

User Guide

PC tool

Software for addressing, calibration and parameterization of Basic, Premium and Heavy Duty gas detection units and gas detection controller configuration



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1 Application possibilities of the software

1. Addressing of the Basic, Premium and Heavy Duty GD Units.
2. Calibration of gain and zero-point of the Basic, Premium and Heavy Duty GD devices.
3. Configuration of application parameters of the Basic, Premium and Heavy Duty GD devices.
4. Long-term recording on hard disk in .csv format.
5. Monitoring of all measured values at a glance, live.
6. Print of Calibration reports.
7. Gas detector controller configuration

2 Scope of delivery

The PC tool software has to be started from the USB stick in order to use the available functions. on the USB stick there are binary data files that must be opened and/or changed - otherwise; no functions can be performed.

The PC software is an alternative solution to the Danfoss handheld service tool.

Please use the included USB-RS485 adapter to physically connect the PC to the sensor.

3 Installation

Connect your PC via a USB cable to the adapter that will automatically start to install the driver for the USB-RS485 adapter. A virtual COM port will be generated and this new port number is required later for configuring the PC tool Software.

It is not necessary to install the PC tool Software, since all parts of the program will be started during runtime.

The PC tool will run on WINDOWS 7, 8 and 10.

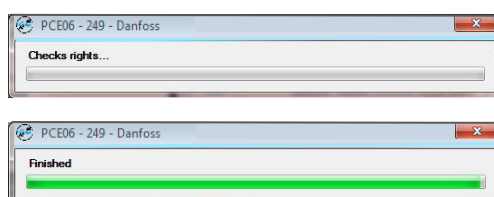
4 Main window with short description

Before the main window starts, the User rights are checked.



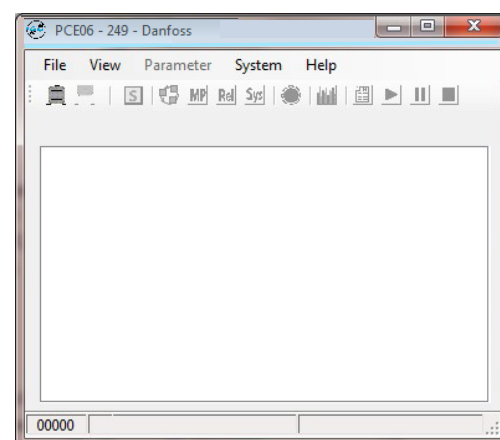
Attention:

If the PC Tool software is not started from the USB stick or if the rights check fails, the software will be closed again without showing the main window.



The main window opens only after successful verification.

The company name and the name of the software will appear in the window head.



Menu bar:

File has only one submenu 'Exit' for quitting the application.

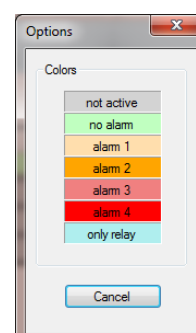
View has two subitems:

Language

Here you can change the display language. British English, German and USA English are currently available.

Options

All possible background colours are listed here (see image to the right).



4 Main window with short description (continued)

Parameters has four submenus:

Addressing opens the dialog for setting the address of the connected device.

The  icon on the toolbar stands for this menu item.

MP Parameters opens the dialog where you can manage the settings for the single measuring points in the gas detection system.

The  icon on the toolbar stands for this menu item.

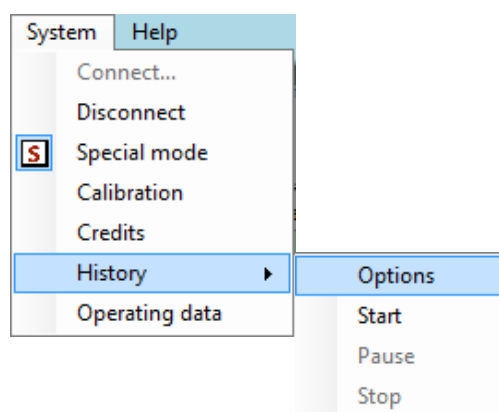
Relay Parameters opens the dialog where you can manage the settings for the single relay outputs in the gas detection system.

The  icon on the toolbar stands for this menu item.

System Parameters opens the dialog where you can manage the system parameters of the gas detection system.

The  icon on the toolbar stands for this menu item.

The menu items are only active if the connection to the gas detection controller or gas detection unit is established. The functions are specified in the following chapters.



System has seven submenus:

Connect opens the dialog where you can set the serial COM port.

You can also access this dialog via the  icon on the toolbar.

Disconnect does not open a new dialog window, but interrupts the connection to the COM port. It is also possible to use the  icon on the toolbar to cut the connection.

Special mode does not open a dialog window either, but sets the connected device into special mode. If activated again, the special mode is cancelled and the device will return to the measurement mode.

The special mode can be switched on or off with the  icon on the toolbar.

If the device is in special mode, the colour of the menu bar and toolbar changes to blue and the  icon will be displayed in the system menu.

Calibration opens the calibration dialog. The functions of this window are specified in detail later.

The  icon on the toolbar stands for this menu item.

History contains four submenus:

Options starts the history dialog where you can change all settings for data recording.

The  icon on the toolbar stands for this menu item.

Start - with a click on the start button the recording is started.

The  icon on the toolbar stands for this menu item.

Pause - with a click on the pause button the recording is interrupted.

The  icon on the toolbar stands for this menu item.

Stop - with a click on the stop button the recording is stopped.

The  icon on the toolbar stands for this menu item.

The functions of the history window are described in detail later.

Operating data opens the operating data dialog. The functions of this window are described in detail later.

The  icon on the toolbar stands for this menu item.

Under the toolbar, there is a system tray displaying error messages concerning the communication with the connected device.

The middle section of the main window varies according to the connected device. This is described in detail later.

At the very bottom of the status bar the following information is displayed:

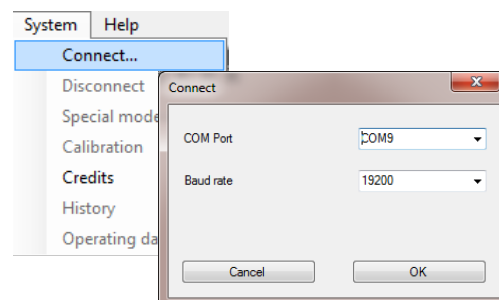
Software version of the master
The system tray where currently only the information on the history is displayed.
Connected COM port with baud rate.

5 Establish the connection

When you click on the *Connect* button or on the  icon, the application opens the dialog for setting the serial port.

Only those COM ports that are active on the PC are displayed. By clicking OK you can establish the connection to the COM port.

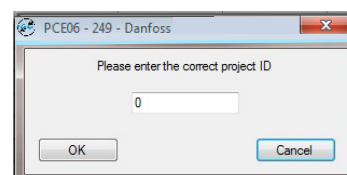
The display in the main window varies depending on the connected device.



