Manual

46/11-50 EN

Device Type Manager DTM for TF12, TF212

PROFIBUS PA Communication
for temperature transmitters TF12, TF212

Industrial IT enabled

PROFIBUS

ABB

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for temperature transmitters TF12, TF212

Manual

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Contents

Important information

Symbols

In order that you can make the best use of this document and to ensure safety during commissioning, operation and maintenance of the equipment, please note the following explanation of the symbols used.

Explanation of the symbols used.

Symbol	Signal Word	Definitions
	**DANGER**	DANGER indicates an **imminently hazardous** situation which, if not avoided, **will result** in death or serious injury. (High level of risk.)
	**WARNING**	WARNING indicates a **potentially hazardous** situation which, if not avoided, **could result** in death or serious injury. (Medium level of risk.)
	**CAUTION**	CAUTION indicates a **potentially hazardous** situation which, if not avoided, **could result** in minor or moderate injury. (Low level of risk.)
	**NOTICE**	NOTICE indicates a **potentially harmful** situation which, if not avoided, **may result** in damage of the product itself or of adjacent objects. (Damage to property)
	**IMPORTANT**	IMPORTANT indicates useful hints or other special information which, if not observed, could lead to a decline in operating convenience or affect the functionality. (Does not indicate a dangerous or harmful situation.)

As well as the instructions in this document, you must also follow the generally applicable accident prevention and safety regulations.

If the information in this document is insufficient in any situation, please contact our service department, who will be happy to help you.

Please read this document carefully before installation and commissioning.

CE marking

The product complies with the specifications in the EMC Directive 89/336/EEC and the Low-Voltage Directive 73/23/EEC.

1 Installation

The DTM TF12/TF212 is installed as part of the setup for DSV401 (SMART VISION). For information on setup and licensing of DSV401 (SMART VISION) please see the operating instructions for the DSV401 (SMART VISION), 42/63-11.

2 Operation

2.1 Display options for the user interface

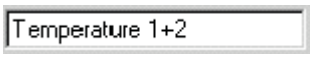
2.1.1 Intended use and functionality

DTM TF12/TF212 is an application with which the TF12/TF212 transducers, can be configured and diagnosed via an acyclical (DPV1) PROFIBUS link, from a controlling application.

The user interface of the DTM TF12/TF212 offers the following functionality:

- Online / offline configuration of the TF12/TF212 temperature transducers
- “Uploading” parameters = reading parameters from the device
- “Downloading” parameters = writing stored parameters back to the device
- Online display of measurements and status information
- Online diagnosis with display of fault sources

2.1.2 Status indication in the input fields

	Fields with a yellow background show information read from a particular transducer, which can't be changed.
	Fields with a grey background (tab: *Configuration (UV)*) show a summary of the current device configuration, which can only be displayed here and not changed.
	Fields with a white background containing black lettering show configuration parameters which have just been read from a transducer. These parameters can be changed and written back to the transducer.
	Parameters which have been changed, or parameters stored offline, are displayed in blue and are underlined. This shows that the information displayed in DTM might be different from that stored in the transducer. After a successful download, the parameters will be displayed in black letters.

2.1.3 Window header and status bar

The window header shows the type of transducer as well as its bus address and its TAG name.

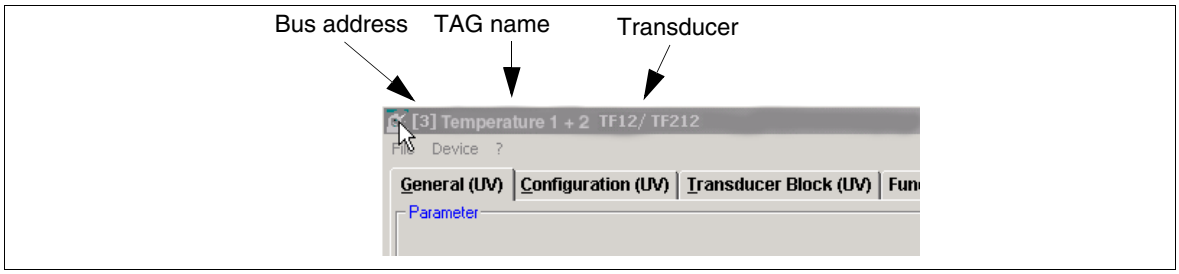


Fig. 2-1 Window header and status bar

The bottom of the device window is a status bar. It shows the status of the communications connection to the device (connected / not connected), whether data uploaded from a device is being shown (data loaded / no data loaded) and the status of the device (OK / fault). Also, for certain procedures (e.g. when loading or storing the data to / from the transducer), a bar shows the progress made.

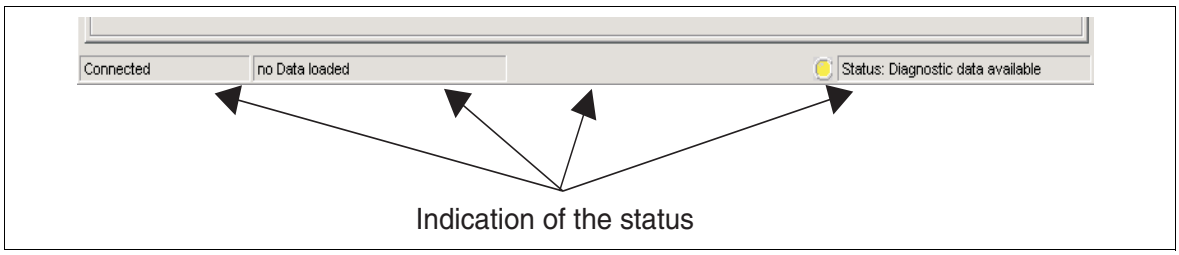


Fig. 2-2 Status display

2.2 Communication

2.2.1 Establishing a connection to the device

To be able to exchange information with the transducer, a connection must first be established between the DTM and the transducer.

Establish a connection between DTM and the device via *Device* → *Connect*.

2.2.2 Reading information from the device

Information is read from the device to the DTM via *Device* → *Load from device*.

This command must always be manually executed if information is to be read from the transducer as the data is not read automatically when the DTM is opened.

Acknowledge warnings with “OK”

2.2.3 Writing information to the device

Any changes to the configuration are only valid when they are transmitted to the transducer.
To transmit data, use *Device* → *Save to the device*.

Acknowledge warnings with “OK”

2.2.4 Resetting to the default settings

Via the menu *Device* → *Defaults*… the following commands can be called up, with which the temperature transducer can be reset to its default settings:

Warm start
A warm start restarts the device as far as the PROFIBUS communication is concerned.

WARNING
During a warm start the device interrupts both the cyclical and the acyclical PROFIBUS communication. This means that, during the restart phase, error messages will be produced, reporting that contact has been lost with the transducer. You should thus ensure that no important or critical process is relying on having contact with the transducer before you do a warm start.

Reset (bus address)
Reset sets the PROFIBUS address back to "**126**". The stored parameters will not be changed by that.

WARNING
The bus address will be changed to 126 immediately. The transducer will thus be removed from the cyclical and acyclical bus communication immediately after the "Reset (bus address)" command. You should thus ensure that no important or critical process is relying on having contact with the transducer before you do a reset (bus address).

Reset (standard settings)
Reset sets the parameters back to the factory default settings.
The standard settings are: 2 × Pt 100 3-wire, 0...100 °C, etc.

