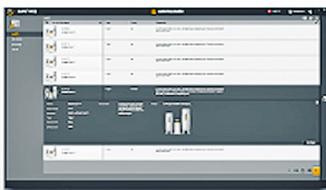


Operating Instructions

BioPAT® MFCS 4

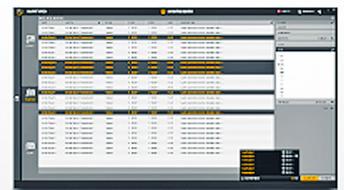
Sample Data Module
Software



ADMINISTRATION



MONITORING



ANALYSIS

85037-550-40



SARTORIUS

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1 About this Document

These instructions form part of the Sample Data Module of the BioPAT® MFCS 4 software. The Sample Data Module program module is also called the SDM.

Fundamental information about the basic version of BioPAT® MFCS 4 can be found in the BioPAT® MFCS 4 Operating Instructions. Fundamental information includes:

- software use
- configurations and installation
- user interface
- ADMINISTRATION, MONITORING, ANALYSIS functional areas

Ensure that these instructions are read by anyone working with Sample Data Module.

- ▶ You can order a printout of these instructions at an additional cost. Contact Sartorius in order to do so.

The figures and illustrations from the Sample Data Module in these instructions were created with English as the set language (for language settings, see BioPAT® MFCS 4 Operating Instructions, "System Settings").

1.1 Accompanying Documents

- ▶ In addition to these instructions, observe the following document:
 - "BioPAT® MFCS 4 Software" Operating Instructions

1.2 Symbols Used

1.2.1 Warnings in Operation Descriptions

NOTICE

Denotes a danger that may result in property damage if it is **not** avoided.

1.2.2 Other Symbols

- ▶ Required action: Describes actions which must be carried out.
- ▷ Result: Describes the result of the actions carried out.
- [] Text inside brackets refers to control and display items.
- [] Text inside brackets indicates status, warning, and error messages.

2 Operating Concept

2.1 Module Description

The SDM is an optional program module that enhances the functional scope of the basic version of BioPAT® MFCS 4.

Once the SDM is activated, the following additional functions can be used:

- Configure offline variables in the [ADMINISTRATION] functional area
- Display overviews of offline and online values in shared trends
- Export offline and online values in a shared table
- Save offline analysis results from sampling
- Create a time stamp by automatically assigning the date and process time to the sample taken
- Take a screenshot for real-time recording of (interpolated) online values at the time of sampling
- Schedule future sampling for multiple process units
- Add files and images to sampling entries
- Use search, sort, and filter functions to simplify the display and editing of samples

2.2 Setting up the Module

2.2.1 Updating the Basic Version

Procedure

- ▶ To be able to use the advanced functions of the SDM: Update the basic version of BioPAT® MFCS 4 (see BioPAT® MFCS 4 Operating Instructions, Chapter "Program Updates").

2.2.2 Licensing and Activating the Module

Procedure

- ▶ To be able to use the advanced functions of the SDM permanently: License and activate the SDM (see BioPAT® MFCS 4 Operating Instructions, chapter "Program Licensing").

2.2.3 Configuring SDM Functions

Procedure

- ▶ In order to add offline variables: See BioPAT® MFCS 4 Operating Instructions, Chapter "UNIT Management".
- ▶ To add and edit samples: See Chapter "4 "Sample Data" Module," page 7.

3 User Interface

Fundamental information on the user interface of the basic software can be found in the BioPAT® MFCS 4 User Manual in the following chapters:

- Software Start
- Start Screen
- Navigation Aids
- Selection Keys

3.1 Functional Areas

Fundamental information on the functional areas of the basic software can be found in the BioPAT® MFCS 4 User Manual in the following chapters:

- ADMINISTRATION Functional Area
- MONITORING Functional Area
- ANALYSIS Functional Area

3.2 Additional Navigation and Selection Keys

The navigation aids help you quickly toggle from one neighboring functional area or menu to another and return to the start screen fast.

The selection keys are reproduced in the functional areas. The additional navigation and selection keys and their functions are presented in the following table:

Icon	Description
	[SAMPLES] menu: Navigation key in the [MONITORING] functional area
	[SAMPLES] menu: Navigation key in the [ANALYSIS] functional area
	Show overview: Navigate to the batch processes overview
	Select process variables: Select process variables (online and offline variables) for the display in the [SAMPLES] menu
	Remove process variables: Remove process variables (online and offline variables) from the display in the [SAMPLES] menu

4 “Sample Data” Module

Once licensed and activated, the SDM enhances the BioPAT® MFCS 4 program by providing additional menus, navigation aids, and selection keys in the [MONITORING] and [ANALYSIS] functional areas.

4.1 Menu [SAMPLES] in Functional Area [MONITORING]

Samples can be added in the [SAMPLES] menu after a batch process is started in the [MONITORING] functional area. Existing samples of the started batch process are listed.