Attention:
If the authorization key (password) of the PC tool software differs from the authorization key of the connected device, a window will appear showing the input screen for plant ID (password). Password: 5468

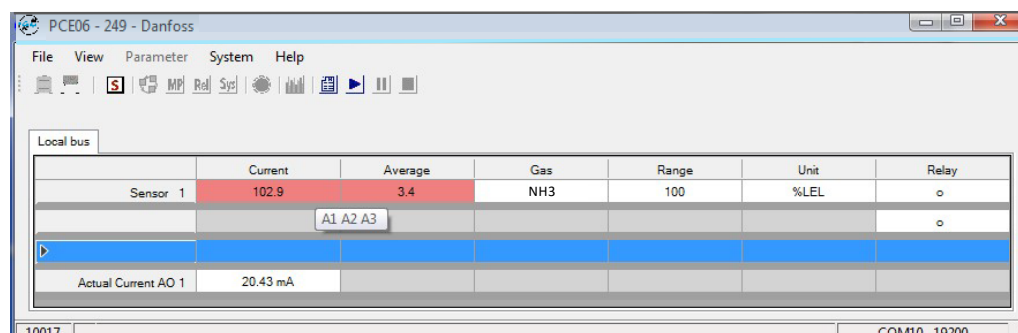
The mask remains open until you have entered the correct plant ID and confirmed with OK or cancelled the input by using the cancel button.
If you click cancel, the application will close!

If you enter the correct plant ID, the input screen will release the application and you can use all functions to the full extent.



5.1 Local bus

The Danfoss PC tool is connected via the COM port to the devices of the IO class (Basic, Premium and Heavy Duty).



A table with four lines appears in the middle of the main window. The first column of the table is a header column for each line. If the sensor is activated, the text "Sensor X" will appear in this column with X being a number between 1 and 4. Otherwise the header column remains empty.

The following columns give more information on the connected digital sensor head or the analog input.

Current and average value:

The current and average values of the connected digital sensor head or the analog input are displayed here. If the alarm thresholds are set to 0, the alarm evaluation will not take place and the readings will be displayed without alarm (usually backlighted in green).

	Current	Average
Sensor 1	149.4	0.0
	A1 A2 A3 A4	

If the threshold values are set greater than zero at the measuring point, a local alarm evaluation is active and the alarms are marked with different background colours. In addition, a tool tip displaying the active alarms will appear, if you click in the cell.

5.1
Local bus (Continued)

Gas:
The gas type of the connected digital Sensor head or the analog input is displayed here.

Range:
The measuring range of the connected digital Sensor head or the analog input is displayed here.

Unit:
The unit of the connected digital Sensor head or the analog input is displayed here.

Relay:
The last column (Relay) shows the current status of available relays of the connected device.
○ means that the relay coil is de-energized
● means that the relay is energized.
The indicator reflects the actual energization state of the relays, regardless of the parameterization.

For devices with more than 1 input signal (Premium) the read-back information (current value) of the analog output signals appears in the line 4.

It has already been converted to the current range of 4-20 mA (measuring range 4-20 mA).

5.2 Field Bus = Danfoss Controller

The PC tool is connected via the COM port to the Danfoss Controller.

The screenshot shows the Danfoss Gas Detection PC tool interface. It has a menu bar (File, View, Parameter, System, Help) and a toolbar. Below the toolbar are three tabs: 'Current Values', 'Average Values', and 'Set Current'. The 'Current Values' tab is active, showing a table with 12 rows and 8 columns of digital measuring points (SR / DP). The 'Average Values' tab shows a table with 4 rows and 8 columns of analog measuring points (AR / AP). The 'Set Current' tab shows a table with 2 rows and 8 columns of analog output points (AO).

	SR / DP 1 - 12	SR / DP 13 - 24	SR / DP 25 - 36	SR / DP 37 - 48	SR / DP 49 - 60	SR / DP 61 - 72	SR / DP 73 - 84	SR / DP 85 - 96
1	102.9							
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

	AR / AP 1 - 4	AR / AP 5 - 8	AR / AP 9 - 12	AR / AP 13 - 16	AR / AP 17 - 20	AR / AP 21 - 24	AR / AP 25 - 28	AR / AP 29 - 32
1	129.9							
2	11.3							
3								
4								

	AO 1 - 2	AO 3 - 4	AO 5 - 6	AO 7 - 8	AO 9 - 10	AO 11 - 12	AO 13 - 14	AO 15 - 16
1	4.00 mA							
2	4.00 mA							

In the middle of the main window two tabs appear containing two tables and a block each.

The first tab shows the current values and the second the averages. Both tabs are constructed identically, so only the tab with current values is described herein.

The first larger table shows the current values of the 96 possible digital measuring point addresses. The second table displays the current values of a total of 32 possible analog measuring point addresses.

The cells of inactive measuring points are grey and empty.

The cells with inactive measuring points, but with active relays are shown with light blue background colour and the relay status.

The cells with active measuring points display the actual value with different background colours depending on the alarm status of the measurement point. The definitions of the colours can be looked up in *Options*.

In addition to the current value each cell contains further information about the respective measuring point: The following icons may be displayed on the left next to the current value:

→ means that this measuring point needs maintenance. The maintenance for analog measurement points is monitored and reported by the EP module, so here the display is simultaneous for all four possible analog measuring points.

○ or ● information concerning the relay status. These icons may only appear if the relay is used at this address. The icons reflect the energization state of the relay, regardless of the parameter setting operating/quiescent current or the relay contacts used. The alarm status is shown by the coloured background of the cell.

SR / DP 1 - 12	SR / DP 13 - 24	SR / DP 25 - 36
○ 157.8		

SR / DP 1
1110 Carbon monoxide(CO) 300.0ppm
A1 A2 A3 A4

AR / AP 1 - 4	AR / AP 5 - 8	AR / AP 9 - 12
● 83.3		

AR / AP 1
1110 Carbon monoxide(CO) 300.0ppm
A1 A2

5.2

Field Bus = Danfoss Controller
(Continued)

When the mouse pointer hovers over the cell, a tool tip window pops up showing the following additional information:

- Relay or measuring point address including the current measuring value
- Nomenclature number with the gas type of the connected measuring point
- Measuring range and unit of the connected measuring point
- Active alarms
- Present current of the analog output
- Number of days left until next maintenance

The lower block displays the control information (set point) of the 16 possible analog outputs. It has already been converted to the output current range of 0-22 mA (measuring range 4-20 mA).

SR / DP 1 - 12	SR / DP 13 - 24	SR / DP 25 - 36
69.7		
DP 1 69.7 %LEL 3400 Methane(CH4) 100%LEL Actual Current AO: 1.50 mA Days left until maintenance: 889 A1 A2 A3 A4		

129.8		
11.3	AR / AP 1 129.9 ppm	
	1110 Carbon monoxide(CO) 300ppm	
	A1 A2	

5.2.1

Display of possible error messages

A distinction is made between system errors and measuring point errors.