WARNING
When resetting the parameters, the bus address is not changed. The transducer thus remains accessible via cyclical and acyclical bus communication. It is possible that error messages will be produced, reporting that the measurements are no longer reliable. You should thus ensure that no important or critical process is relying on having contact with the transducer before you do a reset (standard settings).

2.3 Description of the DTM user interface

2.3.1 Structure of the temperature transducer TF12/TF212

The TF12/TF212 temperature transducers are structured to correspond to the Profibus PA profile definition version 3.0 as specified by the PROFIBUS user organization (abbrev. PUO). For the transducer, the following block diagram thus results. This block diagram can be used to illustrate the workings of the DTM program user interface, which is closely modeled on this scheme.

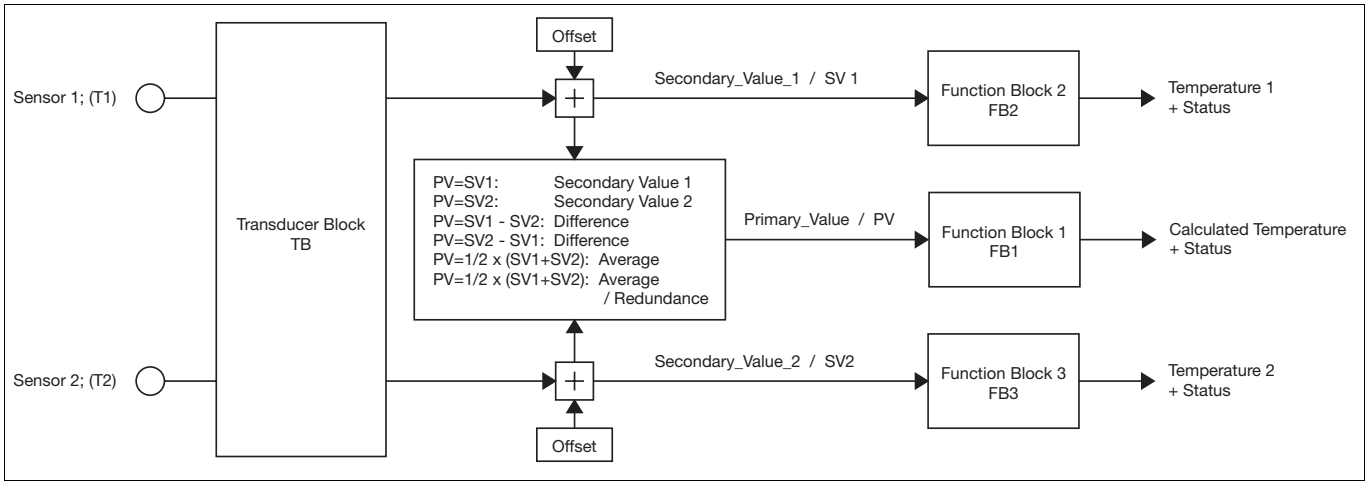


Fig. 2-3 Structure of the temperature transducer TF12/TF212

The TF12/TF212 temperature transducer offers the option of connecting one or two sensors independently from one another. In the "transducer block" the input signal will be linearized corresponding to the selected type of sensor. The type of sensor connected is thus also set in the transducer block. In addition, up to 4 user-defined characteristic curves can be programmed.

Arithmetic functions are then connected to the transducer block with which, to start off with, a configured offset for every measured sensor value can be separately produced. Afterwards, using these same sensor measurements, a third, calculated measurement value can be produced as a difference or as an average.

After this, the measurement values are checked in the 3 function blocks to see whether the configured upper or lower process limits have been reached or if an alarm threshold has been reached, so as to transmit a corresponding status message.

2.3.2 Overview (UV)

Normally the DTM display in the “User View”. This is shown by “(UV)” at the end of the tab title. As all relevant parameters can be changed with this setting, it should not be changed.

The engineering view (expert level) is only for internal service purposes and is protected by a password.

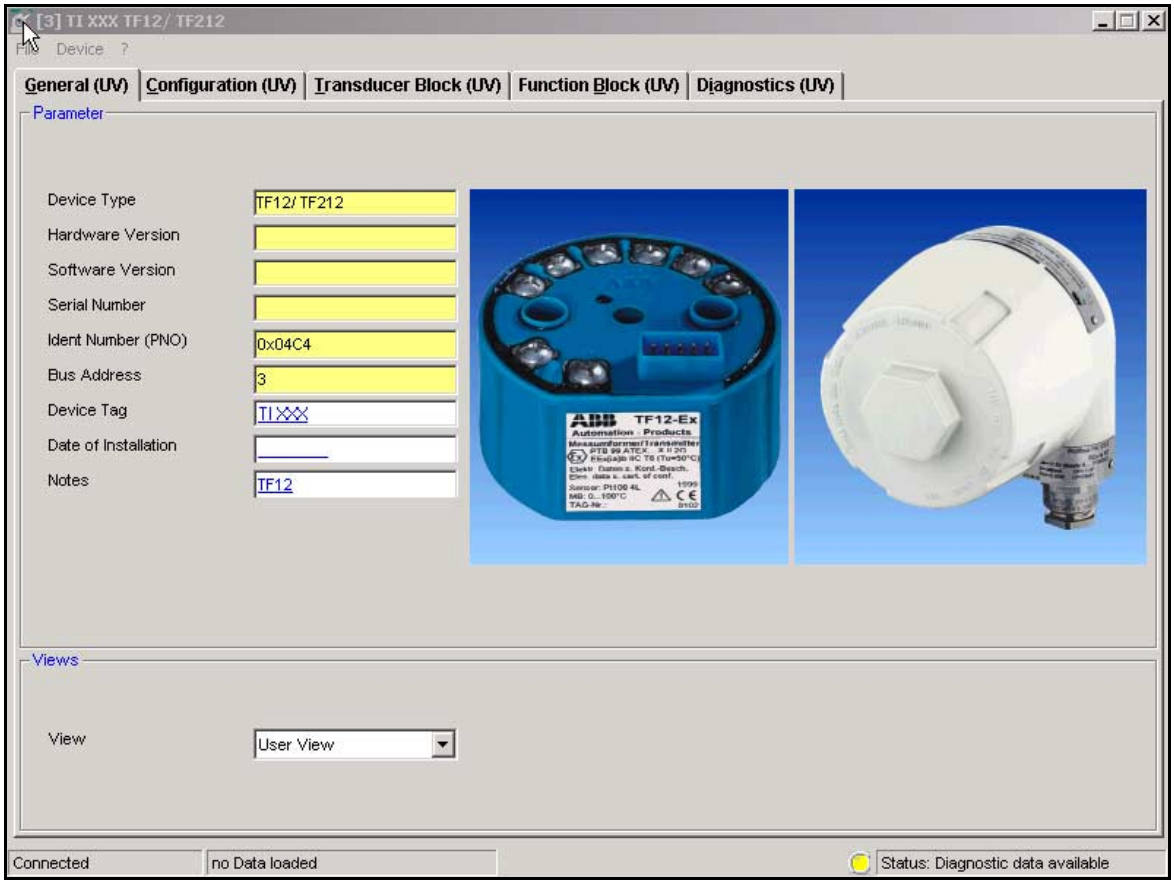


Fig. 2-4 Overview

Device type	Shows the type of the transducer (belonging to the bus address).
Hardware version	Displays the internal hardware version.
Software version	Displays the version of the software installed in the transducer.
Serial number	Displays the serial number of the device concerned.
Identity number (PUO)	Displays the PROFIBUS identity number.
Certification	Displays the PROFIBUS certification.
Bus address	Displays the bus address of the transducer.
TAG name of the device	Option to enter a TAG name (name of measurement location).
Installation date	Option to enter the date.
Notes	Option for additional notes.