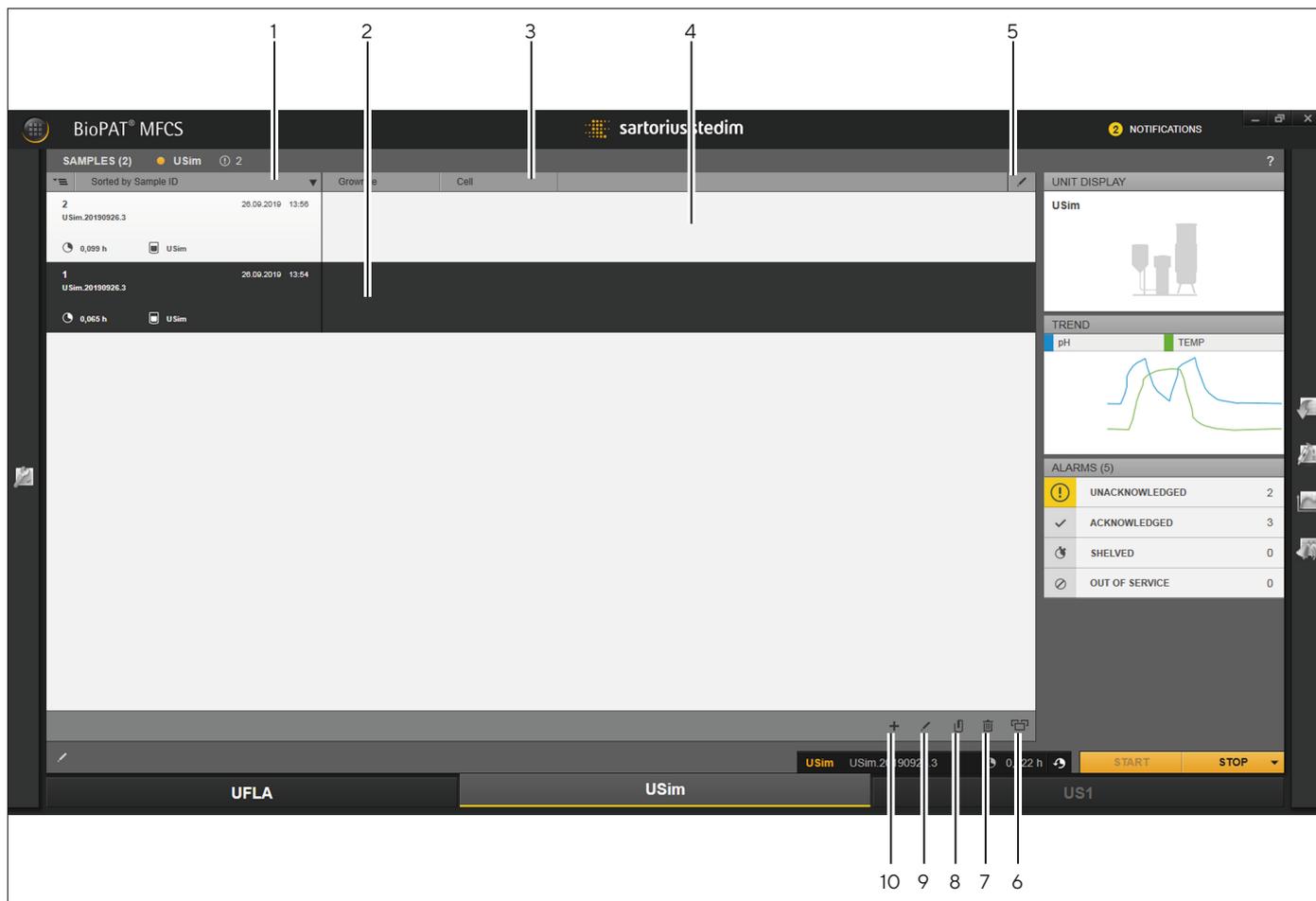


Fig. 1: Menu [SAMPLES (#)] in Functional Area [MONITORING] (Example)

Pos.	Icon	Description
1		List of added samples for the current batch process
2		Selected sample, which can be edited
3		Process variables (online and offline variables)
4		Display of values at time of sampling
5		Select process variables to be displayed
6		Activate full-screen mode
7		Delete sample

Pos.	Icon	Description
8		Attach file: Attach file(s) to sample
9		Edit sample
10		Add sample: Add a new sample for the current batch process

No samples are displayed in the [SAMPLES] menu before a batch process is started or if the batch process is stopped. Samples of a stopped batch process are displayed in the [ANALYSIS] functional area and can be edited.

The following settings and editing functions can be defined and used for the samples during the current batch process:

- Select offline and online variables to be displayed in the [SAMPLES] menu
- Enter offline values (e.g., analysis results) for the offline variables
- Change offline values
- Change time of sampling (time stamp)
- Add file attachments as additional information for the sample

4.2 Menu [SAMPLES] in Functional Area [ANALYSIS]

The samples of the selected batch process, which were added during the batch process, are listed in the [SAMPLES] menu in the [ANALYSIS] functional area.

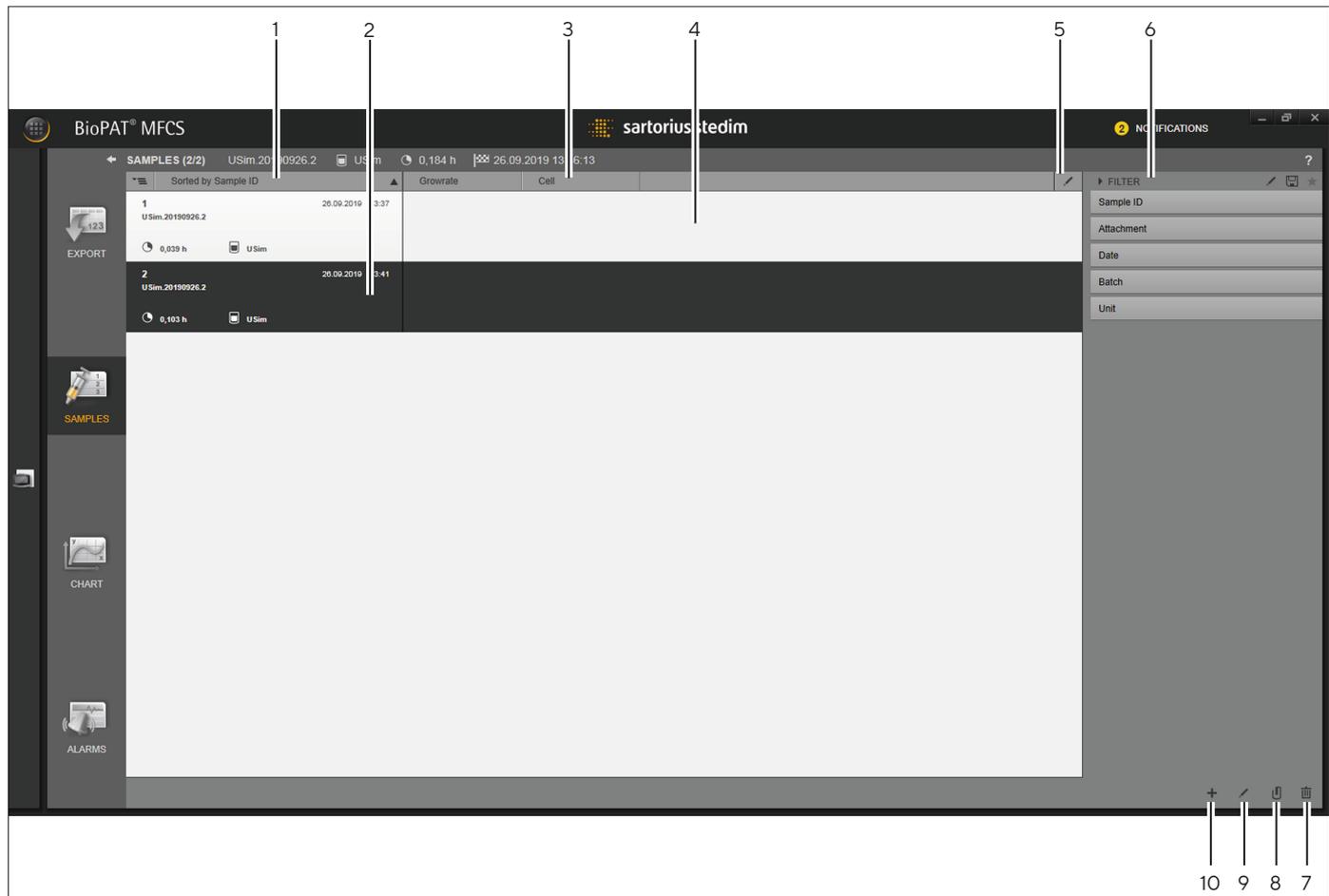


Fig.2: Menu [SAMPLES (#/#)] in functional area [ANALYSIS] (example)

Pos.	Icon field	Description
1		Header, list of added samples
2		Selected sample, which can be edited
3		Process variables (online and offline variables)
4		Display of values at time of sampling
5		Settings menu for selecting process variables with values to be displayed
6		Search filter with filter functions
	Sample ID	Sample identification name
	Attachment	File attachment for samples:
	Yes	Samples with file attachment are displayed.
	No	Samples without file attachment are displayed.
	Date	Date of sampling
	Batch	Name of batch process to which the sample is assigned.
	Unit	Name of unit assigned to the batch process
7		Delete sample
8		Attach file: Attach file(s) to sample
9		Edit sample
10		Add sample: Add a new sample for the current batch process

The samples of a stopped batch process are displayed in the [SAMPLES] menu in the [ANALYSIS] functional area and can be edited.

