Profix

Microprofiling-Software for
Microsensor Measurements

Instruction Manual

Version 4.2
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pyro science
exploring the microworld

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1 Introduction

1.1 System Requirements

- PC with Windows 2000/ XP/ Vista (XP or Vista recommended)
- Processor with >1.8 GHz
- 200 MB free hard disk space
- Motorized micromanipulator from Pyro Science (e.g. *Micromanipulator MU1*), requires USB-port
- Microsensor modules from Pyro Science:
  - *Microx TX3-USB* (optical oxygen microsensor), requires USB-port
  - *pH1 micro-USB* (optical pH microsensor), requires USB-port
  - *Dual Channel Reader DCR16* (data acquisition module with 2 voltage inputs), requires USB-port

1.2 General Features of Profix

Profix is a program for automated microsensor measurements. It can read data from two different microsensor modules. In addition, Profix can control motorized micromanipulators from Pyro Science. The central feature of the program are automated microprofile measurements. The user defines the (i) starting-depth, (ii) the end-depth, and (iii) the step size of the desired micro-profile, thereafter the computer will control the complete microprofiling process. The timing-schemes can be adjusted in detail. Automated long-term measurements can easily be set up (e.g. performing a microprofile measurement every hour for several days). If the micromanipulator is additionally equipped with a motorized x-axis (e.g. MUX2), Profix can also perform automated transects measurements. Basic features of the program are:

- Strip chart indicators for the indication of actual microsensor readings
- Microsensor calibration
- Manual motor control
- Manual data acquisition
- Logging at defined time intervals
- Fast microprofiling
- Standard microprofiling
- Automated transects
- Adjustable timing schemes
- Inspection of old data files

2 Safety Guidelines

PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE STARTING TO WORK WITH THIS PRODUCT

- If there is any reason to assume that the instrument can no longer be employed without a risk, it must be set aside and appropriately marked to prevent any further use.
- The user has to ensure the following laws and guidelines:
  - EEC directives for protective labor legislation
  - National protective labor legislation
  - Safety regulations for accident prevention

THIS DEVICE MAY ONLY BE OPERATED BY QUALIFIED PERSONAL:

- This device is only intended for use in the laboratory by qualified personal according to this instruction manual and these safety guidelines
- Keep this product out of the reach of children
- This product is not intended for medical or military purposes

3 Installation

3.1 Software installation

Insert the Pyro Science CD into the CD/DVD-drive of your computer or download the newest installer package from http://www.pyro-science.com. Start the installation program "setup.exe" in the folder "Installer Profix". Follow the installation guidelines. Your operation system might give warnings about "unregistered installation software" during the installation process. Ignore these warnings and resume the installation process by clicking "continue anyway".

IMPORTANT

Under Windows 2000/XP: Always perform the installation in the administrator mode!

The installation adds a new program group "Pyro Profix" to the start-menu, where you can find the program Profix. Additionally, a shortcut is added to the desktop.

3.2 Assembling the measuring setup

A standard setup of a microprofiling system consists of (i) a motorized micro-manipulator and (ii) one or two microsensor modules from Pyro Science. In the following sections you can find instructions for integrating the different components into the microprofiling setup.

3.2.1 Micromanipulator MU1 and MUX2

Read carefully the instruction manual following with the Micromanipulators MU1 and MUX2, which explains their assembly, manual operation, and cabling. Before connecting the micromanipulator to the power supply, ensure that the manual control knobs on the motor housings are turned into their center positions (feel the slight detent!). Otherwise the motors would immediately start moving when connecting the power supply! After Profix is started, the manual control knob is by default deactivated, but can be again manually activated within the program.

IMPORTANT

First install Profix before connecting the USB cable of the micromanipulator MU1 for the first time to the computer!

It is important that you **first** install Profix **before** connecting the USB cable for the first time to the computer. So, if the Profix installation was successful, just connect the USB cable to the PC which will then automatically install the correct USB-drivers.

3.2.2 Microx TX3-USB

The Microx TX3-USB is a compact microsensor module for optical oxygen microsensors. It is recommended to read carefully the instruction manual following with the Microx TX3, before integrating it into the microprofiling setup. A simple PC-software for calibration and data logging is included with the Microx TX3 package (based on RS232 interface). It is recommended that you get accustomed to the Microx TX3 by using this software

IMPORTANT

First install Profix before connecting the USB cable of the Microx TX3-USB for the first time to the computer!

(follow the instruction manual of the TX3). However, for the operation with Profix, this software is principally not required and need not to be installed.

It is important that you **first** install Profix **before** connecting the USB cable for the first time to the computer. So, if the Profix installation was successful, just connect the USB cable to the PC which will then automatically install the correct USB-drivers.

3.2.3 Dual Channel Reader DCR16

The Dual Channel Reader DCR16 provides an interface between the PC and voltage signals from microsensor meters. Up to two microsensor signals in the range of ±10 V are read at a maximum precision of 0.1 mV into the PC. An integrated hardware low-pass filter (cut-off frequency 10 Hz) removes possible interferences from the mains frequency 50/60 Hz. The DCR16 is intended for microsensor meters which do not possess a built-in PC interface.

IMPORTANT

First install the DCR16 driver software before connecting its USB cable for the first time to the computer!

It is important to install first the DCR16 driver software on the PC, before connecting it for the first time to the USB-port of the PC. Please follow the installation instruction following with the DCR16.

3.2.4 pH1 micro-USB

The *pH1 micro-USB* is a compact microsensor module for optical pH micro-sensors. It is recommended to read carefully the instruction manual following with the *pH1 micro*, before integrating it into the microprofiling setup.

IMPORTANT

First install Profix before connecting the USB cable of the *pH1 micro-USB* for the first time to the computer!

