



**BRS**

***BioReactor Simulator***

*<https://unity.bioprocesscontrol.com>*

**Software Guide**



This is a quick user guide on how the software of the new BioReactor Simulator (BRS) is working. For information of the hardware and general product information, please see the BRS Manual. The BRS cloud application is reached through the following website address: <https://unity.bioprocesscontrol.com>

bioprocess

CONTROL

Signed in as BRS\_Demo

Back to Dashboard

Instrument status: Online

08:56 UTC / 10:56 TZ

Home

Control

Feeding/Discharging

Graphs

Reports

System

Instruments ▾

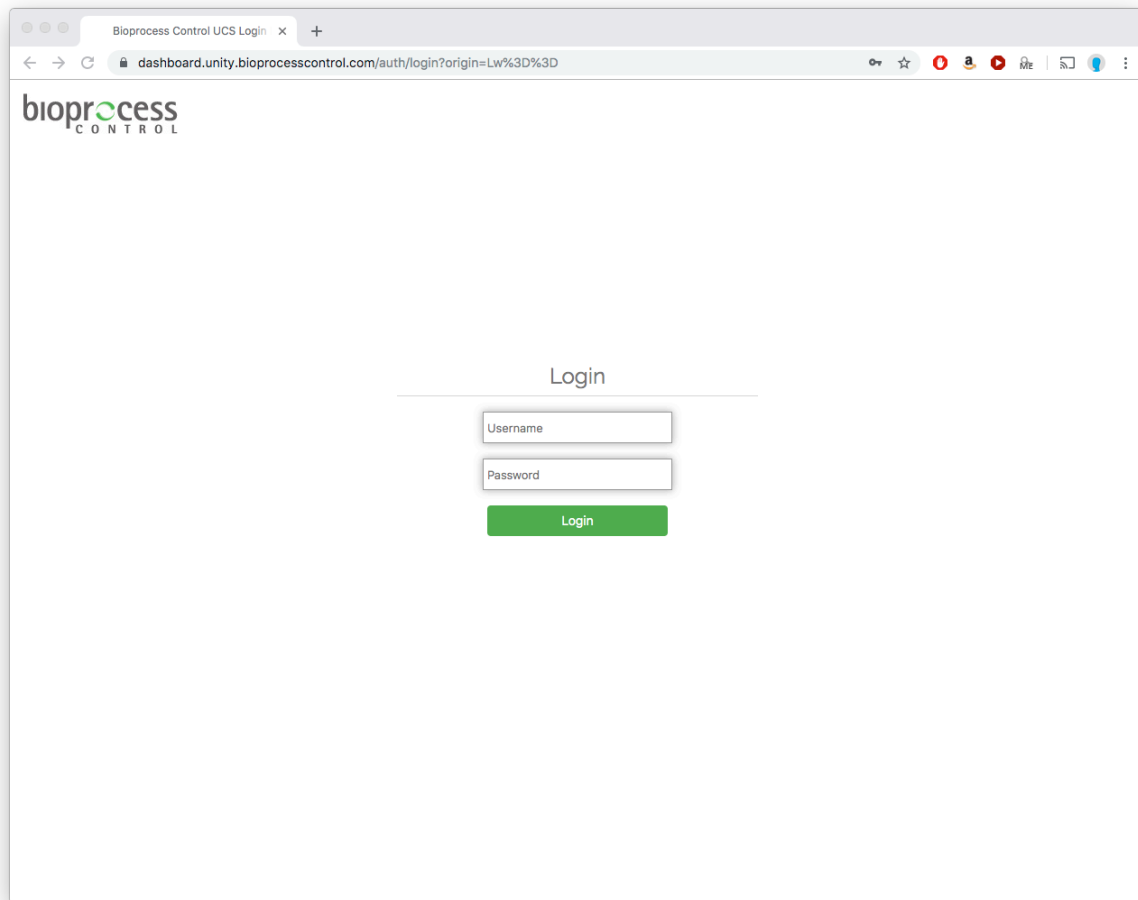
BioReactor Simulator (BRS)