Messages only concerning the measured value will appear in the cell instead of the valid current value. This also includes the communication error to the sensor board or the digital sensor head.

Current Values		Average Values
GC Error	SR / DP 1 - 12	SR / DP 13 - 24
1	o Error	
2		SB 1
3		Communication error.

Messages generated by the gas detection controller will appear in the upper left corner of the table. The messages are displayed in the form of an error code. The detailed breakdown can be read in the tool tip.

Current Values		Average Values	
GC Error	SR / DP 1 - 12	SR / DP 13 - 24	SR / DP 25 - 36
▶ 1	o Error		
2		SR / DP 1 1110 Carbon monoxide(CO) 300.0ppm	
3		A1 A2 A3 A4 -----	
4		Communication error.	

If there is an error at a measuring point, the gas detection controller, too, will generate an error message; therefore, the two messages always occur together.

Current Values	Average Values
GC Error	SR / DP 1 - 12
MP Error.	Error

If the current value is displayed, but highlighted in yellow, then there is a configuration conflict between gas detection controller and gas detection unit.

An automatic measuring point configuration was deliberately omitted in order to obtain a high level of security when configuring. The installer must consciously enter the configuration of each measuring point accordingly.

Current Values		Average Values	
GC Error	SR / DP 1 - 12	SR / DP 13 - 24	SR / DP 25 - 36
▶ 1	○ 150.5		
2		SR / DP 1	
3		1110 Carbon monoxide(CO) 300.0ppm	
		A1 A2 A3 A4	
4		Incorrect configuration!	

5.2.2

Context menu in the Central Bus

Deselect: The highlighted area is free again.

Acknowledge horn: Allows acknowledgment of the horn with the address of the selected cell via the software interface.

Acknowledge latching: Allows acknowledgment of the latching selected address.

Relay test: Appears only if special mode is activated and relays are available. It has three submenus:

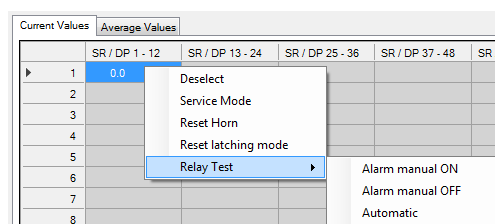
Alarm Test ON: Turns the relay into the alarm state.

Alarm Test OFF: Turns the relay into the alarm-free state.

Automatic: Turns the test function off. The relay returns to its normal function.

AO test: Appears only if special mode and the analog output are activated. Allows testing of the analog output by setting a fixed value.

- The left button sets the device, where the AO should be tested; usually the software takes over the setting automatically.
- The test value for the AO is set in the AO test value field in the range of 0 - 22 mA.
- The upper right button starts or stops the transmission of the test value.
- The bottom right button closes the window for the AO test; if the transfer of the test value is still active, it will be interrupted.



6 Parameters



Attention:

Due to the hard real-time behaviour the parameter data can only be exchanged if the device is in special mode. Therefore, the parameter buttons are only enabled in special mode.

6.1 Addressing

This dialog opens via Parameters → Addressing or via the quick access toolbar with the icon . The device to which the PC tool is connected to

via COM port will always be addressed. With the *Change* button, the new address and any configuration is taken over.

6.1.1 Addressing of gas detection controller

The slave address of the gas detection controller is assigned here.

It is required on the M-Bus for communication with an alarm master unit.

6.1.2 Addressing of expansion module

Here the slave address is assigned to an expansion module. It is required on the field bus for communication with the central gas

controller. Addresses from 1 to 7 are allowed, since there is a maximum of seven expansion modules.

	Input configuration	active	1110 CO	Gas type	Measuring Range
1.	AP 5 analog	☒	1110 CO	Carbon monoxide	ppm 300
2.	AP 6 analog	☐	1110 CO	Carbon monoxide	ppm 300
3.	AP 7 analog	☐	1110 CO	Carbon monoxide	ppm 300
4.	AP 8 analog	☐	1110 CO	Carbon monoxide	ppm 300

In addition, the configuration of the expansion module is set here.

1. column:
Number of analog input with respect to the connected device. Corresponds to MP number 1 - 4 in MP Parameters.

2. column:
Four analog inputs can be set. They are available at all times, so the addresses are always reserved and the buttons AP (X) to AP (X+3) are always active. The first four analog inputs can only be set in the controller, so the AP addresses of the expansion module with address 1 start in line 1 with address AP 5.

3. column:
Since there are only analog inputs, the buttons in the third column always remain analog.

4. column:
Active: Here you can enable or disable the analog inputs. Corresponds to the settings in the MP Parameters menu.

5. column:

Gas type: Here you can select the gas type of the connected analog sensor. Corresponds to the settings in the MP Parameters menu.

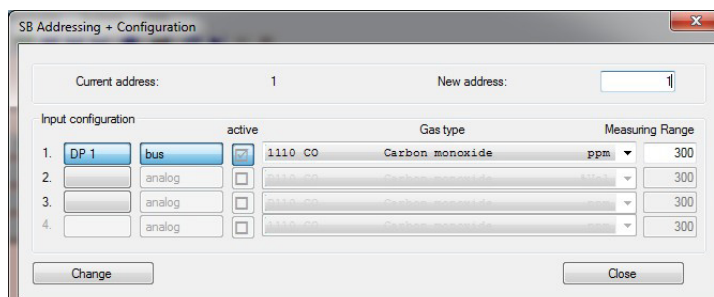
6. column:

Measuring range: Here you can set the measuring range of the connected analog sensor. Corresponds to the settings in the MP Parameters menu.

6.1.3 Addressing of gas detection units

Here the slave address is assigned to a sensor board. It is required on the field bus for communication with the GC central device. Addresses are allowed from 1- 96, because there

can be a maximum of 96 digital measuring points. In addition; the desired configuration of the sensor boards is set here.



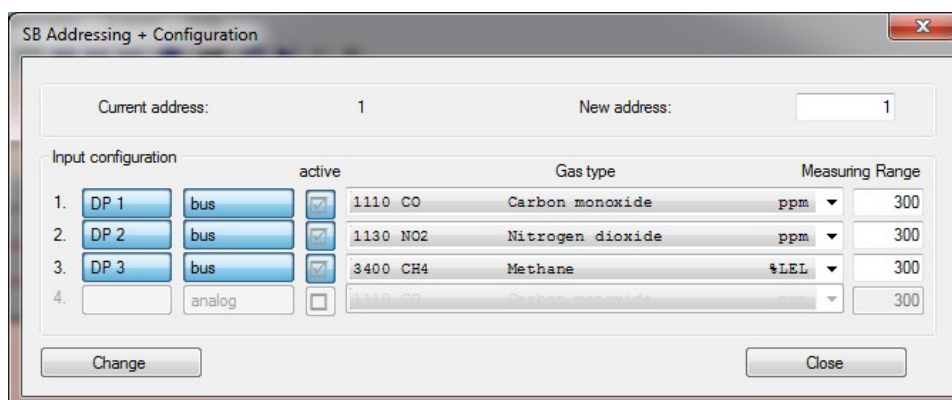
1. column:

MP number related to the connected device. Corresponds to the MP number 1 – 4 in MP Parameters, with Premium units having a maximum of two measuring points. Therefore, the P3 and P4 is always inactive and greyed out.