The following settings and editing functions can be defined and used for the samples of the batch processes in question:

- Select offline and online variables to be displayed in the [SAMPLES] menu
- Enter offline values (e.g., analysis results) for the offline variables
- Change offline values
- Change time of sampling (time stamp)
- Add file attachments as additional information for the sample

4.3 Adding a Sample

Requirements

- Offline variables must be created for the corresponding unit (see BioPAT® MFCS 4 Operating Instructions, Chapter "Unit Management").
- A batch process must be started in the [MONITORING] functional area or a finished batch process is saved in the [ANALYSIS] functional area (see BioPAT® MFCS 4 Operating Instructions, Chapter "Batch Process" and Chapter "Functional Area ANALYSIS").

4.3.1 Adding a Sample in Functional Area [MONITORING]

Procedure

- ▶ Start the batch process.
- ▶ In order to determine the offline value in a lab analysis, for example: Take a sample from the corresponding process.
- ▶ Add the time stamp immediately before or after sampling. In order to do this, click [Add] in the [SAMPLES] preview window or [Add] in the [SAMPLES] menu.
- ▶ The input window [ADD SAMPLE] appears.

ADD SAMPLE	
Batch	USim.20190926.5
Sample ID*	1
Date*	26.09.2019
Time*	15:54:57
Process Time	0,26 h
Description	
<div style="display: flex; justify-content: space-around;"> SAVE CANCEL </div>	

Fig. 3: [ADD SAMPLE] input window (example)

Field	Description
Batch	Name of batch process
Sample ID*	Entry of the identification name
Date*	Entry of the sampling date (is automatically set)
Time*	Entry of the sampling time (is automatically set)
Process time	Entry of the time stamp for the process time in reference to the start time of the batch process (is automatically set)
Description	Entry of a description

* Required information

- ▶ Enter the sample ID in the [Sample ID*] input field. If required: Enter a description of the sample in the [Description] input field.
- ▶ Confirm the entries with [SAVE].
- ▷ The sample is created for the currently running batch process.
 - ▷ The entry for the sample is added in the [SAMPLES] menu and in the [SAMPLES] preview window:

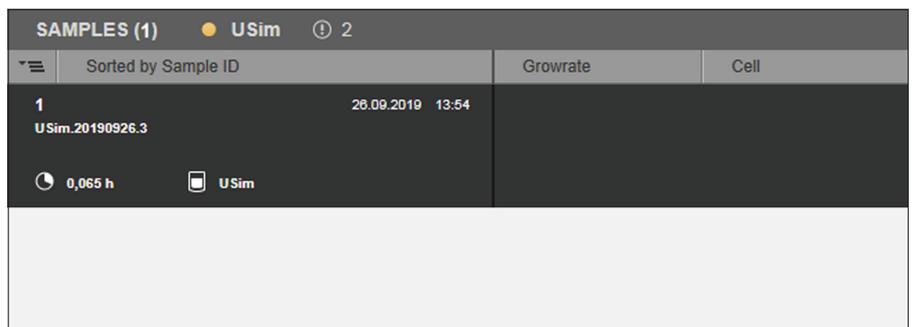


Fig. 4: Sample entry in menu [SAMPLES]

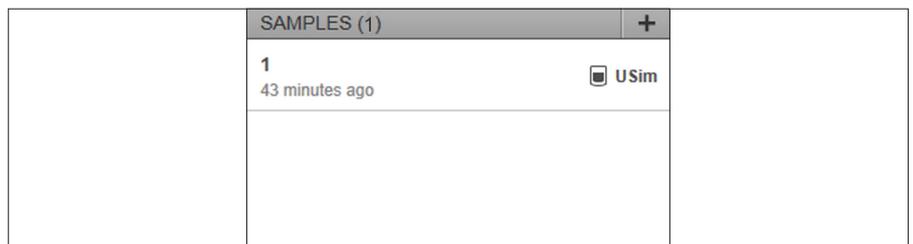


Fig. 5: Sample entry in preview window [SAMPLES]

4.3.2 Adding a Sample in Functional Area [ANALYSIS]

The entry of sampling, which was carried out during an already completed batch process, can be carried out at a later date in the [SAMPLES] menu in the [ANALYSIS] functional area.

Example

Batch Process Status	Time (hh:mm:ss)	Process Duration	Process time
Batch started.*	10:04:31 AM		
Batch stopped*	11:29:28 AM		
Process period*		1,416 h	
Sampling time	11:05:00 AM		
Process time (time of sampling)			1,008 h

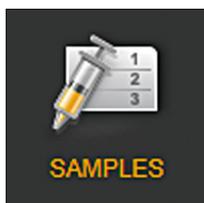
* Data from the overview of menu [BATCHES]

Requirements

- The sampling was carried out during the batch process and the time of sampling is logged.
- The batch process has been stopped.

Procedure

- ▶ On the start screen, click on the [ANALYSIS] button.
- ▷ The [ANALYSIS] functional area appears.
- ▶ To switch to the [SAMPLES] menu: Click on the [SAMPLES] button.
- ▶ Select the batch process:
 - ▶ If the [BATCHES (#/#)] menu with the list of the batch processes is displayed: Select the batch process.
 - ▶ If the [BATCHES (#/#)] menu with the list of batch processes is **not** displayed: Navigate to the [BATCHES (#/#)] list and select the batch process.
- ▶ Click on the [SAMPLES] button.
- ▷ The [SAMPLES] menu is displayed.
- ▶ Click on the [Add] button.
- ▷ The input window [ADD SAMPLE] appears.