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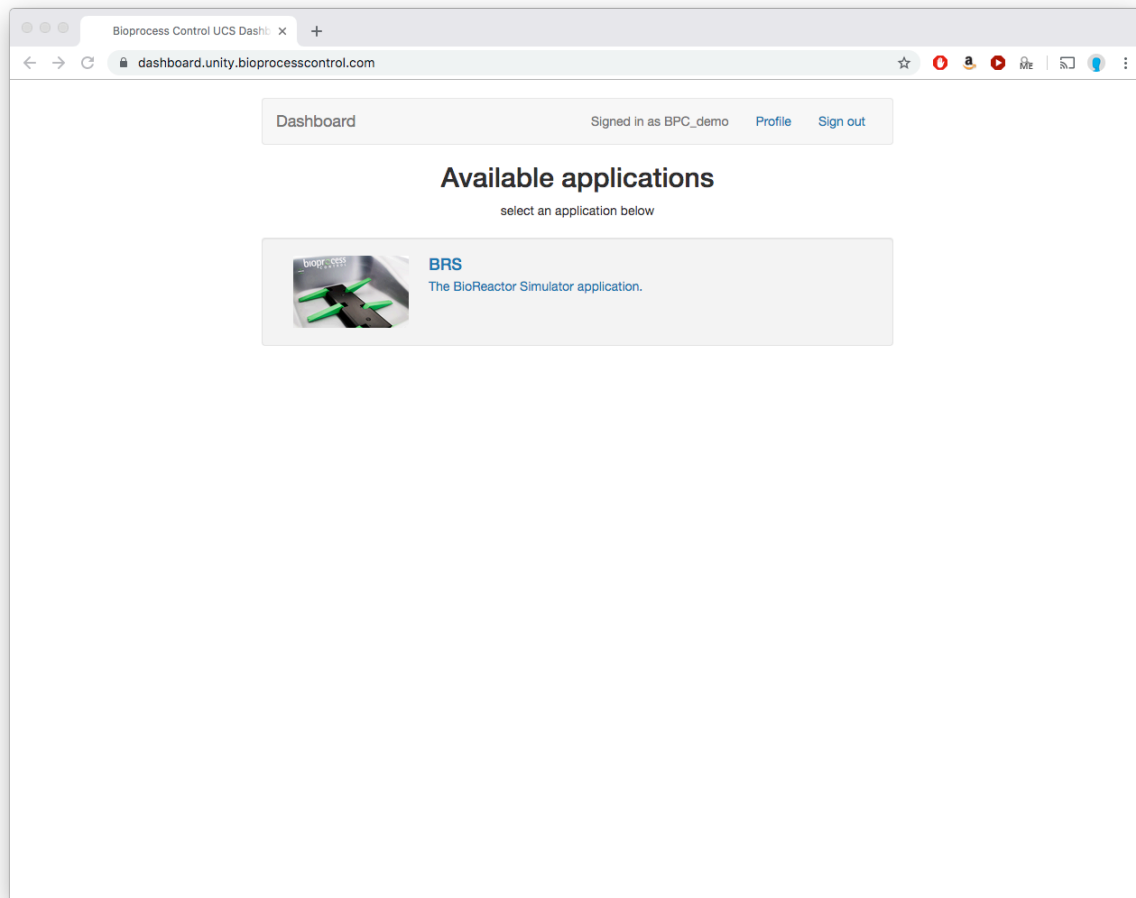
# 1 LOGIN



The login page is reached when accessing the BRS web application at <https://unity.bioprocesscontrol.com>. To login do the following steps:

- 1) Enter your assigned user name.
- 2) Enter your password: bioprocesscontrol (default password). Please note that this password should be changed by the user for security purposes.
- 3) Press **Login**.

## 2 DASHBOARD



The dashboard shows the available applications of BPC Unity which is a platform where all Bioprocess Control's web based applications are gathered. If you have purchased a BRS it's application will be visible as in the screenshot above. To access the BRS, click anywhere inside the grey box around the BRS application. From the dashboard you can also access your profile settings and sign out by using the buttons located in top right corner.