2. column:

Up to two DP can be set. With each additional measuring point the sensor board occupies an additional address on the field bus. With two activated measuring points the addresses X, X + 1 are occupied. These addresses must not be assigned to any other sensor board! The superordinate controller can detect address errors (multiple uses) only via incorrect bus data.

	Gas type	Meas
1110 CO	Carbon monoxide	ppm
1130 NO2	Nitrogen dioxide	ppm
3400 CH4	Methane	%LEL
1110 CO	Carbon monoxide	ppm
D110 CO	Carbon monoxide	%Vol
D110 CO	Carbon monoxide	ppm
1130 NO2	Nitrogen dioxide	ppm
1129 NO	Nitrogen monoxide	ppm
1195 O2	Oxygen	%Vol
1125 NH3	Ammonia	ppm
D164 CO2	Carbon dioxide	ppm
S164 CO2	Carbon dioxide	ppm
D164 CO2	Carbon dioxide	%Vol
S164 CO2	Carbon dioxide	%Vol
I164 CO2	Carbon dioxide	%Vol
3400 CH4	Methane	%LEL
I400 CH4	Methane	%LEL
I400 CH4	Methane	%Vol
3490 C3H8	Propane	%LEL
I480 C3H8	Propane	%LEL
I480 C3H8	Propane	%Vol
3440 H2	Hydrogen	%LEL
3408 NH3	Ammonia	%LEL
3485 (CH3)2CO	Acetone	%LEL
3430 C6H6	Benzene	%LEL
3425 C2H5OH	Ethyl alcohol	%LEL
3427 CH3COOC2H5	Ethyl acetate	%LEL
3410 C2H4	Ethylene	%LEL
3460 C4H10	n-Butane	%LEL
3491 C7H16	n-Heptane	%LEL
3435 C6H14	n-Hexane	%LEL
3445 (CH3)2CHOH	Isopropyl alcohol	%LEL
3498 JP8	JP8	%LEL



3. column:

Here you can set whether the measured values should come from the digital sensor head or the analog input.

4. column:

Active: Since each additional measuring point occupies one address on the field bus, it is assumed that this measuring point is physically present and is therefore automatically activated when addressed. However, it can be deactivated manually.

5. column:

Gas type: Here you can select the gas type of the measuring point. Double gas type configurations are not allowed, therefore gas types already used are deactivated in the selection list, displayed greyed out and can only be used as analog measurement points several times. Corresponds to the setting in the MP Parameters.

6. column:

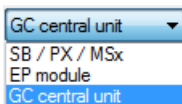
Measuring range: The measuring range of the measuring point is set here. Corresponds to the setting in the MP Parameters. It is essential that it corresponds to the measuring range of the sensor heads.

6.2 Measuring point MP parameters

In the upper part of the dialog are all buttons and input fields for the activation of a measuring point:

1. **MP address:** The address of the measuring point to be parameterized is entered here.

2. Selection field for the target device where the parameters have to be read.



Sb/PX/ MSx = Gas detection units
Ep Module = Expansion Module
GC central unit = Danfoss controller

Note: Parameters can only be written into a device directly connected to the PC tool.

3. Button for **Digital / Analog:**

If digital is set, the addresses 1-96 can be set for the digital measuring points in MP Address. If analog is set, the addresses 1-32 can be set for the analog measuring points in MP Address.

Two buttons are placed in the middle of the upper half of the dialog:

1. **Read MP:** Here you load the parameters of each measuring point from the selected device in the dialog interface.

2. **Write MP:** Here you can upload the settings from the dialog interface into the connected device. This button is inactive, if you have selected a device one level down.

If you want to enter the same parameters for a plurality of measuring points, you do not need to upload them individually.

In the dialog, there is a button called *Duplicate*.

In this area there are also two input fields and a button for specifying a start and end address. The specified addresses are included when transferring.

The Step button defines whether all measuring points between the start and the end address should be transmitted or only every second or every third address.

All input fields must contain numbers.

If you make no or incorrect parameter entries and you click on an Upload button, the fields containing errors, are highlighted in yellow, an info button appears and the device or file function will not be executed (forcing a correct and plausible input).

By clicking on the info button, a message box pops up containing the detailed error description.

6.2

Measuring point MP parameters
(Continued)

On the top right there is the file area with two buttons:

Export: With this button the parameters of all measuring points are successively read without showing them in the dialog interface. At the start of transmission, the button changes its text to *Cancel*, so you can cancel the transfer at any time by clicking on the same button; but then the read data will be lost. The remaining buttons are deactivated until the transmission has been completed.

Import: After clicking on this button, you are prompted to select the file you want to load. Once the correct file is selected, all measuring point parameters are consecutively uploaded to the controller. All buttons are disabled during this process.

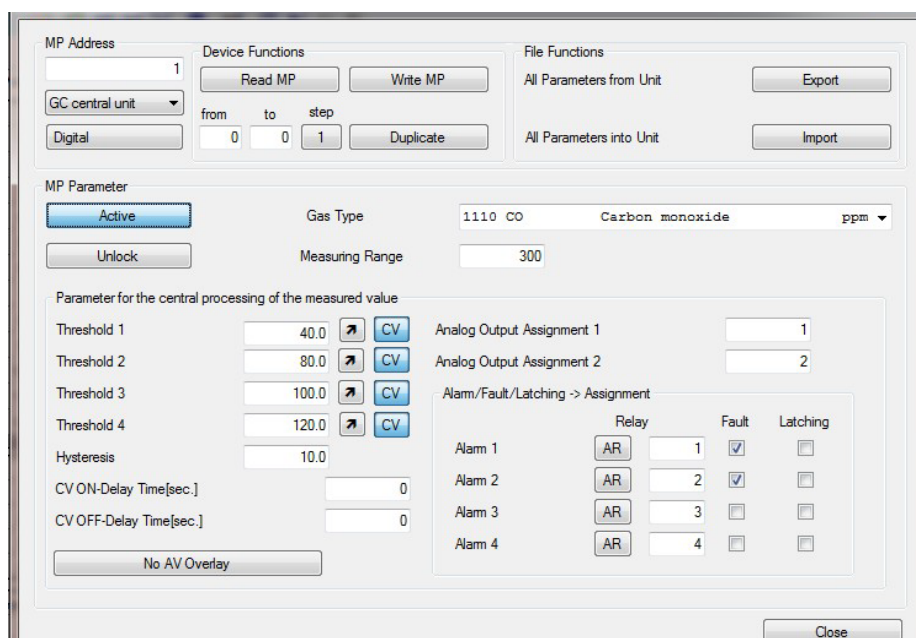
If an incorrectly structured file is selected, the transfer will not be admitted.