ADD SAMPLE

Batch	USim.20190927
Sample ID*	1
Date*	27.09.2019 ▼
Time*	11:05:00 ▼
Process Time	1,008 h
Description	

SAVE
CANCEL

Fig. 6: [ADD SAMPLE] input window (example)

Field	Description
Batch	Name of batch process
Sample ID*	Entry of the identification name
Date*	Entry of the date of sampling
Time*	Entry of the time of sampling
Process time	Entry of the time stamp for the process time in reference to the start time of the batch process
Description	Entry of a description

* Required information

- ▶ Enter the sample ID in the [Sample ID*] input field. If required, enter a description of the sample in the [Description] input field.
- ▶ Enter the data for the sampling time:
 - ▶ Enter the date in the [Date*] input field.
 - ▶ Enter the time in the [Time*] input field.
- ▷ The time of sampling is calculated in reference to the running time of the batch process and displayed in the [Process Time] input field.
- ▶ Confirm the entries with [SAVE].
- ▷ The sample for the selected batch process is added in the [SAMPLES #/#] menu:

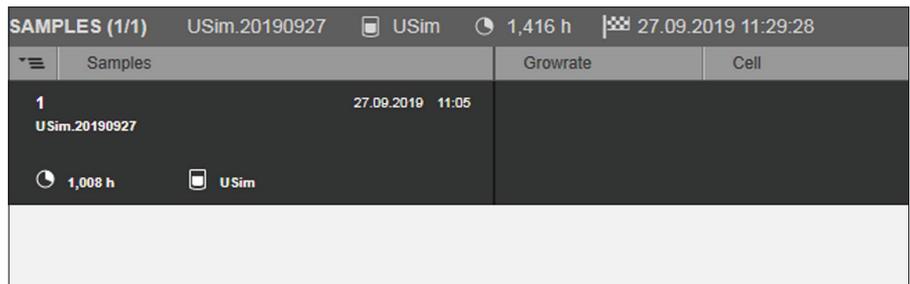


Fig. 7: Sample entry in the [SAMPLES] menu (example)

4.3.3 Checking and Changing Sample Entries

Procedure

- ▶ Double-click on the sample in the [SAMPLES #/#] menu.
- ▶ The settings menu is displayed:

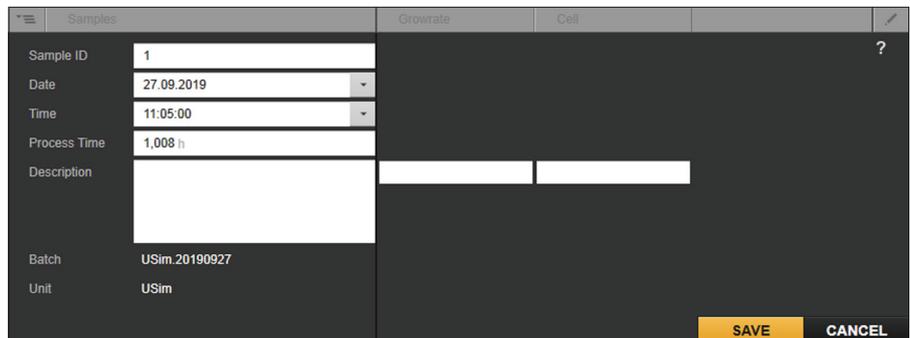


Fig. 8: Sample settings menu in the [SAMPLES] menu (example)

- ▶ Check the entries. If required: Change the entries.
- ▶ Confirm the changes with [SAVE].

4.4 Selecting Process Variables

In the [SAMPLES] menu in the [MONITORING] and [ANALYSIS] functional areas, the process variables (offline and online variables) needed for the display of the corresponding process values are selected.

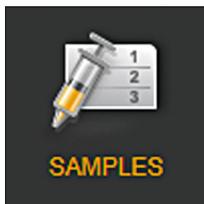
Only configured process variables can be selected.

The settings for selecting the process variables can be made for the [MONITORING] and [ANALYSIS] functional areas and for each batch process individually.

The procedure for selecting the process variables is the same for the [MONITORING] and [ANALYSIS] functional areas and is described in the following sections using the [ANALYSIS] functional area as an example.

4.4.1 Adding Process Variables

Procedure



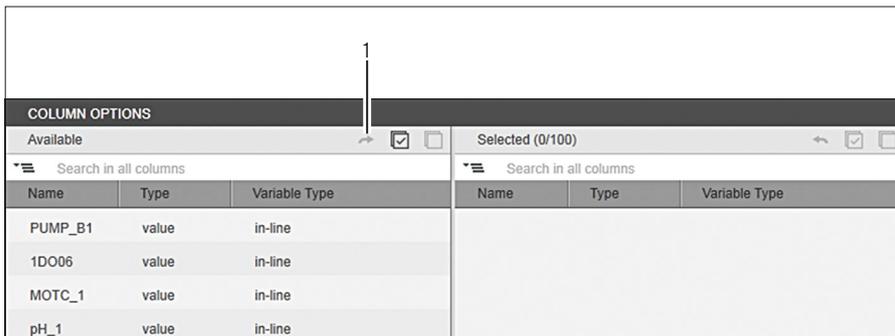
- ▶ In the [ANALYSIS] functional area, click on the [SAMPLES] button.
- ▶ In the [SAMPLES] menu, select the batch process.



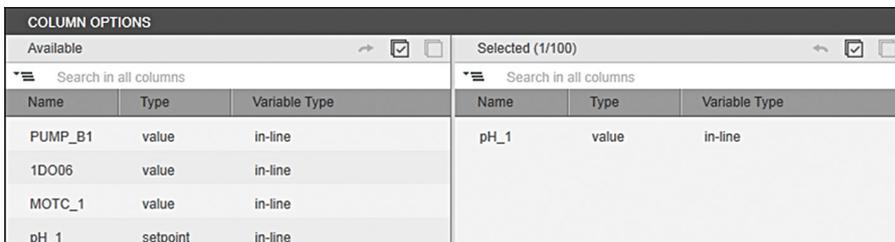
- ▶ Click on the [SAMPLES] button.
- ▷ The [SAMPLES] menu is displayed:



- ▶ In the header of the listed samples, click on the [Edit] button.
- ▷ The [COLUMN OPTIONS] selection window appears:



- ▶ Select and add the process variables in the [Available] list for the [Selected] list:
 - ▶ Via the button: In the header of the [Available] list, click on the button (1).
 - ▶ By double-clicking: Double-click on the selected process variable.
- ▷ The process variable is displayed in the [Selected] list and is selected for display in the [SAMPLES] menu.



- ▶ If required: Add further process variables.
- ▶ Confirm the process with [OK].
- ▷ The selected process variables are displayed in the header of the [SAMPLES] menu.



4.4.2 Removing Process Variables

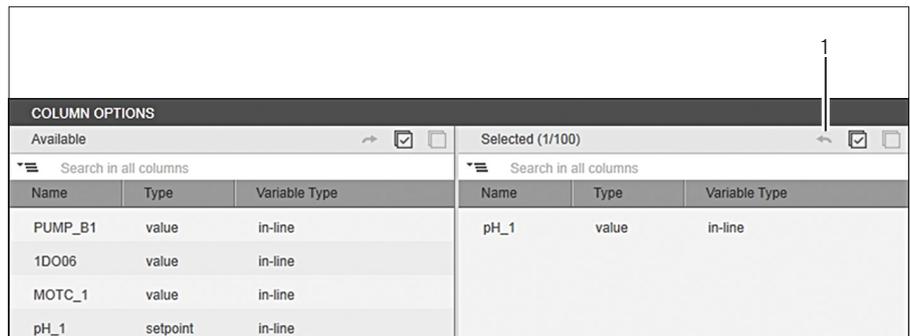
Procedure



- ▶ In the [ANALYSIS] functional area, click on the [SAMPLES] button.
- ▶ In the [SAMPLES] menu, select the batch process.



