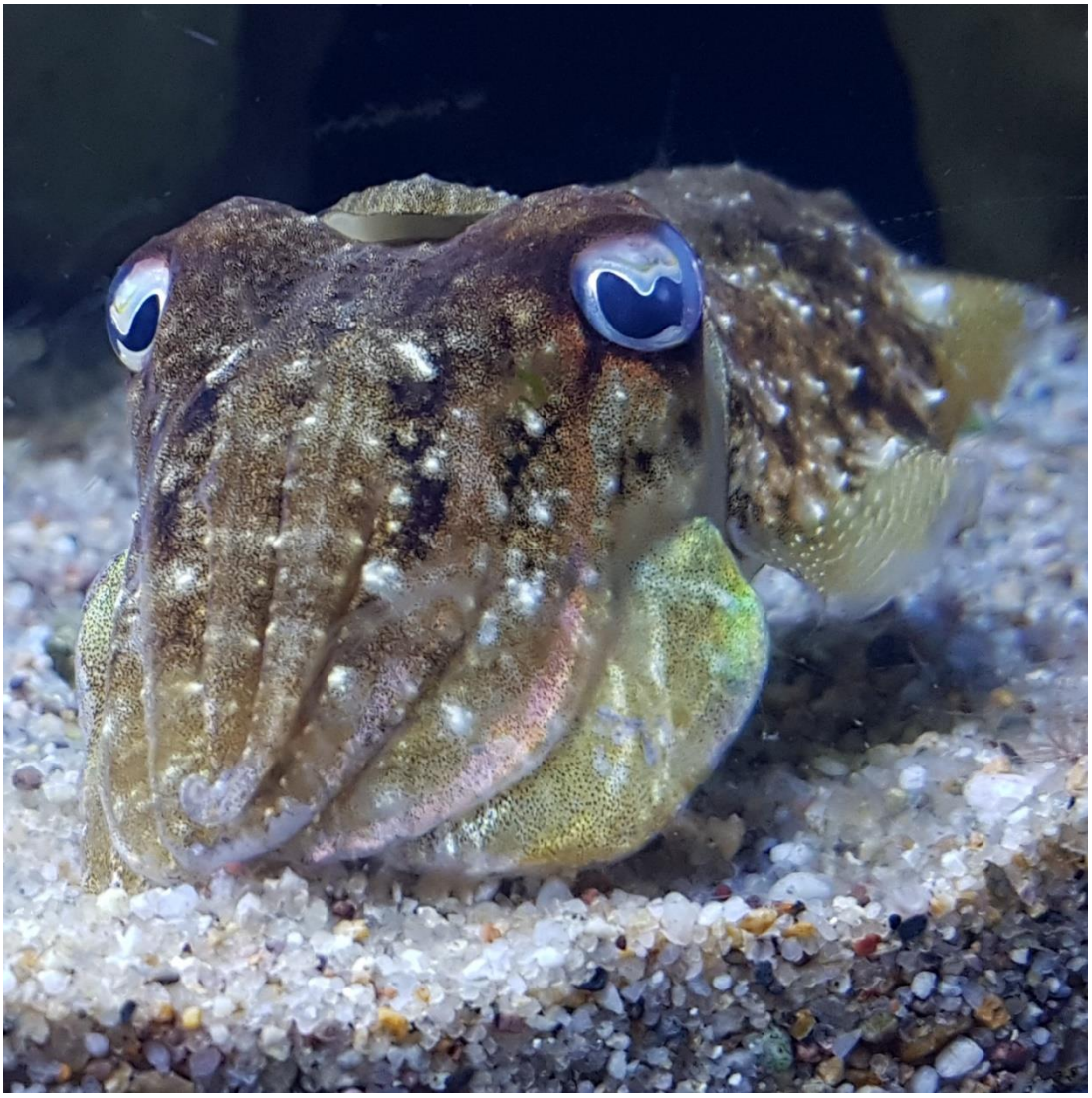
OCTAFLOW II CONTROL APP V1.0
USER GUIDE



About the app

The Octaflow II Control App is a user written alternative to the official control software.