When the reading is finalized, you are prompted to save the file in the .csv format. If you cancel the storage process, all read data will be lost. For storing them in a file, they have to be read again!

At the end of the specified filename, the text, MP' is appended to make sure that the measuring point parameters are stored here.

6.2.1

MP parameters description



In the middle of the dialog are all input fields for setting the measuring point parameters:

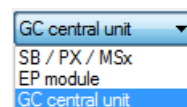
1. **Active or Inactive** indicates whether the measuring point should be activated (physically present).
2. **Unlock or Lock** indicates whether the measuring point should be (temporarily) blocked.
3. **Gas Type:** Here the gas type is assigned to the measuring point.
4. **Measuring Range:** Here the measuring range is assigned to the measuring point.
5. **Threshold 1 - Threshold 4:** Values of the alarm thresholds, each with its own function box for
 - Alarm release at in- or decreasing concentrations
 - Alarm release by current (CV) or average (AV) value.
6. **Hysteresis:** The measured value has to exceed or to fall below the alarm threshold by the hysteresis value, so that the alarm will be deleted.
7. **CV ON Delay Time** (sec): Switch-on delay for the release by the current value in seconds (not applicable for Heavy duty units, it is always 0)
8. **CV OFF Delay Time** (sec.): Switch-off delay for the release by the current value in seconds
9. **Average Value Overlay / No AV Overlay:** Average value overlay is only available for gas type CO.
10. **Analog Output:** Assignment of MP to one or two analog outputs
11. **Alarm / Fault / Latching**
 - Assignment of relay to alarm (Alarm Relays AR 1 - 32 or Signal Relays SR 1 - 96)
 - Setting of alarms in case of an error of the measuring point
 - Alarm latching when the gas concentration is again < alarm threshold (requires manual acknowledgment by the operator)

The information about the current operation is displayed at the very bottom of the status field.

6.3 Relay parameters

Same as for the measuring point parameters, all buttons and input fields for activation of a relay are located in the upper part of the dialog:

1. **Relay Address:** Address of the relay to be parameterized.
2. Selection field for the targetdevice from which the parameters have to be read.



Note: Parameters can only be written in the device directly connected to the PC tool.

3. **Button for Alarm Relay / Signal Relay**
(only GC central unit):
If Alarm Relay is set, you can set addresses from 1 to 32 for the alarm relays in Relay Address. If Signal Relay is set, you can set addresses from 1 to 96 for the signal relays in Relay Address.

In the middle of the upper half of the dialog there are two buttons:

1. **Read Relay:** Here you download the parameters of the corresponding relay from the controller into the dialog interface.
2. **Write Relay:** With this button you can write the final settings into the controller, with the parameters being stored under the specified relay address.

Same as for the measuring point parameters, there is also the Duplicate button and two input fields for start and end address. Here the relay settings from the start to the end address are transmitted into the controller.

With the Export button all relay parameters are read by the controller and you are prompted to save the data in a CSV file. If you cancel the storage, all read data will be lost. The transmission can be interrupted at any time the same way as for the measuring point parameters.

A previously selected file can be uploaded to the controller by means of the import button.

6.3.1 MP parameters description

Same as for the MP parameters, all input fields for setting parameters of a relay are located in the middle of the dialog:

1. **Used / Unused:**
Indicates whether the relay is physically available.
2. **Energized / De-energized:** Operating or quiescent current
3. **Static / Flashing:** Static or flashing mode
4. **Local / Remote:**
Control mode of the relay:
Own alarm evaluation (local) or override by the GC central unit (remote)
5. **Alarm Trigger Quantity:** The relay switches only when the number of active alarms has been reached. Only if all alarms are cleared, the relay switches off again.
6. **External relay, manual ON / OFF:**
BI(1-96) / DI(1-32) distinguishes between the digital inputs of Gas detection units and expansion modules.
a. Manual ON via DI: External ON function via digital input
b. Manual OFF via DI: External OFF function via digital input
7. **Delay On:** Delay time for switching-on in seconds
8. **Delay Off:** Delay time for switching-off in seconds
9. **Horn function:**
 - a. *Automatic Reset / Automatic Return:* The text of the time specification adapts depending on the selection.
 - b. *Time for automatic reset / Time for automatic return:* is specified in seconds.
 - c. *Reset via DI:* The horn is deactivated via the specified digital input DI.
(Distinction: DI = GC and EP modules, all other field modules = BI)
If no time is set (0) and no digital input selected (0), the horn functions are inactive.
10. **ON / OFF at Failure:** If ON is set, this relay will always switch together with the collective fault message.
11. **ON / OFF at Maintenance:** If ON is set, this relay will switch together with the maintenance message of the devices.

At the very bottom of the status field the information about the current operation is displayed.

6.4 System parameters

The values on the the upper left of the window can only be read.

1. **Serial number**
2. **Date of production**

In the left middle area are the input fields for the system parameters:

1. **Maintenance interval:** The service interval is entered during each maintenance in the field (current remaining days until maintenance).
2. **Average value overlay:** Averaging overlay in seconds and ppm
3. **Average value time:** Time base for averaging in seconds
4. **Power On Time:** Start delay of alarm evaluation after switching-on in seconds
5. **Error time in seconds:** Is currently not implemented.
6. **Activate failure via DI:** Activation of collective fault relays by external DI
7. **Analog outputs:** Button for opening an additional dialog for the analog outputs.

8. Here, a total of 16 available analog outputs can be configured.

The following values can be set per each analog output:

- a. Scaling range:

0	Analog output not active
1	Analog output active, but is overridden by the GC central unit (Setting is not available in GC controller as it and only it can control)
10-100	Analog output active The value indicates the factor how the measuring range is scaled to 4-20 mA, e.g. 100% requires 100% of the range scaled to 4-20mA 10% only requires 10% of the range scaled to 4-20mA

- b. Source for the values to be output: Current or average value.

- c. Definition, which signal of all assigned MP will be output:

Min.(= minimum gas signal); average (= average calculation); Max.(= maximum gas signal)

With a click on the OK button the settings for the analog inputs are accepted internally.

The settings are written later together with other system parameters.

6.4

System parameters (Continued)

9. **Relay Multiplication:** is opening an additional dialog for the relay multiplication. This feature is available only in the Danfoss controller.

With the relay multiplication table it is possible to assign additional relay functions to an alarm in the system. This corresponds to one reproduction of the source relay per entry.

The additional relay then follows the state of the source relay, but uses its own relay parameters to allow different needs of the doubled relay. The source relay can be configured e.g. as a safety function relay in de-energized mode whereas the doubled relay may be defined with flashing function or as horn function relay.

There is a maximum of 20 entries (Controller) and three entries (Premium units) for IN and OUT relays. It is possible on the one hand to multiply one relay to further relays or on the other hand to double max. 15 relays (Controller). In the column IN (source), the relay that has been assigned is set to an alarm in MP Parameters.

