

FERMWORKS 3.0

DEMO

GETTING STARTED GUIDE



Jova Solutions provides advanced hardware and software products and custom applications for process control, data management, test, measurement, and automation.

Jova Solutions was founded in 2000 and is located in Berkeley, California.

Please contact us with any questions or to request a FermWorks quote.

fwsupport@jovasolutions.com

www.jovasolutions.com

1-866-755-1400

What is FermWorks?

FermWorks is a software application that automates processes, from simple lab experiments to large-scale manufacturing. FermWorks communicates with a wide variety of instruments and devices to acquire data from them and control their operations. FermWorks has been used successfully in labs and pilot plants for over a decade, at sites such as leading pharmaceutical corporations, biofuels and biopharm start-ups, other process control facilities, and academic institutions. FermWorks stores, analyzes, and displays the data, controls the process continuously and with specific recipes (methods) during experiments, generates reports, and manages users and security. It is a turnkey system, ready to use immediately, yet easily customized and extended for specific needs. FermWorks can run on a single computer or as a networked distributed system supporting an unlimited number of users, computers, instruments, and process tags.

What is the FermWorks Demo?

The demo version of FermWorks has most of the functionality of the FermWorks application. The demo does not include the device drivers that communicate with instruments and devices from a wide variety of vendors, but communication with instruments that provide a standard OPC Server is supported. In addition, some simulated devices (Digital Control Units, DCU's) are included in the demo to provide simulated data.

The FermWorks demo does not support the networked capabilities of the full FermWorks application, that allows shared data and control among multiple computers on a network. In the demo, there is only one computer running FermWorks, and this is called "Station 1." In a networked installation, there would be any number of FermWorks "stations," and each could show data from or control the process on any of the others.



The FermWorks demo may be used for evaluation purposes for **one month**, after which it will no longer run. Instead, a dialog will remind you to contact Jova Solutions to purchase a license to continue using FermWorks.



Contact Jova Solutions at any time during or after the demo period to request a FermWorks quote to get started with real data management and process control.

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Installation of FermWorks

System Requirements

FermWorks requires a computer running Windows XP or 7, with a minimum of 2 GB RAM.

Acrobat Reader is required for displaying the FermWorks Help documentation.

FermWorks Demo Installation

IMPORTANT: After installation, your computer will be restarted automatically. Please save your work and exit all other applications before running the FermWorks installer. After the restart, FermWorks will be automatically configured for first-time use.

Run the FermWorks Demo Installer. The installer will ask you to select the location where FermWorks should be installed. The default is **C:\FW**. Click Next to start the installation to this folder.

After the installation of the application, the FermWorks installer still needs to install other supporting components, restart the computer, and then configure FermWorks for first-time use. When you see **Installation Complete** as shown in Figure 1, click Next and **please wait** until all components are installed and your computer has restarted.

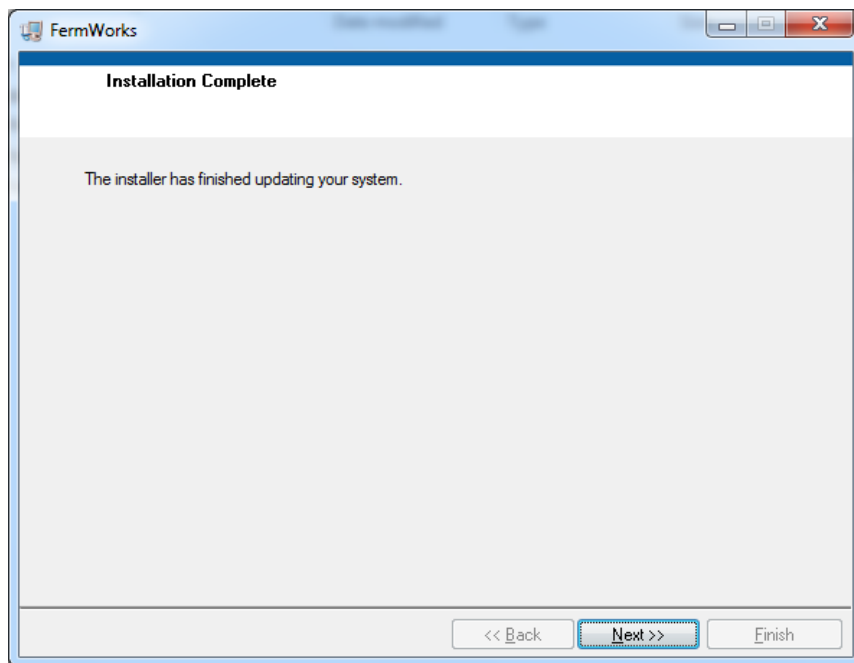


Figure 1: Installation Complete : click Next and then **please wait** for your computer to restart.