### 3 PROFILE

[Dashboard](#)Signed in as bpcadmin[Profile](#)[Sign out](#)

## User profile

**User ID:** bpcadmin

**User name:**

**Timezone:**

☒ **Change password**

**New password**  
(8 to 24 characters):

**Confirm password:**

[Save changes](#)

Here you can change the settings of your user profile. To save any changed settings click on the button **Save changes**. The settings that can be edited are:

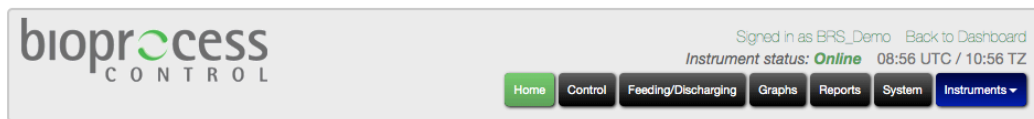
**User ID:** Unique user ID that is set by Bioprocess Control to manage users. This ID cannot be changed

**User name:** Name that is set by the user and will be displayed in the software.

**Timezone:** The time zone that you are operating your instrument at. In the BRS all data is presented at UTC time to avoid confusion when users are looking at it from different time zones. However, to simplify inputs (e.g. feeding and discharging) the local time (and UTC) is used.

**Change password:** Change the password for the user profile. It is recommended to change from the default password that is *bioprocesscontrol*.

## 4 HOME



### BioReactor Simulator (BRS)



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The web interface of the BRS application is organized in a number of pages, all reachable from the start page named “Home”, which is the first page the user enters. The pages are organised in the order an experiment is setup, executed, monitored and finally documented. In the top right corner you may also see which user is signed in, the status of the instrument (online or not) and the current time (both UTC and the local time zone (TZ)).

The following pages are available:

**Home:** Just a landing page with product photo. In the future some product information and documentation will be available here.

**Control:** The user can start, pause and end an experiment. The user can also control the speed of the motors driving the reactor stirrers.

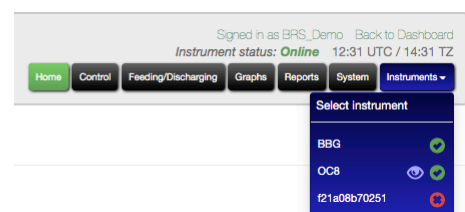
**Feeding/Discharging:** The user has the possibility to specify type of substrate, its concentration, and schedule the time for feeding/discharging and one of the following variable inputs: amount, requested OLR or HRT.

**Graphs:** Two graphs, showing the gas flow rate and OLR & HRT vs. time, are displayed.

**Reports:** The user can generate a report with experiment data for each reactor/line.

**System:** This page contains the configuration of IP addresses and cell volume settings, the system log and set date and time.

**Instruments:** A list of available instruments assigned to the user. If you have more than one BRS instrument, you can switch between these here. The eye symbol indicates the instrument you currently are looking at, a green checkmark indicate it is online and a red cross indicates it is offline.



## 5 CONTROL

bioprocess  
CONTROL

Signed in as BRS\_Demo Back to Dashboard  
Instrument status: **Online** 13:40 UTC / 15:40 TZ

HomeControlFeeding/DischargingGraphsReportsSystemInstruments

### Lines

Line	Name	Reactor volume (ml)	Unit	Control	Status	Started	Duration
1	Experiment 1	2000	TS VS COD	▶	Running	2019-08-22 09:33	7d 4h
2	Experiment 2	2000	TS VS COD	▶	Running	2019-08-22 09:30	7d 4h
3	Experiment 3	4000	TS VS COD	▶	Running	2019-08-22 09:30	7d 4h
4	Biogas reactor nr. 4	2000	TS VS COD	▶	Running	2019-08-22 09:34	7d 4h
5	Biogas reactor nr. 5	5000	TS VS COD	▶	Running	2019-08-22 09:29	7d 4h
6	Biogas reactor nr. 6	10000	TS VS COD	▶	Running	2019-08-22 09:29	7d 4h

Only stopped experiments can be changed.

### Motor

Speed adjustment (%)

85

Mixers on time (s)

90

Mixers off time (s)

30

Motor power

OnOff

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This page is used to set some information about the experiments, start and stop the experiments and control the motors. It is divided into two submenus: Lines and Control.

### Line control

The line control menu is organized as a table with each of the 6 lines as rows and the various settings and information as columns. Below follows some information of each setting/information in the columns.

**Line:** Number of the line (1-6).

**Name:** The name of the line in the experiment. Can only be edited when experiment is in stop mode (not running)

**Reactor volume:** The volume (ml) of the reactor/digester that is used. It is used to calculate some process parameters. Can only be edited when experiment is in stop mode (not running)

**Unit:** The unit that is used to quantify the organic material in the substrate. Total solids (TS), Volatile Solids (VS) and Chemical Oxygen Demand (COD) is the available options. Can only be edited when experiment is in stop mode (not running)

**Control:** Start, pause and stop of the experiments. Once an experiment is started all data from a previous experiment on the same line will be erased.