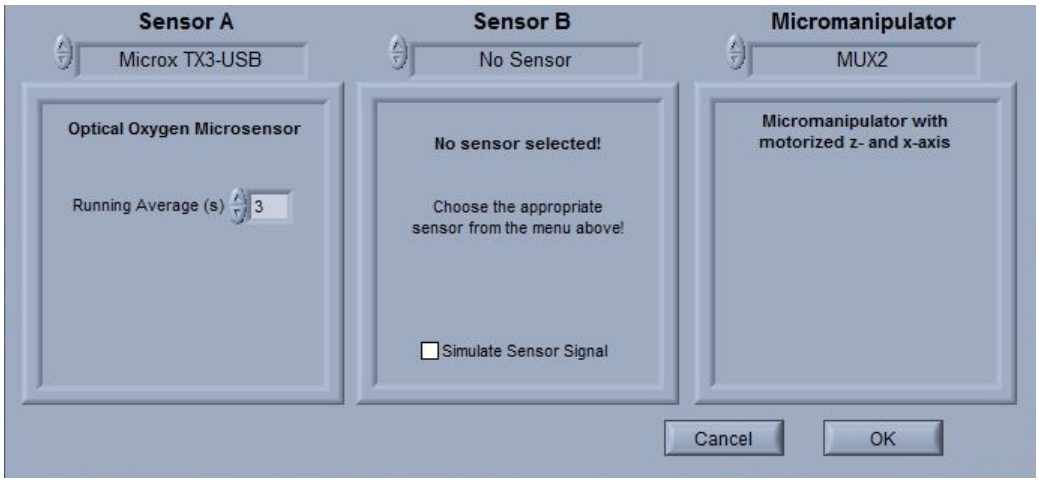
It is important that you **first** install Profix **before** connecting the USB cable for the first time to the computer. So, if the Profix installation was successful, just connect the USB cable to the PC which will then automatically install the correct USB-drivers.

4 Operation instructions

Remark for the following sections: Words written in **bold** designate elements within the Profix user interface (e.g. button names).

4.1 Starting of Profix and Settings

After starting Profix the settings in the following window have to be adjusted:



Profix reads up to two microsensor signals, which are designated within the program as sensor A and sensor B. In settings window different microsensor modules can be selected under **Sensor A** and **Sensor B**. For each sensor the **Running Average** has to be adjusted. The running average defines the time interval in seconds over which the sensor signal is averaged. If only one microsensor module will be used, just leave the one channel (e.g. Sensor B) as "No Sensor".

On the right side of the window, the settings for the motorized micromanipulator can be found. Select the appropriate **Micromanipulator**. **Angle** is the angle in degrees between the microsensor and the surface normal of the sample under investigation (not available for MUX2). If the microsensor penetrates the surface perpendicularly, this value is 0. All depths used by Profix are real depths inside the sample measured perpendicularly towards the surface. The actual distances the motor has to move are calculated by correcting the real depths with the value of **Angle**. For example if the microsensor penetrates the sample with an angle of 45° and the user wants to move the microsensors 100 µm in depth, the motor actually moves the sensor 141 µm along its longitudinal axis.

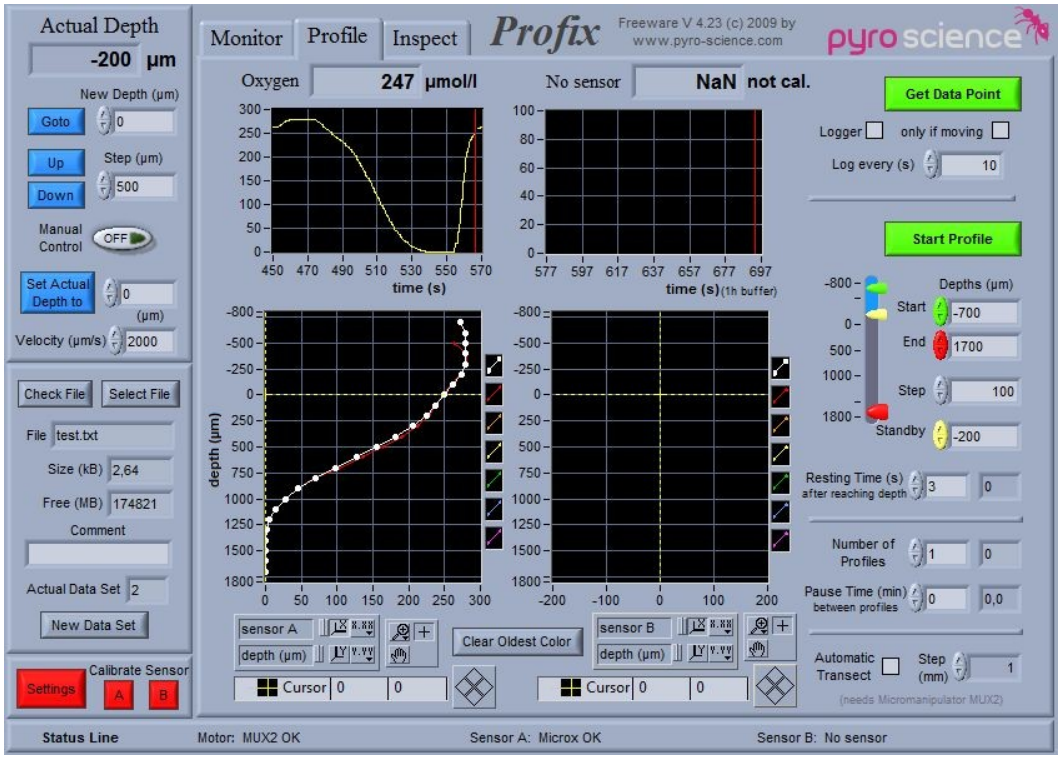
For testing and training purposes it is possible to operate Profix without any equipment attached. Just select "No Sensor" under **Sensor A** and **Sensor B** and "No Motor" under **Micromanipulator**, and check the **Simulate Sensor Signal** and **Simulate Motor** boxes. This will simulate oscillating sensor signals, which might be helpful for performing some test runs with Profix.