FermWorks Demo Configuration

After your computer has restarted, login to Windows. The FermWorks Demo Configuration will start automatically, as shown in Figure 2. Please wait while FermWorks gathers the necessary system information.

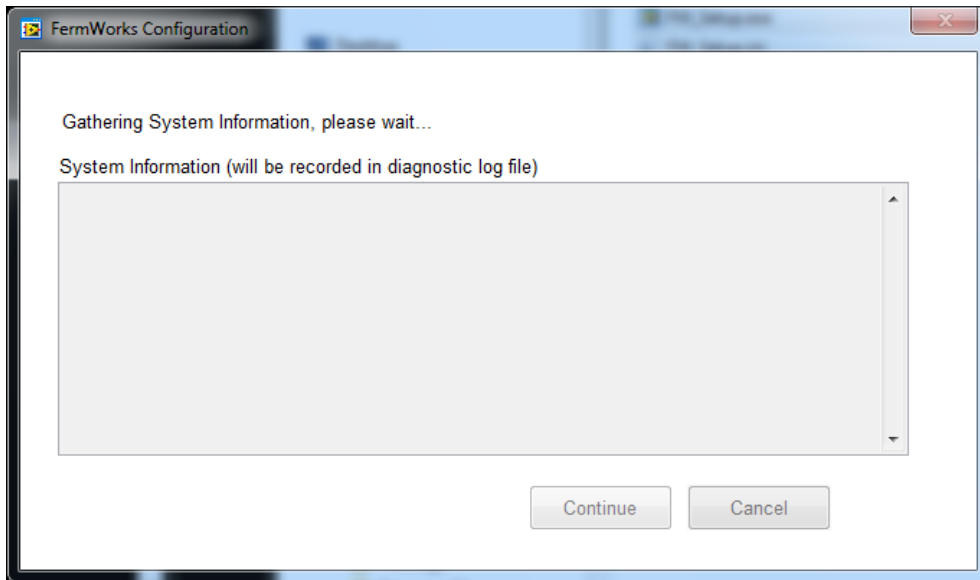


Figure 2: FermWorks Configuration: Gathering system information , please wait

You might be asked to allow changes to your computer, as shown in Figure 3. Click Yes.

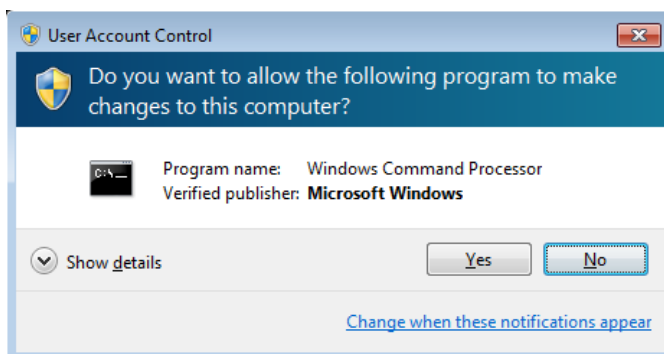


Figure 3: Allow changes: Click Yes

When ready for configuration, the window changes to look like Figure 4. Click the Continue button.