**Status:** Indicates whether the experiment is running or not.


**Started:** The date and time (UTC) when the experiment was started.

**Duration:** How long the experiment has been running.

### Motor control

Here the user operate the mixing by setting the speed (% of max), the on and off time (s) as well as starting (On) and stopping (Off) them. A blue color on the button indicate if the motor is on or off.

## 6 FEEDING AND DISCHARGING



Signed in as BRS\_Demo   Back to Dashboard  
 Instrument status: Online   13:41 UTC / 15:41 TZ

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### Feeding/Discharging

Line	Name	Mode	Interval (min)	Next	Count	Status
1	Experiment 1	Off <a href="#">Auto</a> <a href="#">Manual</a>	240	in 45m 35s	43	Running
2	Experiment 2	Off <a href="#">Auto</a> <a href="#">Manual</a>	240	in 3h 2m	43	Running
3	Experiment 3	Off <a href="#">Auto</a> <a href="#">Manual</a>	1440	in 21h 14m	8	Running
4	Biogas reactor nr. 4	Off <a href="#">Auto</a> <a href="#">Manual</a>	1440	in 6h 12m	7	Running
5	Biogas reactor nr. 5	Off <a href="#">Auto</a> <a href="#">Manual</a>	480	in 4h 20m	22	Running
6	Biogas reactor nr. 6	Off <a href="#">Auto</a> <a href="#">Manual</a>	480	in 4h 20m	23	Running

[Experiment 1](#)
[Experiment 2](#)
[Experiment 3](#)
[Biogas reactor nr. 4](#)
[Biogas reactor nr. 5](#)
[Biogas reactor nr. 6](#)

Line 1: Experiment 1 (Running)

2019

August

22 23 24 25 26 27 28 29

Feedings							Discharges	
Time (UTC)	Substrate	Concentration (%)	Amount (g)	TS (g)	OLR (g/l/day)	HRT (days)	Time (UTC)	Amount (g)
2019-08-29 02:26	Substrate name (change m 0)	0	0.0	0.0	N/A		<a href="#">Click to add</a>	<a href="#">Click to add</a>
2019-08-29 06:26	Substrate name (change m 0)	0	0.0	0.0	N/A		<a href="#">Click to add</a>	<a href="#">Click to add</a>
2019-08-29 10:26	Substrate name (change m 0)	0	0.0	0.0	N/A		<a href="#">Click to add</a>	<a href="#">Click to add</a>

[Log new feeding](#)

On this page the feeding and discharging of the reactors are entered into the software. This allows you to track the feeding and discharging and compare with the measured gas production. The data from the feedings is also used to calculate some process parameters.

The feeding/discharging menu is organized as a table with each of the 6 lines as rows and the various settings and information as columns. Below follows some information of each setting/information in the columns.

**Line:** Number of the line (1-6).

**Name:** The name of the line in the experiment. Can't be edited.

**Mode:** Three options on how the feedings and discharges should be registered in the software. **Off** means that no feedings/discharges are registered automatically. Instead each new entry has to be manually inserted by the user. **Auto** means that a new feeding and discharge is entered automatically and **Manual** means that the feeding is entered automatically but needs to be confirmed (green checkmark next to feeding) by the user before it is registered by the system fully.

**Interval:** The planned time interval between each feeding and discharge in minutes. When the mode is in manual or auto a feeding and discharge will be added with this interval.

**Next:** Time to next feeding and discharge. The circular arrow is a button that resets the time to next feeding and discharge.

**Count:** Number of feedings and discharges that are uploaded to the table below. Once it has reached 100, only the latest 100 will be shown in table. To upload more click on the arrow next to the 100 number.