- ▶ Click on the [SAMPLES] button.
- ▷ The [SAMPLES] menu is displayed.
- ▶ In the header of the listed samples, click on the [Edit] button.
- ▷ The [COLUMN OPTIONS] selection window appears:



- ▶ Select and remove the process variables in the [Selected] list:
 - ▶ Via the button: In the header of the [Selected] list, click on the button (1).
 - ▶ By double-clicking: Double-click on the selected process variable.
- ▷ The process variable is removed from the [Selected] list and is deselected for display in the [SAMPLES] menu.
- ▶ If required: Remove further process variables.
- ▶ Confirm the process with [OK].
- ▷ The selected process variables are **no longer** displayed in the header of the [SAMPLES] menu.

4.4.3 Arranging Process Variables

The process variable entries can be rearranged horizontally in the [SAMPLES] menu.

Example

The "OD" process variable should be placed between the "pH" and "pO₂" process variables.

pH	pO2	OD	Glucose	
pH	%sat	0,567 AU	10 g/l	

Procedure

- Position the mouse cursor over the "OD" process variable in the header.

pH	pO2	OD	OD	Glucose	
pH	%sat	0,567 AU		10 g/l	

- Drag the "OD" process variable horizontally between the "pH" and "pO₂" entries.

pH	OD	pO2	OD	Glucose	
pH	%sat	0,567 AU		10 g/l	

- The process variable is rearranged:

pH	OD	pO2	Glucose	
pH	0,567 AU	%sat	10 g/l	

4.4.4 Grouping Process Variables

Up to three process variables can be grouped in the [SAMPLES] menu. The entries and the corresponding process values are arranged under each other. The vertical arrangement of the process variables within the group can be changed by dragging individual variables vertically to a new position.

Example

The "pH" and "Glucose" process variables should be grouped.

pH	pO2	OD	Glucose	
pH	%sat	0,567 AU	10 g/l	

Procedure

- ▶ Position the mouse cursor over the "Glucose" process variable in the header.

pH	OD	Glucose	Glucose ▲	pO2	
pH	0,567 AU		10 g/l	%sat	

- ▶ Drag the "Glucose" process variable under the "pH" process variable entry.

pH	Glucose	OD	Glucose ▲	pO2	
pH	0,567 AU		10 g/l	%sat	

- ▶ The "pH" and "Glucose" process variables are grouped:

pH ▲	OD	pO2	
Glucose			
pH	0,567 AU	%sat	
10 g/l			

4.5 Managing Offline Values

After sampling, any preparation of the sample, and subsequent calculation of the offline value, the offline value is entered in the input field for the offline variable of the corresponding sample.

The offline value can be entered in the input field for the offline variable:

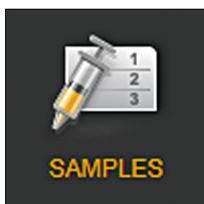
- during the batch process in the [MONITORING] functional area,
- after the batch process in the [ANALYSIS] functional area.

Entered offline values can be changed subsequently. In this case, a reason for changing the offline value must be given.

The procedure for entering and editing the offline values is the same for the [MONITORING] and [ANALYSIS] functional areas and is described in the following sections using the [ANALYSIS] functional area as an example.

4.5.1 Entering Offline Values

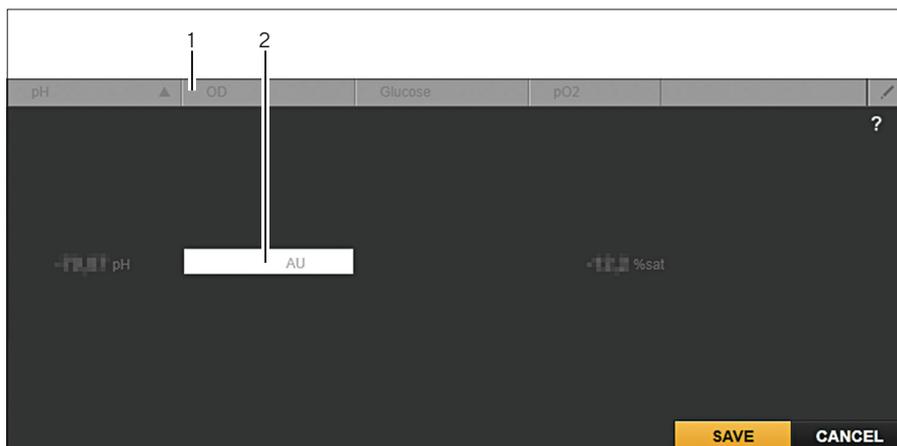
Procedure



- ▶ In the [ANALYSIS] functional area, click on the [SAMPLES] button.
- ▶ In the [SAMPLES] menu, select the batch process.



- ▶ Click on the [SAMPLES] button.
- ▷ The [SAMPLES] menu is displayed.
- ▶ Select the sample.
- ▶ In the footer, click on the [Edit] button.
- ▷ The settings menu is displayed.



- ▶ Enter the offline value in the input field (2) for the corresponding offline variable (1).
- ▶ If required: Enter further offline values in the input fields for the corresponding offline variables.
- ▶ Confirm the entry with [SAVE].

- ▷ The offline value is displayed in the [SAMPLES] menu for the corresponding offline variable:



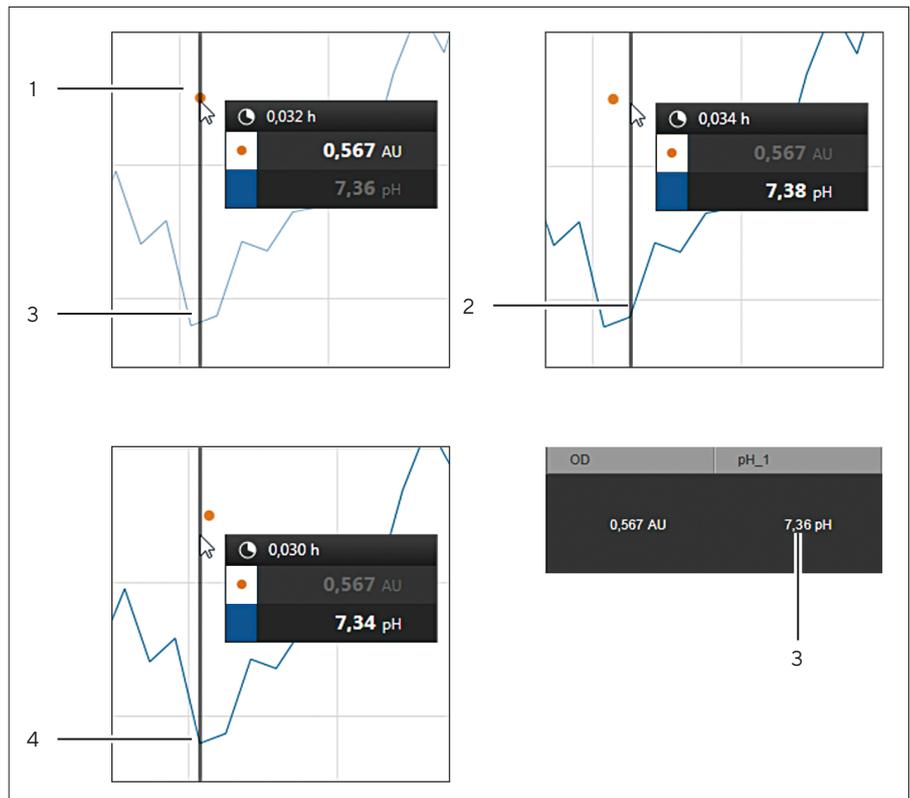
4.5.1.1 Interpolation of Online Values

The time of sampling does not necessarily correspond with the measurement cycle for the online values. For this reason, the online values (at the time of sampling) are calculated using an interpolation method (linear interpolation). The online values measured in the measurement cycle before and after the time of sampling are used to calculate the interpolated value.

Example

Online variable with a value for the pH measurement (pH)

Offline variable with a value for the measurement of the optical density of the culture broth (AU)

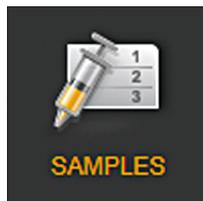


Pos.	Description	Process Time	Value
1	Offline value at time of sampling	0.032 h	0.567 AU
2	Online value (first measurement cycle value after sampling)	0.034 h	7.38 pH

Pos.	Description	Process Time	Value
3	Interpolated online value in [SAMPLES] menu	0.032 h	7.36 pH
4	Online value (last measurement cycle value before sampling)	0.030 h	7.34 pH

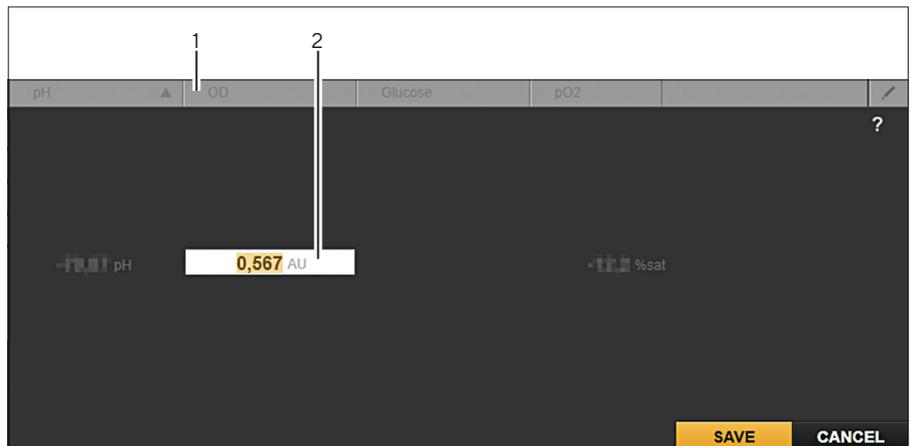
4.5.2 Changing the Offline Value

Procedure



- ▶ To switch to the [SAMPLES] menu: Click on the [SAMPLES] button.
- ▶ To display the [BATCHES] view with the saved batch processes: Click on the [Show overview] button.
- ▶ Select the batch process.

- ▶ Click on the [SAMPLES] button.
- ▷ The [SAMPLES] menu is displayed.
- ▶ Click on the sample for which the offline value needs to be changed.
- ▶ In the footer, click on the [Edit sample] button.
- ▷ The settings menu is displayed.



- ▶ Change the offline value in the input field (2) for the corresponding offline variable (1).
- ▶ Confirm the entry with [SAVE].
- ▷ The [VALUE MODIFICATION] window appears.

VALUE MODIFICATION

Variable	OD
Old value	0,567 AU
New value	0,657 AU
Comment*	<input style="width: 90%;" type="text"/>

OK
CANCEL

VALUE MODIFICATION	
Variable	OD
Old value	0,567 AU
New value	0,657 AU
Comment*	transposed digits

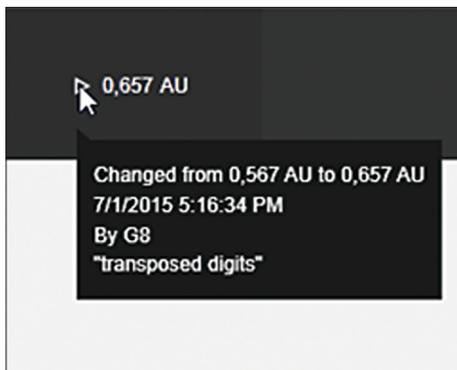
OK CANCEL

- ▶ In the [Comment*] input field, enter the reason for changing the offline value.
- ▶ Confirm the entry with [OK].

- ▶ The changed offline value is indicated with an arrow (1) in the [SAMPLES] menu for the corresponding offline variable.



- ▶ To obtain information on the changes to the offline value: Hover the mouse over the arrow symbol.



4.6 Adding Additional Information for a Sample

Information from external sources can also be added to a sample to supplement the batch process data. The sample can be linked to files (attachment). These files can be Excel tables or PDF files, for example.

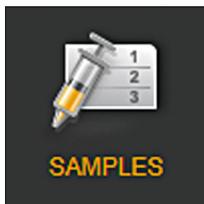
The "Attachment" function can be used:

- during the batch process in the [MONITORING] functional area,
- after the batch process in the [ANALYSIS] functional area.

The procedure for linking a file to a sample is the same for the [MONITORING] and [ANALYSIS] functional areas and is described using the [ANALYSIS] functional area as an example.

4.6.1 Linking a File to the Sample

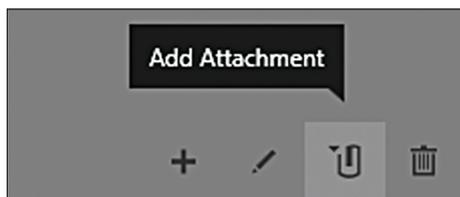
Procedure



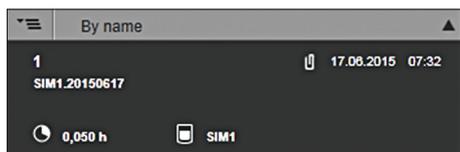
- ▶ In the [ANALYSIS] functional area, click on the [SAMPLES] button.
- ▶ Select the batch process.

Click on the [SAMPLES] button.

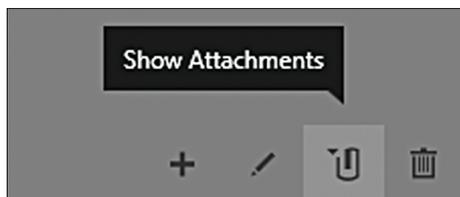
- ▶ The [SAMPLES] menu is displayed.
- ▶ Click on the sample.
- ▶ In the footer, click on the [Add Attachment] button.
- ▶ The file explorer opens.
- ▶ Navigate to the file location of the file to be attached and select the file.



