

Generic HART DTM
for FDT 1.2 compliant Frame Applications
Release 4

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Generic HART DTM

Device Type Manager for the parameterization of HART-capable field devices. The Generic HART DTM runs in frame applications that were implemented in compliance with Release 1.2 of the Field Device Tool Specification. Frame applications may be parameterization programs like PACTware, Engineering tools or control systems.

The Generic HART DTM runs under Windows 98, NT 4.0, 2000 and XP.

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1. Introduction

The Generic HART Device Type Manager (DTM) is used for the parameterization of HART-capable field devices. Universal and Common Practice Commands are supported which are executed by most HART-devices.

A HART-Communicator or a HART-Multiplexer is required for the hardware-sided communication with a HART-device.

The software-sided communication is performed via a HART Communication Device Type Manager (ComDTM). A HART ComDTM is offered e.g. for the parameterization software PACTware by the member companies of the PACTware Consortium e.V.. Other frame applications like e.g. control systems of big automation producers contain their own HART ComDTMs.

The Generic HART DTM as well as the HART ComDTM must have been implemented according to the Field Device Tool (FDT) Specification Release 1.2 (see /1/), so they can be used in FDT 1.2 conforming frame applications.

As the Field Device Tool Specification has been continuously further developed, the component which processes the interfaces between the frame applications is also constantly updated. This component is the DTM Runtime Library, which was developed by ICS GmbH and is used in the DTMs of numerous device manufacturers.

The user interface of the Generic HART DTM contains a component for all parameters which was also developed by ICS GmbH and is compliant with the DTM Styleguide of the FDT Specification.

The Generic HART DTM comprises several forms to define the DTM functions. These are:

- Offline Parameterization
- Online Parameterization
- Diagnostics
- Display of Measured Values
- Trend with Log Functions
- Calibration of the current signal
- Print parameter values
- Save parameter values

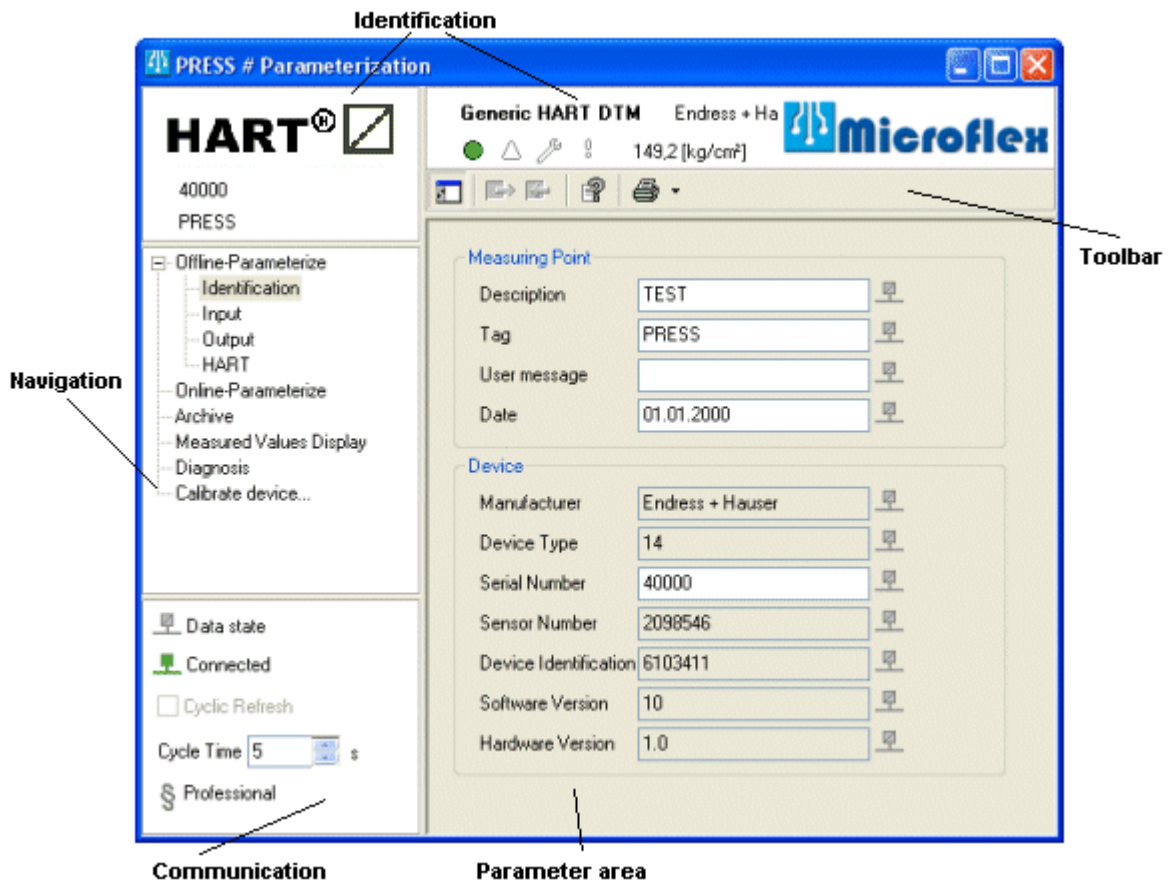
The user interface of the DTM is available in German, English and French.

If the product is unlicensed, the use of all functions of the Generic HART DTM - except Save and Print parameter values - is enabled for 10 minutes. To use the Generic HART DTM again, the project containing the Generic Hart DTM, must be reloaded.

The Professional License provides unlimited use of all functions.

2. Layout of the DTM

The DTM displays several fields which contain general and special data and are used to control the display and the communication with the field device.



Identification The tag numbers and serial numbers of the HART device which is processed by the Generic HART DTM are displayed under the HART logo. The right part of the identification shows the name of the DTM, the manufacturer and the hardware-version of the HART-device, below it the state of the field device, the most recently read value of the primary variable with unit and the company logo of the ICS GmbH.

The website of ICS GmbH can be accessed via the logo on the top right if an internet connection is available at the workplace.

Navigation A component of the control area is offered for fast navigation between the dialogs of the DTM. All dialogs are displayed in a tree display. You can switch between dialogs using the mouse and the direction keys of the keyboard.

Communication

In this part of the control area the state of the parameter of the complete DTM and the state of connection between the field device and the DTM are displayed. Furthermore, a cyclic update of parameter values can be set. The licensee is displayed by a tooltip on the paragraph sign.