**Status:** Indication if the line is running or is stopped.

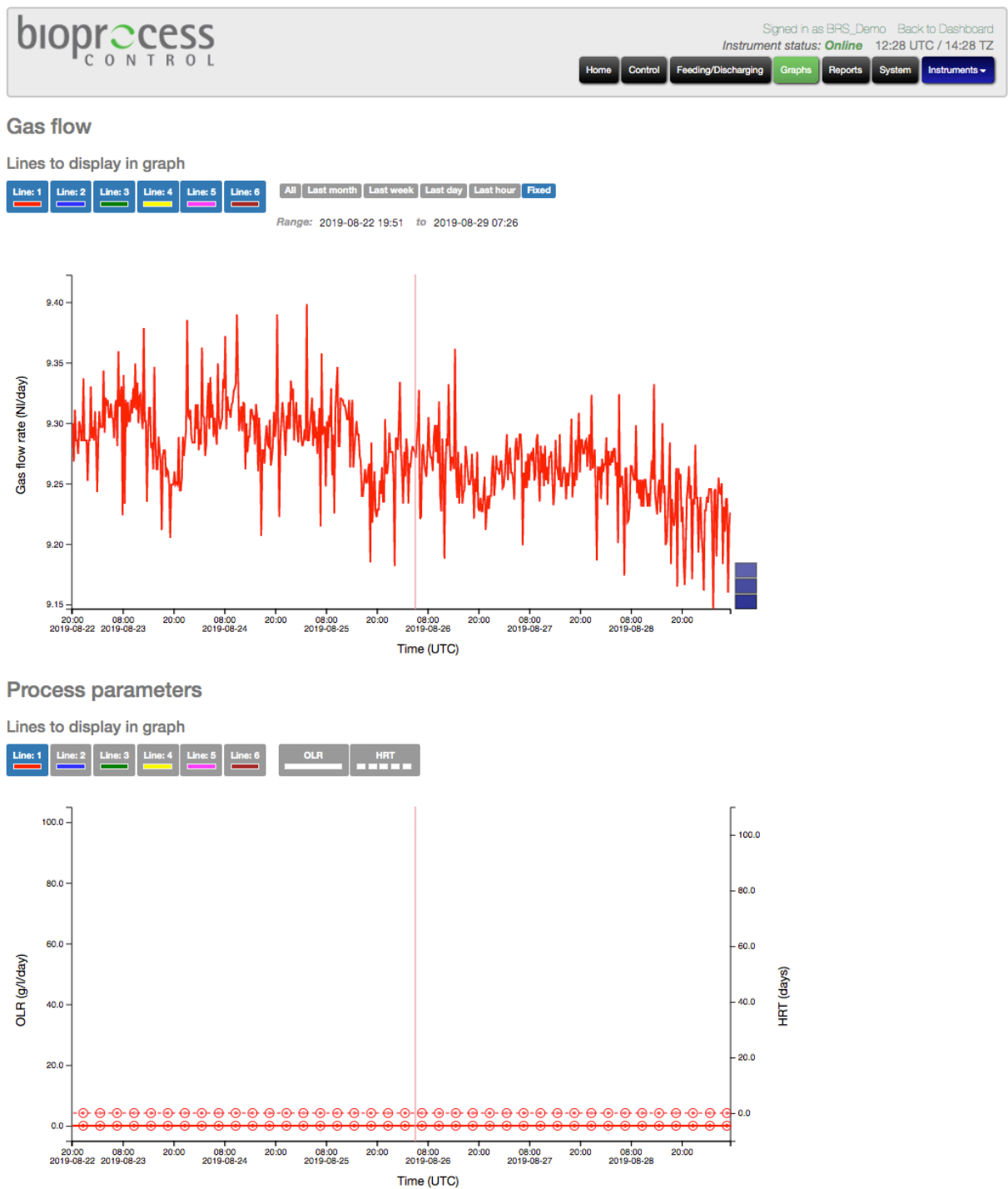
Below the feeding/discharging operation menu there is a table that shows the individual feedings and discharges for each line. Here you can also edit, add and remove them. Only the feedings and discharges for one line can be viewed at a time and to switch between them use the line names above the table. In the table, the feeding and



discharges are organized in chronological order and divided into smaller groups (i.e. year, months and days) depending on number of feedings within the interval. Each feeding has a time, substrate name, concentration and amount that can be edited. The substrate name is an arbitrary name chosen by the user to identify which substrate (mixture or not) that is used. The concentration and amount is, as their names suggests, the amount (g) and the concentration (% (VS and TS) or g/L (COD)) of the substrate added for the feeding. To reduce the need for entering the same information multiple times, the substrate name, concentration and amount is automatically copied to the next feeding. For each feeding the added organic amount ( $g_{VS/TS/COD}$ ), organic loading rate (OLR;  $g_{VS/TS/COD}/l/day$ ) and hydraulic retention time (HRT; days) are calculated and presented in the table. For the discharges, only time and amount (g) is present in the table. Each feeding is coupled to a discharge and if there is no discharge carried out with the feeding, the amount of the discharge should be set to 0 g.

