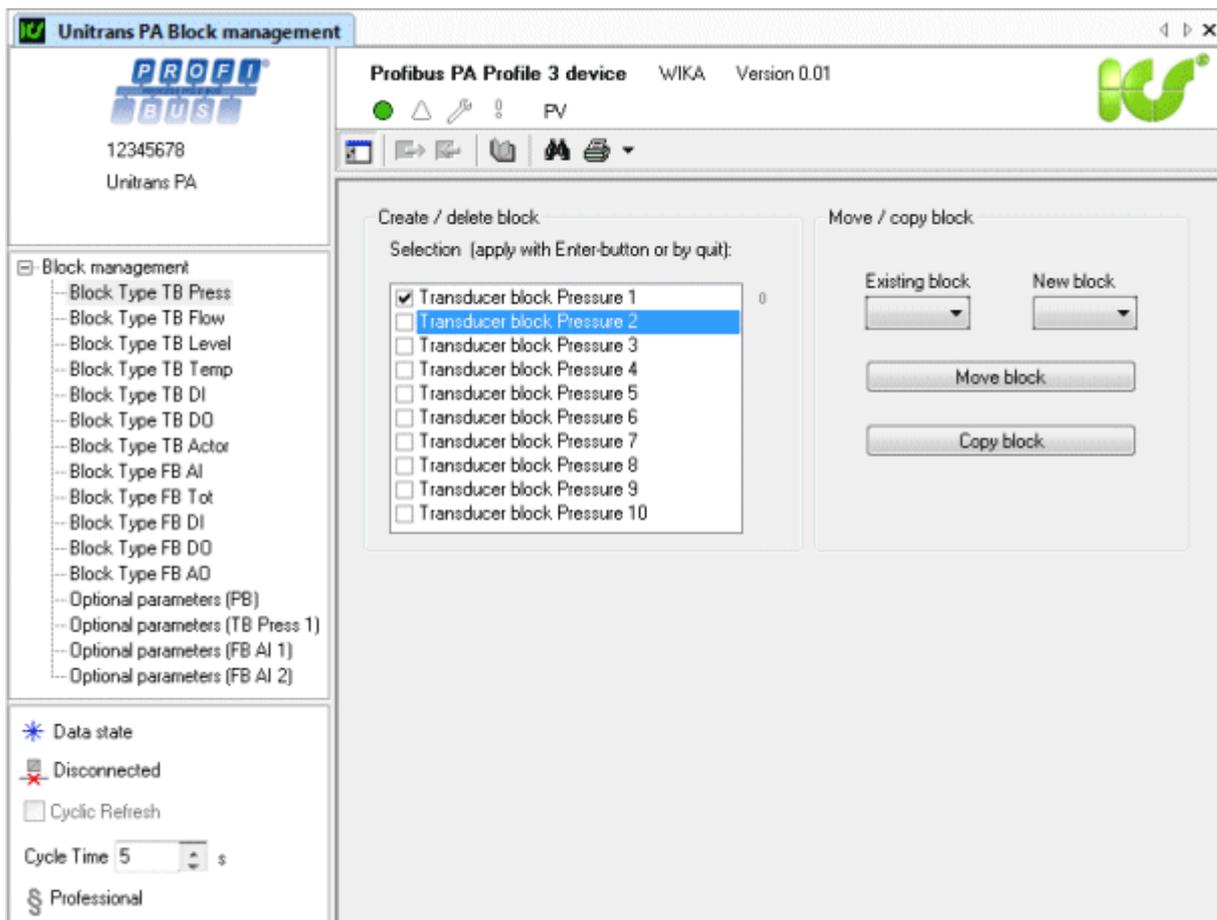
Data state  
 Connected  
 Cyclic Refresh  
 Cycle Time 5 s  
 Professional