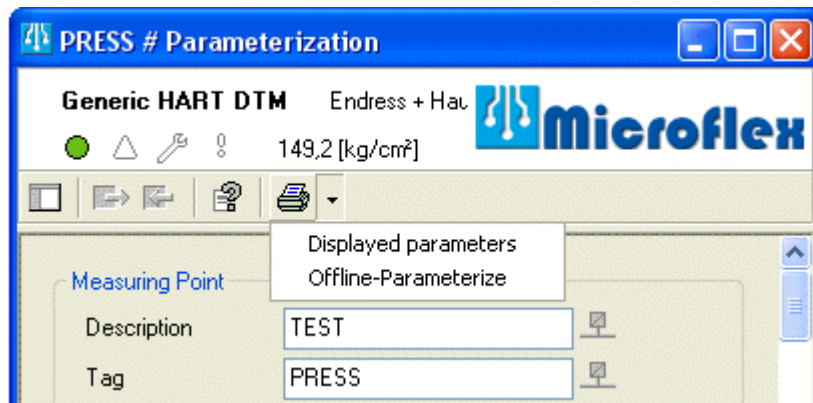
Parameter area

The parameter area displays a group of parameters which were selected from the frame application (e.g. PACTware) via the context menu or from an entry in the navigation.

Toolbar

The Toolbar contains keys from the left to the right to show and hide the left control area, to read and write parameters from the field device which are associated to the displayed dialog, to start the online-documentation and to print parameter lists.

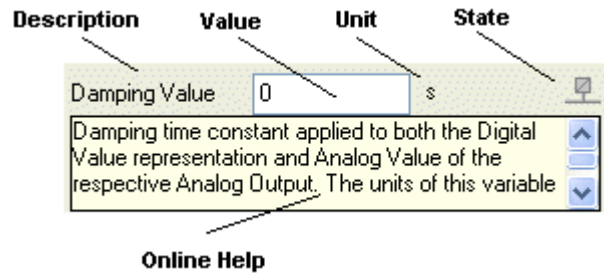
The parameter lists can be selected by means of the menu.



3. Parameter Component

The display and editing of parameter values is offered in accordance with the DTM Styleguide (see /2/).

The constituents of parameters component are illustrated below:














The identification is displayed in the currently selected language.

The value is displayed differently depending on the data type. The display is Windows Styleguide-compliant.

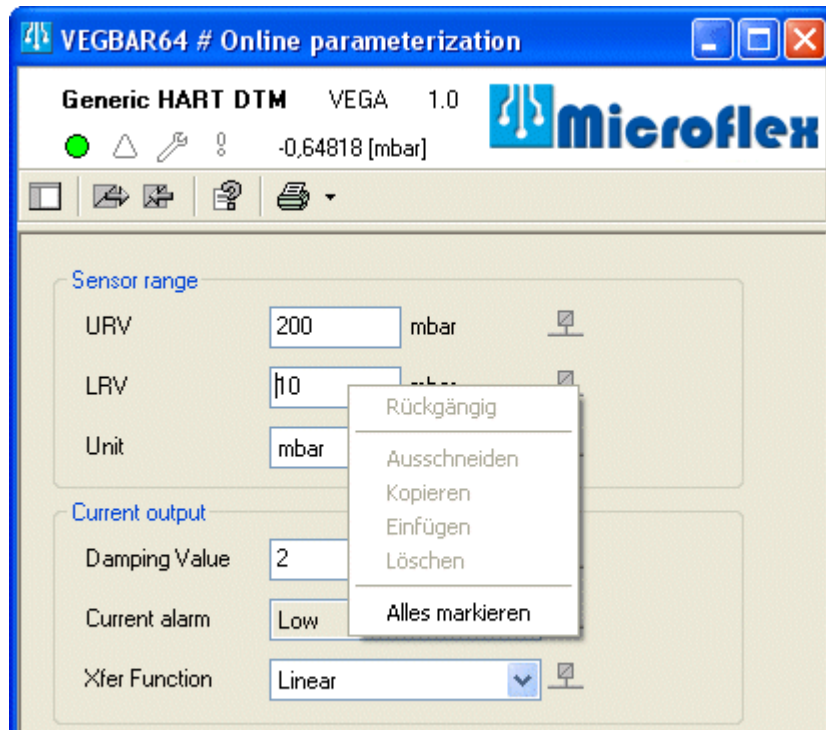
The unit is taken from the list of HART-units. The list is contained in the DTMdictionary.xml file.

The state of the parameter can adopt the following values:

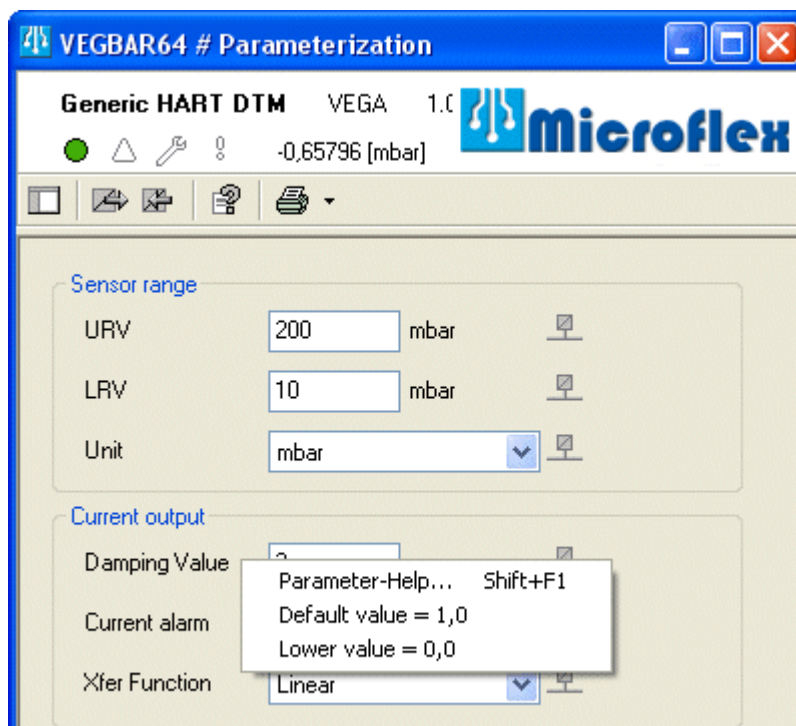
	Communication error
	Device error (Tooltip shows detailed description)
	Range violation
	Invalid input
	Parameter must be confirmed
	Parameter was changed
	Parameter is dynamic
	Parameter cannot be changed with current rights
	Parameter has initial value
	Parameter was read from project
	Parameter was read from device

Help is offered for each parameter. It is also displayed in short form as a tooltip. Help is displayed when using key combination Shift F1.