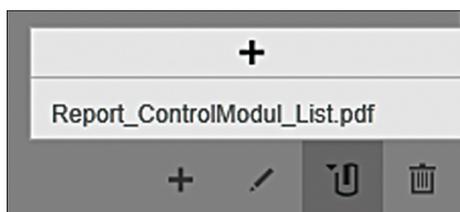
- ▶ The selected file is linked to the sample.
- ▶ The [Add Attachment] icon is added to the sample entry.



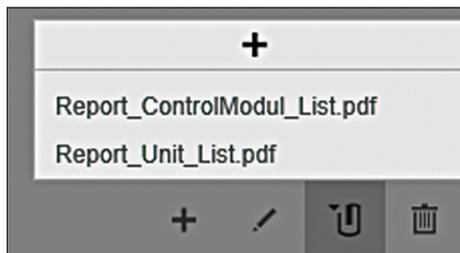
- ▶ If required: Link other files to the sample. To do this, in the footer, click on the [Add Attachment] button.



- ▶ The file already linked to the sample is listed.
- ▶ To link another file to the sample: Click on the [Add] button.



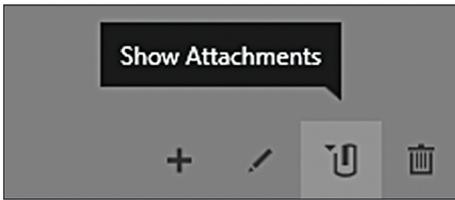
- ▶ Once the selected file has been linked to the sample, the list entry is added.



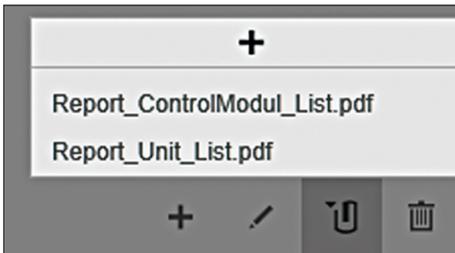
4.6.2 Opening a Linked File

Procedure

- ▶ In order to display the attachment for a sample: Click on the [Add Attachment] button.



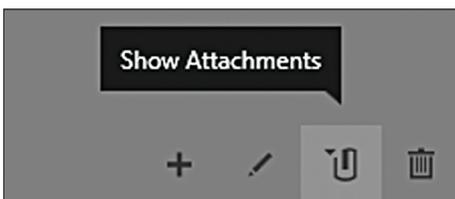
- ▶ The files linked to the sample are listed.
- ▶ To open the file: Click the file.
- ▶ The corresponding file opens.



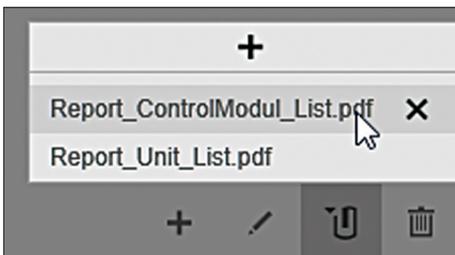
4.6.3 Unlinking Files

Procedure

- ▶ Click on the [Add Attachment] button.



- ▶ The files linked to the sample are listed.
- ▶ Move the mouse cursor to the file you need to unlink from the sample.
- ▶ Click on the [Remove] button.
- ▶ The file is unlinked from the sample and removed from the list.



4.7 Displaying Offline Values

4.7.1 Display in the [TREND] | [CHART] Menu

The offline value is a constant value at time "x" which is assigned to a batch process.

After selecting the corresponding offline variable in the [TREND] | [CHART] menu

- during a started batch in the [TREND] menu and after entering the offline value, the offline value is displayed in the chart as a point.
- after a stopped batch in the [CHART] menu and after entering the offline value, the offline value is displayed in the chart as a point.

The point marks the time (x-axis) and the offline value (y-axis).

If the same offline variable is added to a batch process with multiple samples, a curve is displayed.