After pressing **OK** in the settings window, a file has to be selected in which the data of the microsensor measurements should be stored. If an existing

file is chosen, the user is asked either to append new data to the file or to overwrite it completely. Finally, the main window of Profix shows up. The settings can be adjusted any time by pressing the **Settings** button in the main window. When closing Profix, the settings are automatically saved for the next start-up.

4.2 Overview of Profix

The main window of Profix is divided into several areas. The area to the left is always visible and contains the manual control buttons for the micromanipulator (blue buttons), the file handling buttons (grey buttons), and the buttons for opening the settings and calibration windows, respectively (red buttons). The area to the right can be switched between three tabs. The **Monitor** tab shows two chart recorders indicating the actual readings of the two channels. The **Profile** tab is used for manual data acquisition, logging in defined time intervals, fast and standard profiling. Finally, already acquired data sets can be reviewed in the **Inspect** tab.



4.3 Manual Motor Control

All depth values indicated in the manual motor control box represent the real depth in the sample (see section 4.1 under **Angle**) and are always given in units of micro-meters. **Actual Depth** indicates the current depth position of the microsensor tip. If **Goto** is pressed, the microsensor will be moved to a new depth chosen in **New Depth**. If either **Up** or **Down** is pressed, the microsensor will be moved one step up or down, respectively. The step size can be set in **Step**.

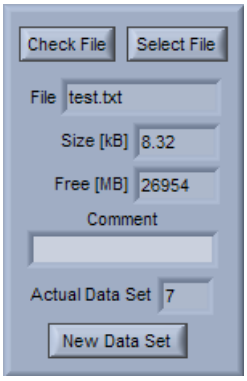
While the motor is moving, the background of the **Actual Depth** indicator turns red and a red **STOP Motor** button appears. The motor can be stopped any time by pressing this button. The velocity of the motor can be set in **Velocity** (range 1-2000 µm/s for MU1 And MUX2). The maximum speed should only be used for traveling larger distances. For the actual microprofiling measurements speeds around 100-500 µm/s are recommended.

A new depth reference point can be chosen by entering a depth value into the control box next to the **Set Actual Depth** button. After pressing this button, the **Actual Depth** indicator will be set to the entered value. A convenient way to establish a reference point is to move the microsensor tip to the surface of the sample using the **Up** and **Down** buttons with relevant step sizes. When the sensor tip is touching the surface, type "0" next to the **Set Actual Depth** button and click this button. The **Actual Depth** indicator will be set to zero. Assuming also that the correct value for **Angle** was entered in the settings (see section 4.1), all other depth values in the program are now understood as real depths in the sample.

The **Manual Control** switch allows to enable or disable the manual control knob on the motor housings. These control knobs allow an easy way, for a fast rough positioning of the motors. The maximum speed (control knob fully turned to left or right) is still given by the settings in **Velocity.** Profix will give an acustical warning (beeps in 1 second intervals), if a motor is operated this way. During a profiling process, the manual control knob is by default deactivated.

REMARK for **Micromanipulator MUX2:** The program elements described in this section control only the motor of the z-axis (up-down). In order to move the motor of the x-axis (left-right), enable the **Manual Control** switch and use the manual control knob on the motor housing.

4.4 File Handling



All data points acquired by Profix are always saved into a text file with the extension ".txt". This file can be read by common spreadsheet programs like Excel™. As separator characters *tab* and *return* are used. The current file name is indicated in **File**. Additionally, Profix generates in the same directory a binary data file with the extension ".pro". It is important that the text file and the binary data file remain within the same directory; otherwise the file cannot be re-opened in a later Profix-session. You can choose a new file by pressing on **Select File**. If an already existing file is selected, a dialog box asks, whether to append or to overwrite the existing data file. The size in kilobytes of the actual file is indicated in **Size**, while the space left in megabytes on the volume (e.g. hard disk C:) is indicated in **Free**. Under **Comment** the user can type in any text during the measurements. This text will be saved together with the next data point acquired by Profix.

IMPORTANT

Always keep the text file (*.txt) and the binary data file (*.pro) in the same directory!

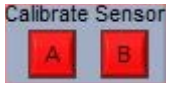
The data points saved in a file are separated in successive data sets by a header in the beginning of each data set. The header contains channel descriptions, date, time, data set number, and current parameter settings of Profix. The actual data set is indicated in **Actual Data Set**. You can manually generate a new data set by pressing **New Data Set**. The program generates automatically a new data set when a new profile is acquired by the standard profiling process. For a detailed discussion of data points and data sets refer to section 4.7.1.

If a channel is calibrated, the calibrated data are saved in separate columns. These columns are filled with "NaN" ("not a number") as long as the channel is not calibrated. The uncalibrated data are always saved.