In addition, two context menus are offered. The standard menu which corresponds to the type of the displayed value is opened in the context menu of the parameter value. Different menus may be displayed depending on the configuration of the operating system.



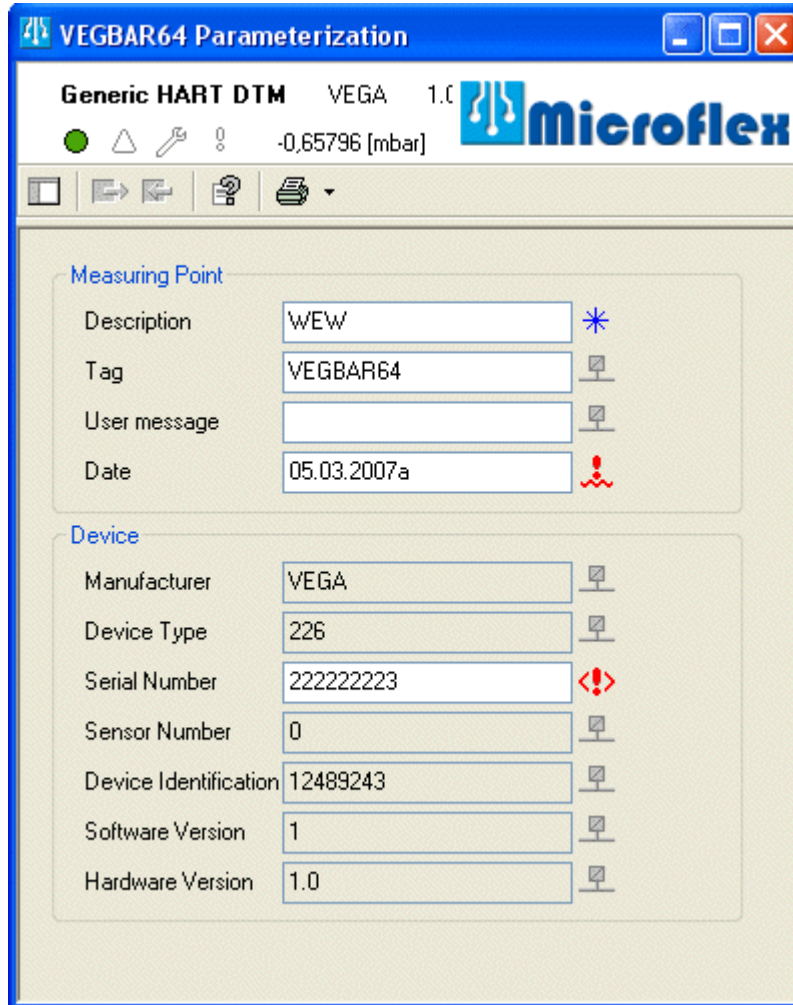
The context menu which is accessed via parameter names displays a series of default settings for the parameter value depending on the parameter type as well as the call for the help text.



4. Offline Parameterization

Offline parameterization is used for the display and entry of all parameters of a field device that can be edited in the Generic HART DTM.

The offline parameterization comprises 4 pages. The first page displays the device-identification:



Measuring Point	
Description	WEW *
Tag	VEGBAR64
User message	
Date	05.03.2007a

Device	
Manufacturer	VEGA
Device Type	226
Serial Number	222222223 <!
Sensor Number	0 <!
Device Identification	12489243
Software Version	1
Hardware Version	1.0

The parameter status is displayed in different icons:

- the description was modified
- the serial number contains an invalid character (only digits are admissible)
- the sensor number is too high.

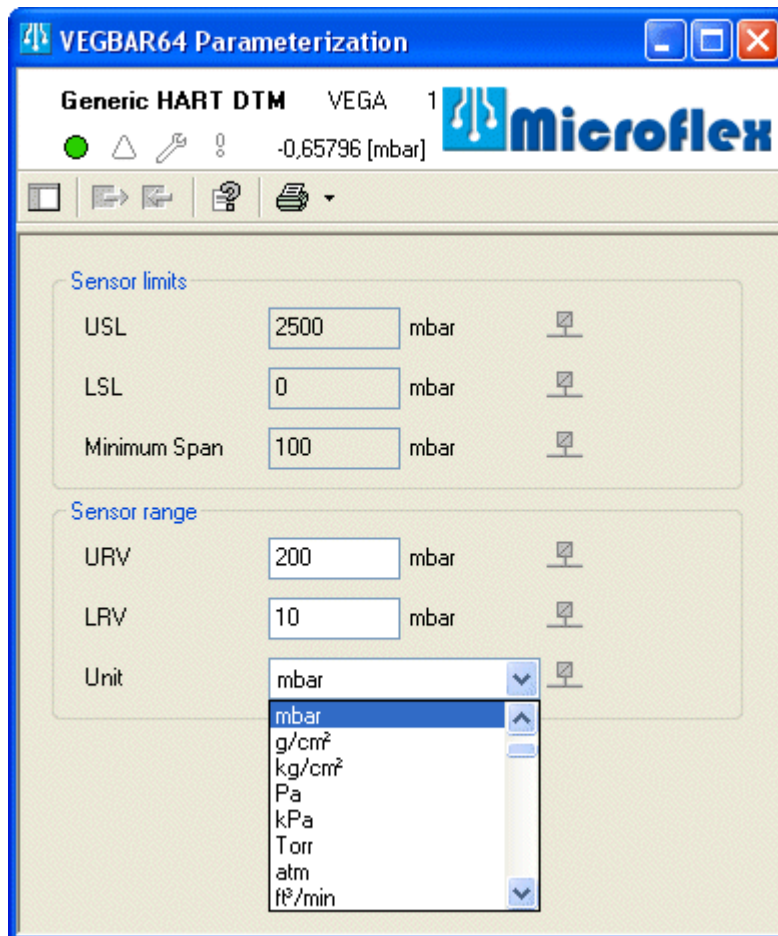
All remaining parameters were read from the device.

Commands used:

- #0 Read out device identification
- #12 Read message
- #13 Read tag, description and date
- #14 Read the sensor information of the primary variables
- #16 Read device serial number

- #17 Write message
- #18 Write tag, description and date
- #19 Write device serial number

The input value is parameterized on the second page of the offline parameterization:



Whereas the sensor limits are default values of the device and are therefore unchangeable, the limits of measuring ranges may be user-defined.

