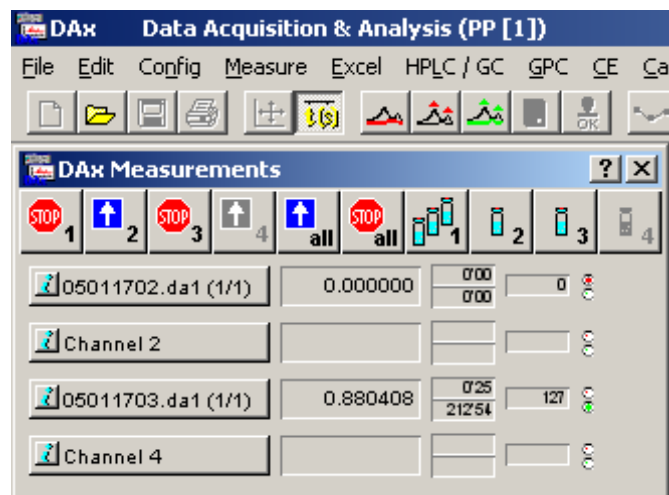


DAX

Data Acquisition Software

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Measurement Window User's Manual



www.dax.nl

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Chapter 1. Introduction

The DAX Measurement window is the part of DAX that acquires voltages from a data acquisition board or system.

There are several drivers available, each for a certain type of data acquisition hardware.

The measurement window displays the acquired voltages, information on timing and number of points measured, and the trigger status of all channels.

Chapter 1.1 Terminology

For a complete understanding of this manual a number of terms need to be explained.

Chapter 1.1.1 Triggering

Triggering is used to be able to start a measurement at exactly the right moment.

Many data acquisition boards allow the use of a TTL compatible switch¹ to start a channel measuring. These switches are called **trigger sources**. Typically the board will use one of three possible changes in the state of the TTL. These changes are: go high (TTL switches from low state to high state), go low, and either edge. Changes are called **events**.

Triggering is achieved by attaching a switch to the injection port of a separation system. When the injection is performed the switch changes state, and the measurement is started (triggered).

If an autosampler is used, stop triggers can be used to indicate the end of a measurement. Alternatively, a time-out can be used to stop a measurement and start waiting for the next start trigger.

¹ A TTL compatible switch has a low and a high state. By definition the low state has a voltage smaller than 0.6 Volts, and a high state greater than 4.2 Volts.

Chapter 1.1.2 GLP

GLP stands for Good Laboratory Practise, a system of rules and regulations intended to formalise the way in which measurements are performed in a laboratory.

Unless otherwise indicated using the **File | Customise > GLP** menu option, DAX will not overwrite an existing data file with a new data file.

DAX will also always save a measurement as soon as it stops.

Finally, measurement data are saved every five minutes to prevent data loss due to power outages².

Chapter 1.1.3 Enslavement

DAX has the option of enslaving channels to other channels. Enslaved channels share certain attributes with their owner channels.

- **basic enslavement:** the enslaved channel is always started and stopped along with the owner channel. It shares the same **sequence set-up**. Refer to chapter 6 for information on starting and stopping channels, and to chapter 8 for details on sequence set-ups.
- **frequency enslavement:** in addition to basic enslavement the enslaved channel shares the same measurement frequency with the owner channel.
- **trigger enslavement:** in addition to basic enslavement the enslaved channel shares its triggers with the owner channel.

Enslavement will typically be used for multi-detector measurements.

Refer to chapter 7 for details on how to enslave channels.

² The automatic save period can also be adjusted using the **File | Customise > Measurement Window** menu option.

Chapter 1.1.4 Sequences

DAX can perform sequences of measurements unattended. In the **sequence set-up** a number of measurements are defined that will be performed consecutively. Each measurement has:

- a repeat count defining the number of times this measurement will be repeated
- a file name where the data will be stored. The data are always stored in a file. A default filename may be generated by DAX (refer to chapter 1.1.5 for details)
- two measurement description lines

Since for sequences of measurements that run unattended there is no user to start and stop individual measurements, triggers need to be defined to start measurements. To stop individual measurements either a *stop trigger* or a *time-out period* needs to be defined. Refer to chapter 7 for details on how to set up a measurement with start and stop triggers, and time-out periods.

Refer to chapter 8 for a detailed discussion of sequence set-ups.

Chapter 1.1.5 Default filenames

DAX has extensive sequencing capability³, which lets you measure large numbers of measurements automatically. In order not to have to enter filenames for each of these measurements DAX offers the possibility of using **default filenames**. These default filenames are generated as follows:

³ For full details on sequences refer to chapter 8.

For the file **name**:

- 6 alphanumerical characters denote the year, month, and day⁴
- 2 numerical characters denote the index of the file. The first 99 files are numbered 01 .. 99, the next 10 are numbered a0 .. a9, the next 26 aa .. az, and so on.

For the file **extension**:

- extensions start with **.d** for DAX format files, or **.w** for WinVolt files.
- Older versions of DAX saved the data from each channel in a separate file. 1 alphanumerical character denoted the enslavement order. The first channel in a group of enslaved channels got an **a**, the second a **b**, etc. If channel 2 was measuring as a slave of channel 1, it got a **b**. If it was not a slave, it got an **a**.
Current versions of DAX save all channels in a single file, with an **a** as the second character of the file extension.
- 1 numerical character denotes the repeat index, **1** through **9**

An example filename is **960404a5.da2**. This file is measured on April 4, and is the 105th file measured that day. This is the second repeat of this measurement.

In addition to these filenames, the file needs a location. That is what the **File | Customise > Measurement data directory** menu option is used for. Entering a directory here will cause all subsequent measurements with default path & filename to be written to that directory.

Refer to chapter 4.3 for details on the **File | Customise > Measurement data directory** menu option.

It is also possible to use a default filename, but a specific path. This is set up in the sequence setup for each channel. Refer to chapter 8 for details.

⁴ It is possible to indicate the channel in the first character of the filename. Refer to chapter 4.3 for details.