To log a new feeding and discharge click on the “Log new feeding” button. This will add a feeding and discharge with the current time that then can be edited. To remove a feeding and discharge use the blue and white cross on the right side of the table. Finally, the green checkmark indicate that the feeding and discharge has been verified (automatically for auto mode and manually added feedings). An unverified feeding and discharge is indicated by a yellow checkmark. To verify an unverified entry, click on the yellow checkmark.


## 7 GRAPHS



In the graphs page, the recorded data is visualised. It is divided into two graphs, the top shows the recorded gas production while the bottom one shows the organic loading rate and hydraulic retention time based on the feedings. Each line is represented by a unique color and the its graph can be shown or hidden by clicking on the rectangles with the color and line number in the top left corner of the page. To the right of these boxes ther are a few short cuts that allows you to look at different time intervals. It is also also possible to specify an exact interval in the fields below.

To zoom in the graph draw a box of the area that you want to zoom in to with left mouse button. Once it is displayed in a zoomed view you can get back to the previous view by clicking on the blue box that pops to the right of the graph. To pan in the graph, hold the right mouse button and move around. By hover the cursor over a point the graph, its value will be displayed.

## 8 REPORTS



Signed in as Test Admin · [Back to Dashboard](#)  
Instrument status: Online 12:02 UTC / 16:02 TZ

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### Reports

Select experiments and interval

Line	Name	Starting time (UTC)	Duration	Last opening	Status	Include		Extra
1	Experiment 1	2019-08-22 09:33	6d 22h	11d 3h	Running	<input type="checkbox"/> yes	<input type="checkbox"/> no	<a href="#">csv</a>
2	Experiment 2	2019-08-22 09:30	0s	18d 2h	Running	<input type="checkbox"/> yes	<input type="checkbox"/> no	<a href="#">csv</a>
3	Experiment 3	2019-08-22 09:30	0s	18d 2h	Running	<input type="checkbox"/> yes	<input type="checkbox"/> no	<a href="#">csv</a>
4	Biogas reactor nr. 4	2019-08-22 09:34	0s	18d 2h	Running	<input type="checkbox"/> yes	<input type="checkbox"/> no	<a href="#">csv</a>
5	Biogas reactor nr. 5	2019-08-22 09:29	0s	18d 2h	Running	<input type="checkbox"/> yes	<input type="checkbox"/> no	<a href="#">csv</a>
6	Biogas reactor nr. 6	2019-08-22 09:29	0s	18d 2h	Running	<input type="checkbox"/> yes	<input type="checkbox"/> no	<a href="#">csv</a>

Interval [Days](#) [Hours](#) [15 min](#)

[Create report](#)

### List of reports

Generated at (UTC)	Name (click to rename)	Rows	Size	Interval	Lines	Status	Action	
2019-08-21 07:24	<a href="#">Report nr 31</a>	18235	4.35 mb	15 min	1, 2, 3, 4, 5, 6	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-26 09:08	<a href="#">Report nr 30</a>	60	77.00 kb	Days	1	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-26 08:52	<a href="#">Report nr 29</a>	60	77.00 kb	Days	1	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-26 08:37	<a href="#">Report nr 28</a>	189	2.18 mb	Days	2, 3, 4, 5, 6	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-26 08:36	<a href="#">Report nr 27</a>	189	2.56 mb	Days	1, 2, 3, 4, 5, 6	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-25 22:55	<a href="#">Report nr 26</a>	189	2.56 mb	Days	1, 2, 3, 4, 5, 6	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-20 07:46	<a href="#">Report nr 25</a>	0	2.51 mb	Days	1, 2, 3, 4, 5, 6	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-13 08:26	<a href="#">Report nr 24</a>	0	0.30 mb	15 min	1, 2, 3	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-13 08:25	<a href="#">Report nr 23</a>	0	0.30 mb	Days	1, 2, 3	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-13 08:24	<a href="#">Report nr 22</a>	0	0.14 mb	Hours	1, 2	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-13 08:12	<a href="#">Report nr 21</a>	0	0.30 mb	Days	1, 2, 3	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-13 08:07	<a href="#">Report nr 20</a>	228	10.96 mb	Days	1, 2, 3, 4, 5, 6	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-06-13 07:44	<a href="#">Report nr 19</a>	228	10.96 mb	Days	1, 2, 3, 4, 5, 6	Finished	<a href="#">download</a>	<a href="#">delete</a>
2019-04-26 13:12	<a href="#">Report nr 18</a>	5505	11.27 mb	Hours	1, 2, 3, 4, 5, 6	Finished	<a href="#">download</a>	<a href="#">delete</a>