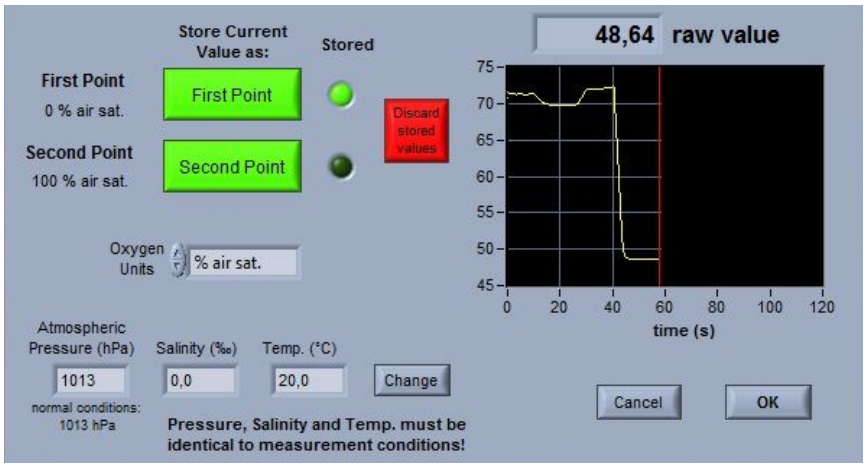
By pressing **Check File** a window is opened wherein the current data file is viewed as it would appear in a common spreadsheet program. Maximally the last 200 lines of the data file are shown. The content of the window will be updated each time **Check File** is pressed again.

4.5 Sensor Calibration

The calibration procedure is started by pressing the calibration buttons **A** or **B** for sensor A or sensor B, respectively. A separate calibration window will be opened. The following subsections will explain the calibration procedure for the different microsensor modules. The actual calibration is automatically saved on the hard disk if Profix is terminated. At the next startup Profix will ask, whether it should retrieve the last calibration.



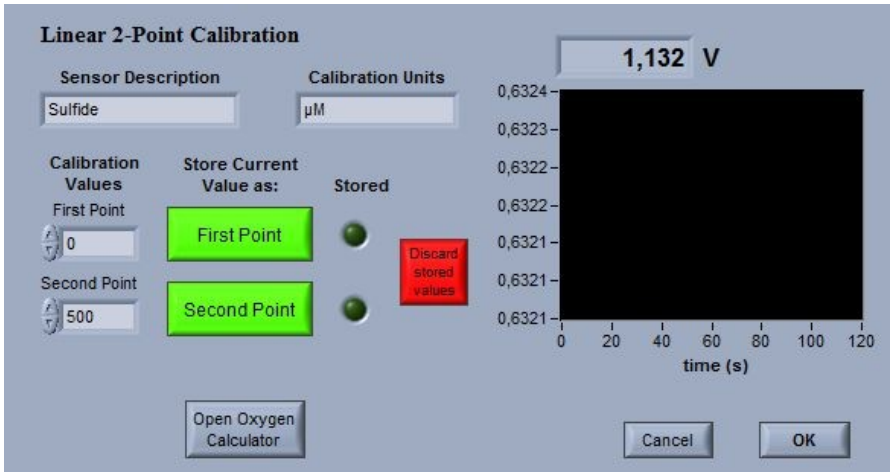
4.5.1 Calibration of Microx TX3-USB



The calibration of oxygen microsensors has to be performed under the same environmental conditions as found in the sample, where the actual measurements should be performed. Specifically, the atmospheric pressure, the salinity and the temperature must be identical to the sample conditions. Select the **Oxygen Units** for the calibrated values (**% air sat.**, **mg/l**, or **µM**). If units of mg/l or µM are chosen, it is especially important to adjust the values for the **Atmospheric Pressure**, the **Salinity** and the **Temperature**, otherwise the oxygen values will not be calculated correctly. Press **Change** for adjusting these values.

The current uncalibrated readings (**raw value**) of the microsensor are shown in a chart recorder. The microsensor is calibrated by a two-point-calibration at 0% and 100% air saturation. The sensor is successively put into an oxygen free (0%, e.g. N_2-bubbled water) and an air-saturated (100%, air-bubbled water) calibration liquid. On the chart recorder can be seen, when the signal achieves a stable reading. By pressing **First Point** or **Second Point**, the current sensor reading is stored as a calibration point for 0% and 100% air sat., respectively. The bright green indicators next to the calibration buttons indicate, that a calibration value has been **Stored**. By pressing **Discard Calibration**, the actual calibration can be deleted and all readings in Profix for the respective sensor will be again uncalibrated values.

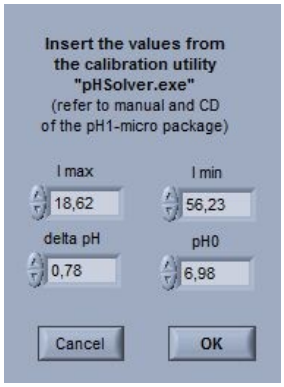
4.5.2 Calibration with the Dual Channel Reader DCR16



Microsensors connected to the Dual Channel Reader DCR16 are calibrated by a linear two-point calibration. Insert an appropriate **Sensor Description** and the **Calibration Units.** Chose two calibration points and insert their values under **First Point** and **Second Point.** The microsensor is successively put into the two calibration liquids. The chart recorder indicates when the signal achieves a stable reading. By pressing **First Point** or **Second Point**, the current sensor reading is stored as a calibration point. The bright green indicators next to the calibration buttons indicate, that a calibration value has been **Stored**. By pressing **Discard stored values**, the actual calibration can be deleted and all readings in Profix for the respective sensor will be again uncalibrated values.