Chapter 2. Installation

Chapter 2.1 Installing the Software

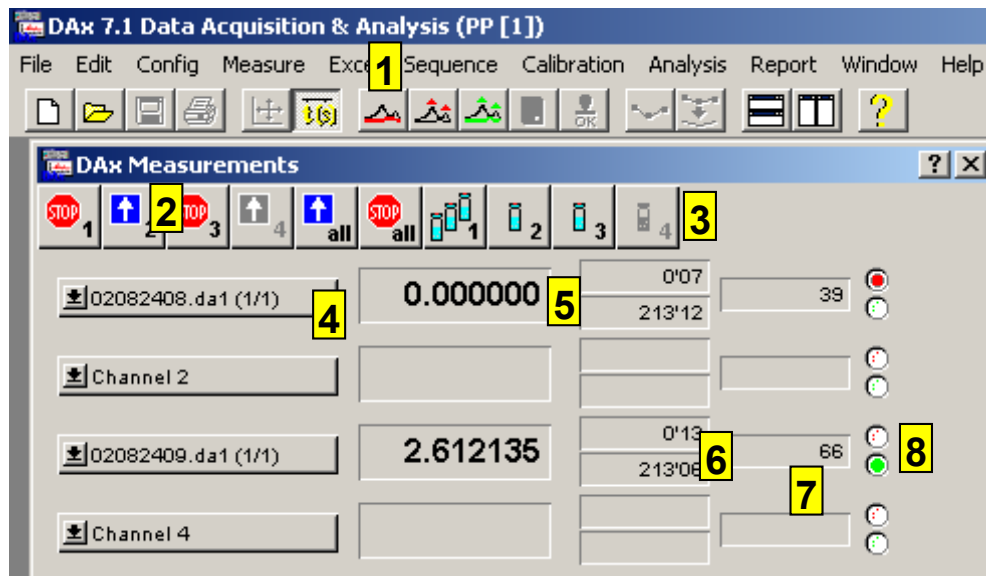
Refer to the DAX manual for installation instructions. The first time DAX is run, a dialog box is displayed to select the data acquisition hardware being used. The menu option **File | Customise > StartUp and Measurement Driver Options** can also be used to make this selection.

Chapter 2.2 Installing the Hardware

1. To prevent damage to either the data acquisition board or the computer hardware, installations should be performed only by trained personnel.
2. Carefully follow the instructions that came with the data acquisition board on how to install the board into the PC.

Chapter 3. The Measurement Window

The Measurement window can appear in two possible forms, as selected in the **File | Customise > Measurement Window** menu option. The most common form is displayed below. This form is called *Big Display* or *Small Display* in the Customisation menu. The other possible form is *Toolbar Display*.



1. The menu bar options are explained in chapters 4, 5, and 6.
2. The left side of the button bar has buttons that start and stop measurements. Channel start buttons turn into stop buttons as soon as a measurement starts.
3. The right side of the button bar has buttons that invoke **sequence setup dialog boxes**. These are discussed in detail in chapter 8.
4. Measurement **data tag** displaying channel name, current file name, or ordinate name. Use the **File | Customise** menu option to determine which will be displayed. Click on the data tag to invoke the data tag menu, see to chapter 3.1 for details.
5. Most recently measured voltage or ordinate value. Use the **Config | Hardware Setup** option (chapter 5.4) or the **File | Customise > Measurement Window** option (chapter 4.1) to set the number of decimal places used. Use the **File | Customise > Measurement Window** menu option to switch between displaying *Volts* or *Detector Units*.
6. Elapsed measurement time (top) and maximum remaining time (bottom) are displayed here.

Maximum measurement time is determined by two factors. Firstly by the measurement frequency, as entered using the **Config | Config acquisition** menu option.

Secondly by the maximum number of points that DAX can measure.
7. The number of points that has been measured is displayed here.

8. Traffic lights.

Each channel can have one of three statuses:



Idle.

Waiting. (*Red light is on*) A measurement has been started for the channel, but is still waiting for the start trigger. Triggers are events that are used to start or stop measurements. Typically, a trigger is associated with some sort of switch.



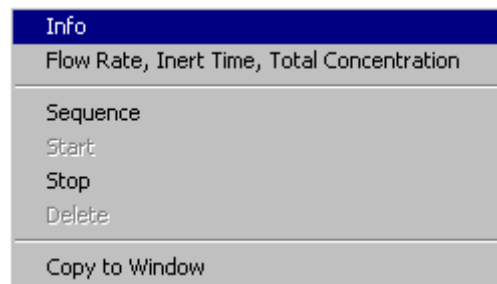
Running. (*Green light is on*) A measurement is being performed for the channel.

The traffic lights also serve as input devices. Click on the green light when a channel is waiting for a trigger to start the channel (the “trigger is simulated” by clicking on the traffic light).

Click on the red light to “simulate a stop trigger” when a channel is running. The difference between simulating a stop trigger and clicking the **stop** button is that the stop trigger only stops the current measurement, whereas the stop button stops the entire sequence of measurements.

Chapter 3.1 Measurement Data Tag menu

This popup menu is invoked when the user clicks on the data tag.



1. The **Flow rate, Inert time, Total concentration** menu option will display a dialog box, see chapter 3.2.
2. The **Sequence** menu option displays the sequence list dialog box for the channel. This dialog box may then be used to enter a measurement sequence.
3. Use the **Copy to Window** menu option to send a static copy of the data set to a window. Even if the measurement is running, the window will receive no further points.

Copying a data set can also be achieved by pressing the **Ctrl key** and dragging the data tag to a Data Set Graphics window or to the DAX client area (to create a new window).

Chapter 3.2 The Flow Rate, Inert Time and Total Concentration Dialog Box

This dialog box is displayed when the **Flow Rate, Inert Time, Total Concentration** item in a measurement data tag menu is invoked. The dialog box is used to enter a **flow rate**. The flow rate is used to calculate elution volumes (in chromatography) as elution volume = time coordinate * flow rate. All flow rates for a set of enslaved channels (chapter 1.1.3) are always the same (because the data sets are all thought to pertain to the same separation column).

The screenshot shows the 'Flow Rate' dialog box with the following fields and values:

- File: \\buffy\le\daxsnp2\02082401.dal
- File Date/Time: 00/00/2000 00:00:00
- Operator: PP
- Generic (dropdown menu)
- Measured: 24/08/2002 15:18:05
- Measurement (button)
- Timing section:
 - Freq (Hz): 10
 - Offset (s): 0.10
 - Inert (s): 0.00
- Unit section:
 - Name: Volt (V)
 - Offset: 0
 - Factor: 1
- Flow Rate (ml/min): 60
- Total Concentration: 0
- Dilution: 0
- Buttons: OK, Cancel, Help

If the flow rate is changed any graphics windows with Volume Axes will be re-plotted. Since Molecular Weights are calculated from volume data as well, any graphics windows with Molecular Weight Axes will also be re-plotted.