2.3.3 Configuration (UV)

By activating the tab *Device* → *TF12 View* → *Configuration (UV)* the following window will appear:

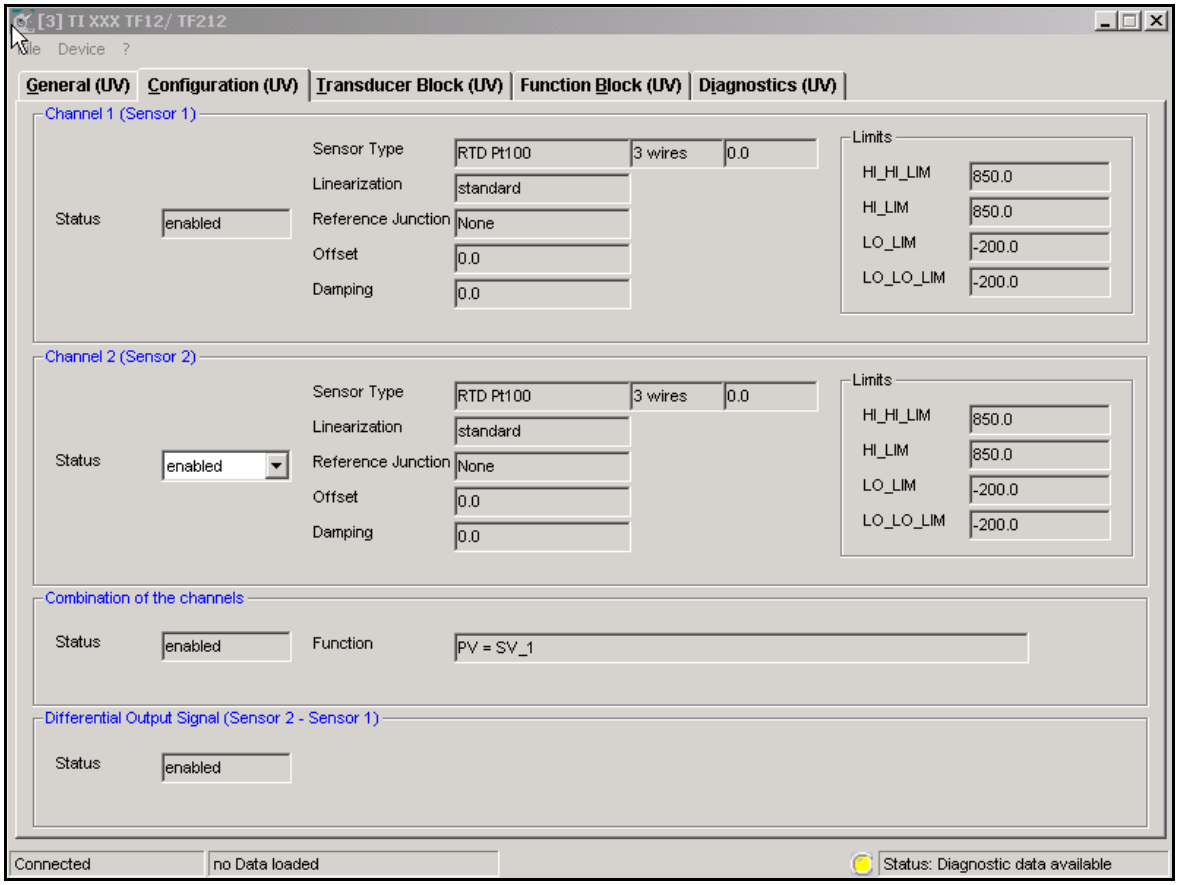


Fig. 2-5 Configuration

In this window the current device configuration is shown as well as a selection as to whether the transducer is to be used with one or with two sensors.

Channel 1:	Temperature sensor 1 (Status: always on)
Channel 2:	Temperature sensor 2 (Status: on or off)
Linking the channels	Status: always on
Difference signal	Status: for 2 sensors always on, for 1 sensor always off

The only selectable option in this window is the status of sensor 2. This can be switched on or off via the selection menu. This directly affects the options selectable on the tab *"Transducer block (UV)"*.

IMPORTANT
If channel 2 is switched from "off" to "on" then, afterwards, a sensor must be selected in the transducer block for this change to become effective. If this is not the case, channel 2 will not be activated!

IMPORTANT
If a resistive thermometer with 4-wire connection is selected for channel 1, then sensor 2 will automatically be set to "off" and the selectable option for sensor 2 in the above window will be disabled.

2.3.4 Transducer block (UV)

By activating the tab *Device* → *TF12 View* → *Transducer block (UV)*, the following window will appear:

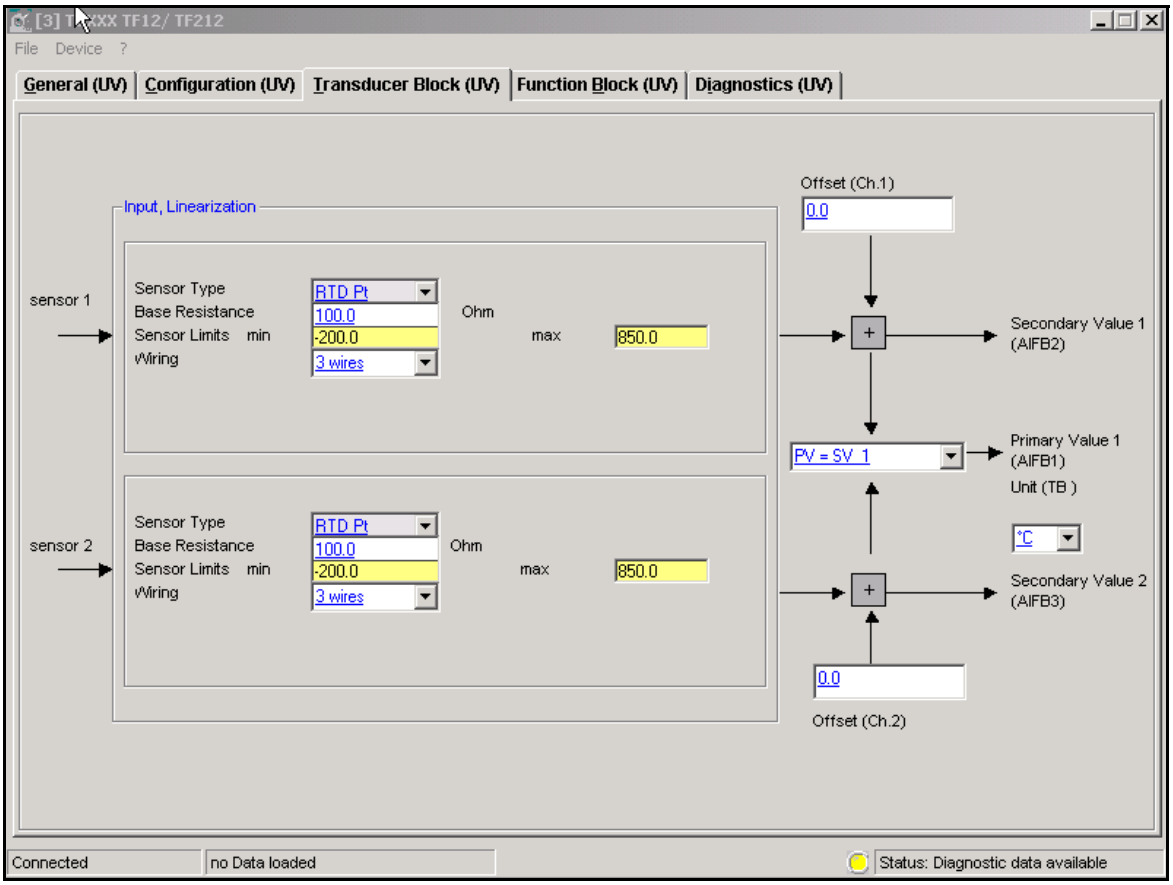


Fig. 2-6 Transducer block (UV)

The input signals for channel 1 and channel 2 as well as the calculation function are set in this window.