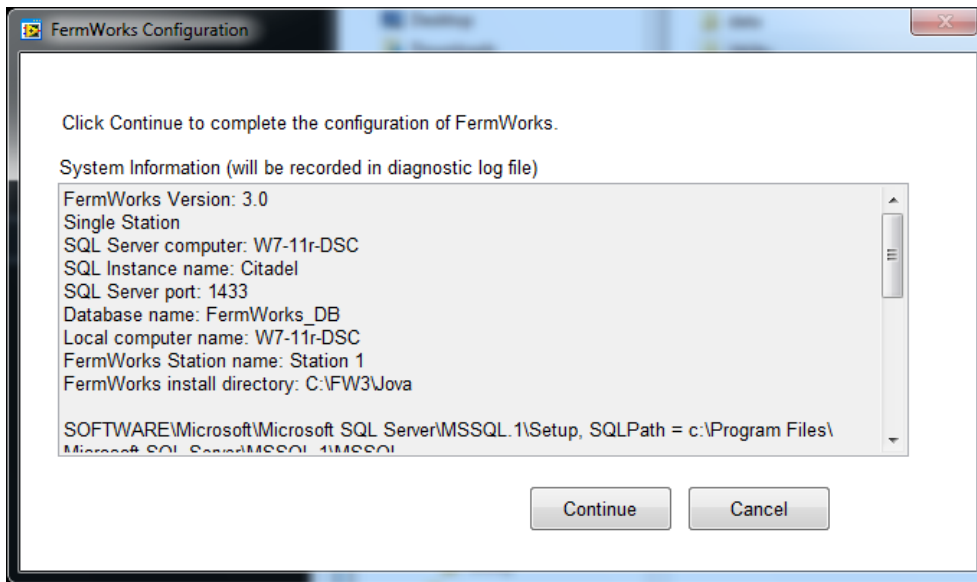


Figure 4: FermWorks Configuration: Click Continue

Getting Started



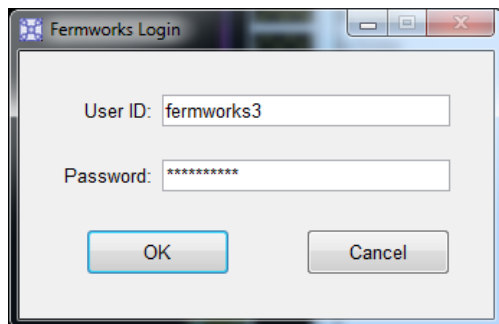
Run FermWorks by double-clicking its shortcut icon on the desktop.

The following section will give you a tour to help you become familiar with the main features of FermWorks. All FermWorks functionality and its many displays are described in more detail in the FermWorks User Manual, that you can open by selecting **FermWorks Help** from the **Help** menu.

1. Log in

FermWorks has its own users and security feature, separate from Windows users, so that facilities that need a high level of security can enable and disable selected FermWorks functionality for individual users or user groups, while facilities or single users without that concern may make all functionality accessible.

In the FermWorks demo, there is a pre-configured user with access to all demo functionality. Select **Login** from the **File** menu and enter "fermworks3" for both the user name and password.



2. View Live Data

The **Overview** display is the main display in FermWorks. It can show three different groups (datasets) of current process values in tables, with the third dataset also plotted on a graph as data are acquired.

In the dropdown lists under **Upper Datasets**, select "Basic Process Values" for one, and "Most Tags" for the other. For **Lower Dataset**, select "Values and Setpoints."

Observe the data in the tables and graph. Some values in the tables will show they are in an alarm state with a colored background. The blinking red and yellow light at the right also indicates an alarm state. Click on it to see details, if you like.

3. Change Setpoints

The FermWorks demo simulates a response to setpoint changes for certain process values, or "tags." Select **Tag Value** from the **Process** menu. Select "Values and Setpoints" as the Dataset. As an exercise, change the pH target value (setpoint) by double-clicking on the line in the table showing "Reactor A :pH_CS." Enter 7 for **Tag Value** and click OK. Click the **Send** button to commit the change. Close the Tag Value window or move it to the side.

On the Overview graph, watch the pink dotted pH_CS setpoint plot move to the new value of 7, and the solid pink pH plot slowly drop in response.

4. View Historic Data

The Overview display shows *current* data, a snapshot of the process status in real time. To view *past* data, open the **Trends** display from the **Analysis** menu. This display shows one dataset in both table and graph form, and offers many more options for recalling historic data by date, by experiment name, or just by scrolling back in time.

There are other displays that show data from multiple experiments and/or multiple datasets, either independently (Trends Comparison, Trends Quad) or overlaid (Trends Overlay).

Take some time to investigate the features of these displays. Read more detailed information about these displays in the User Manual (**FermWorks Help**).

5. Run Experiments and Recipes

An experiment is the collection of data during a specified time period, often while running recipes to control the process. An experiment is composed of one or more cases, and each case can have a different bioreactor, or different recipes, or different recipe parameters, so that one experiment can include a variety of operating conditions.