The dialog box is also used to enter **inert times** (i.e. retention times of inert components, used to calculate capacity factors).

The dialog box can be used to enter a **total concentration** for the sample. The total concentration is used to calculate (relative) concentrations.

Finally, the **dilution** of the sample can be set in this dialog box. Refer to the DAX User's manual for details on how dilutions are used.

If the channel for which new settings are entered is part of a group of enslaved channels all channels will have these settings updated (because the data sets are all thought to pertain to the same sample and chromatographic separation column).

Chapter 4. The Measurement Window

File Menu

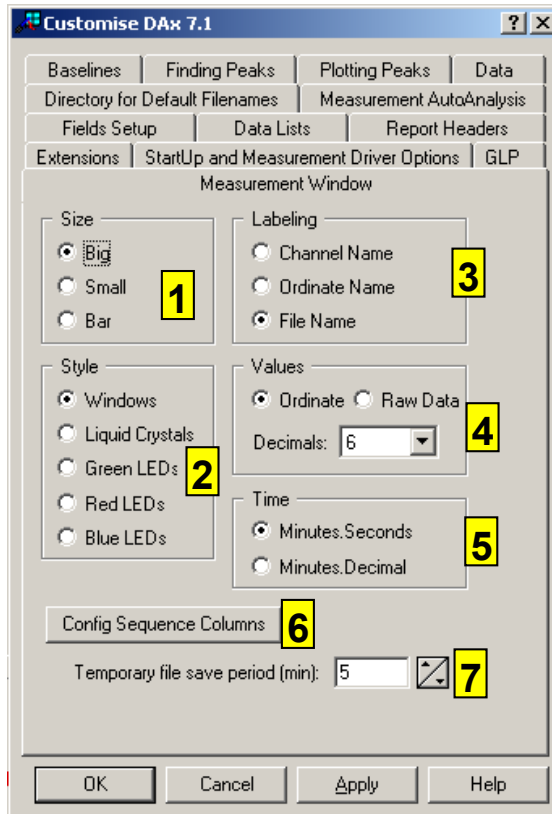
When the DAX Measurement window is active (highlighted), the DAX menu changes to the Measurement window menu.

The Measurement window File menu has the following menu options.

- **Open.** Use the Open command to load previously saved measurements. DAX can load various file formats. The measurements will be displayed in a graphics window.
- **Printer setup.** This menu lets you select a printer, and set it up. This is useful when measurements are being automatically analysed and printed.
- **Customise.** This command lets you customise a large number of aspects of DAX.
 - Appearance of the measurement window. Refer to the next section.
 - Extra Input fields. Refer to chapter 4.2.
 - **Default File Directory.** The **File | Customise > Directory for Default Files** command asks for a directory in which measurements that have had no explicit filename entered will be stored. Cf. chapter 4.3.
- **Exit.** This command quits **DAX**.

Chapter 4.1 Customising the Measurement Window's Appearance

Invoking the **File | Customise** menu option, and selecting **Measurement Window** displays the following dialog box.



Refer to chapters 4.1.1 through 4.1.7 for details.

Chapter 4.1.1 Display Size

The Measurement window can appear in two basic forms. The first form is the one that was discussed in chapter 3. It can have two sizes, big or small.

The Measurement window can also be displayed as a vertical button bar. In this case, none of the other Customisation options have any effect.

Chapter 4.1.2 LED/LCD Style

The most recently measured voltage, elapsed and remaining measurement time, and the number of points that have been measured are displayed as LED/LCD style numbers. You may choose one of five styles:

- Windows windows
- Liquid Crystals
- Green Diodes
- Red Diodes
- Blue Diodes

The **Windows windows** style displays a classic style of windows.

Chapter 4.1.3 Channel Name Style

Either the channel name or the ordinate name for each channel can be displayed. Both of these are entered using the **Config | Hardware setup** menu option.

Additionally, there is the option of displaying the current filename for channels that are currently measuring (*waiting* or *measuring* as opposed to *idle*).

Chapter 4.1.4 Measurement Display Style

The most recent measurement that has been performed for a channel can be displayed in one of two forms: as a raw value (most often a voltage), or as an ordinate value. If you choose to display measurement values as ordinate values DAX uses the offset and conversion factors that you have entered under the **Config | Hardware setup** menu option.

The most recent measurement for a channel can be displayed with from one to six decimal places. The Measurement window will become smaller if fewer decimals are used.

Chapter 4.1.5 Time Style

The elapsed and remaining measurement times can be displayed either as minutes.seconds or as minutes.decimal minutes.

Chapter 4.1.6 Sequence List Column Customisation

You can hide one or more columns from sequence lists (cf. chapter 8). Use this option with caution.

Chapter 4.1.7 Setting the temporary save period

Running measurements will be saved at the interval specified here.

Chapter 4.2 Customising Extra Input Fields

The **File | Customise > Fields Setup** menu option invokes a dialog box that is used to set the number of extra input fields that will be used, as well as their names. Values for the extra fields are entered in the sequence list (chapter 8).

Chapter 4.3 Measurement data directory

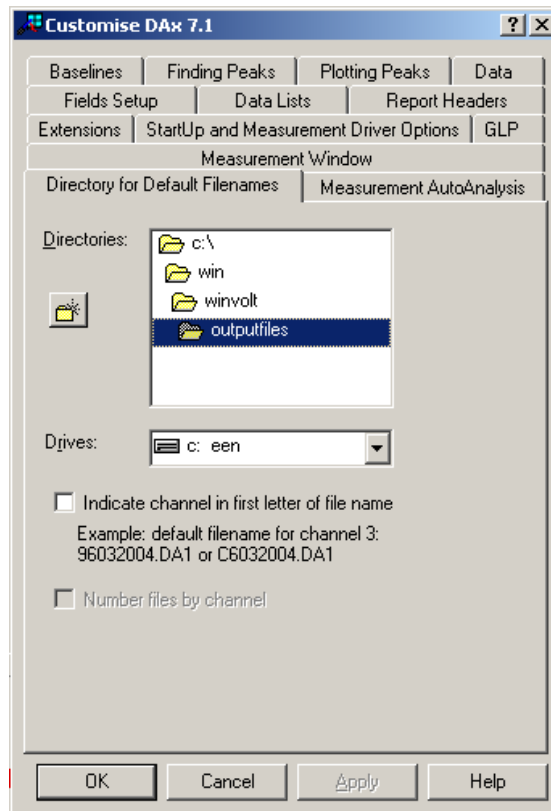
DAX has extensive sequencing capability⁵, which lets you measure large numbers of measurements automatically. In order not to have to enter filenames for each of these measurements DAX offers the possibility of using *default filenames*. For information on how these filenames are generated, refer to chapter 1.1.5.