The display and data entry options depend on the type of sensor configured.

IMPORTANT
If the status for channel 2 is set to “off” in the configuration window, the input options for sensor 2 in the above window will be disabled.

IMPORTANT
To activate the changes made, the data has to be saved to the device and then reloaded from the device!

Sensor type

Setting the type of sensor determines the input signal for channel 1 and channel 2.

The input options / connection options are as follows:

Input element		Measurement range
Standard	**Sensor**	
IEC 584-1	Thermocouple type B	400...+1820 °C (+752...+3308 °F)
	Thermocouple type E	–100...+1000 °C (–148...+1832 °F)
	Thermocouple type J	–100...+1200 °C (–148...+2192 °F)
	Thermocouple type J	–180...+1370 °C (–292...+2498 °F)
	Thermocouple type R	– 50...+1760 °C (– 58...+3200 °F)
	Thermocouple type S	– 50...+1760 °C (– 58...+3200 °F)
	Thermocouple type T	–200...+ 400 °C (–328...+ 752 °F)
	Thermocouple type N	–180...+1300 °C (–292...+2372 °F)
W3, ASTME 998	Thermocouple type C	0...+2300 °C (+ 32...+4172 °F)
	Thermocouple type D	0...+2300 °C (+ 32...+4172 °F)
DIN 43710	Thermocouple type L	–100...+ 900 °C (–148...+1652 °F)
	Thermocouple type U	–200...+ 600 °C (–328...+1112 °F)
IEC 751[1)]	Pt 100 resistance thermometer	–200...+ 850 °C (–328...+1562 °F)
	Pt 1000 resistance thermometer	–200...+ 850 °C (–328...+1562 °F)
	Pt 100/Pt1000 resistance thermometer	–100...+ 250 °C (–148...+ 482 °F)
DIN 43760[2)]	Ni 100 resistance thermometer	– 60...+ 250 °C (– 76...+ 482 °F)
Resistance	2-, 3-, 4-wire	0...400 Ω/0...4000 Ω
Voltage		–15 mV...+115 mV
User defined characteristic curve	Voltage or resistance (2-, 3-, 4-wire)	

The selection is made via the corresponding list (sensor 1 or sensor 2).

IMPORTANT
In this window, the sensor limits (measurement range) will only be shown automatically (depending on the type of sensor as in the above table) if the data is transmitted to the transducer and then read back again.

Source of comparative temperature

The optional comparative temperature serves to reduce measurement errors and is included in each value measured.

A selection list is used to set whether none at all, an internal or an external comparative temperature is used to be included in the calculation.

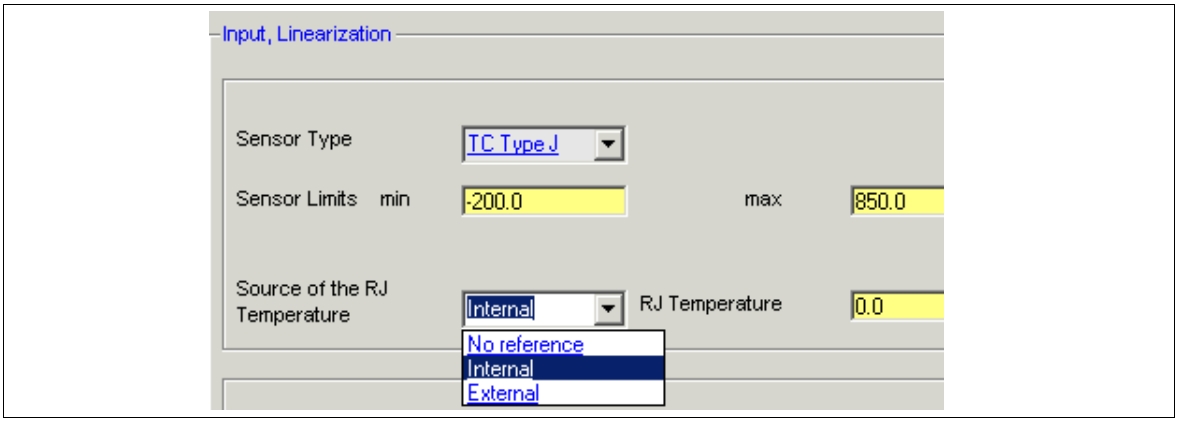


Fig. 2-7 Source of comparative temperature

No reference of for linear voltage	No display / inclusion in the calculation of comparative temperature
Internal	Display / use in the calculation of a current, constantly measured comparative temperature.
External	Option to enter / include a constant comparative temperature in the calculation.

Base resistance (resistive thermometers)

IMPORTANT
A base resistance can only be entered if a resistive thermometer has been selected.

Connection type (resistive thermometers)
In addition, a selection list is used here to choose the type of connection (2-, 3- or 4-wire connection).

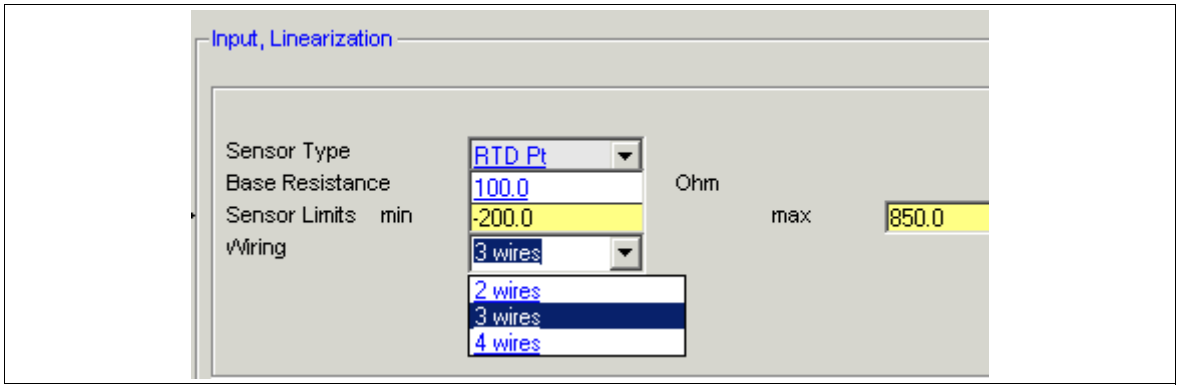


Fig. 2-8 Connection type (resistive thermometers)

For “2-wire connections” and option to enter the resistance of the wire in Ohms will appear (resistance of the wire between the sensor and the transducer).