Therefore, the usage is at your own risk.

It is written and tested using MATLAB R2020b on a PC using Windows 10 (64 bit) as operating system.

Octaflow II ™ is a trademark of ALA Scientific Instruments, Inc., Farmingdale, NY, USA.

The app includes the CyUSB.dll v. 1.2.3.0 from the Cypress Semiconductor Corp., San Jose, CA, USA.

Usage is only allowed with the Octaflow II ™ system or other devices with Cypress controllers.

Installation

System requirements:

- Windows 10 (64 bit) (.NET Framework 4.0 or newer necessary)
- MATLAB Runtime v. 9.9 from The MathWorks, Inc. or internet access to download it during the app installation. System requirements available at www. mathworks.com)
- Octaflow II Software Version 3.0.1.0 64 bit from ALA Scientific Instruments, Inc. installed to get the necessary drivers

Startup

After starting the app, the startup view will be presented.

When the Octaflow II™ system is connected, you can close the view with the “Start” button.

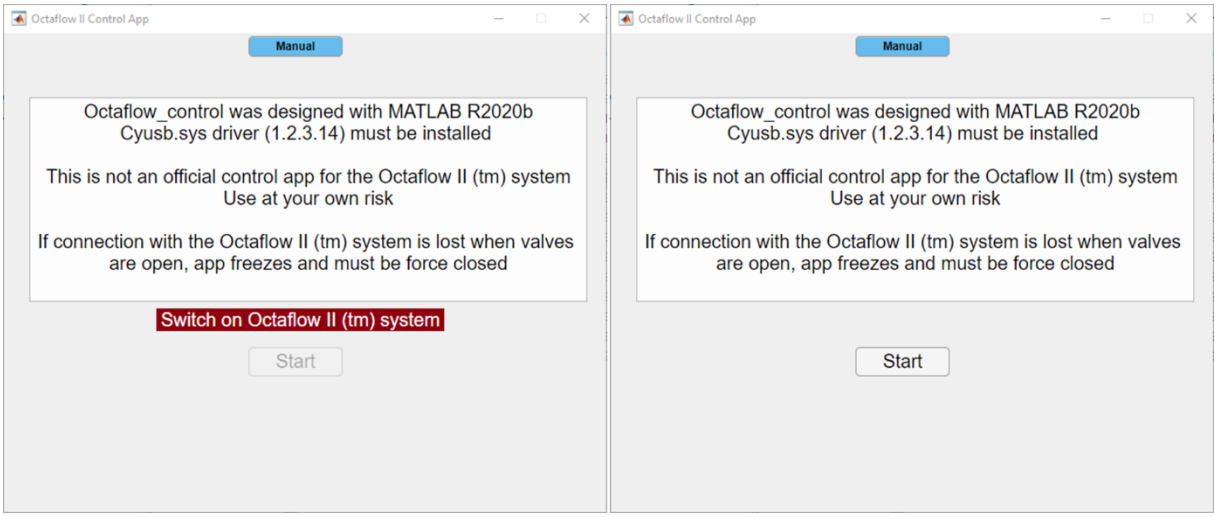


Figure 1: Start up view without (left) or with (right) connected Octaflow II™ system

General panel arrangement

The apps main window is divided in three areas. On Top are the general buttons for (de)activation of the SYNC OUT feature, opening the manual and breaking operations (blue area in Figure 2).

Below is the tab group with the main controls (green area in Figure 2).

At the bottom the pressure gauge (not functional) and the set valves power settings are shown (yellow area in Figure 2).