In this page Excel reports with experiment results can be generated and downloaded. To generate a report, choose which of the lines to include (yes/no) under the column **Include**, choose the time interval (days, hours, 15 min) below the table and click on **Create report**. Other information in the create report table is:

**Line:** Number of the line.

**Name:** The name of the line in the experiment. Can't be edited.

**Starting time:** Starting time of experiment

**Duration:** The duration of experiment

**Last opening:** Time since the last cell opening was registered

**Status:** Status of the experiment. Can be running, paused or stopped.

**Extra:** A csv file with the raw data of the experiment (time, temperature and pressure for each opening).

After a report is generated it is added to the table below where all generated reports are stored in chronological order. From here it is possible to download the report by clicking on the **download** button to the right of the table. To delete a report click on the **delete** button. Other information in the report table is:

**Generated at:** Time of report generation

**Name:** Name of report. Can be edited by user

**Rows:** Number of rows in Excel report


**Size:** Size of Excel file

**Interval:** Time interval used for the report data

**Lines:** Lines included in the report

**Status:** If the report generation is finished or not.

## 9 SYSTEM



Signed in as BRS\_Demo · [Back to Dashboard](#)  
Instrument status: **Online** 11:34 UTC / 13:34 TZ

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### System

#### Instrument info

##### Values

Unique id	f21a08b702df
Display name	OC8
Last seen	Just now
IP address	Unknown
Version	brs-ucs_3.2 v2.2248 (oc8a5)

#### Hardware

##### Cell Volume (ml)

1	10
2	10
3	10
4	10
5	10
6	10

[Reset to factory default](#)

#### Temperature and pressure sensor calibration

	Temperature (°C)	Pressure (kPa)
Stored offset	1.3	-0.3
Calculated offset	0.8	-0.2
Sensor value	22.2	100.9
Actual value	23	100,7

[Set Temperature](#) [Set Pressure](#)

#### Live instrument log (showing last 136 entries)

Timestamp (UTC)	Log entry
2019-09-11 10:02:05	[cclient] Failed to retrieve device IP; not a major thing...
2019-09-11 10:02:15	[motor] Stopping motor for 30 sec.
2019-09-11 10:02:45	[motor] Running motor with dutycycle=195 for 90 sec.
2019-09-11 10:04:07	[cclient] Failed to retrieve device IP; not a major thing...
2019-09-11 10:04:15	[motor] Stopping motor for 30 sec.
2019-09-11 10:04:45	[motor] Running motor with dutycycle=195 for 90 sec.
2019-09-11 10:06:08	[cclient] Failed to retrieve device IP; not a major thing...
2019-09-11 10:06:15	[motor] Stopping motor for 30 sec.
2019-09-11 10:06:45	[motor] Running motor with dutycycle=195 for 90 sec.

The system page contains all the system settings and information of the BRS. It is divided into four submenus:

**Instrument info:** Some information about the instrument as use. Here it is possible to see the unique id (MAC id), when it was last connected to the BRS server, what IP address it has on its local network and what firmware version it is running. It is also possible to give the instrument a name in the field next to Display name. This can be of interest when you have more than one BRS instrument to navigate between.

**Hardware:** Cell volumes of the flow cells in the instrument. These can only be modified when the line experiment is not running (stopped). A new instrument is delivered with factory default values entered in these field. To revert back to these, just click on button **Reset to factory default**.

**Temperature and pressure sensor calibration:** In this menu it is possible to calibrate the instrument temperature and pressure sensor. To perform the calibration enter the correct temperature and/or pressure in the actual value field and click on **set temperature** and/or **set pressure**. An offset between the sensor value and the reference value will then be stored and applied to correct each temperature and pressure reading. Please note that the pressure and temperature displayed in the system log is not corrected with the offset. It is recommended to re-calibrate the sensors once every month.

**Live instrument log:** The system log of the instrument. In this table, some of the recorded events by the system is displayed together with the time (UTC) of the event. For example, it is possible to see each cell opening, the motor actions and if there is a power failure etc. Only the last 200 log posts are possible to see.