In addition to filenames, the file needs a location. That is what the **File | Customise > Measurement data directory** menu option is used for. Entering a directory here will cause all subsequent measurements with default path & filename to be written to that directory.⁶

⁵ For full details on sequences refer to chapter 8.

⁶ It is also possible to use a default filename with a specified path. This allows you to store all measurements of a certain type in the same folder. Use the sequence setup dialog box to do this.

The option displays a dialog box:



Use the mouse or cursor and tab keys to set the drive and directory that should be used to store default filename files, then press the **Enter** key or click **OK** to confirm your selection.

The two check boxes at the bottom have the following meaning:

- the measurement channel can be indicated in the first letter of default file names. For instance, data measured on the second channel will get filenames starting with **b**. If this option is used, the measurement year will only be indicated with a single character.
- the first data set that is measured on a new day is numbered 00. Data sets can be numbered overall, or per channel. This option can only be used if the **Indicate channel in first letter of filename** option is also used.

Chapter 5. The Config Menu

The **Config** menu contains options that let you configure various aspects of measurements. Most important are the measurement set-up, which is discussed in chapter 7, and sequence set-up, which is discussed in chapter 8.

The other config options deal with the data acquisition board and dynamic data exchange. These are discussed below.

Chapter 5.1 Config | Acquisition menu option

This option is used to set up a measurement and analysis. Refer to chapter 7 for a full discussion of the option.

Chapter 5.2 Config | Sequences menu options

These options invoke the sequence set-up dialog boxes. Refer to chapter 8 for full details on these dialog boxes.

Chapter 5.3 Config | Frequency menu option

DAX allows a frequency to be selected for each individual channel. Some data acquisition boards require that before the frequency is set for an individual channel, a master frequency is selected. The **Config | Frequency** menu option is used to do this. Use the **Config | Acquisition** menu option to set frequencies for individual channels.

If the menu option **Config | Frequency** is not present, the data acquisition board being used does not require a master frequency selection.

Chapter 5.4 Config | Hardware setup menu option

This option is used to enter data on the signals (or *detectors*) that are being measured with the data acquisition board.

In addition to the names of the channels, trigger *sources* and trigger *events*, you can set up a conversion from the voltage that is measured, to *detector units*.

The following formula is used:

$$\text{detector units} = \text{factor} * (\text{offset} + \text{voltage})$$

Chapter 5.5 Config | Reset board menu option

This menu option initialises the data acquisition hardware. This option is not normally needed.

Chapter 5.6 Config | Setup DDE menu option

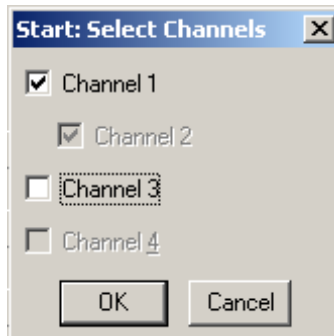
This menu option invokes a dialog box that lets you set the **update period** for the dynamic data exchange conversations DAX can have, for instance with Excel. Newly measured points are sent to these applications once in every update period.

Chapter 6. The Measure Menu

The measurement menu has options that start and stop channels measuring, and an option that displays measurement statistics for channels.

Chapter 6.1 Measure | Start .. menu option

This option invokes a dialog that you can use to indicate which channels should start measuring. These channels will have their status changed from *idle* to either *waiting*⁷ or *running*.



1. The check mark in front of a channel name will make this channel start as soon as the OK button is clicked
2. Channel 2 has been enslaved to channel 1, so it will always share its check mark with channel 1 (it cannot be started separately). Refer to chapter 7 for information on setting up a channel as enslaved.
3. Channel 3 does not have a check mark, so it will not be started if the OK button is clicked.
4. Channel 4 cannot be started, because it is already measuring or is not available.

Press the enter key or click the OK button to start the checked measurements.

⁷ if a start trigger has been defined for the channel. Refer to chapter 7 for information on how to set up channels with a start trigger.

Chapter 6.2 Measure | Start 1, Start 2, Start 3, Start 4, Start All menu options

These options start the indicated channel, or all channels that can be started. The effect is identical to pressing one of the **start buttons** in the button bar.



The buttons and the menu options are not always enabled. There are four possible reasons why they may be greyed:

- the channel is measuring (in the case of the button bar the button will change to a stop button)
- the channel is enslaved to an earlier channel. In this case the channel will start (and stop) along with its owner channel. Refer to chapter 7 for details on how to enslave channels.
- the current frequency set-up does not allow for the channel to be used. Use the **Config | Frequency** menu option to set up the frequency.
- the channel is set up to run a sequence, but no sequence has been defined.



Chapter 6.3 Measure | Stop .. menu option

This option invokes a dialog that you can use to indicate which channels should stop measuring. These channels will have their status changed from either *waiting* or *running* to *stopped*.

Chapter 6.4 Measure | Stop 1, Stop 2, Stop 3, Stop 4, Stop All menu options

These options stop the indicated channel, or all channels that are currently measuring. The effect is identical to pressing one of the **stop buttons** in the button bar.



The buttons and the menu options are enabled only if the channel is measuring data.

Pressing one of the stop buttons or using one of the **Measure | Stop** menu options is not considered a normal measurement termination. Depending on the **File | Customise > GLP** settings, DAX will either still save the measurement, or prompt the user to decide if the measurements that are being stopped should be saved.

When a channel is stopped in the middle of a sequence of measurements, DAX asks if you want to run a priority measurement. If so

- the channel is set to run a single measurement
- the sequence will be marked so that when it is next started, it starts with the measurement that was interrupted

Chapter 6.5 Measure | Statistics

This menu option may be used to keep track of how many measurements have been performed by a channel, and how many minutes the channel has measured.

The menu option displays a dialog box which displays statistics. The dialog box has **Reset** buttons, which can be used to start counting measurements and minutes from zero.