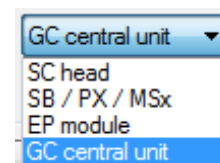
In the column OUT (target) the additionally required relay is entered.

	AR/SR	IN	AR/SR	OUT
1	AR		1 AR	4
2	SR		2 AR	5
3	SR		3 AR	6
4	AR		4 AR	8
5	SR		0 SR	0
6	SR		0 SR	0
7	SR		0 SR	0
8	SR		0 SR	0
9	SR		0 SR	0
10	SR		0 SR	0
11	SR		0 SR	0
12	SR		0 SR	0
13	SR		0 SR	0
14	SR		0 SR	0
15	SR		0 SR	0
16	SR		0 SR	0
17	SR		0 SR	0
18	SR		0 SR	0
19	SR		0 SR	0
20	SR		3 SR	0

Next in the dialog System Parameters:

At the right side is the control range with buttons:

1. **Address:** Just as with the two previous parameter dialogs the system dialog contains the control range of the addresses with the difference that system parameters can also be read from a sensor head.
2. Input field for the address the parameters should be read from.



Note: Parameters can only be written in the device directly connected to the PC tool.

Just as with the two previous parameter dialogs, there are two buttons "Read device" and "Write device". With these buttons the system parameters are read from the device into the dialog or written back into the device.

Unlike the other parameter dialogs, there is no *Duplicate* button, because the system parameters only exist once.

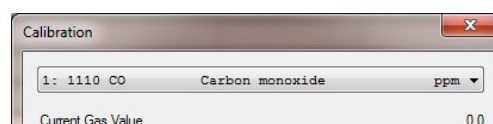
The System Parameters dialog also has two file buttons to save the settings into a file or to upload them from a file.

Unlike the other parameter dialogs, the system parameters are saved from the dialog interface into a CSV file and uploaded from the file into the dialog interface.

7 Calibration at the local bus



Attention:
The calibration function can only be used when the device is in special mode. Therefore, the menu item and the button for calibration are only active in special mode.



Using this dialog, the sensor heads can be recalibrated. The calibration is carried out via the local bus. Please connect the PC software via the COM port to the sensor board.

In the upper part of the dialog is a selection box where you can define the target head. Directly under it the current value of the set head is displayed.

In the middle of the dialog there are three register tabs: *Report*, *Zero* and *Gain*. Directly below that you can find the system tray with information on the calibration process. At the bottom right the close button which quit the dialog.

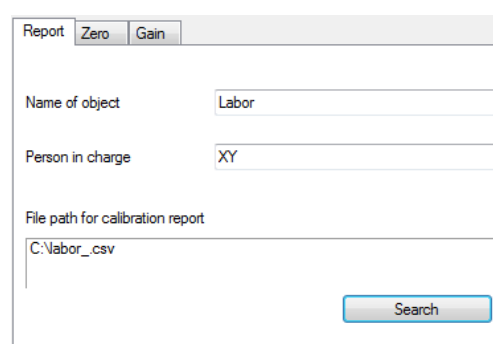
7.1 Register tab „Report“

The tab *Report* contains:

- **Name of object**
Here you can enter the name of the current object.
- **Person in charge**
Here you can enter the name of the responsible person.
- a box with the path to the location of the calibration report. The file path can be selected via the *Search* button.



Attention:
The entries in these fields are important for the calibration, as this information will appear in the calibration report. The software prevents you from switching to the calibration register tabs before the object information fields have not been completed.



7.2

Register tab „Zero“

The tab *Zero* contains:

- **First Zero Offset**
Here the first zero offset is displayed.
- **New Zero Offset**
Is displayed as soon as it is successfully calculated.
- Three buttons:
Step 1: *Display*
Step 2: *Calculate*
Step 3: *Save*

Prior to calibrating the zero point, you have to display the current values by clicking on the button **Step 1: Display**

If the values could be read successfully, the corresponding message is displayed in the system tray, and only then the button **Step 2: Calculate** is enabled. The current values for the display are permanently read, and the current status is always shown in the window. No need for pressing the button again.

When clicking on the button **Step 2: Calculate** the zero calibration switches into the calculation mode. The calculation of the new zero offset is permanently executed and displayed in the associated field. The values are therefore always updated.

When the calculation has been successfully completed, the current value in *Current gas value* drops to 0 and the button **Step 3: Save** is activated.

If you cancel the calibration now by closing the dialog box or by changing over to another tab, a message box will be activated asking if you want to quit this function without saving. With the Yes button you will definitely cancel the function, with the No button you will return to the current dialog.

If you cancel the function definitely or disconnect the device, the recalculated zero offset value is lost. After exiting the special mode, the last stored zero offset is used again.



Note:

For calibrating the zero point, you need zero gas or sample gas-free ambient air. The measured value must not exceed the 10% mark of the measuring range! Sensors with higher deviation can no longer be used.

In this case, the appropriate error message appears in the system tray and the button “Step 3: Save” is disabled.

Use the button “Step 3: Save” for saving the new zero offset which will be employed with immediate effect. This can also be seen with the display of all measuring points in the main window. The permanent calculation mode has finished now.

The display of the calibration has been successful!

Calibration calculation successful.

Calibration storage successful.

7.3

Register tab „Gain“

The tab *Gain* contains:

- Reference gas:
Currently not implemented, intended for the calibration with reference gas.
- **Test Gas Concentration**
Enter the concentration of the test gas here.
- **Sensor Sensitivity**
Is displayed in %.
- Three buttons:
Step 1: *Display*
Step 2: *Calculate*
Step 3: *Save*

Prior to calibrating the gain, you have to display the current values by clicking on the button **Step 1: Display**. If the values could be read successfully, the corresponding message will be displayed in the system tray, and only then the button **Step 2: Calculate** is enabled. The current values for the display are permanently read, and the current status is always shown in the window. No need for pressing the button again.

When clicking on the button **Step 2: Calculate** the gain calibration switches to the calculation mode. The calculation of the new gain is permanently executed and is based on the test gas concentration.

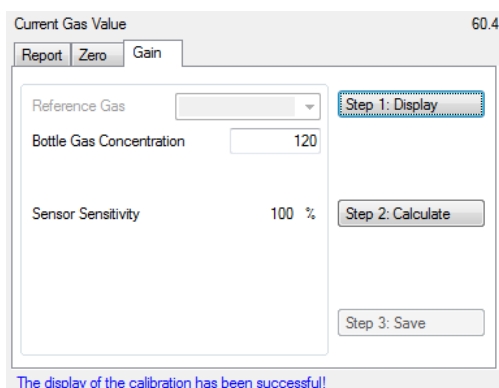
If the value of the entered test gas concentration is too high or too low, an error message will appear.

The current status for the calculation is displayed in the system tray beneath the tab.