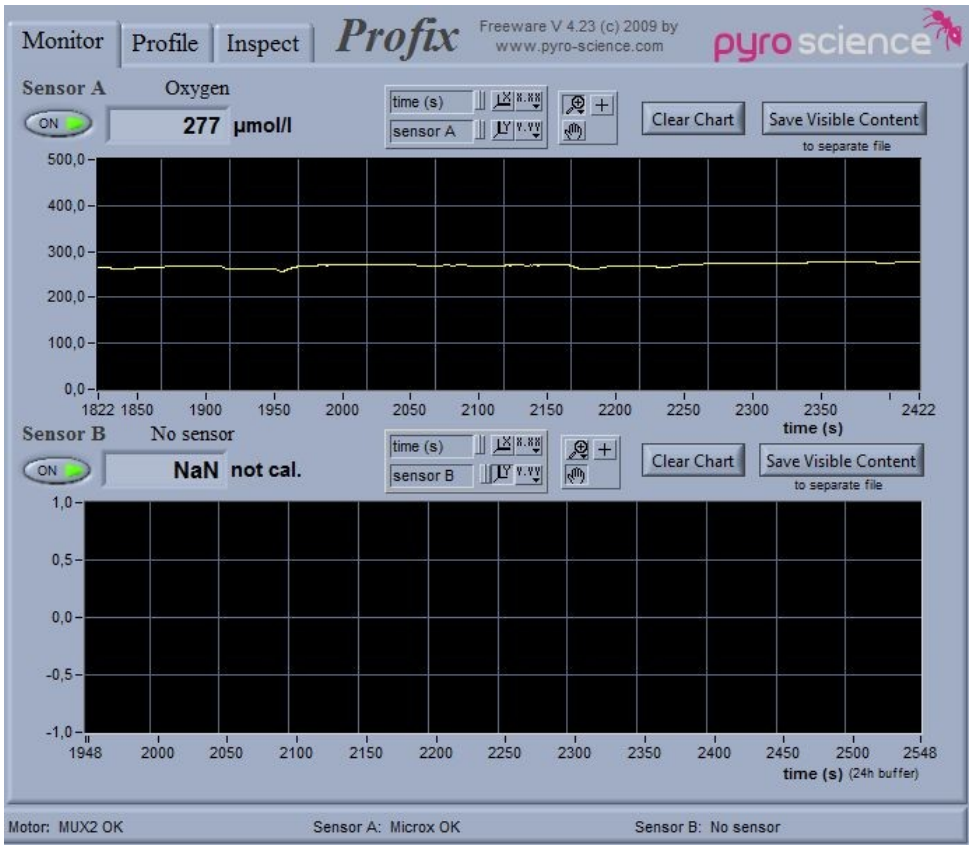
4.5.3 Calibration with the pH1 micro-USB

Please refer to the manual of the *pH1 micro*, where the calibration procedure is explained in detail. With help of the included PC-software "pHSolver.exe" the calibration values **I max**, **I min**, **delta pH** and **pH0** are determined. Insert these values in the calibration window in Profix.



4.6 The Monitor Tab

The Monitor tab contains two chart recorders for both sensors A and B. The actual reading of each sensor is indicated in the numerical display above the chart recorders. Depending on the calibration status it is given in **not cal.** units or in calibrated units. Each recorder can be switched on and off by pressing the oval **ON/OFF** button to the left side. The content of the chart recorders can be deleted by pressing the **Clear Chart** bottom.



There are several possibilities to change the range of the charts. The upper and lower limits of both axes can be changed by clicking with the mouse onto the limit tags, whereupon a new value can be typed in. Additionally, a tool panel is positioned above the chart. The buttons or provide auto-scaling for the x- or y-axis, respectively. This feature can also be permanently activated by clicking on the switches. The buttons and can be used for changing the format, precision, or the mapping mode (linear, logarithmic). The button offers several zoom options. After clicking the button , the user has the possibility to click onto the chart and move the whole area while keeping the mouse button pressed. During recording, the chart recorders will automatically adjust the x-range in such a way that the actual reading is visible. It might prevent the user from inspecting older parts of the chart. This problem can be avoided if the chart recorder is momentarily switched off by the oval **ON/OFF** buttons.

NOTE

The data indicated in the chart recorders are not automatically saved to the harddisk.

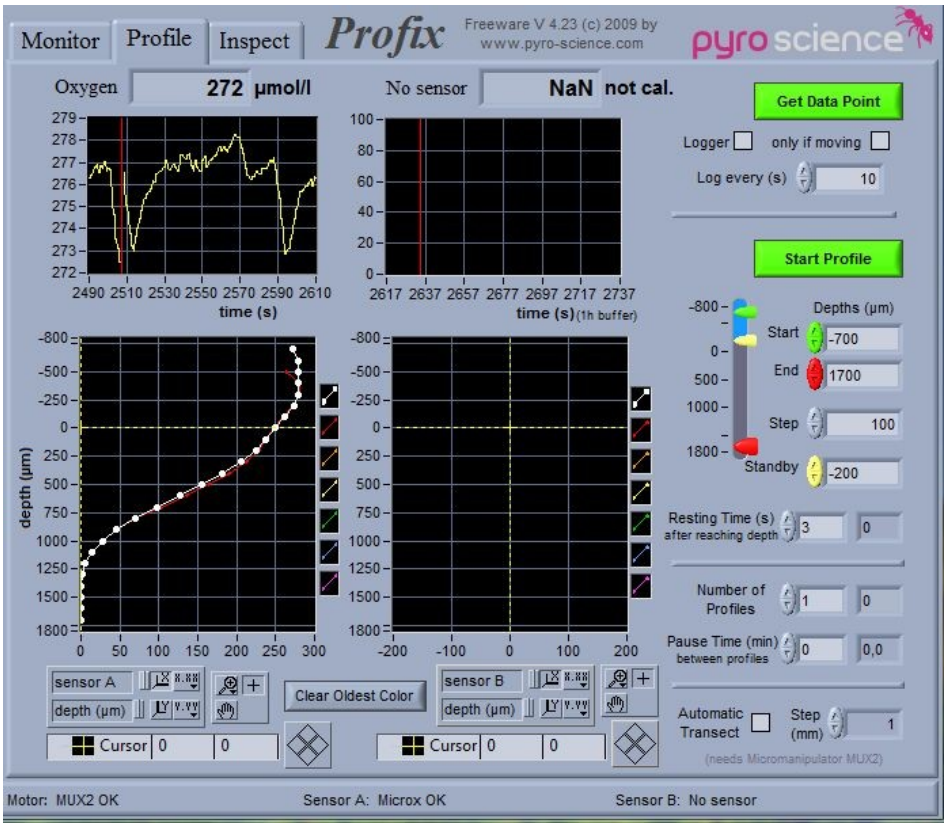
The sensor readings shown in the chart recorders are not automatically

saved in the data files. For saving data points periodically, refer to section 4.7.3. However, it is possible to save the actual visible content of each chart recorder by clicking on **Save Visible Content**. The data are saved in two columns in a text file selected by the user. The text-file can be read by common spreadsheet programs (separators: *tab* and *return*). The first column gives the time in seconds, the second column the channel readings.