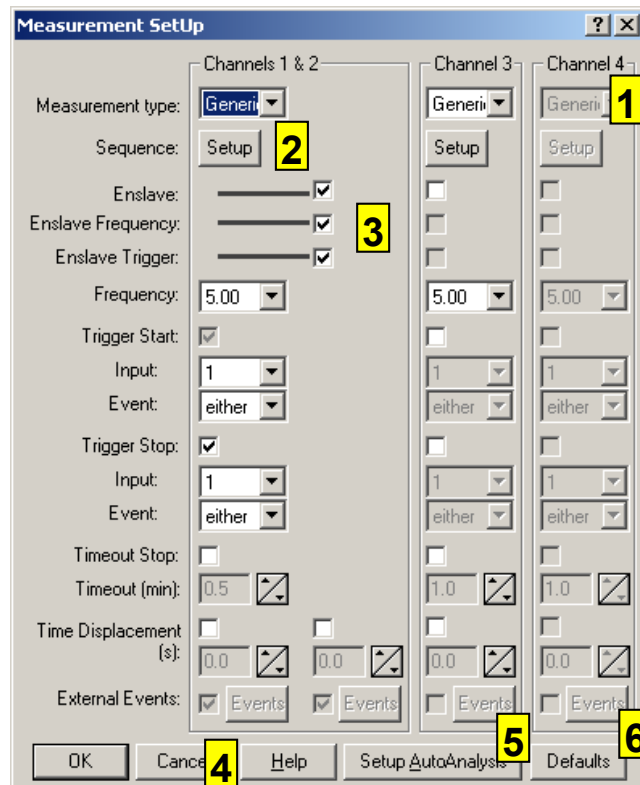
The user can set boundary values in the dialog box for numbers of measurements and measurement minutes. When a channel approaches the boundary values, a warning is given. This option could be used to determine when maintenance is needed. A boundary value of 0 means that no warnings will be given.

Chapter 7. Setting up a Measurement

The **Config | Acquisition** menu option is used to set up how each channel should perform measurements. The option invokes a dialog box that allows for configuration of the following.

- **sequence set-ups.** Refer to chapter 8 for full details on sequence set-ups.
- **enslavement.** A channel can be enslaved (attached, connected) to an owner channel. This will cause certain aspects of the measurement set-up for the enslaved channel to be derived from the owner channel. Refer to chapter 1.1.3 for more information.
- **frequency.** This determines how many points will be measured for the channel per second. This also indirectly determines the maximum measurement time for the channel, since a limited number of points (normally 64000) can be measured.
- **start trigger.** If a sequence of measurements is going to be performed for the channel (unattended by the user) a start trigger is required. Refer to chapter 1.1.1 for details on triggering.
- **stop trigger.**
- **time-out period.** If a sequence of measurements is going to be performed for the channel (unattended by the user) either a stop trigger or a time-out period is required for the channel. Refer to chapter 1.1.1 for details on triggering. Refer to chapter 7.1 for details on how to set up a sequence for use with an autosampler.
- **time displacement.** Enter a time displacement to shift the time coordinates of the points measured for the channel. The time displacement value will be *subtracted* from the time coordinates when the measurements take place. This feature is useful if there is some dead volume between a separation column and a detector, or if two detectors with some dead volume between them are being used.

The **Config | Acquisition** menu option invokes a dialog box that looks like this.



1. An entire channel will be disabled because it is *running* (or *waiting*). If the master frequency (chapter 5.3) allows for fewer than 4 channels to be used the additional channels will be hidden (not just disabled).
2. This button invokes the sequence setup dialog (chapter 8).
3. All possible forms of enslavement are being used for channel 2. As a result there are no controls to set up its triggers or frequency, since these are derived from its owner channel (channel 1)
4. Press the **Esc** key or click the **cancel** button to abort any changes. Press the **Return** key or click the **OK** button to confirm changes.
5. Click the **Setup AutoAnalysis** button to set up Automatic Analysis, cf. chapter 7.2.
6. Click the **Defaults** button to fill the dialog box with default values.

Controls are shown in greater detail below.

1	Channel:	Channel 1
	Sequence:	Setup
	Enslave:	
	Enslave Frequency:	
	Enslave Trigger:	
	Frequency:	5
2	Trigger Start:	<input checked="" type="checkbox"/>
3	Input:	0
	Event:	go high
4	Trigger Stop:	<input checked="" type="checkbox"/>
	Input:	0
	Event:	go high
4	Timeout Stop:	<input type="checkbox"/>
5	Timeout (min):	5.0
	Time Displacement (s):	<input checked="" type="checkbox"/>
6		1.4

1. Channel name. This control is read-only. To change the channel name use the **Config | Hardware setup** menu option or the **Config | Driver** option.
2. **Start Trigger**. If this box is checked a start trigger will be used. Since a start trigger is required to run a sequence, selecting sequence run mode will disable this check box (to prevent it from being unchecked). Sequence run mode can only be selected if the box is checked.
3. **Trigger Source and Event**. These controls display a list of possible sources and events. These controls are enabled only if triggering is being used.
The names in the list can be set using the **Config | Hardware setup** menu option or the **Config | Driver** option. Below (0) some limitations on the choice of source and event are discussed.
4. **Stop Trigger/Timeout Stop**. If these boxes are checked either a stop trigger or a time-out stop (or both) will be used. Since either a stop trigger or time-out stop is required to run a sequence, deselecting both these boxes while sequence run mode is enabled will cause an error message when you try to confirm these settings.
5. **Time-out period**. Entered as minutes.decimal, **not** minutes.seconds. If you specify a timeout period that, at the current frequency setting, would generate more than the maximum number of points you will receive a warning.
6. Time displacement is used when there is a known delay between a component leaving the analytical equipment, and reaching the detector (and causing a signal). It is especially useful when two enslaved channels are used with two different detectors.

Chapter 7.1 Setting up triggers for autosamplers

To run a sequence of measurements using an autosampler that can generate start and stop pulses attach the start and stop pulse to a trigger source each, and enter these trigger sources into the measurement set-up.

To run a sequence of measurements using an autosampler that can generate only start pulses, attach the start pulse to a trigger source, and enter the trigger source into the measurement set-up. Then indicate the measurement should use a time-out period. Set the time-out period slightly lower than the sample interchange period for the autosampler (this will give DAX some time to finish and store the measurement before the next measurement is started by the autosampler).