If a “4-wire connection” is selected, the following warning message will appear:

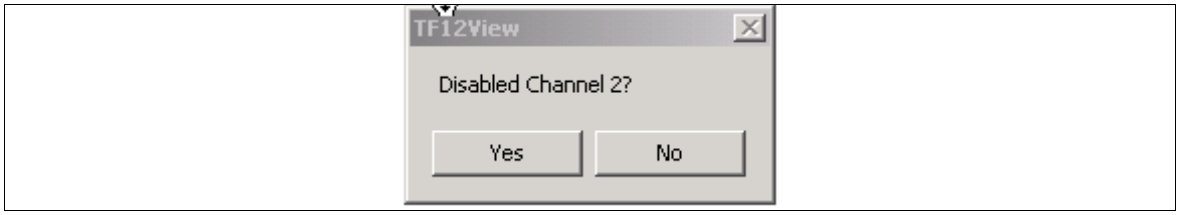


Fig. 2-9 Warning message for connection type

If you confirm this with “Yes”, sensor 2 will automatically be set to “off” and the selection options for sensor 2 will be disabled in the “Configuration” window.

User defined characteristic curve
The polynomial coefficients for the linearizing of voltage and resistance measurements are stored in each transducer.

NOTICE
The "User defined characteristic curve" setting is for customer specific programming of this linearization curve and should only be done by suitably trained specialists.

When a user defined characteristic curve is selected, an additional tab appears *"User curve channel X (UV)"* per channel.

When the *"User curve channel X (UV)"* tab is activated, the following window will appear:

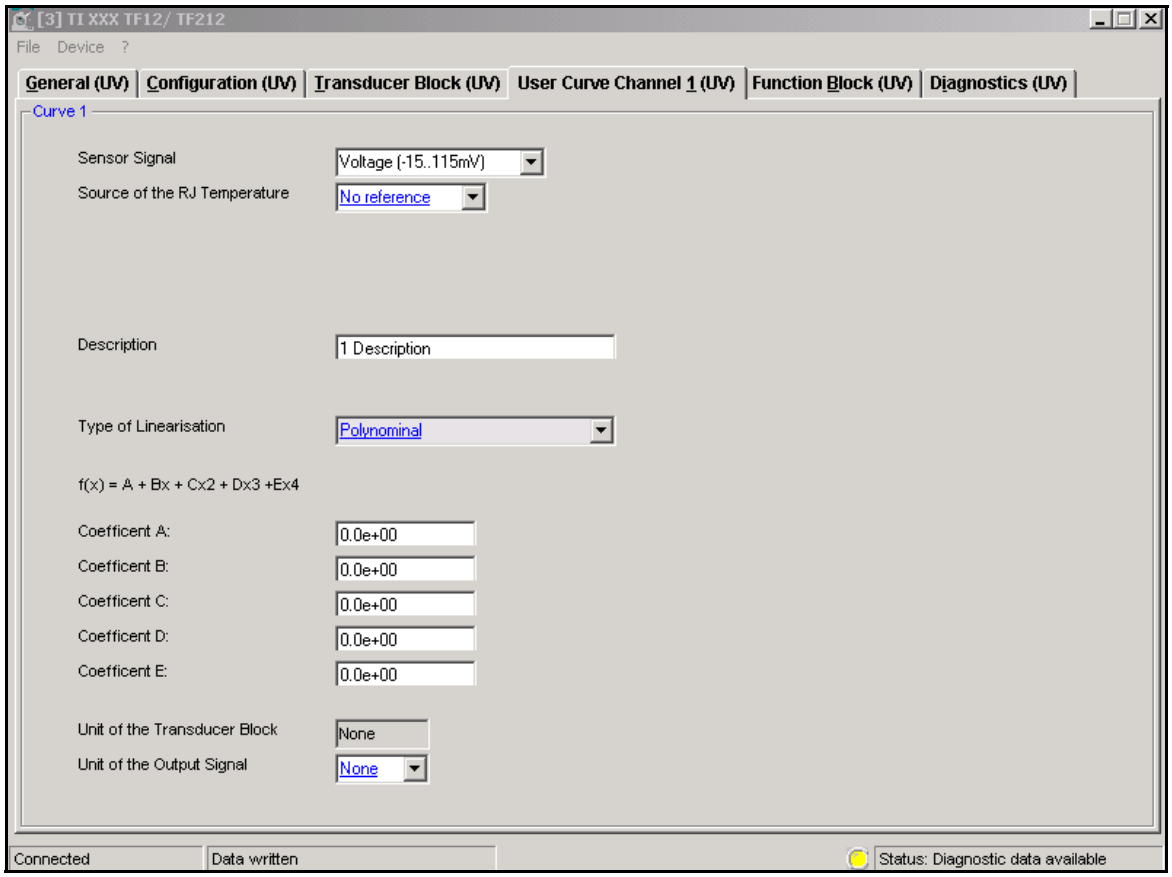


Fig. 2-10 User curve channel X (UV)

Sensor signal	Resistance (0..400 Ohm) Resistance (0..400 Ohm) Voltage (-15...+115 mV)
Connection type	2-wire 3-wire 4-wire
Wiring resistance	Option to enter the resistance of the wiring in Ohms (only for 2-wire).
Description	Here you can enter a unique description of the user defined characteristic curve.

A tool is included with the transducer, which calculates the necessary polynomial coefficients from the specified user specific table.

To do this, the type of linearization in the selection list has to be changed from *"Polynomial"* to *"Table"* (see Fig. 2-11 Page 14).

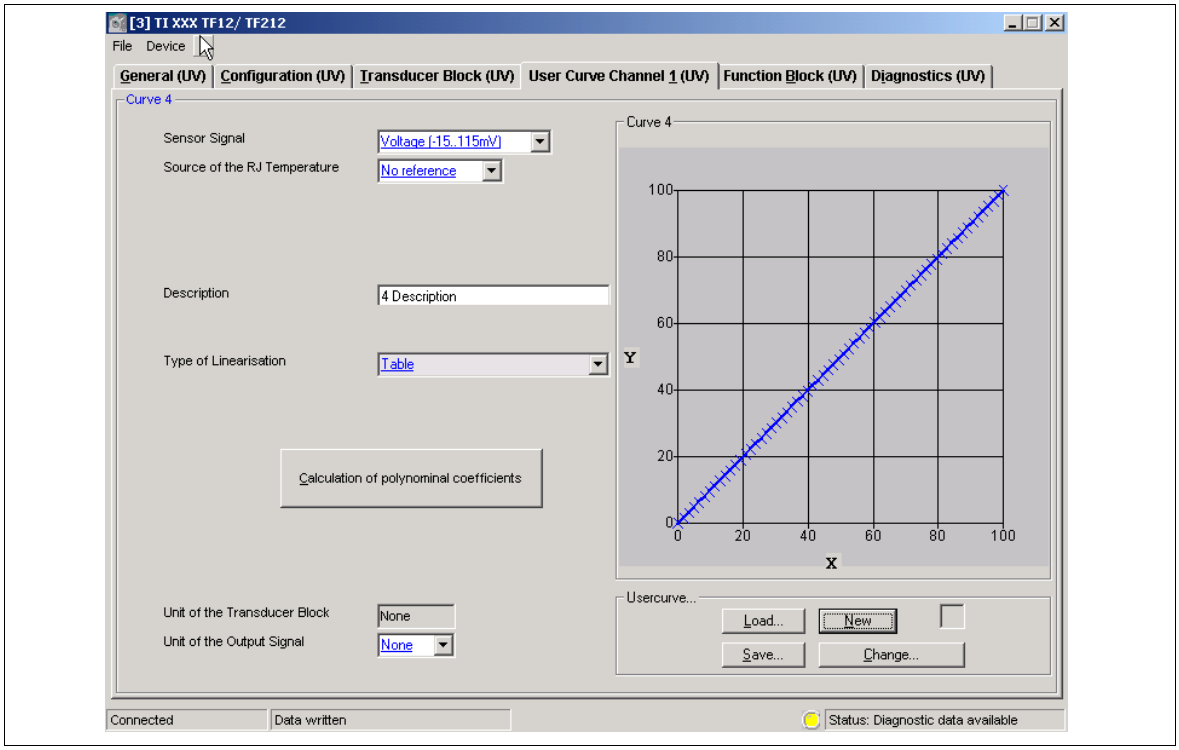


Fig. 2-11 Changing the type of linearization

User defined characteristic curves are always saved as files with names ending *.crv.
The *"Load..."* button can be used to load previously stored characteristic curves. Press the *"Save..."* button to store new or changed characteristic curves.