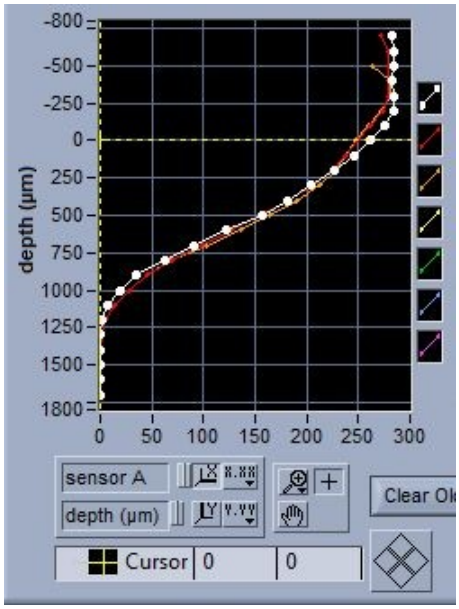
By clicking with the right mouse button onto the black part of the chart recorder a pop-up menu appears. Several of the functions in this pop-up menu are useful. **Clear Chart** removes all old data shown in the chart recorder. Under **Update Mode** it is possible to select three different modes for the graphics updating, when the visible part of the chart recorder is filled up. In the first mode the visible part is continuously scrolled. The second mode clears the chart recorder and starts again at the beginning, whereas the third mode also starts at the beginning but overwrites the old data. The actual position is indicated by a vertical red line. The items **AutoScale X** and **AutoScale Y** function in exactly the same manner as the autoscaling switches in the tool panel described above.

4.7 The Profile Tab

The **Profile** tab is used for the actual microprofiling. It contains at the top a small version of the chart recorders already described for the **Monitor** tab in the last section. The content of the chart recorders is not saved in the data files. In contrast, the two profile graphs at the bottom show all data points, which are saved, into the data files. To the right of the **Profile** tab all control elements are located which are used for manual data acquisition, data logging, fast profiling, standard profiling and automated transects.



4.7.1 About Data Points and the Profile Graphs



Profix provides four different possibilities to acquire data: manual data acquisition, logging at defined time intervals, fast and standard profiling. All four options save the acquired data as "data points" into the data files. Each data point is saved in a separate row of the data file, together with an optional comment written by the user in **Comment** during the measurement. The data points are grouped into successive "data sets".

The data points of the last recent 7 data sets are plotted in the profile graphs for sensor A and B, respectively. The y-axis refers to the depth position (µm), where the data points have been acquired. The x-axis refers to the sensor reading. The legend next to the profile graph defines the plot mode of each data set, where the uppermost entry refers to the actual data set. By clicking on an element in the legend a pop-up menu appears. The items **Common Plots**, **Color**, **Line Width**, **Line Style**, **Point style**, **Interpolation** can be used to change the appearance of the plotted data points (The items Bar Plot, Fill BaseLine, and Y-Scale are not appropriate to this application). If the graph becomes too crowded, the points of the oldest data set can be removed by clicking **Clear Oldest Color**. By repeatedly pressing this button all data sets except the current one can be removed. This operation does not effect the data file.

The scaling of the profile graph can be modified by the user as described for the chart recorders (see section 4.6). Additionally, a cursor is available inside the profile graph for reading precise values of data points. The actual position of the cursor can be read in the cursor control panel below the profile graph. In order to move the cursor, click onto the cursor button  in the tool panel. Now you can click onto the center of the cursor and drag it to a new position.

By clicking the cursor mode button  a pop-up menu appears. The first three items **Cursor style**, **Point style**, and **Color** can be used to alter the appearance of the cursor. The last two items of the pop-up menu are useful if the cursor is not within the visible part of the profile graph. If you click Bring to the cursor will be moved to the center of this window. Choosing **Go to cursor** will change the ranges of the two axes of the profile graph, so that the cursor appears in the center.

An additional possibility for moving the cursor is the diamond shaped button. It allows precise single step movements of the cursor in all four directions. 

4.7.2 Manual Data Acquisition

The simplest data acquisition is performed by pressing the button **Get Data Point**. One data point is read from each sensor. It is saved directly into the data files and is plotted into the profile graph. A new data set can be created by pressing the button **New Data Set** (see section 4.4).

4.7.3 Logging at Defined Time Intervals

If the **Logger** option is checked, data points will be acquired periodically. The period in seconds has to be set in **Log every (sec)**. The minimum period is 1 second. Besides the periodical acquisition the action of the logger is precisely the same as the action of the Get Data Point button (see section 4.7.2).