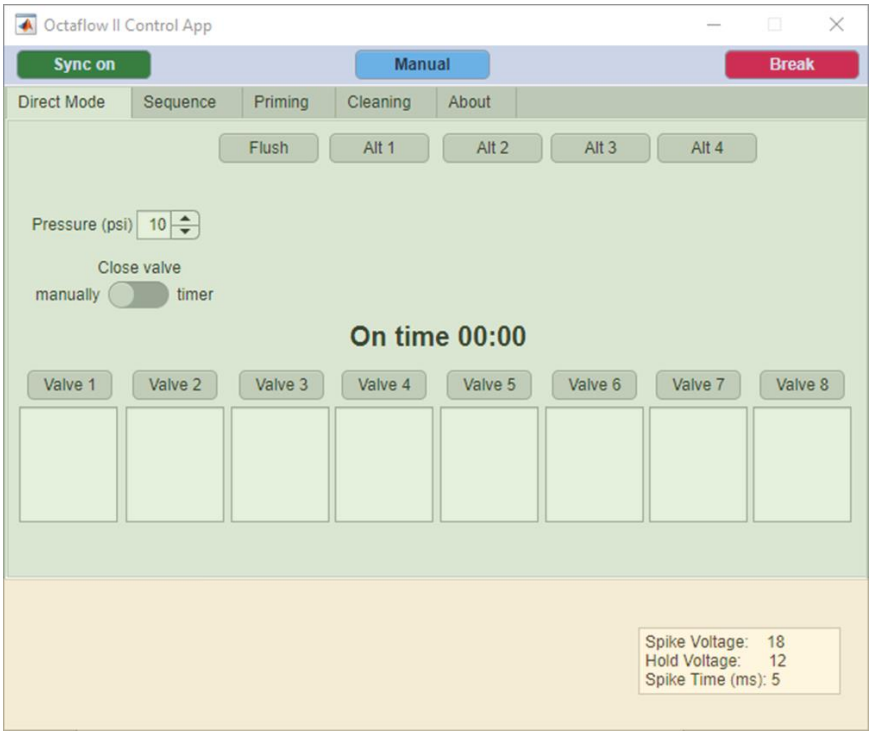


Figure 2: Window areas

General Buttons

Sync on/off: If Sync is on, every time a valve opens and if the last open valve closes, a TTL pulse is send out from the Octaflows SYNC OUT port.

Manual: Opens the apps user manual (pdf).

Break: Stops the ongoing operation and closes the valves. A notification will be visible till the break procedure is finished.

Direct Mode Tab

In the direct mode single valves can be controlled manually. From Top to bottom are the buttons for the special valves flush and Alt1-4 (Only one can be selected at the same time),

a spinner to set the pressure (0-30 psi),

the switch to toggle between the valve closing modes ‘manually’ and timer based,

the ‘on time’ spinner (1-300 s; timer mode only),

a timer (manually mode only),

the control buttons for the valves (Only one can be selected at the same time) and

text areas to label the valves.

To use this mode, first decide if a special valve should be involved. The flush valve opens and closes at the same time as the regular valves. The Alt valves close when the regular valves open and vice versa. If no special valve is selected, the special valve will be open all the time. To unselect a special valve, select its button again. If another special valve is selected, the first selected one will become unselected.

Then set the application pressure and decide how the valves should be closed. In manual mode the selected valve closes when its button is selected again. A timer shows how long the valve is already open in the time format mm:ss. If the timer mode is selected, set after how many seconds the selected valve will close.

After deciding the settings, select the valve which should be opened. During the valves open time, most control buttons will be disabled.

In manual mode close the valve by clicking its button again. Alternatively, select another valve button to open it and close the prior selected one.

In timer mode another valve can only selected after the first selected valve closes.

The labels can be used to note the applied compounds in the channels and have no active function.