## 15. Block management

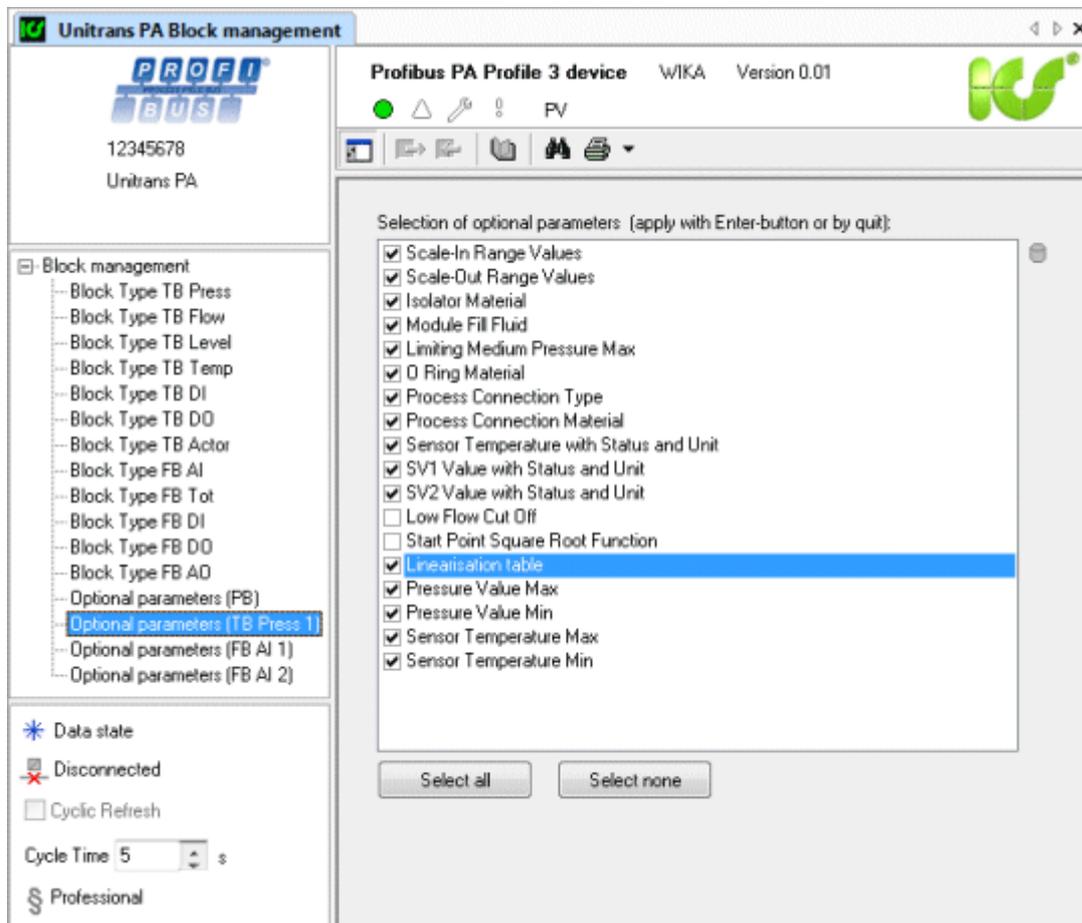


The block management can be used to configure the quantity and the numbers of the transducer and function blocks of a profile DTM. A new copy of an existing block, including its parameters, can be generated in addition.





The optional parameters can be displayed or hidden for the physical block (PB), the transducer blocks (TB), and the function blocks (FB).



If the connection between DTM and field device has been established, the block information is read out immediately and compared with the configuration in the DTM. The settings of the field device are adopted.

When uploading, the optional parameters which do not exist in the device are automatically disabled. In this manner, the DTM is automatically adapted following establishment of the connection and uploading to the device. A prerequisite for this functionality is supply of the correct error information concerning the optional parameters by the upstream communication components such as CommDTM, gateway DTM, or control system.



## 16. Search function

This function is called from the shortcut menu (additional functions).

Terms can be searched for in the complete DTM using a filter, and the locations listed. Parameters can therefore be specifically accessed in comprehensive DTMs.