Example with "OD" offline variable

Time: 0.040 h
 Offline value: 0.657 AU

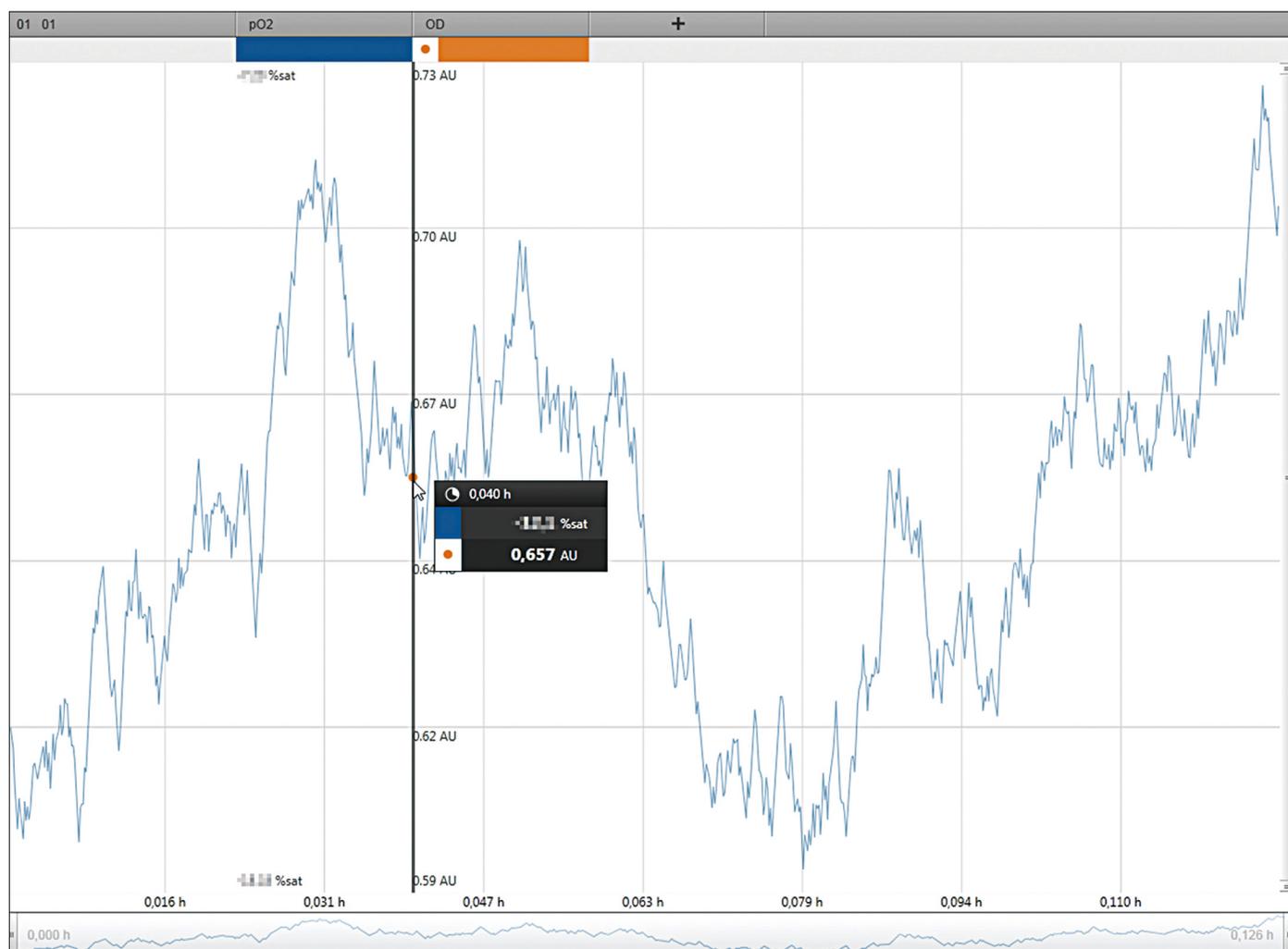


Fig. 9: Display of the offline value of a sample in the [CHART] menu (example)

4.7.2 Display in the [UNIT DISPLAY] Menu

After selecting the corresponding offline variable in the [UNIT DISPLAY] menu, during a started batch and after entering the offline value, the offline value is displayed in the [UNIT DISPLAY] menu.

If several samples with the same offline variable are added to a batch process, the last offline value entered is always displayed in the [UNIT DISPLAY] menu.

Example with "OD" Offline Variable

	Process Time	Offline Value
First sampling	0.016 h	0.324 AU
Second sampling	0.267 h	0.488 AU

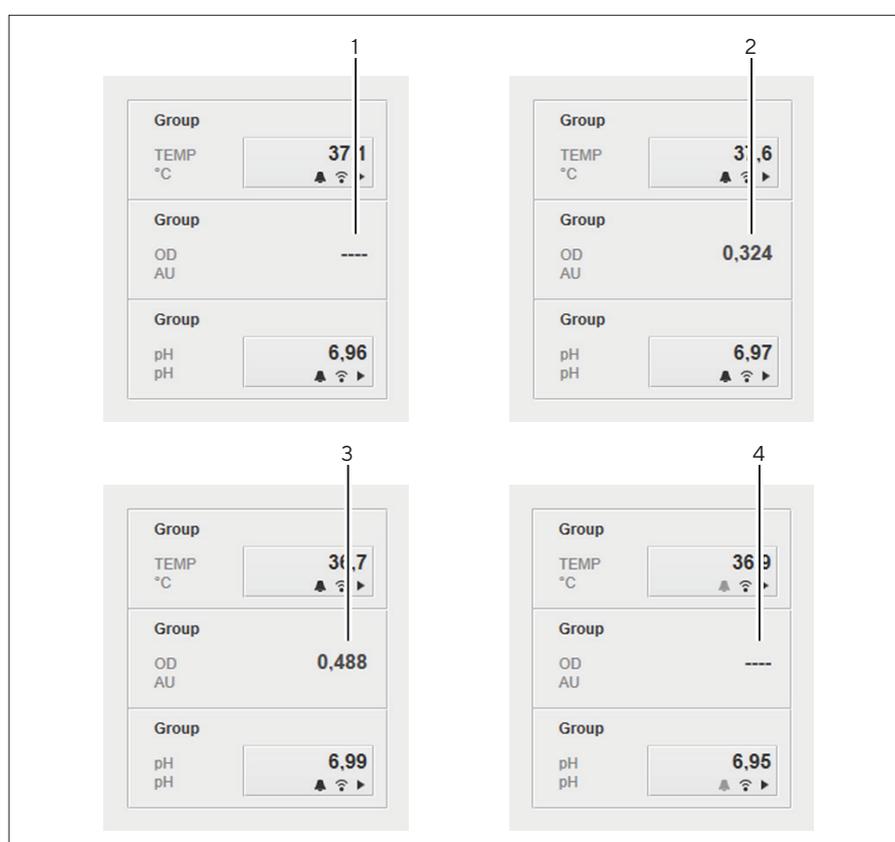


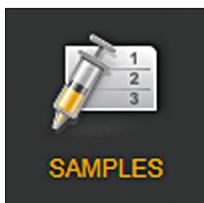
Fig. 10: Process for the displayed offline values in the [UNIT DISPLAY] menu (example)

Pos.	Description	Value
1	While the batch is started and before entry of the offline value	----
2	After entering the value for the first sampling	0.324 AU
3	After entering the value for the second sampling	0.488 AU
4	Immediately after the batch has been stopped	----
	If the offline variable is selected in the [CHART] menu, the offline value for the last sampling is displayed again.	0.488 AU

4.8 Deleting a Sample

The procedure for deleting a sample is the same for the [MONITORING] and [ANALYSIS] functional areas and is described using the [ANALYSIS] functional area as an example.

Procedure



- ▶ In the [ANALYSIS] functional area, click on the [SAMPLES] button.
- ▶ In the [SAMPLES] menu, select the batch process.

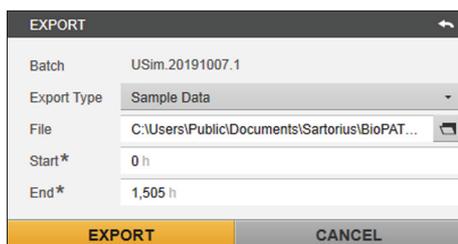
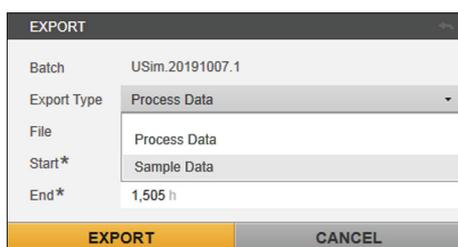
- ▶ Click on the [SAMPLES] button.
- ▷ The [SAMPLES] menu is displayed.
- ▶ Click on the sample entry.
- ▶ In the Footer, click on [Delete].
- ▶ Confirm the [Delete Sample] message with [YES].
- ▷ The sample is deleted.

4.9 Exporting Batch Process Sample Data

In the [EXPORT] menu, you can export the sample data of a completed, aborted, and running batch process and save the data in a csv file. You can choose to export data for either the complete batch process time or a selected time frame of the batch process.

Procedure

- ▶ In the [ANALYSIS] functional area, select the batch with the sample data for the export.
- ▶ Click on the [EXPORT] button.
- ▶ In the [Export Type] selection menu, select the [Sample Data] entry.



- ▶ Click on the [File location] button, and select the file location and file name.
- ▶ In the [EXPORT] window, click on the [EXPORT] button.
- ▶ The sample data of the batch process is exported as a csv file to the selected file location.



- ▶ To view the data: Click on the [OPEN] button, and open the file with the corresponding program.

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