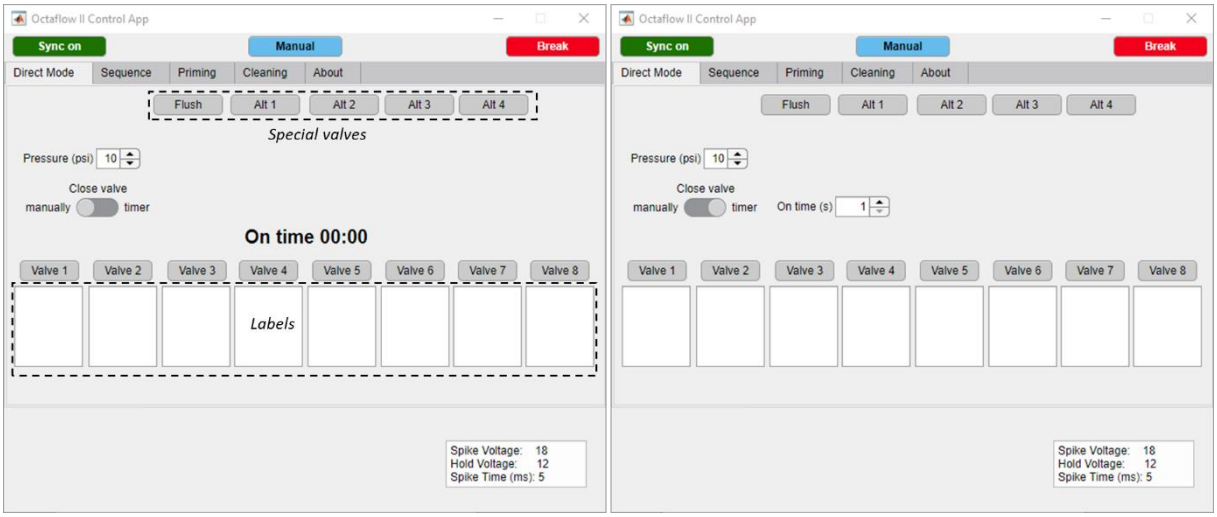


Figure 3: Direct mode tab in manual mode (left) and timer mode (right)

Sequence Tab

With the sequence tab a series of valve activations with pauses between can be set.

In the first line the new steps settings can be selected and added to the sequence in the table below.

Below the table on the left are the ‘Start sequence’ button and the status label. On the right side are the delete options for the sequence.

To add a new step to the sequence, select its position (if at least one step is already present), the valve and the applied pressure. Decide how long the valve should open and for how many seconds the sequence should wait before progressing with the next step. In the drop down menu a special valve can be selected. The flush valve opens the regular valves and closes during the wait times and after the sequence. The Alt valves close when the regular valves open and vice versa. If no special valve is selected, the special valve will be open all the time.

By clicking the ‘Add Step’ button, the new step will be added to the sequence.

To delete a single step, select its number with spinner next to the ‘Delete step’ button and press the delete button. To delete the whole sequence, check the box next to the ‘Delete all’ button and click the delete button.

If at least one step is present in the sequence, it can be started with the ‘Start sequence’ button. The label next to it shows the actual step and phase.

Use the break button to interrupt the started sequence.