When the calculation has been successful, the current sensor sensitivity is displayed, the actual value in *Current gas value* accepts the value of the test gas concentration and the button **Step 3: Save** is enabled.

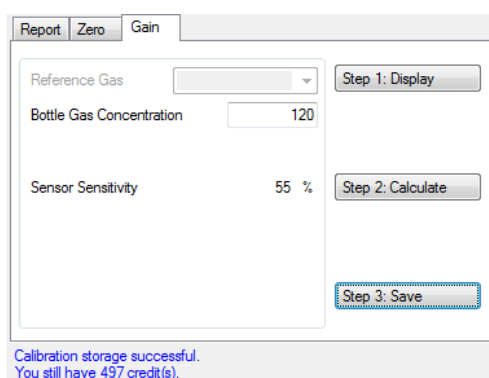
If you cancel the calibration now by closing the dialog box or by changing over to another tab, a message box will be activated asking if you want to quit this function without saving. With the Yes button you will definitely cancel the function, with the No button you will return to the current dialog.

If you cancel the function definitely or disconnect the device, the recalculated gain factor is lost. After exiting the special mode, the last stored gain factor is used again.



The gas concentration must be between 30% and 90% of the measuring range!

Sensor stabilisation time running...



7.3
Register tab „Gain“ (Continued)

If the gain calibration was not successful, there might be several reasons:

- If the sensor sensitivity is below 30%, the calibration of the gain is cancelled. The sensor is either too old and you can no longer calibrate its gain, or there is no calibration gas present on the sensor. Storage is not allowed in this case, therefore, the buttons are disabled.

Sensor Sensitivity 24 %

Step 2: Calculate

Step 3: Save

Check gas or replace sensor!

- If the sensor sensitivity is higher than 30%, but lower than 40%, the gain is calibrated, but it is noted that the sensor is defective; furthermore, you should check if calibration gas is present on the sensor.

Sensor Sensitivity 33 %

Step 2: Calculate

Step 3: Save

Attention: Sensor sensibility below 40%

- The calibration of gain is not possible with the following error messages either.

Gas value instable.

Current value too low!
Check gas or replace sensor!

Current value too high!
Check gas or replace sensor!

Use the button **Step 3: Save** for saving the new gain factor which will be employed with immediate effect. This can also be seen with the display of all measuring points in the main window. The permanent calculation mode has finished now.

Report Zero Gain

Reference Gas

Bottle Gas Concentration 120

Sensor Sensitivity 55 %

Step 1: Display

Step 2: Calculate

Step 3: Save

Calibration storage successful.
You still have 497 credit(s).

7.4 Zero-point calibration of the analog output

The tab AO contains:

- **Board AOs**
Here you can set whether the analog output of the connected device should be calibrated. If the box is not ticked, the device, in which the AO should be calibrated, will be set via the selection field of the measurement points.
- **AO1 and AO2:**
Depending on the connected device type there is either only the AO1 or additionally the AO2.
- **AO Offset from device**
Here the current offset of the analog output is displayed.
- **AO Offset to device**
Here the new offset is set in the range of 160 to 700 (AD converter value)
- Three buttons:
Step 1: *Display*
Step 2: *Calculate*
Step 3: *Save*

Prior to calibrating the AO zero-point, you must display the current values by clicking on the button **Step 1: Display**. If the values could be read successfully, the corresponding message will be displayed in the system tray, and only then the button **Step 2: Calculate** will be enabled. The current values for the display are permanently read, and the current status is always shown in the window. No need for pressing the button again.

When clicking on the button **Step 2: Calculate** the AO zero-point calibration switches to the calculation mode. The calculation of the new signal zero offset is permanently executed and displayed in the corresponding box. The values are therefore always updated.

When the calculation has been successful, the actual value is not added to it and the button **Step 3: Save** is enabled.

If you cancel the calibration now by closing the dialog box or by changing over to another tab, a message box will be activated asking if you want to quit this function without saving. With the Yes button you will definitely cancel the function, with the No button you will return to the current dialog.

If you cancel the function definitely or disconnect the device, the recalculated zero offset is lost. After exiting the special mode, the last stored zero offset is used again.



Note:

To calibrate the analog output zero, you need an amperimeter to change it until the value corresponds to the desired zero.

If the calculation was not successful, the corresponding error message appears in the system tray and the button **Step 3: Save** is disabled.

With the **Step 3: Save** button the new zero offset is stored and will be used immediately.

7.5

Register tab "Burn" (self-cleaning by burning)

This tab *Burn* is for starting the process of heating a pellistor sensor up for self-cleaning.

- The **Start** button sets the command for burning free.
- The **Cancel** button interrupts the burning process.

The buttons are only enabled for Pellistor sensors. The function is for heating catalytic bead sensors (pellistors) up to a higher temperature for a certain time in order to remove any residues on the heating wire.

It is used if the sensors show too low sensitivity on some or all combustible gases due to dirt on the filament.

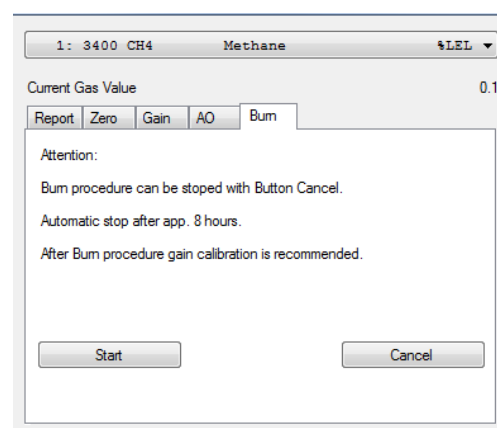
Before starting the burn-off, a combustible test gas - the best would be hydrogen - has to be applied to the pellistor with a calibration cap in order to intensify the combustion.



Note:

The burning cannot improve or undo the natural aging!

The operation can be stopped with **Cancel** at any time.



8 Operating data



Note:
The operating data can only be exchanged with the device if the device is in the special mode. Therefore, the operating data buttons are only enabled in the special mode.

- **Read Unit** and **Write file**. The function for storing the file is not yet implemented.

The information area concerning the device is located to the right of the address field.

- **Serial number**
- **Date of production**

At the top left of the dialog there is the address activation area. It contains the following entry options:

- Selection box Device Type: Device type the operating data are read from.
- Selection box Address: Address the operating data are read from.

Just as for the Parameters you can read out the operating data across hierarchical levels.

Grey fields are not valid for the read-out device.

The large operating data area is divided into several sections.

SC area

Here only the operating data of a head are displayed.

- Concentration counter

MP x

Here the operating data are displayed based on a measuring point.

- Number of calibrations
- Zero offset: current zero offset.
- Gain: current gain
- Sensitivity: compared to new condition
- Maintenance days at calibration
- Last calibration day: operating day at the last calibration.

- Days left until maintenance: Number of days remaining until the next maintenance
- Max CV: Maximum current value

All other fields are displayed along with each device:

- Last Tool PID: Marking of the tool the last calibration was performed with.
- Min. temperature
- Max. temperature
- Last tool serial number
- AO offset x
- Operating days

The Close button closes the window.