Use the *"New"* button to enter new user defined characteristic curves. Press the *"Change..."* button to alter the currently displayed characteristic curve.
A window will appear, which looks something like the following:

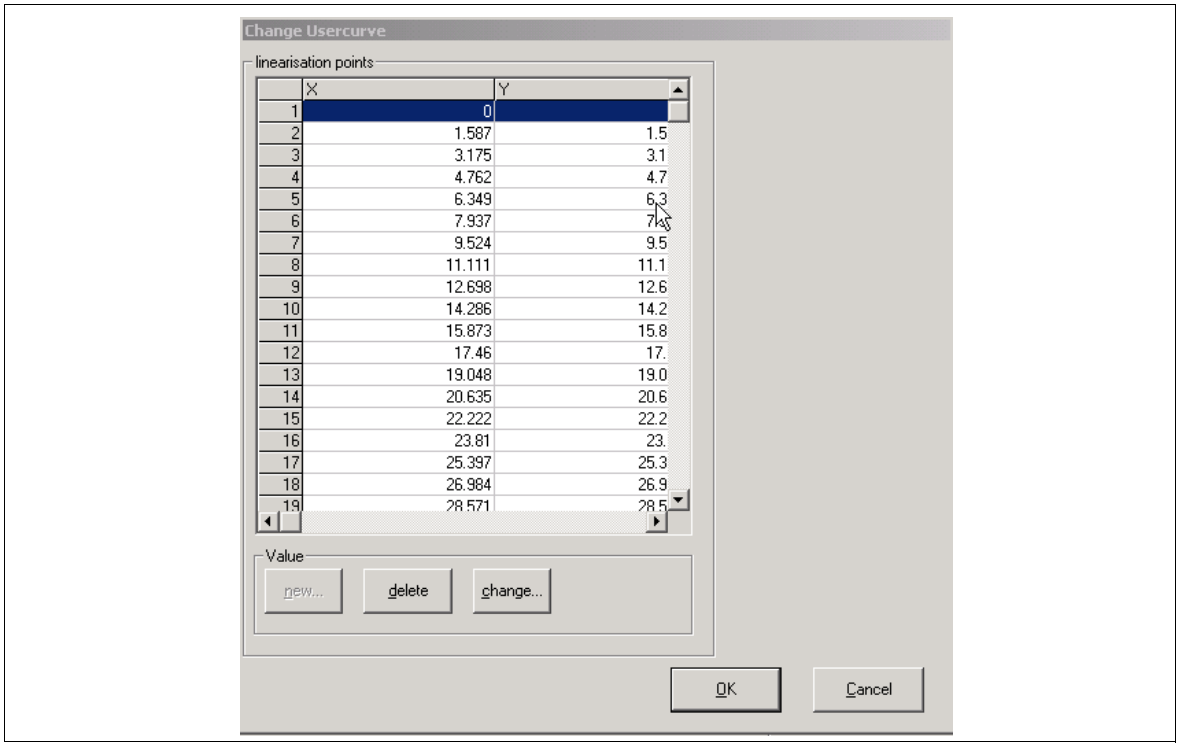


Fig. 2-12 Changing the characteristic curve, linearizing table
Click on the *"OK"* button to accept the characteristic curve entered.

Press the *"Cancel"* button to cancel the process; the data entered will not be accepted.

Use the *"Delete..."* button to delete coordinate pairs which are no longer required.

Press the *"New..."* button to insert a new pair of coordinates.

Press the *"Change..."* button to change the pair of coordinates currently marked.

A window will appear, which looks something like the following:

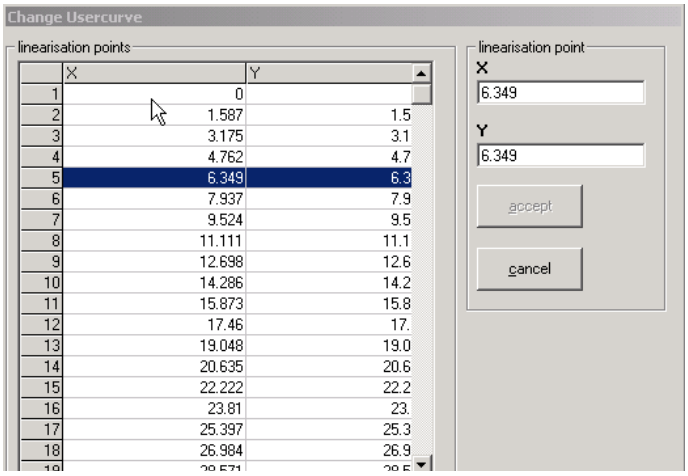


Fig. 2-13 Entering coordinate pairs

You now have the option of entering coordinate pairs X and Y.

The entries made are written to the table when you press the *"Accept"* button.

Pushing the *"Cancel"* button finishes the data entry without accepting the input/ changes.

Offset

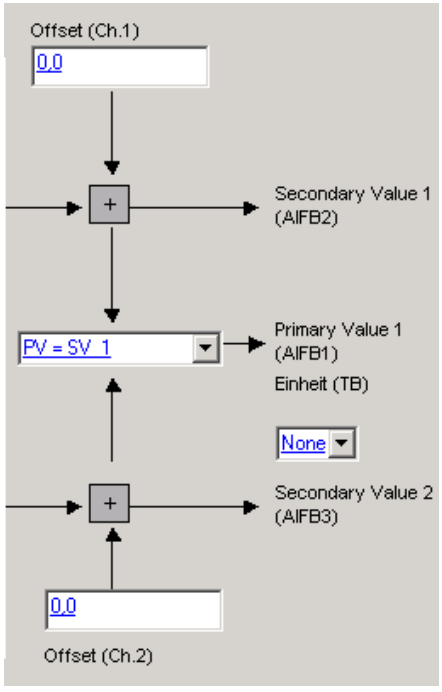


Fig. 2-14 Offset

Here, an "offset" can be entered for every sensor (channel), separately.

2.3.5 Calculation function

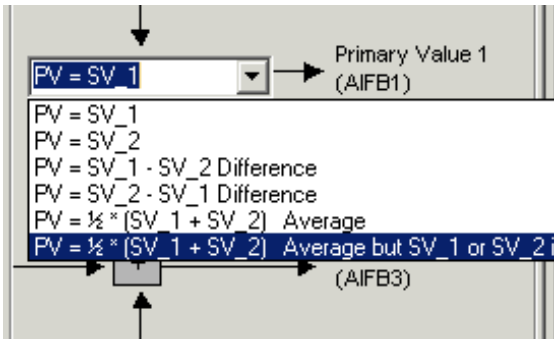


Fig. 2-15 Calculation function

At this point you decide which signal is to be displayed or calculated in the *"Function block"* window for the "Primary value" (PV, AI Function block 1).