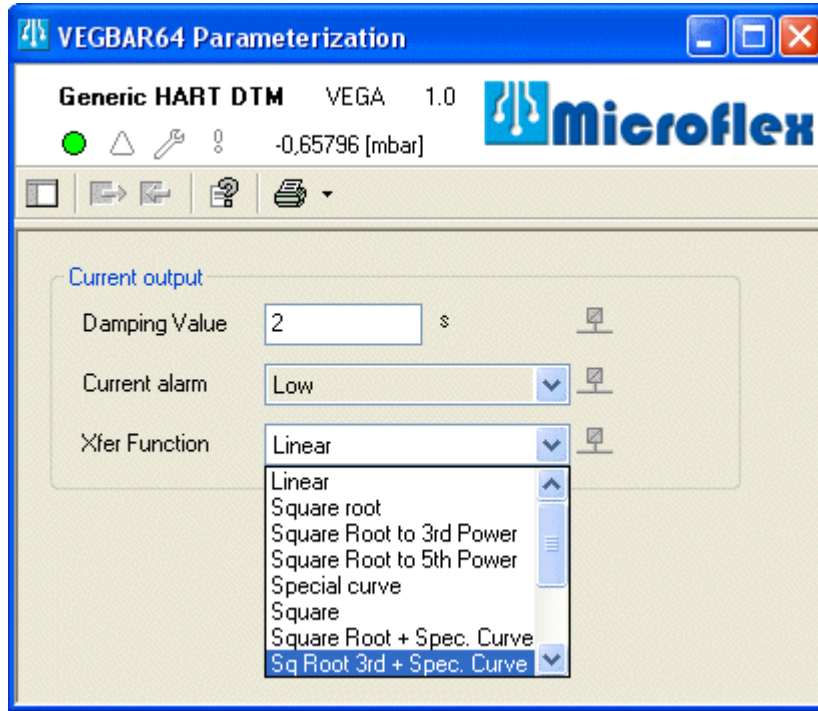
The unit of the measured value can be selected from the list of the HART units. The list is contained in file DTMDictionary.xml of directory XMLData in the installation directory of the Generic HART DTM.

The selected unit is applied to all limiting values and to the measuring span. It also appears in the display of measured values and in the trend.

Commands used:

- #14 Read sensor information of the primary variables
- #15 Read information of the primary output
- #35 Write the limiting values of the primary variables
- #44 Write the primary unit

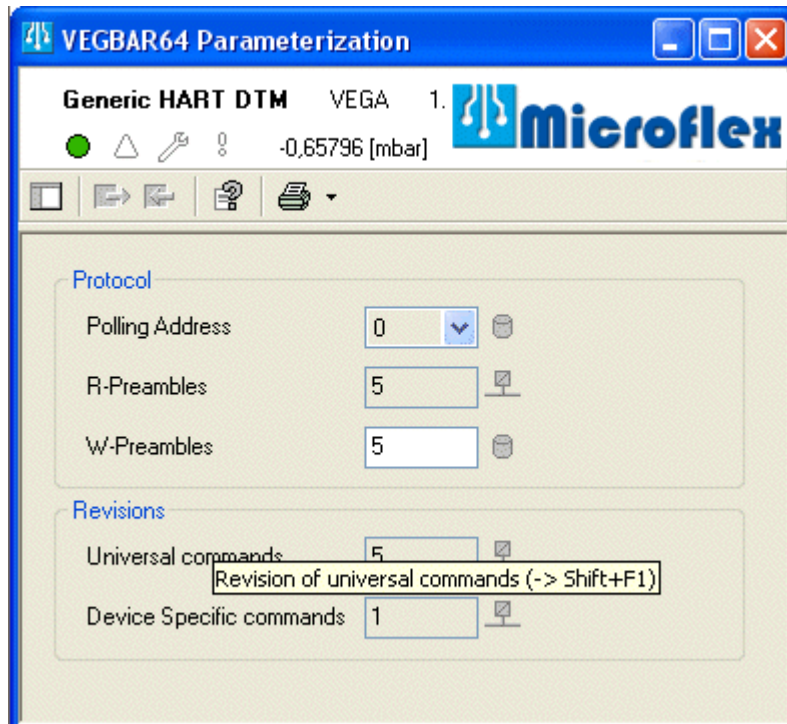
The parameters damping, current alarm and transfer function are configured for the output.



Commands used:

- #15 Read information of the primary output
- #34 Write damping values of the primary variables

The protocol parameters are configured and the revisions are displayed for the HART interface.

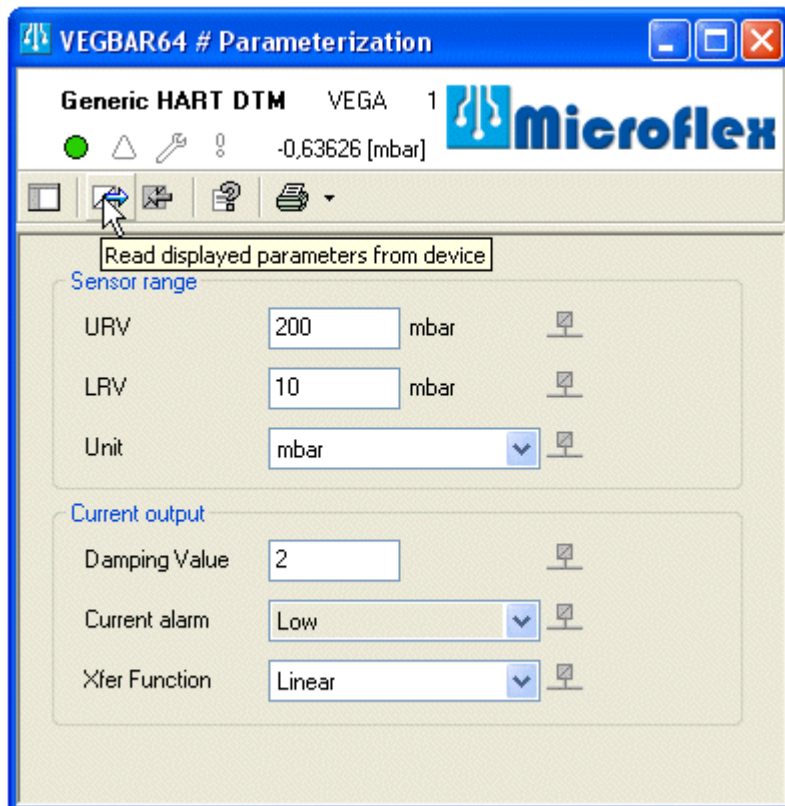


The polling address is written using the HART CommDTM.