9 History of the data logger

Options:

In the upper half, you can manage all settings for the measured value control of all measuring points:

- If only the current value or the average value, or both are monitored.
- If **Periodic Record** is active, monitoring is continuously performed at certain time intervals.
- If **Each Poll** is active, storage is performed with each measurement cycle.



Note:

This setting is not recommended for extended periods of time, since the data transfer between the devices is very fast and the PC cannot keep up the speed.

- **Poll rate in sec.** represents the time interval in which the data are written. As the PC timer is not synchronized with the timer of the device, there may be minimal time delays when recording.
- If **Periodic Record** is not active, the values are written by the data logger only if the measured value changes by the **Difference value**.

In the bottom half, the path is indicated where the audit records are stored automatically.

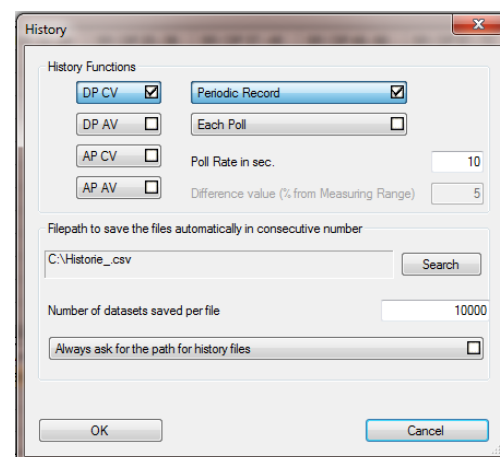
Separate files for digital measurement points (DP) and analog measurement points (AP) are started. The corresponding files are marked by the abbreviation DP or AP in the filename.

A consecutive number is automatically added to the specified name of the file, so that the file is not overwritten. If there are already files with the same name in the specified directory, the numbers will continue.

E.g.

- If the files 1, 2 and 3 are in the directory, the PC tool software will start saving the file with number 4.
- If the files 1, 3, and 6 are in the directory, the file 2 will be written first, then 4, then 5, 7, 8, 9, etc., so that the gaps are filled! This has the disadvantage that it will not be represented in chronological order (e.g. with Excel Diagram).

Each automatically saved file contains as many records as indicated in the field **Number of datasets saved per file**.



If **Always ask for the path of history files** is active, a file storing dialog will appear when starting the history, in order to control the path right from the start.



Note:

Each dataset is directly written into the file. Therefore, the file must not be opened during the ongoing operation of history!

The user must have access rights for the specified path, otherwise the file will not be written.

The imported data are stored with the OK button.

This function of the PC tool allows you to record and monitor the measured values of all connected digital and analog measurement points.



Note:

Missing or incorrect settings will have a serious impact on the monitoring!

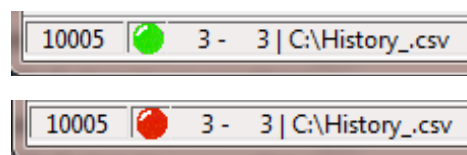
9 History of the data logger (Continued)

Start:

This menu item or button starts the history.

The following information appears at the very bottom of the main window in the status bar.

- A green LED changing to red from time to time. The green LED indicates that history is enabled. If the LED changes to red, a record is just being written into the file.
- Two numbers separated by a minus. The first number represents the number of records in the current file with digital measuring points (DP). The second number represents the number of records in the current file with analog measuring points (AP).
- The specified path where the files are stored.



Attention:

If the LED flashes green-red, but the numbers remain at 0, the software tries to write the history files, but fails. In this case, please check access rights to the path or run the PC tool as an administrator.

Pause:

This menu item or button interrupts the recording. It is useful if you want to view the file in between. If you resume the recording with the start button, the current file will continue to be written.



Attention:

If the file was opened, please pay attention to closing the file before restarting.

Stop:

This menu item or button stops the recording. A new file is started after restarting.

Structure of Files:

Regardless of whether only digital or only analog measuring points or both are recorded, the files are of an identical structure.

- The first column contains the date and time with hours, minutes and seconds.
- The second column indicates the measurement values as current and / or average values.
- From the third column on, the measured values are displayed. 96 entries for digital measuring points and 32 entries for the analog measured values.

The measured values are displayed according to the measuring range. If the system contains mixed measurement points, the scaling of the measured values may be different according to the measuring range.

A minus instead of the measured value means that the measurement points are not activated.

If there is an error at a measuring point, it is shown in form of a hexadecimal error code. E.g.: 0x8100 → Underrange

A	B	C	D	E	F	G	H
17.02.2016 16:22	CV	69.6	-	-	-	-	-
17.02.2016 16:23	CV	69.6	-	-	-	-	-
17.02.2016 16:23	CV	69.6	-	-	-	-	-
17.02.2016 16:23	CV	69.7	-	-	-	-	-
17.02.2016 16:23	CV	69.5	-	-	-	-	-
17.02.2016 16:23	CV	69.7	-	-	-	-	-
17.02.2016 16:23	CV	69.6	-	-	-	-	-
17.02.2016 16:23	CV	69.5	-	-	-	-	-
17.02.2016 16:23	CV	69.6	-	-	-	-	-

17/02/2016 16:28:38	CV	37.6	0.8	0x8100	0x8100	63.7	-	-	-
17/02/2016 16:28:43	CV	37.4	0.3	0x8100	0x8100	63.5	-	-	-
17/02/2016 16:28:48	CV	37.7	1.1	0x8100	0x8100	63.6	-	-	-
17/02/2016 16:28:54	CV	37.6	0.8	0x8100	0x8100	63.6	-	-	-
17/02/2016 16:28:59	CV	37.5	0.6	0x8100	0x8100	63.6	-	-	-
17/02/2016 16:29:04	CV	37.8	1.3	0x8100	0x8100	63.7	-	-	-

**10
Notes and general
information**

It is important to read this user manual thoroughly and clearly in order to understand the information and instructions. The Danfoss Gas Detection units must be used within product specification capabilities. The appropriate operating and maintenance instructions and recommendations must be followed.

Due to on-going product development, Danfoss reserves the right to change specifications without notice. The information contained herein is based upon data considered to be accurate. However, no guarantee is expressed or implied regarding the accuracy of this data.

Installers' Responsibilities

It is the installer's responsibility to ensure that all Danfoss Gas Detection units are installed in compliance with all national and local codes and OSHA requirements. Installation should be implemented only by technicians familiar with proper installation techniques and with codes, standards and proper safety procedures for control installations and the latest edition of the National Electrical Code (ANSI/NFPA70). It is also essential to follow strictly all instructions as provided in the installation guides.

Maintenance

It is recommended to check the Danfoss Gas Detection units regularly. Due to regular maintenance any performance deviations may easily be corrected. Re-calibration and part replacement in the field may be implemented by a qualified technician and with the appropriate tools.