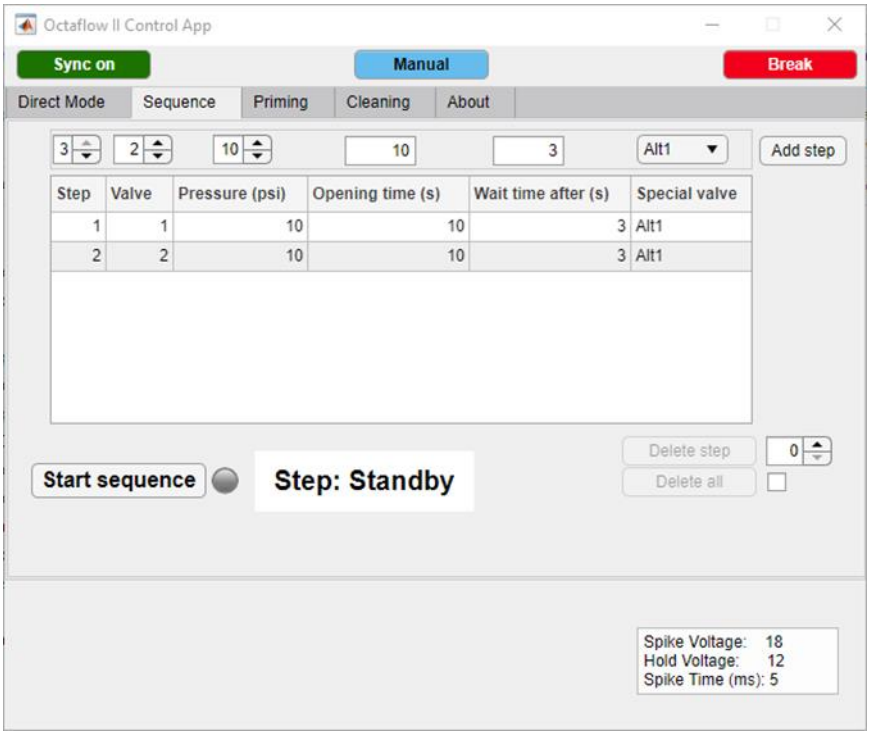


Figure 4: Sequence tab with two added steps

Priming Tab

With the priming tab, all regular valves will be opened consecutively for a set number of loops with the same settings. Therefore, it is useful for flushing the valves.

Like in the sequence mode, you can set the valves opening time (1-30 s), the applied pressure (0-30 psi), the wait time after closing the valve (1-30 s) and if special valves should be involved. Additionally, you set the number of loops (1-20) and in which order the valves (valve 1→8 or valve 8→1) will be opened.

Pressing the start button will start the priming sequence. The actual sequence step will be shown on the panels top right. The gauge displays the residual time of the ongoing step.

Note that the last wait time step will not be executed.

In case a special valve of the Direct Mode Tab was selected, it will be reselected after the priming sequence was executed. The other way around, if a special valve was solely selected in the Priming Tab, the corresponding special valve of the Direct Mode Tab will not be selected after the sequence finish. An exception is the flush valve, which will be kept enabled if it was selected during the priming sequence. It can be disabled manually in the direct mode panel.

Clicking the break button will interrupt the priming procedure.

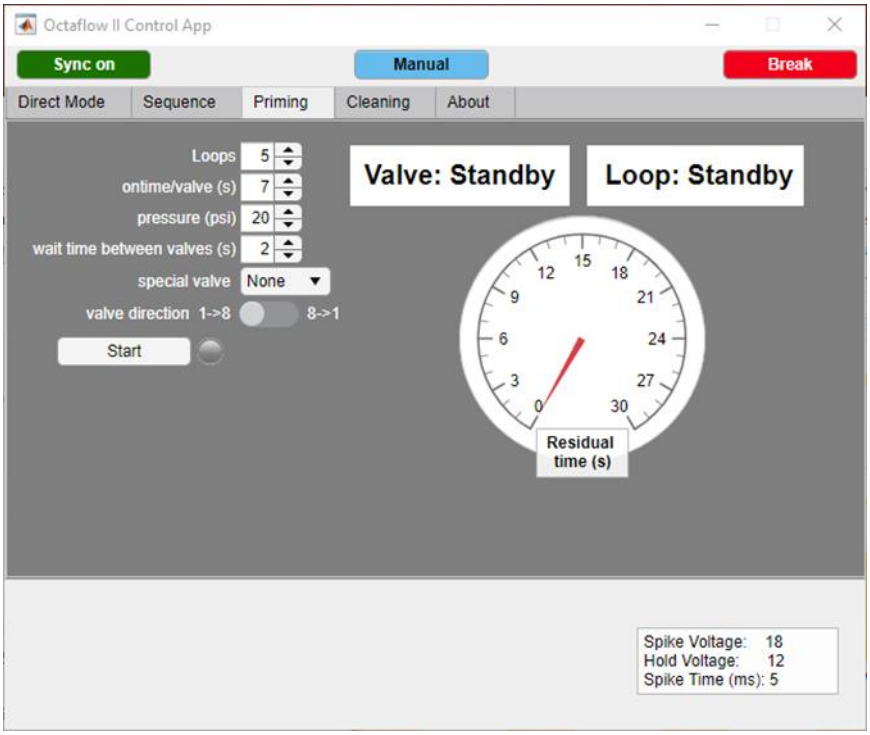


Figure 5: Priming tab

Cleaning tab

The cleaning tab allows the user to open all valves in parallel with a set pressure. The special valves are not involved in the process and will be kept unpowered during the cleaning procedure.

There are two modes for cleaning. With the start button the cleaning procedure will start, with the set opening time (1-20 min) and pressure (0-30 psi).