- #0 Read out device identification
- #59 Enter the number of the answer preambles

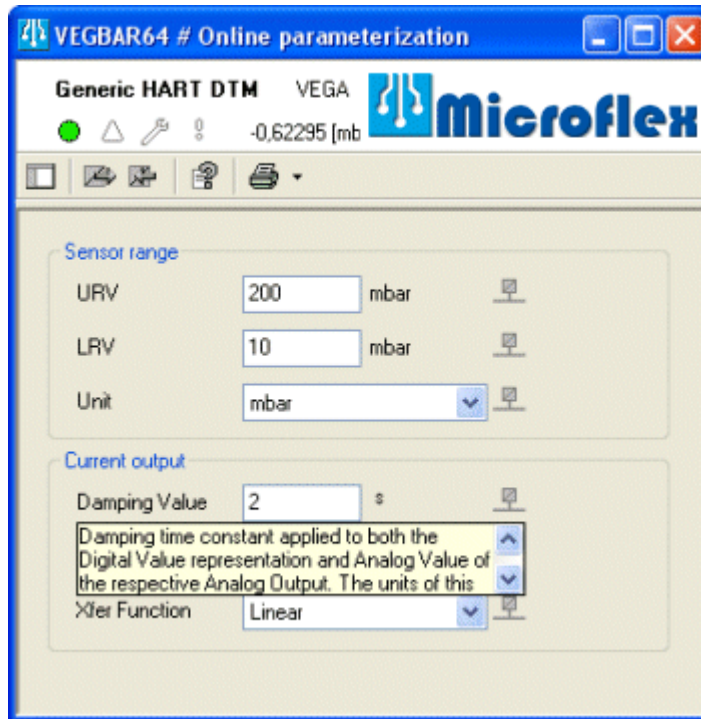
5. Online Parameterization

The online parameterization comprises the parameters used for setting the measuring range and the current output.



The parameters can be read and written directly. During the read or write operation, the parameter values are displayed grey and a modification of the parameters by the user is disabled.

A tooltip or help text can be displayed alternatively for each parameter. Detailed help text can be called by using Shift F1 or via the context menu.

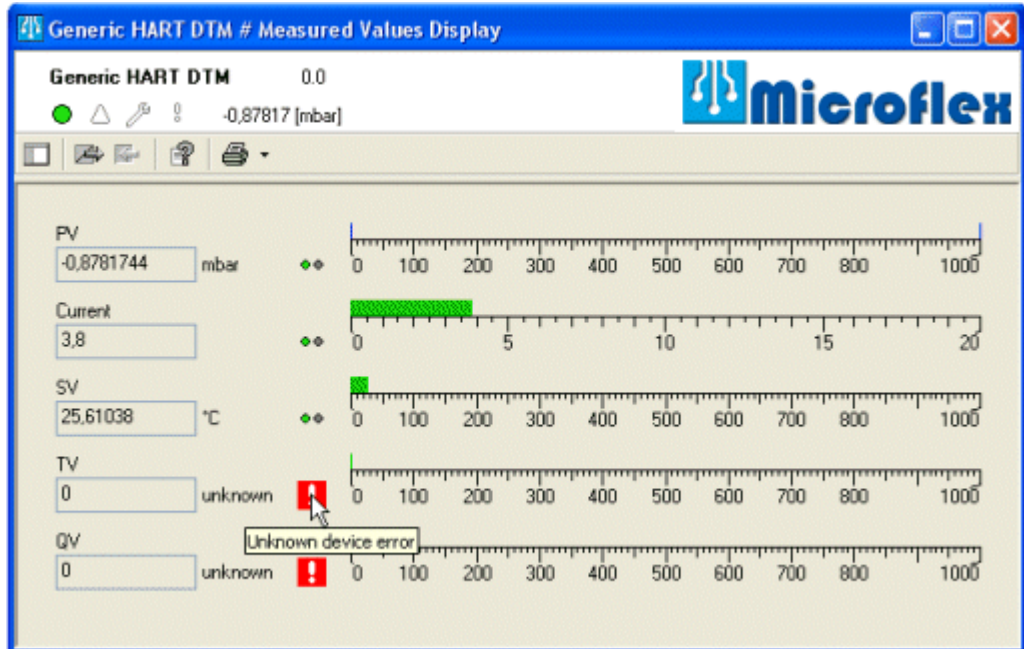


Commands used:

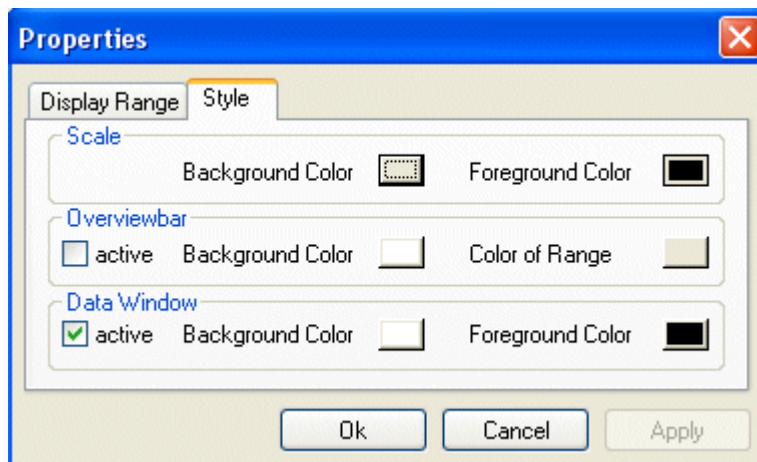
- #15 Read information of the primary output
- #35 Write limiting values of the primary variables
- #44 Write primary unit

6. Measured Value

Four variables and the current output value are displayed together in a bar graph.



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



The overview bar shows which view of the total measuring range is displayed by means of the scale.