Chapter 7.2 Automatic Analysis Preferences

Automatic Analysis Preferences indicate to DAX which actions should be taken when a measurement is complete. They are set up using the dialog box that is displayed when the **Setup AutoAnalysis** button is clicked in the **Config | Acquisition** dialog box.

Possible actions are:

- Filtering. The measurement data are filtered, using the most recently used filter parameters, as set in the **Data | Filter** menu option.
- Baseline construction. A baseline is constructed using the most recently used baseline construction parameters.
- Peak detection. Peaks are detected using the most recently used peak detection parameters. A baseline must have been constructed to detect peaks.
- Peak list printing. A table of peaks is printed. The table is created by creating a *peak list window*, then invoking the print option. If the **Close Peak List Windows** option is checked the peak list window will be closed when it is no longer needed. The **Only Named Peaks** box limits the peak list to peaks that have been recognised by the Identification Database.
- Creating a peak list file. A file with peak detection results is written. The file name will be the same as the measurement's

data file, but with the file extension changed to **pks** for single data sets, or **pa1**, **pb1**, etc for series of data sets. The file is created using a peak list window.

- Overlaying. The measurement data are overlaid, using the most recently used overlay parameters, as set in the **Data | Overlay** menu option.
- Printing. The measurement is printed. If a baseline has been constructed it will be included. If peaks have been detected, they will be marked on the print.
- Printing a *report*. A measurement report is printed, using the current report definition.
- Derive a new GPC calibration from the analysed data. Molecular weight values will be taken from peak names, so the Identification Database must contain component names that contain Mw values.

The calibration will be set up to have the same form as the currently present calibration, which defaults to multi-linear (i.e. lines drawn between calibration points), using logarithms of Molecular Weight.

- Derive a new Calibration from the analysed data. Calibrated values will be taken from peak names, so the Identification Database must contain component names that contain calibrated values.

The calibration will be set up to have the same form as the currently present calibration, which defaults to multi-linear (i.e. lines drawn between calibration points), not using logarithms.

NB Even though it is possible to change automatic analysis preferences while a measurement is running, the preferences that were in effect when the measurement was started will be used.

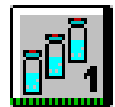
If the **Close Data Windows after Analysis** option is checked data sets will be deleted after automatic analysis has been performed. Data will be saved first. Data sets will only be deleted when all data sets in an enslavement group have been analysed. If no data sets remain in the graphics window, the window will be closed.

Chapter 8. Measurement Sequences

DAX can perform sequences of measurements unattended. In the **sequence set-up** a number of measurements are defined that will be performed consecutively.

Since for sequences of measurements that run unattended there is no user to start and stop individual measurements, triggers need to be defined to start measurements. To stop individual measurements either a *stop trigger* or a *time-out period* needs to be defined. Refer to chapter 7 for details on how to set up a measurement with start and stop triggers, and time-out periods. Refer to chapter 7.1 for details on how to set up sequences and triggers for use with an autosampler.

Actual set-up of sequences is done in a dialog box. This dialog box can be invoked either from the measurement set-up dialog box invoked by the **Config | Acquisition** menu option, or from a modeless dialog box⁸ invoked by the **Config | Sequences** menu option (or one of the sequence set-up buttons in the Measurement window, see chapter 3).



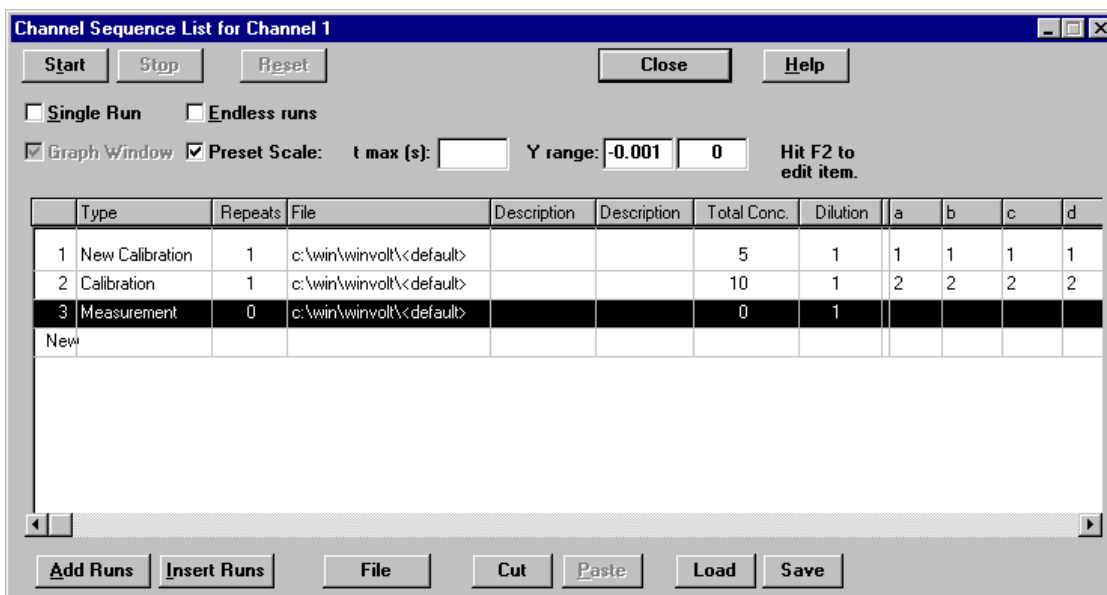
The dialog boxes invoked in these ways are not identical - the modeless version has buttons to start, stop and reset measurements. Also, the modeless version does not have a cancel button, so any changes are always permanent. Since these are the only differences only the modeless version will be discussed in detail below.

Measurements are entered in a spreadsheet. The spreadsheet contains the following columns:

- Line number. This can be changed to **Start** to run only part of the sequence list. Once a start line has been marked, an **End** line can also be marked. To remove the **Start** and **End** markers, simply change the start marker back to a line number. *NB If new data lists (see DAX manual) are started for each sequence, no new list will be started if only a partial sequence is run.*

⁸ A dialog box that stays on the screen as a separate “application”. You may continue to use options in DAX even when the dialog is displayed. A *modal* dialog has to be terminated before you can continue using DAX. Some versions of DAX only have the modal dialog box.