SV_1	Display: the value measured by sensor 1
SV_2	Display: the value measured by sensor 2
SV_1 - SV_2 Difference	Calculation and display: value measured by sensor 1 minus value measured by sensor 2
SV_2 - SV_1 Difference	Calculation and display: value measured by sensor 2 minus value measured by sensor 1
½ x (SC_1 + SV_2) Average	Calculation and display: Average of values measured by sensor 1 and sensor 2
½ x (SV_1 + SV_2) Average but SV_1 or SV_2 if the other is wrong	Calculation and display: Average of values measured by sensor 1 and sensor 2 (but display of value measured by only one sensor (channel), if one of the sensors is faulty)

IMPORTANT
The option of making a selection is subject to a plausibility check:
If the status for channel 2 is set to "off" in the *"Configuration"* window, then all options for sensor 2 (SV_2) will be disabled.

Units
Here, you can set the units that the measurements should be displayed in.
If a unit is selected here, this selection is valid for all displays in the "Function block" window.

If "none" is selected then the units can be selected separately for each of the 3 displays in the "Function block" window.

IMPORTANT
The option of making a selection is subject to a plausibility check:
The possible units depend on the type of sensor selected.

2.3.6 Function block (UV)

By activating the tab *Device → TF12 View → Function block (UV)* the following window will appear:

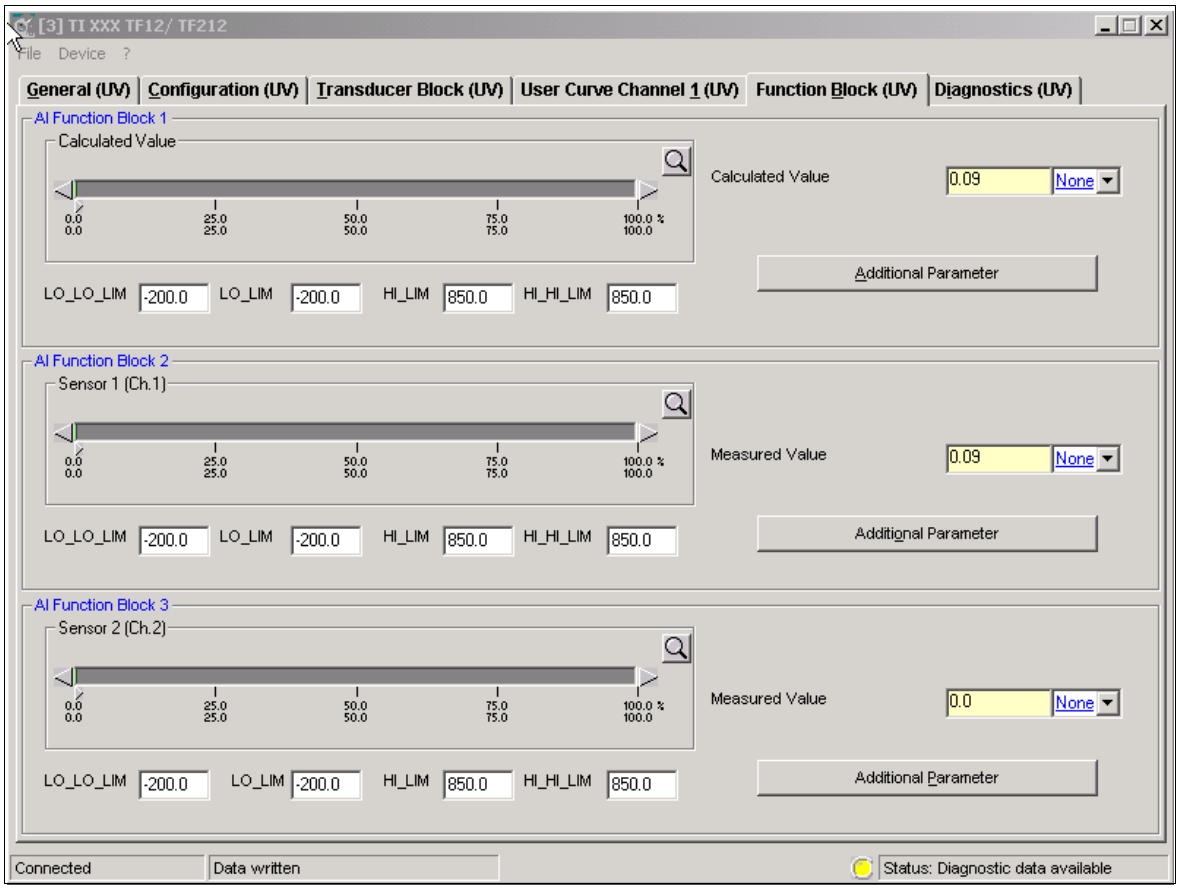


Fig. 2-16 Display of values measured by sensors 1 and 2

In this window the values measured by sensor 1 and sensor 2 as well as the value according to the function selected in the “Transducer block” window will be displayed.

Display
The values measured will be shown as text as well as in a bar diagram.
The color of the bar provides information about each alarm state.

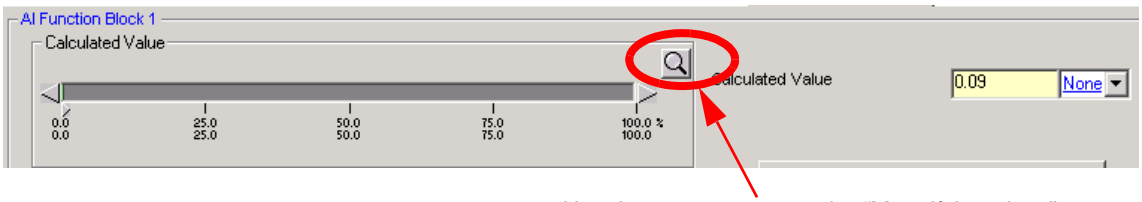
The limits of the bar diagram display (displayed section of measurement range) are set under *“Additional parameters”*.

IMPORTANT
The percentages specified under the bars relate to the display limits set under *“Additional parameters”*.

Units
The units can be set in the associated selection list as long as the units have not already been set in the “Transducer block” window.

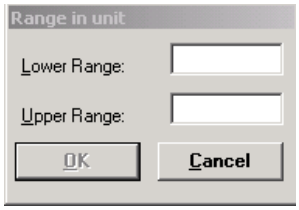
Zoom function (magnifying glass)

In addition to the limits set under *"Additional parameters"* the bar diagram can also be modified.



Use the mouse to press the "Magnifying glass".

The *"Display limits"* field will appear.



The display limits can now be entered in the units selected for display.
Click on "OK" to confirm

Fig. 2-17 Zoom function (magnifying glass)

The activation of the zoom function will be shown by the display of the <<<Zoom active>>> line.

To switch the zoom function off, click on the "magnifying glass" again.