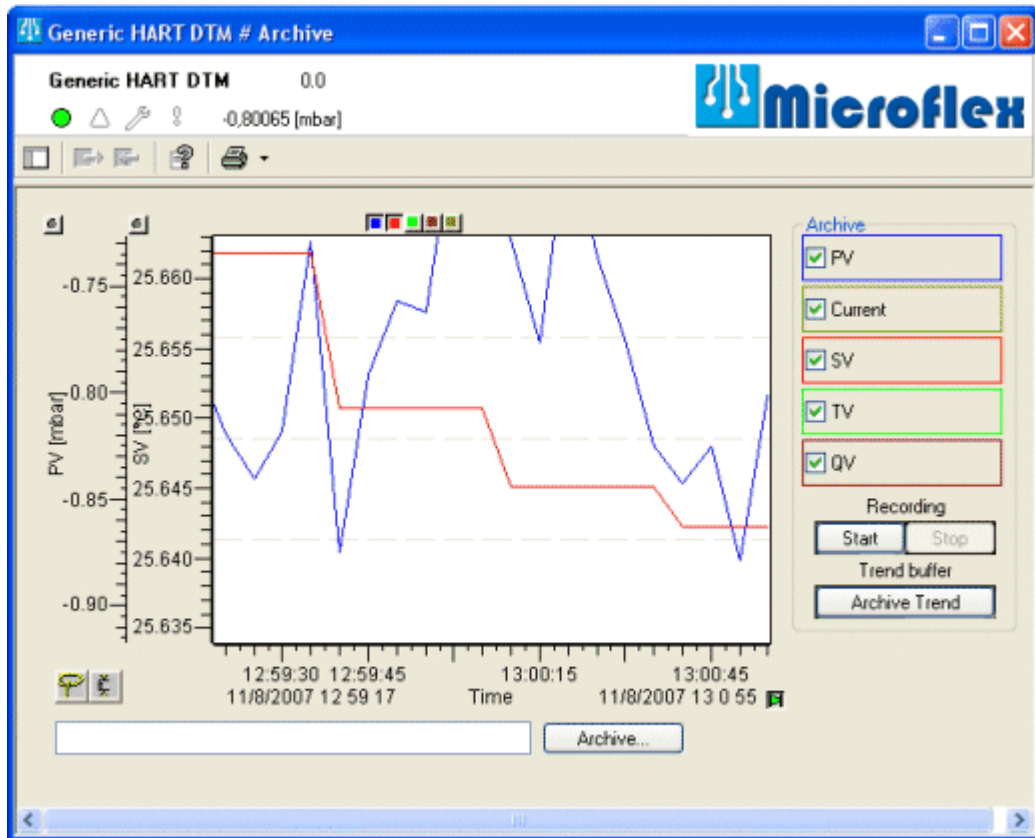
The data window displays the scale value at the pointer position of a scale.

Commands used:

- #3 Read analog output value and dynamic variables with units
- #15 Read information of the primary output

7. Trend with log functions

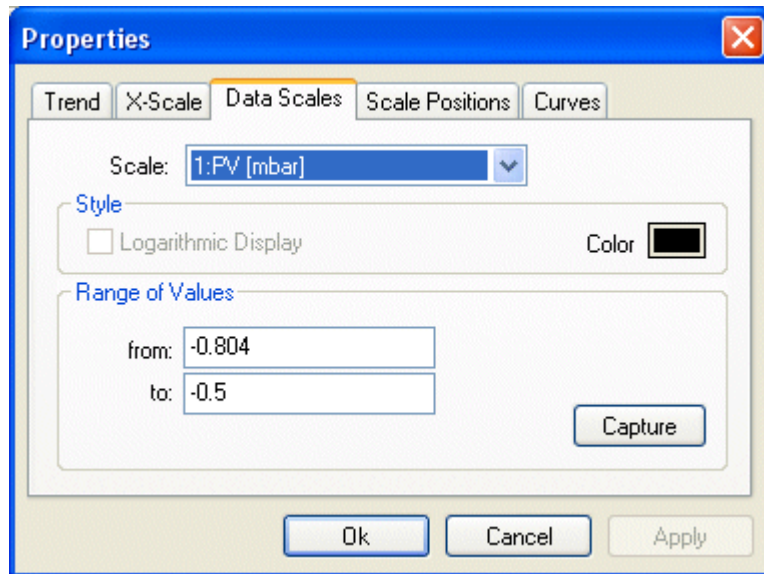
The current output variable and the four variables can be written to a diagram cyclically and saved as a csv-file.



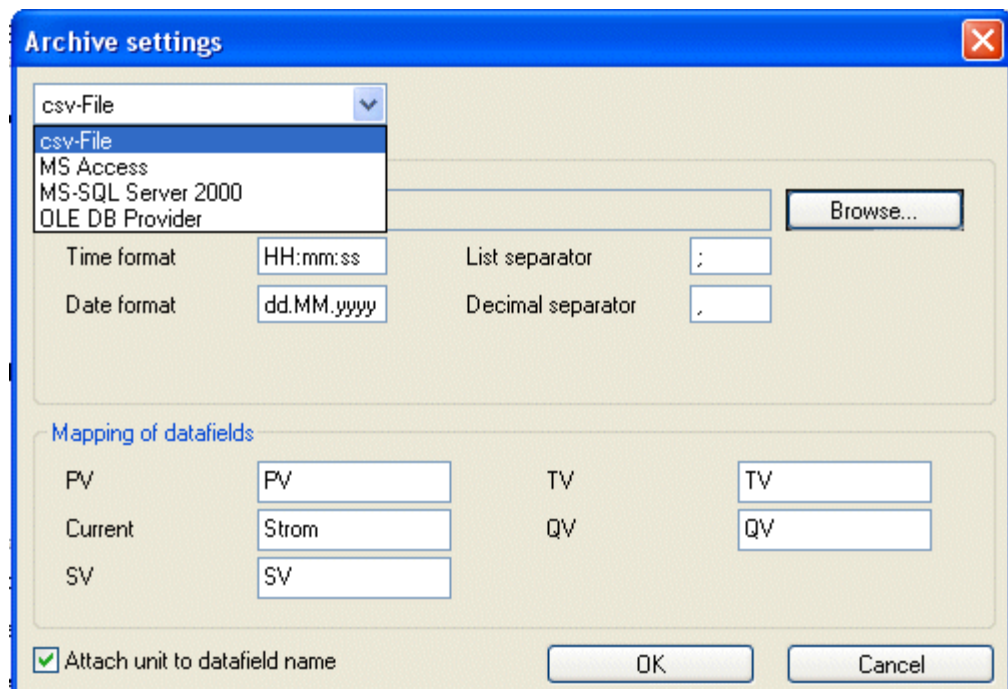
Commands used:

- #3 Read analog output value and dynamic variables with units
- #15 Read information of the primary output

The trend diagram can be modified in many parameters by using the property dialog that is displayed by a double-click.



When a new archive file is created, the format of the recorded data can be selected in the following form:



For additional processing of archived data from csv-formatted files most of all the setting of a suitable list separator is important. The format of the time and date as well as the decimal separators are determined by the respective local version of Windows.

The measured data can also be saved to Microsoft databases.