- Measurement type. This can be measurement, calibration, new calibration (causing pre-existing calibration points to be discarded), control, relative control, comment, or procedure.
Controls are used to ensure that the system is still working correctly. A (relative) control line defines lower and upper limits for the (relative) concentrations of a number of components. If the components turn out to have concentrations outside the valid interval, all measurements in the sequence will be considered tainted.
A procedure line causes an analysis procedure file with the specified name to be loaded.
Comment lines are skipped.
- Number of times the line is repeated. This only applies to measurements, not to calibrations, controls or procedure lines.
When the line is either the **start** or the **end** line, it is possible to run only a subset of the repeats. This is indicated as “last x of y” and “first x of y”, respectively.
- Filename. For measurements, calibrations and controls, this is the name of the file the data will be stored in. For parameter lines this is the name of the parameter file to be loaded.
- Descriptions.
- Total concentration. The total component concentration in a sample can be entered here.
- Dilution. DAX displays all concentrations *after* correcting for sample dilution. In other words, the dilution factor has already been applied to any concentrations DAX lists.
- Extra fields. These fields are user definable, and can contains items such as sample ID. Use the **File | Customise > Fields Setup** menu item to enter the number of extra fields, and their names.
- Component concentrations. Only calibration and control lines can contain component concentrations.
A calibration will use the specified concentration to set up a calibration line.
Controls check that concentrations for components are within the specified range.
Components will be identified using the current Identification Database.



To add a new component to the sequence, use the **Components>>** button. The button also lets you add columns for all components in the current Identification Database, and allows for unused components to be removed from the sequence.

To change the name of a component, click the mouse on the component column header and enter a new name.

Sequence lists can have a number of so-called persistent compounds. These are components that will always be present in the sequence list. They will not be removed when unused components are removed, no matter if they have been used or not. Use the **Components >>** button's **Persistent compounds** menu option to enter a list of persistent compounds for each channel.

To add a line at the bottom of the sequence, just start typing in the row marked as "New".

The sequence setup dialog box is also used to define a preset scale for graphic windows. The **preset scale** item must be checked. A maximum time coordinate as well as lower and upper data value coordinates can be entered. Leave items blank to let DAX find the optimum value. Use the **View | Reset Scale** menu option in a graphic window to stop using the preset scale.

If a measurement is running, the line in the sequence currently being measured will be highlighted. As each measurement line completes, its filename will be changed to *default*, to prevent a next run of the sequence from using the same filename.

Chapter 8.1 Filename considerations

Files will have extensions that indicate how they were generated. The extension is made up of:

- **.d** for DAX files, **.w** for WinVolt files
- Older versions of DAX saved the data from each channel in a separate file. 1 alphanumeric character denoted the enslavement order. The first channel in a group of enslaved channels got an **a**, the second a **b**, etc. If channel 2 was measuring as a slave of channel 1, it got a **b**. If it was not a slave, it got an **a**.
Current versions of DAX save all channels in a single file, with an **a** as the second character of the file extension.
- the final character in the extension is a numeral (**1 .. 9**) indicating the repeat index of the measurement (each measurement in a sequence can be repeated from 1 to 9 times).

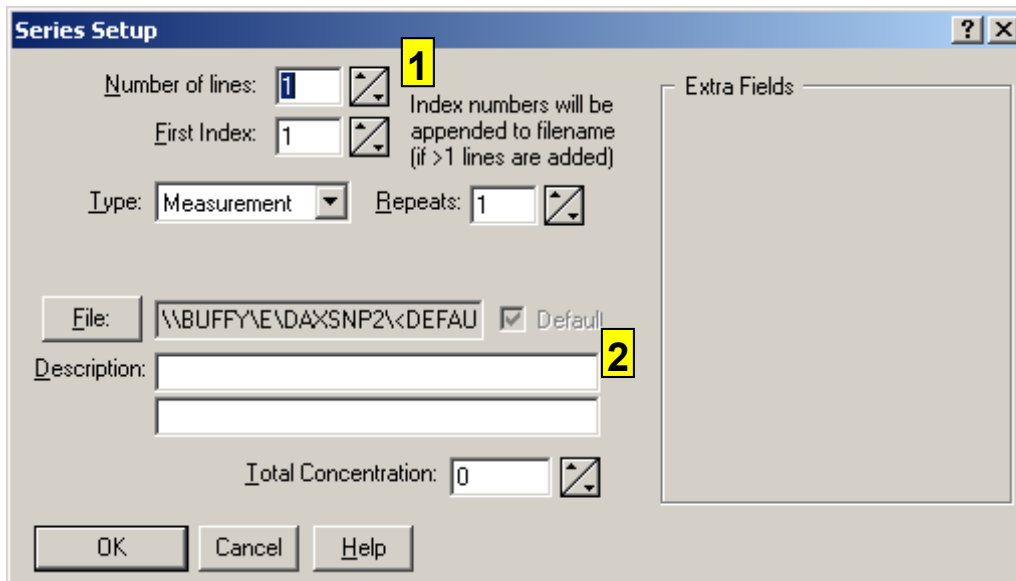
A filename does not have to be entered for measurements in a sequence. There is the option of using default filenames. For full details on how default filenames are generated refer to chapter 1.1.5. The default file can either be stored in the default file directory (use the **Default Path & File** button in the file entry dialog box), or in a specified directory (go to the required directory, then use the **Path + Default File** button in the file entry dialog box). Use the **File | Customise > Measurement data directory** menu option to set up the default file directory.

Chapter 8.2 Sequence List Command Buttons

Chapter 8.2.1 Add Runs / Insert Runs buttons

These buttons are used to add measurement lines at the bottom of the list (Add Runs), or to insert runs before the current highlighted line (Insert Runs).

These buttons invoke another dialog:



1. Enter the number of lines to add to the sequence list here. This number is limited by the fact that a sequence may not contain more than 99 lines.
2. All items not discussed here have the same meaning as in the sequence dialog. Values entered here will be copied to all generated lines, with (partial) exception of filenames (see below).

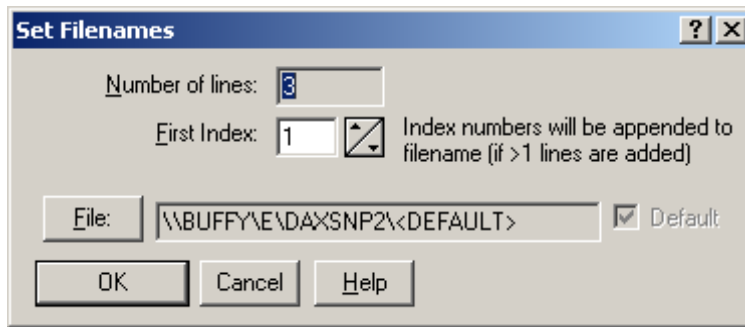
If more than one line is going to be added, an index number is added to the filename, unless default filenames are indicated. The index of the filename for the first line may be entered in the dialog, with all next lines obtaining a subsequent index number.