Additional parameters

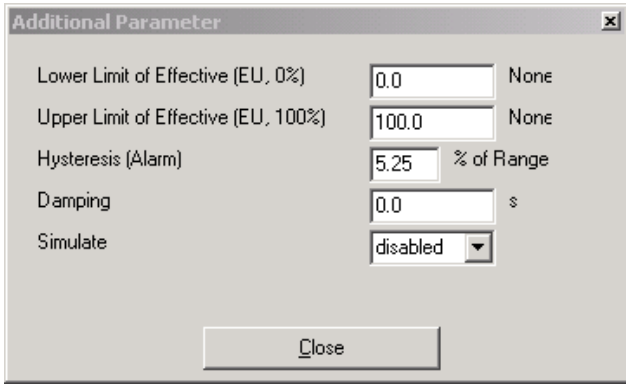


Fig. 2-18 Data entry window for "Additional parameters"

Additional parameters can be set for each of the 3 displays (value measured, sensor 1, sensor 2).
After pressing each *"Additional parameters"* button, the adjacent window will open.

IMPORTANT
The upper and lower limits to the measuring range show the permissible measurement range of the associated sensor. This display does not appear in "All function block 1: value measured".

lower process limit (EU 0 %)	To enter the lower display limit of the bar diagram (corresponds to 0 % of the display range)
upper process limit (EU 100 %)	To enter the upper display limit of the bar diagram (corresponds to 100 % of the display range)
Hysteresis (Alarm)	To enter the hysteresis for the threshold value (alarms) in %
Damping	To enter the signal damping in seconds (s)
Simulation	Switching the simulation on/off (see below)

Simulation
Via a selection list (inactive or inactive) a simulation of measurements can be switched on/off.

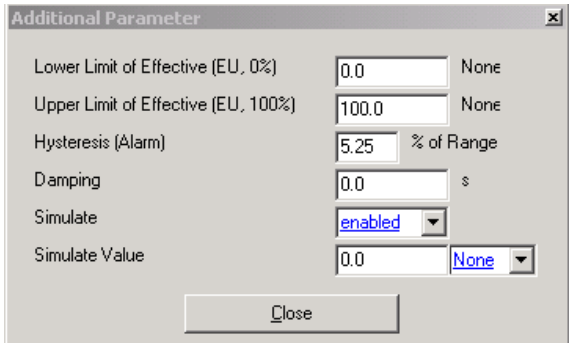


Fig. 2-19 Simulation

To enter the values for the simulation and to set the units via a selection list.

Press the *"Close"* button to close the window.

Alarms (thresholds)
4 alarms (thresholds) can be set for each of the 3 displays (value measured, sensor 1, sensor 2). Entries are made underneath the bar diagrams in the corresponding fields.
The alarm points set are also shown above the bar diagrams as tabs, as long as they lie within the selected display range.

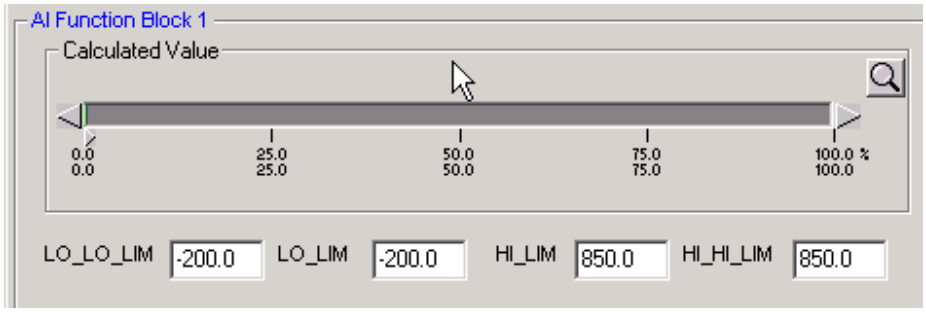


Fig. 2-20 Alarms

LO_LO_LIM	lower main alarm
LO_LIM	lower provisional alarm
HI_HI_LIM	upper provisional alarm
HI_LIM	upper main alarm

The color of the bar provides information about the associated alarm state:

green	no alarm
yellow	lower or upper provisional alarm
red	lower or upper main alarm

Diagnosis (UV)

By activating the tab *Device* → *TF12 View* → *Diagnosis (UV)* the following window will appear:

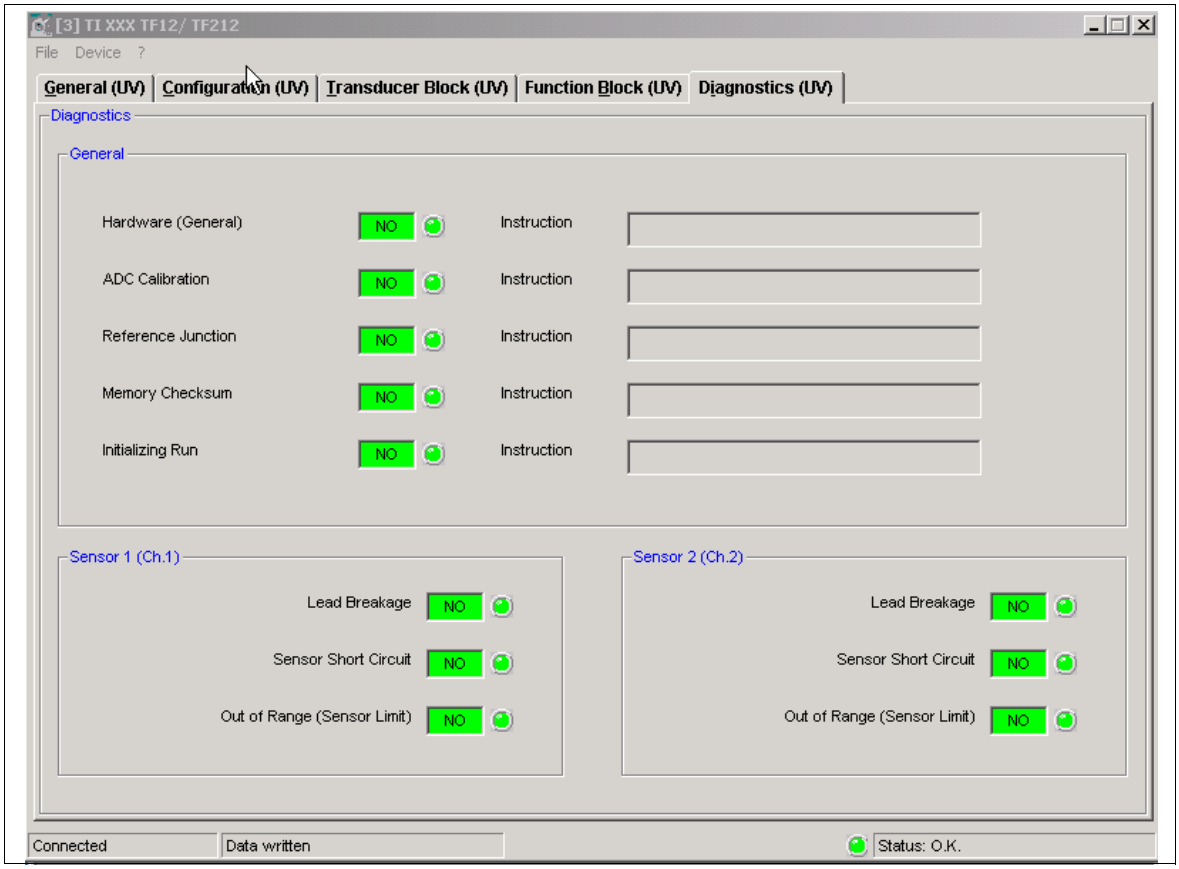


Fig. 2-21 Diagnosis

In this window the various current states of the transducer as well as of the maximum of 2 sensors will be displayed.

NO / green	no fault, everything is OK
Yes / red	fault

If there's a fault, the status will be displayed in the bar at the foot of the window.

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