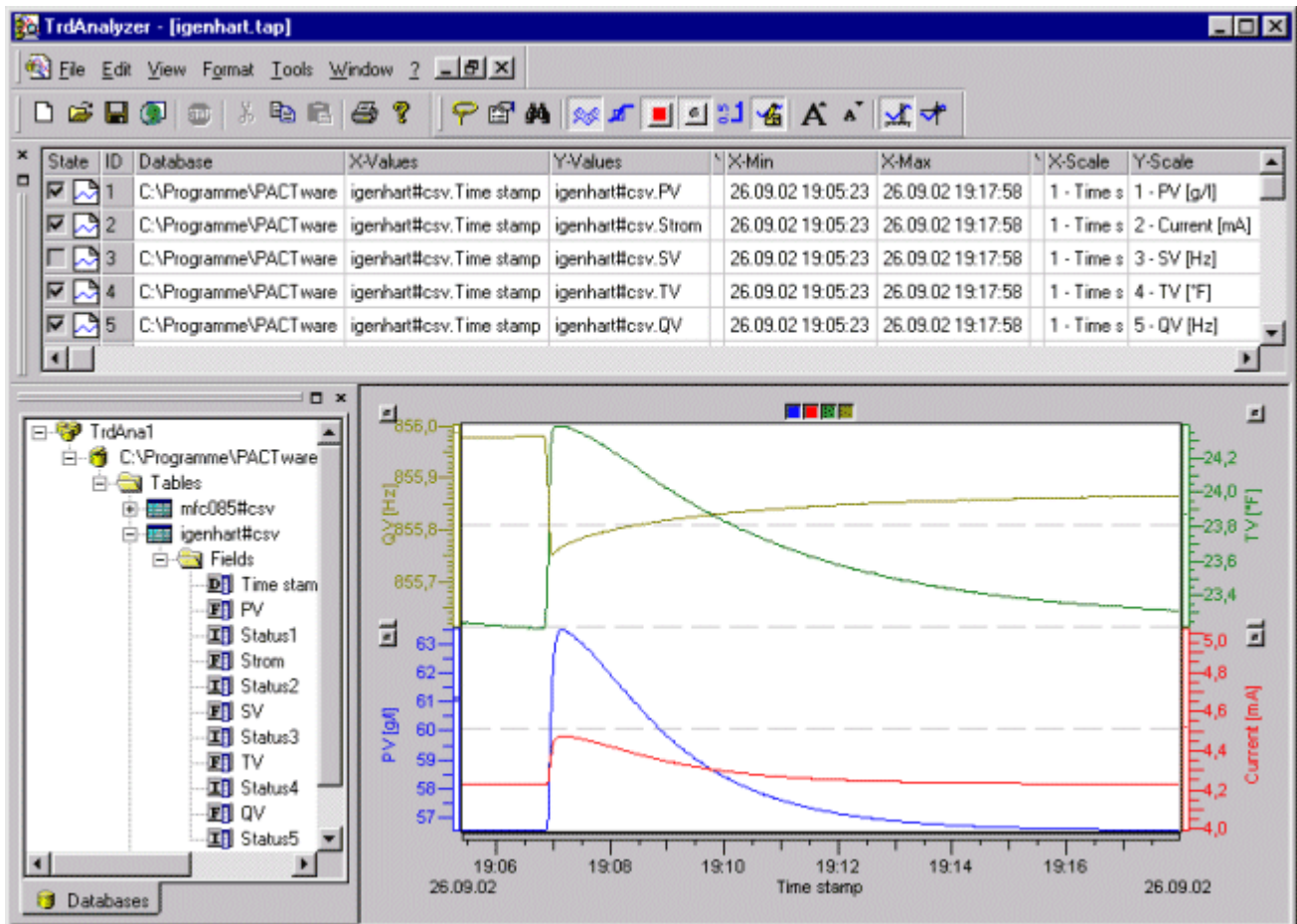
Data that was acquired in the trend chart is written to the selected file by using key **Archive Trend**.

The recorded measured values can be written to the selected file by using the keys **Start** and **Stop** or the recording can be discontinued.

The archive may, for example, have the following content:

```
Time stamp;PV;Status1;Current;Status2;SV;Status3;TV;Status4;QV;Status5
25.09.07 18:41:03;59,5224800109863;1;13,5235967636108;1;59,528995513916;1;23,9977188110352;1;855,952941894531;1;
25.09.07 18:41:06;59,5132369995117;1;13,5221176147461;1;59,5146942138672;1;23,9959201812744;1;855,953125;1;
25.09.07 18:41:08;59,5112609863281;1;13,5218019485474;1;59,5093536376953;1;23,995246887207;1;855,953125;1;
25.09.07 18:41:10;59,5085372924805;1;13,5213661193848;1;59,5146942138672;1;23,9959201812744;1;855,953308105469;1;
25.09.07 18:41:12;59,5048751831055;1;13,5207796096802;1;59,5013427734375;1;23,9942359924316;1;855,953308105469;1;
25.09.07 18:41:14;59,5073890686035;1;13,5211820602417;1;59,5075988769531;1;23,9950256347656;1;855,953308105469;1;
25.09.07 18:41:16;59,5043106079102;1;13,5206899642944;1;59,5013427734375;1;23,9942359924316;1;855,953430175781;1;
```

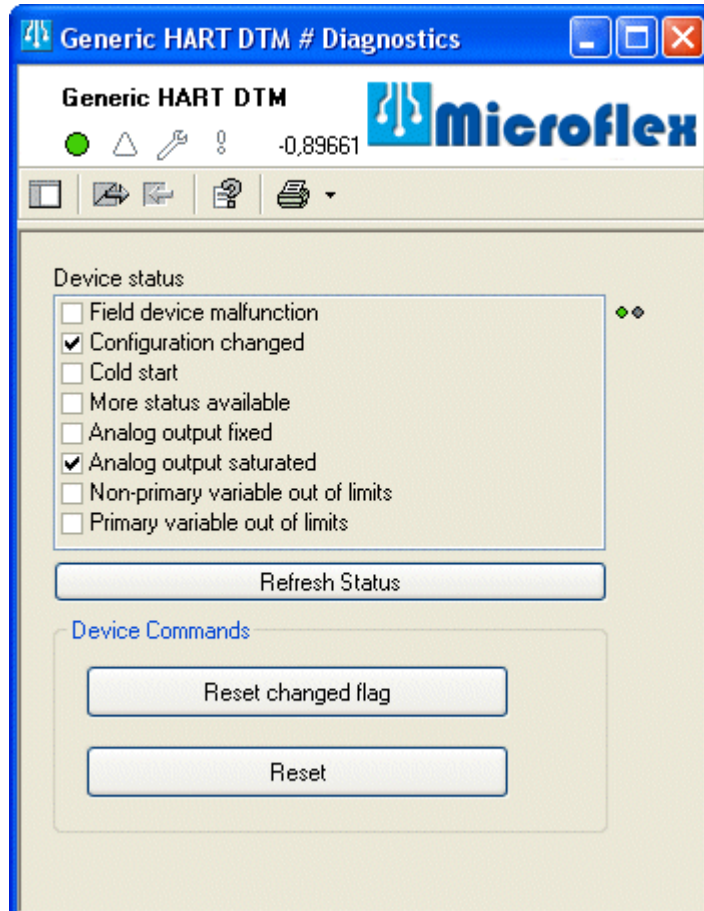
The Software Tool TrendAnalyzer fits perfectly for the analysis or the documentation of archived measured values. If, e.g. in the development of field devices, in the production or quality assurance and in cases of warranty when measured curves must be recorded and documented repeatedly, the respective project file is simply called again.