This FermWorks demo has a few experiments and recipes already configured. These show just a small subset of the control functionality available. FermWorks includes a large library of control algorithms and data analysis functions that can be configured and expanded by users.

From the **Process** menu, select **Experiment >> Status**. The Experiment Status display shows all experiments that have been run (Completed), are running (Running), or are waiting to be run (Configured). Expand an experiment to see its cases, and expand a case to see which bioreactor and recipes it used.

Close the Experiment Status display when you are finished exploring it.

Switch to the Trends display to see the data collected during each experiment. On the Trends display, select an experiment and dataset pair from the following:

Experiment "Dual-Reactor Ramping Example" with Dataset "DO2 Tags"

Experiment "Dissolved Oxygen Example" with Dataset "Most Tags"

Experiment "Ramping Example" with Dataset "Values and Setpoints"

After selecting the Experiment and Dataset, click the **Zoom to Experiment Time** button to the right of the graph, outlined here in red.



Now you can see the process values as they changed over the course of the experiment.

To configure a new experiment, select **Experiment** >> **Configure** from the **Process** menu. The easiest way to create a new experiment is to copy a similar existing experiment. Select "Dual Reactor Ramping Example" from the Experiment list and click the copy button, outlined here in red.



The new experiment will be named "Dual Reactor Ramping Example 1" by default, but you can enter any name you like. Change the recipe's "Stop Value" parameters in the lower-right table to 7 for pH and 50 for DO2. Click OK to close the Experiment Configuration display.

Open the Experiment Status display again. The new experiment is configured but has not yet been run, so you will find it listed under Configured Experiments. (If you do not see it, select **Refresh** from the **Edit** menu.) Click on the experiment's name to select it, then select **Start** from the **Experiment** menu. After the experiment initializes and starts, it will be listed under Running Experiments, and you can expand it there to watch the progress of the recipes. At the same time on the Trends display, select the experiment and the "DO2 Tags" dataset to watch the process data change as the experiment's recipes control the setpoints. Notice that the pH and DO2 ramps use the modified stop value parameters.

After the recipes have finished (or at any time), click on the experiment name in the Experiment Status display, then select **Stop** from the **Experiment** menu.

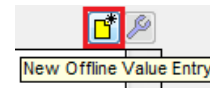
To modify a recipe or create a new one, select **Recipe** from the **Process** menu to open the Recipe Configuration display. Take a look at the example recipes, clicking on the various Recipe Steps and Inputs / Outputs to see how they are configured. Refer to the User Manual (**FermWorks Help**) to learn more about recipes.

Often, more experienced researchers configure experiments and recipes as part of process development work, and lab technicians run those preconfigured experiments. In a full FermWorks system, the users and security feature could be used to grant access to configuration displays for the researchers but not for the technicians.

6. Enter Offline Values

Most process values in FermWorks are online measurements from a sensor or instrument connected to the computer, such as pH and temperature, that are logged continuously as long as FermWorks is running. Other process values can be calculated from these measurements, such as the average pH or the rate of change of dissolved oxygen, and also logged continuously. Discrete values that cannot be measured directly, such as cell density as observed with a microscope, are called Offline Values and may be entered manually. All of these different kinds of process values can be displayed together in tables and on graphs, such as those on the Overview and Trends displays, and in reports.

To enter or modify offline values, select **Offline Values** from the **Process** menu. Select the experiment "Ramping Example" and you will see the values that were entered for the three Offline tags. Click the **New** button, outlined here in red, to open a dialog where you can enter more values.



First, change the **Sample Time** to 03/25/2013 01:45 PM. Next, enter values for each of the three offline tags, such as those shown below, and click OK. You will see the new values listed in the table on the Offline Value display, and if you open the Trends display and select the "Ramping Example" experiment and the "Most Tags" dataset, you will see those values on the graph.

For more about Offline Values, refer to the User Manual (**FermWorks Help**).