On the other hand by checking the box the quick flush button gets enabled. Clicking this button will open the valves for 15 s with a pressure of 30 psi.

The gauge on the right will show the cleaning procedures residual time in min.

Clicking the break button will interrupt the cleaning procedure.

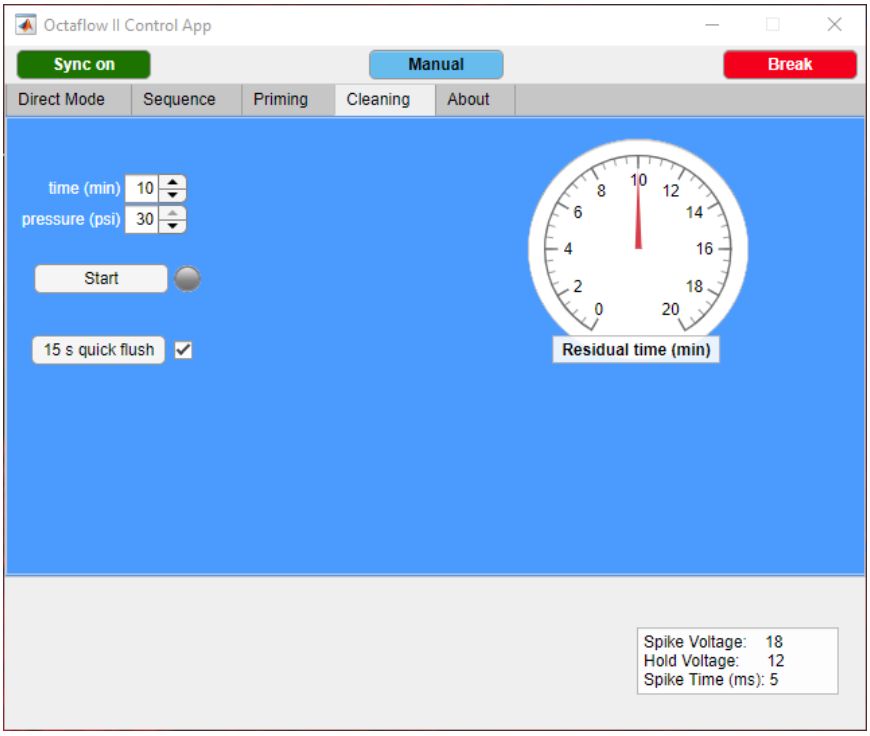


Figure 6: Cleaning tab

About tab

In this tab some general information are listed.

Connection lost panel

If the connection with the Octaflow II™ system has been lost during the apps standby, a notification window will appear. If the device is reconnected, this window disappears.

If the connection has been lost during when a valve was open or a sequence was running, the app freezes and has to be force closed.

Closing the app

The app can be closed by clicking the close symbol in the apps top right corner.

A confirmation window will appear and by clicking ‘yes’ the app will be closed.

This process needs some seconds to stop the background processes.

Known issues and limitations

App freezes if the connection to the Octaflow II™ system is lost during running sequences, priming loops and cleaning and must be force closed.

The devices actual pressure is not shown.

Since the app controls the Octaflow II™ system directly, valves can not be triggered via the devices 'TRIGGER IN' port.

Only control of Bank 1 is implemented.

Parallel opening of multiple valves is not supported.

Since sequences are not uploaded to the device, your system resources can affect the timing of the steps.

Even if a pressure of 29 or 30 psi is selected, the maximum pressure will be around 28.5 psi.

Acknowledgments

I thank Prof. Valentin Stein and Ulf Einsfelder from the Institute for Physiology II of the University of Bonn for their help in designing the app and Andy Pomerantz from ALA Scientific Instruments, Inc. for providing the program's base code.

Connection to device via CyUSB.dll adapted from code provided by anonymous user on the Feb 19, 2015 04:41 AM at https://community.cypress.com/t5/USB-Low-Full-High-Speed/CyUSB-dll-in-MATLAB-problems-at-indexing-a-device-list/m-p/58551 (last access 04/13/2021).