For additional information about TrendAnalyzer see <http://www.icsgmbh.de/english/datenanalyse/trendana1.htm>

8. Diagnostics

The diagnostic functions displays the status of the field device:



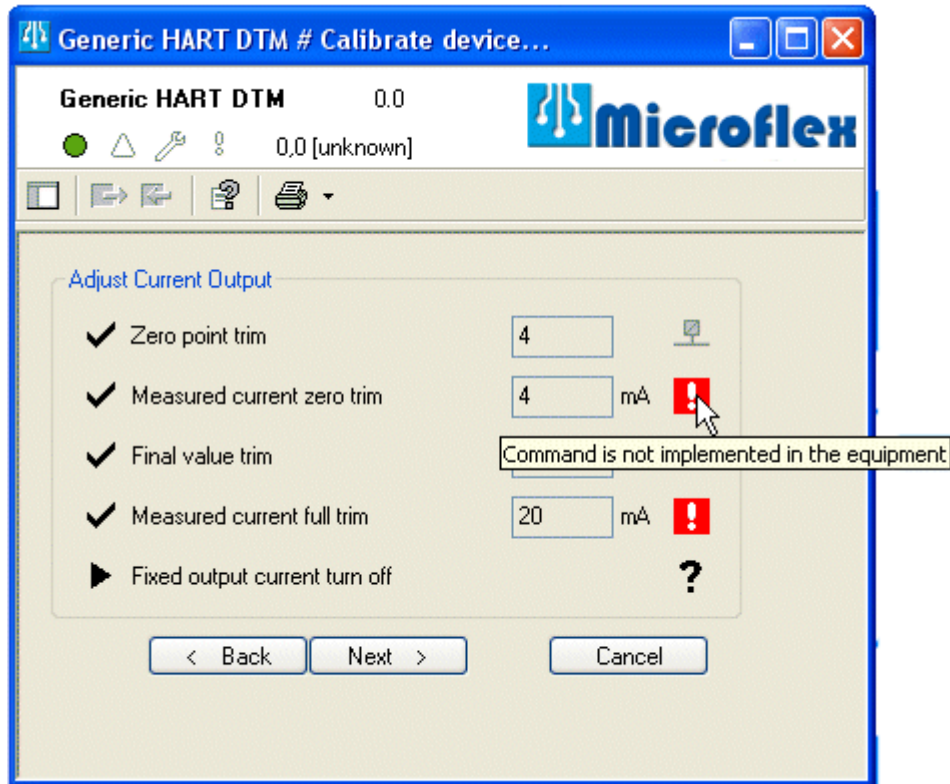
Commands used:

#38 Reset display "Configuration changed"

#44 Master reset

9. Calibration

A wizard is offered to calibrate the current output. It will guide you through the required steps:



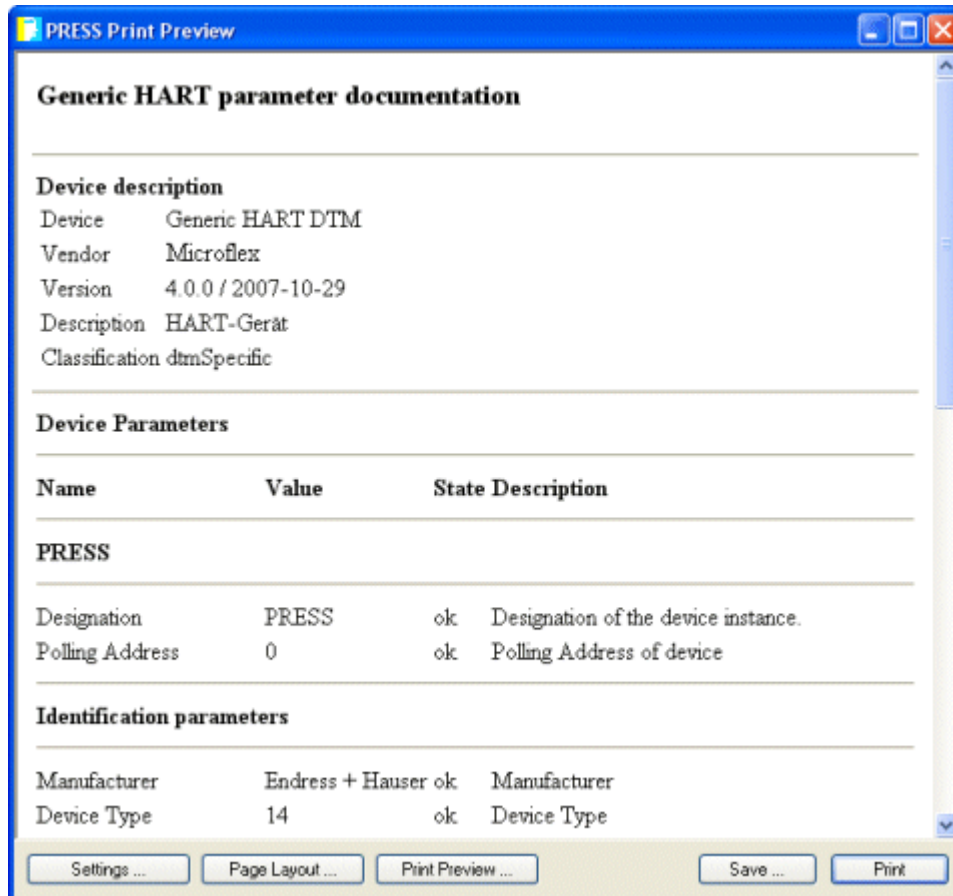
The calibration can be repeated successively multiple times.

Commands used:

- #40 Set/reset the current output to/from fixed value
- #45 zero trim of the digital-analog converter
- #46 span balancing of the digital-analog converter

10. Print parameters

All parameters or a subset of the parameters are printed with their names, values, description and status. If the frame application offers a print preview, the printout can be previewed in a window.



Microsoft Internet Explorer, at least Version 5.0 must be installed on the PC to display the preview.

11. Literature

- /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