Type	User dialog	Name / Text	Tooltip	Help text	Enum
Parameter	Parameter		The revision level of the st...		
Parameter	Parameter		Measuring Range Unit: Th...		
Parameter	Parameter	Unit (Level)	Selected engineering unit f...		
Parameter	Parameter	Level Offset	Shifts the zero point of the ...		
Parameter	Parameter	Level empty	Level empty is the value of...		
Parameter	Parameter	Level full	Level full is the value of le...		
Frame	Parameter	Level ranges			
Parameter	Profile View		Measuring Range Unit: Th...		
Parameter	Profile View	Unit (Level)	Selected engineering unit f...		
Parameter	Profile View	Level Offset	Shifts the zero point of the ...		
Parameter	Profile View	Level empty	Level empty is the value of...		
Parameter	Profile View	Level full	Level full is the value of le...		
Parameter	Profile View		Measured Value: The mea...		
Parameter	Profile View	Measured Value (L...	The measured process lev...		
Parameter	Profile View		Secondary_Value_1 is Lev...		
Parameter	Profile View		Diameter for cylindric lying ...		



By double-clicking on the desired entry in the list, the DTM directly opens the location.

VEGA Puls61 # Search... VEGA Puls61 # Parameterization

Profibus PA Profile 3 device VEGA 2-1-1-0

15727817  
VEGA Puls61

Parameter

- Identification (PB)
- Input (TB Level 1)
- Output (FB AI 1)

Data state

Connected

Cyclic Refresh

Cycle Time 5 s

Professional

Measuring limits

Sensor Unit	m
Lower Value Min	0 m
Upper Value Max	30 m
Sensor Offset	0 m

Level ranges

Unit (Level)	%
Level empty	0 %
Level full	100 %
Level Offset	0 %

Units

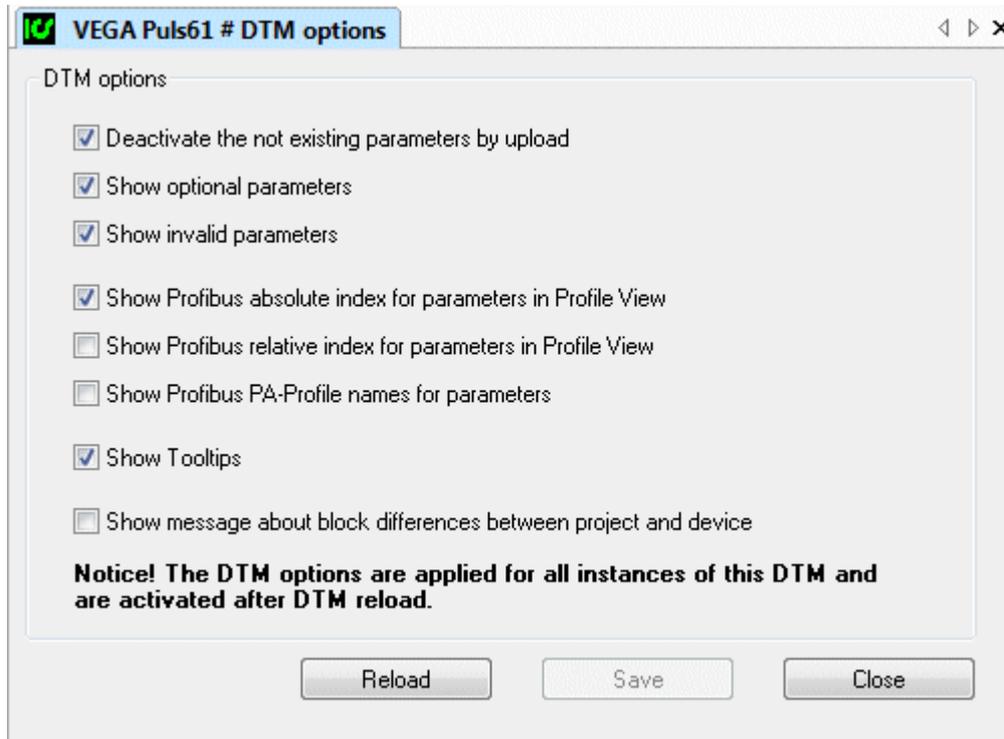
PV Unit	m
Temperature Unit	°C





## 18. DTM options

This dialog can be used to set the options which apply globally to all DTM instances on the computer.





## 19. References

/1/PROFIBUS Guideline: Specification for PROFIBUS Device Description and Device Integration, Volume 3: FDT V 1.2; PROFIBUS Guideline – Order No. 2.162

/2/PROFIBUS Guideline: DTM Styleguide, Guideline for the implementation of Device Type Managers (DTMs) for Field Devices; PROFIBUS Guideline – Order No. 2.172