4.7.4 Fast Profiling

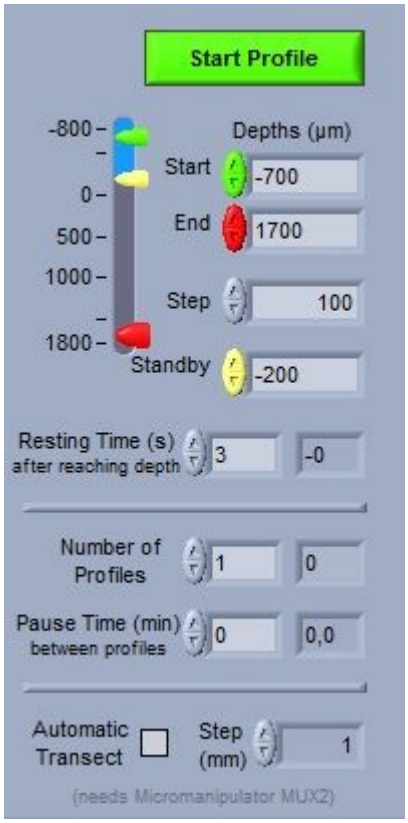
NOTE

Precise measurements of profiles should preferably be performed with the standard profiling function as described in the section 4.7.5

If both the **Logger** and the **only if moving** option are marked, Profix acquires data points (as described in section 4.7.3) only while the motor is moving. This option can be used for acquiring a fast profile. A fast profile is acquired by continuously moving the microsensor tip through the sample while sampling data points in defined time intervals. It should be emphasized that the acquired data are not precise for two reasons. The position information for each data point is not well defined due to the time delay of the data transmission from the microsensor module. Secondly, the data acquisition takes place while the sensor tip is moving, so it is not really a point measurement. Generally the quality of the fast profiling is increased by lowering the velocity of the motor.

An example for fast profiling is given in the following: A profile between -500 µm and 2000 µm depth in steps of 100 µm should be acquired. First move the microsensor to a depth of –500 µm by using the **Goto** function of the manual motor control. Adjust the **Velocity** of the motor to 50 µm/s and set a logging interval of 2 seconds in **log every (sec)**. These values will yield a fast profile with 100 µm steps between the data points. Now check first the **only if moving** box, followed by checking the **Logger** box. Use the **Goto** button again for moving the microsensor to the depth of 2000 µm. The motor will start moving and the fast profile will be acquired. The acquired data points will be directly viewed in the profile graph. If you want the fast profile to be saved as a separate data set, remember to press **New Data Set** (see section 4.4) before starting the profiling.

4.7.5 Standard Profiling



The lower right area of the **Profile** tab contains all controls for the standard profiling process, i.e. the motor moves the microsensor stepwise through the sample and acquires at each step one or more data points. All depth units are given in micrometer. The following parameters have to be defined before starting a profile. **Start** is the depth where the first data points for the channels A and B are acquired. **End** is the depth where the profiling process finishes. **Step** defines the step size of the profile. When a profile is finished, the microsensor tip is moved to the **Standby depth**.

Because microsensors have a certain response time, the **Resting Time after Reaching Depth** has to be adjusted. It determines the time in seconds the microsensor tip rests after reaching a new depth, before the next data points is read. If several profiles should be acquired automatically, the appropriate **Number of Profiles** can be chosen. The microsensor tip is moved to the **Standby** depth between successive profiles. In **Pause Time** the resting time in minutes before the next profile is performed can be adjusted.

The profiling is started by pressing **Start Profile**. The profiling process can be followed by the five indicators with the dark gray background: The indicator to the right of **Number of Profiles** displays the actual profile number. The other two indicators act as "count-down" indicators, i.e. they show how much time is left of the resting time. The currently active resting time (i.e. either **Resting Time after Reaching Depth** or **Pause Time between Profiles**) is indicated by a red background of the respective "count-down" indicator.

A **STOP Profile** button and a **Pause** button appear during profiling. The profiling process can be at any time aborted by pressing **STOP Profile**. Pressing the **Pause** button causes the profiling process to halt, but it can be resumed any time by pressing the **Resume** button.

4.7.6 Automated Transects

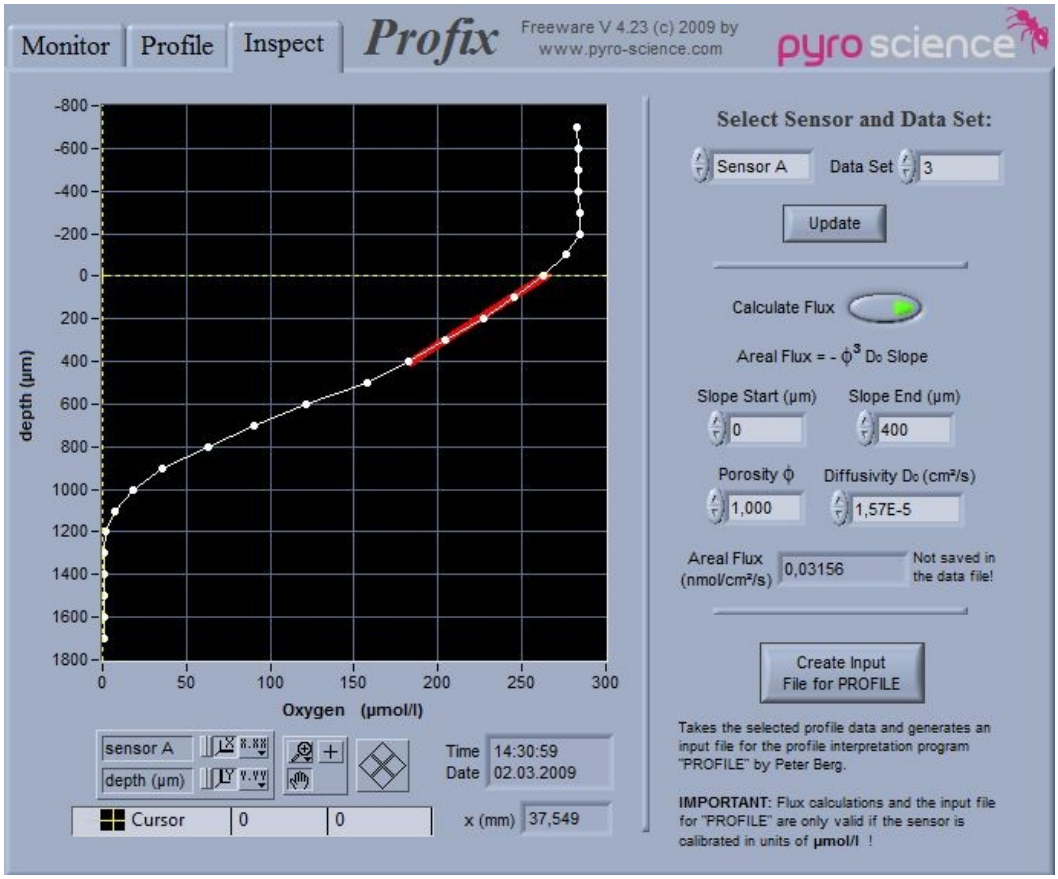
If the micromanipulator is equipped with a motorized x-axis (left-right, e.g. MUX2), Profix can acquire also automated transects. A transect consists of a series of microprofiles, where the x-position inbetween each microprofile is moved by a constant step. The following example explains how to acquire an automated transect across e.g. 10 mm with a step size of 2 mm:

1) Enable the **Manual Control** switch (see section 4.3) and use the manual control knob on the motor housing for adjusting the starting x-position of the microsensor. The automated transect will start at this x-position, which will be set to 0 mm in the saved data file.
2) Adjust the parameters of the single profiles as described in the previous section.
3) Check **Automatic Transect**.
4) Adjust **Step (mm)** to 2 mm.
5) Adjust **Number of Profiles** to 6 (corresponding to a total x-displacement of 10 mm for a step size of 2 mm)
6) Press **Start Profile**.

The single microprofiles of the transect are saved in separate data sets (see section 4.4). The x-position of each microprofile is written in the header of each data set.

4.8 The Inspect Tab

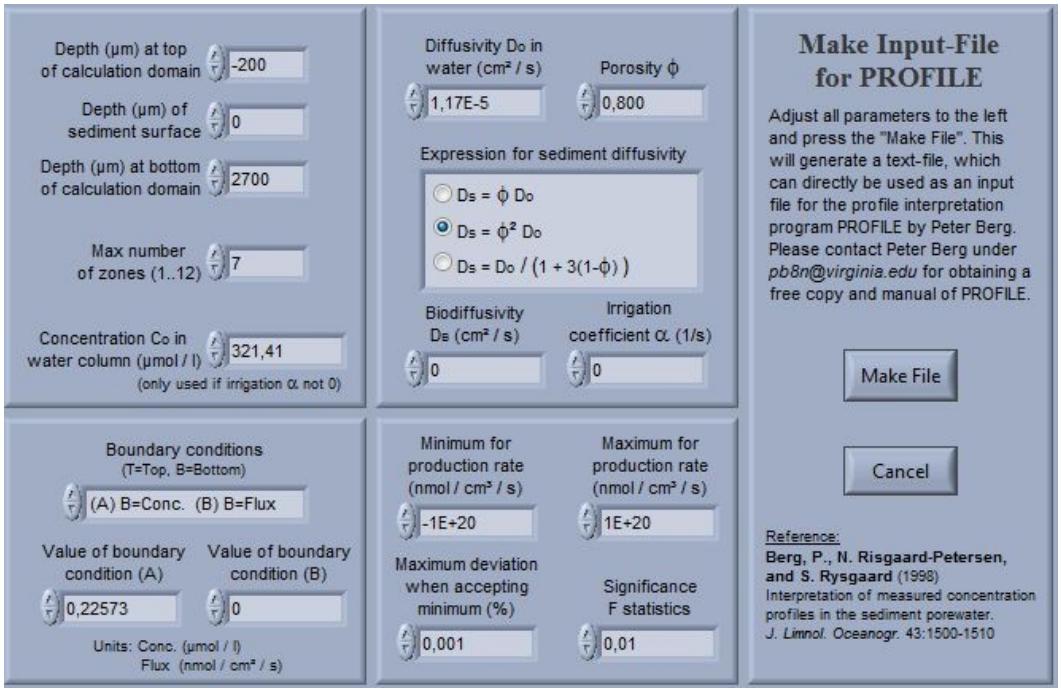
In the **Inspect** tab provides several options for reviewing and analysing acquired data sets. The data set, which should be plotted in the profile graph, is selected in **Sensor A/B** and **Data Set**. The scaling, range, cursor, etc. of the profile graph can be adjusted in the same manner as already described for the profile graphs in the **Profile** tab (see section 4.7.1). If older data files should be inspected, the user has to open the respective files by pressing the **Select File** button and choosing "append data file" (see section 4.4). Pressing the **Update** button will refresh the graphs after a new file has been



selected.

The inspect tab provides a simple way for calculating areal fluxes with help of a linear regression. Enter the depths for the **Slope Start** and the **Slope End** defining the depth interval of the linear regression. Click the **Calculate Flux** button and the result of the linear regression is shown in the plot as a thick red line. By adjusting the **Porosity** and the **Diffusivity Do** the calculated areal flux will be shown in **Areal Flux.** Note, that these calculations are NOT saved to the data file!

By pressing **Create Input File for PROFILE** it is possible to generate for the currently shown profile an input file for the profile analysis program "PROFILE" from Peter Berg:



Refer to the PROFILE manual for details about adjusting the parameters. Please contact Peter Berg under pb8n@virginia.edu for obtaining a free copy and documentation of his PROFILE-software.

5 Technical Specifications

System requirements	PC with Windows 2000/ XP/ Vista (XP or Vista recommended)
	Processor with >1.8 GHz
	200 MB free hard disk space
Updates	Updates can be downloaded under:
	http://www.pyro-science.com