GLP Because of GLP an extensive check is performed on all the filenames that will be generated. If any of these filenames already exists as a file, or is already in use in the sequence, you will have to change it.

Chapter 8.2.2 Filenames button

This button is used to set the filenames for a series of lines. A series of lines must have been highlighted in the sequence list.

If more than one line is highlighted in the sequence setup dialog box this button invokes the following dialog.

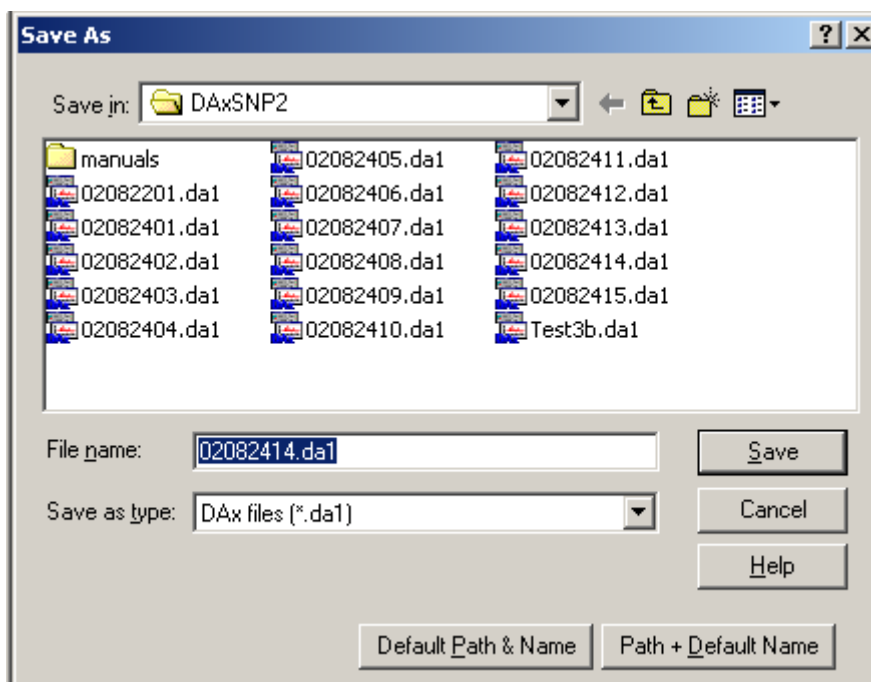


An index number is added to the filename, unless default filenames are indicated. The index of the filename for the first line may be entered in the dialog, with all next lines obtaining a consecutive index number.

- Pressing the **File** button will display the File Entry dialog box. If only one line had been highlighted in the sequence list, the File Entry dialog box is displayed immediately.

Chapter 8.2.3 The Sequence File Entry Dialog

This dialog box is used to enter a filename for one or more lines in a Sequence Setup or Set Filenames dialog box. It is invoked when the **File** button is clicked.



Entering a filename, then clicking the **OK** button will set a filename in the usual way. After the measurement has been saved, the filename will be reset to using the default path and an automatically generated filename. This is done to prevent overwriting the file when the sequence is next run.

Clicking the **Default Path & Name** button will cause the measurement to be saved with an automatically generated filename, in the directory set using the **File | Customise > Measurement data directory** menu option.

Clicking the **Path + Default Name** button will cause the measurement to be saved with an automatically generated filename in the directory specified. The specified path will be used even if the sequence is run several times. There is no risk that this will overwrite existing files, as a new filename is automatically generated.

Chapter 8.2.4 Cut Button

This button removes the highlighted lines from the sequence list. The lines are placed in a local clipboard (not on the Windows clipboard). They may be reinserted with the **Paste button**. This button is greyed unless lines are selected in the sequence list.

Chapter 8.2.5 Paste Button

The Paste button inserts the contents of the local clipboard (filled previously using the **Cut button**) before the currently highlighted line in the sequence list. If more than one line is highlighted the line with the dotted line around it is the insertion point. This button will be greyed unless there are lines on the local clipboard.

Chapter 8.2.6 Save / Load Sequence Buttons

These buttons save or load an entire sequence. It is possible to load a sequence that was set up for a different channel.

Chapter 9. Frequently Asked Questions

Chapter 9.1 Why Can't I Start A Measurement?

You cannot start a measurement on a channel if

- the data acquisition hardware has not been properly installed
- the channel is already measuring. Stop the channel.
- the channel is enslaved to another channel (the channel will be started as soon as the master channel is started).
- the channel index is higher than the number of active channels. Some data acquisition boards only support a limited number of active channels for high frequency measurements. If such a high frequency has been selected, some channels will be disabled. Cf. chapter 5.3.
- the channel has been configured to run a sequence, but no triggers have been defined (cf. chapter 7), or the sequence list is empty (cf. chapter 8).

In the version with Prince Control:

- a Prince control window is open, and the Prince is not ready to start. This will make it impossible to start measuring channel 1, the channel associated with the Prince.

Chapter 9.2 Is it possible to interrupt a sequence list for a priority measurement?

Yes. Simply use the stop menu command, or click on the stop sign. DAX will ask if you want to set a start marker in the sequence list so that you can finish the sequence later. Choose **Yes**. DAX will also automatically switch the channel to **single run**.

Now, perform the priority measurement. When it is finished, open the sequence list setup dialog box, and uncheck the **single run** item. Now, when you start the channel, DAX will continue from where it was stopped. Importantly, the measurement that was running when the channel was stopped will be **rerun**!

Chapter 9.3 Do I have to set the flow rate / inert time every time?

No. If you set the flow rate / inert time using the measurement data tag (the data tag displayed in the measurement window), it will be saved. The next time a measurement is started the flow rate / inert time will get the same value as was last entered.

Make sure to enter the flow rate / inert time in the measurement window. Entering it in a graphics window will mean that the value will not be used for new measurements, since DAX has no way of knowing to which measurement channel the values pertain⁹.

⁹ If the measurement being displayed in the graphics window is still running the flow rate / inert time **will** be remembered.

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