Sample Time	
03/25/2013	
01:45 PM	
Offline Data Entry	
Tag	Value
Bioreactor A :Offline 1	40
Bioreactor A :Offline 2	25
Bioreactor A :Offline 3	50

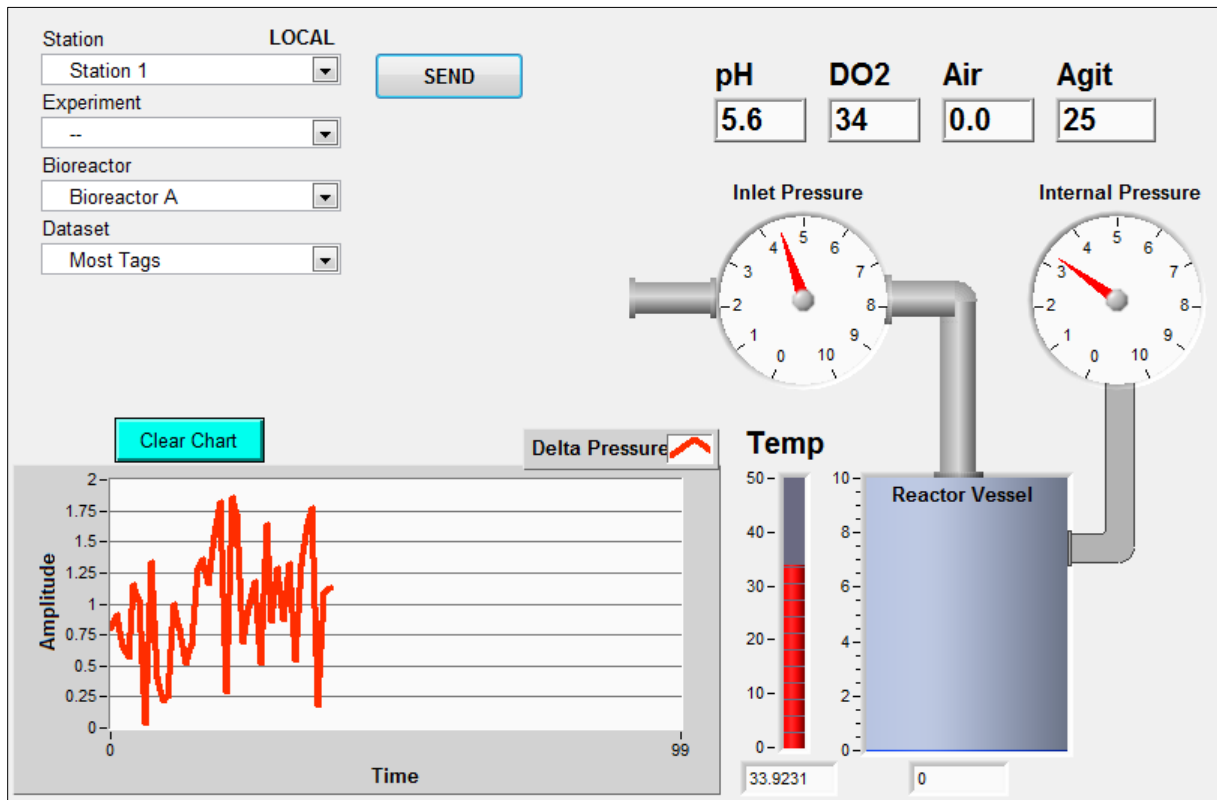
7. Generate a Report

Data collected during an experiment can be viewed and exported in standard spreadsheet (tab-delimited) format with the **Report Generation** display, in the **Analysis** menu. Any number of different reports can be configured to include different process values and calculations. Select an experiment from the list, and then select the report named "Simple PV CS." Click the Generate button to create this pre-configured report of some basic tags and their setpoints at 5-second intervals. You could save the report data to a file by selecting **Export Data** from the **File** menu.

It is not *necessary* to export the data to a file because FermWorks stores all data securely in a database, which can be archived automatically. Also, most common data analysis functions can be done directly in FermWorks. However, it can be useful sometimes to export data for import into other software systems.

8. View a Custom Display

If you would like to view your process data in a different way, perhaps using graphics to show the layout of your specific process, you can add a custom display to FermWorks. Select **Sample Display** from the **Analysis** menu to see an example of a custom display, as shown below. Creating a custom display is beyond the scope of this demo, but you can read about it in the User Manual (**FermWorks Help**).



What's Next?

Continue to explore the features of FermWorks with the help of the User Manual (**FermWorks Help**). Try out other displays, create a new dataset, or take a look at the configuration of a bioreactor. Let us know what kinds of devices and analytical instruments provide the data for your process, and we can help you integrate all of them into one coherent data management and control system with FermWorks.



Contact Jova Solutions at any time during or after the demo period to request a FermWorks quote to get started with real data management and process control.

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